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<b>UTILITY                  PATENT APPLICATION                  TRANSMITTAL</b>  <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Attorney Docket No.	ALI-050ACON1
	First Named Inventor	Gregory C. Burnett
	Title	FORMING VIRTUAL MICROPHONE ARRAYS...
	Express Mail Label No.	N/A

<b>APPLICATION ELEMENTS</b> <i>See MPEP chapter 600 concerning utility patent application contents.</i>	<b>ADDRESS TO:</b> Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
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1. <input type="checkbox"/> Fee Transmittal Form (PTO/SB/17 or equivalent) 2. <input checked="" type="checkbox"/> Applicant asserts small entity status. See 37 CFR 1.27 3. <input type="checkbox"/> Applicant certifies micro entity status. See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent. 4. <input checked="" type="checkbox"/> Specification [Total Pages 54] Both the claims and abstract must start on a new page. (See MPEP § 608.01(a) for information on the preferred arrangement) 5. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 17] 6. <input type="checkbox"/> Inventor's Oath or Declaration [Total Pages _____] (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e)) a. <input type="checkbox"/> Newly executed (original or copy) b. <input type="checkbox"/> A copy from a prior application (37 CFR 1.63(d)) 7. <input checked="" type="checkbox"/> Application Data Sheet * See note below. See 37 CFR 1.76 (PTO/AIA/14 or equivalent) 8. <input type="checkbox"/> CD-ROM or CD-R in duplicate, large table, or Computer Program (Appendix) <input type="checkbox"/> Landscape Table on CD 9. <input type="checkbox"/> Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. - c. are required) a. <input type="checkbox"/> Computer Readable Form (CRF) b. <input type="checkbox"/> Specification Sequence Listing on: i. <input type="checkbox"/> CD-ROM or CD-R (2 copies); or ii. <input type="checkbox"/> Paper c. <input type="checkbox"/> Statements verifying identity of above copies	<b>ACCOMPANYING APPLICATION PAPERS</b> 10. <input type="checkbox"/> Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 11. <input type="checkbox"/> 37 CFR 3.73(c) Statement [when there is an assignee] <input type="checkbox"/> Power of Attorney 12. <input type="checkbox"/> English Translation Document (if applicable) 13. <input type="checkbox"/> Information Disclosure Statement (PTO/SB/08 or PTO-1449) <input type="checkbox"/> Copies of citations attached 14. <input type="checkbox"/> Preliminary Amendment 15. <input type="checkbox"/> Return Receipt Postcard (MPEP § 503) (Should be specifically itemized) 16. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed) 17. <input type="checkbox"/> Nonpublication Request Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 18. <input type="checkbox"/> Other: _____ _____ _____ _____
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\*Note: (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 must be included in an Application Data Sheet (ADS).  
 (2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

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This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**Samsung v. Jawbone**  
**IPR2022-01321**  
**Exhibit 1002**

## Application Data Sheet

### **Cross-Reference to Related Applications**

This application is a continuation of U.S. Nonprovisional Patent Application No. 12/139,333, filed June 13, 2008, entitled "Forming Virtual Microphone Arrays Using Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No. 60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

### **Application Information**

<b>Filing Date::</b>	August 5, 2013
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<b>Title::</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>Attorney Docket Number::</b>	ALI-050ACON1
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**APPLICATION FOR UNITED STATES PATENT**

**FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL**  
**OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)**

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**FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)**

**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] This application is a continuation of U.S. Nonprovisional Patent Application No. 12/139,333, filed June 13, 2008, entitled "Forming Virtual Microphone Arrays Using Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No. 60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

**TECHNICAL FIELD**

[0002] The disclosure herein relates generally to noise suppression. In particular, this disclosure relates to noise suppression systems, devices, and methods for use in acoustic applications.

**BACKGROUND**

[0003] Conventional adaptive noise suppression algorithms have been around for some time. These conventional algorithms have used two or more microphones to sample both an (unwanted) acoustic noise field and the (desired) speech of a user. 20 The noise relationship between the microphones is then determined using an adaptive filter (such as Least-Mean-Squares as described in Haykin & Widrow, ISBN# 0471215708, Wiley, 2002, but any adaptive or stationary system identification algorithm may be used) and that relationship used to filter the noise from the desired signal.

[0004] Most conventional noise suppression systems currently in use for speech communication systems are based on a single-microphone spectral subtraction technique first developed in the 1970's and described, for example, by S. F. Boll in "Suppression of Acoustic Noise in Speech using Spectral Subtraction," IEEE Trans. on ASSP, pp. 113-120, 1979. These

techniques have been refined over the years, 30 but the basic principles of operation have remained the same. See, for example, US Patent Number 5,687,243 of McLaughlin, et al., and US Patent Number 4,811,404 of Vilmur, et al. There have also been several attempts at multi-microphone noise suppression systems, such as those outlined in US Patent Number 5,406,622 of Silverberg et al. and US Patent Number 5,463,694 of Bradley et al. Multi-microphone systems have not been very successful for a variety of reasons, the most compelling being poor noise cancellation performance and/or significant speech distortion. Primarily, conventional multi-microphone systems attempt to increase the SNR of the user's speech by "steering" the nulls of the system to the strongest noise sources. This approach is limited in the number of noise sources removed by the number of available nulls.

[0005] The Jawbone earpiece (referred to as the "Jawbone"), introduced in December 2006 by AliphCom of San Francisco, California, was the first known commercial 10 product to use a pair of physical directional microphones (instead of omnidirectional microphones) to reduce environmental acoustic noise. The technology supporting the Jawbone is currently described under one or more of US Patent Number 7,246,058 by Burnett and/or US Patent Application Numbers 10/400,282, 10/667,207, and/or 10/769,302. Generally, multi-microphone techniques make use of an acoustic-based Voice Activity Detector (VAD) to determine the background noise characteristics, where "voice" is generally understood to include human voiced speech, unvoiced speech, or a combination of voiced and unvoiced speech. The Jawbone improved on this by using a microphone-based sensor to construct a VAD signal using directly detected speech vibrations in the user's cheek. This allowed the Jawbone to aggressively remove noise when the user was not producing speech. However, the Jawbone uses a directional microphone array.

#### **INCORPORATION BY REFERENCE**

[0006] Each patent, patent application, and/or publication mentioned in this specification is herein incorporated by reference in its entirety to the same extent as if each individual patent, patent application, and/or publication was specifically and individually indicated to be incorporated by reference.

### BRIEF DESCRIPTION OF THE DRAWINGS

- [0007] **Figure 1** is a two-microphone adaptive noise suppression system, under an embodiment.
- [0008] **Figure 2** is an array and speech source (S) configuration, under an embodiment. The microphones are separated by a distance approximately equal to  $2d_0$ , and the speech source is located a distance  $d_s$  away from the midpoint of the array at an angle  $\theta$ . The system is axially symmetric so only  $d_s$  and  $\theta$  need be specified.
- [0009] **Figure 3** is a block diagram for a first order gradient microphone using two omnidirectional elements  $O_1$  and  $O_2$ , under an embodiment.
- [0010] **Figure 4** is a block diagram for a DOMA including two physical microphones configured to form two virtual microphones  $V_1$  and  $V_2$ , under an embodiment.
- [0011] **Figure 5** is a block diagram for a DOMA including two physical microphones configured to form  $N$  virtual microphones  $V_1$  through  $V_N$ , where  $N$  is any number greater than one, under an embodiment.
- [0012] **Figure 6** is an example of a headset or head-worn device that includes the DOMA, as described herein, under an embodiment.
- [0013] **Figure 7** is a flow diagram for denoising acoustic signals using the DOMA, under an embodiment.
- [0014] **Figure 8** is a flow diagram for forming the DOMA, under an embodiment.
- [0015] **Figure 9** is a plot of linear response of virtual microphone  $V_2$  to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. The null is at 0 degrees, where the speech is normally located.
- [0016] **Figure 10** is a plot of linear response of virtual microphone  $V_2$  to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. There is no null and all noise sources are detected.
- [0017] **Figure 11** is a plot of linear response of virtual microphone  $V_1$  to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. There is no null and the response for speech is greater than that shown in Figure 9.



[0018] **Figure 12** is a plot of linear response of virtual microphone  $V_1$  to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. There is no null and the response is very similar to  $V_2$  shown in Figure 10.

[0019] **Figure 13** is a plot of linear response of virtual microphone  $V_1$  to a speech source at a distance of 0.1 m for frequencies of 100, 500, 1000, 2000, 3000, and 4000 Hz, under an embodiment.

[0020] **Figure 14** is a plot showing comparison of frequency responses for speech for the array of an embodiment and for a conventional cardioid microphone.

[0021] **Figure 15** is a plot showing speech response for  $V_1$  (top, dashed) and  $V_2$  (bottom, solid) versus  $B$  with  $d_s$  assumed to be 0.1 m, under an embodiment. The spatial null in  $V_2$  is relatively broad.

[0022] **Figure 16** is a plot showing a ratio of  $V_1/V_2$  speech responses shown in Figure 10 versus  $B$ , under an embodiment. The ratio is above 10 dB for all  $0.8 < B < 1.1$ . This means that the physical  $\beta$  of the system need not be exactly modeled for good performance.

[0023] **Figure 17** is a plot of  $B$  versus actual  $d_s$  assuming that  $d_s = 10$  cm and  $\theta = 0$ , under an embodiment.

[0024] **Figure 18** is a plot of  $B$  versus  $\theta$  with  $d_s = 10$  cm and assuming  $d_s = 10$  cm, under an embodiment.

[0025] **Figure 19** is a plot of amplitude (top) and phase (bottom) response of  $N(s)$  with  $B = 1$  and  $D = -7.2$   $\mu$ sec, under an embodiment. The resulting phase difference clearly affects high frequencies more than low.

[0026] **Figure 20** is a plot of amplitude (top) and phase (bottom) response of  $N(s)$  with  $B = 1.2$  and  $D = -7.2$   $\mu$ sec, under an embodiment. Non-unity  $B$  affects the entire frequency range.

[0027] **Figure 21** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in  $V_2$  due to a mistake in the location of the speech source with  $q_1 = 0$  degrees and  $q_2 = 30$  degrees, under an embodiment. The cancellation remains below -10 dB for frequencies below 6 kHz.

[0028] **Figure 22** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in  $V_2$  due to a mistake in the location of the speech source with  $q_1 = 0$  degrees and  $q_2 = 45$  degrees, under an embodiment. The cancellation is below -10 dB only for frequencies below about 2.8 kHz and a reduction in performance is expected.

[0029] Figure 23 shows experimental results for a  $2d_0 = 19$  mm array using a linear  $\beta$  of 0.83 on a Bruel and Kjaer Head and Torso Simulator (HATS) in very loud ( $\sim 85$  dBA) music/speech noise environment, under an embodiment. The noise has been reduced by about 25 dB and the speech hardly affected, with no noticeable distortion.

### SUMMARY OF THE INVENTION

[0030] The present invention provides for dual omnidirectional microphone array devices systems and methods.

[0031] In accordance with one embodiment, a microphone array is formed with a first virtual microphone that includes a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; and a second virtual microphone that includes a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination. The first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

[0032] In accordance with another embodiment, a microphone array is formed with a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first omnidirectional microphone and the second microphone signal is generated by a second omnidirectional microphone; and a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination. The first virtual microphone has a first linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech.

[0033] In accordance with another embodiment, a device includes a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal; and a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone

comprises a first combination of the first microphone signal and the second microphone signal, and wherein the second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal. The second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech.

**[0034]** In accordance with another embodiment, a device includes a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal, wherein the first microphone and the second microphone are omnidirectional microphones; and a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal, and the second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal. The second combination is different from the first combination, and the first virtual microphone and the second virtual microphone are distinct virtual directional microphones.

**[0035]** In accordance with another embodiment, a device includes a first physical microphone generating a first microphone signal; a second physical microphone generating a second microphone signal; and a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone. The first virtual microphone comprises the second microphone signal subtracted from a delayed version of the first microphone signal, and the second virtual microphone comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

**[0036]** In accordance with another embodiment, a sensor includes a physical microphone array including a first physical microphone and a second physical microphone, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal; and a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal. The second combination is different from the first combination, and the virtual microphone array includes a single null oriented in a direction toward a source of speech of a human speaker.

### DETAILED DESCRIPTION

[0037] A dual omnidirectional microphone array (DOMA) that provides improved noise suppression is described herein. Compared to conventional arrays and algorithms, which seek to reduce noise by nulling out noise sources, the array of an embodiment is used to form two distinct virtual directional microphones which are configured to have very similar noise responses and very dissimilar speech responses. The only null formed by the DOMA is one used to remove the speech of the user from  $V_2$ . The two virtual microphones of an embodiment can be paired with an adaptive filter algorithm and/or VAD algorithm to significantly reduce the noise without distorting the speech, significantly improving the SNR of the desired speech over conventional noise suppression systems. The embodiments described herein are stable in operation, flexible with respect to virtual microphone pattern choice, and have proven to be robust with respect to speech source-to-array distance and orientation as well as temperature and calibration techniques. In the following description, numerous specific details are introduced to provide a thorough understanding of, and enabling description for, embodiments of the DOMA. One skilled in the relevant art, however, will recognize that these embodiments can be practiced without one or more of the specific details, or with other components, systems, etc. In other instances, well-known structures or operations are not shown, or are not described in detail, to avoid obscuring aspects of the disclosed embodiments.

[0038] Unless otherwise specified, the following terms have the corresponding meanings in addition to any meaning or understanding they may convey to one skilled in the art.

[0039] The term "bleedthrough" means the undesired presence of noise during speech.

[0040] The term "denoising" means removing unwanted noise from Mic1, and also refers to the amount of reduction of noise energy in a signal in decibels (dB).

[0041] The term "devoicing" means removing/distorting the desired speech from Mic1.

[0042] The term "directional microphone (DM)" means a physical directional microphone that is vented on both sides of the sensing diaphragm.

[0043] The term "Mic1 (M1)" means a general designation for an adaptive noise suppression system microphone that usually contains more speech than noise.

[0044] The term "Mic2 (M2)" means a general designation for an adaptive noise suppression system microphone that usually contains more noise than speech.

[0045] The term "noise" means unwanted environmental acoustic noise.

- [0046] The term "null" means a zero or minima in the spatial response of a physical or virtual directional microphone.
- [0047] The term "O<sub>1</sub>" means a first physical omnidirectional microphone used to form a microphone array.
- [0048] The term "O<sub>2</sub>" means a second physical omnidirectional microphone used to form a microphone array.
- [0049] The term "speech" means desired speech of the user.
- [0050] The term "Skin Surface Microphone (SSM)" is a microphone used in an earpiece (e.g., the Jawbone earpiece available from Aliph of San Francisco, California) to detect speech vibrations on the user's skin.
- [0051] The term "V<sub>1</sub>" means the virtual directional "speech" microphone, which has no nulls.
- [0052] The term "V<sub>2</sub>" means the virtual directional "noise" microphone, which has a null for the user's speech.
- [0053] The term "Voice Activity Detection (VAD) signal" means a signal indicating when user speech is detected.
- [0054] The term "virtual microphones (VM)" or "virtual directional microphones" means a microphone constructed using two or more omnidirectional microphones and associated signal processing.
- [0055] **Figure 1** is a two-microphone adaptive noise suppression system 100, under an embodiment. The two-microphone system 100 including the combination of physical microphones MIC 1 and MIC 2 along with the processing or circuitry components to which the microphones couple (described in detail below, but not shown in this figure) is referred to herein as the dual omnidirectional microphone array (DOMA) 110, but the embodiment is not so limited. Referring to Figure 1, in analyzing the single noise source 101 and the direct path to the microphones, the total acoustic information coming into MIC 1 (102, which can be an physical or 5 virtual microphone) is denoted by  $m_1(n)$ . The total acoustic information coming into MIC 2 (103, which can also be an physical or virtual microphone) is similarly labeled  $m_2(n)$ . In the  $z$  (digital frequency) domain, these are represented as  $M_1(z)$  and  $M_2(z)$ . Then,

$$M_1(z) = S(z) + N_2(z)$$

$$M_2(z) = N(z) + S_2(z),$$

with

$$\begin{aligned} N_2(z) &= N(z)H_1(z) \\ S_2(z) &= S(z)H_2(z), \end{aligned}$$

so that

$$\begin{aligned} M_1(z) &= S(z) + N(z)H_1(z) \\ M_2(z) &= N(z) + S(z)H_2(z). \end{aligned} \tag{Eq. 1}$$

This is the general case for all two microphone systems. Equation 1 has four unknowns and only two known relationships and therefore cannot be solved explicitly.

[0056] However, there is another way to solve for some of the unknowns in Equation 1. The analysis starts with an examination of the case where the speech is not being generated, that is, where a signal from the VAD subsystem 104 (optional) equals zero. In this case,  $s(n) = S(z) = 0$ , and Equation 1 reduces to

$$\begin{aligned} M_{1N}(z) &= N(z)H_1(z) \\ M_{2N}(z) &= N(z), \end{aligned}$$

where the N subscript on the M variables indicate that only noise is being received.

This leads to

$$\begin{aligned} M_{1N}(z) &= M_{2N}(z)H_1(z) \\ H_1(z) &= \frac{M_{1N}(z)}{M_{2N}(z)}. \end{aligned} \tag{Eq. 2}$$

The function  $H_1(z)$  can be calculated using any of the available system identification algorithms and the microphone outputs when the system is certain that only noise is being received. The calculation can be done adaptively, so that the system can react to changes in the noise.

[0057] A solution is now available for  $H_1(z)$ , one of the unknowns in Equation 1. The final unknown,  $H_2(z)$ , can be determined by using the instances where speech is being produced and the VAD equals one. When this is occurring, but the recent (perhaps less than 1 second) history

of the microphones indicate low levels of 10 noise, it can be assumed that  $n(s) = N(z) \sim 0$ . Then Equation 1 reduces to

$$\begin{aligned} M_{1s}(z) &= S(z) \\ M_{2s}(z) &= S(z)H_2(z), \end{aligned}$$

which in turn leads to

$$\begin{aligned} M_{2s}(z) &= M_{1s}(z)H_2(z) \\ H_2(z) &= \frac{M_{2s}(z)}{M_{1s}(z)}, \end{aligned}$$

which is the inverse of the  $H_1(z)$  calculation. However, it is noted that different inputs are being used (now only the speech is occurring whereas before only the noise was occurring). While calculating  $H_2(z)$ , the values calculated for  $H_1(z)$  are held constant (and vice versa) and it is assumed that the noise level is not high enough to cause errors in the  $H_2(z)$  calculation.

**[0058]** After calculating  $H_1(z)$  and  $H_2(z)$ , they are used to remove the noise from the signal.

If Equation 1 is rewritten as

$$\begin{aligned} S(z) &= M_1(z) - N(z)H_1(z) \\ N(z) &= M_2(z) - S(z)H_2(z) \\ S(z) &= M_1(z) - [M_2(z) - S(z)H_2(z)]H_1(z) \\ S(z)[1 - H_2(z)H_1(z)] &= M_1(z) - M_2(z)H_1(z), \end{aligned}$$

then  $N(z)$  may be substituted as shown to solve for  $S(z)$  as

$$S(z) = \frac{M_1(z) - M_2(z)H_1(z)}{1 - H_1(z)H_2(z)}. \quad \text{Eq. 3}$$

**[0059]** If the transfer functions  $H_1(z)$  and  $H_2(z)$  can be described with sufficient accuracy, then the noise can be completely removed and the original signal recovered. This remains true without respect to the amplitude or spectral characteristics of the noise. If there is very little or no leakage from the speech source into  $M_2$ , then  $H_2(z) \sim 0$  and Equation 3 reduces to

$$S(z) \approx M_1(z) - M_2(z)H_1(z). \quad \text{Eq. 4}$$

**[0060]** Equation 4 is much simpler to implement and is very stable, assuming  $H_1(z)$  is stable. However, if significant speech energy is in  $M_2(Z)$ , devoicing can occur. In order to construct a well-performing system and use Equation 4, consideration is given to the following conditions:

R1. Availability of a perfect (or at least very good) VAD in noisy conditions

R2. Sufficiently accurate  $H_1(z)$

R3. Very small (ideally zero)  $H_2(Z)$ .

R4. During speech production,  $H_1(z)$  cannot change substantially.

R5. During noise,  $H_2(z)$  cannot change substantially.

**[0061]** Condition R1 is easy to satisfy if the SNR of the desired speech to the unwanted noise is high enough. "Enough" means different things depending on the method of VAD generation. If a VAD vibration sensor is used, as in Burnett 7,256,048, accurate VAD in very low SNRs (-10 dB or less) is possible. Acoustic- only methods using information from  $O_1$  and  $O_2$  can also return accurate VADs, but are limited to SNRs of  $\sim 3$  dB or greater for adequate performance.

**[0062]** Condition R5 is normally simple to satisfy because for most applications the microphones will not change position with respect to the user's mouth very often or rapidly. In those applications where it may happen (such as hands-free conferencing systems) it can be satisfied by configuring Mic2 so that  $H_2(z) \approx 0$ .

**[0063]** Satisfying conditions R2, R3, and R4 are more difficult but are possible given the right combination of  $V_1$  and  $V_2$ . Methods are examined below that have proven to be effective in satisfying the above, resulting in excellent noise suppression performance and minimal speech removal and distortion in an embodiment.

**[0064]** The DOMA, in various embodiments, can be used with the Pathfinder system as the adaptive filter system or noise removal. The Pathfinder system, available from AliphCom, San Francisco, CA, is described in detail in other patents and patent applications referenced herein. Alternatively, any adaptive filter or noise removal algorithm can be used with the DOMA in one or more various alternative embodiments or configurations.

**[0065]** When the DOMA is used with the Pathfinder system, the Pathfinder system generally provides adaptive noise cancellation by combining the two microphone signals (e.g., Mic1, Mic2)



by filtering and summing in the time domain. The adaptive filter generally uses the signal received from a first microphone of the DOMA to remove noise from the speech received from at least one other microphone of the DOMA, which relies on a slowly varying linear transfer function between the two microphones for sources of noise. Following processing of the two channels of the DOMA, an output signal is generated in which the noise content is attenuated with respect to the speech content, as described in detail below.

**[0066]** **Figure 2** is a generalized two-microphone array (DOMA) including an array 201/202 and speech source S configuration, under an embodiment. **Figure 3** is a system 300 for generating or producing a first order gradient microphone V using two omnidirectional elements  $O_1$  and  $O_2$ , under an embodiment. The array of an embodiment includes two physical microphones 201 and 202 (e.g., omnidirectional microphones) placed a distance  $2d_0$  apart and a speech source 200 is located a distance  $d_s$  away at an angle of  $\theta$ . This array is axially symmetric (at least in free space), so no other angle is needed. The output from each microphone 201 and 202 can be delayed ( $Z_1$  and  $Z_2$ ), multiplied by a gain ( $A_1$  and  $A_2$ ), and then summed with the other as demonstrated in Figure 3. The output of the array is or forms at least one virtual microphone, as described in detail below. This operation can be over any frequency range desired. By varying the magnitude and sign of the delays and gains, a wide variety of virtual microphones (VMs), also referred to herein as virtual directional microphones, can be realized. There are other methods known to those skilled in the art for constructing VMs but this is a common one and will be used in the enablement below.

**[0067]** As an example, **Figure 4** is a block diagram for a DOMA 400 including two physical microphones configured to form two virtual microphones  $V_1$  and  $V_2$ , under an embodiment. The DOMA includes two first order gradient microphones  $V_1$  and  $V_2$  formed using the outputs of two microphones or elements  $O_1$  and  $O_2$  (201 and 202), under an embodiment. The DOMA of an embodiment includes two physical microphones 201 and 202 that are omnidirectional microphones, as described above with reference to Figures 2 and 3. The output from each microphone is coupled to a processing component 402, or circuitry, and the processing component outputs signals representing or corresponding to the virtual microphones  $V_1$  and  $V_2$ .

**[0068]** In this example system 400, the output of physical microphone 201 is coupled to processing component 402 that includes a first processing path that includes application of a first delay  $Z_{11}$  and a first gain  $A_{11}$  and a second processing path that includes application of a second

delay  $Z_{12}$  and a second gain  $A_{12}$ . The output of physical microphone 202 is coupled to a third processing path of the processing component 402 that includes application of a third delay  $Z_{21}$  and a third gain  $A_{21}$  and a fourth processing path that includes application of a fourth delay  $Z_{22}$  and a fourth gain  $A_{22}$ . The output of the first and third processing paths is summed to form virtual microphone  $V_1$ , and the output of the second and fourth processing paths is summed to form virtual microphone  $V_2$ .

**[0069]** As described in detail below, varying the magnitude and sign of the delays and gains of the processing paths leads to a wide variety of virtual microphones (VMs), also referred to herein as virtual directional microphones, can be realized. While the processing component 402 described in this example includes four processing paths generating two virtual microphones or microphone signals, the embodiment is not so limited. For example, Figure 5 is a block diagram for a DOMA 500 including two physical microphones configured to form  $N$  virtual microphones  $V_1$  through  $V_N$ , where  $N$  is any number greater than one, under an embodiment. Thus, the DOMA can include a processing component 502 having any number of processing paths as appropriate to form a number  $N$  of virtual microphones.

**[0070]** The DOMA of an embodiment can be coupled or connected to one or more remote devices. In a system configuration, the DOMA outputs signals to the 5 remote devices. The remote devices include, but are not limited to, at least one of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), personal computers (PCs), headset devices, head-worn devices, and earpieces.

**[0071]** Furthermore, the DOMA of an embodiment can be a component or subsystem integrated with a host device. In this system configuration, the DOMA outputs signals to components or subsystems of the host device. The host device includes, but is not limited to, at least one of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), personal computers (PCs), headset devices, head-worn devices, and earpieces.

**[0072]** As an example, **Figure 6** is an example of a headset or head-worn device 600 that includes the DOMA, as described herein, under an embodiment. The headset 600 of an embodiment includes a housing having two areas or receptacles (not shown) that receive and hold two microphones (e.g.,  $O_1$  and  $O_2$ ). The headset 600 is generally a device that can be worn

by a speaker 602, for example, a headset or earpiece that positions or holds the microphones in the vicinity of the speaker's mouth. The headset 600 of an embodiment places a first physical microphone (e.g., physical microphone  $O_1$ ) in a vicinity of a speaker's lips. A second physical microphone (e.g., physical microphone  $O_2$ ) is placed a distance behind the first physical microphone. The distance of an embodiment is in a range of a few centimeters behind the first physical microphone or as described herein (e.g., described with reference to Figures 1-5). The DOMA is symmetric and is used in the same configuration or manner as a single close-talk microphone, but is not so limited.

**[0073]** **Figure 7** is a flow diagram for denoising 700 acoustic signals using the DOMA, under an embodiment. The denoising 700 begins by receiving 702 acoustic signals at a first physical microphone and a second physical microphone. In response to the acoustic signals, a first microphone signal is output from the first physical microphone and a second microphone signal is output from the second physical microphone 704. A first virtual microphone is formed 706 by generating a first combination of the first microphone signal and the second microphone signal. A second virtual microphone is formed 708 by generating a second combination of the first microphone signal and the second microphone signal, and the second combination is different from the first combination. The first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech. The denoising 700 generates 710 output signals by combining signals from the first virtual microphone and the second virtual microphone, and the output signals include less acoustic noise than the acoustic signals.

**[0074]** **Figure 8** is a flow diagram for forming 800 the DOMA, under an embodiment. Formation 800 of the DOMA includes forming 802 a physical microphone array including a first physical microphone and a second physical microphone. The first physical microphone outputs a first microphone signal and the second physical microphone outputs a second microphone signal. A virtual microphone array is formed 804 comprising a first virtual microphone and a second virtual microphone. The first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal. The second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal, and the second combination is different from the first combination. The virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker.

[0075] The construction of VMs for the adaptive noise suppression system of an embodiment includes substantially similar noise response in  $V_1$  and  $V_2$ . Substantially similar noise response as used herein means that  $H_1(z)$  is simple to model and will not change much during speech, satisfying conditions R2 and R4 described above and allowing strong denoising and minimized bleedthrough.

[0076] The construction of VMs for the adaptive noise suppression system of an embodiment includes relatively small speech response for  $V_2$ . The relatively small speech response for  $V_2$  means that  $H_2(z) \approx 0$ , which will satisfy conditions R3 and R5 described above.

[0077] The construction of VMs for the adaptive noise suppression system of an embodiment further includes sufficient speech response for  $V_1$  so that the cleaned speech will have significantly higher SNR than the original speech captured by  $O_1$ .

[0078] The description that follows assumes that the responses of the omnidirectional microphones  $O_1$  and  $O_2$  to an identical acoustic source have been normalized so that they have exactly the same response (amplitude and phase) to that source. This can be accomplished using standard microphone array methods (such as frequency-based calibration) well known to those versed in the art.

[0079] Referring to the condition that construction of VMs for the adaptive noise suppression system of an embodiment includes relatively small speech response for  $V_2$ , it is seen that for discrete systems  $V_2(z)$  can be represented as:

$$V_2(z) = O_2(z) - z^{-\gamma} \beta O_1(z)$$

where

$$\beta = \frac{d_1}{d_2}$$

$$\gamma = \frac{d_2 - d_1}{c} \cdot f_s \text{ (samples)}$$

$$d_1 = \sqrt{d_s^2 - 2d_s d_0 \cos(\theta) + d_0^2}$$

$$d_2 = \sqrt{d_s^2 + 2d_s d_0 \cos(\theta) + d_0^2}$$

[0080] The distances  $d_1$  and  $d_2$  are the distance from  $O_1$  and  $O_2$  to the speech source (see Figure 2), respectively, and  $\gamma$  is their difference divided by  $c$ , the speed of sound, and multiplied by the sampling frequency  $f_s$ . Thus  $\gamma$  is in samples, but need not be an integer. For non-integer  $\gamma$ , fractional-delay filters (well known to those versed in the art) may be used.

[0081] It is important to note that the  $\beta$  above is not the conventional  $\beta$  used to denote the mixing of VMs in adaptive beamforming; it is a physical variable of the system that depends on the intra-microphone distance  $d_0$  (which is fixed) and the distance  $d_s$  and angle  $\theta$ , which can vary. As shown below, for properly calibrated microphones, it is not necessary for the system to be programmed with the exact  $\beta$  of the array. Errors of approximately 10-15% in the actual  $\beta$  (i.e. the  $\beta$  used by the algorithm is not the  $\beta$  of the physical array) have been used with very little degradation in quality. The algorithmic value of  $\beta$  may be calculated and set for a particular user or may be calculated adaptively during speech production when little or no noise is present. However, adaptation during use is not required for nominal performance.

[0082] **Figure 9** is a plot of linear response of virtual microphone  $V_2$  with  $\beta = 0.8$  to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. The null in the linear response of virtual microphone  $V_2$  to speech is located at 0 degrees, where the speech is typically expected to be located. **Figure 10** is a plot of linear response of virtual microphone  $V_2$  with  $\beta = 0.8$  to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. The linear response of  $V_2$  to noise is devoid of or includes no null, meaning all noise sources are detected.

[0083] The above formulation for  $V_2(z)$  has a null at the speech location and will therefore exhibit minimal response to the speech. This is shown in **Figure 9** for an array with  $d_0 = 10.7$  mm and a speech source on the axis of the array ( $\theta = 0$ ) at 10 cm ( $\beta = 0.8$ ). Note that the speech null at zero degrees is not present for noise in the far field for the same microphone, as shown in **Figure 10** with a noise source distance of approximately 1 meter. This insures that noise in front of the user will be detected so that it can be removed. This differs from conventional systems that can have difficulty removing noise in the direction of the mouth of the user.

The  $V_1(z)$  can be formulated using the general form for  $V_1(z)$ :

$$V_1(z) = \alpha_A O_1(z) \cdot z^{-d_A} - \alpha_B O_2(z) \cdot z^{-d_B}$$

Since

$$V_2(z) = O_2(z) - z^{-\gamma} \beta O_1(z)$$

and, since for noise in the forward direction

$$O_{2N}(z) = O_{1N}(z) \cdot z^{-\gamma},$$

Then

$$\begin{aligned} V_{2N}(z) &= O_{1N}(z) \cdot z^{-\gamma} - z^{-\gamma} \beta O_{1N}(z) \\ V_{2N}(z) &= (1 - \beta)(O_{1N}(z) \cdot z^{-\gamma}) \end{aligned}$$

If this is then set equal to  $V_1(z)$  above, the result is

$$V_{IN}(z) = \alpha_A O_{1N}(z) \cdot z^{-d_A} - \alpha_B O_{1N}(z) \cdot z^{-\gamma} \cdot z^{-d_B} = (1 - \beta)(O_{1N}(z) \cdot z^{-\gamma})$$

thus we may set

$$\begin{aligned} d_A &= \gamma \\ d_B &= 0 \\ \alpha_A &= 1 \\ \alpha_B &= \beta \end{aligned}$$

to get

$$V_1(z) = O_1(z) \cdot z^{-\gamma} - \beta O_2(z)$$

The definitions for  $V_1$  and  $V_2$  above mean that for noise  $H_1(z)$  is:

$$H_1(z) = \frac{V_1(z)}{V_2(z)} = \frac{\beta O_2(z) + O_1(z) \cdot z^{-\gamma}}{O_2(z) - z^{-\gamma} \beta O_1(z)}$$

which, if the amplitude noise responses are about the same, has the form of an allpass filter. This has the advantage of being easily and accurately modeled, especially in magnitude response, satisfying R2.

This formulation assures that the noise response will be as similar as possible and that the speech response will be proportional to  $(1 - \beta^2)$ . Since  $\beta$  is the ratio of the distances from  $O_1$  and  $O_2$  to the speech source, it is affected by the size of the array and the distance from the array to the speech source.

**[0084]** **Figure 11** is a plot of linear response of virtual microphone  $V_1$  with  $\beta = 0.8$  to a 1 kHz speech source at a distance of 0.1 m, under an embodiment. The linear response of virtual microphone  $V_1$  to speech is devoid of or includes no null and the response for speech is greater than that shown in Figure 4.

**[0085]** **Figure 12** is a plot of linear response of virtual microphone  $V_1$  with  $\beta = 0.8$  to a 1 kHz noise source at a distance of 1.0 m, under an embodiment. The linear response of virtual microphone  $V_1$  to noise is devoid of or includes no null and the response is very similar to  $V_2$  shown in Figure 5.

**[0086]** **Figure 13** is a plot of linear response of virtual microphone  $V_1$  with  $\beta = 0.8$  to a speech source at a distance of 0.1 m for frequencies of 100, 500, 1000, 2000, 3000, and 4000 Hz, under an embodiment. **Figure 14** is a plot showing comparison of frequency responses for speech for the array of an embodiment and for a conventional cardioid microphone.

**[0087]** The response of  $V_1$  to speech is shown in **Figure 11**, and the response to noise in **Figure 12**. Note the difference in speech response compared to  $V_2$  shown in **Figure 9** and the similarity of noise response shown in **Figure 10**. Also note that the orientation of the speech response for  $V_1$  shown in **Figure 11** is completely opposite the orientation of conventional systems, where the main lobe of response is normally oriented toward the speech source. The orientation of an embodiment, in which the main lobe of the speech response of  $V_1$  is oriented away from the speech source, means that the speech sensitivity of  $V_1$  is lower than a normal directional microphone but is flat for all frequencies within approximately  $\pm 30$  degrees of the axis of the array, as shown in **Figure 13**. This flatness of response for speech means that no shaping postfilter is needed to restore omnidirectional frequency response. This does come at a price - as shown in **Figure 14**, which shows the speech response of  $V_1$  with  $\beta = 0.8$  and the

speech response of a cardioid microphone. The speech response of  $V_1$  is approximately 0 to ~ 13 dB less than a normal directional microphone between approximately 500 and 7500 Hz and approximately 0 to 10+ dB greater than a directional microphone below approximately 500 Hz and above 7500 Hz for a sampling frequency of approximately 16000 Hz. However, the superior noise suppression made possible using this system more than compensates for the initially poorer SNR.

**[0088]** It should be noted that **Figures 9-12** assume the speech is located at approximately 0 degrees and approximately 10 cm,  $\beta = 0.8$ , and the noise at all angles is located approximately 1.0 meter away from the midpoint of the array. Generally, the noise distance is not required to be 1 m or more, but the denoising is the best for those distances. For distances less than approximately 1 m, denoising will not be as effective due to the greater dissimilarity in the noise responses of  $V_1$  and  $V_2$ . This has not proven to be an impediment in practical use - in fact, it can be seen as a feature. Any "noise" source that is ~10 cm away from the earpiece is likely to be desired to be captured and transmitted.

**[0089]** The speech null of  $V_2$  means that the VAD signal is no longer a critical component. The VAD's purpose was to ensure that the system would not train on speech and then subsequently remove it, resulting in speech distortion. If, however,  $V_2$  contains no speech, the adaptive system cannot train on the speech and cannot remove it. As a result, the system can denoise all the time without fear of devoicing, and the resulting clean audio can then be used to generate a VAD signal for use in subsequent single-channel noise suppression algorithms such as spectral subtraction. In addition, constraints on the absolute value of  $H_1(z)$  (i.e. restricting it to absolute values less than two) can keep the system from fully training on speech even if it is detected. In reality, though, speech can be present due to a mis-located  $V_2$  null and/or echoes or other phenomena, and a VAD sensor or other acoustic-only VAD is recommended to minimize speech distortion.

**[0090]** Depending on the application,  $\beta$  and  $\gamma$  may be fixed in the noise suppression algorithm or they can be estimated when the algorithm indicates that speech production is taking place in the presence of little or no noise. In either case, there may be an error in the estimate of the actual  $\beta$  and  $\gamma$  of the system. The following description examines these errors and their effect on the performance of the system. As above, "good performance" of the system indicates that there is sufficient denoising and minimal devoicing.



**[0091]** The effect of an incorrect  $\beta$  and  $\gamma$  on the response of  $V_1$  and  $V_2$  can be seen by examining the definitions above:

$$\begin{aligned} V_1(z) &= O_1(z) \cdot z^{-\gamma_T} - \beta_T O_2(z) \\ V_2(z) &= O_2(z) \cdot z^{-\gamma_T} \beta_T O_1(z) \end{aligned}$$

where  $\beta_T$  and  $\gamma_T$  denote the theoretical estimates of  $\beta$  and  $\gamma$  used in the noise suppression algorithm. In reality, the speech response of  $O_2$  is

$$O_{2S}(z) = \beta_R O_{1S}(z) \cdot z^{-\gamma_R}$$

where  $\beta_R$  and  $\gamma_R$  denote the real  $\beta$  and  $\gamma$  of the physical system. The differences between the theoretical and actual values of  $\beta$  and  $\gamma$  can be due to mis-location of the speech source (it is not where it is assumed to be) and/or a change in air temperature (which changes the speed of sound). Inserting the actual response of  $O_2$  for speech into the above equations for  $V_1$  and  $V_2$  yields

$$\begin{aligned} V_{1S}(z) &= O_{1S}(z)[z^{-\gamma_T} - \beta_T \beta_R z^{-\gamma_R}] \\ V_{2S}(z) &= O_{1S}(z)[\beta_R z^{-\gamma_R} - \beta_T z^{-\gamma_T}] \end{aligned}$$

If the difference in phase is represented by

$$\gamma_R = \gamma_T + \gamma_D$$

And the difference in amplitude as

$$\beta_R = B\beta_T$$

then

$$\begin{aligned} V_{1S}(z) &= O_{1S}(z)z^{-\gamma_T}[1 - B\beta_T^2 z^{-\gamma_D}] \\ V_{2S}(z) &= \beta_T O_{1S}(z)z^{-\gamma_T}[Bz^{-\gamma_D} - 1] \end{aligned}$$

[0092] The speech cancellation in  $V_2$  (which directly affects the degree of devoicing) and the speech response of  $V_1$  will be dependent on both  $B$  and  $D$ . An examination of the case where  $D = 0$  follows. **Figure 15** is a plot showing speech response for  $V_1$  (top, dashed) and  $V_2$  (bottom, solid) versus  $B$  with  $d_s$  assumed to be 0.1 m, under an embodiment. This plot shows the spatial null in  $V_2$  to be relatively broad. **Figure 16** is a plot showing a ratio of  $V_1/V_2$  speech responses shown in **Figure 10** versus  $B$ , under an embodiment. The ratio of  $V_1/V_2$  is above 10 dB for all  $0.8 < B < 1.1$ , and this means that the physical  $\beta$  of the system need not be exactly modeled for good performance. **Figure 17** is a plot of  $B$  versus actual  $d_s$  assuming that  $d_s = 10$  cm and  $\theta = 0$ , under an embodiment. **Figure 18** is a plot of  $B$  versus  $\theta$  with  $d_s = 10$  cm and assuming  $d_s = 10$  cm, under an embodiment.

[0093] In **Figure 15**, the speech response for  $V_1$  (upper, dashed) and  $V_2$  (lower, solid) compared to  $O_1$  is shown versus  $B$  when  $d_s$  is thought to be approximately 10 cm and  $\theta = 0$ . When  $B = 1$ , the speech is absent from  $V_2$ . In **Figure 16**, the ratio of the speech responses in **Figure 10** is shown. When  $0.8 < B < 1.1$ , the  $V_1/V_2$  ratio is above approximately 10 dB - enough for good performance. Clearly, if  $D = 0$ ,  $B$  can vary significantly without adversely affecting the performance of the system. Again, this assumes that calibration of the microphones so that both their amplitude and phase response is the same for an identical source has been performed.

[0094] The  $B$  factor can be non-unity for a variety of reasons. Either the distance to the speech source or the relative orientation of the array axis and the speech source or both can be different than expected. If both distance and angle mismatches are included for  $B$ , then

$$B = \frac{\beta_R \sqrt{d_{SR}^2 - 2d_{SR}d_0 \cos(\theta_R) + d_0^2}}{\beta_T \sqrt{d_{SR}^2 + 2d_{SR}d_0 \cos(\theta_R) + d_0^2}} \cdot \frac{\sqrt{d_{ST}^2 + 2d_{ST}d_0 \cos(\theta_T) + d_0^2}}{\sqrt{d_{ST}^2 - 2d_{ST}d_0 \cos(\theta_T) + d_0^2}}$$

where again the T subscripts indicate the theorized values and R the actual values.

In **Figure 17**, the factor  $B$  is plotted with respect to the actual  $d_s$  with the assumption that  $d_s = 10$  cm and  $\theta = 0$ . So, if the speech source is on-axis of the array, the actual distance can vary from approximately 5 cm to 18 cm without significantly affecting performance - a significant amount. Similarly, **Figure 18** shows what happens if the speech source is located at a distance of approximately 10 cm but not on the axis of the array. In this case, the angle can vary up to

approximately  $\pm 55$  degrees and still result in a B less than 1.1, assuring good performance. This is a significant amount of allowable angular deviation. If there is both angular and distance errors, the equation above may be used to determine if the deviations will result in adequate performance. Of course, if the value for  $\beta_T$  is allowed to update during speech, essentially tracking the speech source, then B can be kept near unity for almost all configurations.

[0095] An examination follows of the case where B is unity but D is nonzero. This can happen if the speech source is not where it is thought to be or if the speed of sound is different from what it is believed to be. From Equation 5 above, it can be seen that the factor that weakens the speech null in  $V_2$  for speech is

$$N(z) = Bz^{-\gamma D} - 1$$

or in the continuous s domain

$$N(s) = Be^{-Ds} - 1$$

Since  $\gamma$  is the time difference between arrival of speech at  $V_1$  compared to  $V_2$ , it can be errors in estimation of the angular location of the speech source with respect to the axis of the array and/or by temperature changes. Examining the temperature sensitivity, the speed of sound varies with temperature as

$$c = 331.3 + (0.606T) \text{ m/s}$$

where T is degrees Celsius. As the temperature decreases, the speed of sound also decreases. Setting 20 C as a design temperature and a maximum expected temperature range to -40 C to +60 C (-40 F to 140 F). The design speed of sound at 20 C is 343 m/s and the slowest speed of sound will be 307 m/s at -40 C with the fastest speed of sound 362 m/s at 60 C. Set the array length ( $2d_0$ ) to be 21 mm. For speech sources on the axis of the array, the difference in travel time for the largest change in the speed of sound is

$$\nabla t_{MAX} = \frac{d}{c_1} - \frac{d}{c_2} = 0.021m \left( \frac{1}{343 \text{ m/s}} - \frac{1}{307 \text{ m/s}} \right) = -7.2 \times 10^{-6} \text{ sec}$$

or approximately 7 microseconds. The response for  $N(s)$  given  $B = 1$  and  $D = 7.2 \mu\text{sec}$  is shown in **Figure 19**. **Figure 19** is a plot of amplitude (top) and phase (bottom) response of  $N(s)$  with  $B = 1$  and  $D = -7.2 \mu\text{sec}$ , under an embodiment. The resulting phase difference clearly affects high frequencies more than low. The amplitude response is less than approximately -10 dB for all frequencies less than 7 kHz and is only about -9 dB at 8 kHz. Therefore, assuming  $B = 1$ , this system would likely perform well at frequencies up to approximately 8 kHz. This means that a properly compensated system would work well even up to 8 kHz in an exceptionally wide (e.g., -40 C to 80 C) temperature range. Note that the phase 10 mismatch due to the delay estimation error causes  $N(s)$  to be much larger at high frequencies compared to low.

**[0096]** If  $B$  is not unity, the robustness of the system is reduced since the effect from non-unity  $B$  is cumulative with that of non-zero  $D$ . **Figure 20** shows the amplitude and phase response for  $B = 1.2$  and  $D = 7.2 \mu\text{sec}$ . **Figure 20** is a plot of amplitude (top) and phase (bottom) response of  $N(s)$  with  $B = 1.2$  and  $D = -7.2 \mu\text{sec}$ , under an embodiment. Non-unity  $B$  affects the entire frequency range. Now  $N(s)$  is below approximately -10 dB only for frequencies less than approximately 5 kHz and the response at low frequencies is much larger. Such a system would still perform well below 5 kHz and would only suffer from slightly elevated devoicing for frequencies above 5 kHz. For ultimate performance, a temperature sensor may be integrated into the system to allow the algorithm to adjust  $\gamma_T$  as the temperature varies.

**[0097]** Another way in which  $D$  can be non-zero is when the speech source is not where it is believed to be - specifically, the angle from the axis of the array to the speech source is incorrect. The distance to the source may be incorrect as well, but that introduces an error in  $B$ , not  $D$ .

**[0098]** Referring to **Figure 2**, it can be seen that for two speech sources (each with their own  $d_s$  and  $\theta$ ) that the time difference between the arrival of the speech at  $O_1$  and the arrival at  $O_2$  is where

$$d_{11} = \sqrt{d_{s1}^2 - 2d_{s1}d_0 \cos(\theta_1) + d_0^2}$$

$$d_{12} = \sqrt{d_{s1}^2 + 2d_{s1}d_0 \cos(\theta_1) + d_0^2}$$

$$d_{21} = \sqrt{d_{s2}^2 - 2d_{s2}d_0 \cos(\theta_2) + d_0^2}$$

$$d_{22} = \sqrt{d_{s2}^2 + 2d_{s2}d_0 \cos(\theta_2) + d_0^2}$$

**[0099]** The  $V_2$  speech cancellation response for  $\theta_1 = 0$  degrees and  $\theta_2 = 30$  degrees and assuming that  $B = 1$  is shown in **Figure 21**. **Figure 21** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in  $V_2$  due to a mistake in the location of the speech source with  $q_1 = 0$  degrees and  $q_2 = 30$  degrees, under an embodiment. Note that the cancellation is still below -10 dB for frequencies below 6 kHz. The cancellation is still below approximately -10 dB for frequencies below approximately 6 kHz, so an error of this type will not significantly affect the performance of the system. However, if  $\theta_2$  is increased to approximately 45 degrees, as shown in **Figure 22**, the cancellation is below approximately -10 dB only for frequencies below approximately 2.8 kHz. **Figure 22** is a plot of amplitude (top) and phase (bottom) response of the effect on the speech cancellation in  $V_2$  due to a mistake in the location of the speech source with  $q_1 = 0$  degrees and  $q_2 = 45$  degrees, under an embodiment. Now the cancellation is below -10 dB only for frequencies below about 2.8 kHz and a reduction in performance is expected. The poor  $V_2$  speech cancellation above approximately 4 kHz may result in significant devoicing for those frequencies.

**[00100]** The description above has assumed that the microphones  $O_1$  and  $O_2$  were calibrated so that their response to a source located the same distance away was identical for both amplitude and phase. This is not always feasible, so a more practical calibration procedure is presented below. It is not as accurate, but is much simpler to implement. Begin by defining a filter  $\alpha(z)$  such that:

$$O_{1C}(z) = \alpha(z)O_{2C}(z)$$

where the "C" subscript indicates the use of a known calibration source. The simplest one to use is the speech of the user. Then

$$O_{1S}(z) = \alpha(z)O_{2C}(z)$$

The microphone definitions are now:

$$\begin{aligned} V_1(z) &= O_1(z) \cdot z^{-\gamma} - \beta(z)\alpha(z)O_2(z) \\ V_2(z) &= \alpha(z)O_2(z) - z^{-\gamma}\beta(z)O_1(z) \end{aligned}$$

**[00101]** The  $\beta$  of the system should be fixed and as close to the real value as possible. In practice, the system is not sensitive to changes in  $\beta$  and errors of approximately  $\pm 5\%$  are easily tolerated. During times when the user is producing speech but there is little or no noise, the system can train  $\alpha(z)$  to remove as much speech as possible. This is accomplished by:

1. Construct an adaptive system as shown in **Figure 1** with  $\beta O_{1s}(z)z^{-Y}$  in the "MIC1" position,  $O_{2s}(z)$  in the "MIC2" position, and  $\alpha(z)$  in the  $H_1(z)$  position.
2. During speech, adapt  $\alpha(z)$  to minimize the residual of the system.
3. Construct  $V_1(z)$  and  $V_2(z)$  as above.

**[00102]** A simple adaptive filter can be used for  $\alpha(z)$  so that only the relationship between the microphones is well modeled. The system of an embodiment trains only when speech is being produced by the user. A sensor like the SSM is invaluable in determining when speech is being produced in the absence of noise. If the speech source is fixed in position and will not vary significantly during use (such as when the array is on an earpiece), the adaptation should be infrequent and slow to update in order to minimize any errors introduced by noise present during training.

**[00103]** The above formulation works very well because the noise (far-field) responses of  $V_1$  and  $V_2$  are very similar while the speech (near-field) responses are very different. However, the formulations for  $V_1$  and  $V_2$  can be varied and still result in good performance of the system as a whole. If the definitions for  $V_1$  and  $V_2$  are taken from above and new variables  $B_1$  and  $B_2$  are inserted, the result is:

$$V_1(z) = O_1(z) \cdot z^{-Y_T} - B_1 \beta_T O_2(z)$$

$$V_2(z) = O_2(z) - z^{-Y_T} B_2 \beta_T O_1(z)$$

where  $B_1$  and  $B_2$  are both positive numbers or zero. If  $B_1$  and  $B_2$  are set equal to unity, the optimal system results as described above. If  $B_1$  is allowed to vary from unity, the response of  $V_1$  is affected. An examination of the case where  $B_2$  is left at 1 and  $B_1$  is decreased follows. As  $B_1$  drops to approximately zero,  $V_1$  becomes less and less directional, until it becomes a simple omnidirectional microphone when  $B_1 = 0$ . Since  $B_2 = 1$ , a speech null remains in  $V_2$ , so very different speech responses remain for  $V_1$  and  $V_2$ . However, the noise responses are much less

similar, so denoising will not be as effective. Practically, though, the system still performs well. B1 can also be increased from unity and once again the system will still denoise well, just not as well as with B1 = 1.

**[00104]** If B2 is allowed to vary, the speech null in  $V_2$  is affected. As long as the speech null is still sufficiently deep, the system will still perform well. Practically values down to approximately B2 = 0.6 have shown sufficient performance, but it is recommended to set B2 close to unity for optimal performance.

**[00105]** Similarly, variables  $\varepsilon$  and  $\Delta$  may be introduced so that:

$$\begin{aligned} V_1(z) &= (\varepsilon - \beta)O_{2N}(z) + (1 + \Delta)O_{1N}(z)z^{-Y} \\ V_2(z) &= (1 + \Delta)O_{2N}(z) + (\varepsilon - \beta)O_{1N}(z)z^{-Y} \end{aligned}$$

This formulation also allows the virtual microphone responses to be varied but retains the all-pass characteristic of  $H_1(z)$ .

**[00106]** In conclusion, the system is flexible enough to operate well at a variety of B1 values, but B2 values should be close to unity to limit devoicing for best performance.

**[00107]** Experimental results for a  $2d_0 = 19$  mm array using a linear  $\beta$  of 0.83 and B1 = B2 = 1 on a Bruel and Kjaer Head and Torso Simulator (HATS) in very loud (~85 dBA) music/speech noise environment are shown in **Figure 23**. The alternate 30 microphone calibration technique discussed above was used to calibrate the microphones. The noise has been reduced by about 25 dB and the speech hardly affected, with no noticeable distortion. Clearly the technique significantly increases the SNR of the original speech, far outperforming conventional noise suppression techniques.

**[00108]** The DOMA can be a component of a single system, multiple systems, and/or geographically separate systems. The DOMA can also be a subcomponent or subsystem of a single system, multiple systems, and/or geographically separate systems. The DOMA can be coupled to one or more other components (not shown) of a host system or a system coupled to the host system.

**[00109]** One or more components of the DOMA and/or a corresponding system or application to which the DOMA is coupled or connected includes and/or runs under and/or in association with a processing system. The processing system includes any collection of processor-based

devices or computing devices operating together, or components of processing systems or devices, as is known in the art. For example, the processing system can include one or more of a portable computer, portable communication device operating in a communication network, and/or a network server. The portable computer can be any of a number and/or combination of devices selected from among personal computers, cellular telephones, personal digital assistants, portable computing devices, and portable communication devices, but is not so limited. The processing system can include components within a larger computer system.

**[00110]** The processing system of an embodiment includes at least one processor and at least one memory device or subsystem. The processing system can also include or be coupled to at least one database. The term "processor" as generally used herein refers to any logic processing unit, such as one or more central processing units (CPUs), digital signal processors (DSPs), application-specific integrated circuits (ASIC), etc. The processor and memory can be monolithically integrated onto a single chip, distributed among a number of chips or components, and/or provided by some combination of algorithms. The methods described herein can be implemented in one or more of software algorithm(s), programs, firmware, hardware, components, circuitry, in any combination.

**[00111]** The components of any system that includes the DOMA can be located together or in separate locations. Communication paths couple the components and include any medium for communicating or transferring files among the components. The communication paths include wireless connections, wired connections, and hybrid wireless/wired connections. The communication paths also include couplings or connections to networks including local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), proprietary networks, interoffice or backend networks, and the Internet. Furthermore, the communication paths include removable fixed mediums like floppy disks, hard disk drives, and CD-ROM disks, as well as flash RAM, Universal Serial Bus (USB) connections, RS-232 connections, telephone lines, buses, and electronic mail messages.

**[00112]** Embodiments of the DOMA described herein include a microphone array comprising: a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; and a second virtual microphone comprising a second combination of the first microphone signal



and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

[00113] The first and second physical microphones of an embodiment are omnidirectional.

[00114] The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech. The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

[00115] The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00116] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00117] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00118] The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

[00119] A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

[00120] The first virtual microphone of an embodiment comprises the second microphone signal subtracted from the first microphone signal.

[00121] The first microphone signal of an embodiment is delayed.

[00122] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00123] The delay of an embodiment is raised to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the

third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00124] The second microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00125] The second virtual microphone of an embodiment comprises the first microphone signal subtracted from the second microphone signal.

[00126] The first microphone signal of an embodiment is delayed.

[00127] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00128] The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00129] The first microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

[00130] The single null of an embodiment is located at a distance from at least one of the first physical microphone and the second physical microphone where the source of the speech is expected to be.

[00131] The first virtual microphone of an embodiment comprises the second microphone signal subtracted from a delayed version of the first microphone signal.

[00132] The second virtual microphone of an embodiment comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

[00133] Embodiments of the DOMA described herein include a microphone array comprising: a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first omnidirectional microphone and the second microphone signal is generated by a second omnidirectional microphone; and a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the

second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech.

**[00134]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00135]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00136]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00137]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00138]** Embodiments of the DOMA described herein include a device comprising: a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal; and a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal, wherein the second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech.

**[00139]** Embodiments of the DOMA described herein include a device comprising: a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal, wherein the first microphone and the second microphone are omnidirectional microphones; and a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a first combination of the first microphone signal and the second microphone signal, wherein the second virtual

microphone comprises a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones.

[00140] Embodiments of the DOMA described herein include a device comprising: a first physical microphone generating a first microphone signal; a second physical microphone generating a second microphone signal; and a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone; wherein the first virtual microphone comprises the second microphone signal subtracted from a delayed version of the first microphone signal; wherein the second virtual microphone comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

[00141] The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

[00142] The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

[00143] The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00144] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00145] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00146] The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

[00147] A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

[00148] One or more of the first microphone signal and the second microphone signal of an embodiment is delayed.

[00149] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00150] The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00151] One or more of the first microphone signal and the second microphone signal of an embodiment is multiplied by a gain factor.

[00152] Embodiments of the DOMA described herein include a sensor comprising: a physical microphone array including a first physical microphone and a second physical microphone, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal; a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker.

[00153] The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that includes the single null.

[00154] The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

[00155] The single null of an embodiment is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00156] The second linear response to speech of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00157] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00158] The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

[00159] Embodiments of the DOMA described herein include a device comprising: a headset including at least one loudspeaker, wherein the headset attaches to a region of a human head; a microphone array connected to the headset, the microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal; and a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech.

[00160] The first and second physical microphones of an embodiment are omnidirectional.

[00161] The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

[00162] The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

[00163] The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00164] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00165] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00166] The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

[00167] A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

[00168] The first virtual microphone of an embodiment comprises the second microphone signal subtracted from the first microphone signal.

[00169] The first microphone signal of an embodiment is delayed.

[00170] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00171] The delay of an embodiment is raised to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00172] The second microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00173] The second virtual microphone of an embodiment comprises the first microphone signal subtracted from the second microphone signal.

[00174] The first microphone signal of an embodiment is delayed.

[00175] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00176] The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00177] The first microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

- [00178] The first virtual microphone of an embodiment comprises the second microphone signal subtracted from a delayed version of the first microphone signal.
- [00179] The second virtual microphone of an embodiment comprises a delayed version of the first microphone signal subtracted from the second microphone signal.
- [00180] A speech source that generates the speech of an embodiment is a mouth of a human wearing the headset.
- [00181] The device of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.
- [00182] The device of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the first and second virtual microphones and generating an output signal, wherein the output signal is a denoised acoustic signal.
- [00183] The microphone array of an embodiment receives acoustic signals including acoustic speech and acoustic noise.
- [00184] The device of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.
- [00185] The device of an embodiment comprises a communication device coupled to the headset via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).
- [00186] Embodiments of the DOMA described herein include a device comprising: a housing; a loudspeaker connected to the housing; a first physical microphone and a second physical microphone connected to the housing, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal, wherein the first and second physical microphones are omnidirectional; a first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal; and a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual



microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

**[00187]** Embodiments of the DOMA described herein include a device comprising: a housing including a loudspeaker, wherein the housing is portable and configured for attaching to a mobile object; and a physical microphone array connected to the headset, the physical microphone array including a first physical microphone and a second physical microphone that form a virtual microphone array comprising a first virtual microphone and a second virtual microphone; the first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by the first physical microphone and the second microphone signal is generated by the second physical microphone; and the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech.

**[00188]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00189]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00190]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00191]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00192]** Embodiments of the DOMA described herein include a device comprising: a housing that is attached to a region of a human speaker; a loudspeaker connected to the housing; and a physical microphone array including a first physical microphone and a second physical microphone connected to the housing, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal

that in combination form a virtual microphone array; the virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of the human speaker.

[00193] The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that includes the single null.

[00194] The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

[00195] The single null of an embodiment is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00196] The second linear response to speech of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00197] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00198] The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

[00199] Embodiments of the DOMA described herein include a system comprising: a microphone array including a first physical microphone outputting a first microphone signal and a second physical microphone outputting a second microphone signal; a processing component coupled to the microphone array and generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone have

substantially similar responses to noise and substantially dissimilar responses to speech; and an adaptive noise removal application coupled to the processing component and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the microphone array.

[00200] The first and second physical microphones of an embodiment are omnidirectional.

[00201] The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

[00202] The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

[00203] The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00204] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00205] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00206] The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

[00207] A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

[00208] The first virtual microphone of an embodiment comprises the second microphone signal subtracted from the first microphone signal.

[00209] The first microphone signal of an embodiment is delayed,

[00210] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00211] The delay of an embodiment is raised to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the

third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00212] The second microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00213] The second virtual microphone of an embodiment comprises the first microphone signal subtracted from the second microphone signal.

[00214] The first microphone signal of an embodiment is delayed.

[00215] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00216] The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00217] The first microphone signal of an embodiment is multiplied by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

[00218] The first virtual microphone of an embodiment comprises the second microphone signal subtracted from a delayed version of the first microphone signal.

[00219] The second virtual microphone of an embodiment comprises a delayed version of the first microphone signal subtracted from the second microphone signal.

[00220] The system of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

[00221] The system of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

[00222] The system of an embodiment comprises a communication device coupled to the processing component via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones,

Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

[00223] Embodiments of the DOMA described herein include a system comprising: a first virtual microphone formed from a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; a second virtual microphone formed from a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech; an adaptive noise removal application coupled to the first and second virtual microphones and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first and second physical microphones.

[00224] The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

[00225] The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00226] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00227] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00228] Embodiments of the DOMA described herein include a system comprising: a first microphone outputting a first microphone signal and a second microphone outputting a second microphone signal, wherein the first microphone and the second microphone are omnidirectional microphones; a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a first combination of the

first microphone signal and the second microphone signal, wherein the second virtual microphone comprises a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones; and an adaptive noise removal application coupled to the virtual microphone array and generating denoised output signals by forming a plurality of combinations of signals output from the first virtual microphone and the second virtual microphone, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first microphone and the second microphone.

**[00229]** Embodiments of the DOMA described herein include a system comprising: a first physical microphone generating a first microphone signal; a second physical microphone generating a second microphone signal; a processing component coupled to the first microphone signal and the second microphone signal, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone; and wherein the first virtual microphone comprises the second microphone signal subtracted from a delayed version of the first microphone signal; wherein the second virtual microphone comprises a delayed version of the first microphone signal subtracted from the second microphone signal; an adaptive noise removal application coupled to the processing component and generating denoised output signals, wherein the denoised output signals include less acoustic noise than acoustic signals received at the first physical microphone and the second physical microphone.

**[00230]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00231]** The second virtual microphone of an embodiment has a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00232]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00233]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00234] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00235] The first physical microphone and the second physical microphone of an embodiment are positioned along an axis and separated by a first distance.

[00236] A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

[00237] One or more of the first microphone signal and the second microphone signal of an embodiment is delayed.

[00238] The delay of an embodiment is raised to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00239] The power of an embodiment is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00240] One or more of the first microphone signal and the second microphone signal of an embodiment is multiplied by a gain factor.

[00241] The system of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

[00242] The system of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

[00243] The system of an embodiment comprises a communication device coupled to the processing component via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless 10 communication radios, personal digital assistants (PDAs), and personal computers (PCs).

[00244] Embodiments of the DOMA described herein include a system comprising: a physical microphone array including a first physical microphone and a second physical microphone, the

first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal; a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker; and an adaptive noise removal application coupled to the virtual microphone array and generating denoised output signals by forming a plurality of combinations of signals output from the virtual microphone array, wherein the denoised output signals include less acoustic noise than acoustic signals received at the physical microphone array.

**[00245]** The first virtual microphone of an embodiment has a first linear response to speech that is devoid of a null, wherein the second virtual microphone of an embodiment has a second linear response to speech that includes the single null.

**[00246]** The first virtual microphone and the second virtual microphone of an embodiment have a linear response to noise that is substantially similar.

**[00247]** The single null of an embodiment is a region of the second linear response to speech having a measured response level that is lower than the measured response level of any other region of the second linear response. The second linear response to speech of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00248]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00249]** The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

**[00250]** Embodiments of the DOMA described herein include a system comprising: a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is output from a first physical microphone and the second microphone signal is output from a second physical microphone; a second virtual microphone comprising a second combination of the first microphone signal and



the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech; and a processing component coupled to the first and second virtual microphones, the processing component including an adaptive noise removal application receiving acoustic signals from the first virtual microphone and the second virtual microphone and generating an output signal, wherein the output Signal is a denoised acoustic signal.

**[00251]** Embodiments of the DOMA described herein include a method comprising: forming a first virtual microphone by generating a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone; and forming a second virtual microphone by generating a second combination of the first microphone signal and the second microphone Signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

**[00252]** Forming the first virtual microphone of an embodiment includes forming the first virtual microphone to have a first linear response to speech that is devoid of a null, wherein the speech is human speech.

**[00253]** Forming the second virtual microphone of an embodiment includes forming the second virtual microphone to have a second linear response to speech that includes a single null oriented in a direction toward a source of the speech.

**[00254]** The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

**[00255]** The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00256]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00257] The method of an embodiment comprises positioning the first physical microphone and the second physical microphone along an axis and separating the first and second physical microphones by a first distance.

[00258] A midpoint of the axis of an embodiment is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.

[00259] Forming the first virtual microphone of an embodiment comprises subtracting the second microphone signal subtracted from the first microphone signal.

[00260] The method of an embodiment comprises delaying the first microphone signal.

[00261] The method of an embodiment comprises raising the delay to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00262] The method of an embodiment comprises raising the delay to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00263] The method of an embodiment comprises multiplying the second microphone signal by a ratio, wherein the ratio is a ratio of a third distance to a fourth distance, the third distance being between the first physical microphone and the speech source and the fourth distance being between the second physical microphone and the speech source.

[00264] Forming the second virtual microphone of an embodiment comprises subtracting the first microphone signal from the second microphone signal.

[00265] The method of an embodiment comprises delaying the first microphone signal.

[00266] The method of an embodiment comprises raising the delay to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

[00267] The method of an embodiment comprises raising the delay to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and the

speech source and the fourth distance being between the second physical microphone and the speech source.

[00268] The method of an embodiment comprises multiplying the first microphone signal by a ratio, wherein the ratio is a ratio of the third distance to the fourth distance.

[00269] Forming the first virtual microphone of an embodiment comprises subtracting the second microphone signal from a delayed version of the first microphone signal.

[00270] Forming the second virtual microphone of an embodiment comprises: forming a quantity by delaying the first microphone signal; and subtracting the quantity from the second microphone signal.

[00271] The first and second physical microphones of an embodiment are omnidirectional.

[00272] Embodiments of the DOMA described herein include a method comprising: receiving a first microphone signal from a first omnidirectional microphone and receiving a second microphone signal from a second omnidirectional microphone; generating a first virtual directional microphone by generating a first combination of the first microphone signal and the second microphone signal; generating a second virtual directional microphone by generating a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

[00273] Embodiments of the DOMA described herein include a method of forming a microphone array comprising: forming a first virtual microphone by generating a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first omnidirectional microphone and the second microphone signal is generated by a second omnidirectional microphone; and forming a second virtual microphone by generating a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; wherein the first virtual microphone has a first linear response to speech that is devoid of a null, wherein the second virtual microphone has a second linear response to speech that has a single null oriented in a direction toward a source of the speech, wherein the speech is human speech.

[00274] Forming the first and second virtual microphones of an embodiment comprises forming the first virtual microphone and the second virtual microphone to have a linear response to noise that is substantially similar.

[00275] The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00276] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech. The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00277] Embodiments of the DOMA described herein include a method comprising: receiving acoustic signals at a first physical microphone and a second physical microphone; outputting in response to the acoustic signals a first microphone signal from the first physical microphone and outputting a second microphone signal from the second physical microphone; forming a first virtual microphone by generating a first combination of the first microphone signal and the second microphone signal; forming a second virtual microphone by generating a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech; generating output signals by combining signals from the first virtual microphone and the second virtual microphone, wherein the output signals include less acoustic noise than the acoustic signals.

[00278] The first and second physical microphones of an embodiment are omnidirectional microphones.

[00279] Forming the first virtual microphone of an embodiment includes forming the first virtual microphone to have a first linear response to speech that is devoid of a null, wherein the speech is human speech.

[00280] Forming the second virtual microphone of an embodiment includes forming the second virtual microphone to have a second linear response to speech that includes a single null oriented in a direction toward a source of the speech. The single null of an embodiment is a

region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00281] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

[00282] The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

[00283] Forming the first virtual microphone of an embodiment comprises subtracting the second microphone signal from a delayed version of the first microphone signal.

[00284] Forming the second virtual microphone of an embodiment comprises: forming a quantity by delaying the first microphone signal; and subtracting the quantity from the second microphone signal. Embodiments of the DOMA described herein include a method comprising: forming a physical microphone array including a first physical microphone and a second physical microphone, the first physical microphone outputting a first microphone signal and the second physical microphone outputting a second microphone signal; and forming a virtual microphone array comprising a first virtual microphone and a second virtual microphone, the first virtual microphone comprising a first combination of the first microphone signal and the second microphone signal, the second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination; the virtual microphone array including a single null oriented in a direction toward a source of speech of a human speaker.

[00285] Forming the first and second virtual microphones of an embodiment comprises forming the first virtual microphone and the second virtual microphone to have a linear response to noise that is substantially similar.

[00286] The single null of an embodiment is a region of the second linear response having a measured response level that is lower than the measured response level of any other region of the second linear response.

[00287] The second linear response of an embodiment includes a primary lobe oriented in a direction away from the source of the speech.

**[00288]** The primary lobe of an embodiment is a region of the second linear response having a measured response level that is greater than the measured response level of any other region of the second linear response.

**[00289]** The single null of an embodiment is located at a distance from the physical microphone array where the source of the speech is expected to be.

**[00290]** Aspects of the DOMA and corresponding systems and methods described herein may be implemented as functionality programmed into any of a variety of circuitry, including programmable logic devices (PLDs), such as field programmable gate arrays (FPGAs), programmable array logic (PAL) devices, electrically programmable logic and memory devices and standard cell-based devices, as well as application specific integrated circuits (ASICs). Some other possibilities for implementing aspects of the DOMA and corresponding systems and methods include: microcontrollers with memory (such as electronically erasable programmable read only memory (EEPROM)), embedded microprocessors, firmware, software, etc. Furthermore, aspects of the DOMA and corresponding systems and methods may be embodied in microprocessors having software-based circuit emulation, discrete logic (sequential and combinatorial), custom devices, fuzzy (neural) logic, quantum devices, and hybrids of any of the above device types. Of course the underlying device technologies may be provided in a variety of component types, e.g., metal-oxide semiconductor field-effect transistor (MOSFET) technologies like complementary metal-oxide semiconductor (CMOS), bipolar technologies like emitter-coupled logic (ECL), polymer technologies (e.g., silicon-conjugated polymer and metal-conjugated polymer-metal structures), mixed 15 analog and digital, etc.

**[00291]** It should be noted that any system, method, and/or other components disclosed herein may be described using computer aided design tools and expressed (or represented), as data and/or instructions embodied in various computer-readable media, in terms of their behavioral, register transfer, logic component, transistor, layout geometries, and/or other characteristics. Computer-readable media in which such formatted data and/or instructions may be embodied include, but are not limited to, non-volatile storage media in various forms (e.g., optical, magnetic or semiconductor storage media) and carrier waves that may be used to transfer such formatted data and/or instructions through wireless, optical, or wired signaling media or any combination thereof. Examples of transfers of such formatted data and/or instructions by carrier waves include, but are not limited to, transfers (uploads, downloads, e-mail, etc.) over the

Internet and/or other computer networks via one or more data transfer protocols (e.g., HTTP, FTP, SMTP, etc.). When received within a computer system via one or more computer-readable media, such data and/or instruction-based expressions of the above described components may be processed by a processing entity (e.g., one or more processors) within the computer system in conjunction with execution of one or more other computer programs.

**[00292]** Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in a sense of "including, but not limited to." Words using the singular or plural number also include the plural or singular number respectively. Additionally, the words "herein," "hereunder," "above," "below," and words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application. When the word "or" is used in reference to a list of two or more items, that word covers all of the following interpretations of the word: any of the items in the list, all of the items in the list and any combination of the items in the list.

**[00293]** The above description of embodiments of the DOMA and corresponding systems and methods is not intended to be exhaustive or to limit the systems and methods to the precise forms disclosed. While specific embodiments of, and examples for, the DOMA and corresponding systems and methods are described herein for illustrative purposes, various equivalent modifications are possible within the scope of the systems and methods, as those skilled in the relevant art will recognize. The teachings of the DOMA and corresponding systems and methods provided herein can be applied to other systems and methods, not only for the systems and methods described above.

**[00294]** The elements and acts of the various embodiments described above can be combined to provide further embodiments. These and other changes can be made to the DOMA and corresponding systems and methods in light of the above detailed description.

**[00295]** In general, in the following claims, the terms used should not be construed to limit the DOMA and corresponding systems and methods to the specific embodiments disclosed in the specification and the claims, but should be construed to include all systems that operate under the claims. Accordingly, the DOMA and corresponding systems and methods is not limited by the disclosure, but instead the scope is to be determined entirely by the claims.

[00296] While certain aspects of the DOMA and corresponding systems and methods are presented below in certain claim forms, the inventors contemplate the various aspects of the DOMA and corresponding systems and methods in any number of claim forms. Accordingly, the inventors reserve the right to add additional claims after filing the application to pursue such additional claim forms for other aspects of the DOMA and corresponding systems and methods.



## CLAIMS

What is claimed is:

1. A microphone array comprising:
  - a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;
  - and
  - a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

**FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)**

**ABSTRACT**

A dual omnidirectional microphone array noise suppression is described. Compared to conventional arrays and algorithms, which seek to reduce noise by nulling out noise sources, the array of an embodiment is used to form two distinct virtual directional microphones which are configured to have very similar noise responses and very dissimilar speech responses. The only null formed is one used to remove the speech of the user from  $V_2$ . The two virtual microphones may be paired with an adaptive filter algorithm and VAD algorithm to significantly reduce the noise without distorting the speech, significantly improving the SNR of the desired speech over conventional noise suppression systems.

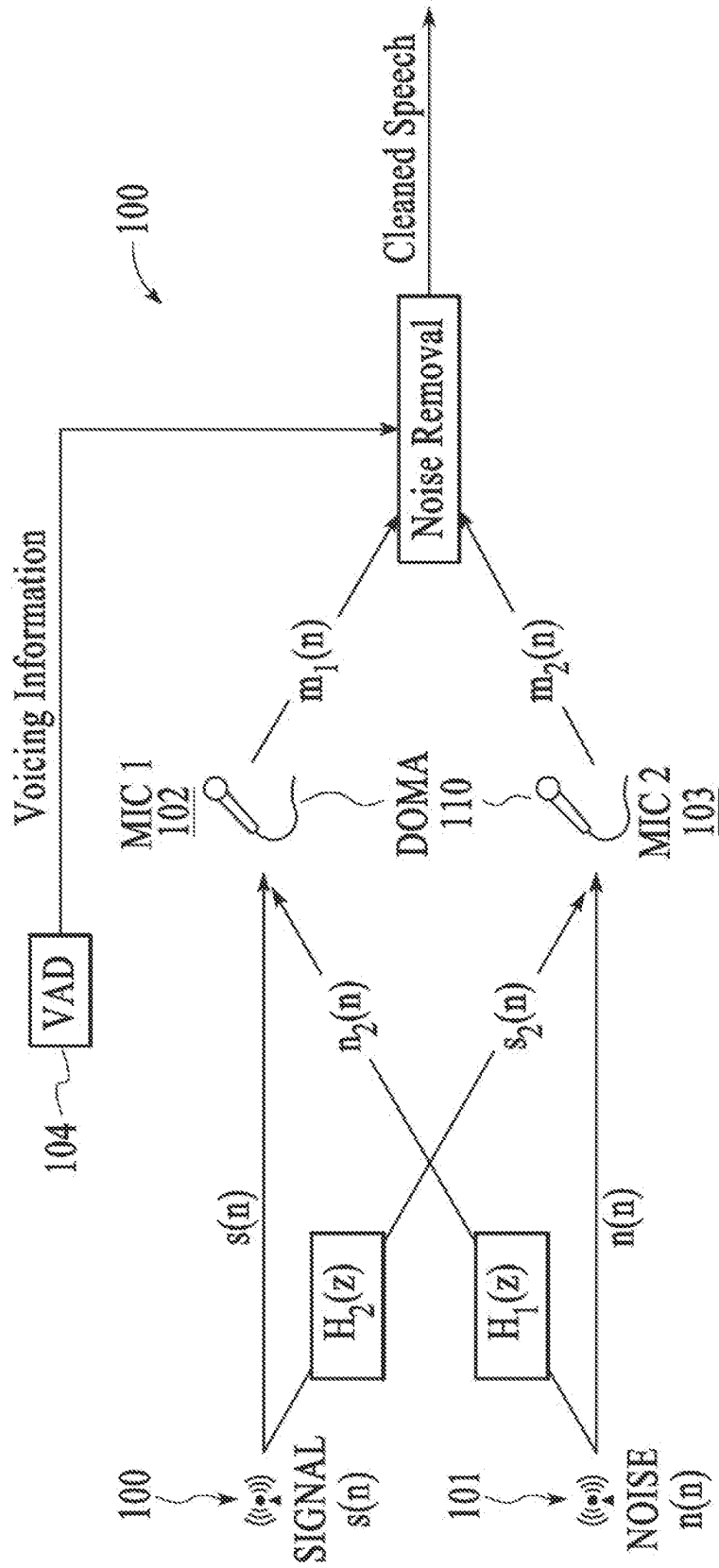


FIG. 1

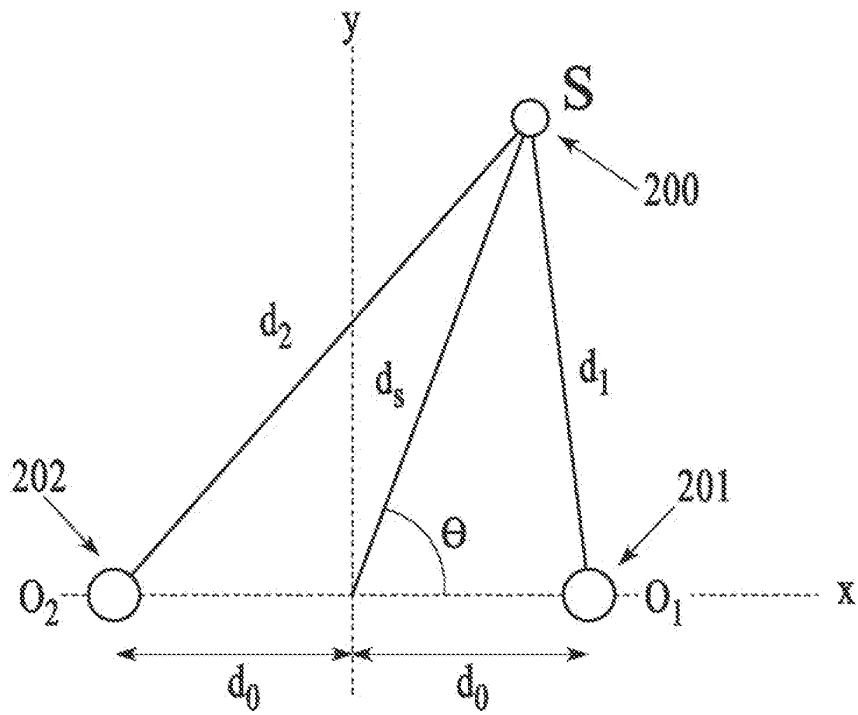


FIG.2

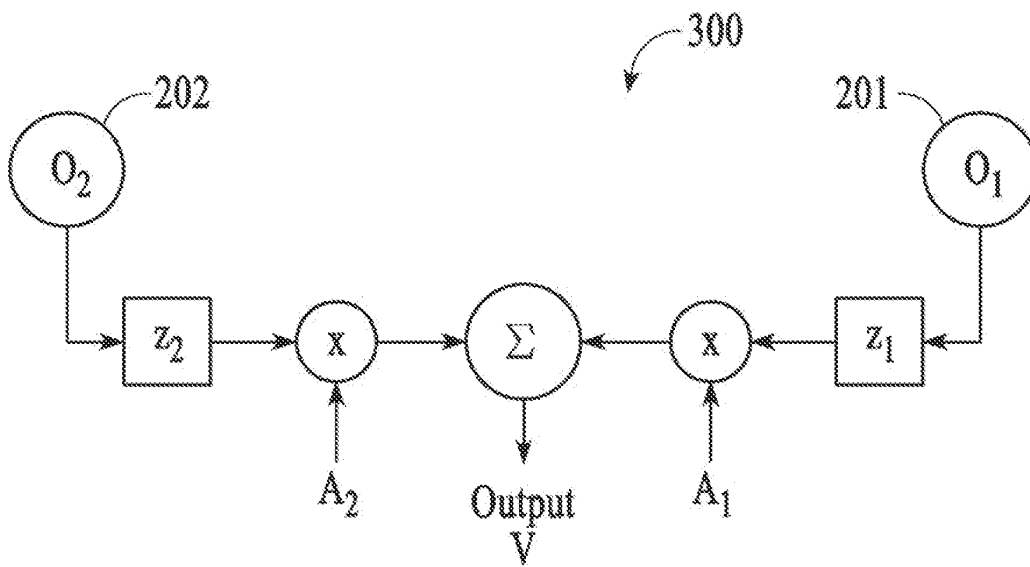


FIG.3

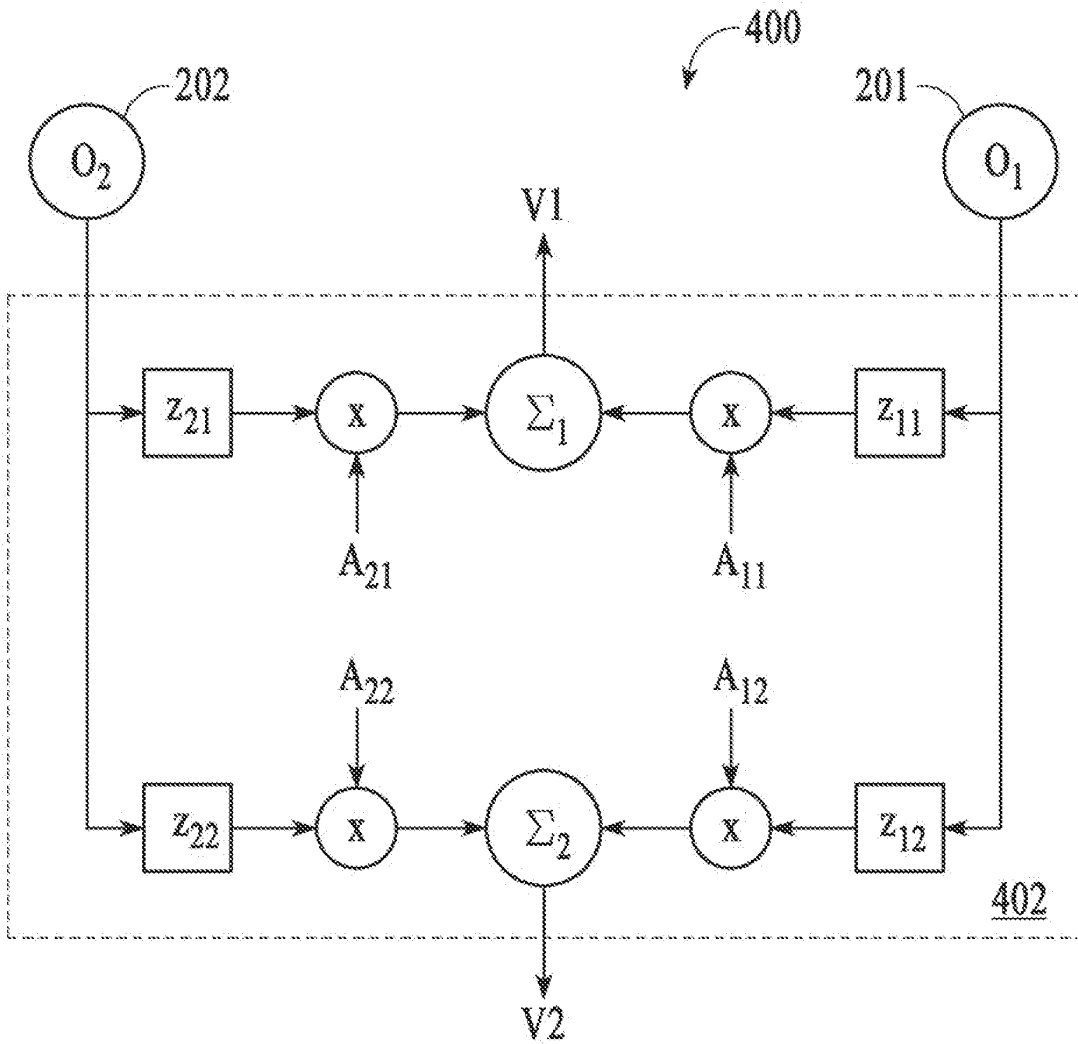


FIG.4

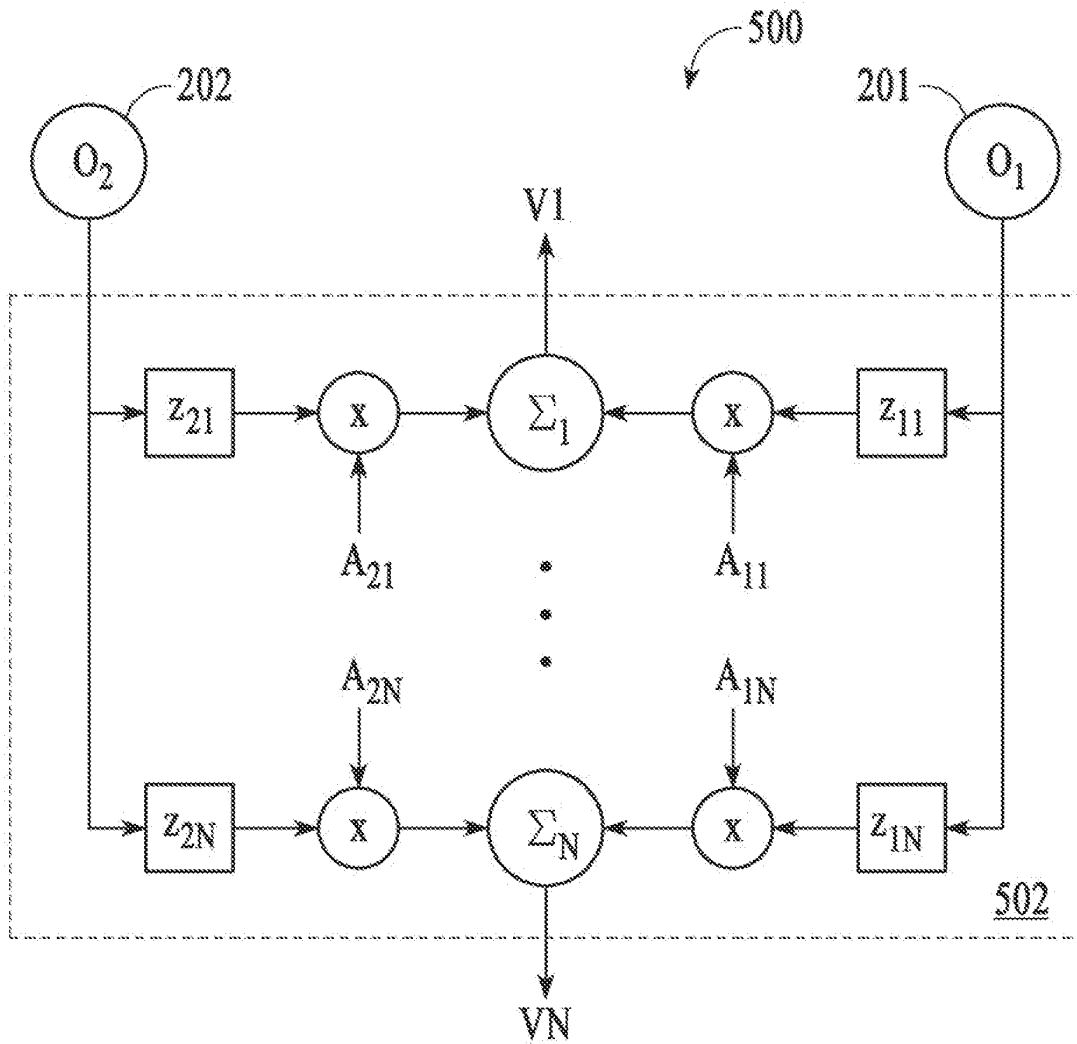


FIG.5

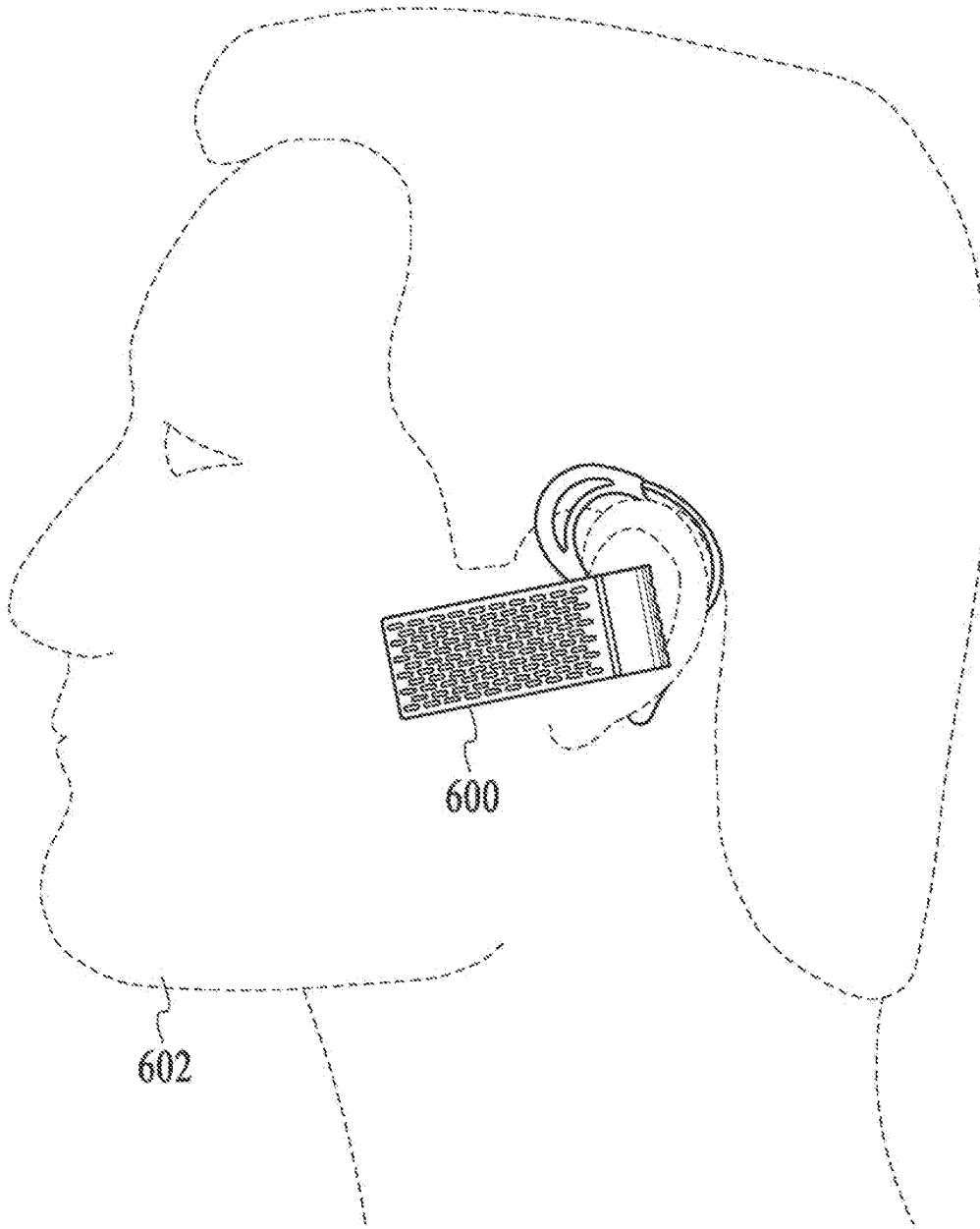


FIG.6

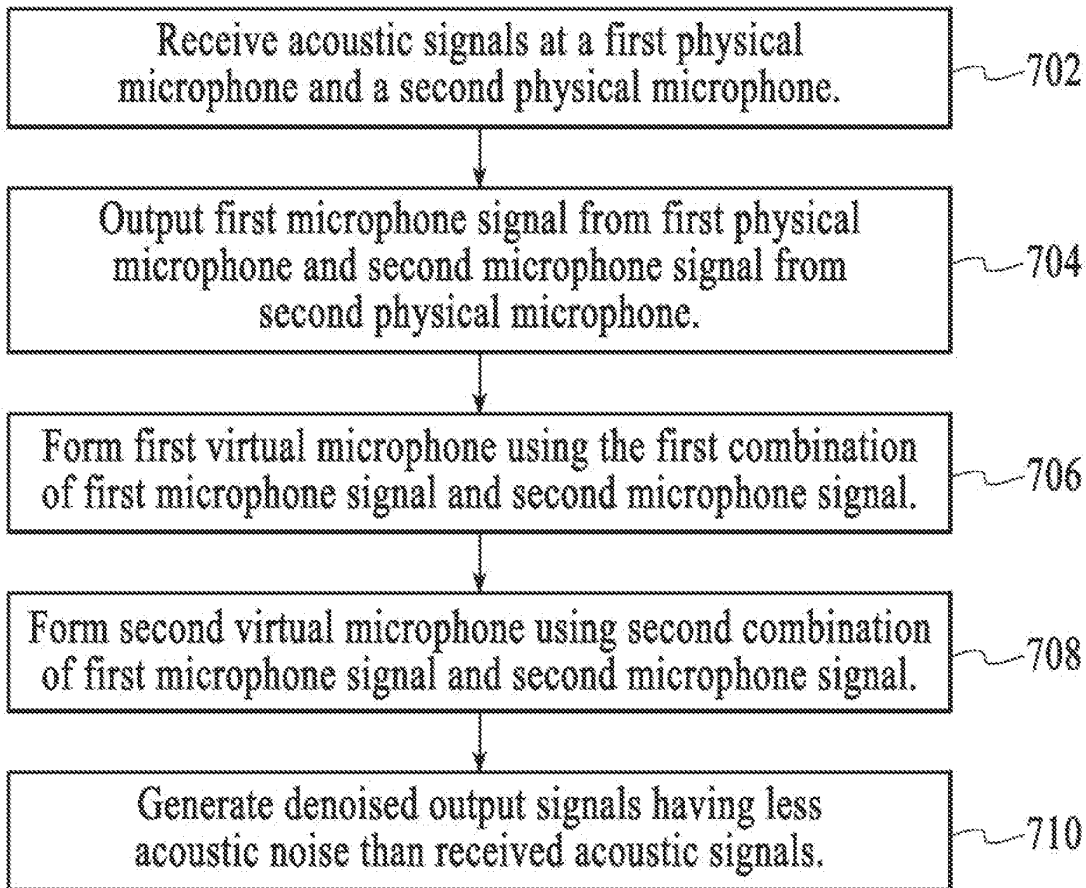


FIG. 7

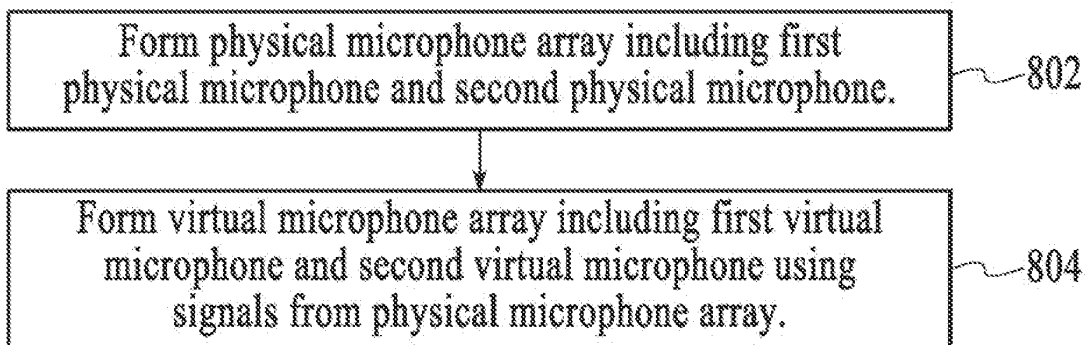


FIG. 8



Linear response of V2 to a speech source at 0.10 meters

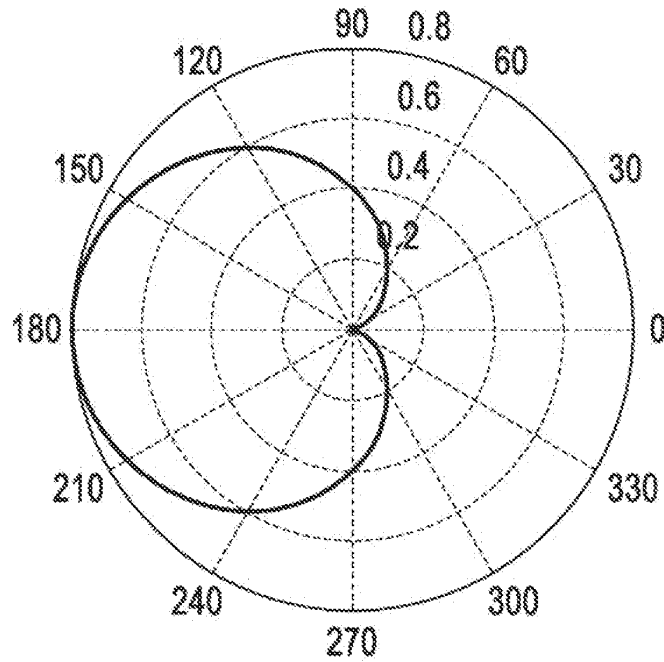


FIG.9

Linear response of V2 to a noise source at 1 meters

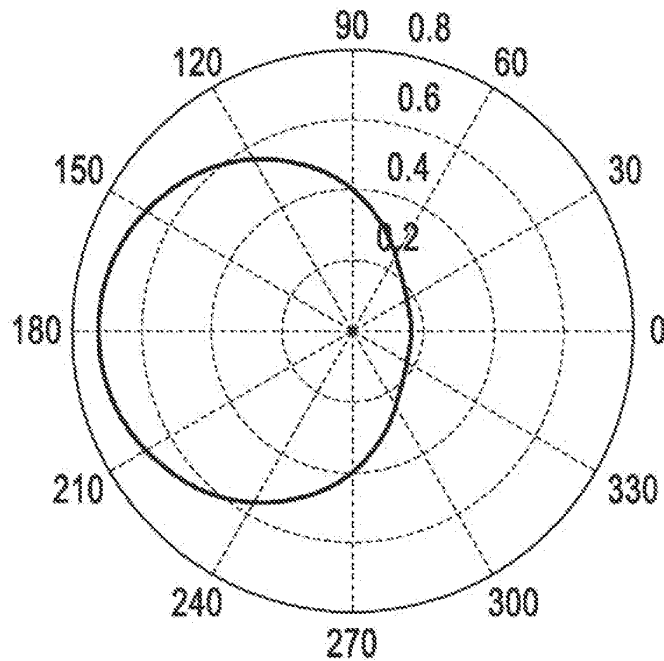


FIG.10

Linear response of V1 to a speech source at 0.10 meters

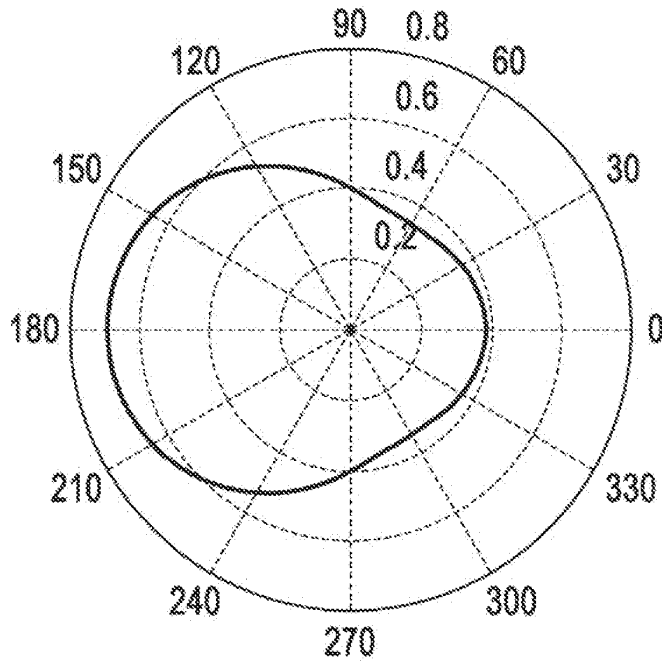


FIG.11

Linear response of V1 to a noise source at 1 meters

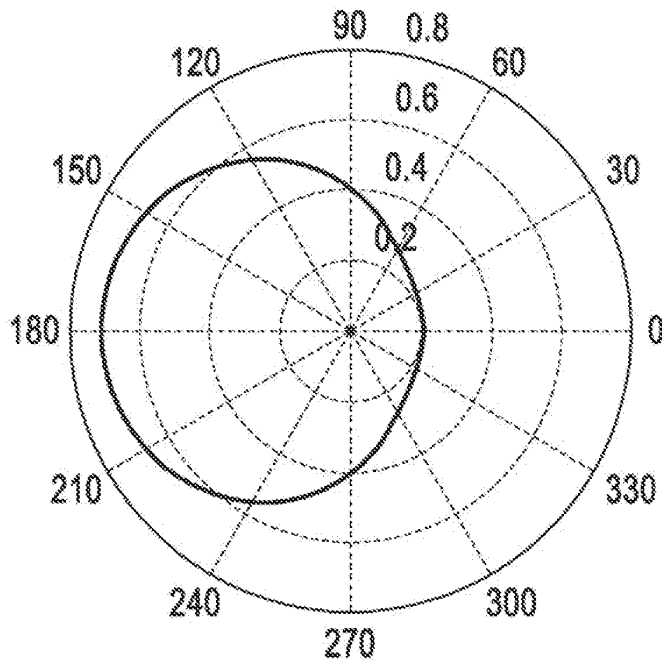


FIG.12

Linear response of V1 to a speech source at 0.1 meters

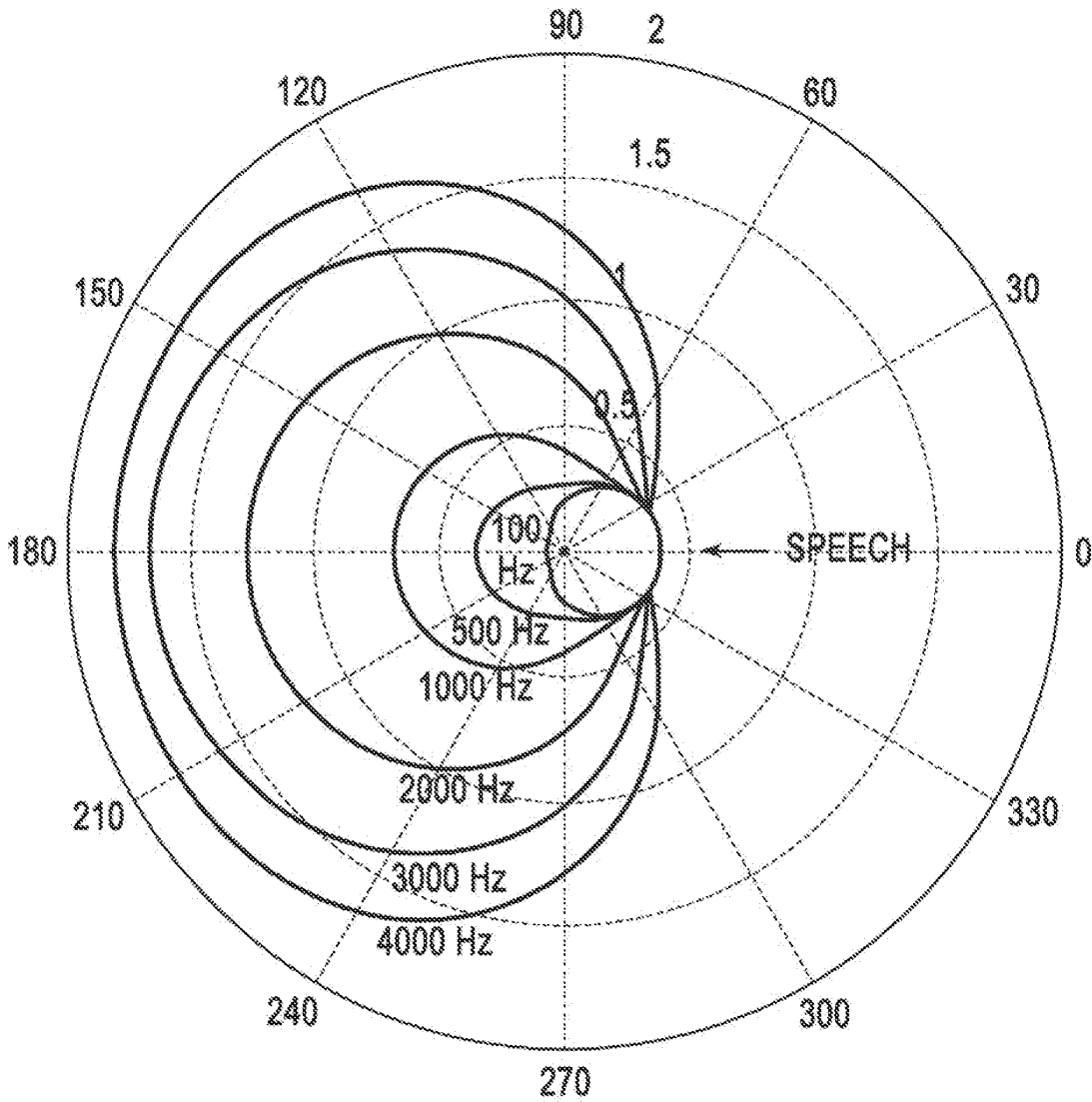


FIG.13

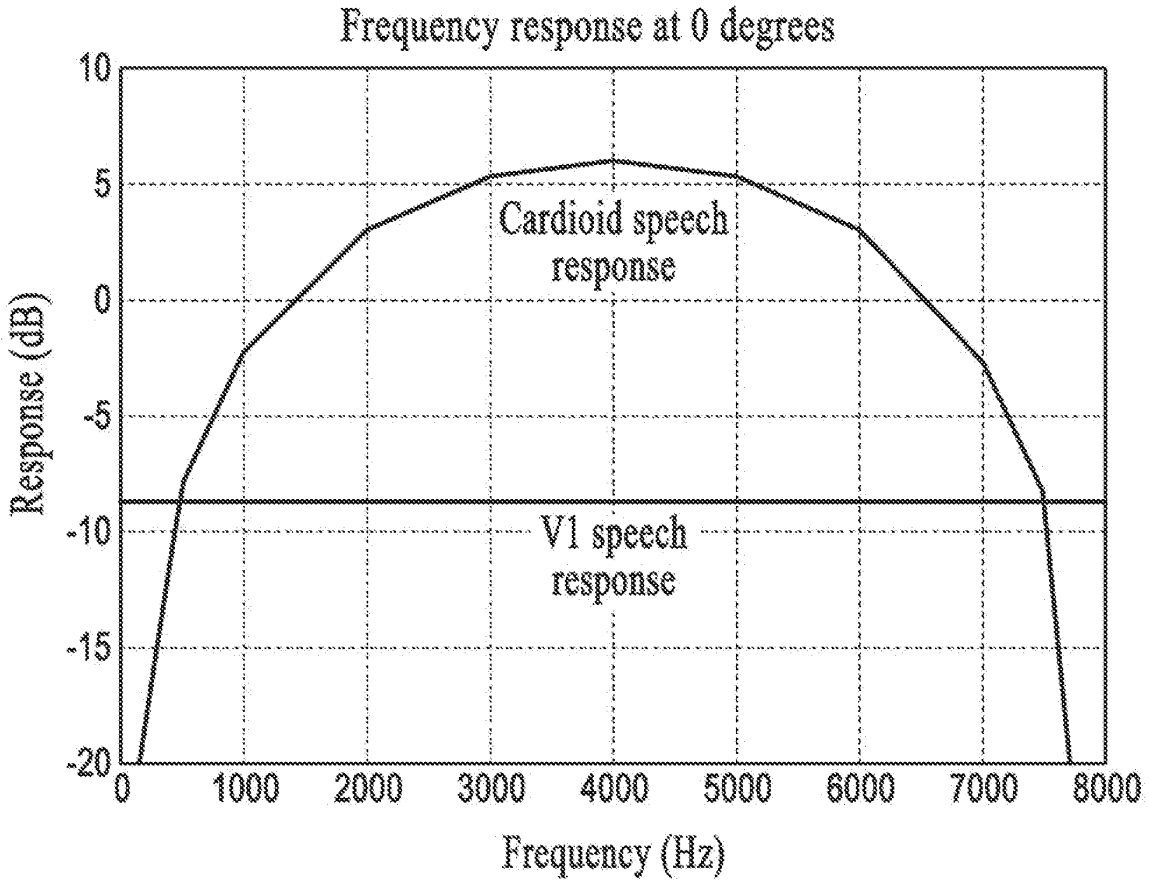


FIG.14

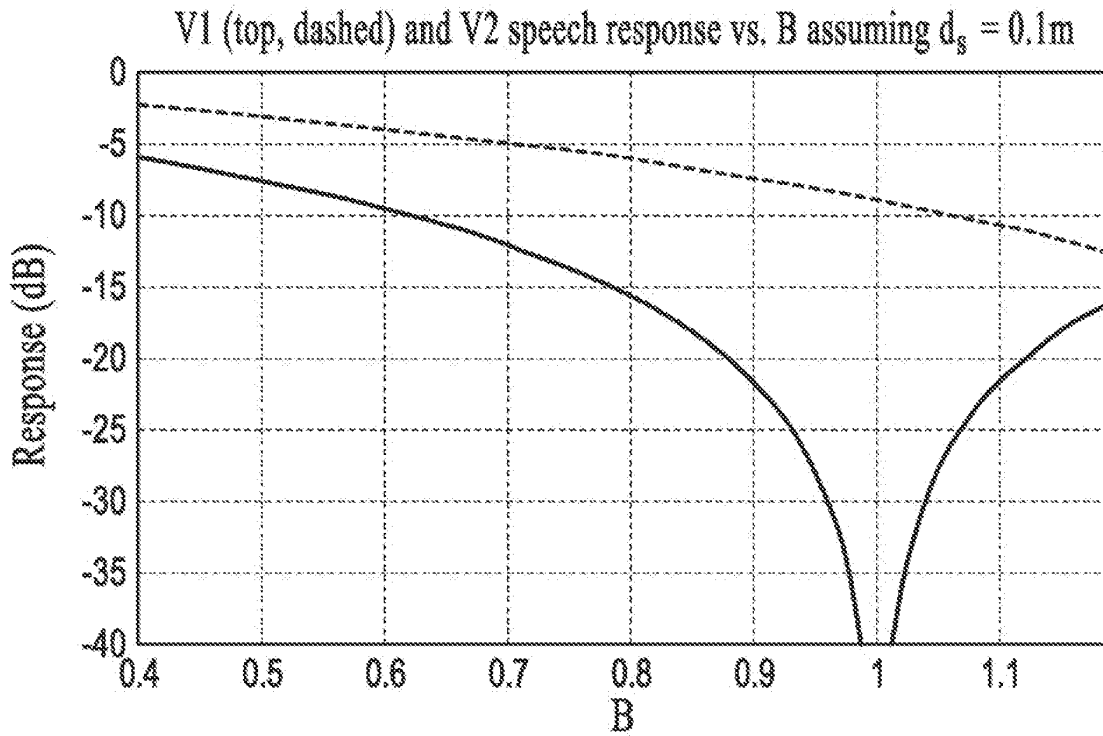


FIG. 15

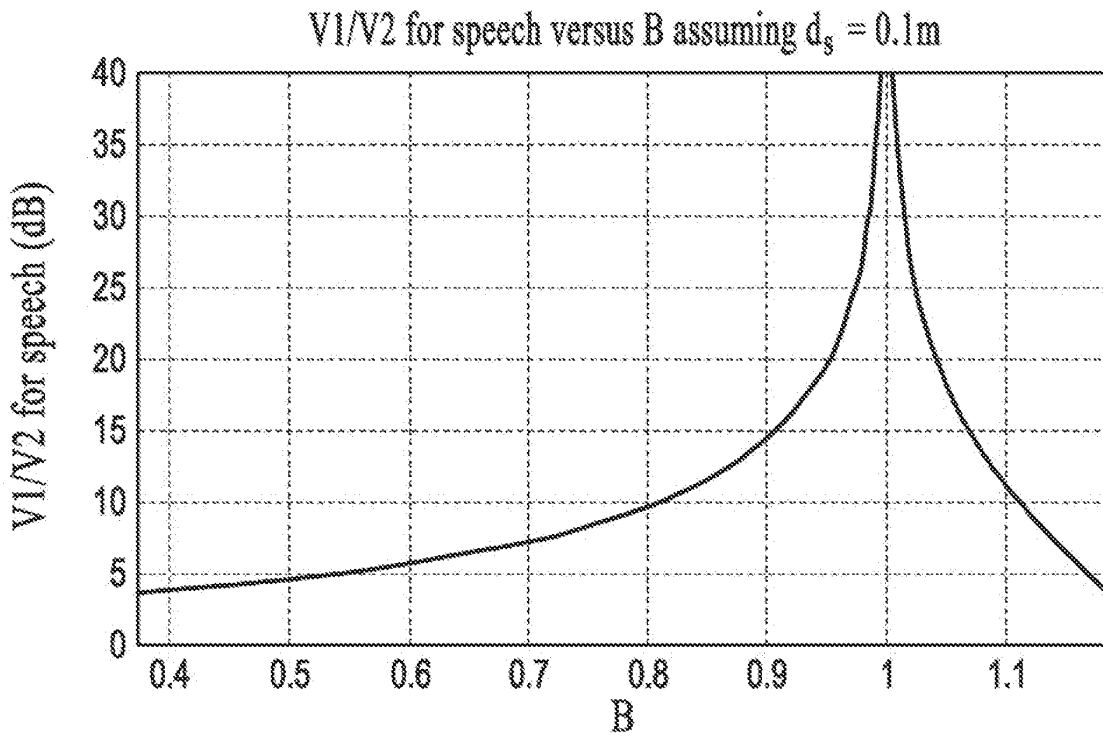


FIG. 16

B factor vs. actual  $d_s$  assuming  $d_s = 0.1\text{m}$  and  $\theta = 0$

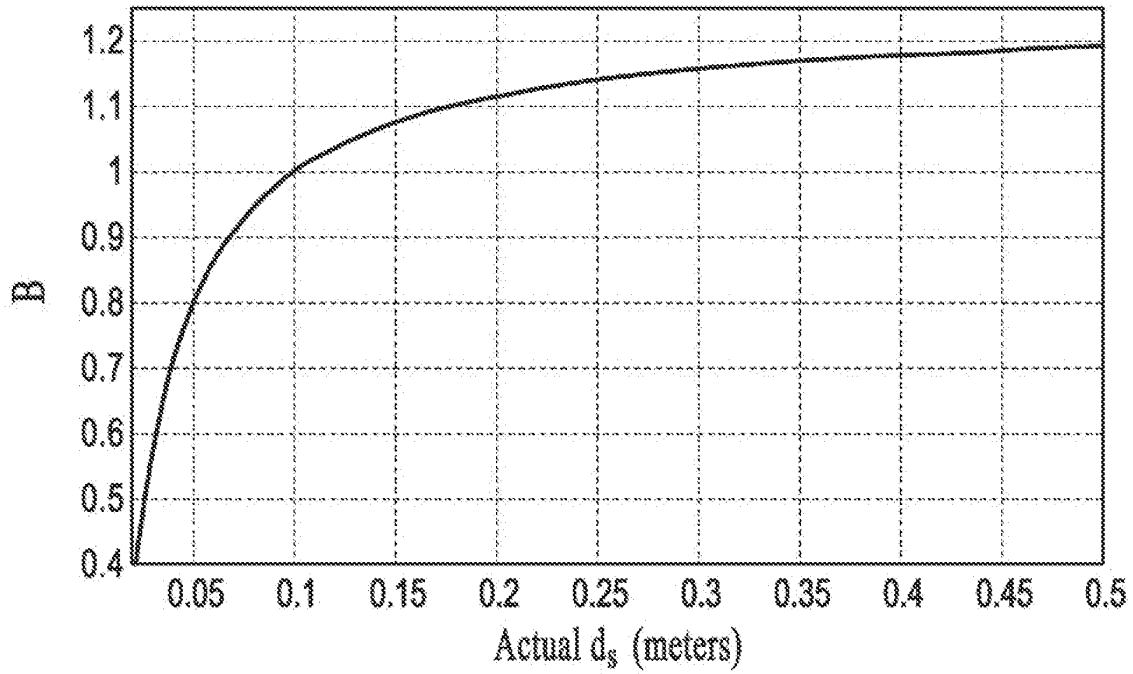


FIG.17

B versus  $\theta$  assuming  $d_s = 0.1\text{m}$

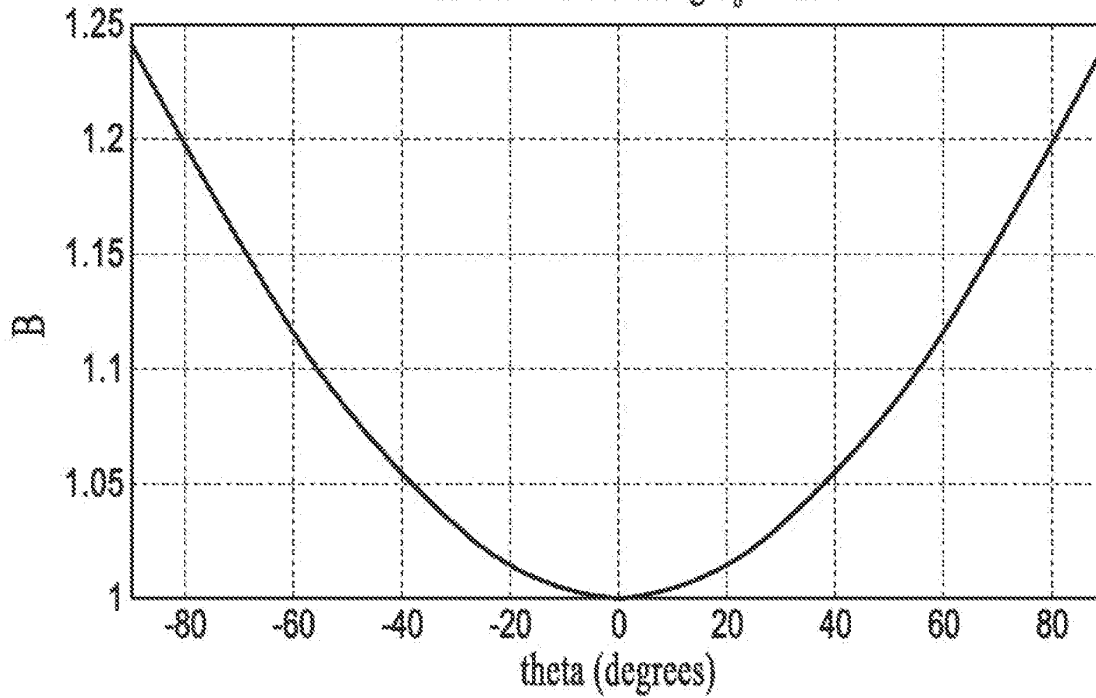


FIG.18

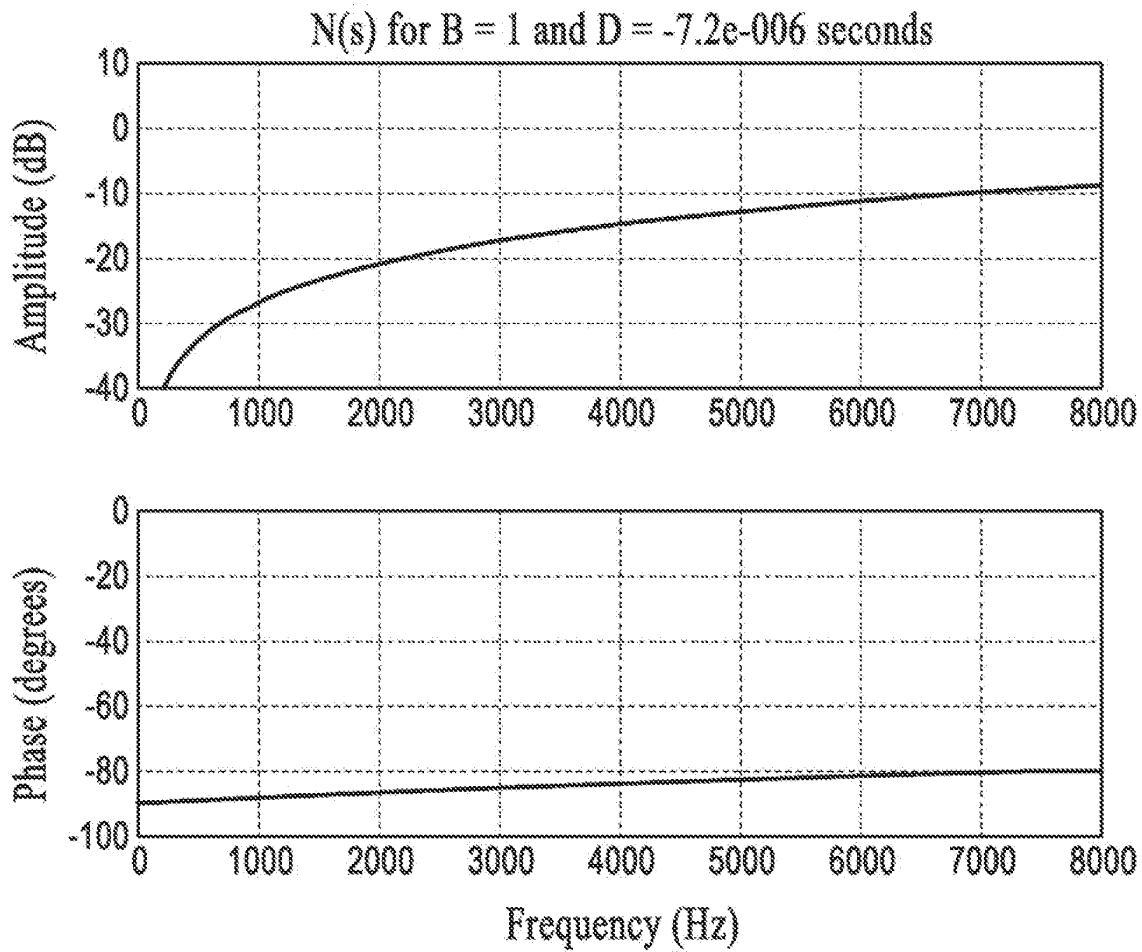


FIG.19

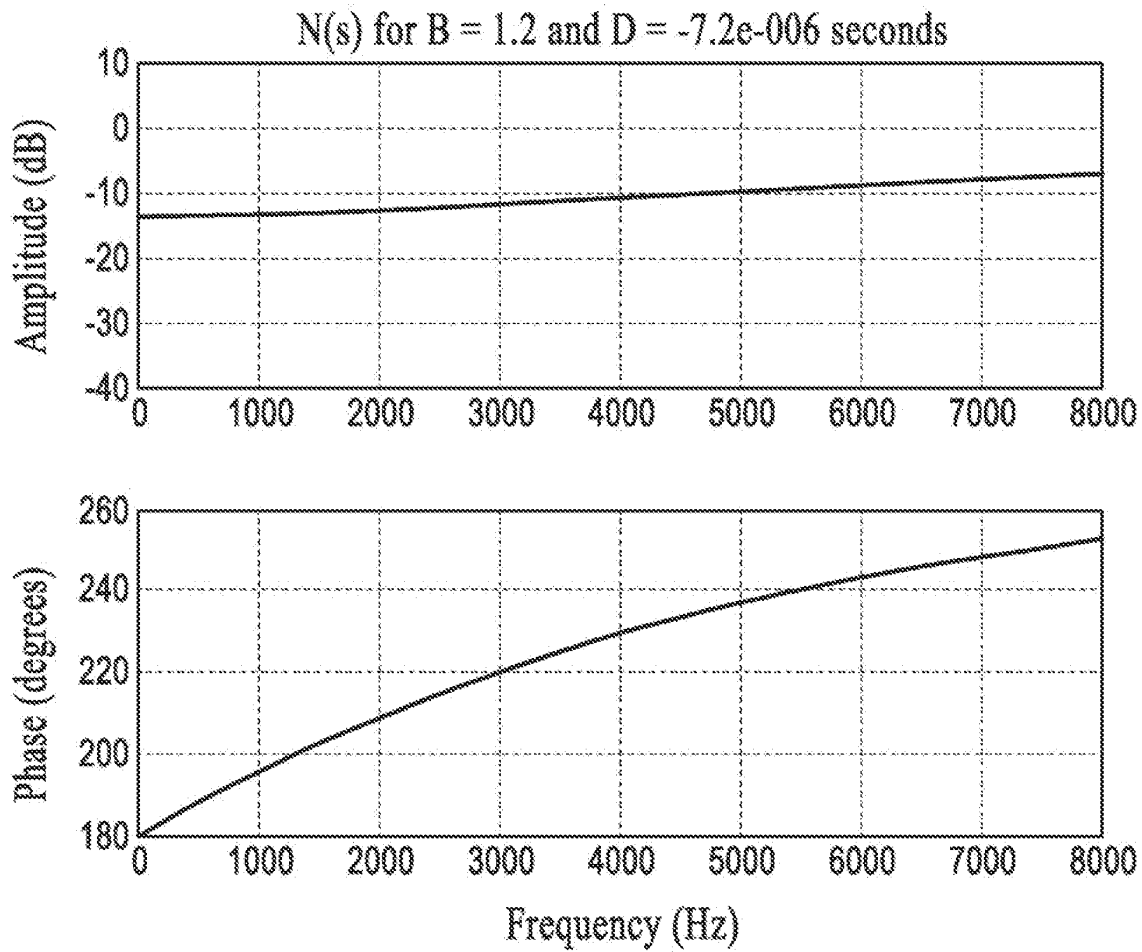


FIG.20



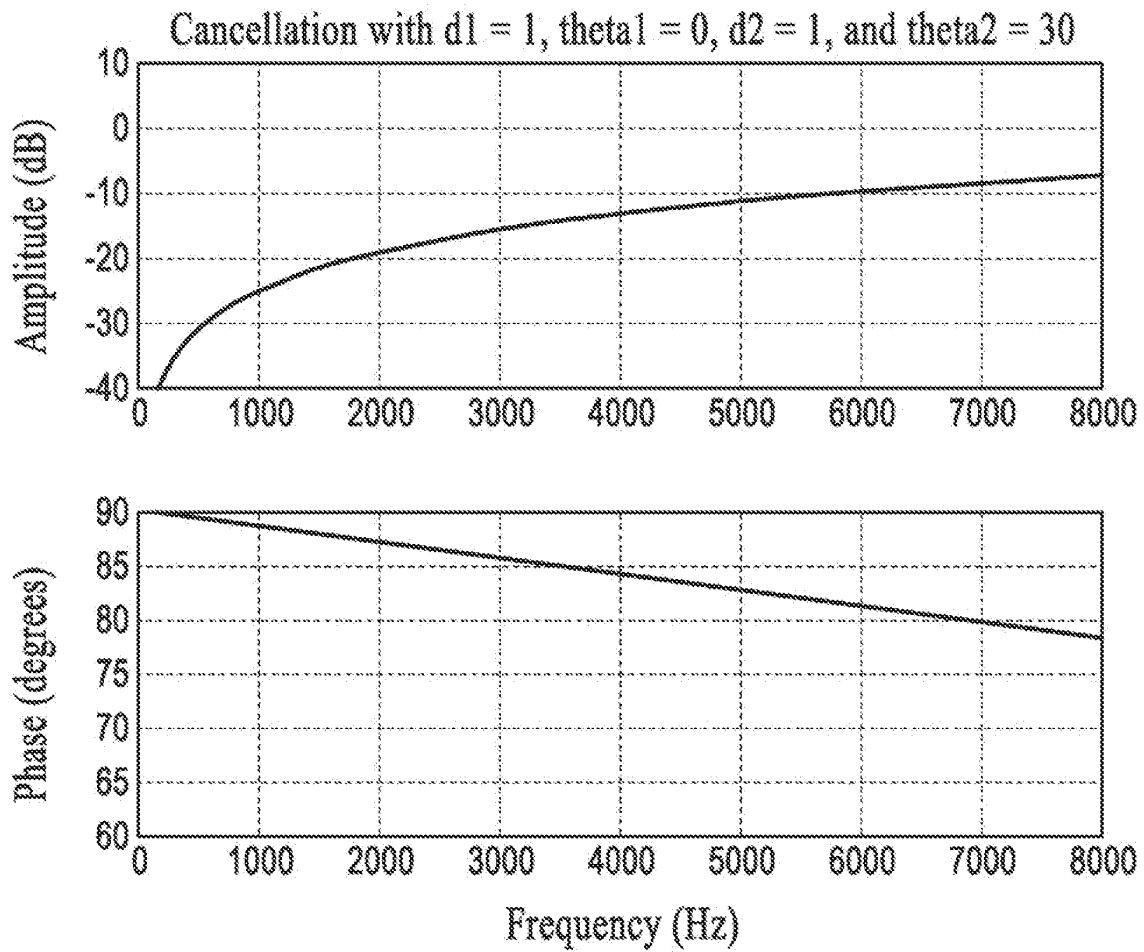


FIG.21

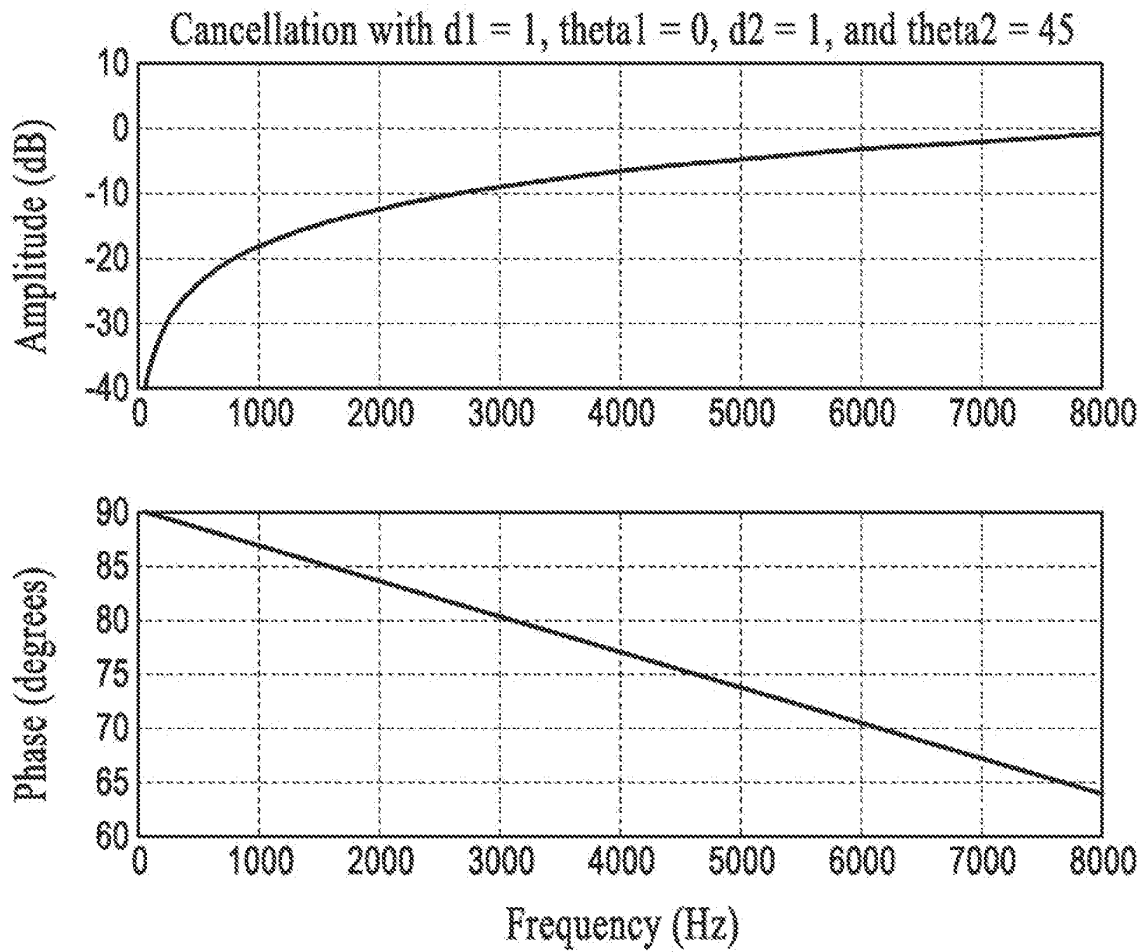


FIG.22

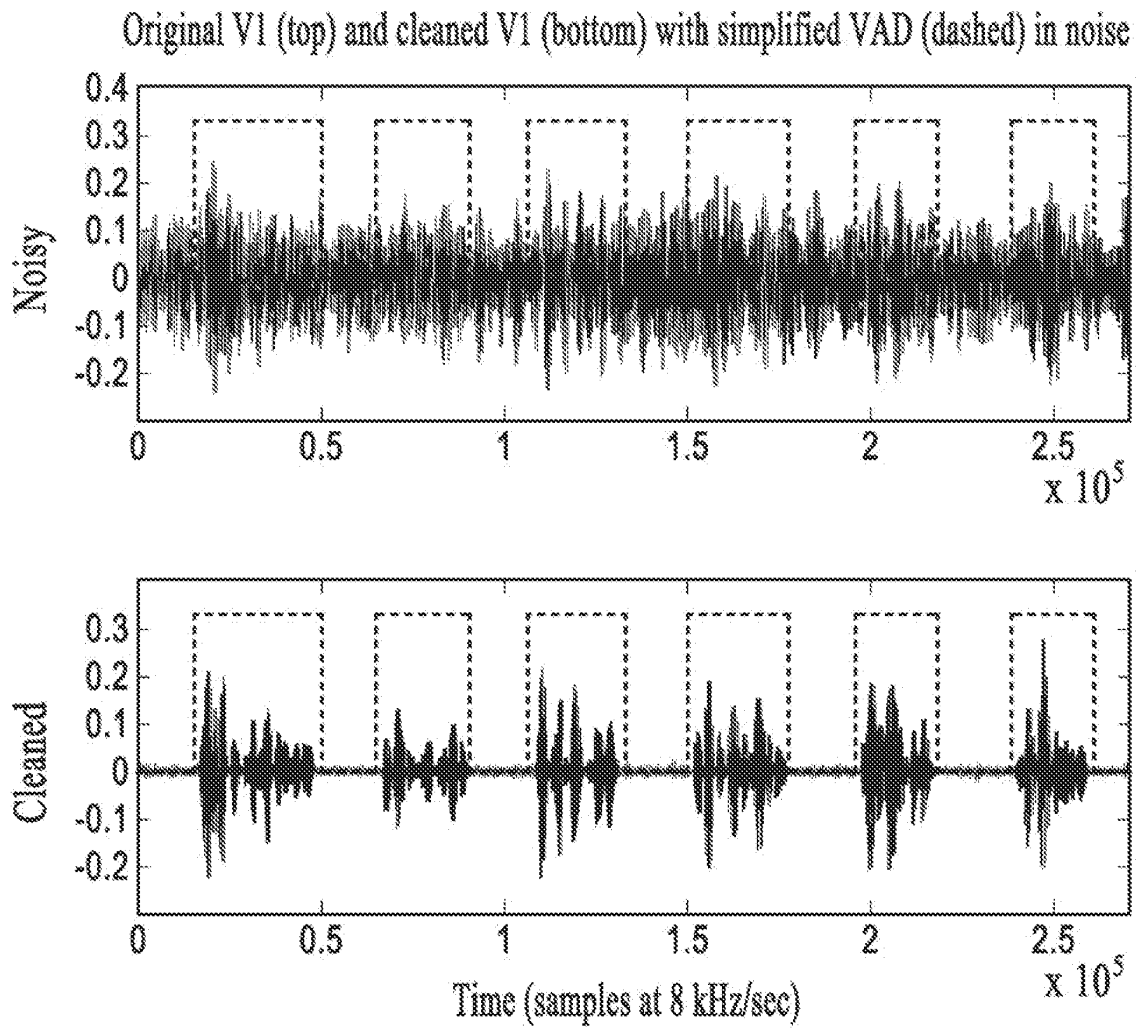


FIG.23

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	16506945
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Scott Susumu Kokka
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	ALI-050ACON1
<b>Receipt Date:</b>	05-AUG-2013
<b>Filing Date:</b>	
<b>Time Stamp:</b>	22:40:44
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ALI-050ACON1_Application_as filed.pdf	1951207  3d16a33d1a394d3a3ddcf154d95f24d82e 78f5f	yes	75

<b>Multipart Description/PDF files in .zip description</b>		
<b>Document Description</b>	<b>Start</b>	<b>End</b>
Transmittal of New Application	1	1
Application Data Sheet	2	4
Specification	5	56
Claims	57	57
Abstract	58	58
Drawings-only black and white line drawings	59	75

**Warnings:**

**Information:**

**Total Files Size (in bytes):**

1951207

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**PATENT APPLICATION FEE DETERMINATION RECORD**

Substitute for Form PTO-875

Application or Docket Number  
13/959,708

**APPLICATION AS FILED - PART I**

(Column 1)		(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	70		N/A	
SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A	300		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	360		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	1 minus 20 = *	*	x 40 =	0.00	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 = *	*	x 210 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	730		TOTAL	

**APPLICATION AS AMENDED - PART II**

(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	* Minus **	**	x =		OR	x =	
	Independent (37 CFR 1.16(h))	* Minus ***	***	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))					OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	* Minus **	**	x =		OR	x =	
	Independent (37 CFR 1.16(h))	* Minus ***	***	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))					OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 4 columns: APPLICATION NUMBER (13/959,708), FILING OR 371(C) DATE (08/05/2013), FIRST NAMED APPLICANT (Gregory C. Burnett), ATTY. DOCKET NO./TITLE (ALI-050ACON1)

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

CONFIRMATION NO. 5622
FORMALITIES LETTER



Date Mailed: 08/21/2013

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
Applicant must submit \$70 to complete the basic filing fee for a small entity.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge (for late submission of the basic filing fee, search fee, examination fee or inventor's oath or declaration) as set forth in 37 CFR 1.16(f) of \$ 70 for a small entity in compliance with 37 CFR 1.27, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within TWO MONTHS from the date of this Notice is \$ 800 for a small entity

- \$ 70 Statutory basic filing fee.
\$ 70 Surcharge.
The application search fee has not been paid. Applicant must submit \$ 300 to complete the search fee.
The application examination fee has not been paid. Applicant must submit \$ 360 to complete the examination fee for a small entity in compliance with 37 CFR 1.27.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):

Gregory C. Burnett

Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.  
<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/hnguyen/

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101





UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/959,708, 08/05/2013, 2654, 0.00, ALI-050ACON1, 1, 1

CONFIRMATION NO. 5622

FILING RECEIPT



15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

Date Mailed: 08/21/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Inventor(s) Gregory C. Burnett, Dodge Center, MN;
Applicant(s) Gregory C. Burnett, Dodge Center, MN;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 12/139,333 06/13/2008 PAT 8503691
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 08/20/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 13/959,708

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

\*\* SMALL ENTITY \*\*

**Title**

FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

**LICENSE FOR FOREIGN FILING UNDER**  
**Title 35, United States Code, Section 184**  
**Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application for:

Gregory C. Burnett

Serial No.: 13/959,708

Filing Date: August 5, 2013

For: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Confirmation No.: 5622

Examiner: Unassigned

Group Art Unit: 2654

Transmission Date: March 20, 2014

Attorney Docket No.: ALI-050ACON1

**Certificate of Transmission**

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **March 20, 2014**.

Signed: \_\_\_\_\_



Dana N. Beardsley

**RESPONSE TO NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION**

Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir or Madam:

In Response to the Notice to File Missing Parts of Nonprovisional Application, mailed August 21, 2013, Applicant hereby provides the requisite surcharge of \$140 for submission of this paper. Applicant also submits the required application filing, examination, search and additional claims fees of \$1,600, as well as a five-month extension of time fee of \$3,000. A copy of the Notice to File Missing Parts of Nonprovisional Application is also submitted herewith.

Applicant also submits a *Written Assertion for Notification of Loss of Entitlement to Small Entity Status Under 37 CFR 1.27(g)(2)*.

Please contact the undersigned representative below if you should have any further questions or require any additional information.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

KOKKA & BACKUS, PC  
703 High Street  
Palo Alto, CA 94301  
Telephone: (650) 566-9921  
Facsimile: (650) 566-9922



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

Table with 4 columns: APPLICATION NUMBER (13/959,708), FILING OR 371(C) DATE (08/05/2013), FIRST NAMED APPLICANT (Gregory C. Burnett), ATTY. DOCKET NO./TITLE (ALI-050ACON1)

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

CONFIRMATION NO. 5622
FORMALITIES LETTER



Date Mailed: 08/21/2013

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given TWO MONTHS from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
Applicant must submit \$70 to complete the basic filing fee for a small entity.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge (for late submission of the basic filing fee, search fee, examination fee or inventor's oath or declaration) as set forth in 37 CFR 1.16(f) of \$ 70 for a small entity in compliance with 37 CFR 1.27, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within TWO MONTHS from the date of this Notice is \$ 800 for a small entity

- \$ 70 Statutory basic filing fee.
\$ 70 Surcharge.
The application search fee has not been paid. Applicant must submit \$ 300 to complete the search fee.
The application examination fee has not been paid. Applicant must submit \$ 360 to complete the examination fee for a small entity in compliance with 37 CFR 1.27.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):

Gregory C. Burnett

Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts  
Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.  
<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at <http://www.uspto.gov/ebc>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/hnguyen/

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Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Gregory C. Burnett

Application Serial No.: 13/959,708

Filing Date: August 5, 2013

For: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Examiner: Unassigned

Confirmation No.: 5622

Group Art Unit: 2654

Transmission Date: March 20, 2014

Atty. Docket No.: ALI-050ACON1

CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **March 20, 2014**.

Signed: \_\_\_\_\_



Dana N. Beardsley

**WRITTEN ASSERTION FOR NOTIFICATION OF LOSS OF ENTITLEMENT TO SMALL ENTITY STATUS UNDER 37 CFR § 1.27(g)(2)**

Dear Sir or Madam:

In accordance with 37 CFR § 1.27(g)(2) and MPEP § 509.03, Applicant is submitting this *Written Assertion for Notification of Loss of Entitlement to Small Entity Status* in the above-referenced patent application. This written assertion is intended to notify the Office of the loss of entitlement to small entity status. Please contact the undersigned representative below if you have any questions or require any additional information.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

KOKKA & BACKUS, PC  
703 High Street  
Palo Alto, CA 94301-2447  
Tel: (650) 566-9921  
Fax: (650) 566-9922



## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708			
<b>Filing Date:</b>	05-Aug-2013			
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)			
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett			
<b>Filer:</b>	Scott Susumu Kokka/Dana Beardsley			
<b>Attorney Docket Number:</b>	ALI-050ACON1			
Filed as Large Entity				
<b>Utility under 35 USC 111(a) Filing Fees</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
Late Filing Fee for Oath or Declaration	1051	1	140	140
<b>Petition:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				
Extension - 5 months with \$0 paid	1255	1	3000	3000
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>4740</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	18541591
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Scott Susumu Kokka
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	ALI-050ACON1
<b>Receipt Date:</b>	20-MAR-2014
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	21:26:15
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$4740
RAM confirmation Number	7256
Deposit Account	
Authorized User	

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1		ALI-050ACON1_Response_to_ NOMP_asfiled.pdf	269596 <small>6a9d5a0394873672d404ee830f8469994e0 15585</small>	yes	5
<b>Multipart Description/PDF files in .zip description</b>					
		<b>Document Description</b>	<b>Start</b>	<b>End</b>	
		Applicant Response to Pre-Exam Formalities Notice	1	4	
		Notification of loss of entitlement to small entity status	5	5	
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	39032 <small>f007ef157afc0fae2debfd3e13ca3a6a6cd73 061</small>	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			308628		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

**PATENT APPLICATION FEE DETERMINATION RECORD**

Substitute for Form PTO-875

Application or Docket Number  
13/959,708

**APPLICATION AS FILED - PART I**

(Column 1)		(Column 2)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (j), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	1 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*			OR	x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

**APPLICATION AS AMENDED - PART II**

(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
Total (37 CFR 1.16(i))	*	Minus **	=	x	=	OR	x	=
Independent (37 CFR 1.16(h))	*	Minus ***	=	x	=	OR	x	=
Application Size Fee (37 CFR 1.16(s))						OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						OR		
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
Total (37 CFR 1.16(i))	*	Minus **	=	x	=	OR	x	=
Independent (37 CFR 1.16(h))	*	Minus ***	=	x	=	OR	x	=
Application Size Fee (37 CFR 1.16(s))						OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						OR		
				TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.



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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/959,708, 08/05/2013, 2654, 1740, ALI-050ACON1, 1, 1

CONFIRMATION NO. 5622

UPDATED FILING RECEIPT



15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

Date Mailed: 03/26/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections

Inventor(s) Gregory C. Burnett, Dodge Center, MN;
Applicant(s) Gregory C. Burnett, Dodge Center, MN;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 12/139,333 06/13/2008 PAT 8503691
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

If Required, Foreign Filing License Granted: 08/20/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is US 13/959,708

Projected Publication Date: 07/03/2014

Non-Publication Request: No

Early Publication Request: No

**Title**

FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

**LICENSE FOR FOREIGN FILING UNDER**  
**Title 35, United States Code, Section 184**  
**Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1

**CONFIRMATION NO. 5622**

15516  
Kokka & Backus, PC  
703 High Street  
Palo Alto, CA 94301

**NOTICE**



Date Mailed: 03/26/2014

**INFORMATIONAL NOTICE TO APPLICANT**

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

The item(s) indicated below are also required and should be submitted with any reply to this notice to avoid further processing delays.

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):  
Gregory C. Burnett



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Table with columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/959,708 08/05/2013 Gregory C. Burnett ALI-050ACON1 5622
15516 7590 05/12/2014
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301
EXAMINER WEISS, HOWARD
ART UNIT 2814 PAPER NUMBER
MAIL DATE 05/12/2014 DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 13/959,708	<b>Applicant(s)</b> BURNETT, GREGORY C.	
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 8/5/2013.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 1 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 1 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on 8/5/2013 is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.

Application/Control Number: 13/959,708  
Art Unit: 2814

Page 2

Attorney's Docket Number: ALI-050ACON1

Filing Date: 8/5/2013

Continuing Data: a continuation of 12/139,333 (06/13/2008 now U. S. Patent No. 8,503,691) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008)

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.
2. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

***Specification***

3. The disclosure is objected to because of the following informalities: --now U. S. Patent No. 8,503,691—should be inserted after “2008” in Line 2 of Paragraph [0001]. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section

Art Unit: 2814

351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claim 1 is rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by Zhang et al. (U. S. Patent No. 8,068,619).

Zhang et al. show all aspects of the instant invention (e.g. Figure 2) including:

- a first virtual microphone  **$b_1(n)$**  comprising a first combination of a first microphone signal  **$s_1(n)$**  and a second microphone signal  **$a(n)$** , wherein the first microphone signal is generated by a first physical microphone **212a** and the second microphone signal is generated by a second physical microphone **212b**
- a second virtual microphone  **$r_1(n)$**  comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech

### ***Double Patenting***

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown

to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit <http://www.uspto.gov/forms/>. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to <http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp>.

7. Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1, 25, 29, 45 and 51 of U.S. Patent No. 8,494,177. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech. The instant invention is a broader statement of the invention of U.S. Patent No. 8,494,177.
8. Claim 1 is rejected on the ground of nonstatutory double patenting as being unpatentable over claims 27, 29 and 41 of U.S. Patent No. 8,503,691. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone

comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech. The instant invention is a broader statement of the invention of U.S. Patent No. 8,503,691.

### ***Conclusion***

9. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.
  
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [Howard.Weiss@uspto.gov](mailto:Howard.Weiss@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.
  
11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

Art Unit: 2814

12. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 381/ 92,94.7; 704/ 233, E21.004; H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	5/7/2014
Other Documentation: Search from 12/139,333 and 13/948,160	5/7/2014
Electronic Database(s): EAST	5/7/2014

HW/hw  
9 May 2014

/Howard Weiss/  
Primary Examiner  
Art Unit 2814



<b>Notice of References Cited</b>	Application/Control No. 13/959,708	Applicant(s)/Patent Under Reexamination BURNETT, GREGORY C.	
	Examiner HOWARD WEISS	Art Unit 2814	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A US-8,503,691	08-2013	Burnett	381/92
*	B US-8,494,177	07-2013	Burnett	381/92
*	C US-8,068,619	11-2011	Zhang et al.	381/92
	D US-			
	E US-			
	F US-			
	G US-			
	H US-			
	I US-			
	J US-			
	K US-			
	L US-			
	M US-			


**FOREIGN PATENT DOCUMENTS**

*	Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N				
	O				
	P				
	Q				
	R				
	S				
	T				

**NON-PATENT DOCUMENTS**

*	Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U
	V
	W
	X

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b>Search Notes</b>  	<b>Application/Control No.</b>  13959708	<b>Applicant(s)/Patent Under Reexamination</b>  BURNETT, GREGORY C.
	<b>Examiner</b>  HOWARD WEISS	<b>Art Unit</b>  2814

CPC- SEARCHED		
Symbol	Date	Examiner
H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	5/7/2014	HW


CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
381	92, 94.7	5/7/2014	HW
704	233, E21.004	5/7/2014	HW

SEARCH NOTES		
Search Notes	Date	Examiner
Searches form 12/139,333 and 13/948,160	5/7/2014	HW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47			
<b>CLAIM</b>			<b>DATE</b>						
Final	Original	05/08/2014							
	1	✓							

## EAST Search History

## EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S36	2828	(704/233,E21.004).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:37
S37	3	(US-5473701-\$ or US-7386135-\$ or US-6473733-\$).did.	USPAT	ADJ	OFF	2014/05/07 14:39
S42	662	S41 and @ad<"20070613"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:41
S41	851	(S38 or S39 or S40) and ( H04R3/005 OR G10L2021/02165 OR G10L21/0208).CPC. )	USPAT	ADJ	OFF	2014/05/07 14:41
S40	1778	(381/92).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:41
S39	364	(381/94.7).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:41
S38	2828	(704/233,E21.004).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:41
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S43	27	(S38 or S39 or S40) AND ( ( H04R2410/05).CPC. )	USPAT	ADJ	OFF	2014/05/07 14:44
S46	705	(( G10L2021/02165 and G10L21/0208).CPC. )	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:47
S45	11138	(( H04R3/005 OR H04R2410/05 OR G10L2021/02165 OR G10L21/0208).CPC. )	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:47
S48	265	S47 not S46	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:48
S47	321	(( H04R3/005 and H04R2410/05).CPC. )	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:48

EAST Search History

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S53	3	("8068619").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/07 14:57
L22	20	(("8503691") or ("8494177")).PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/05/08 08:24

**EAST Search History (Interference)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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5/ 8/ 2014 9:30:48 AM

C:\Users\hweiss\Documents\EAST\Workspaces\13959708.wsp



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Table with 4 columns: APPLICATION NUMBER (13/959,708), FILING OR 371(C) DATE (08/05/2013), FIRST NAMED APPLICANT (Gregory C. Burnett), ATTY. DOCKET NO./TITLE (ALI-050ACON1)

CONFIRMATION NO. 5622

15516
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

PUBLICATION NOTICE



Title:FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

Publication No.US-2014-0185825-A1

Publication Date:07/03/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

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Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re the Application of:  
**Gregory C. Burnett**

Application Serial No.: **13/959,708**

Filing Date: **August 5, 2013**

For: **Forming Virtual Microphone Arrays  
Using Dual Omnidirectional  
Microphone Array (DOMA)**

Examiner: **WEISS, Howard**

Confirmation No.: **5622**


Group Art Unit: **2814**

Transmission Date: **August 12, 2014**

Atty. Docket No.: **ALI-050ACON1**

**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (**EFS-Web**) to the **USPTO** on **August 12, 2014**.

Signed:   
**Heather N. Erwin**

**AMENDMENT A**

Dear Sir or Madam:

Please find enclosed the following items:

1. Amendments to the Specification;
2. a complete, updated claim listing and remarks in response to the **Non-Final Office Action** mailed **May 12, 2014**, and;
3. Supplemental Application Data Sheet.

**AMENDMENTS TO THE SPECIFICATION**

a. Kindly replace paragraph **[0001]** of the present application as filed with the replacement paragraph as indicated below.

**[0001]** This application is a continuation of U.S. Nonprovisional Patent Application No. 12/139,333, filed June 13, 2008, **now U.S. Patent No. 8,503,691,** entitled “Forming Virtual Microphone Arrays Using Dual Omnidirectional Microphone Array (DOMA),” which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No.60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.



**AMENDMENTS TO THE CLAIMS:** This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

1. (Cancelled)

2. (New) A device, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech; and

a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.

3. **(New)** The device of Claim 2, wherein the signal processor comprises one or more digital signal processors (DSPs).

4. **(New)** The device of Claim 2, wherein the noise content comprises acoustic noise and the speech content comprises human speech.

5. **(New)** The device of Claim 2, wherein the signal processor is operative to add a delay to the first microphone signals.

6. **(New)** The device of Claim 5, wherein the signal processor is operative to raise the delay to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.

7. **(New)** The device of Claim 5, wherein the signal processor is operative to raise the delay to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and a speech source of the speech and the fourth distance being between the second physical microphone and the speech source.

8. **(New)** The device of Claim 2, wherein the first and second physical microphones comprise omnidirectional microphones.

9. **(New)** The device of Claim 2, wherein the first and second physical microphones are included in a microphone array.
  
10. **(New)** The device of Claim 2, wherein the first physical microphone and the second physical microphones are disposed along an axis and are separated from each other by a first distance.
  
11. **(New)** The device of Claim 10, wherein a midpoint of the axis is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.
  
12. **(New)** The device of Claim 11, wherein the first virtual microphone is formed by subtracting the second microphone signal from the first microphone signal.
  
13. **(New)** The device of Claim 11, wherein the second virtual microphone is formed by subtracting the first microphone signal from the second microphone signal.
  
14. **(New)** The device of Claim 2, wherein the first virtual microphone is formed by subtracting the second microphone signal from a delayed version of the first microphone signal.
  
15. **(New)** The device of Claim 2, wherein the second virtual microphone is formed by subtracting the first microphone signal from a delayed version of the second microphone signal.

16. **(New)** A device, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech;

a virtual microphone array including the first and second virtual microphones and having a single null oriented in a direction toward a source of speech; and

a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.

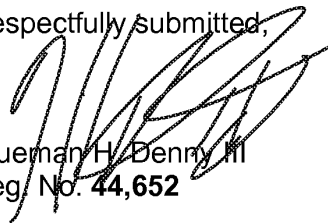
17. **(New)** The device of Claim 16, wherein the source of speech comprises human speech.
  
18. **(New)** The device of Claim 16, wherein the second virtual microphone includes a second linear response to speech and the single null comprises a region of the second linear response to speech having a measured response level that is lower than a measured response level of any other region of the second linear response to speech.
  
19. **(New)** The device of Claim 16, wherein the first virtual microphone is formed by subtracting the second microphone signal from a delayed version of the first microphone signal.
  
20. **(New)** The device of Claim 16, wherein the second virtual microphone is formed by subtracting the first microphone signal from a delayed version of the second microphone signal.
  
21. **(New)** The device of Claim 16, wherein the first and second physical microphones are included in a microphone array.

**REMARKS**

The status of the claims is as follows: **Claim 1 is Cancelled**; and **New Claims 2 – 21** have been **Added** herein. Paragraph **[0001]** of the **Specification** has been amended herein by replacement paragraph to overcome the Examiner’s objections to the disclosure. The Examiner has rejected **Claim 1** under **pre-AIA 35 U.S.C. §102(e)** as being anticipated by U.S. Patent No. **8,068,619** to *Zhang* and on grounds of **Non-Statutory Double Patenting** in view of Claims 1, 25, 29, 45 and 51 of U.S. Patent No. **8,494,177** and Claims 27, 29 and 41 of U.S. Patent No. **8,503,691**. The rejections are respectfully traversed. The **pre-AIA 35 U.S.C. §102(e)** and the **Non-Statutory Double Patenting** rejections of **Claim 1** are mooted by the cancellation herein of independent **Claim 1**. New **Claims 2 – 21** are patentably distinct, are non-obvious, and are not anticipated by the cited sections of *Zhang*.

Reconsideration of the application and allowance of all claims are respectfully requested based on the preceding remarks. If at any time the Examiner believes that an interview would be helpful, please contact the undersigned.

Respectfully submitted,



Truman H. Denny III  
Reg. No. **44,652**

KOKKA & BACKUS, PC  
703 High Street  
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## **Supplemental Application Data Sheet**

### **Cross-Reference to Related Applications**

This application is a continuation of U.S. Nonprovisional Patent Application No. 12/139,333, filed June 13, 2008, **now U.S. Patent No. 8,503,691**, entitled "Forming Virtual Microphone Arrays Using Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No. 60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

### **Application Information**

<b>Filing Date::</b>	August 5, 2013
<b>Application Type::</b>	Continuation
<b>Subject Matter::</b>	Utility
<b>Suggested Group Art Unit::</b>	None
<b>CD-ROM or CD-R?::</b>	None
<b>Title::</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>Attorney Docket Number::</b>	ALI-050ACON1
<b>Request for Early Publication?::</b>	No
<b>Request for Non-Publication?::</b>	No
<b>Suggested Drawing Figure::</b>	FIG. 1
<b>Total Drawing Sheets::</b>	17
<b>Small Entity::</b>	Yes
<b>Petition included?::</b>	No
<b>Secrecy Order in Parent Appl.?::</b>	No

## **Applicant Information**

**Applicant Authority type::** Inventor  
**Primary Citizenship Country::** United States of America  
**Status::** Full Capacity  
**Given Name::** Gregory C.  
**Family Name::** Burnett  
**City of Residence::** Dodge Center  
**State or Province of Residence::** MN  
**Country of Residence::** United States of America  
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**City of mailing address::** Dodge Center  
**Country of mailing address::** United States of America  
**State or Province of mailing address::** MN  
**Postal or Zip Code of mailing address::** 55057

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**State or Province of mailing address::** CA  
**Postal or Zip Code of mailing address::** 94301



**Telephone::** (650) 566-9921

**Fax::** (650) 566-9922

## Representative Information

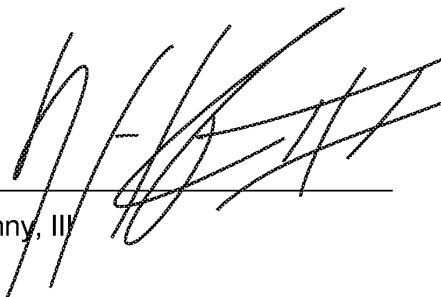
**Representative Customer Number::** 15516

<b>Representative Designation::</b>	<b>Registration Number::</b>	<b>Name::</b>
Primary	44,652	Trueman H. Denny, III

**Signature**

\_\_\_\_\_  
Trueman H. Denny, III

Reg. No. 44,652



\_\_\_\_\_  
August 12, 2014

Date

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	19848613
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Trueman Homer Denny
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	ALI-050ACON1
<b>Receipt Date:</b>	12-AUG-2014
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	23:05:02
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ALI-050ACON1_Amendment_A_and_Supplemental_ADS_asfiled.pdf	134820 <small>8738c45263f3bd071ab8eb2e463b999240885893</small>	yes	11

<b>Multipart Description/PDF files in .zip description</b>		
<b>Document Description</b>	<b>Start</b>	<b>End</b>
Amendment/Req. Reconsideration-After Non-Final Reject	1	8
Application Data Sheet	9	11
<b>Warnings:</b>		
<b>Information:</b>		
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<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>		

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<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875				Application or Docket Number <b>13/959,708</b>		Filing Date <b>08/05/2013</b>		<input type="checkbox"/> To be Mailed		
ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO										
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(Column 1)			(Column 2)							
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)		FEE (\$)			
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>		N/A	N/A		N/A					
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>		N/A	N/A		N/A					
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>		N/A	N/A		N/A					
TOTAL CLAIMS <small>(37 CFR 1.16(i))</small>		minus 20 =	*		X \$ =					
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>		minus 3 =	*		X \$ =					
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>										
					TOTAL					
* If the difference in column 1 is less than zero, enter "0" in column 2.										
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			(Column 3)				
AMENDMENT	<b>08/12/2014</b>		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
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	Independent (37 CFR 1.16(h))		* 2	Minus	*** 3	= 0	X \$420 =		0	
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(Column 1)			(Column 2)			(Column 3)				
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
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	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE				
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.                  ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".                  *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".                  The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

LIE  
/ROLITA WIMBUSH/

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622
15516	7590	10/21/2014	EXAMINER	
Kokka & Backus, PC 703 High Street Palo Alto, CA 94301			WEISS, HOWARD	
			ART UNIT	PAPER NUMBER
			2814	
			MAIL DATE	DELIVERY MODE
			10/21/2014	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 13/959,708	<b>Applicant(s)</b> BURNETT, GREGORY C.	
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 8/12/2014.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 2-21 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 2-21 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.

Attorney's Docket Number: ALI-050ACON1

Filing Date: 8/5/2013

Continuing Data: a continuation of 12/139,333 (06/13/2008 now U. S. Patent No. 8,503,691) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008)

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

**Notice of Pre-AIA or AIA Status**

1. The present application is being examined under the pre-AIA first to invent provisions.

**Double Patenting**

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit <http://www.uspto.gov/forms/>. The filing date of the application will

determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to <http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-l.jsp>.

3. Claims 2 to 21 rejected on the ground of nonstatutory double patenting as being unpatentable over Claims 1 to 51 of U.S. Patent No. 8,494,177. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech, a virtual microphone array including the first and second virtual microphones and having a single null oriented in a direction toward a source of speech, a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.
  
4. Claims 2 to 21 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over Claims 2 to 21 of copending Application No. 13/948,160. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal,



wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech, a virtual microphone array including the first and second virtual microphones and having a single null oriented in a direction toward a source of speech, a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

#### ***Response to Arguments***

5. Applicant's arguments with respect to Claims 2 to 21 have been considered but are moot because the arguments do not apply to any of the references being used in the current rejection.

#### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


7. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [Howard.Weiss@uspto.gov](mailto:Howard.Weiss@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.
9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

10. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 381/ 92,94.7; 704/ 233, E21.004; H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	Thru 10/14/2014
Other Documentation: none	
Electronic Database(s): EAST	Thru 10/14/2014

HW/hw  
20 October 2014

/Howard Weiss/  
Primary Examiner  
Art Unit 2814

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	05/08/2014	10/14/2014						
	1	✓	-						
	2		✓						
	3		✓						
	4		✓						
	5		✓						
	6		✓						
	7		✓						
	8		✓						
	9		✓						
	10		✓						
	11		✓						
	12		✓						
	13		✓						
	14		✓						
	15		✓						
	16		✓						
	17		✓						
	18		✓						
	19		✓						
	20		✓						
	21		✓						

**EAST Search History****EAST Search History (Prior Art)**


Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2993	(704/233,E21.004).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/10/14 09:39
L2	402	(381/94.7).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/10/14 09:39
L3	1948	(381/92).CCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/10/14 09:39
L4	2879	(L1 or L2 or L3) or ( H04R3/005 OR G10L2021/02165 OR G10L21/0208).CPC. )	USPAT	ADJ	OFF	2014/10/14 09:39
L5	164	4 and @pd> "20140507"	USPAT	ADJ	OFF	2014/10/14 09:39

**EAST Search History (Interference)**

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10/ 14/ 2014 9:49:32 AM

C:\Users\hweiss\Documents\EAST\Workspaces\13959708.wsp

<b>Search Notes</b>  	<b>Application/Control No.</b>  13959708	<b>Applicant(s)/Patent Under Reexamination</b>  BURNETT, GREGORY C.
	<b>Examiner</b>  HOWARD WEISS	<b>Art Unit</b>  2814

CPC- SEARCHED		
Symbol	Date	Examiner
H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	5/7/2014	HW
updated	10/14/2014	HW

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
381	92, 94.7	5/7/2014	HW
704	233, E21.004	5/7/2014	HW
all upadted	all upadted	10/14/2014	HW

SEARCH NOTES		
Search Notes	Date	Examiner
Searches form 12/139,333 and 13/948,160	5/7/2014	HW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

**REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL  
(Submitted Only via EFS-Web)**

Application Number	13959708	Filing Date	2013-08-05	Docket Number (if applicable)	ALI-050ACON1	Art Unit	2814
First Named Inventor	Gregory C. Burnett			Examiner Name	WEISS, Howard		

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**  
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

**SUBMISSION REQUIRED UNDER 37 CFR 1.114**

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

Consider the arguments in the Appeal Brief or Reply Brief previously filed on \_\_\_\_\_

Other \_\_\_\_\_

Enclosed

Amendment/Reply

Information Disclosure Statement (IDS)

Affidavit(s)/ Declaration(s)

Other \_\_\_\_\_

**MISCELLANEOUS**

Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months \_\_\_\_\_  
(Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

Other \_\_\_\_\_

**FEES**

**The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**

The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No \_\_\_\_\_

**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED**

Patent Practitioner Signature

Applicant Signature

Doc code: RCEX

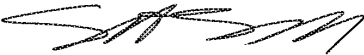
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature		Date (YYYY-MM-DD)	2014-04-21
Name	Scott S. Kokka	Registration Number	51893

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Gregory C. Burnett

Application Serial No.: 13/959,708

Filing Date: August 5, 2013

For: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Examiner: WEISS, Howard

Confirmation No.: 5622

Group Art Unit: 2814

Transmission Date: April 21, 2015

Atty. Docket No.: ALI-050ACON1

CERTIFICATE OF EFS-WEB TRANSMISSION

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **April 21, 2015**.

Signed: \_\_\_\_\_

  
Kate M. Cleland

**RESPONSE**

Dear Sir or Madam:

In response to the *Final Office Action* mailed October 21, 2014, please find enclosed a complete, updated claim listing and remarks as well as 1) *Terminal Disclaimer under 37 C.F.R. §1.321 to Obviate an Obviousness-Type Double Patenting Rejection* and 2) *Terminal Disclaimer under 37 C.F.R. §1.321 to Obviate a Provisional Obviousness-Type Double*. Applicant hereby submits the \$320 fee to cover the statutory disclaimer fees for undiscounted entity as well as a 3-month extension of time fee of \$1,400.

CLAIM LISTING

1. (Cancelled)

2. (Previously presented) A device, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech; and

a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.

3. (Previously presented) The device of Claim 2, wherein the signal processor comprises one or more digital signal processors (DSPs).

4. (Previously presented) The device of Claim 2, wherein the noise content comprises acoustic noise and the speech content comprises human speech.
  
5. (Previously presented) The device of Claim 2, wherein the signal processor is operative to add a delay to the first microphone signals.
  
6. (Previously presented) The device of Claim 5, wherein the signal processor is operative to raise the delay to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.
  
7. (Previously presented) The device of Claim 5, wherein the signal processor is operative to raise the delay to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and a speech source of the speech and the fourth distance being between the second physical microphone and the speech source.
  
8. (Previously presented) The device of Claim 2, wherein the first and second physical microphones comprise omnidirectional microphones.
  
9. (Previously presented) The device of Claim 2, wherein the first and second physical microphones are included in a microphone array.

10. (Previously presented) The device of Claim 2, wherein the first physical microphone and the second physical microphones are disposed along an axis and are separated from each other by a first distance.
  
11. (Previously presented) The device of Claim 10, wherein a midpoint of the axis is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.
  
12. (Previously presented) The device of Claim 11, wherein the first virtual microphone is formed by subtracting the second microphone signal from the first microphone signal.
  
13. (Previously presented) The device of Claim 11, wherein the second virtual microphone is formed by subtracting the first microphone signal from the second microphone signal.
  
14. (Previously presented) The device of Claim 2, wherein the first virtual microphone is formed by subtracting the second microphone signal from a delayed version of the first microphone signal.
  
15. (Previously presented) The device of Claim 2, wherein the second virtual microphone is formed by subtracting the first microphone signal from a delayed version of the second microphone signal.

16. (Previously presented) A device, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech;

a virtual microphone array including the first and second virtual microphones and having a single null oriented in a direction toward a source of speech; and

a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.

17. (Previously presented) The device of Claim 16, wherein the source of speech comprises human speech.

18. (Previously presented) The device of Claim 16, wherein the second virtual microphone includes a second linear response to speech and the single null comprises a region of the second linear response to speech having a measured response level that is lower than a measured response level of any other region of the second linear response to speech.

19. (Previously presented) The device of Claim 16, wherein the first virtual microphone is formed by subtracting the second microphone signal from a delayed version of the first microphone signal.

20. (Previously presented) The device of Claim 16, wherein the second virtual microphone is formed by subtracting the first microphone signal from a delayed version of the second microphone signal.

21. (Previously presented) The device of Claim 16, wherein the first and second physical microphones are included in a microphone array.

**REMARKS**

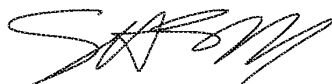
Claims 2-21 remain pending.

The Examiner has rejected claims 2 to 21 on the ground of non-statutory double patenting as being unpatentable over claims 1 to 51 of U.S. Patent No. 8,494,177. The Examiner has provisionally rejected Claims 2 to 21 on the ground of non-statutory double patenting as being unpatentable over Claims 2 to 21 of copending Application No. 13/948,160.

Applicant respectfully submits the enclosed 1) *Terminal Disclaimer under 37 C.F.R. §1.321 to Obviate an Obviousness-Type Double Patenting Rejection* and 2) *Terminal Disclaimer under 37 C.F.R. §1.321 to Obviate a Provisional Obviousness-Type Double Patenting Rejection* to overcome the Examiner's nonstatutory double patenting rejections.

Reconsideration of the application and allowance of all claims are respectfully requested based on the preceding remarks. If at any time the Examiner believes that an interview would be helpful, please contact the undersigned.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

KOKKA & BACKUS, PC  
703 High Street  
Palo Alto, CA 94301-2447  
Tel: (650) 566-9921  
Fax: (650) 566-9922

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:  
Gregory C. Burnett

Application No.: 13/959,708

Filed: August 5, 2013

For: FORMING VIRTUAL  
MICROPHONE ARRAYS USING  
DUAL OMNIDIRECTIONAL  
MICROPHONE ARRAY (DOMA)

Confirmation No.: 5622

Examiner: WEISS, Howard

Group Art Unit: 2814


Date: April 21, 2015

Atty. Docket No.: ALI-050ACON1

CERTIFICATE OF EFS-WEB TRANSMISSION

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **April 21, 2015**.

Signed: \_\_\_\_\_



Kate M. Cleland

**TERMINAL DISCLAIMER UNDER 37 C.F.R. § 1.321**  
**TO OBVIATE A PROVISIONAL OBVIOUSNESS-TYPE DOUBLE**  
**PATENTING REJECTION**

Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Dear Sir or Madam:

The owner(s), AliphCom (Assignee), of the entire interest in the above-identified application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the above-identified application (hereafter "instant application"), which would extend beyond the expiration date of the full statutory term defined in 35 U.S.C. 154 and 173 of any patent granted on pending reference Application Number 13/948,160, filed on July 22, 2013 (hereafter "reference patent application"), as the term of any patent granted on said reference patent application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the reference patent application. The owner(s) hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference

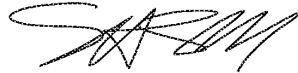


patent application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the above-identified application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 and 173 of any patent(s) granted on said reference patent application, as the term of any patent(s) granted on said reference patent application may be shortened by any terminal disclaimer filed prior to the grant of any patent(s) on the pending reference application, in the event that it later: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued or is in any matter terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

We hereby submit the amount of \$160.00 to cover the statutory disclaimer fees for undiscounted entity. If any questions arise regarding this statutory disclaimer, please contact the undersigned attorney or agent of record.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

Date: April 21, 2015

Kokka & Backus, PC  
703 High Street  
Palo Alto, CA 94301  
Tel: (650) 566-9921  
Fax: (650) 566-9922

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708				
<b>Filing Date:</b>	05-Aug-2013				
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)				
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett				
<b>Filer:</b>	Scott Susumu Kokka/Kate Cleland				
<b>Attorney Docket Number:</b>	ALI-050ACON1				
Filed as Large Entity					
<b>Filing Fees for Utility under 35 USC 111(a)</b>					
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>	
<b>Basic Filing:</b>					
<b>Pages:</b>					
<b>Claims:</b>					
<b>Miscellaneous-Filing:</b>					
<b>Petition:</b>					
<b>Patent-Appeals-and-Interference:</b>					
<b>Post-Allowance-and-Post-Issuance:</b>					
<b>Extension-of-Time:</b>					

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	1253	1	1400	1400
<b>Miscellaneous:</b>				
Request for Continued Examination	1801	1	1200	1200
Statutory or Terminal Disclaimer	1814	2	160	320
<b>Total in USD (\$)</b>				<b>2920</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	22129980
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Scott Susumu Kokka
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	ALI-050ACON1
<b>Receipt Date:</b>	21-APR-2015
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	23:28:56
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$2920
RAM confirmation Number	7202
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1	Request for Continued Examination (RCE)	ALI-050ACON1_RCE_asfiled.pdf	36937 5c7a712f24b2fe2d91f5033726a17f9b7ae72b6e	no	2
<b>Warnings:</b>					
This is not a USPTO supplied RCE SB30 form.					
<b>Information:</b>					
2	Amendment Submitted/Entered with Filing of CPA/RCE	ALI-050ACON1_Response_asfiled.pdf	110823 276adb5a719ff771fc93070ce4ec18347cf4a85	no	7
<b>Warnings:</b>					
<b>Information:</b>					
3	Terminal Disclaimer Filed	ALI-050ACON1_Terminal_Disclaimer_1_asfiled.pdf	89183 9b71a170abd532973fa3d5038d4a93f0c7a12f9b	no	2
<b>Warnings:</b>					
<b>Information:</b>					
4	Terminal Disclaimer Filed	ALI-050ACON1_Terminal_Disclaimer_2_asfiled.pdf	104621 f8ea63f5ba644160ffc28561721b8ab8c1ce1c27	no	2
<b>Warnings:</b>					
<b>Information:</b>					
5	Fee Worksheet (SB06)	fee-info.pdf	34532 cf4b82fb855f24ec9f968c216e7e540840825257	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			376096		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:  
Gregory C. Burnett

Application No.: 13/959,708

Filed: August 5, 2013

For: FORMING VIRTUAL  
MICROPHONE ARRAYS USING  
DUAL OMNIDIRECTIONAL  
MICROPHONE ARRAY (DOMA)

Confirmation No.: 5622

Examiner: WEISS, Howard

Group Art Unit: 2814

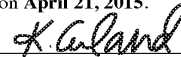
Date: April 21, 2015

Atty. Docket No.: ALI-050ACON1

CERTIFICATE OF EFS-WEB TRANSMISSION

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on **April 21, 2015**.

Signed: \_\_\_\_\_

  
Kate M. Cleland

**TERMINAL DISCLAIMER UNDER 37 C.F.R. § 1.321(c) TO OBVIATE AN  
OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTION**

Dear Sir:

The owner, AliphCom (Assignee), of the entire interest in the above-identified application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the above-identified application (hereafter “instant application”), which would extend beyond the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of prior United States Patent No. 8,494,177 (hereafter “prior patent”), as presently shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of the prior patent, as presently

shortened by any terminal disclaimer, in the event that it later: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR § 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

We hereby submit the amount of \$160.00 to cover the statutory disclaimer fee for undiscounted entity. If any questions arise regarding this statutory disclaimer, please contact the undersigned attorney or agent of record.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

Date: April 21, 2015

Kokka & Backus, PC  
703 High Street  
Palo Alto, CA 94301-2447  
Tel: (650) 566-9921  
Fax: (650) 566-9922




Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875				Application or Docket Number <b>13/959,708</b>		Filing Date <b>08/05/2013</b>		<input type="checkbox"/> To be Mailed		
ENTITY: <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO										
<b>APPLICATION AS FILED – PART I</b>										
(Column 1)			(Column 2)							
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)		FEE (\$)			
<input type="checkbox"/> BASIC FEE <small>(37 CFR 1.16(a), (b), or (c))</small>		N/A	N/A		N/A					
<input type="checkbox"/> SEARCH FEE <small>(37 CFR 1.16(k), (l), or (m))</small>		N/A	N/A		N/A					
<input type="checkbox"/> EXAMINATION FEE <small>(37 CFR 1.16(o), (p), or (q))</small>		N/A	N/A		N/A					
TOTAL CLAIMS <small>(37 CFR 1.16(j))</small>		minus 20 =	*		X \$ =					
INDEPENDENT CLAIMS <small>(37 CFR 1.16(h))</small>		minus 3 =	*		X \$ =					
<input type="checkbox"/> APPLICATION SIZE FEE <small>(37 CFR 1.16(s))</small>		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).								
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT <small>(37 CFR 1.16(j))</small>										
					TOTAL					
* If the difference in column 1 is less than zero, enter "0" in column 2.										
<b>APPLICATION AS AMENDED – PART II</b>										
(Column 1)			(Column 2)			(Column 3)				
AMENDMENT	<b>04/21/2015</b>		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		* 20	Minus	** 20	= 0	X \$80 =		0	
	Independent (37 CFR 1.16(h))		* 2	Minus	*** 3	= 0	X \$420 =		0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE		<b>0</b>		
(Column 1)			(Column 2)			(Column 3)				
AMENDMENT			CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))		*	Minus	**	=	X \$ =			
	Independent (37 CFR 1.16(h))		*	Minus	***	=	X \$ =			
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))									
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
						TOTAL ADD'L FEE				
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.                  ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".                  *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".                  The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

LIE  
/RENEE HAWKINS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

<b>Application Number</b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent under Reexamination</b> BURNETT, GREGORY C.	
<b>Document Code - DISQ</b>		<b>Internal Document – DO NOT MAIL</b>	

<b>TERMINAL DISCLAIMER</b>	<input type="checkbox"/> APPROVED	<input checked="" type="checkbox"/> DISAPPROVED
Date Filed : 4/21/15	<b>This patent is subject to a Terminal Disclaimer</b>	

**Approved/Disapproved by:**

2/Tds disapproved.

Td identifies a party who is not the applicant (for applications filed on/after 9/16/12), see FP 14.26.10.

Below is what needs to be done by Applicant to remedy the defects:

A request under 37 CFR 1.46(c) to change the applicant needs to be filed, which is:

1. A request, signed by a 1.33(b) party,
2. A corrected ADS (37 CFR 1.76(c) that identifies the "NEW" Applicant in the applicant information, and is Underlined since its new, and,
3. A 3.73(c) statement showing chain of title to the New Applicant.
4. We need a POA that gives power to the attorney who is signing the Td.

Also resubmit Td with these papers, NO Fee is required.

Lawana Hixon



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
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Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622
15516	7590	05/01/2015	EXAMINER	
Kokka & Backus, PC 703 High Street Palo Alto, CA 94301			WEISS, HOWARD	
			ART UNIT	PAPER NUMBER
			2814	
			MAIL DATE	DELIVERY MODE
			05/01/2015	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 13/959,708	<b>Applicant(s)</b> BURNETT, GREGORY C.	
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1)  Responsive to communication(s) filed on 4/27/2015.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
- 2a)  This action is **FINAL**.                      2b)  This action is non-final.
- 3)  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4)  Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims\***

- 5)  Claim(s) 2-21 is/are pending in the application.  
5a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 6)  Claim(s) \_\_\_\_\_ is/are allowed.
- 7)  Claim(s) 2-21 is/are rejected.
- 8)  Claim(s) \_\_\_\_\_ is/are objected to.
- 9)  Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

**Application Papers**

- 10)  The specification is objected to by the Examiner.
- 11)  The drawing(s) filed on \_\_\_\_\_ is/are: a)  accepted or b)  objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

**Priority under 35 U.S.C. § 119**

- 12)  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some\*\*    c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1)  Notice of References Cited (PTO-892)
- 2)  Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 3)  Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 4)  Other: \_\_\_\_\_.

Attorney's Docket Number: ALI-050ACON1

Filing Date: 8/5/2013

Continuing Data: a continuation of 12/139,333 (06/13/2008 now U. S. Patent No. 8,503,691) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008); RCE established 4/21/2015

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

***Double Patenting***

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory double patenting rejection is appropriate where the claims at issue are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the reference application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO internet Web site contains terminal disclaimer forms which may be used. Please visit <http://www.uspto.gov/forms/>. The filing date of the application will determine what form should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to <http://www.uspto.gov/patents/process/file/efs/guidance/eTD-info-l.jsp>.

3. Claims 2 to 21 rejected on the ground of nonstatutory double patenting as being unpatentable over Claims 1 to 51 of U.S. Patent No. 8,494,177. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech, a virtual microphone array including the first and second virtual microphones and having a single null oriented in a direction toward a source of speech, a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.
  
4. Claims 2 to 21 are provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over Claims 2 to 21 of copending Application No. 13/948,160. Although the claims at issue are not identical, they are not patentably distinct from each other because both claim a first virtual microphone comprising a

first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone, a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech, a virtual microphone array including the first and second virtual microphones and having a single null oriented in a direction toward a source of speech, a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

***Terminal Disclaimer***

5. The terminal disclaimers filed on 4/21/2015 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 8,494,177 and any patent issued on U.S. Application No. 13/948,160 has been reviewed and is NOT accepted.
6. The terminal disclaimers do not comply with 37 CFR 1.321 because:  
This application was filed on or after September 16, 2012. The party identified in the terminal disclaimers is not the applicant of record. A request to change the applicant under 37 CFR 1.46(c) must be filed and must include an application data sheet specifying the applicant in the applicant information section and comply with 37 CFR

3.71 and 3.73. To be reconsidered, the terminal disclaimers must be filed with the request under 37 CFR 1.46(c).

7. Below is what needs to be done by Applicant to remedy the defects:

- A request under 37 CFR 1.46(c) to change the applicant needs to be filed, which is:
  - 1) A request, signed by a 1.33(b) party.
  - 2) A corrected ADS (37 CFR 1.76(c)) that identifies the "NEW" Applicant in the applicant information, and is Underlined since its new.
  - 3) A 3.73(c) statement showing chain of title to the New Applicant.
  - 4) A POA that gives power to the attorney who is signing the TDs.
- Resubmit TDs with these papers, NO Fee is required.

#### ***Conclusion***

8. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [Howard.Weiss@uspto.gov](mailto:Howard.Weiss@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published




applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

11. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	Thru 4/30/2015
Other Documentation: none	
Electronic Database(s): EAST	Thru 4/30/2015

HW/hw  
1 May 2015


/Howard Weiss/  
Primary Examiner  
Art Unit 2814

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE							
Final	Original	05/08/2014	10/14/2014	04/30/2015					
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	2		✓	✓					
	3		✓	✓					
	4		✓	✓					
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<b>Search Notes</b>  	<b>Application/Control No.</b>  13959708	<b>Applicant(s)/Patent Under Reexamination</b>  BURNETT, GREGORY C.
	<b>Examiner</b>  HOWARD WEISS	<b>Art Unit</b>  2814

CPC- SEARCHED		
Symbol	Date	Examiner
H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	5/7/2014	HW
updated	10/14/2014	HW
updated	4/30/2015	HW

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
381	92, 94.7	5/7/2014	HW
704	233, E21.004	5/7/2014	HW
all upadted	all upadted	10/14/2014	HW

SEARCH NOTES		
Search Notes	Date	Examiner
Searches form 12/139,333 and 13/948,160	5/7/2014	HW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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**EAST Search History**

**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
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**EAST Search History (Interference)**

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**4/ 30/ 2015 8:44:30 AM**

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## PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1  
 Stylesheet Version v1.2

EPAS ID: PAT3502102

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	SECURITY INTEREST
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<b>Name</b>	<b>Execution Date</b>
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MACGYVER ACQUISITION LLC	08/26/2015
ALIPH, INC.	08/26/2015
BODYMEDIA, INC.	08/26/2015
PROJECT PARIS ACQUISITION LLC	08/26/2015
<b>RECEIVING PARTY DATA</b>	
<b>Name:</b>	BLACKROCK ADVISORS, LLC
<b>Street Address:</b>	1 UNIVERSITY SQUARE DRIVE
<b>Internal Address:</b>	C/O GLOBAL ALLOCATION GROUP
<b>City:</b>	PRINCETON
<b>State/Country:</b>	NEW JERSEY
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<b>Application Number:</b>	14133615
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<b>Property Type</b>	<b>Number</b>
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<b>Application Number:</b>	29479052

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Application Number:	29516014
Application Number:	29516015
Application Number:	29516016
Application Number:	29516017
Application Number:	29517054
Application Number:	29517056

**CORRESPONDENCE DATA**

Fax Number: (617)235-9802  
*Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.*  
Phone: 6179517860  
Email: ronald.duvernay@ropesgray.com  
Correspondent Name: JOSHUA S. JACKSON  
Address Line 1: PRUDENTIAL TOWER, 800 BOYLSTON STREET  
Address Line 2: ROPES & GRAY LLP  
Address Line 4: BOSTON, MASSACHUSETTS 02199-3600

<b>ATTORNEY DOCKET NUMBER:</b>	MFOG-652
<b>NAME OF SUBMITTER:</b>	JOSHUA S. JACKSON
<b>SIGNATURE:</b>	/j jackson/
<b>DATE SIGNED:</b>	08/27/2015
	This document serves as an Oath/Declaration (37 CFR 1.63).

**Total Attachments: 32**  
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## AMENDED AND RESTATED PATENT SECURITY AGREEMENT

THIS AMENDED AND RESTATED PATENT SECURITY AGREEMENT (as it may be amended, restated or otherwise modified from time to time, the "Patent Security Agreement") is entered into as of August 26, 2015 by and among (i) AliphCom, a California corporation (the "Company"), MacGyver Acquisition LLC, a Delaware limited liability company, Aliph, Inc., a Delaware Corporation, BodyMedia, Inc., a Delaware corporation, and Project Paris Acquisition LLC, a Delaware limited liability company (each, a "Grantor", and collectively, the "Grantors"), and (ii) BlackRock Advisors, LLC, a Delaware limited liability company (the "Agent").

### W I T N E S S E T H:

WHEREAS, each of the Grantors, the Purchasers identified therein and the Agent are entering into the Note Purchase Agreement, dated as of April 28, 2015, as amended by the First Amendment to Note Purchase Agreement; Omnibus Amendment to Secured Convertible Promissory Notes and Limited Consent, dated as of July 22, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "Existing Note Purchase Agreement"), pursuant to which the Company issued certain secured convertible promissory notes (the "Notes") and the other Grantors agreed to Guarantee the Obligations;

WHEREAS, each of the Grantors and the Agent entered into the original Security Agreement, dated as of April 28, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "Original Security Agreement"), in order to induce the Purchasers to purchase the Notes and to secure the Secured Obligations; and

WHEREAS, pursuant to the Original Security Agreement, each of the Grantors is required to execute and deliver to Agent the original Patent Security Agreement, dated as of April 28, 2015 (the "Original Patent Security Agreement");

WHEREAS, each of the Grantors, the Purchasers identified therein and the Agent entered into the Note Purchase Agreement, dated as of July 21, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "July 2015 Note Purchase Agreement"), pursuant to which the Company issued certain additional Notes and the other Grantors agreed to Guarantee the Secured Obligations;

WHEREAS, each of the Grantors and the Agent entered into the Amended and Restated Security Agreement, dated as of July 22, 2015 (as amended, restated, supplemented, or otherwise modified from time to time, the "Security Agreement"), in order to induce the Purchasers to purchase the additional Notes and to secure the Secured Obligations; and

WHEREAS, the parties to the Original Patent Security Agreement wish to amend and restate the Original Patent Security Agreement in its entirety;

NOW, THEREFORE, in consideration of the premises and mutual covenants herein contained and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, each Grantor hereby agrees as follows:

1. DEFINED TERMS. All initially capitalized terms used but not otherwise defined herein have the meanings given to them in the Security Agreement, and this Patent Security Agreement shall be subject to the rules of construction set forth in the Security Agreement, which rules of construction are incorporated herein by this reference, *mutatis mutandis*.

2. GRANT OF SECURITY INTEREST IN PATENT COLLATERAL. Each Grantor does hereby unconditionally grant, assign, and pledge to Agent, and agrees to unconditionally grant, assign, and pledge to Agent, for its benefit and the benefit of each of the Noteholders, to secure the Secured Obligations, as applicable, a continuing security interest (referred to in this Patent Security Agreement as the “Security Interest”) in all of such Grantor’s entire right, title and interest in and to the following, whether now owned or hereafter acquired or arising (collectively, the “Patent Collateral”):

(a) all of such Grantor’s Patents and Patent Intellectual Property Licenses to which it is a party including those referred to on Schedule I;

(b) all applications, improvements, divisionals, continuations, continuations-in-part, reissues, reexaminations, or extensions of the foregoing, foreign counterparts, and the inventions covered thereby;

(c) all files and records relating to the prosecution, exploitation, and defense of any of the foregoing, and all rights of action pertaining to the Grantor’s Patents; and

(d) all products and proceeds of the foregoing, including any claim by such Grantor against third parties for past, present or future infringement of any Patent or any Patent exclusively licensed under any Intellectual Property License, including the right to receive damages, or right to receive license fees, royalties, and other compensation under any Patent Intellectual Property License.

3. SECURITY FOR SECURED OBLIGATIONS. This Patent Security Agreement and the Security Interest created hereby secures the payment and performance of the Secured Obligations, whether now existing or arising hereafter. Without limiting the generality of the foregoing, this Patent Security Agreement secures the payment of all amounts which constitute part of the Secured Obligations and would be owed by Grantors, or any of them, to Agent, or the Noteholders, whether or not they are unenforceable or not allowable due to the existence of an Insolvency Proceeding involving any Grantor.

4. SECURITY AGREEMENT. The Security Interest granted pursuant to this Patent Security Agreement is granted in conjunction with the security interests granted to Agent, for its benefit and the benefit of the Noteholders, pursuant to the Security Agreement. Each Grantor hereby acknowledges and affirms that the rights and remedies of Agent with respect to the Security Interest in the Patent Collateral made and granted hereby are more fully set forth in the Security Agreement, the terms and provisions of which are incorporated by reference herein as if fully set forth herein. To the extent there is any inconsistency between this Patent Security Agreement and the Security Agreement, the Security Agreement shall control.

5. AUTHORIZATION TO SUPPLEMENT. If any Grantor shall obtain rights to any new patent application or issued patent or become entitled to the benefit of any patent application or patent for any improvement, divisional, continuation, continuation-in-part, reissue, or reexamination of any existing patent or patent application, or any inventions covered thereby, the provisions of this Patent Security Agreement shall automatically apply thereto. Grantors hereby authorize Agent unilaterally to modify this Patent Security Agreement by amending Schedule I to include any such new patent rights of each Grantor. Notwithstanding the foregoing, no failure to so modify this Patent Security Agreement or amend Schedule I shall in any way affect, invalidate or detract from Agent’s continuing security interest in all Collateral, whether or not listed on Schedule I.

6. COUNTERPARTS. This Patent Security Agreement is a Note Document. This Patent Security Agreement may be executed in any number of counterparts and by different parties on separate counterparts, each of which, when executed and delivered, shall be deemed to be an original, and all of which, when taken together, shall constitute but one and the same Patent Security Agreement. Delivery



of an executed counterpart of this Patent Security Agreement by telefacsimile or other electronic method of transmission shall be equally as effective as delivery of an original executed counterpart of this Patent Security Agreement. Any party delivering an executed counterpart of this Patent Security Agreement by telefacsimile or other electronic method of transmission also shall deliver an original executed counterpart of this Patent Security Agreement but the failure to deliver an original executed counterpart shall not affect the validity, enforceability, and binding effect of this Patent Security Agreement.

7. CHOICE OF LAW AND VENUE, JURY TRIAL WAIVER. THIS PATENT SECURITY AGREEMENT SHALL BE SUBJECT TO THE PROVISIONS REGARDING CHOICE OF LAW AND VENUE AND JURY TRIAL WAIVER SET FORTH IN SECTIONS 8.16, 8.17 AND 8.18 OF THE SECURITY AGREEMENT, AND SUCH PROVISIONS ARE INCORPORATED HEREIN BY THIS REFERENCE, *MUTATIS MUTANDIS*.

8. ORIGINAL PATENT SECURITY AGREEMENT AMENDED AND RESTATED. This Patent Security Agreement is an amendment and restatement of the Original Patent Security Agreement. This Patent Security Agreement is in no way intended to constitute a novation of the Original Patent Security Agreement or the “Obligations” (as defined in the Existing Note Purchase Agreement and the July 2015 Note Purchase Agreement). Any security granted pursuant to or in connection with the Original Patent Security Agreement and the other documents executed in connection therewith shall continue to secure the Secured Obligations.

[signature page follows]

IN WITNESS WHEREOF, the parties hereto have caused this Patent Security Agreement to be executed and delivered as of the day and year first above written.

**GRANTORS:**

**ALIPHCOM,**  
a California corporation

DocuSigned by:  
*Hosain Rahman*  
By: \_\_\_\_\_  
Name: Hosain Rahman  
Title: Chief Executive Officer

**ALIPH, INC.,**  
a Delaware corporation

DocuSigned by:  
*Hosain Rahman*  
By: \_\_\_\_\_  
Name: Hosain Rahman  
Title: Chief Executive Officer

**MACGYVER ACQUISITION, LLC,**  
a Delaware limited liability company  
by ALIPHCOM, as sole member

DocuSigned by:  
*Hosain Rahman*  
By: \_\_\_\_\_  
Name: Hosain Rahman  
Title: Chief Executive Officer

**BODYMEDIA, INC.,**  
a Delaware corporation

DocuSigned by:  
*Hosain Rahman*  
By: \_\_\_\_\_  
Name: Hosain Rahman  
Title: Chief Executive Officer

**PROJECT PARIS ACQUISITION LLC,** a  
Delaware limited liability company  
by ALIPHCOM, as sole member


DocuSigned by:  
*Hosain Rahman*  
By: \_\_\_\_\_  
Name: Hosain Rahman  
Title: Chief Executive Officer

[SIGNATURE PAGE TO AMENDED AND RESTATED PATENT SECURITY AGREEMENT]

AGENT:

ACCEPTED AND ACKNOWLEDGED BY:

BLACKROCK ADVISORS, LLC

By:   
Name: Lisa O'Donnell  
Title: Managing Director, Authorized Signatory

[SIGNATURE PAGE TO AMENDED AND RESTATED PATENT SECURITY AGREEMENT]

**SCHEDULE I**  
**to**  
**PATENT SECURITY AGREEMENT**

**Patents**

Current Owner	Country	Patent No.	Application No.	Filed
Aliph, Inc.	U.S.	7246058B2	10159770	5/30/2002
Aliph, Inc.	U.S.		13069244	3/22/2011
Aliph, Inc.	U.S.		13069264	3/22/2011
Aliph, Inc.	U.S.		13069275	3/22/2011
Aliph, Inc.	U.S.	8,942,383	13753441	1/29/2013
Aliph, Inc.	U.S.	D0609901S	29333427	3/9/2009
Aliph, Inc.	U.S.	D0610579S	29333428	3/9/2009
Aliph, Inc.	U.S.	D0614179S	29333430	3/9/2009
Aliph, Inc.	U.S.	D0609900S	29333431	3/9/2009
Aliph, Inc.	U.S.	D0620247S	29333432	3/9/2009
Aliphcom, Inc.	U.S.	8467543B2	10400282	3/27/2003
Aliphcom, Inc.	U.S.	8019091B2	10667207	9/18/2003
Aliphcom, Inc.	U.S.	7433484B2	10769302	1/30/2004
Aliphcom, Inc.	U.S.	8340309B2	11199856	8/8/2005

Aliphcom	U.S.	8810732B1	11704552	2/9/2007
Aliphcom	U.S.	8839342B2	11859460	9/21/2007
Aliphcom	U.S.	8320824B2	11860004	9/24/2007
Aliphcom	U.S.	7929446	11969737	1/4/2008
Aliphcom	U.S.		11982956	11/5/2007
Aliphcom	U.S.	8489136B2	12006607	1/3/2008
AliphCom, Inc.	U.S.	8055307	12039718	2/18/2008
Aliphcom, Inc.	U.S.	8625816B2	12123364	5/19/2008
Aliphcom, Inc.	U.S.	8503691B2	12139333	6/13/2008
Aliphcom, Inc.	U.S.	8837746B2	12139344	6/13/2008
Aliphcom, Inc.	U.S.	8494177B2	12139355	6/13/2008
Aliphcom, Inc.	U.S.	8503692B2	12139361	6/13/2008

Aliphcom, Inc.	U.S.	8254617B2	12163592	6/27/2008
Aliphcom, Inc.	U.S.	8280072B2	12163617	6/27/2008
Aliphcom, Inc.	U.S.		12163647	6/27/2008
Aliphcom, Inc.	U.S.	8477961B2	12163675	6/27/2008
Aliphcom, Inc.	U.S.	8130984B2	12243718	10/1/2008
Aliphcom, Inc.	U.S.	8503596B2	12244670	10/2/2008
Aliphcom, Inc.	U.S.	8452347B2	12354689	1/15/2009
Aliphcom, Inc.	U.S.	8326611B2	12606140	10/26/2009
Aliphcom, Inc.	U.S.	8321213B2	12606146	10/26/2009
Aliphcom, Inc.	U.S.		12756051	4/7/2010
Aliphcom, Inc.	U.S.	8503686B2	12772947	5/3/2010
Aliphcom, Inc.	U.S.	8452023B2	12772963	5/3/2010
Aliphcom, Inc.	U.S.	8488803B2	12772975	5/3/2010

Aliphcom, Inc.	U.S.	8699721B2	12826643	6/29/2010
Aliphcom, Inc.	U.S.	8731211B2	12826658	6/29/2010
Aliphcom, Inc.	U.S.	8842848B2	12882482	9/15/2010
Aliphcom, Inc.	U.S.	9003429	12886919	9/21/2010
Aliphcom, Inc.	U.S.		13037057	2/28/2011
AliphCom	U.S.		13109839	5/17/2011
Aliphcom, Inc.	U.S.	8817642B2	13117539	5/27/2011
Aliphcom, Inc.	U.S.		13135728	7/12/2011
Aliphcom, Inc.	U.S.		13158372	6/10/2011
Aliphcom, Inc.	U.S.		13158416	6/11/2011
Aliphcom	U.S.		13180000	7/11/2011
Aliphcom	U.S.	8793522B2	13180320	7/11/2011
Aliphcom	U.S.		13181486	7/12/2011

Aliphcom	U.S.		13181500	7/12/2011
Aliphcom	U.S.		13181511	7/12/2011
Aliphcom	U.S.		13181512	7/12/2011
Aliphcom	U.S.		13181513	7/12/2011
Aliphcom	U.S.	8838184B2	13184422	7/15/2011
Aliphcom	U.S.		13209047	8/12/2011
AliphCom, Inc.	U.S.	8509690B2	13246617	9/27/2011
Aliphcom	U.S.		13247975	9/28/2011
Aliphcom	U.S.	8804986B2	13270976	10/11/2011
Aliphcom	U.S.		13346719	1/9/2012
Aliphcom	U.S.		13361919	1/30/2012
Aliphcom	U.S.		13374746	1/9/2012



Aliphcom	U.S.		13405240	2/25/2012
Aliphcom	U.S.		13405241	2/25/2012
Aliphcom	U.S.		13420568	3/14/2012
Aliphcom	U.S.		13421576	3/15/2012
Aliphcom	U.S.	8529811B2	13427839	3/22/2012
Aliphcom, Inc.	U.S.		13431725	3/27/2012
Aliphcom	U.S.		13433204	3/28/2012
Aliphcom	U.S.		13433208	3/28/2012
Aliphcom	U.S.		13433213	3/28/2012
Aliphcom, Inc.	U.S.	8682018B2	13436765	3/30/2012
Aliphcom, Inc.	U.S.	8446275B2	13454040	4/23/2012
Aliphcom	U.S.		13491345	6/7/2012

Aliphcom	U.S.		13491524	6/7/2012
Aliphcom	U.S.		13492770	6/8/2012
Aliphcom	U.S.		13492776	6/8/2012
Aliphcom	U.S.		13492857	6/9/2012
Aliphcom	U.S.		13528830	6/20/2012
AliphCom	U.S.		13552462	7/18/2012
Aliphcom	U.S.		13561033	7/28/2012
AliphCom	U.S.		13627997	9/26/2012
AliphCom, Inc.	U.S.		13666932	11/1/2012
AliphCom, Inc.	U.S.		13669356	11/5/2012
AliphCom, Inc.	U.S.		13669369	11/5/2012
AliphCom, Inc.	U.S.		13669375	11/5/2012
AliphCom	U.S.		13670419	11/6/2012
AliphCom	U.S.		13672392	11/8/2012
Aliphcom	U.S.		13672398	11/8/2012
AliphCom	U.S.		13672451	11/8/2012

Aliphcom	U.S.		13672671	11/8/2012
AliphCom	U.S.		13673846	11/9/2012
AliphCom	U.S.		13673857	11/9/2012
AliphCom	U.S.		13674080	11/11/2012
AliphCom	U.S.	8934654B2	13802266	3/13/2013
AliphCom	U.S.		13802283	3/13/2013
AliphCom	U.S.		13802305	3/13/2013
AliphCom	U.S.		13802319	3/13/2013
AliphCom	U.S.		13802409	3/13/2013
AliphCom	U.S.		13802425	3/13/2013
AliphCom	U.S.		13802442	3/13/2013
Aliphcom, Inc.	U.S.		13802528	3/13/2013
AliphCom	U.S.		13802646	3/13/2013
Aliphcom	U.S.		13802674	3/13/2013
Aliphcom	U.S.		13802689	3/13/2013
Aliphcom	U.S.		13827683	3/14/2013
AliphCom	U.S.		13827754	3/14/2013
AliphCom	U.S.		13830770	3/14/2013
Aliphcom	U.S.		13830860	3/14/2013
Aliphcom	U.S.		13830927	3/14/2013
Aliphcom	U.S.		13831139	3/14/2013

AliphCom	U.S.		13831260	3/14/2013
AliphCom	U.S.		13831301	3/14/2013
AliphCom	U.S.		13831447	3/14/2013
Aliphcom	U.S.		13831485	3/14/2013
AliphCom	U.S.		13831689	3/15/2013
AliphCom	U.S.		13831698	3/15/2013
Aliphcom	U.S.		13871843	4/26/2013
AliphCom	U.S.		13886173	5/2/2013
Aliphcom	U.S.		13886254	5/2/2013
AliphCom	U.S.		13890143	5/8/2013
AliphCom	U.S.		13894850	5/15/2013
Aliphcom	U.S.		13898451	5/20/2013
AliphCom	U.S.		13898465	5/20/2013
AliphCom	U.S.		13898472	5/21/2013
AliphCom	U.S.		13898474	5/21/2013
AliphCom	U.S.		13900943	5/23/2013
AliphCom	U.S.		13906109	5/30/2013
AliphCom	U.S.		13906244	5/30/2013
AliphCom	U.S.		13917225	6/13/2013
Aliphcom	U.S.		13919307	6/17/2013
Aliphcom	U.S.		13919339	6/17/2013
AliphCom	U.S.		13919919	6/17/2013

AliphCom	U.S.		13929718	6/27/2013
Aliphcom	U.S.		13942503	7/15/2013
Aliphcom	U.S.		13942623	7/15/2013
Aliphcom	U.S.		13942674	7/15/2013
Aliphcom, Inc.	U.S.		13948160	7/22/2013
AliphCom	U.S.		13952532	7/26/2013
AliphCom	U.S.		13952552	7/26/2013
AliphCom	U.S.		13954331	7/30/2013
AliphCom	U.S.		13954367	7/30/2013
AliphCom	U.S.		13957383	8/1/2013
Aliphcom	U.S.		13959707	8/5/2013
Aliphcom, Inc.	U.S.		13959708	8/5/2013
Aliphcom	U.S.		13959709	8/5/2013
AliphCom	U.S.		13967317	8/14/2013
AliphCom	U.S.		14029300	9/17/2013
AliphCom	U.S.		14058125	10/18/2013
AliphCom	U.S.		14064189	10/27/2013
AliphCom	U.S.		14065393	10/28/2013
AliphCom	U.S.		14065400	10/28/2013
AliphCom	U.S.		14065415	10/28/2013
AliphCom	U.S.		14065419	10/29/2013
AliphCom	U.S.		14067444	10/30/2013
AliphCom	U.S.		14068551	10/31/2013
AliphCom	U.S.		14069008	10/31/2013
AliphCom	U.S.		14069031	10/31/2013

AliphCom	U.S.		14070437	11/1/2013
Aliphcom	U.S.		14070443	11/1/2013
AliphCom	U.S.		14070446	11/1/2013
AliphCom	U.S.		14070452	11/1/2013
AliphCom	U.S.		14071531	11/4/2013
AliphCom	U.S.		14071546	11/4/2013
AliphCom	U.S.		14073550	11/6/2013
AliphCom	U.S.		14073696	11/6/2013
AliphCom	U.S.		14075523	11/8/2013
AliphCom	U.S.		14076014	11/8/2013
AliphCom	U.S.		14079632	11/13/2013
AliphCom	U.S.		14105119	12/12/2013
AliphCom	U.S.		14105127	12/12/2013
AliphCom	U.S.		14105146	12/12/2013
AliphCom	U.S.		14105157	12/12/2013
AliphCom	U.S.		14105159	12/12/2013
AliphCom	U.S.		14105172	12/12/2013
AliphCom	U.S.		14105173	12/12/2013
AliphCom	U.S.		14144494	12/30/2013
AliphCom	U.S.		14144499	12/30/2013
AliphCom	U.S.		14144505	12/30/2013
AliphCom	U.S.		14144512	12/30/2013
AliphCom	U.S.		14144513	12/30/2013
AliphCom	U.S.		14144514	12/30/2013
AliphCom	U.S.		14144516	12/30/2013
AliphCom	U.S.		14144517	12/30/2013
AliphCom	U.S.		14144518	12/30/2013
AliphCom	U.S.		14144519	12/30/2013
AliphCom	U.S.		14144521	12/30/2013
AliphCom	U.S.		14144524	12/30/2013

AliphCom	U.S.		14145849	12/31/2013
AliphCom	U.S.		14145852	12/31/2013
AliphCom	U.S.		14145856	12/31/2013
Aliphcom	U.S.		14145879	12/31/2013
AliphCom	U.S.		14145887	12/31/2013
AliphCom	U.S.		14145894	12/31/2013
AliphCom	U.S.		14149805	1/7/2014
AliphCom	U.S.		14181589	2/14/2014
AliphCom	U.S.		14181595	2/18/2014
AliphCom	U.S.		14183425	2/18/2014
AliphCom	U.S.		14183463	2/18/2014
AliphCom	U.S.		14183472	2/18/2014
AliphCom	U.S.		14183490	2/18/2014
AliphCom	U.S.		14183491	2/18/2014
AliphCom	U.S.		14183493	2/18/2014
AliphCom	U.S.		14187317	2/23/2014
AliphCom	U.S.		14188602	2/24/2014
AliphCom	U.S.		14191284	2/26/2014
AliphCom	U.S.		14192432	2/27/2014
AliphCom	U.S.		14192463	2/27/2014
AliphCom	U.S.		14192610	2/27/2014
AliphCom	U.S.		14192620	2/27/2014
AliphCom	U.S.		14194424	2/28/2014
AliphCom	U.S.		14194495	2/28/2014
AliphCom	U.S.		14203464	3/10/2014
AliphCom	U.S.		14203467	3/10/2014
AliphCom	U.S.		14205138	3/11/2014
AliphCom	U.S.		14205151	3/11/2014
AliphCom	U.S.		14205215	3/11/2014
AliphCom	U.S.		14205263	3/11/2014

AliphCom	U.S.		14207183	3/12/2014
AliphCom	U.S.		14207203	3/12/2014
AliphCom	U.S.		14207221	3/12/2014
AliphCom	U.S.		14207235	3/12/2014
AliphCom	U.S.		14207243	3/12/2014
AliphCom	U.S.		14207263	3/12/2014
AliphCom	U.S.		14207420	3/12/2014
AliphCom	U.S.		14207429	3/12/2014
AliphCom	U.S.		14209329	3/13/2014
AliphCom	U.S.		14209690	3/13/2014
AliphCom	U.S.		14209959	3/13/2014
AliphCom	U.S.		14210201	3/13/2014
AliphCom	U.S.		14210234	3/13/2014
AliphCom	U.S.		14212832	3/14/2014
AliphCom	U.S.		14213439	3/14/2014
AliphCom	U.S.		14214065	3/14/2014
AliphCom	U.S.		14214086	3/14/2014
AliphCom	U.S.		14214254	3/14/2014
AliphCom	U.S.		14215038	3/16/2014
AliphCom	U.S.		14215047	3/16/2014
AliphCom	U.S.		14215051	3/16/2014
AliphCom	U.S.		14219648	3/19/2014
Aliphcom, Inc.	U.S.		14224868	3/25/2014
AliphCom	U.S.		14225339	3/25/2014
AliphCom	U.S.		14243747	4/2/2014
AliphCom	U.S.		14244677	4/3/2014
AliphCom	U.S.		14244759	4/3/2014
AliphCom	U.S.		14246971	4/7/2014
AliphCom	U.S.		14260221	4/23/2014
AliphCom	U.S.		14266697	4/30/2014
AliphCom	U.S.		14270242	5/5/2014
AliphCom	U.S.		14270249	5/5/2014



AliphCom	U.S.		14272464	5/7/2014
AliphCom	U.S.		14279253	5/15/2014
AliphCom	U.S.		14281856	5/19/2014
AliphCom	U.S.		14289617	5/28/2014
AliphCom	U.S.		14301220	6/10/2014
AliphCom	U.S.		14301227	6/10/2014
AliphCom	U.S.		14313895	6/24/2014
AliphCom	U.S.		14328665	7/10/2014
AliphCom	U.S.		14389766	9/30/2014
AliphCom	U.S.		14421815	2/13/2015
AliphCom	U.S.		14445051	7/28/2014
AliphCom	U.S.		14452496	8/5/2014
AliphCom	U.S.		14457051	8/11/2014
AliphCom	U.S.		14463556	8/19/2014
AliphCom	U.S.		14468327	8/25/2014
AliphCom, Inc.	U.S.	D0582398S	29299133	12/19/2007
AliphCom, Inc.	U.S.	D0584294S	29299134	12/19/2007
AliphCom, Inc.	U.S.	D0582898S	29299135	12/19/2007
AliphCom, Inc.	U.S.	D0585881S	29299139	12/19/2007
Aliphcom	U.S.	D0632674S	29353843	1/14/2010
Aliphcom	U.S.	D0632675S	29353844	1/14/2010
Aliphcom	U.S.	D0645026S	29353846	1/14/2010
Aliphcom	U.S.	D0632676S	29353847	1/14/2010

Aliphcom	U.S.	D0633480S	29354212	1/20/2010
Aliphcom	U.S.	D0648709S	29377627	10/22/2010
Aliphcom	U.S.	D0648726S	29377628	10/22/2010
Aliphcom	U.S.	D0645024S	29378325	11/2/2010
AliphCom	U.S.	D0655689S	29378327	11/2/2010
AliphCom	U.S.	D0652019S	29378328	11/2/2010
AliphCom	U.S.	D0652020S	29378329	11/2/2010
AliphCom	U.S.	D0641341S	29383495	1/18/2011
AliphCom	U.S.	D0664948S	29383712	1/20/2011
AliphCom	U.S.	D0664949S	29383714	1/20/2011
AliphCom	U.S.	D0653149S	29393916	6/10/2011
AliphCom	U.S.	D0695758S	29405617	11/3/2011
AliphCom	U.S.	D0696272S	29405623	11/3/2011
AliphCom	U.S.	D0695759S	29405625	11/3/2011
AliphCom	U.S.	D0695760S	29405626	11/3/2011
AliphCom	U.S.	D0695761S	29405627	11/3/2011
AliphCom	U.S.	D0696273S	29405628	11/3/2011
AliphCom	U.S.	D0696274S	29405630	11/3/2011

AliphCom	U.S.	D0695762S	29405631	11/3/2011
AliphCom	U.S.	D0699252S	29405633	11/3/2011
AliphCom	U.S.	D0695763S	29405634	11/3/2011
AliphCom	U.S.	D0696275S	29405635	11/3/2011
AliphCom	U.S.	D0695764S	29405636	11/3/2011
AliphCom	U.S.	D0695765S	29405637	11/3/2011
AliphCom	U.S.	D0695766S	29405638	11/3/2011
AliphCom	U.S.	D0695767S	29405639	11/3/2011
AliphCom	U.S.	D0695768S	29405640	11/3/2011
AliphCom	U.S.	D0695769S	29405641	11/3/2011
AliphCom	U.S.	D0695770S	29405642	11/3/2011
AliphCom	U.S.	D0695771S	29405643	11/3/2011
AliphCom	U.S.	D0695772S	29405644	11/3/2011
AliphCom	U.S.	D0695773S	29405645	11/3/2011
AliphCom	U.S.	D0696276S	29405646	11/3/2011
AliphCom	U.S.	D0678864S	29413571	2/16/2012
AliphCom	U.S.	D0678865S	29413572	2/16/2012

AliphCom	U.S.	D0678244S	29413573	2/16/2012
AliphCom	U.S.	D0698757S	29445283	2/8/2013
AliphCom	U.S.	D0698758S	29445286	2/8/2013
AliphCom	U.S.	D0698759S	29445287	2/8/2013
AliphCom	U.S.	D0710325S	29459899	7/3/2013
AliphCom	U.S.	D0713389S	29459900	7/3/2013
AliphCom	U.S.		62019327	6/30/2014
AliphCom	U.S.		62067428	10/22/2014
AliphCom	U.S.		62107411	1/25/2015
AliphCom	U.S.		14/121,355	8/22/2014
AliphCom	U.S.		14/121,463	9/8/2014
AliphCom	U.S.		14/121,465	9/8/2014
AliphCom	U.S.		14/121,938	11/4/2014
AliphCom	U.S.		14/121,939	11/4/2014
AliphCom	U.S.		14/121,940	11/4/2014
AliphCom	U.S.		14/121,941	11/4/2014
AliphCom	U.S.		14/121,942	11/4/2014
AliphCom	U.S.		14/121,943	11/4/2014
AliphCom	U.S.		14/121,944	11/4/2014
AliphCom	U.S.		14/121,947	11/4/2014
AliphCom	U.S.		14/121,948	11/4/2014
AliphCom	U.S.		14/313901	6/24/2014
AliphCom	U.S.		14/480,048	9/8/2014
AliphCom	U.S.		14/480,070	9/8/2014
AliphCom	U.S.		14/480,427	9/8/2014
AliphCom	U.S.		14/480,446	9/8/2014
AliphCom	U.S.		14/480,452	9/8/2014
AliphCom	U.S.		14/480,462	9/8/2014
AliphCom	U.S.		14/480,628	9/8/2014
AliphCom	U.S.		14/486,978	9/15/2014
AliphCom	U.S.		14/486,997	9/15/2014

AliphCom	U.S.		14/488,042	9/16/2014
AliphCom	U.S.		14/493,298	9/22/2014
AliphCom	U.S.		14/519,116	10/20/2014
AliphCom	U.S.		14/526,503	10/28/2014
AliphCom	U.S.		14/532,789	11/4/2014
AliphCom	U.S.		14/541,064	11/13/2014
AliphCom	U.S.		14/541,134	11/13/2014
AliphCom	U.S.		14/541,135	11/13/2014
AliphCom	U.S.		14/578,297	12/19/2014
AliphCom	U.S.		14/596,127	1/13/2015
AliphCom	U.S.		14/606,995	1/27/2015
AliphCom	U.S.		14/637,387	3/3/2015
AliphCom	U.S.		14/640,013	3/5/2015
AliphCom	U.S.		14/656,683	3/12/2015
AliphCom	U.S.		14/659,521	3/16/2015
BodyMedia, Inc.	U.S.	6,527,711	9419600	10/18/1999
BodyMedia, Inc.	U.S.	7,689,437	9595660	6/16/2000
BodyMedia, Inc.	U.S.	6605038B1	9602537	6/23/2000
BodyMedia, Inc.	U.S.		9620579	7/20/2000
BodyMedia, Inc.	U.S.	6595929B2	9822890	3/30/2001
BodyMedia, Inc.	U.S.	7261690B2	9923181	8/6/2001
BodyMedia, Inc.	U.S.	7020508B2	10227575	8/22/2002
Bodymedia, Inc.	U.S.	7153262B2	10313255	12/6/2002
BodyMedia	U.S.		10612894	7/7/2003
BodyMedia, Inc.	U.S.	8157731B2	10682293	10/9/2003
BodyMedia, Inc.	U.S.	7285090B2	10682759	10/9/2003
BodyMedia, Inc.	U.S.	8398546B2	10940214	9/13/2004
BodyMedia, Inc.	U.S.	7502643B2	10940889	9/13/2004
BodyMedia, Inc.	U.S.	8663106B2	11088002	3/22/2005

Bodymedia, Inc.	U.S.		11239748	9/30/2005
Bodymedia, Inc.	U.S.	8073707	11247049	10/11/2005
Bodymedia, Inc.	U.S.	8961413	11434949	5/16/2006
Bodymedia, Inc.	U.S.	8403845	11481147	7/5/2006
BodyMedia, Inc.	U.S.		11582896	10/17/2006
Bodymedia, Inc.	U.S.	8961414B2	11724373	3/15/2007
Bodymedia, Inc.	U.S.	7,959,567	11876623	10/22/2007
Bodymedia, Inc.	U.S.		11925906	10/27/2007
BodyMedia, Inc.	U.S.	8708904B2	11925965	10/28/2007
Bodymedia, Inc.	U.S.		11928039	10/30/2007
Bodymedia, Inc.	U.S.		11930036	10/30/2007
Bodymedia, Inc.	U.S.		11930053	10/30/2007
Bodymedia, Inc.	U.S.		11930081	10/30/2007
Bodymedia, Inc.	U.S.	8641612B2	11930091	10/31/2007
Bodymedia, Inc.	U.S.	8,968,196	11930092	10/31/2007
Bodymedia, Inc.	U.S.	8852098B2	11930094	10/31/2007

BodyMedia, Inc.	U.S.		12033722	2/19/2008
BodyMedia, Inc.	U.S.		12033731	2/19/2008
BodyMedia, Inc.	U.S.		12033741	2/19/2008
BodyMedia, Inc.	U.S.		12033746	2/19/2008
BodyMedia, Inc.	U.S.		12033751	2/19/2008
BodyMedia, Inc.	U.S.	8382590B2	12033753	2/19/2008
BodyMedia, Inc.	U.S.	8275635B2	12033760	2/19/2008
BodyMedia, Inc.	U.S.		12033766	2/19/2008
BodyMedia	U.S.		12352911	1/13/2009
BodyMedia, Inc.	U.S.	8369936B2	12840109	7/20/2010
BodyMedia, Inc.	U.S.		13130282	6/18/2012
Virginia Commonwealth University				
Bodymedia, Inc.	U.S.	8870766	13291879	11/8/2011
Bodymedia, Inc.	U.S.		13291982	11/8/2011
BodyMedia, Inc.	U.S.		13734433	1/4/2013
BodyMedia, Inc.	U.S.		13761409	2/7/2013
BODYMEDIA, INC.	U.S.		13761557	2/7/2013

BodyMedia, Inc.	U.S.		14058485	10/21/2013
BodyMedia, Inc.	U.S.		14058493	10/21/2013
BodyMedia, Inc.	U.S.	8979763	14058501	10/21/2013
BodyMedia, Inc.	U.S.		14058563	10/21/2013
BodyMedia, Inc.	U.S.		14059054	10/21/2013
BodyMedia, Inc.	U.S.		14059072	10/21/2013
BodyMedia, Inc.	U.S.		14059117	10/21/2013
BODYMEDIA, INC.	U.S.		14060004	10/22/2013
BodyMedia, Inc.	U.S.		14060010	10/22/2013
BodyMedia, Inc.	U.S.		14060029	10/22/2013
BodyMedia, Inc.	U.S.		14060047	10/22/2013
BodyMedia, Inc.	U.S.		14060072	10/22/2013
BodyMedia, Inc.	U.S.		14060082	10/22/2013
BodyMedia, Inc.	U.S.		14060092	10/22/2013
BODYMEDIA, INC.	U.S.		14060122	10/22/2013
BodyMedia, Inc.	U.S.		14081369	11/15/2013
BodyMedia, Inc.	U.S.		14081406	11/15/2013
BodyMedia, Inc.	U.S.		14081880	11/15/2013
BodyMedia, Inc.	U.S.		14081889	11/15/2013
BodyMedia, Inc.	U.S.		14081901	11/15/2013
BodyMedia, Inc.	U.S.		14081928	11/15/2013
BodyMedia, Inc.	U.S.		14081935	11/15/2013
BodyMedia, Inc.	U.S.		14081942	11/15/2013
BodyMedia, Inc.	U.S.		14081951	11/15/2013
BodyMedia, Inc.	U.S.		14081956	11/15/2013
BodyMedia, Inc.	U.S.		14081967	11/15/2013
BodyMedia, Inc.	U.S.		14081972	11/15/2013
BodyMedia, Inc.	U.S.		14081979	11/15/2013
BodyMedia, Inc.	U.S.		14082070	11/15/2013
BodyMedia, Inc.	U.S.		14082176	11/17/2013
BodyMedia, Inc.	U.S.		14082178	11/17/2013
BodyMedia, Inc.	U.S.		14082179	11/17/2013
BODYMEDIA, INC.	U.S.		14082180	11/17/2013
BodyMedia, Inc.	U.S.		14082183	11/17/2013
BODYMEDIA, INC.	U.S.		14082185	11/17/2013
BodyMedia, Inc.	U.S.		14082186	11/17/2013
BodyMedia, Inc.	U.S.		14082188	11/17/2013
BodyMedia, Inc.	U.S.		14082189	11/17/2013
BodyMedia, Inc.	U.S.		14082190	11/17/2013
BodyMedia, Inc.	U.S.		14082192	11/17/2013
BodyMedia, Inc.	U.S.		14083372	11/18/2013



BodyMedia, Inc.	U.S.		14083382	11/18/2013
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BodyMedia, Inc.	U.S.		14083397	11/18/2013
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BodyMedia, Inc.	U.S.		14083404	11/18/2013
BodyMedia, Inc.	U.S.		14083407	11/18/2013
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BodyMedia, Inc.	U.S.		14133610	12/18/2013
BodyMedia, Inc.	U.S.		14133612	12/18/2013
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BodyMedia, Inc.	U.S.		14133622	12/18/2013
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BodyMedia, Inc.	U.S.		14133634	12/18/2013
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BodyMedia, Inc.	U.S.		14138030	12/21/2013
BodyMedia, Inc.	U.S.		14138033	12/21/2013
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Bodymedia, Inc.	U.S.		14139875	12/24/2013
BodyMedia, Inc.	U.S.		14221506	3/21/2014
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BodyMedia, Inc.	U.S.	D0645968S	29383860	1/24/2011
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Project Paris Acquisition LLC	U.S.		14039258	9/27/2013
University of Maryland, College park Office of Technology Commercialization	U.S.	6,399,306	9622910	9/5/2000
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	U.S.		29/495,404	6/30/2014
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	U.S.		29/517,054	2/9/2015
	U.S.		29/517,056	2/9/2015

**Patent License**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:

Gregory C. Burnett

Application Serial No.: 13/959,708

Filing Date: August 5, 2013

For: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Examiner: WEISS, Howard

Group Art Unit: 2814

Confirmation No.: 5622

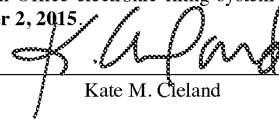
Transmission Date: November 2, 2015

Atty. Docket No.: ALI-050ACON1

CERTIFICATE OF EFS-WEB TRANSMISSION

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Signed: \_\_\_\_\_



Kate M. Cleland

**RESPONSE TO OFFICE ACTION**

Dear Sir or Madam:

In response to the *Non-Final Office Action*, mailed May 1, 2015, Applicant respectfully submits herewith a complete claim listing and remarks as well as (1) a *Terminal Disclaimer under 37 C.F.R. § 1.321(c) to Obviate an Obviousness-Type Double Patenting Rejection* and (2) a *Terminal Disclaimer Under 37 C.F.R § 1.321 to Obviate a Provisional Obviousness-Type Double Patenting Rejection*. Please also find enclosed (3) an *Application Data Sheet* (corrected), (4) a *Statement Under 37 C.F.R. § 3.73(c)*, and (5) a *Power of Attorney* (Form PTO/SB/80).

**CLAIM LISTING**

1. (Cancelled)
  
2. (Previously presented) A device, comprising:
  - a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;
  - a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech; and
  - a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.
  
3. (Previously presented) The device of Claim 2, wherein the signal processor comprises one or more digital signal processors (DSPs).
  
4. (Previously presented) The device of Claim 2, wherein the noise content comprises acoustic noise and the speech content comprises human speech.



5. (Previously presented) The device of Claim 2, wherein the signal processor is operative to add a delay to the first microphone signals.
6. (Previously presented) The device of Claim 5, wherein the signal processor is operative to raise the delay to a power that is proportional to a time difference between arrival of the speech at the first virtual microphone and arrival of the speech at the second virtual microphone.
7. (Previously presented) The device of Claim 5, wherein the signal processor is operative to raise the delay to a power that is proportional to a sampling frequency multiplied by a quantity equal to a third distance subtracted from a fourth distance, the third distance being between the first physical microphone and a speech source of the speech and the fourth distance being between the second physical microphone and the speech source.
8. (Previously presented) The device of Claim 2, wherein the first and second physical microphones comprise omnidirectional microphones.
9. (Previously presented) The device of Claim 2, wherein the first and second physical microphones are included in a microphone array.
10. (Previously presented) The device of Claim 2, wherein the first physical microphone and the second physical microphones are disposed along an axis and are separated from each other by a first distance.

11. (Previously presented) The device of Claim 10, wherein a midpoint of the axis is a second distance from a speech source that generates the speech, wherein the speech source is located in a direction defined by an angle relative to the midpoint.
12. (Previously presented) The device of Claim 11, wherein the first virtual microphone is formed by subtracting the second microphone signal from the first microphone signal.
13. (Previously presented) The device of Claim 11, wherein the second virtual microphone is formed by subtracting the first microphone signal from the second microphone signal.
14. (Previously presented) The device of Claim 2, wherein the first virtual microphone is formed by subtracting the second microphone signal from a delayed version of the first microphone signal.
15. (Previously presented) The device of Claim 2, wherein the second virtual microphone is formed by subtracting the first microphone signal from a delayed version of the second microphone signal.

16. (Previously presented) A device, comprising:

a first virtual microphone comprising a first combination of a first microphone signal and a second microphone signal, wherein the first microphone signal is generated by a first physical microphone and the second microphone signal is generated by a second physical microphone;

a second virtual microphone comprising a second combination of the first microphone signal and the second microphone signal, wherein the second combination is different from the first combination, wherein the first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech;

a virtual microphone array including the first and second virtual microphones and having a single null oriented in a direction toward a source of speech; and

a signal processor coupled with the first and second microphone signals and operative to combine the first and second microphone signals by filtering and summing in the time domain, to apply a varying linear transfer function between the first and second microphone signals, and to generate an output signal having noise content that is attenuated with respect to speech content.

17. (Previously presented) The device of Claim 16, wherein the source of speech comprises human speech.

18. (Previously presented) The device of Claim 16, wherein the second virtual microphone includes a second linear response to speech and the single null comprises a region of the second linear response to speech having a measured response level that is lower than a measured response level of any other region of the second linear response to speech.

19. (Previously presented) The device of Claim 16, wherein the first virtual microphone is formed by subtracting the second microphone signal from a delayed version of the first microphone signal.

20. (Previously presented) The device of Claim 16, wherein the second virtual microphone is formed by subtracting the first microphone signal from a delayed version of the second microphone signal.

21. (Previously presented) The device of Claim 16, wherein the first and second physical microphones are included in a microphone array.

**REMARKS**

Claims 2-21 remain pending.

The Examiner has rejected claims 2-21 on the ground of non-statutory double patenting as being unpatentable over claims 1-51 of U.S. Patent No. 8,494,177. Additionally, the Examiner has provisionally rejected claims 2-21 on the ground of non-statutory double patenting as being unpatentable over claims 2-21 of copending U.S. Patent Application No. 13/948,160.

The Examiner has set forth the non-statutory double patenting rejections as set forth above. Applicant respectfully submits the enclosed *Terminal Disclaimer under 37 C.F.R. § 1.321(c) to Obviate an Obviousness-Type Double Patenting Rejection* and *Terminal Disclaimer Under 37 C.F.R § 1.321 to Obviate a Provisional Obviousness-Type Double Patenting Rejection* to overcome the Examiner's non-statutory double patenting rejections.

Additionally, Applicant respectfully requests to update the Applicant information in accordance with 37 C.F.R. § 1.46(c), and submits herewith (1) an *Application Data Sheet* (corrected) (Exhibit A), (2) a *Statement Under 37 C.F.R. § 3.73(c)* (Exhibit B), and (3) a *Power of Attorney* (Form PTO/SB/80) (Exhibit C).

Reconsideration of the application and allowance of all claims are respectfully requested based on the preceding remarks. If at any time the Examiner believes that an interview would be helpful, please contact the undersigned.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

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703 High Street  
Palo Alto, CA 94301-2447  
Tel: (650) 566-9921  
Fax: (650) 566-9922

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:  
Gregory C. Burnett

Application Serial No.: 13/959,708

Filing Date: August 5, 2013

For: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Examiner: WEISS, Howard

Group Art Unit: 2814

Confirmation No.: 5622

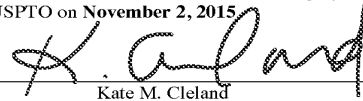
Transmission Date: November 2, 2015

Atty. Docket No.: ALI-050ACON1

CERTIFICATE OF EFS-WEB TRANSMISSION

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Signed: \_\_\_\_\_



Kate M. Cleland

**TERMINAL DISCLAIMER UNDER 37 C.F.R. § 1.321(c) TO OBVIATE AN  
OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTION**

Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Dear Sir or Madam:

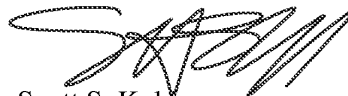
The owner(s), AliphCom (Assignee), of the entire interest in the above-identified application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the above-identified application (hereafter "instant application"), which would extend beyond the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of prior United States Patent No. 8,494,177 (hereafter "prior patent"), as presently

shortened by any terminal disclaimer. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term, as defined in 35 U.S.C. §§ 154 and 173, of the prior patent, as presently shortened by any terminal disclaimer, in the event that it later: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR § 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

We hereby submit the amount of \$160.00 to cover the statutory disclaimer fees for undiscounted entity. If any questions arise regarding this statutory disclaimer, please contact the undersigned attorney or agent of record.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

Date: November 2, 2015

KOKKA & BACKUS, PC  
703 High Street  
Palo Alto, CA 94301-2447  
Tel: (650) 566-9921  
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:  
Gregory C. Burnett

Application Serial No.: 13/959,708

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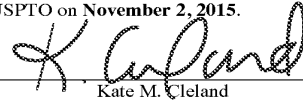
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Signed: \_\_\_\_\_



Kate M. Cleland

**TERMINAL DISCLAIMER UNDER 37 C.F.R. § 1.321**  
**TO OBVIATE A PROVISIONAL OBVIOUSNESS-TYPE DOUBLE PATENTING**  
**REJECTION**

Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Dear Sir or Madam:

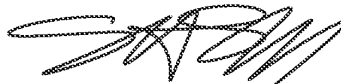
The owner(s), AliphCom (Assignee), of the entire interest in the above-identified application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the above-identified application (hereafter "instant application"), which would extend beyond the expiration date of the full statutory term defined in 35 U.S.C. 154 and 173 of any patent granted on pending reference Application Number 13/948,160, filed on July

22, 2013 (hereafter “reference patent application”), as the term of any patent granted on said reference patent application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the reference patent application. The owner(s) hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the reference patent application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the above-identified application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 and 173 of any patent(s) granted on said reference patent application, as the term of any patent(s) granted on said reference patent application may be shortened by any terminal disclaimer filed prior to the grant of any patent(s) on the pending reference application, in the event that it later: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued or is in any matter terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.

We hereby submit the amount of \$160.00 to cover the statutory disclaimer fees for undiscounted entity. If any questions arise regarding this statutory disclaimer, please contact the undersigned attorney or agent of record.

Respectfully submitted,



Scott S. Kokka  
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## Application Data Sheet

### Cross-Reference to Related Applications

This application is continuation of U.S. Nonprovisional Patent Application No. 12/139,355, filed June 13, 2008, now U.S. Patent No. 8,494,177 and entitled "Dual Omnidirectional Microphone Array (DOMA)," which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No. 60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

### Application Information

<b>Filing Date::</b>	August 5, 2013
<b>Application Type::</b>	Continuation
<b>Subject Matter::</b>	Utility
<b>Suggested Group Art Unit::</b>	None
<b>CD-ROM or CD-R?::</b>	None
<b>Title::</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>Attorney Docket Number::</b>	ALI-050ACON1
<b>Request for Early Publication?::</b>	No
<b>Request for Non-Publication?::</b>	No
<b>Suggested Drawing Figure::</b>	FIG. 1
<b>Total Drawing Sheets::</b>	17
<b>Small Entity::</b>	Yes
<b>Petition included?::</b>	No
<b>Secrecy Order in Parent Appl.?::</b>	No

## Applicant Information

**Applicant Authority type::** Assignee  
**Organization Name::** AliphCom  
**Street of mailing address::** 99 Rhode Island Street, Third Floor  
**City of mailing address::** San Francisco  
**Country of mailing address::** United States of America  
**State or Province of mailing address::** CA  
**Postal or Zip Code of mailing address::** 94103

**Applicant Authority type::** Inventor  
**Primary Citizenship Country::** United States of America  
**Status::** Full Capacity  
**Given Name::** Gregory C.  
**Family Name::** Burnett  
**City of Residence::** Dodge Center  
**State or Province of Residence::** MN  
**Country of Residence::** United States of America  
**Street of mailing address::** 10550 First Timberlane Drive  
**City of mailing address::** Dodge Center  
**Country of mailing address::** United States of America  
**State or Province of mailing address::** MN  
**Postal or Zip Code of mailing address::** 55057

## Correspondence Information

**Customer Number::** 15516  
**Name::** Kokka & Backus, PC  
**Street of mailing address::** 703 High Street  
**City of mailing address::** Palo Alto  
**Country of mailing address::** USA  
**State or Province of mailing address::** CA  
**Postal or Zip Code of mailing address::** 94301

**Telephone::** (650) 566-9921  
**Fax::** (650) 566-9922

## Representative Information

**Representative Customer Number::** 15516

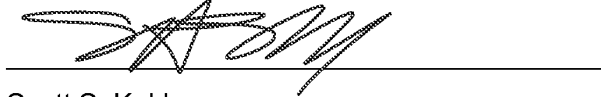
<b>Representative Designation::</b>	<b>Registration Number::</b>	<b>Name::</b>
Primary	51,893	Scott S. Kokka

**Assignee Information**

**Name::** AliphCom

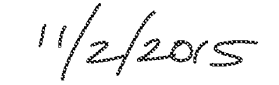
**Mailing address::** 99 Rhode Island Street, Third Floor, San Francisco, CA 94103

**Signature**



\_\_\_\_\_

Scott S. Kokka  
Reg. No. 51,893



\_\_\_\_\_

Date

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO**

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

 Practitioners associated with the Customer Number:

15516

OR

 Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used).

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

 The address associated with Customer Number:

15516

OR

 Firm or Individual Name:

Address

City

State

Zip

Country

Telephone

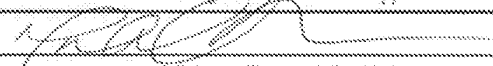
Email

Assignee Name and Address:

AliphCom  
89 Rhode Island St., 3rd Floor  
San Francisco, CA 94103**A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.**

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	10-23-2011
Name	Michael Edward Smith Luna	Telephone	(877) 254-7426
Title	Chief Technology Officer, AliphCom		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1458, Alexandria, VA 22313-1458.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

**STATEMENT UNDER 37 CFR 3.73(c)**

Applicant/Patent Owner: Gregory C. Burnett  
Application No./Patent No.: 13/959,708 Filed/Issue Date: August 5, 2013  
Titled: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)  
AliphCom, a Corporation  
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1.  The assignee of the entire right, title, and interest.
2.  An assignee of less than the entire right, title, and interest (check applicable box):
- The extent (by percentage) of its ownership interest is \_\_\_\_\_%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
  - There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3.  The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4.  The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A.  An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 036018, Frame 0297, or for which a copy thereof is attached.

- B.  A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

2. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*



**STATEMENT UNDER 37 CFR 3.73(c)**

3. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

4. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

5. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

6. From: \_\_\_\_\_ To: \_\_\_\_\_

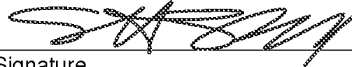
The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.



Signature

**Scott S. Kokka**

Printed or Typed Name

**November 2, 2015**

Date

**51,893**

Title or Registration Number

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708				
<b>Filing Date:</b>	05-Aug-2013				
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)				
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett				
<b>Filer:</b>	Scott Susumu Kokka/Kate Cleland				
<b>Attorney Docket Number:</b>	ALI-050ACON1				
Filed as Large Entity					
<b>Filing Fees for Utility under 35 USC 111(a)</b>					
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>	
<b>Basic Filing:</b>					
<b>Pages:</b>					
<b>Claims:</b>					
<b>Miscellaneous-Filing:</b>					
<b>Petition:</b>					
<b>Patent-Appeals-and-Interference:</b>					
<b>Post-Allowance-and-Post-Issuance:</b>					
<b>Extension-of-Time:</b>					

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 3 months with \$0 paid	1253	1	1400	1400
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1400</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	23967045
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Scott Susumu Kokka/Kate Cleland
<b>Filer Authorized By:</b>	Scott Susumu Kokka
<b>Attorney Docket Number:</b>	ALI-050ACON1
<b>Receipt Date:</b>	02-NOV-2015
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	22:50:42
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1400
RAM confirmation Number	7839
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	ALI-050ACON1_Response.pdf	130757 a99c5f9a3cc22dac2f5e2635fae1163822b9d108	no	8
<b>Warnings:</b>					
<b>Information:</b>					
2	Terminal Disclaimer Filed	ALI-050ACON1_TD1.pdf	124803 aa89ebccccb28f2ba91a9f4df968581a71f3ef18	no	2
<b>Warnings:</b>					
<b>Information:</b>					
3	Terminal Disclaimer Filed	ALI-050ACON1_TD2.pdf	122527 0da930e8d81d496d344b40b41da7dd5bb8eda52c	no	2
<b>Warnings:</b>					
<b>Information:</b>					
4	Application Data Sheet	ALI-050ACON1_ADS.pdf	88882 4118ce108f002f4a9bcedae0507903213dd12237d	no	4
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
5	Power of Attorney	ALI-050ACON1_GPOA.pdf	1328450 3042876164a4e4856217389b9561bf1ba1c8a6f1	no	1
<b>Warnings:</b>					
<b>Information:</b>					
6	Assignee showing of ownership per 37 CFR 3.73	ALI-050ACON1_Stmt_373.pdf	85877 688eb39403e80ba2c70e0650eef921cb5f327942	no	2
<b>Warnings:</b>					
<b>Information:</b>					
7	Fee Worksheet (SB06)	fee-info.pdf	31108 c9d9c58c05191cfbd3a83ae00432e60e94c36f4b	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1912404		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875	Application or Docket Number <b>13/959,708</b>	Filing Date <b>08/05/2013</b>	<input type="checkbox"/> To be Mailed
---	---	----------------------------------	---------------------------------------

ENTITY:  LARGE  SMALL  MICRO

**APPLICATION AS FILED – PART I**

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

**APPLICATION AS AMENDED – PART II**

AMENDMENT	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
	<b>11/02/2015</b>	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total (37 CFR 1.16(i))	* 20	Minus ** 20	= 0	X \$80 =	0
	Independent (37 CFR 1.16(h))	* 2	Minus *** 3	= 0	X \$420 =	0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
					TOTAL ADD'L FEE	<b>0</b>

AMENDMENT	(Column 1)	(Column 2)	(Column 3)	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)
		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR			
	Total (37 CFR 1.16(i))	*	Minus **	=	X \$ =	
	Independent (37 CFR 1.16(h))	*	Minus ***	=	X \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))					
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
					TOTAL ADD'L FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.  
 \*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".  
 \*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".  
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE  
/DENISE T. LILES/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1

15516  
Kokka & Backus, PC  
703 High Street  
Palo Alto, CA 94301

**CONFIRMATION NO. 5622**  
**POA ACCEPTANCE LETTER**



OC000000078564857

Date Mailed: 11/09/2015

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**


This is in response to the Power of Attorney filed 11/02/2015.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mbeyenc/



<b>Application Number</b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent under Reexamination</b> BURNETT, GREGORY C.	

<b>Document Code - DISQ</b>	<b>Internal Document – DO NOT MAIL</b>
-----------------------------	--

<b>TERMINAL DISCLAIMER</b>	<input checked="" type="checkbox"/> <b>APPROVED</b>	<input type="checkbox"/> <b>DISAPPROVED</b>
Date Filed : 11/2/15	<b>This patent is subject to a Terminal Disclaimer</b>	

<b>Approved/Disapproved by:</b>
---------------------------------

ANDRE ROBINSON  2 TDS WERE APPRVD.
--

U.S. Patent and Trademark Office



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

15516 7590 01/19/2016
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

EXAMINER

WEISS, HOWARD

ART UNIT PAPER NUMBER

2814

DATE MAILED: 01/19/2016

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

13/959,708 08/05/2013 Gregory C. Burnett ALI-050ACON1 5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

nonprovisional UNDISCOUNTED \$960 \$0 \$0 \$960 04/19/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 01/19/2016  
 Kokka & Backus, PC  
 703 High Street  
 Palo Alto, CA 94301

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	04/19/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
WEISS, HOWARD	2814	381-092000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____</p> <p>3 _____</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
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5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_



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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

15516 7590 01/19/2016
Kokka & Backus, PC
703 High Street
Palo Alto, CA 94301

EXAMINER

WEISS, HOWARD

ART UNIT PAPER NUMBER

2814

DATE MAILED: 01/19/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b><i>Notice Requiring Inventor's Oath or Declaration</i></b>	Application No. 13/959,708	Applicant(s) Gregory C. Burnett	
	Examiner WEISS, HOWARD	Art Unit 2814	

This notice is an attachment to the Notice of Allowability (PTOL-37), or the Notice of Allowability For A Design Application (PTOL-37D).

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor has not yet been submitted.

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor (for any inventor for which a compliant oath, declaration, or substitute statement has not yet been submitted) **MUST** be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application.

A properly executed inventor's oath to declaration has not been received for the following inventor(s):

If applicant previously filed one or more oaths, declarations, or substitute statements, applicant may have received an informational notice regarding deficiencies therein.

The following deficiencies are noted:

**INFORMAL ACTION PROBLEMS**

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):  
**Gregory C. Burnett.**  
Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b> 13/959,708	<b>Applicant(s)</b> BURNETT, GREGORY C.	
	<b>Examiner</b> /HOWARD WEISS/	<b>Art Unit</b> 2814	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to a reply filed 11/2/2015.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 2-21. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [FPHfeedback@uspto.gov](mailto:FPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some    \*c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |  |
|--|--|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)   | 5. <input type="checkbox"/> Examiner's Amendment/Comment                             |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____    | 6. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 7. <input type="checkbox"/> Other _____.   |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____.                     |  |

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Attorney's Docket Number: ALI-050ACON1

Filing Date: 8/5/2013

Continuing Data: a continuation of 12/139,333 (06/13/2008 now U. S. Patent No. 8,503,691) which claims benefit of 60/934,551 (06/13/2007) and claims benefit of 60/953,444 (08/01/2007) and claims benefit of 60/954,712 (08/08/2007) and claims benefit of 61/045,377 (04/16/2008); RCE established 4/21/2015

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Howard Weiss

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions.

***Terminal Disclaimer***

2. The terminal disclaimers filed on 11/2/2015 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 8,494,177 and any patent issued on U.S. Application No. 13/948,160 has been reviewed and is accepted.

***Reasons for Allowance***

3. The following is an examiner's statement of reasons for allowance: the filing of the TDs on 11/2/215.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."



***Conclusion***

4. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.
  
5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [Howard.Weiss@uspto.gov](mailto:Howard.Weiss@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on **(571) 272-1705**.
  
6. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at **866-217-9197** (toll-free).

7. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	Thru 1/13/2016
Other Documentation: none	
Electronic Database(s): EAST	Thru 1/13/2016

HW/hw  
14 January 2016

/Howard Weiss/  
Primary Examiner  
Art Unit 2814



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BIB DATA SHEET

CONFIRMATION NO. 5622

<b>SERIAL NUMBER</b> 13/959,708	<b>FILING or 371(c) DATE</b> 08/05/2013 <b>RULE</b>	<b>CLASS</b> 381	<b>GROUP ART UNIT</b> 2814	<b>ATTORNEY DOCKET NO.</b> ALI-050ACON1		
<b>APPLICANTS</b> AliphCom, San Francisco, CA <b>INVENTORS</b> Gregory C. Burnett, Dodge Center, MN; <b>** CONTINUING DATA *****</b> This application is a CON of 12/139,333 06/13/2008 PAT 8503691 which claims benefit of 60/934,551 06/13/2007 and claims benefit of 60/953,444 08/01/2007 and claims benefit of 60/954,712 08/08/2007 and claims benefit of 61/045,377 04/16/2008 <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 08/20/2013						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input type="checkbox"/> No Verified and / Howard Weiss/ Acknowledged Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> MN	<b>SHEETS DRAWINGS</b> 17	<b>TOTAL CLAIMS</b> 1	<b>INDEPENDENT CLAIMS</b> 1
<b>ADDRESS</b> Kokka & Backus, PC 703 High Street Palo Alto, CA 94301 UNITED STATES						
<b>TITLE</b> FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)						
<b>FILING FEE RECEIVED</b> 1740	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit			

**EAST Search History**

**EAST Search History (Prior Art)**


Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	219	@pd> "20150430" and ( (H04R3/005 OR G10L2021/02165 OR G10L21/0208).CPC. )	USPAT	ADJ	OFF	2016/01/13 08:09

**EAST Search History (Interference)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	53	burnett.in. and (virtual microphone)	US-PGPUB; USPAT; * No UPAD	ADJ	OFF	2016/01/13 08:14

1/ 13/ 2016 8:17:01 AM

C:\ Users\ hweiss\ Documents\ EAST\ Workspaces\ 13959708.wsp

<b>Search Notes</b>  	<b>Application/Control No.</b>  13959708	<b>Applicant(s)/Patent Under Reexamination</b>  BURNETT, GREGORY C.
	<b>Examiner</b>  HOWARD WEISS	<b>Art Unit</b>  2814

CPC- SEARCHED		
Symbol	Date	Examiner
H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	5/7/2014	HW
updated	10/14/2014	HW
updated	4/30/2015	HW
updated	1/13/2016	HW


CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
381	92, 94.7	5/7/2014	HW
704	233, E21.004	5/7/2014	HW
all upadted	all upadted	10/14/2014	HW

SEARCH NOTES		
Search Notes	Date	Examiner
Searches form 12/139,333 and 13/948,160	5/7/2014	HW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
all	all (see printout)	1/13/2016	HW


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<b>Issue Classification</b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814

CPC				
Symbol			Type	Version
H04R	3	002	F	2013-01-01
G10L	21	0208	I	2013-01-01
G10L	2021	02165	A	2013-01-01
H04R	1	406	I	2013-01-01
H04R	3	005	I	2013-01-01
H04R	3	04	I	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20	
/HOWARD WEISS/ Primary Examiner. Art Unit 2814	01/13/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> HOWARD WEISS	<b>Art Unit</b> 2814

US ORIGINAL CLASSIFICATION					INTERNATIONAL CLASSIFICATION								
CLASS		SUBCLASS			CLAIMED			NON-CLAIMED					
					H	0	4	R	3 / 00 (2006.01.01)				
<b>CROSS REFERENCE(S)</b>													
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)												

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20	
/HOWARD WEISS/ Primary Examiner. Art Unit 2814	01/13/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5







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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622
15516	7590	01/26/2016	EXAMINER	
Kokka & Backus, PC 703 High Street Palo Alto, CA 94301			WEISS, HOWARD	
			ART UNIT	PAPER NUMBER
			2814	
			MAIL DATE	DELIVERY MODE
			01/26/2016	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

Application No. : 13959708  
Applicant : Burnett  
Filing Date : 08/05/2013  
Date Mailed : 01/27/2016

## NOTICE TO FILE CORRECTED APPLICATION PAPERS

### *Notice of Allowance Mailed*

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

**Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.**

The application is not in compliance with 37 CFR 1.78, as indicated in the attachment. The consequences of failure to respond within the above-identified time period are set forth in the attachment.

Even if the Office has recognized a benefit claim and has entered it into the Office's database and included it on applicant's filing receipt, the benefit claim is not a proper benefit claim unless the reference in compliance with 37 CFR 1.78 is included, depending upon the application's filing date and as indicated in the attachment, in an application data sheet or in the first sentence(s) of the specification and all other requirements are met.

**See attachment.**

*A copy of this notice **MUST** be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".*

/Kam Sin/  
Publication Branch  
Office of Data Management  
(571) 272-4200

**Application No. 13959708**

**APPLICATION FILED ON OR AFTER MARCH 16, 2013,  
NOT IN COMPLIANCE WITH 37 CFR 1.78**

- The 37 CFR 1.78(c)(2) reference on the application data sheet does not indicate the relationship (continuation, division, continuation-in-part) to the prior U.S. nonprovisional application or international application designating the U.S. See document coded , listing application number(s) .
- The 37 CFR 1.78(c)(2) reference on the application data sheet does not provide the U.S. nonprovisional application number (series code and serial number) or, with respect to an international PCT application designating the U.S., it provides the international application number or international filing date but not both. See document coded , in which the following is missing: .
- The 37 CFR 1.78(c)(2) reference on the application data sheet shows an incorrect, incomplete, or illegible U.S. nonprovisional application number, international PCT application number, or international PCT filing date. See document coded ADS dated 11/02/2015, in which the following error was made: 12/139355 is incorrect.
- The 37 CFR 1.78(c)(2) reference to the prior U.S. nonprovisional application or international application designating the U.S. is not present on an application data sheet, thus removing the validating link under 35 U.S.C. 119(a)-(d) to a prior foreign application or under 35 U.S.C. 119(e) to a prior U.S. provisional application.
- The 37 CFR 1.78(c)(2) reference to the prior U.S. nonprovisional application or international application designating the U.S. is not present on an application data sheet.
- The 37 CFR 1.78(a)(3) reference to the prior U.S. provisional application is not present on an application data sheet.
- The 37 CFR 1.78(a)(3) reference to the prior U.S. provisional application on an application data sheet does not provide the provisional application number (series code and serial number). See document coded , in which the following is missing: .
- The 37 CFR 1.78(a)(3) reference to the prior U.S. provisional application on an application data sheet shows an incorrect, incomplete, or illegible U.S. provisional application number. See document coded , in which the following error was made: .
- Other: .

**HOW TO RESPOND**

A proper response to this notice would include: (1) a corrected Application Data Sheet (ADS) pursuant to 37 CFR 1.76(c) which provides the benefit information from the attached filing receipt which would make the benefit information comply with 37 CFR 1.78(c)(2) or 37 CFR 1.78(a)(3) or (2) a petition filed pursuant to the provisions of 37 CFR 1.78(b) or 37 CFR 1.78(d) if the benefit information from the attached filing receipt does not accurately reflect the benefits under 35 U.S.C. 119(e), 120, 121 or 365(c) as claimed by applicant (a grantable petition would include a corrected ADS as required by 37 CFR 1.78(b)(1) or 37 CFR 1.78(d)(1)).

**WARNING:** If Applicant fails to timely submit a proper response, the benefit information will be deleted and the patent will be printed without the benefit information present.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application for:

Gregory C. Burnett

Serial No.: 13/959,708

Filing Date: August 5, 2013

For: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Confirmation No.: 5622

Examiner: WEISS, Howard

Group Art Unit: 2814

Transmission Date: March 28, 2016

Atty. Docket No.: ALI-050ACON1

**Certificate of EFS-Web Transmission**

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office (USPTO) electronic filing system (EFS-Web) to the USPTO on **March 28, 2016.**

Signed: \_\_\_\_\_

  
Yasmin R. Allje

**RESPONSE TO NOTICE TO FILE CORRECTED APPLICATION PAPERS**


Mail Stop Issue Fee  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir or Madam:

In response to the *Notice to File Corrected Application Papers*, mailed January 26, 2016, Applicant respectfully submits a corrected *Application Data Sheet* in compliance with 37 C.F.R. 1.78(c)(2). Specifically, the attached *Application Data Sheet* has been modified to correct a typographical error in the section entitled "Cross Reference to Related Applications" to properly identify U.S. Patent Application Serial No. 12/139,333 as required by the *Notice*. A copy of the *Notice to File Corrected Application Papers* is also submitted herewith.

Please contact the undersigned representative below if you should have any further questions or require any additional information.

Respectfully submitted,



Scott S. Kokka  
Reg. No. 51,893

KOKKA & BACKUS, PC  
703 High Street  
Palo Alto, CA 94301  
Telephone: (650) 566-9921  
Facsimile: (650) 566-9922



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622
15516	7590	01/26/2016	EXAMINER	
Kokka & Backus, PC 703 High Street Palo Alto, CA 94301			WEISS, HOWARD	
			ART UNIT	PAPER NUMBER
			2814	
			MAIL DATE	DELIVERY MODE
			01/26/2016	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

Application No. : 13959708  
Applicant : Burnett  
Filing Date : 08/05/2013  
Date Mailed : 01/27/2016

## NOTICE TO FILE CORRECTED APPLICATION PAPERS

### *Notice of Allowance Mailed*

This application has been accorded an Allowance Date and is being prepared for issuance. The application, however, is incomplete for the reasons below.

**Applicant is given two (2) months from the mail date of this Notice within which to respond. This time period for reply is extendable under 37 CFR 1.136(a) for only TWO additional MONTHS.**

The application is not in compliance with 37 CFR 1.78, as indicated in the attachment. The consequences of failure to respond within the above-identified time period are set forth in the attachment.

Even if the Office has recognized a benefit claim and has entered it into the Office's database and included it on applicant's filing receipt, the benefit claim is not a proper benefit claim unless the reference in compliance with 37 CFR 1.78 is included, depending upon the application's filing date and as indicated in the attachment, in an application data sheet or in the first sentence(s) of the specification and all other requirements are met.

See attachment.

*A copy of this notice **MUST** be returned with the reply. Please address response to "Mail Stop Issue Fee, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450".*

/Kam Sin/  
Publication Branch  
Office of Data Management  
(571) 272-4200

**Application No. 13959708**

**APPLICATION FILED ON OR AFTER MARCH 16, 2013,  
NOT IN COMPLIANCE WITH 37 CFR 1.78**

- The 37 CFR 1.78(c)(2) reference on the application data sheet does not indicate the relationship (continuation, division, continuation-in-part) to the prior U.S. nonprovisional application or international application designating the U.S. See document coded , listing application number(s) .
- The 37 CFR 1.78(c)(2) reference on the application data sheet does not provide the U.S. nonprovisional application number (series code and serial number) or, with respect to an international PCT application designating the U.S., it provides the international application number or international filing date but not both. See document coded , in which the following is missing: .
- The 37 CFR 1.78(c)(2) reference on the application data sheet shows an incorrect, incomplete, or illegible U.S. nonprovisional application number, international PCT application number, or international PCT filing date. See document coded ADS dated 11/02/2015, in which the following error was made: 12/139355 is incorrect.
- The 37 CFR 1.78(c)(2) reference to the prior U.S. nonprovisional application or international application designating the U.S. is not present on an application data sheet, thus removing the validating link under 35 U.S.C. 119(a)-(d) to a prior foreign application or under 35 U.S.C. 119(e) to a prior U.S. provisional application.
- The 37 CFR 1.78(c)(2) reference to the prior U.S. nonprovisional application or international application designating the U.S. is not present on an application data sheet.
- The 37 CFR 1.78(a)(3) reference to the prior U.S. provisional application is not present on an application data sheet.
- The 37 CFR 1.78(a)(3) reference to the prior U.S. provisional application on an application data sheet does not provide the provisional application number (series code and serial number). See document coded , in which the following is missing: .
- The 37 CFR 1.78(a)(3) reference to the prior U.S. provisional application on an application data sheet shows an incorrect, incomplete, or illegible U.S. provisional application number. See document coded , in which the following error was made: .
- Other: .

**HOW TO RESPOND**

A proper response to this notice would include: (1) a corrected Application Data Sheet (ADS) pursuant to 37 CFR 1.76(c) which provides the benefit information from the attached filing receipt which would make the benefit information comply with 37 CFR 1.78(c)(2) or 37 CFR 1.78(a)(3) or (2) a petition filed pursuant to the provisions of 37 CFR 1.78(b) or 37 CFR 1.78(d) if the benefit information from the attached filing receipt does not accurately reflect the benefits under 35 U.S.C. 119(e), 120, 121 or 365(c) as claimed by applicant (a grantable petition would include a corrected ADS as required by 37 CFR 1.78(b)(1) or 37 CFR 1.78(d)(1)).

**WARNING:** If Applicant fails to timely submit a proper response, the benefit information will be deleted and the patent will be printed without the benefit information present.



## Application Data Sheet

### Cross-Reference to Related Applications

This application is continuation of U.S. Nonprovisional Patent Application No. 12/139,355 33, filed June 13, 2008, now U.S. Patent No. 8,494,177 503.691 and entitled "~~Dual Omnidirectional Microphone Array (DOMA)~~," "Forming Virtual Microphone Arrays Using Dual Omnidirectional Microphone Array (DOMA)" which claims the benefit of U.S. Provisional Patent Application No. 60/934,551, filed June 13, 2007, U.S. Provisional Patent Application No. 60/953,444, filed August 1, 2007, U.S. Provisional Patent Application No.60/954,712, filed August 8, 2007, and U.S. Provisional Patent Application No. 61/045,377, filed April 16, 2008, all of which are incorporated by reference herein in their entirety for all purposes.

### Application Information

<b>Filing Date::</b>	August 5, 2013
<b>Application Type::</b>	Continuation
<b>Subject Matter::</b>	Utility
<b>Suggested Group Art Unit::</b>	None
<b>CD-ROM or CD-R?::</b>	None
<b>Title::</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>Attorney Docket Number::</b>	ALI-050ACON1
<b>Request for Early Publication?::</b>	No
<b>Request for Non-Publication?::</b>	No
<b>Suggested Drawing Figure::</b>	FIG. 1
<b>Total Drawing Sheets::</b>	17
<b>Small Entity::</b>	Yes
<b>Petition included?::</b>	No

**Secrecy Order in Parent Appl.?::** No

## **Applicant Information**

**Applicant Authority type::** Assignee  
**Organization Name::** AliphCom  
**Street of mailing address::** 99 Rhode Island Street, Third Floor  
**City of mailing address::** San Francisco  
**Country of mailing address::** United States of America  
**State or Province of mailing address::** CA  
**Postal or Zip Code of mailing address::** 94103

## **Correspondence Information**

**Customer Number::** 15516  
**Name::** Kokka & Backus, PC  
**Street of mailing address::** 703 High Street  
**City of mailing address::** Palo Alto  
**Country of mailing address::** USA  
**State or Province of mailing address::** CA  
**Postal or Zip Code of mailing address::** 94301  
**Telephone::** (650) 566-9921  
**Fax::** (650) 566-9922

## **Representative Information**

**Representative Customer Number::** 15516

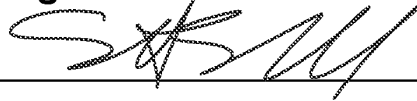
<b>Representative</b>	<b>Registration Number::</b>	<b>Name::</b>
<b>Designation::</b>		
Primary	51,893	Scott S. Kokka

## Assignee Information

**Name::** AliphCom

**Mailing address::** 99 Rhode Island Street, Third Floor, San Francisco, CA 94103

## Signature



---

Scott S. Kokka

Reg. No. 51,893

March 28, 2016

Date

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	25325172
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Scott Susumu Kokka/Kate Cleland
<b>Filer Authorized By:</b>	Scott Susumu Kokka
<b>Attorney Docket Number:</b>	ALI-050ACON1
<b>Receipt Date:</b>	28-MAR-2016
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	22:45:46
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Post Allowance Communication - Incoming	ALI-050ACON1_Resp_Notice_File_Corrected_Appln_asFILED.pdf	303659 <small>10e71c1ed69815dc3bfa3c694d69c87b874b99cb</small>	no	5

### Warnings:

### Information:

2	Application Data Sheet	ALI-050ACON1_Corrected_ADS _asFILED.pdf	78202  22f32a91fe713d36ca392aab9a569a2fbac6 62b	no	3
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
<b>Total Files Size (in bytes):</b>			381861		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

<b>REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)</b>							
Application Number	13/959,708	Filing Date	2008-06-13	Docket Number (if applicable)	ALI-050ACON1	Art Unit	2814
First Named Inventor	Gregory C. Burnett			Examiner Name	WEISS, Howard		
<p><b>This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.</b>                      Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at <a href="http://WWW.USPTO.GOV">WWW.USPTO.GOV</a></p>							
<b>SUBMISSION REQUIRED UNDER 37 CFR 1.114</b>							
<p>Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).</p>							
<p><input type="checkbox"/> Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.</p> <p style="margin-left: 40px;"><input type="checkbox"/> Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p> <p><input checked="" type="checkbox"/> Enclosed</p> <p style="margin-left: 40px;"><input type="checkbox"/> Amendment/Reply</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> Information Disclosure Statement (IDS)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Affidavit(s)/ Declaration(s)</p> <p style="margin-left: 40px;"><input type="checkbox"/> Other _____</p>							
<b>MISCELLANEOUS</b>							
<p><input type="checkbox"/> Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months _____                      (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)</p> <p><input type="checkbox"/> Other _____</p>							
<b>FEES</b>							
<p><b>The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.</b></p> <p><input type="checkbox"/> The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No _____</p>							
<b>SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED</b>							
<p><input checked="" type="checkbox"/> Patent Practitioner Signature</p> <p><input type="checkbox"/> Applicant Signature</p>							

Doc code: RCEX


Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature		Date (YYYY-MM-DD)	2016-04-19
Name	Scott S, Kokka	Registration Number	51893

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application for:

Gregory C. Burnett

Application Serial No.: 13/959,708

Filing Date: June 13, 2008

For: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Confirmation No.: 5622

Examiner: WEISS, Howard

Group Art Unit: 2814

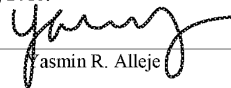
Date: April 19, 2016

Atty. Docket No.: ALI-050ACON1

**CERTIFICATE OF TRANSMISSION**

I hereby certify that this correspondence is being transmitted via the U.S. Patent and Trademark Office electronic filing system (EFS-Web) to the USPTO on April 19, 2016.

Signed: \_\_\_\_\_

  
Asmin R. Alleje

**INFORMATION DISCLOSURE STATEMENT**

Sir or Madam:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The items are listed on the attached forms PTO/SB/08a. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be “material” pursuant to 37 CFR § 1.56. The submission thereof by Applicants is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as “prior art” under 35 USC § 102 with respect to this invention unless specifically designated by Applicants as such.

**1. Timing of the Information Disclosure Statement:**

- This IDS is believed to be timely in that it is being submitted under 37 CFR § 1.97(b), that is (1) with the new patent application submitted herein (37 CFR § 1.97(a)); or (2) within three months of the filing date of the application, which is not a continued prosecution application filed under § 1.53(d) or (3) within three months of entry of the national stage as set forth in 37 CFR § 1.491; or (4) before the



mailing of a first Office action on the merits; or (5) before the mailing of a first Office action after filing a request for continued examination under § 1.114. Thus, no fee is required.

- However, if the undersigned is in error in this regard, Applicant respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable.
- However, if the undersigned is in error in this regard, Applicant respectfully requests that the Office consider this IDS as filed under 37 CFR § 1.97(c), if applicable, and a statement under 37 CFR § 1.97(e) is included below, thus no fee is required.
- This IDS is being submitted under 37 CFR § 1.97(c), that is after mailing of a first Office Action on the merits, but before a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311.
  - The fee due under 37 CFR § 1.17(p) is submitted herewith.
  - A statement under 37 CFR § 1.97(e) is included below, thus no fee is required. In the event that this IDS is not mailed before a Final Action or a Notice of Allowance, then Applicant respectfully requests that the Office consider the filing of these papers to be submitted under 37 CFR § 1.97(d).
- This IDS is being submitted under 37 CFR § 1.97(d), that is after a Final Action under 37 CFR § 1.113 or a Notice of Allowance under 37 CFR § 1.311, but before payment of the issue fee. A statement under 37 CFR § 1.97(e) is included below. The fee due under 37 CFR § 1.17(p) is submitted herewith.

**STATEMENT UNDER 37 CFR § 1.97(e):**

- Non-Patent Literature Document Cite No. X contained in the IDS was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS.
- No item contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing this statement after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 CFR § 1.56(c) more than three months prior to the filing of this IDS.

**2. Copies of the Cited Items:**

- Copies of all items listed on the attached form PTO/SB/08a are enclosed.
- Copies of all Foreign Patent Documents listed on form PTO/SB/08a are enclosed as required by 37 CFR § 1.98(a)(2).

Copies of the following documents listed in PTO/SB/08a (Item Nos. X) are not supplied as they were previously cited by the Office or submitted in Information Disclosure Statements in related applications (Application No. X, filed X) and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

Copies of the following items listed on the attached forms PTO/SB/08a (Non-Patent Literature Documents Item Nos. 1) were cited in a foreign examination report in a related case. A copy of the search report is attached hereto.

**3. Concise Explanation of Relevance:**

A concise explanation of relevance of the items listed on forms PTO/SB/08a is not given.

A concise explanation of relevance of [some of] the items listed on forms PTO/SB/08a is in the form of an English language copy of a Search Report from a foreign patent office, issued in a counterpart application, which refers to the relevant portions of the references (copy attached).

**4. Related Applications:**

Applicant(s) bring to the Office's attention the following related application(s): U.S. Patent Application No. 12/139,333, Attorney Docket No. ALI-050A; U.S. Patent Application No. 12/163,592, Attorney Docket No. ALI-049CIP4; U.S. Patent Application No. 13/436,765, Attorney Docket No. ALI-049CIP4DIV; U.S. Patent Application No. 11/805,897, Attorney Docket No. ALI-055CON1; U.S. Patent Application No. 10/159,770, Attorney Docket No. ALI-055; U.S. Patent Application No. 14/224,868, Attorney Docket No. ALI-049CIP4DIVCON1; U.S. Patent Application No. 10/667,207, Attorney Docket No. ALI-051CIP1; and U.S. Patent Application No. 09/905,361, Attorney Docket No. ALI-051.

**5. Conclusion:**

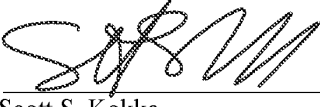
Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached forms PTO/SB/08a with initials or other appropriate marks. In the unlikely event that the transmittal letter is separated from this document and the U.S. Patent Office determines that an extension and/or other relief is required, Applicants petition for any required relief including extensions of time. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: April 19, 2016

By:   
\_\_\_\_\_  
Scott S. Kokka  
Registration No. 51,893

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13959708
	Filing Date		2008-06-13
	First Named Inventor	Gregory C. Burnett	
	Art Unit	2814	
	Examiner Name	WEISS, Howard	
	Attorney Docket Number	ALI-050ACON1	

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	7386135		2008-06-10	Fan	
	2	5473701		1995-12-05	Cezanne et al.	
	3	5664014		1997-09-02	Yamaguchi et al.	
	4	5815582		1998-09-29	Claybaugh et al.	
	5	5208864		1993-05-04	Kaneda, Yutaka	
	6	5276765		1994-01-04	Freeman et al.	
	7	5907624		1999-05-25	Takada, Masashi	
	8	5590241		1996-12-31	Park et al.	

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13959708
	Filing Date	2008-06-13
	First Named Inventor	Gregory C. Burnett
	Art Unit	2814
	Examiner Name	WEISS, Howard
	Attorney Docket Number	ALI-050ACON1

9	6233551		2001-05-15	Cho et al.	
10	4653102		1987-03-24	Hansen, Per K.	
11	5664052		1997-09-02	Nishiguchi et al.	
12	6006175		1999-12-21	Holzrichter, John F.	
13	4777649		1988-10-11	Carlson et al.	
14	5825897		1998-10-20	Andrea et al.	
15	5633935		1997-05-27	Kanamori et al.	
16	5754665		1998-05-19	Hosoi, Yoshiaki	
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	Art Unit	2814
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Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
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	1	2009003180	WO		2008-12-31	Burnett, Gregory C.		<input type="checkbox"/>

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**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).


See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature		Date (YYYY-MM-DD)	2016-04-19
Name/Print	Scott S. Kokka	Registration Number	51,893

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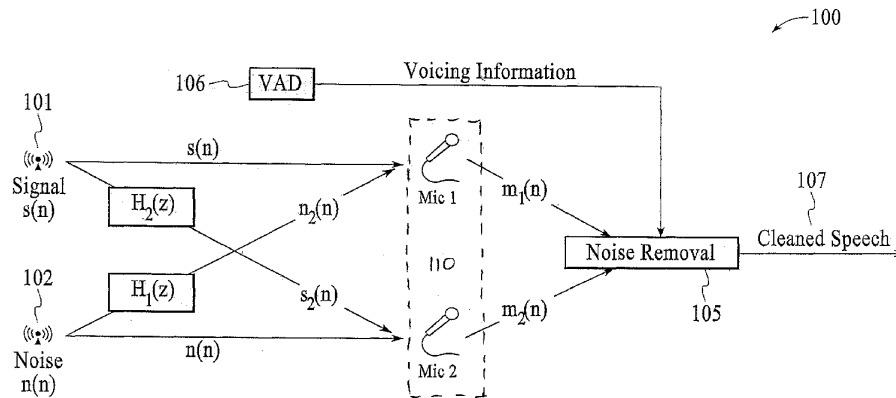


FIG. 1

(57) Abstract: Microphone arrays (MAs) are described that position and vent microphones so that performance of a noise suppression system coupled to the microphone array is enhanced. The MA includes at least two physical microphones to receive acoustic signals. The physical microphones make use of a common rear vent (actual or virtual) that samples a common pressure source. The MA includes a physical directional microphone configuration and a virtual directional microphone configuration. By making the input to the rear vents of the microphones (actual or virtual) as similar as possible, the real-world filter to be modeled becomes much simpler to model using an adaptive filter.

MICROPHONE ARRAY WITH REAR VENTING

Inventor:

Gregory C. Burnett

RELATED APPLICATIONS

This application claims the benefit of United States (US) Patent Application Number 60/937,603, filed June 27, 2007.

This application is a continuation in part application of US Patent Application Numbers 10/400,282, filed March 27, 2003, 10/667,207, filed September 18, 2003, 11/805,987, filed May 25, 2007, and 12/139,333, filed June 13, 2008.

TECHNICAL FIELD

The disclosure herein relates generally to noise suppression. In particular, this disclosure relates to noise suppression systems, devices, and methods for use in acoustic applications.

BACKGROUND

Conventional adaptive noise suppression algorithms have been around for some time. These conventional algorithms have used two or more microphones to sample both an (unwanted) acoustic noise field and the (desired) speech of a user. The noise relationship between the microphones is then determined using an adaptive filter (such as Least-Mean-Squares as described in Haykin & Widrow, ISBN# 0471215708, Wiley, 2002, but any adaptive or stationary system identification algorithm may be used) and that relationship used to filter the noise from the desired signal.

Most conventional noise suppression systems currently in use for speech communication systems are based on a single-microphone spectral subtraction technique first developed in the 1970's and described, for example, by S. F. Boll in "Suppression of Acoustic Noise in Speech using Spectral Subtraction," IEEE Trans. on ASSP, pp. 113-120, 1979. These techniques have been refined over the years, but the basic principles of operation have remained the same. See, for example, US Patent Number 5,687,243 of McLaughlin, et al., and US Patent Number

4,811,404 of Vilmur, et al. There have also been several attempts at multi-microphone noise suppression systems, such as those outlined in US Patent Number 5,406,622 of Silverberg et al. and US Patent Number 5,463,694 of Bradley et al. Multi-microphone systems have not been very successful for a variety of reasons, the most compelling being poor noise cancellation performance and/or significant speech distortion.

#### INCORPORATION BY REFERENCE

Each patent, patent application, and/or publication mentioned in this specification is herein incorporated by reference in its entirety to the same extent as if each individual patent, patent application, and/or publication was specifically and individually indicated to be incorporated by reference.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**Figure 1** is a two-microphone adaptive noise suppression system, under an embodiment.

**Figure 2** is a block diagram of a directional microphone array (MA) having a shared-vent configuration, under an embodiment.

**Figure 3** shows results obtained for a MA having a shared-vent configuration, under an embodiment.

**Figure 4** is a three-microphone adaptive noise suppression system, under an embodiment.

**Figure 5** is a block diagram of the MA in the shared-vent configuration including omnidirectional microphones to form virtual directional microphones (VDMs), under an embodiment.

**Figure 6** is a block diagram for a MA including three physical omnidirectional microphones configured to form two virtual microphones  $M_1$  and  $M_2$ , under an embodiment.

**Figure 7** is a generalized two-microphone array including an array and speech source  $S$  configuration, under an embodiment.

**Figure 8** is a system for generating a first order gradient microphone  $V$  using two omnidirectional elements  $O_1$  and  $O_2$ , under an embodiment.

**Figure 9** is a block diagram for a MA including two physical microphones configured to form two virtual microphones  $V_1$  and  $V_2$ , under an embodiment.

**Figure 10** is a block diagram for a MA including two physical microphones configured to form N virtual microphones  $V_1$  through  $V_N$ , where N is any number greater than one, under an embodiment.

**Figure 11** is an example of a headset or head-worn device that includes the MA, under an embodiment.

**Figure 12** is a flow diagram for forming the MA having the physical shared-vent configuration, under an embodiment.

**Figure 13** is a flow diagram for forming the MA having the shared-vent configuration including omnidirectional microphones to form VDMs, under an alternative embodiment.

**Figure 14** is a flow diagram for denoising acoustic signals using the MA having the physical shared-vent configuration, under an embodiment.

**Figure 15** is a flow diagram for denoising acoustic signals using the MA having the shared-vent configuration including omnidirectional microphones to form VDMs, under an alternative embodiment.

#### DETAILED DESCRIPTION

Systems and methods are provided including microphone arrays and associated processing components for use in noise suppression. The systems and methods of an embodiment include systems and methods for noise suppression using one or more of microphone arrays having multiple microphones, an adaptive filter, and/or speech detection devices. More specifically, the systems and methods described herein include microphone arrays (MAs) that position and vent microphones so that performance of a noise suppression system coupled to the microphone array is enhanced.

The MA configuration of an embodiment uses rear vents with the directional microphones, and the rear vents sample a common pressure source. By making the input to the rear vents of directional microphones (actual or virtual) as similar as possible, the real-world filter to be modeled becomes much simpler to model using an adaptive filter. In some cases, the filter collapses to unity, the simplest

filter of all. The MA systems and methods described herein have been successfully implemented in the laboratory and in physical systems and provide improved performance over conventional methods. This is accomplished differently for physical directional microphones and virtual directional microphones (VDMs). The theory behind the microphone configuration, and more specific configurations, are described in detail below for both physical and VDMs.

The MAs, in various embodiments, can be used with the Pathfinder system (referred to herein as "Pathfinder") as the adaptive filter system or noise removal. The Pathfinder system, available from AliphCom, San Francisco, CA, is described in detail in other patents and patent applications referenced herein. Alternatively, any adaptive filter or noise removal algorithm can be used with the MAs in one or more various alternative embodiments or configurations.

The Pathfinder system includes a noise suppression algorithm that uses multiple microphones and a VAD signal to remove undesired noise while preserving the intelligibility and quality of the speech of the user. Pathfinder does this using a configuration including directional microphones and overlapping the noise and speech response of the microphones; that is, one microphone will be more sensitive to speech than the other but they will both have similar noise responses. If the microphones do not have the same or similar noise responses, the denoising performance will be poor. If the microphones have similar speech responses, then devoicing will take place. Therefore, the MAs of an embodiment ensure that the noise response of the microphones is as similar as possible while simultaneously constructing the speech response of the microphones as dissimilar as possible. The technique described herein is effective at removing undesired noise while preserving the intelligibility and quality of the speech of the user.

In the following description, numerous specific details are introduced to provide a thorough understanding of, and enabling description for, embodiments of the microphone array (MA). One skilled in the relevant art, however, will recognize that these embodiments can be practiced without one or more of the specific details, or with other components, systems, etc. In other instances, well-known structures or operations are not shown, or are not described in detail, to avoid obscuring aspects of the disclosed embodiments.



Unless otherwise specified, the following terms have the corresponding meanings in addition to any meaning or understanding they may convey to one skilled in the art.

The term "speech" means desired speech of the user.

The term "noise" means unwanted environmental acoustic noise.

The term "denoising" means removing unwanted noise from MIC 1, and also refers to the amount of reduction of noise energy in a signal in decibels (dB).

The term "devoicing" means removing/distorting the desired speech from MIC 1.

The term "directional microphone (DM)" means a physical directional microphone that is vented on both sides of the sensing diaphragm.

The term "virtual microphones (VM)" or "virtual directional microphones" means a microphone constructed using two or more omnidirectional microphones and associated signal processing.

The term "MIC 1 (M1)" means a general designation for a microphone that is more sensitive to speech than noise.

The term "MIC 2 (M2)" means a general designation for a microphone that is more sensitive to noise than speech.

The term "null" means a zero or minima in the spatial response of a physical or virtual directional microphone.

The term "O<sub>1</sub>" means a first physical omnidirectional microphone used to form a microphone array.

The term "O<sub>2</sub>" means a second physical omnidirectional microphone used to form a microphone array.

The term "O<sub>3</sub>" means a third physical omnidirectional microphone used to form a microphone array.

The term "V<sub>1</sub>" means the virtual directional "speech" microphone, which has no nulls.

The term "V<sub>2</sub>" means the virtual directional "noise" microphone, which has a null for the user's speech.

The term "Voice Activity Detection (VAD) signal" means a signal indicating when user speech is detected.

**Figure 1** is a two-microphone adaptive noise suppression system 100, under an embodiment. The two-microphone system 100 includes the combination of microphone array 110 along with the processing or circuitry components to which the microphone array couples. The processing or circuitry components, some of which are described in detail below, include the noise removal application or component 105 and the VAD sensor 106. The output of the noise removal component is cleaned speech, also referred to as denoised acoustic signals 107.

The microphone array 110 of an embodiment comprises physical microphones MIC 1 and MIC 2, but the embodiment is not so limited, and either of MIC 1 and MIC 2 can be a physical or virtual microphone. Referring to Figure 1, in analyzing the single noise source 101 and the direct path to the microphones, the total acoustic information coming into MIC 1 is denoted by  $m_1(n)$ . The total acoustic information coming into MIC 2 is similarly labeled  $m_2(n)$ . In the  $z$  (digital frequency) domain, these are represented as  $M_1(z)$  and  $M_2(z)$ . Then,

$$M_1(z) = S(z) + N_2(z)$$

$$M_2(z) = N(z) + S_2(z)$$

with

$$N_2(z) = N(z)H_1(z)$$

$$S_2(z) = S(z)H_2(z),$$

so that

$$M_1(z) = S(z) + N(z)H_1(z)$$

$$M_2(z) = N(z) + S(z)H_2(z).$$

Eq. 1

This is the general case for all two-microphone systems. Equation 1 has four unknowns and only two known relationships and therefore cannot be solved explicitly.

However, there is another way to solve for some of the unknowns in Equation 1. The analysis starts with an examination of the case where the speech is not being generated, that is, where a signal from the VAD subsystem 106 (optional) equals zero. In this case,  $s(n) = S(z) = 0$ , and Equation 1 reduces to

$$M_{1N}(z) = N(z)H_1(z)$$

$$M_{2N}(z) = N(z),$$

where the N subscript on the M variables indicate that only noise is being received. This leads to

$$M_{1N}(z) = M_{2N}(z)H_1(z)$$

$$H_1(z) = \frac{M_{1N}(z)}{M_{2N}(z)}. \quad \text{Eq. 2}$$

The function  $H_1(z)$  can be calculated using any of the available system identification algorithms and the microphone outputs when the system is certain that only noise is being received. The calculation can be done adaptively, so that the system can react to changes in the noise.

A solution is now available for  $H_1(z)$ , one of the unknowns in Equation 1. The final unknown,  $H_2(z)$ , can be determined by using the instances where speech is being produced and the VAD equals one. When this is occurring, but the recent (perhaps less than 1 second) history of the microphones indicate low levels of noise, it can be assumed that  $n(s) = N(z) \sim 0$ . Then Equation 1 reduces to

$$M_{1S}(z) = S(z)$$

$$M_{2S}(z) = S(z)H_2(z),$$

which in turn leads to

$$M_{2S}(z) = M_{1S}(z)H_2(z)$$

$$H_2(z) = \frac{M_{2S}(z)}{M_{1S}(z)},$$

which is the inverse of the  $H_1(z)$  calculation. However, it is noted that different inputs are being used (now only the speech is occurring whereas before only the noise was occurring). While calculating  $H_2(z)$ , the values calculated for  $H_1(z)$  are held constant (and vice versa) and it is assumed that the noise level is not high enough to cause errors in the  $H_2(z)$  calculation.

After calculating  $H_1(z)$  and  $H_2(z)$ , they are used to remove the noise from the signal. If Equation 1 is rewritten as

$$\begin{aligned}
 S(z) &= M_1(z) - N(z)H_1(z) \\
 N(z) &= M_2(z) - S(z)H_2(z) \\
 S(z) &= M_1(z) - [M_2(z) - S(z)H_2(z)]H_1(z) \\
 S(z)[1 - H_2(z)H_1(z)] &= M_1(z) - M_2(z)H_1(z),
 \end{aligned}$$

then  $N(z)$  may be substituted as shown to solve for  $S(z)$  as

$$S(z) = \frac{M_1(z) - M_2(z)H_1(z)}{1 - H_1(z)H_2(z)}. \quad \text{Eq. 3}$$

If the transfer functions  $H_1(z)$  and  $H_2(z)$  can be described with sufficient accuracy, then the noise can be completely removed and the original signal recovered. This remains true without respect to the amplitude or spectral characteristics of the noise. If there is very little or no leakage from the speech source into  $M_2$ , then  $H_2(z) \approx 0$  and Equation 3 reduces to

$$S(z) \approx M_1(z) - M_2(z)H_1(z). \quad \text{Eq. 4}$$

Equation 4 is much simpler to implement and is very stable, assuming  $H_1(z)$  is stable. However, if significant speech energy is in  $M_2(z)$ , devoicing can occur. In order to construct a well-performing system and use Equation 4, consideration is given to the following conditions:

- R1. Availability of a perfect (or at least very good) VAD in noisy conditions
- R2. Sufficiently accurate  $H_1(z)$
- R3. Very small (ideally zero)  $H_2(z)$ .
- R4. During speech production,  $H_1(z)$  cannot change substantially.
- R5. During noise,  $H_2(z)$  cannot change substantially.

Condition R1 is easy to satisfy if the SNR of the desired speech to the unwanted noise is high enough. "Enough" means different things depending on the method of VAD generation. If a VAD vibration sensor is used, as in Burnett 7,256,048, accurate VAD in very low SNRs (-10 dB or less) is possible. Acoustic-

only methods using information from MIC 1 and MIC 2 can also return accurate VADs, but are limited to SNRs of  $\sim 3$  dB or greater for adequate performance.

Condition R5 is normally simple to satisfy because for most applications the microphones will not change position with respect to the user's mouth very often or rapidly. In those applications where it may happen (such as hands-free conferencing systems) it can be satisfied by configuring MIC 2 so that  $H_2(z) \approx 0$ .

Satisfying conditions R2, R3, and R4 are more difficult but are possible given the right combination of microphone output signals. Methods are examined below that have proven to be effective in satisfying the above, resulting in excellent noise suppression performance and minimal speech removal and distortion in an embodiment.

The MA, in various embodiments, can be used with the Pathfinder system as the adaptive filter system or noise removal (element 105 in Figure 1), as described above. When the MA is used with the Pathfinder system, the Pathfinder system generally provides adaptive noise cancellation by combining the two microphone signals (e.g., MIC 1, MIC 2) by filtering and summing in the time domain. The adaptive filter generally uses the signal received from a first microphone of the MA to remove noise from the speech received from at least one other microphone of the MA, which relies on a slowly varying linear transfer function between the two microphones for sources of noise. Following processing of the two channels of the MA, an output signal is generated in which the noise content is attenuated with respect to the speech content, as described in detail below.

A description follows of the theory supporting the MA with the Pathfinder. While the following description includes reference to two directional microphones, the description can be generalized to any number of microphones.

Pathfinder operates using an adaptive algorithm to continuously update the filter constructed using MIC 1 and MIC 2. In the frequency domain, each microphone's output can be represented as:

$$\begin{aligned} M_1(z) &= F_1(z) - z^{-d_1} B_1(z) \\ M_2(z) &= F_2(z) - z^{-d_2} B_2(z) \end{aligned}$$

where  $F_1(z)$  represents the pressure at the front port of MIC 1,  $B_1(z)$  the pressure at the back (rear) port, and  $z^{-d_1}$  the delay instituted by the microphone. This delay can be realized through port venting and/or microphone construction and/or other ways known to those skilled in the art, including acoustic retarders which slow the acoustic pressure wave. If using omnidirectional microphones to construct virtual directional microphones, these delays can also be realized using delays in DSP. The delays are not required to be integer delays. The filter that is constructed using these outputs is

$$H_1(z) = \frac{M_1(z)}{M_2(z)} = \frac{F_1(z) - z^{-d_1} B_1(z)}{F_2(z) - z^{-d_2} B_2(z)}$$

In the case where  $B_1(z)$  is not equal to  $B_2(z)$ , this is an IIR filter. It can become quite complex when multiple microphones are employed. However, if  $B_1(z) = B_2(z)$  and  $d_1 = d_2$ , then

$$H_1(z) = \frac{F_1(z) - z^{-d_1} B_1(z)}{F_2(z) - z^{-d_1} B_1(z)} \quad (B_1(z) = B_2(z), d_1 = d_2)$$

The front ports of the two microphones are related to each other by a simple relationship:

$$F_2(z) = A z^{-d_{12}} F_1(z)$$

where  $A$  is the difference in amplitude of the noise between the two microphones and  $d_{12}$  is the delay between the microphones. Both of these will vary depending on where the acoustic source is located with respect to the microphones. A single noise source is assumed for purposes of this description, but the analysis presented can be generalized to multiple noise sources. For noise, which is assumed to be more than a meter away (in the far field),  $A$  is approximately  $\sim 1$ . The delay  $d_{12}$  will vary depending on the noise source between  $-d_{12\max}$  and  $+d_{12\max}$ , where  $d_{12\max}$  is the maximum delay possible between the two front ports. This maximum delay is a function of the distance between the front vents of the microphones and the speed of sound in air.

The rear ports of the two microphones are related to the front port by a similar relationship:

$$B_1(z) = Bz^{-d_{13}}F_1(z)$$

where  $B$  is difference in amplitude of the noise between the two microphones and  $d_{FB}$  is the delay between front port 1 and the common back port 3. Both of these will vary depending on where the acoustic source is located with respect to the microphones as shown above with  $d_{12}$ . The delay  $d_{13}$  will vary depending on the noise source between  $-d_{13max}$  and  $+d_{13max}$ , where  $d_{13max}$  is the maximum delay possible between front port 1 and the common back port 3. This maximum delay is determined by the path length between front port 1 and the common back port 3 – for example, if they are located 3 centimeters (cm) apart,  $d_{13max}$  will be

$$d_{13max} = \frac{d}{c} = \frac{0.03\text{m}}{345\text{m/s}} = 0.87\text{m sec}$$

Again, for noise,  $B$  is approximately one (1) since the noise sources are assumed to be greater than one (1) meter away from the microphones. Thus, in general, the above equation reduces to:

$$H_{1N}(z) = \frac{F_1(z) - z^{-d_1}Bz^{-d_{13}}F_1(z)}{z^{-d_{12}}F_1(z) - z^{-d_1}Bz^{-d_{23}}F_1(z)} = \frac{1 - z^{-(d_1+d_{13})}}{z^{-d_{12}} - z^{-(d_1+d_{13})}}$$

where the "N" denotes that this response is for far-field noise. Since  $d_1$  is a characteristic of the microphone, it remains the same for all different noise orientations. Conversely,  $d_{13}$  and  $d_{12}$  are relative measurements that depend on the location of the noise source with respect to the array.

If  $d_{12}$  goes to or becomes zero (0), then the filter  $H_{1N}(z)$  collapses to

$$H_{1N}(z) \Rightarrow \frac{1 - z^{-(d_1+d_{13})}}{1 - z^{-(d_1+d_{13})}} = 1 \quad (d_{12} \rightarrow 0)$$

and the resulting filter is a simple unity response filter, which is extremely simple to model with an adaptive FIR system. For noise sources perpendicular to the array

axis, the distance from the noise source to the front vents will be equal and  $d_{12}$  will go to zero. Even for small angles from the perpendicular,  $d_{12}$  will be small and the response will still be close to unity. Thus, for many noise locations, the  $H_{1N}(z)$  filter can be easily modeled using an adaptive FIR algorithm. This is not the case if the two directional microphones do not have a common rear vent. Even for noise sources away from a line perpendicular to the array axis, the  $H_{1N}(z)$  filter is still simpler and more easily modeled using an adaptive FIR filter algorithm and improvements in performance have been observed.

A first approximation made in the description above is that  $B_1(z) = B_2(z)$ . This approximation means the rear vents are exposed to and have the same response to the same pressure volume. This approximation can be satisfied if the common vented volume is small compared to a wavelength of the sound wave of interest.

A second approximation made in the description above is that  $d_1 = d_2$ . This approximation means the rear port delays for each microphone are the same. This is no problem with physical directional microphones, but must be specified for VDMs. These delays are relative; the front ports can also be delayed if desired, as long as the delay is the same for both microphones.

A third approximation made in the description above is that  $F_2(z) \approx F_1(z)z^{-d_{12}}$ . This approximation means the amplitude response of the front vents are about the same and the only difference is a delay. For noise sources greater than one (1) meter away, this is a good approximation, as the amplitude of a sound wave varies as  $1/r$ .

For speech, since it is much closer to the microphones (approximately 1 to 10 cm),  $A$  is not unity. The closer to the mouth of the user, the more different from unity  $A$  becomes. For example, if MIC 1 is located 8 cm away from the mouth and MIC 2 is located 12 cm away from the mouth, then for speech  $A$  would be

$$A = \frac{F_2(z)}{F_1(z)} = \frac{1/12}{1/8} = 0.67$$

This means for speech  $H_1(z)$  will be



$$H_{1S}(z) = \frac{F_1(z) - z^{-d_1} B_1(z)}{z^{-d_{12}} A F_1(z) - z^{-d_1} B_1(z)}$$

with the "S" denoting the response for near-field speech and  $A \neq 1$ . This does not reduce to a simple FIR approximation and will be harder for the adaptive FIR algorithm to adapt to. This means that the models for the filters  $H_{1N}(z)$  and  $H_{1S}(z)$  will be very different, thus reducing devoicing. Of course, if a noise source is located close to the microphone, the response will be the similar, which could cause more devoicing. However, unless the noise source is located very near the mouth of the user, a non-unity  $A$  and nonzero  $d_{12}$  should be enough to limit devoicing.

As an example, the difference in response is next examined for speech and noise when the noise is located behind the microphones. Let  $d_1 = 3$ . For speech, let  $d_{12} = 2$ ,  $A = 0.67$ , and  $B = 0.82$ . Then

$$H_{1S}(z) = \frac{F_1(z) - z^{-d_1} B_1(z)}{z^{-d_{12}} A F_1(z) - z^{-d_1} B_1(z)}$$

$$H_{1S}(z) = \frac{1 - 0.82z^{-3}}{0.67z^{-3} - 0.82z^{-2}}$$

which has a very non-FIR response. For noise located directly opposite the speech,  $d_{12} = -2$ ,  $A = B = 1$ . Thus the phase of the noise at  $F_2$  is two samples ahead of  $F_1$ . Then

$$H_{1N}(z) = \frac{F_1(z) - z^{-3} B_1(z)}{z^2 F_1(z) - z^{-3} B_1(z)} = \frac{z^{-2} - z^{-5}}{1 - z^{-5}}$$

which is much simpler and easily modeled than the speech filter.

The MA configuration of an embodiment implements the technique described above, using directional microphones, by including or constructing a vented volume that is small compared to the wavelength of the acoustic wave of interest and vent the front of the DMs to the outside of the volume and the rear of the DM to the volume itself. **Figure 2** is a block diagram of a microphone array 110 having a shared-vent configuration, under an embodiment. The MA includes a housing 202, a first microphone MIC 1 connected to a first side of the housing, and a second

microphone MIC 2 connected to a second side of the housing. The second microphone MIC 2 is positioned approximately orthogonally to the first microphone MIC 1 but is not so limited. The orthogonal relationship between MIC 1 and MIC 2 is shown only as an example, and the positional relationship between MIC 1 and MIC 2 can be any number of relationships (e.g., opposing sides of the housing, etc.). The first and second microphones of an embodiment are directional microphones, but are not so limited.

The housing also includes a vent cavity 204 in an interior region of the housing. The vent cavity 204 forms a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones. The vent cavity is in an interior region of the housing and positioned behind the first microphone and the second microphone. The vent cavity of an embodiment is a cylindrical cavity having a diameter of approximately 0.125 inch, a length of approximately 0.5 inch, and a volume of approximately 0.0006 cubic inches; however, the vent cavity of alternative embodiments can have any shape and/or any dimensions that provide a volume of approximately 0.0006 cubic inches.

The first microphone and the second microphone sample a common pressure of the vent cavity, and have an equivalent response to the common pressure. The housing of an embodiment includes at least one orifice 206 that connects the vent cavity to an external environment. For example, the housing can include a first orifice in a third side of the housing, where the first orifice connects the vent cavity to an external environment. Similarly, the housing can include, instead of or in addition to the first orifice, a second orifice in a fourth side of the housing, where the second orifice connects the vent cavity to the external environment.

A first rear port of the first microphone and a second rear port of the second microphone are connected to the vent cavity. A first delay of the first rear port is approximately equal to a second delay of the second rear port. Also, a first input to the first rear port is substantially similar to a second input to the second rear port. A first front port of the first microphone and a second front port of the second microphone vent outside the vent cavity.

According to the relationships between the microphones described above, a pressure of the second front port is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first and the second microphones. Further, a pressure of the first rear port is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first front port and the common rear port.

Generally, physical microphones of the MA of an embodiment are selected and configured so that a first noise response and a first speech response of the first microphone overlaps with a second noise response and a second speech response of the second microphone. This is accomplished by selecting and configuring the microphones such that a first noise response of the first microphone and a second noise response of the second microphone are substantially similar, and a first speech response of the first microphone and a second speech response of the second microphone are substantially dissimilar.

The first microphone and the second microphone of an embodiment are directional microphones. An example MA configuration includes electret directional microphones having a 6 millimeter (mm) diameter, but the embodiment is not so limited. Alternative embodiments can include any type of directional microphone having any number of different sizes and/or configurations. The vent openings for the front of each microphone and the common rear vent volume must be large enough to ensure adequate speech energy at the front and rear of each microphone. A vent opening of approximately 3 mm in diameter has been implemented with good results.

**Figure 3** shows results obtained for a microphone array having a shared-vent configuration, under an embodiment. These experimental results were obtained using the shared-rear-vent configuration described herein using a live subject in a sound room in the presence of complex babble noise. The top plot 302 ("MIC 1 no processing") is the original noisy signal in MIC 1, and the bottom plot 312 ("MIC 1 after PF + SS") the denoised signal (Pathfinder plus spectral subtraction) (under identical or nearly identical conditions) after adaptive Pathfinder

denoising of approximately 8 dB and additional single-channel spectral subtraction of approximately 12 dB. Clearly the technique is adept at removing the unwanted noise from the desired signal.

**Figure 4** is a three-microphone adaptive noise suppression system 400, under an embodiment. The three-microphone system 400 includes the combination of microphone array 410 along with the processing or circuitry components to which the microphone array is coupled (described in detail herein, but not shown in this figure). The microphone array 410 includes three physical omnidirectional microphones in a shared-vent configuration in which the omnidirectional microphones form VDMs. The microphone array 410 of an embodiment comprises physical microphones MIC 1, MIC 2 and MIC 3 (correspond to omnidirectional microphones  $O_1$ ,  $O_2$ , and  $O_3$ ), but the embodiment is not so limited.

**Figure 5** is a block diagram of the microphone array 410 in the shared-vent configuration including omnidirectional microphones to form VDMs, under an embodiment. Here, the common "rear vent" is a third omnidirectional microphone situated between the other two microphones. This example embodiment places the first microphone  $O_1$  on a first side, and places the second  $O_2$  and third  $O_3$  microphones on a second side, but the embodiment is not so limited. The relationship between the three microphones is shown only as an example, and the positional relationship between the three microphones can be any number of relationships (e.g., all microphones on a same side of the housing, each microphone on a different side of the housing, any combination of two microphones on a same side, etc.). MIC 1 and MIC 2 (as defined above) can be defined as:

$$M_1 = O_1 - O_3 z^{-dt}$$

$$M_2 = O_2 - O_3 z^{-dt}$$

Here the distances "d" between the microphones are equal but the embodiment is not so limited. The delay time "dt" is the time it takes for the sound to travel the distance "d". In this embodiment, assuming a temperature of 20 Celsius, that time would be about  $5.83 \times 10^{-5}$  seconds. The above assumes that all three omnidirectional microphones have been calibrated so that their response to

an identical source is the same, but this is not limiting as calibration techniques are well known to those in the art. Different combinations of two or more microphones are possible, but the virtual "rear vents" are as similar as possible to derive full benefit from this configuration. The MA configuration of an embodiment dedicates a single microphone (in this case  $O_3$ ) to be the rear "vent" for both VDMs.

As an example, **Figure 6** is a block diagram for a MA 410 including three physical microphones configured to form two virtual microphones  $M_1$  and  $M_2$ , under an embodiment. The MA includes two first order gradient microphones  $M_1$  and  $M_2$  formed using the outputs of three microphones or elements  $O_1$ ,  $O_2$  and  $O_3$ , under an embodiment. The MA of an embodiment includes three physical microphones that are omnidirectional microphones, as described above. The output from each physical microphone is coupled to a processing component 602, or circuitry, and the processing component 602 outputs signals representing or corresponding to the virtual microphones  $M_1$  and  $M_2$ .

In this example system 410, the output of physical microphone  $O_1$  is coupled to a first processing path of processing component 602 that includes application of a first delay  $z_{11}$  and a first gain  $A_{11}$ . The output of physical microphone  $O_2$  is coupled to a second processing path of processing component 602 that includes application of a second delay  $z_{12}$  and a second gain  $A_{12}$ . The output of physical microphone  $O_3$  is coupled to a third processing path of the processing component 602 that includes application of a third delay  $z_{21}$  and a third gain  $A_{21}$  and a fourth processing path that includes application of a fourth delay  $z_{22}$  and a fourth gain  $A_{22}$ . The output of the first and third processing paths is summed to form virtual microphone  $M_1$ , and the output of the second and fourth processing paths is summed to form virtual microphone  $M_2$ .

As described in detail below, varying the magnitude and sign of the delays and gains of the processing paths leads to a wide variety of virtual microphones (VMs), also referred to herein as virtual directional microphones, can be realized. While the processing component 602 described in this example includes four processing paths generating two virtual microphones or microphone signals, the embodiment is not so limited.

A generalized description follows of formation of virtual microphones or virtual microphone arrays from physical microphones or physical microphone arrays. **Figure 7** is a generalized two-microphone array (MA) including an array 701/702 and speech source S configuration, under an embodiment. **Figure 8** is a system 800 for generating or producing a first order gradient microphone V using two omnidirectional elements  $O_1$  and  $O_2$ , under an embodiment. The generalized array includes two physical microphones 701 and 702 (e.g., omnidirectional microphones) placed a distance  $2d_0$  apart and a speech source 700 located a distance  $d_s$  away at an angle of  $\theta$ . This array is axially symmetric (at least in free space), so no other angle is needed. The output from each microphone 701 and 702 can be delayed ( $z_1$  and  $z_2$ ), multiplied by a gain ( $A_1$  and  $A_2$ ), and then summed with the other as described above and as demonstrated in **Figure 8**. The output of the array is or forms at least one virtual microphone, as described in detail herein. This operation can be over any frequency range desired. By varying the magnitude and sign of the delays and gains, a wide variety of virtual microphones (VMs), also referred to herein as virtual directional microphones, can be realized. There are other methods known to those skilled in the art for constructing VMs but this is a common one and will be used in the enablement below.

As an example, **Figure 9** is a block diagram for a MA 900 including two physical microphones configured to form two virtual microphones  $V_1$  and  $V_2$ , under an embodiment. The MA includes two first order gradient microphones  $V_1$  and  $V_2$  formed using the outputs of two microphones or elements  $O_1$  and  $O_2$  (701 and 702), under an embodiment. The MA of an embodiment includes two physical microphones 701 and 702 that are omnidirectional microphones, as described herein. The output from each microphone is coupled to a processing component 902, or circuitry, and the processing component outputs signals representing or corresponding to the virtual microphones  $V_1$  and  $V_2$ .

In this example system 900, the output of physical microphone 701 is coupled to processing component 702 that includes a first processing path that includes application of a first delay  $z_{11}$  and a first gain  $A_{11}$  and a second processing path that includes application of a second delay  $z_{12}$  and a second gain  $A_{12}$ . The output of physical microphone 702 is coupled to a third processing path of the

processing component 902 that includes application of a third delay  $z_{21}$  and a third gain  $A_{21}$  and a fourth processing path that includes application of a fourth delay  $z_{22}$  and a fourth gain  $A_{22}$ . The output of the first and third processing paths is summed to form virtual microphone  $V_1$ , and the output of the second and fourth processing paths is summed to form virtual microphone  $V_2$ .

As described in detail below, varying the magnitude and sign of the delays and gains of the processing paths leads to a wide variety of virtual microphones (VMs), also referred to herein as virtual directional microphones, can be realized. While the processing component 902 described in this example includes four processing paths generating two virtual microphones or microphone signals, the embodiment is not so limited. For example, **Figure 10** is a block diagram for a MA 1000 including two physical microphones configured to form  $N$  virtual microphones  $V_1$  through  $V_N$ , where  $N$  is any number greater than one, under an embodiment. Thus, the MA can include a processing component 1002 having any number of processing paths as appropriate to form a number  $N$  of virtual microphones.

The MA of an embodiment can be coupled or connected to one or more remote devices. In a system configuration, the MA outputs signals to the remote devices. The remote devices include, but are not limited to, at least one of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), personal computers (PCs), headset devices, head-worn devices, and earpieces.

Furthermore, the MA of an embodiment can be a component or subsystem integrated with a host device. In this system configuration, the MA outputs signals to components or subsystems of the host device. The host device includes, but is not limited to, at least one of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), personal computers (PCs), headset devices, head-worn devices, and earpieces.

As an example, **Figure 11** is an example of a headset or head-worn device 1100 that includes the MA, as described herein, under an embodiment. The headset 1100 of an embodiment includes a housing having areas or receptacles

(not shown) that receive and hold physical microphones (e.g.,  $O_1$ ,  $O_2$  and/or  $O_3$  as described above). The headset 1100 is generally a device that can be worn by a speaker 1102, for example, a headset or earpiece that positions or holds the microphones in the vicinity of the speaker's mouth. The headset 1100 of an embodiment places a first physical microphone (e.g., physical microphone  $O_1$ ) in a vicinity of a speaker's lips. A second physical microphone (e.g., physical microphone  $O_2$ ) is placed a distance behind the first physical microphone. The distance of an embodiment is in a range of a few centimeters behind the first physical microphone or as described herein.

**Figure 12** is a flow diagram for forming 1200 the MA having the physical shared-vent configuration, under an embodiment. Formation 1200 of the MA includes positioning 1202 a first microphone in a housing relative to a speech source. A second microphone is positioned 1204 in the housing relative to the first microphone. The relative positions of the first and second microphones are not restricted, but best performance was observed when the front of the first microphone was approximately orthogonal to the front of the second microphone. Formation 1200 of the MA continues with formation 1206 of a common rear port that is common to the first microphone and the second microphone. The common rear port is formed using a vent cavity in an interior region of the housing. Formation of the vent cavity comprises forming a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones. The vent cavity is connected to the rear ports of each of the first microphone and the second microphone.

**Figure 13** is a flow diagram for forming 1300 the MA having the shared-vent configuration including omnidirectional microphones to form VDMs, under an alternative embodiment. Formation 1300 of the MA includes positioning 1302 a first microphone in a housing relative to a speech source. A second microphone is positioned 1304 in the housing relative to the first microphone. A third microphone is positioned 1306 in the housing relative to the first and second microphone. Best performance was observed when the relative positions of the microphones were such that the third microphone was positioned between the first and second microphones. Furthermore, in an embodiment, a front of the first microphone is



approximately orthogonal to the front of each of the second and third microphones, but this is not so required. The third microphone is configured as the rear "vent" for the first and second microphones.

**Figure 14** is a flow diagram for denoising 1400 acoustic signals using the MA having the physical shared-vent configuration, under an embodiment. The denoising 1400 begins by receiving 1402 acoustic signals at a first microphone and a second microphone. The denoising includes a configuration that controls 1404 a delay of the first rear port of the first microphone to be approximately equal to a delay of a second rear port of the second microphone. Controlling of the delay includes venting the first rear port and the second rear port to a common vent cavity having a volume that is small relative to a wavelength of the acoustic signals. The denoising 1400 generates 1406 output signals by combining signals from the first microphone and the second microphone, and the output signals include less acoustic noise than the acoustic signals.

**Figure 15** is a flow diagram for denoising 1500 acoustic signals using the MA having the shared-vent configuration including omnidirectional microphones to form VDMs, under an alternative embodiment. The denoising 1500 begins by receiving 1502 acoustic signals at a first physical microphone and, in response to the acoustic signals, outputting a first microphone signal. The acoustic signals are received 1504 at a second physical microphone and, in response, a second microphone signal is output. The acoustic signals are received 1506 at a third physical microphone and, in response, a third microphone signal is output. A first virtual microphone is formed 1508 by generating a combination of the first microphone signal and the third microphone signal. A second virtual microphone is formed 1510 by generating a combination of the second microphone signal and the third microphone signal. The first virtual microphone and the second virtual microphone are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech. The denoising 1500 generates 1512 output signals by combining signals from the first virtual microphone and the second virtual microphone, and the output signals include less acoustic noise than the acoustic signals.

The construction of VMs for the adaptive noise suppression system of an embodiment includes substantially similar noise response in  $V_1$  and  $V_2$ . Substantially similar noise response as used herein means that  $H_1(z)$  is simple to model and will not change much for noises at different orientations with respect to the user, satisfying conditions R2 and R4 described above and allowing strong denoising and minimized bleedthrough.

The MA can be a component of a single system, multiple systems, and/or geographically separate systems. The MA can also be a subcomponent or subsystem of a single system, multiple systems, and/or geographically separate systems. The MA can be coupled to one or more other components (not shown) of a host system or a system coupled to the host system.

One or more components of the MA and/or a corresponding system or application to which the MA is coupled or connected includes and/or runs under and/or in association with a processing system. The processing system includes any collection of processor-based devices or computing devices operating together, or components of processing systems or devices, as is known in the art. For example, the processing system can include one or more of a portable computer, portable communication device operating in a communication network, and/or a network server. The portable computer can be any of a number and/or combination of devices selected from among personal computers, cellular telephones, personal digital assistants, portable computing devices, and portable communication devices, but is not so limited. The processing system can include components within a larger computer system.

The processing system of an embodiment includes at least one processor and at least one memory device or subsystem. The processing system can also include or be coupled to at least one database. The term "processor" as generally used herein refers to any logic processing unit, such as one or more central processing units (CPUs), digital signal processors (DSPs), application-specific integrated circuits (ASIC), etc. The processor and memory can be monolithically integrated onto a single chip, distributed among a number of chips or components, and/or provided by some combination of algorithms. The methods described herein can be

implemented in one or more of software algorithm(s), programs, firmware, hardware, components, circuitry, in any combination.

The components of any system that includes the MA can be located together or in separate locations. Communication paths couple the components and include any medium for communicating or transferring files among the components. The communication paths include wireless connections, wired connections, and hybrid wireless/wired connections. The communication paths also include couplings or connections to networks including local area networks (LANs), metropolitan area networks (MANs), wide area networks (WANs), proprietary networks, interoffice or backend networks, and the Internet. Furthermore, the communication paths include removable fixed mediums like floppy disks, hard disk drives, and CD-ROM disks, as well as flash RAM, Universal Serial Bus (USB) connections, RS-232 connections, telephone lines, buses, and electronic mail messages.

Embodiments of the MA described herein include a device comprising: a housing; a first microphone connected to a first side of the housing; a second microphone connected to a second side of the housing; and a vent cavity in an interior region of the housing, the vent cavity forming a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

The first microphone and the second microphone of an embodiment sample a common pressure of the vent cavity.

The first microphone and the second microphone of an embodiment have an equivalent response to the common pressure.

The device of an embodiment comprises a first orifice in a third side of the housing, the first orifice connecting the vent cavity to an external environment.

The device of an embodiment comprises a first orifice in one or more of the first side and the second side of the housing, the first orifice connecting the vent cavity to an external environment.

The device of an embodiment comprises a second orifice in a fourth side of the housing, the second orifice connecting the vent cavity to the external environment.

A first rear port of the first microphone and a second rear port of the second microphone of an embodiment are connected to the vent cavity.

A first rear port delay of the first microphone of an embodiment is approximately equal to a second rear port delay of the second microphone.

A first input to the first rear port of an embodiment is substantially similar to a second input to the second rear port.

A first front port of the first microphone and a second front port of the second microphone of an embodiment vent outside the vent cavity.

A pressure of the second front port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first and the second microphones.

A pressure of the first rear port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first front port and the common rear port.

A first noise response and a first speech response of the first microphone of an embodiment overlaps with a second noise response and a second speech response of the second microphone.

A first noise response of the first microphone and a second noise response of the second microphone of an embodiment are substantially similar.

A first speech response of the first microphone and a second speech response of the second microphone of an embodiment are substantially dissimilar.

The second microphone of an embodiment is positioned approximately orthogonally to the first microphone.

The second microphone of an embodiment is positioned approximately opposite to the first microphone.

The first microphone and the second microphone of an embodiment are directional microphones.

Embodiments of the MA described herein include a device comprising: a housing; a first microphone connected to a first side of the housing; a second microphone connected to a second side of the housing; and a vent cavity in an

interior region of the housing, the vent cavity positioned behind the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

A first rear port of the first microphone and a second rear port of the second microphone of an embodiment are connected to the vent cavity and the vent cavity forms a common rear port of the first microphone and the second microphone.

The first rear port and the second rear port of an embodiment sample a common pressure of the vent cavity.

A first rear port delay of the first microphone of an embodiment is approximately equal to a second rear port delay of the second microphone.

A first delay of the first rear port of an embodiment is approximately equal to a second delay of the second rear port.

A first front port of the first microphone and a second front port of the second microphone of an embodiment vent outside the vent cavity.

A pressure of the second front port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first and the second microphones.

A pressure of the first rear port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first front port and the common rear port.

The device of an embodiment comprises a first orifice in a third side of the housing, the first orifice connecting the vent cavity to an external environment.

The device of an embodiment comprises a second orifice in a fourth side of the housing, the second orifice connecting the vent cavity to the external environment.

A first noise response of the first microphone and a second noise response of the second microphone of an embodiment are substantially similar.

A first speech response of the first microphone and a second speech response of the second microphone of an embodiment are substantially dissimilar.

The second microphone of an embodiment is positioned approximately orthogonally to the first microphone.

The second microphone of an embodiment is positioned approximately opposite to the first microphone.

Embodiments of the MA described herein include a device comprising: a housing; a first microphone connected to the housing; a second microphone connected to the housing; and a vent cavity in an interior region of the housing and connected to a first rear port of the first microphone and a second rear port of the second microphone, the vent cavity having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

Embodiments of the MA described herein include a device comprising: a housing; a first microphone connected to the housing; a second microphone connected to the housing; and a vent cavity in an interior region of the housing, the vent cavity forming a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

A first noise response of the first microphone and a second noise response of the second microphone of an embodiment are substantially similar.

A first speech response of the first microphone and a second speech response of the second microphone of an embodiment are substantially dissimilar.

The device of an embodiment comprises a plurality of vents in one or more sides of the housing, the plurality of vents connecting the vent cavity to an external environment.

Front ports of the first microphone and the second microphone of an embodiment vent outside the vent cavity.

A first rear port of the first microphone and a second rear port of the second microphone of an embodiment are connected to the vent cavity.

A rear port delay of the first microphone of an embodiment is approximately equal to a rear port delay of the second microphone.

Embodiments of the MA described herein include a device comprising: a housing; a first microphone connected to a first side of the housing; a second microphone connected to a second side of the housing, wherein the second

microphone is positioned approximately orthogonally to the first microphone; a vent cavity in an interior region of the housing, the vent cavity forming a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones; and a first orifice in a third side of the housing and a second orifice in a fourth side of the housing, the first and the second orifice connecting the vent cavity to an external environment.

Embodiments of the MA described herein include a method comprising: receiving acoustic signals; outputting microphone signals in response to receiving the acoustic signals; controlling a delay of a first rear port of a first microphone and a second rear port of a second microphone to be approximately equal by using a common rear vent that samples a common pressure source; and generating output signals by combining the microphone signals, the output signals including less acoustic noise than the acoustic signals.

Receiving acoustic signals of an embodiment comprises receiving acoustic signals at first and second microphones.

The common rear vent of an embodiment comprises a common vent cavity connected to rear ports of the first and second microphones.

The common vent cavity of an embodiment has a volume that is small relative to a wavelength of the acoustic signals.

Outputting microphone signals of an embodiment comprises outputting a first microphone output of the first microphone and a second microphone output of the second microphone.

The first microphone and the second microphone of an embodiment sample a common pressure of the vent cavity.

The first microphone and the second microphone of an embodiment have an equivalent response to the common pressure.

The method of an embodiment comprises connecting the vent cavity to an external environment.

The method of an embodiment comprises venting front ports of the first microphone and the second microphone to an external environment.

Receiving acoustic signals of an embodiment comprises receiving acoustic signals at a first, a second and a third microphone, wherein the common rear vent comprises the third microphone.

Outputting microphone signals of an embodiment comprises outputting a first virtual microphone signal by combining a first microphone output of the first microphone and a third microphone output of the third microphone.

The method of an embodiment comprises subtracting the third microphone output from the first microphone output.

The method of an embodiment comprises delaying the third microphone output of an embodiment.

Outputting microphone signals of an embodiment comprises outputting a second virtual microphone signal by combining a second microphone output of the second microphone and the third microphone output of the third microphone.

The method of an embodiment comprises subtracting the third microphone output from the second microphone output.

The method of an embodiment comprises delaying the third microphone output.

Embodiments of the MA described herein include a method comprising: receiving acoustic signals at a first microphone and a second microphone; controlling a delay of a first rear port of the first microphone to be approximately equal to a delay of a second rear port of the second microphone, wherein controlling of the delay includes venting the first rear port and the second rear port to a common vent cavity having a volume that is small relative to a wavelength of the acoustic signals; and generating output signals by combining signals from the first microphone and the second microphone, the output signals include less acoustic noise than the acoustic signals.

Outputting microphone signals of an embodiment comprises outputting a first microphone output of the first microphone and a second microphone output of the second microphone.

The first microphone and the second microphone of an embodiment sample a common pressure of the common vent cavity.



The first microphone and the second microphone of an embodiment have an equivalent response to the common pressure.

The method of an embodiment comprises connecting the common vent cavity to an external environment.

The method of an embodiment comprises venting front ports of the first microphone and the second microphone to an external environment.

Embodiments of the MA described herein include a device comprising: a headset including a housing; a loudspeaker connected to the housing; a first microphone connected to a first side of the housing; a second microphone connected to a second side of the housing; and a vent cavity in an interior region of the housing, the vent cavity forming a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

The first microphone and the second microphone of an embodiment sample a common pressure of the vent cavity.

The first microphone and the second microphone of an embodiment have an equivalent response to the common pressure.

The device of an embodiment comprises a first orifice in a third side of the housing, the first orifice connecting the vent cavity to an external environment.

The device of an embodiment comprises a second orifice in a fourth side of the housing, the second orifice connecting the vent cavity to the external environment.

A first rear port of the first microphone and a second rear port of the second microphone of an embodiment are connected to the vent cavity.

A first rear port delay of the first microphone of an embodiment is approximately equal to a second rear port delay of the second microphone.

A first input to the first rear port of an embodiment is substantially similar to a second input to the second rear port.

A first delay of the first rear port of an embodiment is approximately equal to a second delay of the second rear port.

A first front port of the first microphone and a second front port of the second microphone of an embodiment vent outside the vent cavity.

A pressure of the second front port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first and the second microphones.

A pressure of the first rear port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first front port and the common rear port.

A first noise response and a first speech response of the first microphone of an embodiment overlaps with a second noise response and a second speech response of the second microphone.

A first noise response of the first microphone and a second noise response of the second microphone of an embodiment are substantially similar.

A first speech response of the first microphone and a second speech response of the second microphone of an embodiment are substantially dissimilar.

The second microphone of an embodiment is positioned approximately orthogonally to the first microphone.

The second microphone of an embodiment is positioned approximately opposite to the first microphone.

The first microphone and the second microphone of an embodiment are directional microphones.

The headset of an embodiment is portable and attaches to a region of a human head.

The first microphone and the second microphone of an embodiment receive acoustic signals including acoustic speech and acoustic noise.

A source that generates the acoustic speech of an embodiment is a mouth of a human wearing the headset.

The device of an embodiment comprises a processing component coupled to the first microphone and the second microphone.

The device of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

The device of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the first and second microphones and generating the output signals.

The device of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

The device of an embodiment comprises a communication device coupled to the headset via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

Embodiments of the MA described herein include a device comprising: a housing that is portable and attaches to a region of a human head; a loudspeaker connected to the housing; a first microphone connected to the housing; a second microphone connected to the housing; and a vent cavity in an interior region of the housing, the vent cavity positioned behind the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

A first rear port of the first microphone and a second rear port of the second microphone of an embodiment are connected to the vent cavity and the vent cavity forms a common rear port of the first microphone and the second microphone.

The first rear port and the second rear port of an embodiment sample a common pressure of the vent cavity.

A first rear port delay of the first microphone of an embodiment is approximately equal to a second rear port delay of the second microphone.

A first delay of the first rear port of an embodiment is approximately equal to a second delay of the second rear port.

A first front port of the first microphone and a second front port of the second microphone of an embodiment vent outside the vent cavity.

A pressure of the second front port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first and the second microphones.

A pressure of the first rear port of an embodiment is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first front port and the common rear port.

The device of an embodiment comprises a first orifice in the housing, the first orifice connecting the vent cavity to an external environment.

The device of an embodiment comprises a second orifice in the housing, the second orifice connecting the vent cavity to the external environment.

A first noise response of the first microphone and a second noise response of the second microphone of an embodiment are substantially similar.

A first speech response of the first microphone and a second speech response of the second microphone of an embodiment are substantially dissimilar.

The device of an embodiment comprises a processing component coupled to the first microphone and the second microphone.

The device of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the first and second microphones and generating the output signals.

The device of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel. The device of an embodiment comprises a communication device coupled to the processing component via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

Embodiments of the MA described herein include a device comprising: a headset comprising a housing that attaches to a human head; a first microphone connected to a first side of the housing; a second microphone connected to a second side of the housing; and a vent cavity in an interior region of the housing and connected to a first rear port of the first microphone and a second rear port of the second microphone, the vent cavity having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

The device of an embodiment comprises a processing component coupled to the first microphone and the second microphone.

The device of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the first and second microphones and generating the output signals.

The device of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel. The device of an embodiment comprises a communication device coupled to the processing component via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

Embodiments of the MA described herein include a device comprising: a housing; a first microphone; a second microphone; and a third microphone, wherein the third microphone functions as a common rear vent for the first and the second microphones.

The device of an embodiment comprises a first virtual microphone comprising a combination of a first microphone signal and a third microphone signal, wherein the first microphone signal is generated by the first microphone and the third microphone signal is generated by a third microphone.

The device of an embodiment comprises a second virtual microphone comprising a combination of a second microphone signal and the third microphone

signal, wherein the second microphone signal is generated by the second microphone, wherein the third physical microphone functions as a common rear vent for the first and the second virtual microphones.

A first noise response of the first virtual microphone and a second noise response of the second virtual microphone of an embodiment are substantially similar.

A first speech response of the first virtual microphone and a second speech response of the second virtual microphone of an embodiment are substantially dissimilar.

The first microphone, the second microphone, and the third microphone of an embodiment are connected to a first side of the housing.

The first microphone of an embodiment is connected to a first side of the housing, the second microphone is connected to a second side of the housing, and the third microphone is connected to a third side of the housing.

The first microphone of an embodiment is connected to a first side of the housing and the second microphone and the third microphone is connected to a second side of the housing.

The second microphone of an embodiment is positioned approximately orthogonally to the first microphone

The third microphone of an embodiment is positioned approximately orthogonally to the first microphone

The third microphone of an embodiment is positioned adjacent the second microphone and between the first and the second microphones.

The third microphone of an embodiment is positioned adjacent the second microphone and behind the first microphone.

A first distance between the first microphone and the third microphone of an embodiment is approximately equal to a second distance between the second microphone and the third microphone.

The first microphone, the second microphone, and the third microphone of an embodiment are omnidirectional microphones.

Embodiments of the MA described herein include a device comprising: a housing; a first microphone connected to a first side of the housing; a second

microphone connected to a second side of the housing; and a third microphone connected to the second side of the housing, the third microphone coupled to the first microphone and the second microphone, wherein the third microphone functions as a common rear vent for the first and the second microphones.

Embodiments of the MA described herein include a microphone array comprising: a first virtual microphone comprising a combination of a first microphone signal and a third microphone signal, wherein the first microphone signal is generated by a first physical microphone and the third microphone signal is generated by a third physical microphone; and a second virtual microphone comprising a combination of a second microphone signal and the third microphone signal, wherein the second microphone signal is generated by a second physical microphone, wherein the third physical microphone functions as a common rear vent for the first and the second virtual microphones.

The first virtual microphone and the second virtual microphone of an embodiment are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

The first virtual microphone of an embodiment comprises the third microphone signal subtracted from the first microphone signal.

The third microphone signal of an embodiment is delayed.

The second virtual microphone of an embodiment comprises the third microphone signal subtracted from the second microphone signal.

The third microphone signal of an embodiment is delayed.

The first virtual microphone of an embodiment comprises a delayed version of the third microphone signal subtracted from the first microphone signal.

The second virtual microphone of an embodiment comprises a delayed version of the third microphone signal subtracted from the second microphone signal.

The second physical microphone of an embodiment is positioned approximately orthogonally to the first physical microphone.

The third physical microphone of an embodiment is positioned approximately orthogonally to the first physical microphone.

The third physical microphone of an embodiment is positioned adjacent the second physical microphone and between the first and the second physical microphones.

The third physical microphone of an embodiment is positioned adjacent the second physical microphone and behind the first physical microphone.

A first distance between the first physical microphone and the third physical microphone of an embodiment is approximately equal to a second distance between the second physical microphone and the third physical microphone.

A first noise response of the first physical microphone and a second noise response of the second physical microphone of an embodiment are substantially similar.

A first speech response of the first physical microphone and a second speech response of the second physical microphone of an embodiment are substantially dissimilar.

The first, second and third physical microphones of an embodiment are omnidirectional

Embodiments of the MA described herein include a device comprising: a first microphone outputting a first microphone signal, a second microphone outputting a second microphone signal, and a third microphone outputting a third microphone signal; and a processing component coupled to the first, second and third microphone signals, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a combination of the first microphone signal and the third microphone signal, wherein the second virtual microphone comprises a combination of the second microphone signal and the third microphone signal, wherein the third physical microphone functions as a common rear vent for the first and the second virtual microphones, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech.

The first virtual microphone of an embodiment comprises a delayed version of the third microphone signal subtracted from the first microphone signal.



The second virtual microphone of an embodiment comprises a delayed version of the third microphone signal subtracted from the second microphone signal.

The third microphone of an embodiment is positioned adjacent the second microphone and between the first and the second microphones.

The third microphone of an embodiment is positioned adjacent the second microphone and behind the first microphone.

A first distance between the first microphone and the third microphone of an embodiment is approximately equal to a second distance between the second microphone and the third microphone.

The second and the third microphones of an embodiment are positioned approximately orthogonally to the first microphone.

Embodiments of the MA described herein include a sensor comprising: a physical microphone array including a first physical microphone, a second physical microphone, and a third physical microphone, the first physical microphone outputting a first microphone signal, the second physical microphone outputting a second microphone signal, and the third physical microphone outputting a third microphone signal; and a virtual microphone array comprising a first virtual microphone and a second virtual microphone and a common rear vent, the first virtual microphone comprising a combination of the first microphone signal and the third microphone signal, the second virtual microphone comprising a combination of the second microphone signal and the third microphone signal, wherein the third physical microphone functions as the common rear vent for the first and the second virtual microphones.

Embodiments of the MA described herein include a method comprising: receiving acoustic signals at a physical microphone array and in response outputting a plurality of microphone signals from the physical microphone array; forming a virtual microphone array by generating a plurality of different signal combinations from the plurality of microphone signals, wherein a number of physical microphones of the physical microphone array is larger than a number of virtual microphones of the virtual microphone array; and generating output signals

by combining signals output from the virtual microphone array, the output signals including less acoustic noise than the received acoustic signals.

Embodiments of the MA described herein include a method comprising: receiving acoustic signals at a first physical microphone and in response outputting a first microphone signal from the first physical microphone; receiving acoustic signals at a second physical microphone and in response outputting a second microphone signal from the second physical microphone; receiving acoustic signals at a third physical microphone and in response outputting a third microphone signal from the third physical microphone; forming a first virtual microphone and a second virtual microphone by generating a plurality of combinations of the first microphone signal, the second microphone signal and the third microphone signal; and generating output signals by combining signals output from the first virtual microphone and the second virtual microphone, the output signals including less acoustic noise than the received acoustic signals.

Forming the first virtual microphone of an embodiment comprises combining the first microphone signal and the third microphone signal.

The first virtual microphone of an embodiment comprises the third microphone signal subtracted from the first microphone signal.

The third microphone signal of an embodiment is delayed.

Forming the second virtual microphone of an embodiment comprises combining the second microphone signal and the third microphone signal.

The second virtual microphone of an embodiment comprises the third microphone signal subtracted from the second microphone signal.

The third microphone signal of an embodiment is delayed.

Embodiments of the MA described herein include a method comprising: receiving acoustic signals at a first physical microphone and in response outputting a first microphone signal from the first physical microphone; receiving acoustic signals at a second physical microphone and in response outputting a second microphone signal from the second physical microphone; receiving acoustic signals at a third physical microphone and in response outputting a third microphone signal from the third physical microphone; forming a first virtual microphone by generating a combination of the first microphone signal and the third microphone

signal; forming a second virtual microphone by generating a combination of the second microphone signal and the third microphone signal; and generating output signals by combining signals output from the first virtual microphone and the second virtual microphone, the output signals including less acoustic noise than the received acoustic signals.

Embodiments of the MA described herein include a device comprising: a headset including a housing; a loudspeaker connected to the housing; a first microphone; a second microphone; and a third microphone, wherein the third microphone functions as a common rear vent for the first and the second microphones.

The device of an embodiment comprises a first virtual microphone comprising a combination of a first microphone signal and a third microphone signal, wherein the first microphone signal is generated by the first microphone and the third microphone signal is generated by a third microphone.

The device of an embodiment comprises a second virtual microphone comprising a combination of a second microphone signal and the third microphone signal, wherein the second microphone signal is generated by the second microphone, wherein the third physical microphone functions as a common rear vent for the first and the second virtual microphones.

A first noise response of the first virtual microphone and a second noise response of the second virtual microphone of an embodiment are substantially similar.

A first speech response of the first virtual microphone and a second speech response of the second virtual microphone of an embodiment are substantially dissimilar.

The first microphone, the second microphone, and the third microphone of an embodiment are connected to a first side of the housing.

The first microphone of an embodiment is connected to a first side of the housing, the second microphone is connected to a second side of the housing, and the third microphone is connected to a third side of the housing.

The first microphone of an embodiment is connected to a first side of the housing and the second microphone and the third microphone is connected to a second side of the housing.

The second microphone of an embodiment is positioned approximately orthogonally to the first microphone

The third microphone of an embodiment is positioned approximately orthogonally to the first microphone

The third microphone of an embodiment is positioned adjacent the second microphone and between the first and the second microphones.

The third microphone of an embodiment is positioned adjacent the second microphone and behind the first microphone.

A first distance of an embodiment between the first microphone and the third microphone is approximately equal to a second distance between the second microphone and the third microphone.

The first microphone, the second microphone, and the third microphone of an embodiment are omnidirectional microphones.

The headset of an embodiment is portable and attaches to a region of a human head.

The first, second and third microphones of an embodiment receive acoustic signals including acoustic speech and acoustic noise.

A source that generates the acoustic speech of an embodiment is a mouth of a human wearing the headset.

The device of an embodiment comprises a processing component coupled to the first microphone, the second microphone and the third microphone.

The device of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

The device of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the first, second and third microphones and generating the output signals.

The device of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

The device of an embodiment comprises a communication device coupled to the headset via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

Embodiments of the MA described herein include a device comprising: a housing that is portable and attaches to a region of a human head; a loudspeaker connected to the housing; a first microphone connected to a first side of the housing; a second microphone connected to a second side of the housing; and a third microphone connected to the second side of the housing, the third microphone coupled to the first microphone and the second microphone, wherein the third microphone functions as a common rear vent for the first and the second microphones.

Embodiments of the MA described herein include a headset comprising: a housing including a loudspeaker, a first physical microphone, a second physical microphone and a third physical microphone; a first virtual microphone comprising a combination of a first microphone signal and a third microphone signal, wherein the first microphone signal is generated by the first physical microphone and the third microphone signal is generated by the third physical microphone; and a second virtual microphone comprising a combination of a second microphone signal and the third microphone signal, wherein the second microphone signal is generated by the second physical microphone, wherein the third physical microphone functions as a common rear vent for the first and the second virtual microphones.

The first virtual microphone and the second virtual microphone of an embodiment are distinct virtual directional microphones with substantially similar responses to noise and substantially dissimilar responses to speech.

The first virtual microphone of an embodiment comprises the third microphone signal subtracted from the first microphone signal.

The third microphone signal of an embodiment is delayed.

The second virtual microphone of an embodiment comprises the third microphone signal subtracted from the second microphone signal. The third microphone signal of an embodiment is delayed.

The first virtual microphone of an embodiment comprises a delayed version of the third microphone signal subtracted from the first microphone signal.

The second virtual microphone of an embodiment comprises a delayed version of the third microphone signal subtracted from the second microphone signal.

The second physical microphone of an embodiment is positioned approximately orthogonally to the first physical microphone.

The third physical microphone of an embodiment is positioned approximately orthogonally to the first physical microphone.

The third physical microphone of an embodiment is positioned adjacent the second physical microphone and between the first and the second physical microphones.

The third physical microphone of an embodiment is positioned adjacent the second physical microphone and behind the first physical microphone.

A first distance between the first physical microphone and the third physical microphone of an embodiment is approximately equal to a second distance between the second physical microphone and the third physical microphone.

A first noise response of the first physical microphone and a second noise response of the second physical microphone of an embodiment are substantially similar.

A first speech response of the first physical microphone and a second speech response of the second physical microphone of an embodiment are substantially dissimilar.

The first, second and third physical microphones of an embodiment are omnidirectional.

The first, second and third microphones of an embodiment receive acoustic signals including acoustic speech and acoustic noise.

A source that generates the acoustic speech of an embodiment is a mouth of a human wearing the headset.

The headset of an embodiment comprises a processing component coupled to the first microphone, the second microphone and the third microphone.

The headset of an embodiment comprises a voice activity detector (VAD) coupled to the processing component, the VAD generating voice activity signals.

The headset of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the first, second and third microphones and generating output signals that are denoised versions of the acoustic signals.

The headset of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel.

The headset of an embodiment comprises a communication device coupled to the headset via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

The housing of an embodiment is portable and attaches to a region of a human head.

Embodiments of the MA described herein include a headset comprising: a loudspeaker, a first microphone outputting a first microphone signal, a second microphone outputting a second microphone signal, and a third microphone outputting a third microphone signal; and a processing component coupled to the first, second and third microphone signals, the processing component generating a virtual microphone array comprising a first virtual microphone and a second virtual microphone, wherein the first virtual microphone comprises a combination of the first microphone signal and the third microphone signal, wherein the second virtual microphone comprises a combination of the second microphone signal and the third

microphone signal, wherein the third physical microphone functions as a common rear vent for the first and the second virtual microphones, wherein the first virtual microphone and the second virtual microphone have substantially similar responses to noise and substantially dissimilar responses to speech.

The headset of an embodiment comprises a processing component coupled to the first, second and third microphones.

The headset of an embodiment comprises an adaptive noise removal application coupled to the processing component, the adaptive noise removal application receiving signals from the first, second and third microphones and generating the output signals.

The headset of an embodiment comprises a communication channel coupled to the processing component, the communication channel comprising at least one of a wireless channel, a wired channel, and a hybrid wireless/wired channel. The headset of an embodiment comprises a communication device coupled to the processing component via the communication channel, the communication device comprising one or more of cellular telephones, satellite telephones, portable telephones, wireline telephones, Internet telephones, wireless transceivers, wireless communication radios, personal digital assistants (PDAs), and personal computers (PCs).

Aspects of the MA and corresponding systems and methods described herein may be implemented as functionality programmed into any of a variety of circuitry, including programmable logic devices (PLDs), such as field programmable gate arrays (FPGAs), programmable array logic (PAL) devices, electrically programmable logic and memory devices and standard cell-based devices, as well as application specific integrated circuits (ASICs). Some other possibilities for implementing aspects of the MA and corresponding systems and methods include: microcontrollers with memory (such as electronically erasable programmable read only memory (EEPROM)), embedded microprocessors, firmware, software, etc. Furthermore, aspects of the MA and corresponding systems and methods may be embodied in microprocessors having software-based circuit emulation, discrete logic (sequential and combinatorial), custom devices, fuzzy (neural) logic, quantum devices, and hybrids of any of the above device types. Of course the underlying



device technologies may be provided in a variety of component types, e.g., metal-oxide semiconductor field-effect transistor (MOSFET) technologies like complementary metal-oxide semiconductor (CMOS), bipolar technologies like emitter-coupled logic (ECL), polymer technologies (e.g., silicon-conjugated polymer and metal-conjugated polymer-metal structures), mixed analog and digital, etc.

It should be noted that any system, method, and/or other components disclosed herein may be described using computer aided design tools and expressed (or represented), as data and/or instructions embodied in various computer-readable media, in terms of their behavioral, register transfer, logic component, transistor, layout geometries, and/or other characteristics. Computer-readable media in which such formatted data and/or instructions may be embodied include, but are not limited to, non-volatile storage media in various forms (e.g., optical, magnetic or semiconductor storage media) and carrier waves that may be used to transfer such formatted data and/or instructions through wireless, optical, or wired signaling media or any combination thereof. Examples of transfers of such formatted data and/or instructions by carrier waves include, but are not limited to, transfers (uploads, downloads, e-mail, etc.) over the Internet and/or other computer networks via one or more data transfer protocols (e.g., HTTP, FTP, SMTP, etc.). When received within a computer system via one or more computer-readable media, such data and/or instruction-based expressions of the above described components may be processed by a processing entity (e.g., one or more processors) within the computer system in conjunction with execution of one or more other computer programs.

Unless the context clearly requires otherwise, throughout the description and the claims, the words "comprise," "comprising," and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in a sense of "including, but not limited to." Words using the singular or plural number also include the plural or singular number respectively. Additionally, the words "herein," "hereunder," "above," "below," and words of similar import, when used in this application, refer to this application as a whole and not to any particular portions of this application. When the word "or" is used in reference to a list of two or more items, that word covers all of the following interpretations of the

word: any of the items in the list, all of the items in the list and any combination of the items in the list.

The above description of embodiments of the MA and corresponding systems and methods is not intended to be exhaustive or to limit the systems and methods to the precise forms disclosed. While specific embodiments of, and examples for, the MA and corresponding systems and methods are described herein for illustrative purposes, various equivalent modifications are possible within the scope of the systems and methods, as those skilled in the relevant art will recognize. The teachings of the MA and corresponding systems and methods provided herein can be applied to other systems and methods, not only for the systems and methods described above.

The elements and acts of the various embodiments described above can be combined to provide further embodiments. These and other changes can be made to the MA and corresponding systems and methods in light of the above detailed description.

In general, in the following claims, the terms used should not be construed to limit the MA and corresponding systems and methods to the specific embodiments disclosed in the specification and the claims, but should be construed to include all systems that operate under the claims. Accordingly, the MA and corresponding systems and methods is not limited by the disclosure, but instead the scope is to be determined entirely by the claims.

While certain aspects of the MA and corresponding systems and methods are presented below in certain claim forms, the inventors contemplate the various aspects of the MA and corresponding systems and methods in any number of claim forms. Accordingly, the inventors reserve the right to add additional claims after filing the application to pursue such additional claim forms for other aspects of the MA and corresponding systems and methods.

CLAIMS

What is claimed is:

1. A device comprising:
  - a housing;
  - a first microphone connected to a first side of the housing;
  - a second microphone connected to a second side of the housing; and
  - a vent cavity in an interior region of the housing, the vent cavity forming a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.
2. The device of claim 1, wherein the first microphone and the second microphone sample a common pressure of the vent cavity.
3. The device of claim 2, wherein the first microphone and the second microphone have an equivalent response to the common pressure.
4. The device of claim 1, comprising a first orifice in a third side of the housing, the first orifice connecting the vent cavity to an external environment.
5. The device of claim 1, comprising a first orifice in one or more of the first side and the second side of the housing, the first orifice connecting the vent cavity to an external environment.
6. The device of claim 5, comprising a second orifice in a fourth side of the housing, the second orifice connecting the vent cavity to the external environment.
7. The device of claim 1, wherein a first rear port of the first microphone and a second rear port of the second microphone are connected to the vent cavity.
8. The device of claim 7, wherein a first rear port delay of the first microphone is approximately equal to a second rear port delay of the second microphone.

9. The device of claim 7, wherein a first input to the first rear port is substantially similar to a second input to the second rear port.
10. The device of claim 7, wherein a first front port of the first microphone and a second front port of the second microphone vent outside the vent cavity.
11. The device of claim 10, wherein a pressure of the second front port is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first and the second microphones.
12. The device of claim 10, wherein a pressure of the first rear port is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first front port and the common rear port.
13. The device of claim 1, wherein a first noise response and a first speech response of the first microphone overlaps with a second noise response and a second speech response of the second microphone.
14. The device of claim 1, wherein a first noise response of the first microphone and a second noise response of the second microphone are substantially similar.
15. The device of claim 1, wherein a first speech response of the first microphone and a second speech response of the second microphone are substantially dissimilar.
16. The device of claim 1, wherein the second microphone is positioned approximately orthogonally to the first microphone.

17. The device of claim 1, wherein the second microphone is positioned approximately opposite to the first microphone.
18. The device of claim 1, wherein the first microphone and the second microphone are directional microphones.
19. A device comprising:
  - a housing;
  - a first microphone connected to a first side of the housing;
  - a second microphone connected to a second side of the housing; and
  - a vent cavity in an interior region of the housing, the vent cavity positioned behind the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.
20. The device of claim 19, wherein a first rear port of the first microphone and a second rear port of the second microphone are connected to the vent cavity and the vent cavity forms a common rear port of the first microphone and the second microphone.
21. The device of claim 20, wherein the first rear port and the second rear port sample a common pressure of the vent cavity.
22. The device of claim 20, wherein a first rear port delay of the first microphone is approximately equal to a second rear port delay of the second microphone.
23. The device of claim 20, wherein a first delay of the first rear port is approximately equal to a second delay of the second rear port.
24. The device of claim 20, wherein a first front port of the first microphone and a second front port of the second microphone vent outside the vent cavity.

25. The device of claim 24, wherein a pressure of the second front port is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first and the second microphones.
26. The device of claim 24, wherein a pressure of the first rear port is approximately proportional to a pressure of the first front port multiplied by a difference in amplitude of noise between the first and the second microphone multiplied by a delay between the first front port and the common rear port.
27. The device of claim 20, comprising a first orifice in a third side of the housing, the first orifice connecting the vent cavity to an external environment.
28. The device of claim 27, comprising a second orifice in a fourth side of the housing, the second orifice connecting the vent cavity to the external environment.
29. The device of claim 20, wherein a first noise response of the first microphone and a second noise response of the second microphone are substantially similar.
30. The device of claim 20, wherein a first speech response of the first microphone and a second speech response of the second microphone are substantially dissimilar.
31. The device of claim 19, wherein the second microphone is positioned approximately orthogonally to the first microphone.
32. The device of claim 19, wherein the second microphone is positioned approximately opposite to the first microphone.
33. A device comprising:  
a housing;  
a first microphone connected to the housing;

a second microphone connected to the housing; and  
a vent cavity in an interior region of the housing and connected to a first rear port of the first microphone and a second rear port of the second microphone, the vent cavity having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.

34. A device comprising:  
a housing;  
a first microphone connected to the housing;  
a second microphone connected to the housing; and  
a vent cavity in an interior region of the housing, the vent cavity forming a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones.
35. The device of claim 34, wherein a first noise response of the first microphone and a second noise response of the second microphone are substantially similar.
36. The device of claim 34, wherein a first speech response of the first microphone and a second speech response of the second microphone are substantially dissimilar.
37. The device of claim 34, comprising a plurality of vents in one or more sides of the housing, the plurality of vents connecting the vent cavity to an external environment.
38. The device of claim 34, wherein front ports of the first microphone and the second microphone vent outside the vent cavity.
39. The device of claim 38, wherein a first rear port of the first microphone and a second rear port of the second microphone are connected to the vent cavity.

40. The device of claim 38, wherein a rear port delay of the first microphone is approximately equal to a rear port delay of the second microphone.
41. A device comprising:  
a housing;  
a first microphone connected to a first side of the housing;  
a second microphone connected to a second side of the housing, wherein the second microphone is positioned approximately orthogonally to the first microphone;  
a vent cavity in an interior region of the housing, the vent cavity forming a common rear port of the first microphone and the second microphone and having a volume that is small relative to a wavelength of acoustic signals received by the first and second microphones; and  
a first orifice in a third side of the housing and a second orifice in a fourth side of the housing, the first and the second orifice connecting the vent cavity to an external environment.
42. A method comprising:  
receiving acoustic signals;  
outputting microphone signals in response to receiving the acoustic signals;  
controlling a delay of a first rear port of a first microphone and a second rear port of a second microphone to be approximately equal by using a common rear vent that samples a common pressure source; and  
generating output signals by combining the microphone signals, the output signals including less acoustic noise than the acoustic signals.
43. The method of claim 42, wherein receiving acoustic signals comprises receiving acoustic signals at first and second microphones.
44. The method of claim 43, wherein the common rear vent comprises a common vent cavity connected to rear ports of the first and second microphones.



45. The method of claim 44, wherein the common vent cavity has a volume that is small relative to a wavelength of the acoustic signals.
46. The method of claim 44, wherein outputting microphone signals comprises outputting a first microphone output of the first microphone and a second microphone output of the second microphone.
47. The method of claim 44, wherein the first microphone and the second microphone sample a common pressure of the vent cavity.
48. The method of claim 47, wherein the first microphone and the second microphone have an equivalent response to the common pressure.
49. The method of claim 44, comprising connecting the vent cavity to an external environment.
50. The method of claim 44, comprising venting front ports of the first microphone and the second microphone to an external environment.
51. The method of claim 42, wherein receiving acoustic signals comprises receiving acoustic signals at a first, a second and a third microphone, wherein the common rear vent comprises the third microphone.
52. The method of claim 51, wherein outputting microphone signals comprises outputting a first virtual microphone signal by combining a first microphone output of the first microphone and a third microphone output of the third microphone.
53. The method of claim 52, comprising subtracting the third microphone output from the first microphone output.
54. The method of claim 53, wherein the third microphone output is delayed.
55. The method of claim 52, wherein outputting microphone signals comprises outputting a second virtual microphone signal by combining a second microphone

output of the second microphone and the third microphone output of the third microphone.

56. The method of claim 55, comprising subtracting the third microphone output from the second microphone output.

57. The method of claim 56, wherein the third microphone output is delayed.

58. A method comprising:

receiving acoustic signals at a first microphone and a second microphone;  
controlling a delay of a first rear port of the first microphone to be approximately equal to a delay of a second rear port of the second microphone, wherein controlling of the delay includes venting the first rear port and the second rear port to a common vent cavity having a volume that is small relative to a wavelength of the acoustic signals; and

generating output signals by combining signals from the first microphone and the second microphone, the output signals include less acoustic noise than the acoustic signals.

59. The method of claim 58, wherein outputting microphone signals comprises outputting a first microphone output of the first microphone and a second microphone output of the second microphone.

60. The method of claim 58, wherein the first microphone and the second microphone sample a common pressure of the common vent cavity.

61. The method of claim 60, wherein the first microphone and the second microphone have an equivalent response to the common pressure.

62. The method of claim 58, comprising connecting the common vent cavity to an external environment.

63. The method of claim 58, comprising venting front ports of the first microphone and the second microphone to an external environment.

100

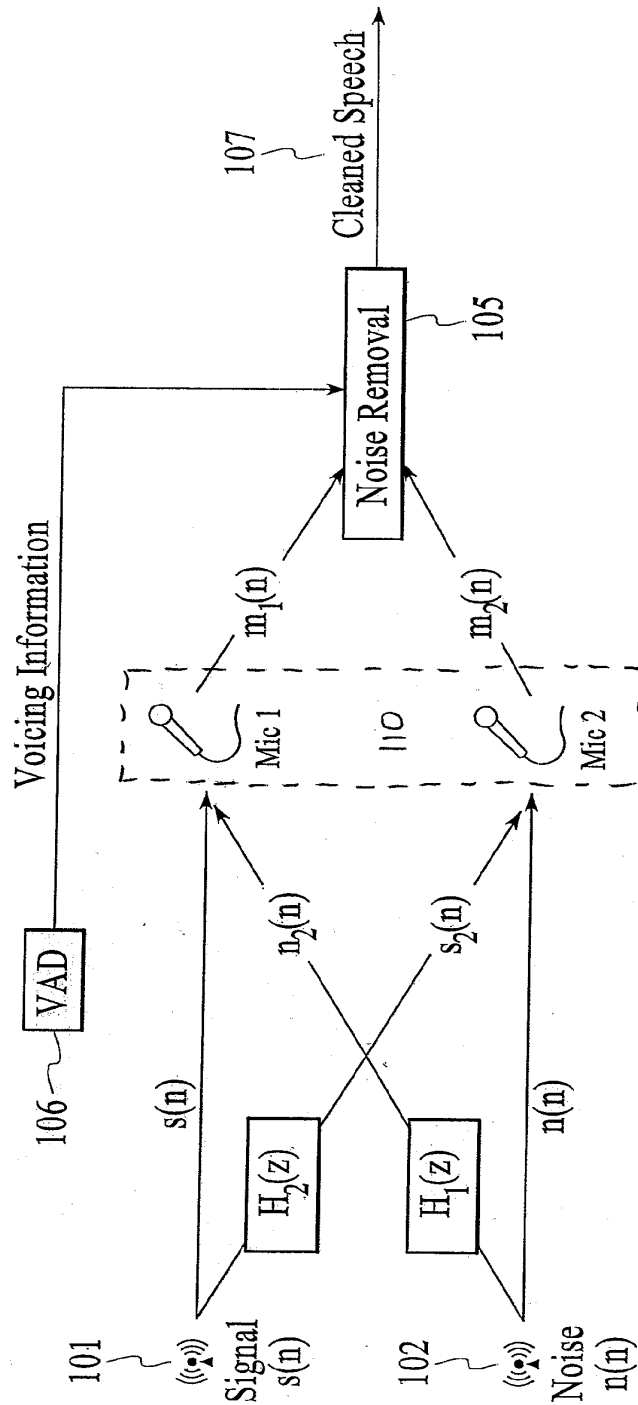


FIG.1

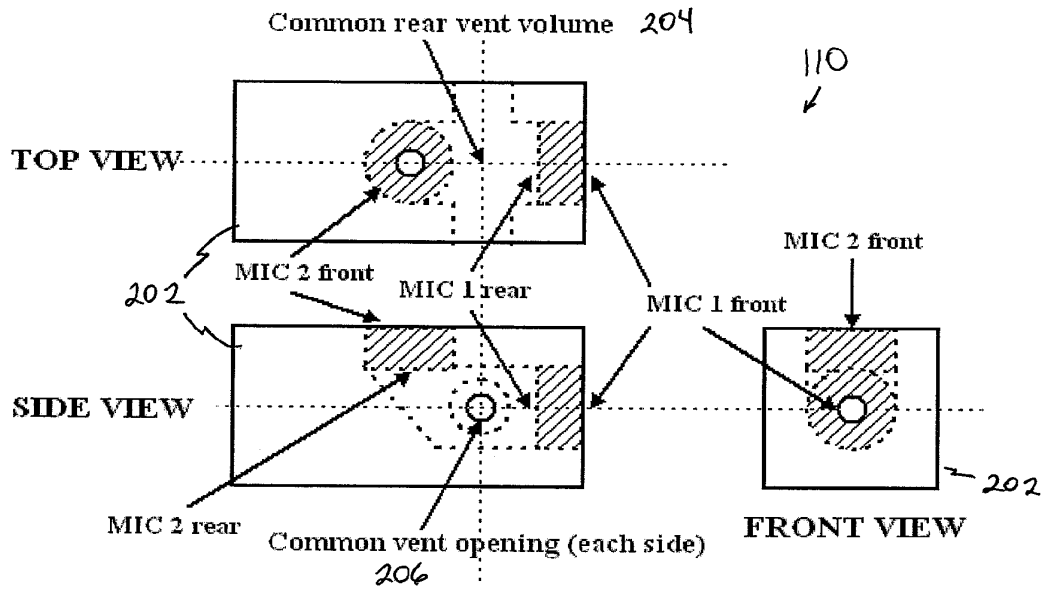


FIGURE 2

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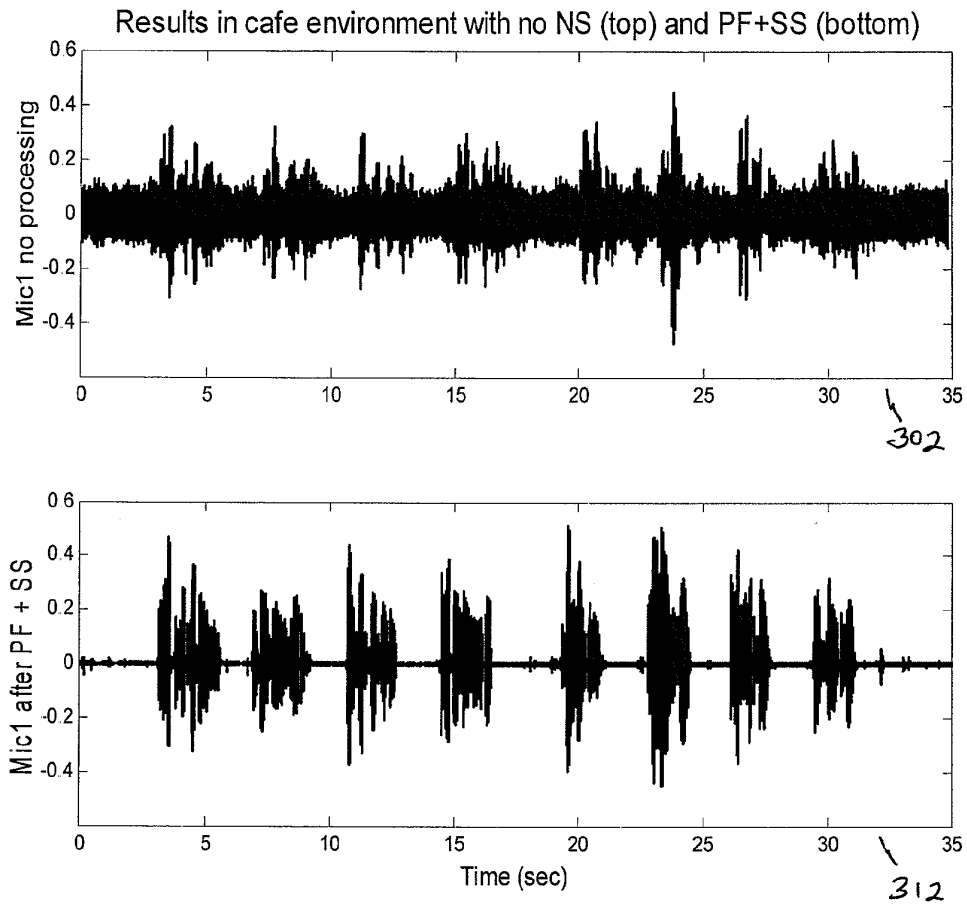


FIGURE 3

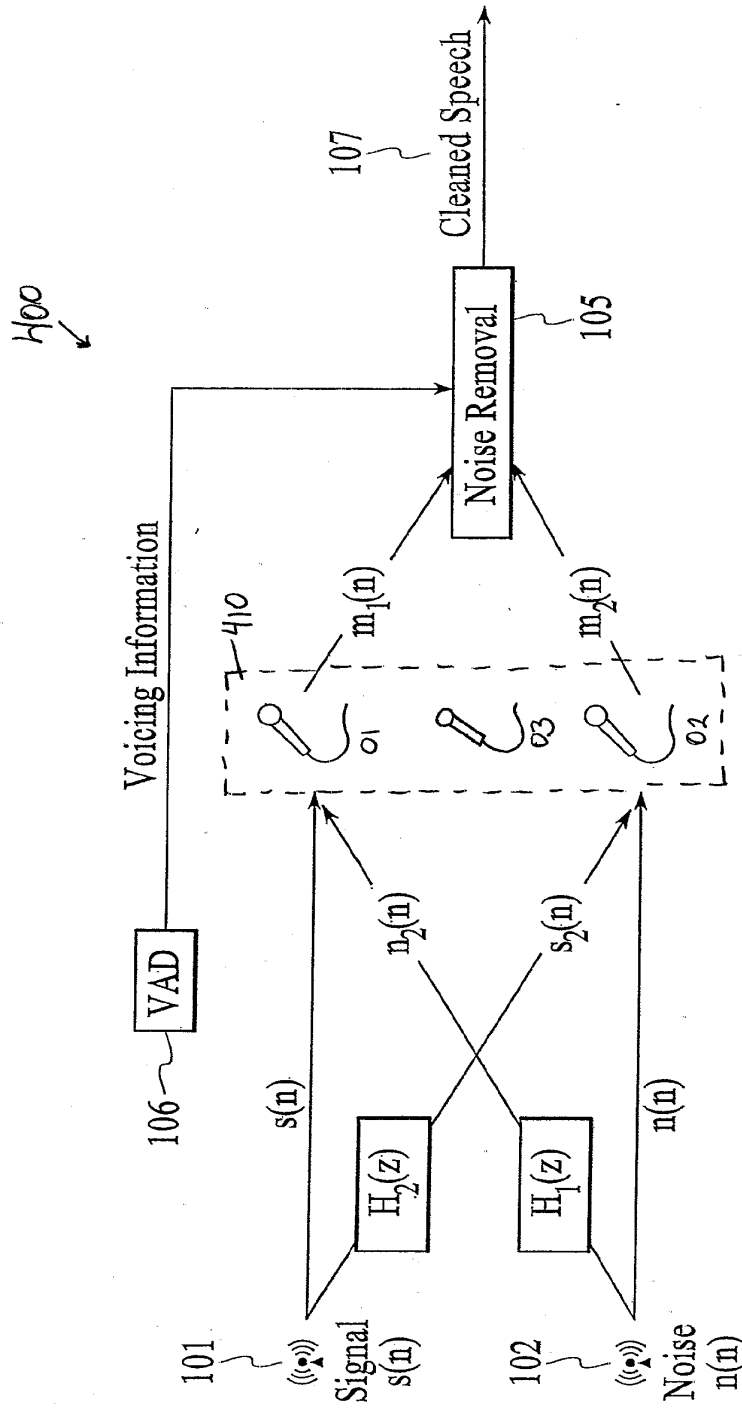


FIG. 4

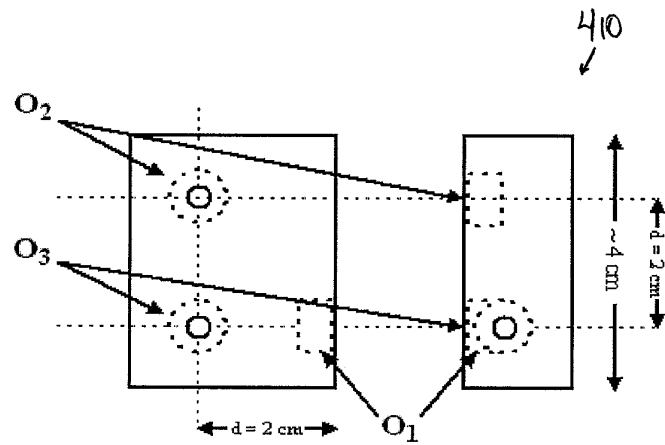


FIGURE 5



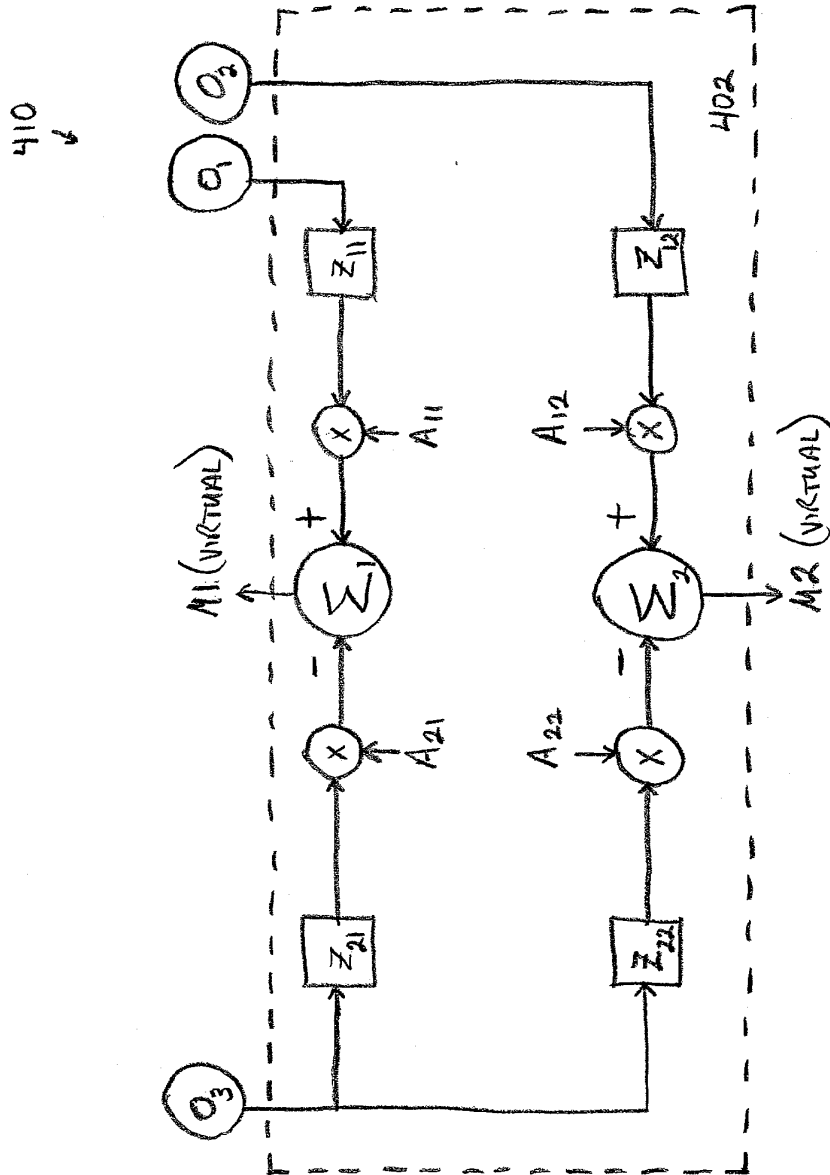


FIGURE 6

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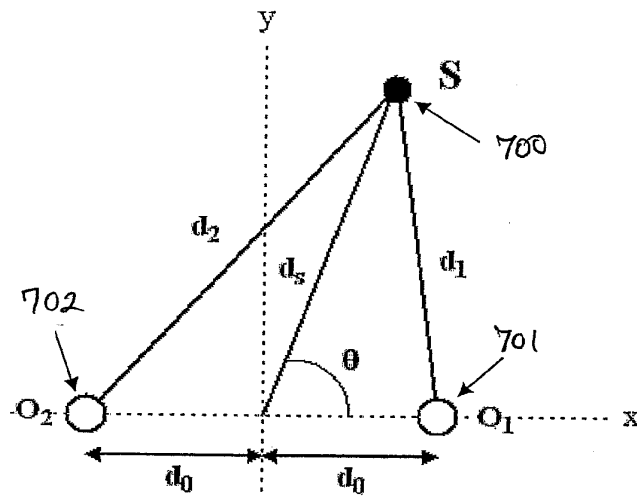


FIGURE 7

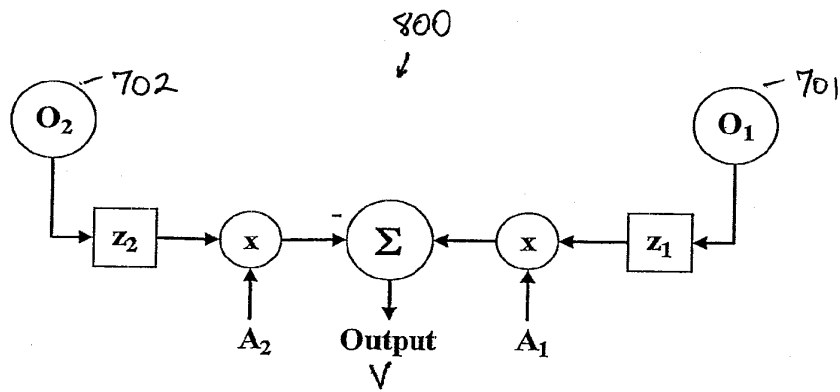


FIGURE 8

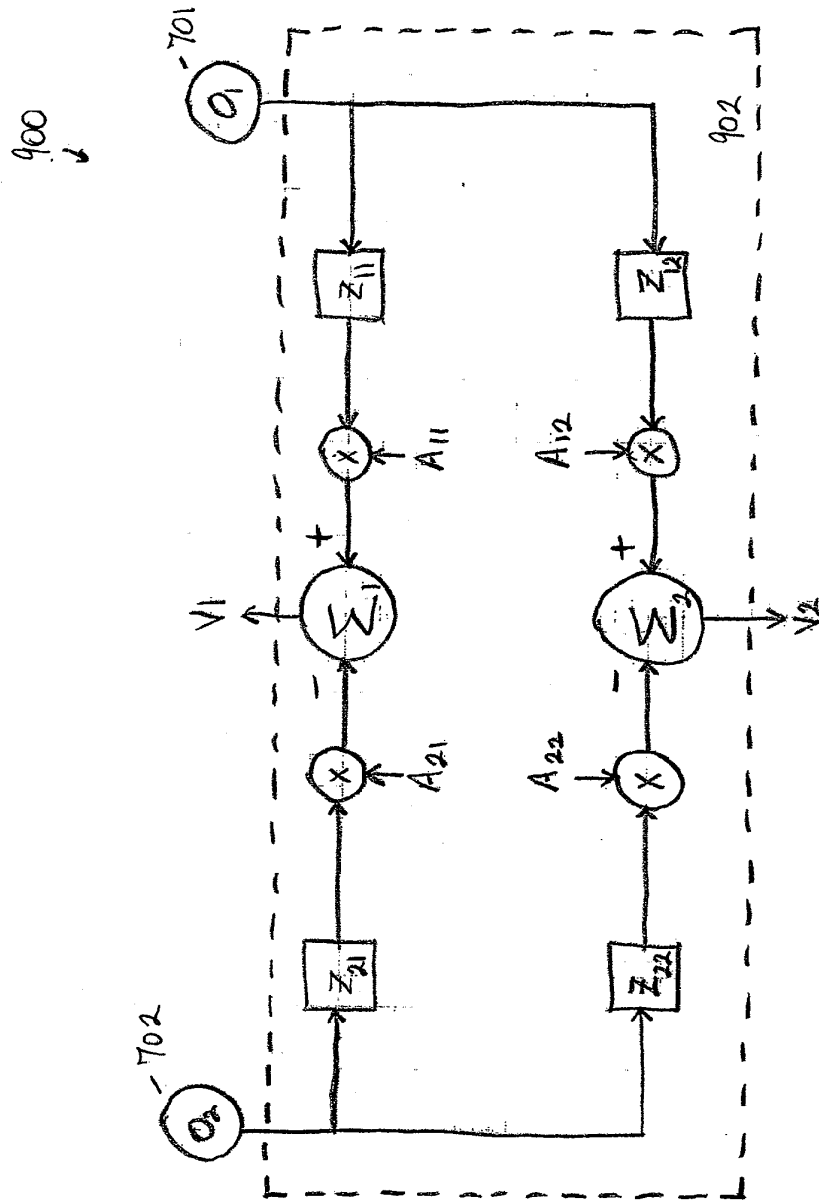


FIGURE 9

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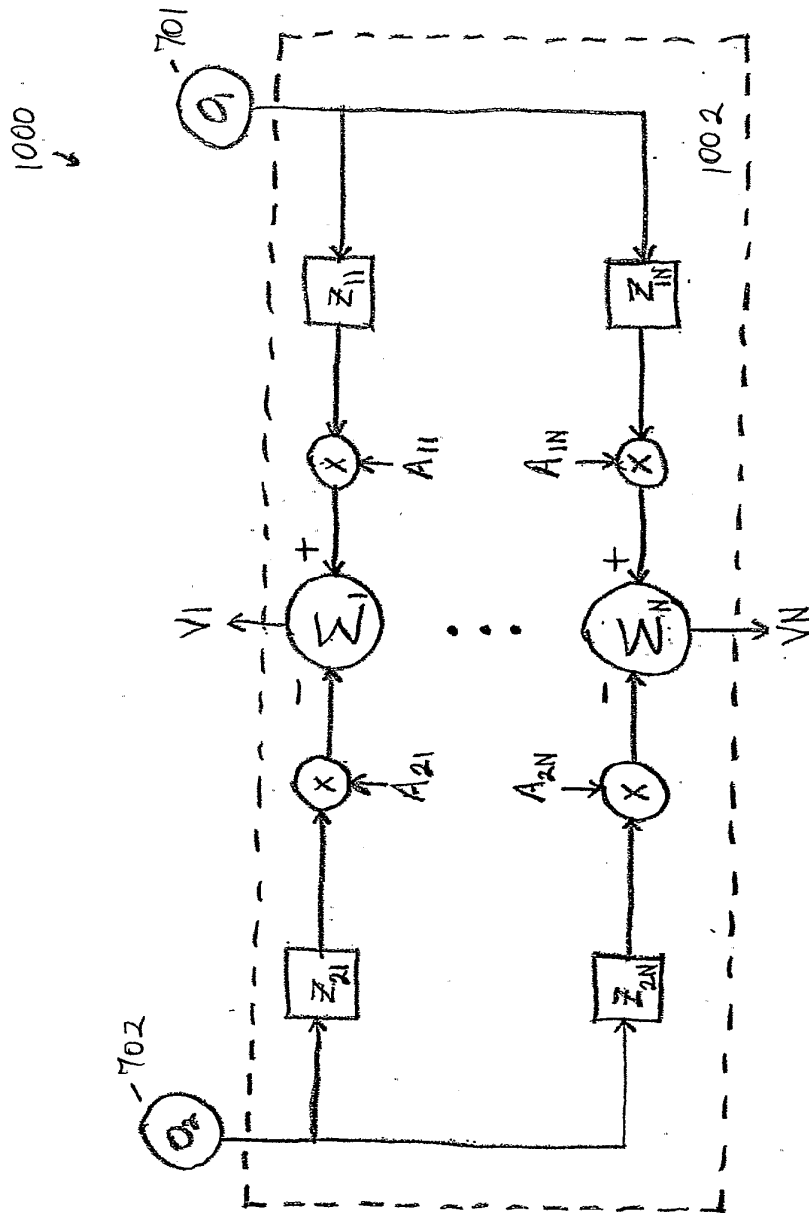


FIGURE 10

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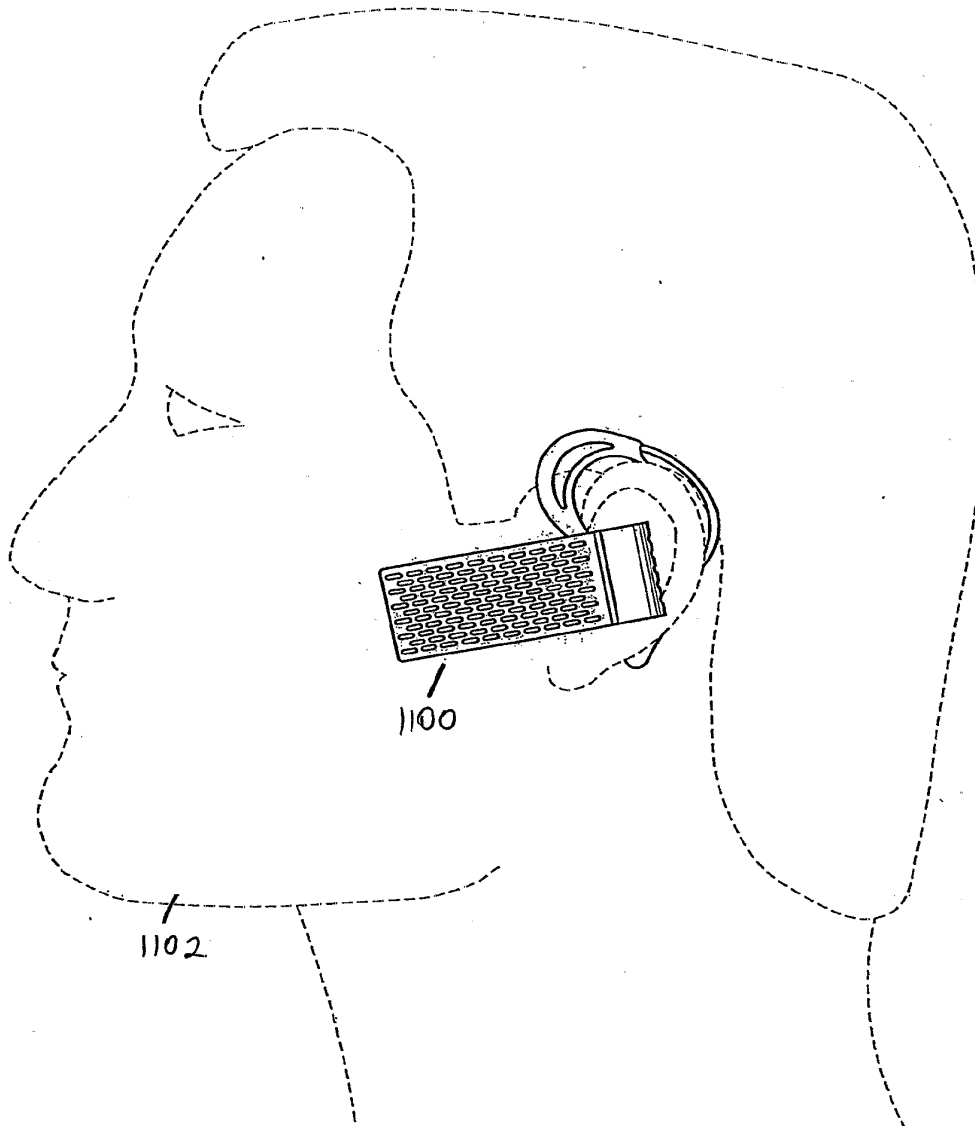


FIGURE 11

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1200

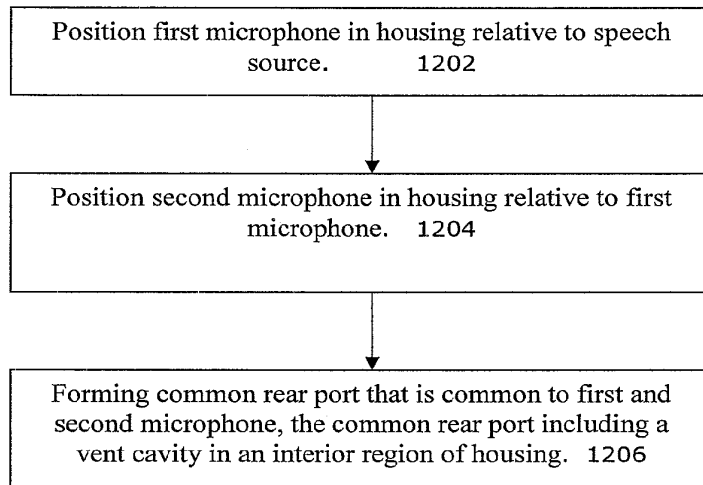


Figure 12

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1300

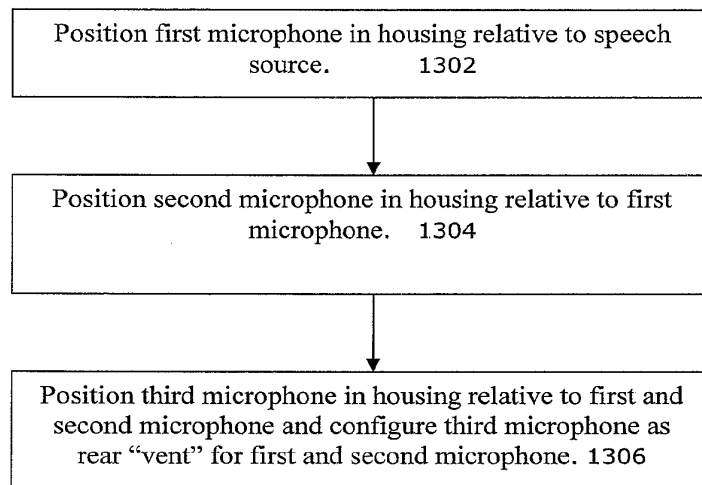


Figure 13

1400

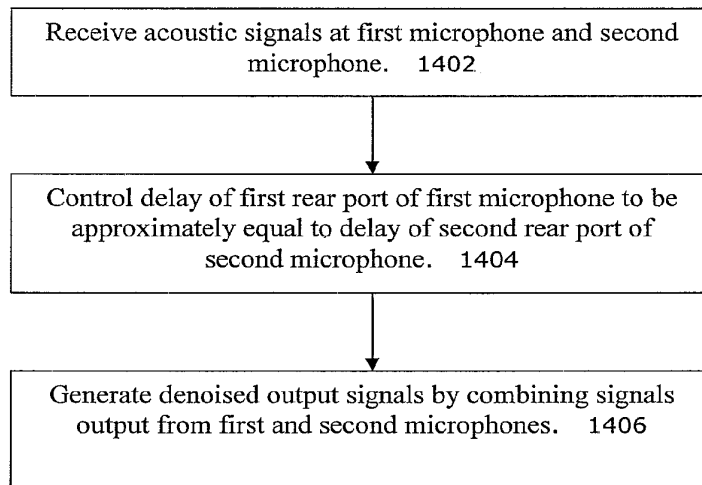


Figure 14



1500

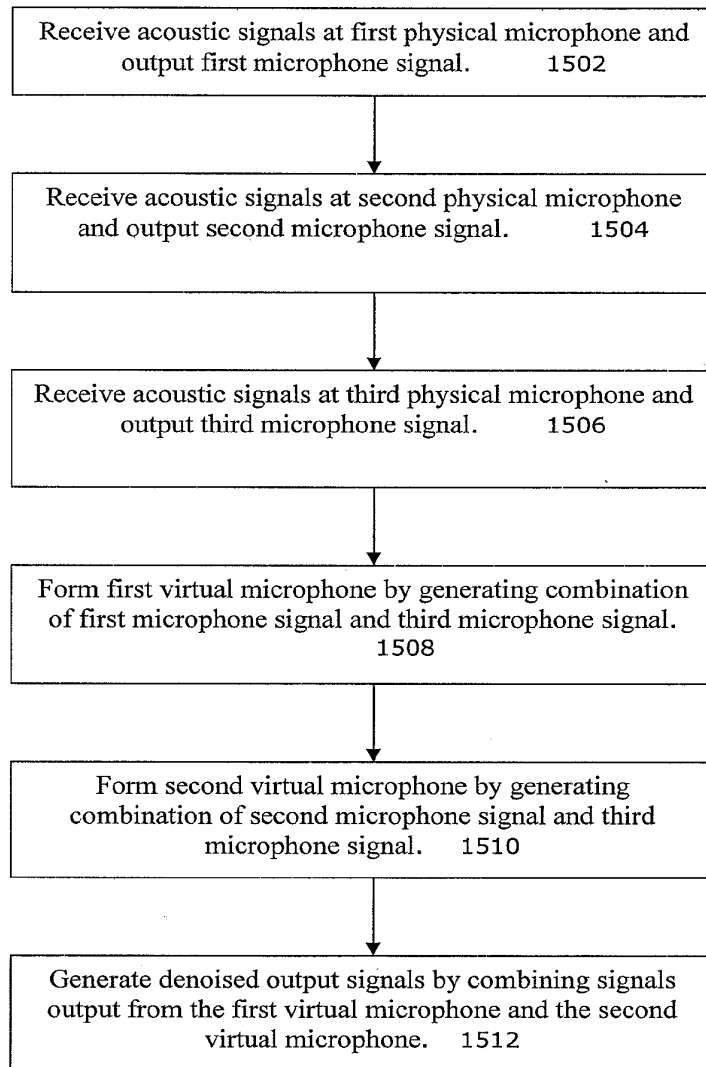


Figure 15

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2008/068634

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC(8) - H04R 25/00 (2008.04) USPC - 381/150 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC(8) - H04R 25/00 (2008.04) USPC - 381/150 Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) Micropatent, Google Advanced Patent Search		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/0110256 A1 (WATSON et al) 15 August 2002 (15.08.2002) entire document	1-63
A	US 2007/0003082 A1 (PEDERSEN) 04 January 2007 (04.01.2007) entire document	1-63
A	US 2007/0121974 A1 (NEMIROVSKI) 31 May 2007 (31.05.2007) entire document	1-63
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/>		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 27 August 2008		Date of mailing of the international search report <b>02 SEP 2008</b>
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201		Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (April 2005)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL SEARCH REPORT AND  
THE WRITTEN OPINION OF THE INTERNATIONAL  
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

To: RICHARD GREGORY  
COURTNEY STANIFORD & GREGORY LLP  
P.O. BOX 9686  
SAN JOSE, CA 95157

Date of mailing  
(day/month/year) **02 SEP 2008**

Applicant's or agent's file reference <b>ALPH.P034WO</b>	<b>FOR FURTHER ACTION</b> See paragraphs 1 and 4 below
International application No. <b>PCT/US2008/068634</b>	International filing date (day/month/year) <b>27 June 2008</b>
Applicant <b>ALIPHCOM, INC.</b>	

1.  The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.  
**Filing of amendments and statement under Article 19:**  
 The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):  
**When?** The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.  
**Where?** Directly to the International Bureau of WIPO, 34 chemin des Colombettes  
 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 740 14 35  
**For more detailed instructions, see the notes on the accompanying sheet.**
2.  The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3.  **With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:**  
 the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.  
 no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.
4. **Reminders**  
 Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.  
 The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.  
 Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.  
 In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.  
 See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer:  Blaine R. Copenhaver  Telephone No. 571-272-7774
---	---

Form PCT/ISA/220 (January 2004)

(See notes on accompanying sheet)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference ALPH.P034WO	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2008/068634	International filing date (day/month/year) 27 June 2008	(Earliest) Priority Date (day/month/year) 27 June 2007
Applicant ALIPHCOM, INC.		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- the international application in the language in which it was filed
- a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b.  With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2.  Certain claims were found unsearchable (see Box No. II)

3.  Unity of invention is lacking (see Box No. III)

4. With regard to the title,

- the text is approved as submitted by the applicant
- the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- the text is approved as submitted by the applicant
- the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
  - as suggested by the applicant
  - as selected by this Authority, because the applicant failed to suggest a figure
  - as selected by this Authority, because this figure better characterizes the invention
- b.  none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2008/068634

<p>A. CLASSIFICATION OF SUBJECT MATTER                  IPC(8) - H04R 25/00 (2008.04)                  USPC - 381/150                  According to International Patent Classification (IPC) or to both national classification and IPC</p>																												
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols)                  IPC(8) - H04R 25/00 (2008.04)                  USPC - 381/150</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)                  Micropatent, Google Advanced Patent Search</p>																												
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 2002/0110256 A1 (WATSON et al) 15 August 2002 (15.08.2002) entire document</td> <td>1-63</td> </tr> <tr> <td>A</td> <td>US 2007/0003082 A1 (PEDERSEN) 04 January 2007 (04.01.2007) entire document</td> <td>1-63</td> </tr> <tr> <td>A</td> <td>US 2007/0121974 A1 (NEMIROVSKI) 31 May 2007 (31.05.2007) entire document</td> <td>1-63</td> </tr> </tbody> </table> <p><input type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/></p> <p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</td> </tr> <tr> <td>"E" earlier application or patent but published on or after the international filing date</td> <td>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</td> </tr> <tr> <td>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</td> <td>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table> <table border="1"> <tr> <td>                 Date of the actual completion of the international search                  27 August 2008             </td> <td>                 Date of mailing of the international search report  <b>02 SEP 2008</b> </td> </tr> <tr> <td>                 Name and mailing address of the ISA/US                  Mail Stop PCT, Attn: ISA/US, Commissioner for Patents                  P.O. Box 1450, Alexandria, Virginia 22313-1450                  Facsimile No. 571-273-3201             </td> <td>                 Authorized officer:                  Blaine R. Copenheaver                  PCT Helpdesk: 571-272-4300                  PCT OSP: 571-272-7774             </td> </tr> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 2002/0110256 A1 (WATSON et al) 15 August 2002 (15.08.2002) entire document	1-63	A	US 2007/0003082 A1 (PEDERSEN) 04 January 2007 (04.01.2007) entire document	1-63	A	US 2007/0121974 A1 (NEMIROVSKI) 31 May 2007 (31.05.2007) entire document	1-63	"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention	"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone	"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art	"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family	"P" document published prior to the international filing date but later than the priority date claimed		Date of the actual completion of the international search 27 August 2008	Date of mailing of the international search report <b>02 SEP 2008</b>	Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
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## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708				
<b>Filing Date:</b>	05-Aug-2013				
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)				
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett				
<b>Filer:</b>	Scott Susumu Kokka/Yasmin Alleje				
<b>Attorney Docket Number:</b>	ALI-050ACON1				
Filed as Large Entity					
<b>Filing Fees for Utility under 35 USC 111(a)</b>					
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>	
<b>Basic Filing:</b>					
<b>Pages:</b>					
<b>Claims:</b>					
<b>Miscellaneous-Filing:</b>					
<b>Petition:</b>					
<b>Patent-Appeals-and-Interference:</b>					
<b>Post-Allowance-and-Post-Issuance:</b>					
<b>Extension-of-Time:</b>					

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Miscellaneous:</b>				
RCE- 2nd and Subsequent Request	1820	1	1700	1700
<b>Total in USD (\$)</b>				<b>1700</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	25533330
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Scott Susumu Kokka/Kate Cleland
<b>Filer Authorized By:</b>	Scott Susumu Kokka
<b>Attorney Docket Number:</b>	ALI-050ACON1
<b>Receipt Date:</b>	19-APR-2016
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	20:28:25
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$1700
RAM confirmation Number	6530
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:



<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1	Request for Continued Examination (RCE)	ALI-050ACON1_RCE_asFILED.pdf	110701 3f6d905d032b3f962a9c2d5d81a642ffc57a62f5	no	2
<b>Warnings:</b>					
This is not a USPTO supplied RCE SB30 form.					
<b>Information:</b>					
2	Transmittal Letter	ALI-050ACON1_IDS_Transmittal_asFILED.pdf	111114 f714d1f87bd9eadf79e3206302280e9abd565617	no	4
<b>Warnings:</b>					
<b>Information:</b>					
3	Information Disclosure Statement (IDS) Form (SB08)	ALI-050ACON1_sb08a_asFILED.pdf	96262 10dcb267666a379319eff79236e955e62099e021	no	8
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied IDS fillable form					
4	Foreign Reference	ALI-050ACON1_FR_1.pdf	2772107 cc202836e80b6b13649ef711834d7287b06180c3	no	71
<b>Warnings:</b>					
<b>Information:</b>					
5	Non Patent Literature	ALI-050ACON1_NPL_1.pdf	155082 3cdf168e1af0e17782ac2aace7ba7900c5b9aee	no	3
<b>Warnings:</b>					
<b>Information:</b>					
6	Fee Worksheet (SB06)	fee-info.pdf	30752 90ee9f2ddf92b3e8336f80353af41b98f8e24169	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			3276018		

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**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**



UNITED STATES PATENT AND TRADEMARK OFFICE

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United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

15516 7590 11/21/2016
Kokka & Backus, PC
1 Embarcadero Center
Suite 4150
San Francisco, CA 94111-3740

EXAMINER

PIZARRO CRESPO, MARCOS D

ART UNIT PAPER NUMBER

2814

DATE MAILED: 11/21/2016

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.

13/959,708 08/05/2013 Gregory C. Burnett ALI-050ACON1 5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE

nonprovisional UNDISCOUNTED \$960 \$0 \$0 \$960 02/21/2017

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 11/21/2016  
 Kokka & Backus, PC  
 1 Embarcadero Center  
 Suite 4150  
 San Francisco, CA 94111-3740

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	02/21/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZARRO CRESPO, MARCOS D	2814	381-092000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____</p> <p>3 _____</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

<p>4a. The following fee(s) are submitted:</p> <p><input type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
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5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____	Date _____
Typed or printed name _____	Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

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Row 1: 13/959,708, 08/05/2013, Gregory C. Burnett, ALI-050ACON1, 5622
Row 2: 15516, 7590, 11/21/2016, EXAMINER, PIZARRO CRESPO, MARCOS D
Row 3: Kokka & Backus, PC, 1 Embarcadero Center, Suite 4150, San Francisco, CA 94111-3740, ART UNIT, PAPER NUMBER, 2814

DATE MAILED: 11/21/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

<b><i>Notice Requiring Inventor's Oath or Declaration</i></b>	Application No. 13/959,708	Applicant(s) Gregory C. Burnett	
	Examiner PIZARRO CRESPO, MARCOS D	Art Unit 2814	

This notice is an attachment to the Notice of Allowability (PTOL-37), or the Notice of Allowability For A Design Application (PTOL-37D).

An inventor's oath or declaration in compliance with 37 CFR 1.63 or 1.64 executed by or with respect to each inventor has not yet been submitted.

An oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each inventor (for any inventor for which a compliant oath, declaration, or substitute statement has not yet been submitted) **MUST** be filed no later than the date on which the issue fee is paid. See 35 U.S.C. 115(f). Failure to timely comply will result in ABANDONMENT of this application.

A properly executed inventor's oath to declaration has not been received for the following inventor(s):

If applicant previously filed one or more oaths, declarations, or substitute statements, applicant may have received an informational notice regarding deficiencies therein.

The following deficiencies are noted:

**INFORMAL ACTION PROBLEMS**

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):  
**Gregory C. Burnett.**  
Applicant may submit the inventor's oath or declaration at any time before the Notice of Allowance and Fee(s) Due, PTOL-85, is mailed.

Questions relating to this Notice should be directed to the Application Assistance Unit at 571-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b> 13/959,708	<b>Applicant(s)</b> BURNETT, GREGORY C.	
	<b>Examiner</b> Marcos D. Pizarro	<b>Art Unit</b> 2814	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to the submission filed on 4/19/2016.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 2-21. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All    b)  Some    \*c)  None of the:
  1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |   |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment       |
| 2. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date <u>4/19/2016</u> | 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material                    | 7. <input type="checkbox"/> Other _____.                                  |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____.  |   |



Attorney's Docket Number: ALI-050ACON1

Filing Date: 8/5/2013

Claimed Foreign Priority Date: none

Applicant(s): Burnett

Examiner: Marcos D. Pizarro

**Detailed Action / Examiner's Comment**

This Office action responds to the submission filed on 4/19/2016.

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions. In the event the determination of the status of the application as subject to pre-AIA is incorrect, any correction of the statutory basis for a rejection, as subject to AIA instead, will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

***Terminal Disclaimer***

2. The terminal disclaimers filed on 11/2/2015 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. Patent No. 8,494,177 and any patent issued on U.S. Application No. 13/948,160 has been reviewed and is accepted.

***Reasons for Allowance***

3. Claims 2-21 are allowed.

4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably

accompany the issue fee. Such submissions should be clearly labeled "Comments on Allowance."


**Conclusion**

5. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is (571) 273-8300. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marcos D. Pizarro at (571) 272-1716 and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [Marcos.Pizarro@USPTO.gov](mailto:Marcos.Pizarro@USPTO.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on 571-272-1705. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either private PAIR or public PAIR. Status information for unpublished applications is available through private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MP/mp  
16 November 2016

/Marcos D. Pizarro/  
Primary Examiner  
Art Unit 2814

<b>Search Notes</b>  	<b>Application/Control No.</b>  13959708	<b>Applicant(s)/Patent Under Reexamination</b>  BURNETT, GREGORY C.
	<b>Examiner</b>  Marcos D. Pizarro	<b>Art Unit</b>  2814

<b>CPC- SEARCHED</b>		
Symbol	Date	Examiner
H04R 3/005, 2410/05; G10L 2021/02165, 21/0208	5/7/2014	HW
updated	10/14/2014	HW
updated	4/30/2015	HW
updated	1/13/2016	HW
H04R3 / 005	11/15/2016	MP
G10L2021 / 02165	11/15/2016	MP
G10L21 / 0208	11/15/2016	MP

<b>CPC COMBINATION SETS - SEARCHED</b>		
Symbol	Date	Examiner

<b>US CLASSIFICATION SEARCHED</b>			
Class	Subclass	Date	Examiner
381	92, 94.7	5/7/2014	HW
704	233	5/7/2014	HW
all upadted	all upadted	10/14/2014	HW
381	92, 94.7	11/15/2016	MP
704	233	11/15/2016	MP

<b>SEARCH NOTES</b>		
Search Notes	Date	Examiner
Searches form 12/139,333 and 13/948,160	5/7/2014	HW
H04R3 / 005	11/15/2016	MP
G10L2021 / 02165	11/15/2016	MP
G10L21 / 0208	11/15/2016	MP
381/ 92, 94.7	11/15/2016	MP
704 / 233	11/15/2016	MP
PGPub text search. See interference search printout.	11/15/2016	MP

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**INTERFERENCE SEARCH**

<b>US Class/ CPC Symbol</b>	<b>US Subclass / CPC Group</b>	<b>Date</b>	<b>Examiner</b>
all	all (see printout)	1/13/2016	HW
H04R3	005	11/15/2016	MP
G10L2021	02165	11/15/2016	MP
G10L21	0208	11/15/2016	MP
381	92, 94.7	11/15/2016	MP
704	233	11/15/2016	MP

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**EAST Search History**

**EAST Search History (Interference)**

<b>Ref #</b>	<b>Hits</b>	<b>Search Query</b>	<b>DBs</b>	<b>Default Operator</b>	<b>Plurals</b>	<b>Time Stamp</b>
L1	40	burnett.in. and (virtual adj microphone)	US-PGPUB	OR	ON	2016/11/15 16:05
L2	61	(virtual adj microphone).clm.	US-PGPUB	OR	ON	2016/11/15 16:06

**11/ 15/ 2016 4:07:56 PM**

**C:\ Users\ mpizarro\ Documents\ EAST\ Workspaces\ % 13959708 (interference search).wsp**

<b>Index of Claims</b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> Marcos D. Pizarro	<b>Art Unit</b> 2814

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

Claims renumbered in the same order as presented by applicant
  CPA
  T.D.
  R.1.47

CLAIM		DATE									
Final	Original	05/08/2014	10/14/2014	04/30/2015	01/13/2016	11/15/2016					
	1	✓	-	-	-	-					
7	2		✓	✓	=	=					
8	3		✓	✓	=	=					
9	4		✓	✓	=	=					
14	5		✓	✓	=	=					
15	6		✓	✓	=	=					
16	7		✓	✓	=	=					
10	8		✓	✓	=	=					
11	9		✓	✓	=	=					
17	10		✓	✓	=	=					
18	11		✓	✓	=	=					
19	12		✓	✓	=	=					
20	13		✓	✓	=	=					
12	14		✓	✓	=	=					
13	15		✓	✓	=	=					
1	16		✓	✓	=	=					
2	17		✓	✓	=	=					
3	18		✓	✓	=	=					
4	19		✓	✓	=	=					
5	20		✓	✓	=	=					
6	21		✓	✓	=	=					



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BIB DATA SHEET

CONFIRMATION NO. 5622

<b>SERIAL NUMBER</b> 13/959,708	<b>FILING or 371(c) DATE</b> 08/05/2013 <b>RULE</b>	<b>CLASS</b> 381	<b>GROUP ART UNIT</b> 2814	<b>ATTORNEY DOCKET NO.</b> ALI-050ACON1	
<b>APPLICANTS</b> AliphCom, San Francisco, CA <b>INVENTORS</b> Gregory C. Burnett, Dodge Center, MN; <b>** CONTINUING DATA *****</b> This application is a CON of 12/139,333 06/13/2008 PAT 8503691 which claims benefit of 60/934,551 06/13/2007 and claims benefit of 60/953,444 08/01/2007 and claims benefit of 60/954,712 08/08/2007 and claims benefit of 61/045,377 04/16/2008 <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 08/20/2013					
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and /MARCOS D PIZARRO/ Acknowledged _____ Examiner's Signature	<input type="checkbox"/> Met after Allowance _____ Initials	<b>STATE OR COUNTRY</b> MN	<b>SHEETS DRAWINGS</b> 17	<b>TOTAL CLAIMS</b> 1	<b>INDEPENDENT CLAIMS</b> 1
<b>ADDRESS</b> Kokka & Backus, PC 1 Embarcadero Center Suite 4150 San Francisco, CA 94111-3740 UNITED STATES					
<b>TITLE</b> FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)					
<b>FILING FEE RECEIVED</b> 1740	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

#21 IDS

Doc code: IDS Receipt date: 04/19/2016

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)

Approved for use through 07/31/2016. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	13959708
	Filing Date	2008-06-13
	First Named Inventor	Gregory C. Burnett
	Art Unit	2814
	Examiner Name	WEISS, Howard
	Attorney Docket Number	ALI-050ACON1

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code <sup>1</sup>	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	7386135		2008-06-10	Fan	
	2	5473701		1995-12-05	Cezanne et al.	
	3	5664014		1997-09-02	Yamaguchi et al.	
	4	5815582		1998-09-29	Claybaugh et al.	
	5	5208864		1993-05-04	Kaneda, Yutaka	
	6	5276765		1994-01-04	Freeman et al.	
	7	5907624		1999-05-25	Takada, Masashi	
	8	5590241		1996-12-31	Park et al.	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./



<p>Receipt date: 04/19/2016</p> <p><b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)</p>	Application Number		13959708	
	Filing Date		2008-06-13	
	First Named Inventor	Gregory C. Burnett		
	Art Unit	2814		
	Examiner Name	WEISS, Howard		
	Attorney Docket Number	ALI-050ACON1		

9	6233551		2001-05-15	Cho et al.	
10	4653102		1987-03-24	Hansen, Per K.	
11	5664052		1997-09-02	Nishiguchi et al.	
12	6006175		1999-12-21	Holzrichter, John F.	
13	4777649		1988-10-11	Carlson et al.	
14	5825897		1998-10-20	Andrea et al.	
15	5633935		1997-05-27	Kanamori et al.	
16	5754665		1998-05-19	Hosoi, Yoshiaki	
17	5406622		1995-04-11	Silverberg et al.	
18	5463694		1995-10-31	Bradely et al.	
19	6707910		2004-03-16	Valve et al.	

<p>Receipt date: 04/19/2016</p> <p><b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)</p>	Application Number		13959708	
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	Art Unit		2814	
	Examiner Name		WEISS, Howard	
	Attorney Docket Number		ALI-050ACON1	

20	5473702		1995-12-05	Yoshida et al.	
21	5517435		1996-05-14	Sugiyama, Akihiko	
22	5729694		1998-03-17	Holzrichter et al.	
23	9099094		2015-08-04	Burnett, Gregory C.	
24	5625684		1987-04-29	Matouk et al.	
25	7206418		2007-04-17	Yang et al.	
26	6963649		2005-11-08	Vaudrey et al.	
27	5353376		1994-10-04	Oh et al.	
28	6795713		2004-09-21	Housni, Jamal	
29	6980092		2005-12-27	Turnbull et al.	

If you wish to add additional U.S. Patent citation information please click the Add button.

**U.S.PATENT APPLICATION PUBLICATIONS**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./

<p>Receipt date: 04/19/2016</p> <p><b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)</p>	Application Number		13959708	
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	First Named Inventor	Gregory C. Burnett		
	Art Unit	2814		
	Examiner Name	WEISS, Howard		
	Attorney Docket Number	ALI-050ACON1		

Examiner Initial*	Cite No	Publication Number	Kind Code <sup>1</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20020110256	A1	2002-08-15	Watson et al.	
	2	20070003082	A1	2007-01-04	Pedersen	
	3	20070121974	A1	2007-05-31	Nemirovski	
	4	20020116187	A1	2002-08-22	Erte, Gamze	
	5	20090010450	A1	2009-01-08	Burnett, Gregory C	
	6	20030228023	A1	2003-12-11	Burnett et al.	
	7	20030044025	A1	2003-03-06	Ouyang et al.	

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**FOREIGN PATENT DOCUMENTS**

Examiner Initial*	Cite No	Foreign Document Number <sup>3</sup>	Country Code <sup>2</sup>	Kind Code <sup>4</sup>	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T <sup>5</sup>
	1	2009003180	WO		2008-12-31	Burnett, Gregory C.		<input type="checkbox"/>

If you wish to add additional Foreign Patent Document citation information please click the Add button

<p>Receipt date: 04/19/2016</p> <p><b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)</p>	Application Number		13959708
	Filing Date		2008-06-13
	First Named Inventor	Gregory C. Burnett	
	Art Unit	2814	
	Examiner Name	WEISS, Howard	
	Attorney Docket Number	ALI-050ACON1	

NON-PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>5</sup>
	1	WEISS, Howard; Office Action mailed by U.S. Patent and Trademark Office on April 10, 2012 for U.S. Patent Application No. 12/139,333.	<input type="checkbox"/>
	2	WEISS, Howard; Office Action mailed by U.S. Patent and Trademark Office on July 14, 2011 for U.S. Patent Application No. 12/139,333.	<input type="checkbox"/>
	3	COPENHEAVER, Blaine R; International Searching Authority; Notification of Transmittal of the International Search Report and Written Opinion of the International Searching Authority of the Declaration for International Patent Application No. PCT/US2008/068634, mailed September 2, 2008.	<input type="checkbox"/>
	4	TRAN, Long K.; Office Action mailed by U.S. Patent and Trademark Office on August 10, 2011 for U.S. Patent Application No. 12/163,592.	<input type="checkbox"/>
	5	SHAH, Paras D.; Office Action mailed by U.S. Patent and Trademark Office on November 16, 2011 for U.S. Patent Application No. 11/805, 987..	<input type="checkbox"/>
	6	SHAH, Paras D.; Office Action mailed by U.S. Patent and Trademark Office on January 16, 2009 for U.S. Patent Application No. 11/805,987.	<input type="checkbox"/>
	7	AZAD, Abul K.; Office Action mailed by U.S. Patent and Trademark Office on February 6, 2008 for U.S. Patent Application No. 11/805,987.	<input type="checkbox"/>
	8	SHAH, Paras D.; Office Action mailed by U.S. Patent and Trademark Office on October 10, 2006 for U.S. Patent Application No. 10/159,770.	<input type="checkbox"/>
	9	SHAH, Paras D.; Office Action mailed by U.S. Patent and Trademark Office on December 15, 2005 for U.S. Patent Application No. 10/159,770.	<input type="checkbox"/>

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./

<p>Receipt date: 04/19/2016</p> <p><b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)</p>	Application Number	13959708
	Filing Date	2008-06-13
	First Named Inventor	Gregory C. Burnett
	Art Unit	2814
	Examiner Name	WEISS, Howard
	Attorney Docket Number	ALI-050ACON1

10	TRAN, Long K.; Office Action mailed by U.S. Patent and Trademark Office on July 31, 2013 for U.S. Patent Application No. 13/436,765.	<input type="checkbox"/>
11	LAO, Lun S.; Office Action mailed by U.S. Patent and Trademark Office on August 30, 2010 for U.S. Patent Application No. 10/667,207.	<input type="checkbox"/>
12	LAO, Lun S.; Office Action mailed by U.S. Patent and Trademark Office on December 24, 2009 for U.S. Patent Application No. 10/667,207.	<input type="checkbox"/>
13	LAO, Lun S.; Office Action mailed by U.S. Patent and Trademark Office on March 11, 2009 for U.S. Patent Application No. 10/667,207.	<input type="checkbox"/>
14	LAO, Lun S.; Office Action mailed by U.S. Patent and Trademark Office on July 9, 2008 for U.S. Patent Application No. 10/667,207.	<input type="checkbox"/>
15	LAO, Lun S.; Office Action mailed by U.S. Patent and Trademark Office on February 9, 2007 for U.S. Patent Application No. 10/667,207.	<input type="checkbox"/>
16	TRAN, Long K.; Office Action mailed by U.S. Patent and Trademark Office on March 3, 2016 for U.S. Patent Application No. 14/224,868.	<input type="checkbox"/>
17	TRAN, Long K.; Office Action mailed by U.S. Patent and Trademark Office on August 7, 2015 for U.S. Patent Application No. 14/224,868.	<input type="checkbox"/>
18	TRAN, Long K.; Office Action mailed by U.S. Patent and Trademark Office on December 21, 2014 for U.S. Patent Application No. 14/224,868.	<input type="checkbox"/>
19	FAULK, Devona E.; Office Action mailed by U.S. Patent and Trademark Office on March 3, 2016 for U.S. Patent Application No. 10/400,282.	<input type="checkbox"/>
20	FAULK, Devona E.; Office Action mailed by U.S. Patent and Trademark Office on June 23, 2011 for U.S. Patent Application No. 10/400,282.	<input type="checkbox"/>

Receipt date: 04/19/2016  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number		13959708
	Filing Date		2008-06-13
	First Named Inventor	Gregory C. Burnett	
	Art Unit	2814	
	Examiner Name	WEISS, Howard	
	Attorney Docket Number	ALI-050ACON1	

21	FAULK, Devona E.; Office Action mailed by U.S. Patent and Trademark Office on August 17, 2010 for U.S. Patent Application No. 10/400,282.	<input type="checkbox"/>
22	FAULK, Devona E.; Office Action mailed by U.S. Patent and Trademark Office on December 9, 2009 for U.S. Patent Application No. 10/400,282.	<input type="checkbox"/>
23	FAULK, Devona E.; Office Action mailed by U.S. Patent and Trademark Office on March 16, 2009 for U.S. Patent Application No. 10/400,282.	<input type="checkbox"/>
24	FAULK, Devona E.; Office Action mailed by U.S. Patent and Trademark Office on August 18, 2008 for U.S. Patent Application No. 10/400,282.	<input type="checkbox"/>

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**EXAMINER SIGNATURE**

Examiner Signature	/Marcos Pizarro Crespo/	Date Considered	11/15/2016
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> See Kind Codes of USPTO Patent Documents at [www.USPTO.GOV](http://www.USPTO.GOV) or MPEP 901.04. <sup>2</sup> Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>3</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>4</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. <sup>5</sup> Applicant is to place a check mark here if English language translation is attached.


ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.P./

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.	
	<b>Examiner</b> Marcos D. Pizarro	<b>Art Unit</b> 2814	

CPC					
Symbol				Type	Version
H04R	1		1091	F	2013-01-01
G10L	21		0208	I	2013-01-01
G10L	2021		02165	A	2013-01-01
H04R	1		406	I	2013-01-01
H04R	3		005	I	2013-01-01
H04R	3		04	I	2013-01-01
H04R	3		002	I	2013-01-01
H04R	2460		01	A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version


NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20	
/Marcos D. Pizarro/ Primary Examiner. Art Unit 2814	11/15/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> Marcos D. Pizarro	<b>Art Unit</b> 2814

US ORIGINAL CLASSIFICATION				INTERNATIONAL CLASSIFICATION									
CLASS		SUBCLASS		CLAIMED				NON-CLAIMED					
381		92		H	0	4	R	3 / 00 (2006.01.01)					
<b>CROSS REFERENCE(S)</b>													
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)												
381	94.7												
704	233												

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20	
/Marcos D. Pizarro/ Primary Examiner. Art Unit 2814	11/15/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5



<b>Issue Classification</b> 	<b>Application/Control No.</b> 13959708	<b>Applicant(s)/Patent Under Reexamination</b> BURNETT, GREGORY C.
	<b>Examiner</b> Marcos D. Pizarro	<b>Art Unit</b> 2814

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant		<input type="checkbox"/> CPA		<input checked="" type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47									
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
7	2	3	18												
8	3	4	19												
9	4	5	20												
14	5	6	21												
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18	11														
19	12														
20	13														
12	14														
13	15														
1	16														
2	17														

NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20	
/Marcos D. Pizarro/ Primary Examiner. Art Unit 2814	11/15/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5



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www.uspto.gov

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/959,708 08/05/2013 Gregory C. Burnett ALI-050ACON1 5622
EXAMINER: PIZARRO CRESPO, MARCOS D
ART UNIT: 2814
PAPER NUMBER:
NOTIFICATION DATE: 03/10/2017 DELIVERY MODE: ELECTRONIC

Notice of Abandonment

This application is abandoned in view of:

- 1. [ ] The applicant's failure to timely file a proper reply to the Office letter mailed on \_\_\_\_\_.
(a) [ ] A reply was received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission date \_\_\_\_\_), which is after the expiration of the period for reply (including a total extension of \_\_\_\_ month(s)) which expired on \_\_\_\_\_.
(b) [ ] No reply has been received.
2. [X] Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
(a) [ ] The issue fee and publication fee, if applicable, was received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission date \_\_\_\_\_), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
(b) [ ] The submitted fee of \$\_\_\_\_\_ is insufficient. A balance of \$\_\_\_\_\_ is due.
The issue fee required by 37 CFR 1.18 is \$\_\_\_\_\_.
The publication fee, if required by 37 CFR 1.18(d), is \$\_\_\_\_\_.
(c) [X] The issue fee and publication fee, if applicable, has not been received.
3. [ ] Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
(a) [ ] Proposed corrected drawings were received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission dated \_\_\_\_\_), which is after the expiration of the period for reply.
(b) [ ] No corrected drawing have been received.
4. [X] Applicant's failure to timely file the inventor's oath or declaration no later than the date on which the issue fee was paid as required by the Notice Requiring Inventor's Oath or Declaration (PTO-2306).
(a) [ ] An inventor's oath or declaration was received on \_\_\_\_\_ (with a Certificate of Mailing or Transmission date \_\_\_\_\_), which is after the date on which the issue fee was paid.
(b) [ ] While an oath or declaration (or substitute statement) for one or more inventors was received, an oath or declaration (or substitute statement) for at least one other inventor has not been received.
(c) [X] No inventor's oath or declaration has been received.
5. [ ] Drawings received on \_\_\_\_\_ were disapproved by examiner. See examiner's response dated \_\_\_\_\_.
6. [ ] Corrected drawings were received on \_\_\_\_\_, which is after the expiration of the one-month period for reply set in examiner's response dated \_\_\_\_\_.
7. [ ] No corrected drawings have been received in reply to one-month period set in examiner's response dated \_\_\_\_\_.
8. [ ] The reason(s) below:

Petitions to revive under 37 CFR 1.137(a) or (b), or request to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.

Brandi Zylly for
(571)-272-4200 or 1(888)-786-0101
Patent Publication Branch
Office of Data Management

FORM PTO-ABN0 (Rev. 06/09)

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 11/21/2016  
 Kokka & Backus, PC  
 1 Embarcadero Center  
 Suite 4150  
 San Francisco, CA 94111-3740

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	02/21/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZARRO CRESPO, MARCOS D	2814	381-092000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____</p> <p>3 _____</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

<p>4a. The following fee(s) are submitted:</p> <p><input checked="" type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
--	--

5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /MAULIN SHAH/ Date 01/30/2019

Typed or printed name MAULIN SHAH Registration No. 56,587

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION</b> <b>(37 CFR 1.63)</b>  <input type="checkbox"/> Declaration Submitted With Initial Filing      OR <input checked="" type="checkbox"/> Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)	Attorney Docket Number	JAL-050ACONI
	First Named Inventor	Gregory C. Burnett
	COMPLETE IF KNOWN	
	Application Number	13/959,708
	Filing Date	08-05-2013
	Art Unit	2814
Examiner Name	MARCOS D PIZARRO CRESPO	

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

*(Title of the Invention)*

the specification of which

is attached hereto

OR

was filed on (MM/DD/YYYY)  as United States Application Number or PCT International

Application Number  and was amended on (MM/DD/YYYY)  (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				Yes	No
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

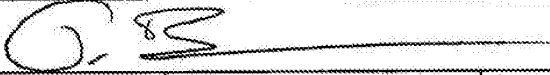
Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

[Page 1 of 2]

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

**DECLARATION — Utility or Design Patent Application**

Direct all correspondence to: <input type="checkbox"/> Customer Number: <input style="width: 100px;" type="text"/>				OR		<input checked="" type="checkbox"/> Correspondence address below	
<b>Name</b> Shemwell Gregory & Courtney LLP							
<b>Address</b> 4880 Stevens Creek Blvd., Suite 201							
<b>City</b> San Jose			<b>State</b> CA		<b>ZIP</b> 95129		
<b>Country</b> US		<b>Telephone</b> 408-236-6647		<b>Fax</b> 408-236-6641			
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.							
<b>NAME OF SOLE OR FIRST INVENTOR:</b>				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
<b>Given Name</b> (first and middle [if any]) GREGORY C.				<b>Family Name</b> or Surname BURNETT			
<b>Inventor's Signature</b> 						<b>Date</b> 12/2/2013	
<b>Residence: City</b> Dodge Center		<b>State</b> Minnesota		<b>Country</b> US		<b>Citizenship</b> US	
<b>Mailing Address</b> 62568 174th Avenue							
<b>City</b> Dodge Center		<b>State</b> Minnesota		<b>ZIP</b> 55927		<b>Country</b> US	
<b>NAME OF SECOND INVENTOR:</b>				<input type="checkbox"/> A petition has been filed for this unsigned inventor			
<b>Given Name</b> (first and middle [if any])				<b>Family Name</b> or Surname			
<b>Inventor's Signature</b>						<b>Date</b>	
<b>Residence: City</b> Dublin		<b>State</b> California		<b>Country</b> US		<b>Citizenship</b> US	
<b>Mailing Address</b> 11526 Streambed Place							
<b>City</b> Dublin		<b>State</b> California		<b>ZIP</b> 94568		<b>Country</b> US	
<input type="checkbox"/> Additional inventors or a legal representative are being named on the supplemental sheet(s) PTO/SB/02A or 02LR attached hereto.							

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708				
<b>Filing Date:</b>	05-Aug-2013				
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)				
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett				
<b>Filer:</b>	Maulin Shah				
<b>Attorney Docket Number:</b>	JAL-050ACON1				
Filed as Small Entity					
<b>Filing Fees for Utility under 35 USC 111(a)</b>					
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>	
<b>Basic Filing:</b>					
<b>Pages:</b>					
<b>Claims:</b>					
<b>Miscellaneous-Filing:</b>					
LATE FILING FEE FOR OATH OR DECLARATION	2051	1	80	80	
<b>Petition:</b>					
<b>Patent-Appeals-and-Interference:</b>					
<b>Post-Allowance-and-Post-Issuance:</b>					

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
UTILITY APPL ISSUE FEE	2501	1	480	480
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>560</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	35005529
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Maulin Shah
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	JAL-050ACON1
<b>Receipt Date:</b>	30-JAN-2019
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	13:32:43
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$560
RAM confirmation Number	013019INTEFSW13330900
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:



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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	13959708_NOA.pdf	55275	no	1
			7fd85de248a06bcc73fc7fdaaa9a87dfee03938b		

**Warnings:**

**Information:**

2	Oath or Declaration filed	13959708_Oath.pdf	548839	no	2
			08115e7b9361564b5f69efa55e8ec1b10ca5933e		

**Warnings:**

**Information:**

3	Fee Worksheet (SB06)	fee-info.pdf	32214	no	2
			57814548e0e96cc2699c343fa254d4027339166		

**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	636328
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**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Electronic Petition Request	PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)
Application Number	13959708
Filing Date	05-Aug-2013
First Named Inventor	Gregory Burnett
Art Unit	2814
Examiner Name	MARCOS PIZARRO CRESPO
Attorney Docket Number	JAL-050ACON1
Title	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

The above-identified application became abandoned for failure to file a timely and proper reply to a notice or action by the United States Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the office notice or action plus any extensions of time actually obtained.

**APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION**

NOTE: A grantable petition requires the following items:

- (1) Petition fee;
- (2) Reply and/or issue fee;
- (3) Terminal disclaimer with disclaimer fee – required for all utility and plant applications filed before June 8, 1995; and for all design applications;
- (4) Statement that the entire delay was unintentional.

**Petition Fee**

- |   |
|---|
| <input checked="" type="radio"/> Small Entity |
| <input type="radio"/> Micro Entity            |
| <input type="radio"/> Regular Undiscounted    |

**Issue Fee and Publication Fee :**

Issue Fee and Publication Fee are not due.

- Issue Fee Transmittal is attached

**Drawing corrections and/ or other deficiencies.**

- Drawing corrections and/ or other deficiencies are not required
- I certify, in accordance with 37 CFR 1.4(d)(4), that drawing corrections and/ or other deficiencies have previously been filed on
- Drawing corrections and/ or other deficiencies are attached.

STATEMENT: The entire delay in filing the required reply from the due date for the required reply until the filing of a  grantable petition under 37 CFR 1.137(a) was unintentional.

THIS PORTION MUST BE COMPLETED BY THE SIGNATORY OR SIGNATORIES

I certify, in accordance with 37 CFR 1.4(d)(4) that I am:

- An attorney or agent registered to practice before the Patent and Trademark Office who has been given power of attorney in this application.
- An attorney or agent registered to practice before the Patent and Trademark Office, acting in a representative capacity.
- A sole inventor
- A joint inventor; I certify that I am authorized to sign this submission on behalf of all of the inventors as evidenced by the power of attorney in the application
- A joint inventor; all of whom are signing this e-petition.

Signature	/Maulin Shah/
Name	Maulin Shah
Registration Number	56587

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
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 Alexandria, Virginia 22313-1450  
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**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 11/21/2016  
 Kokka & Backus, PC  
 1 Embarcadero Center  
 Suite 4150  
 San Francisco, CA 94111-3740

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	02/21/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZARRO CRESPO, MARCOS D	2814	381-092000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____</p> <p>3 _____</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

<p>4a. The following fee(s) are submitted:</p> <p><input checked="" type="checkbox"/> Issue Fee</p> <p><input type="checkbox"/> Publication Fee (No small entity discount permitted)</p> <p><input type="checkbox"/> Advance Order - # of Copies _____</p>	<p>4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)</p> <p><input type="checkbox"/> A check is enclosed.</p> <p><input checked="" type="checkbox"/> Payment by credit card. Form PTO-2038 is attached.</p> <p><input type="checkbox"/> The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).</p>
--	--

5. **Change in Entity Status** (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature MAULIN SHAH/ Date 01/30/2019  
 Typed or printed name MAULIN SHAH Registration No. 56,587

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708			
<b>Filing Date:</b>	05-Aug-2013			
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)			
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett			
<b>Filer:</b>	Maulin Shah			
<b>Attorney Docket Number:</b>	JAL-050ACON1			
Filed as Small Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
PET. REVIVE ABANDON APP, DELAY PYMT-RESP	2453	1	1000	1000
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1000</b>



## UNITED STATES PATENT AND TRADEMARK OFFICE

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Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

Decision Date : January 30, 2019  
In re Application of : DECISION ON PETITION  
Gregory Burnett UNDER CFR 1.137(a)  
Application No : 13959708  
Filed : 05-Aug-2013  
Attorney Docket No : JAL-050ACON1

This is an electronic decision on the petition under 37 CFR 1.137(a), filed January 30, 2019 , to revive the above-identified application.

The petition is **GRANTED**.

The above-identified application became abandoned for failure to reply in a timely manner to the Notice of Allowance and Issue Fee(s) Due. The date of abandonment is the day after the expiration date of the period set for reply in the Notice.

The electronic petition satisfies the conditions for revival pursuant to the provisions of 37 CFR 1.137(a) in that (1) the reply in the form of payment of the Issue Fee and the Publication Fee (if necessary); (2) the petition fee as set forth in 37 CFR 1.17 (m); (3) the drawing correction and/or other deficiencies (if necessary); and (4) the required statement of unintentional delay have been received. Accordingly, the Issue Fee payment is accepted as having been unintentionally delayed.

It is not apparent whether the person signing the statement of unintentional delay was in a position to have firsthand or direct knowledge of the facts and circumstances of the delay at issue. Nevertheless, such statement is being treated as having been made as the result of a reasonable inquiry into the facts and circumstances of such delay. See 37 CFR 10.18(b) and Changes to Patent Practice and Procedure; Final Rule Notice, 62 Fed. Reg. 53131, 53178 (October 10, 1997), 1203 Off. Gaz. Pat. Office 63, 103 (October 21, 1997). In the event that such an inquiry has not been made, petitioner must make such an inquiry. If such inquiry results in the discovery that it is not correct that the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 CFR 1.137(a) was unintentional, petitioner must notify the Office.

Telephone inquiries concerning this decision should be directed to the Patent Electronic Business Center (EBC) at 866-217-9197.

This application file is being directed to the Office of Data Management.

Office of Petitions

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	35005552
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Maulin Shah
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	JAL-050ACON1
<b>Receipt Date:</b>	30-JAN-2019
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	13:34:44
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1000
RAM confirmation Number	013019INTEFSW13344200
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:



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**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition automatically granted by EFS	petition-request.pdf	31975	no	2
			ec58cf65818fe7f603dc5bee13e2cba30ca3e4bc1		

**Warnings:**

**Information:**

2	Issue Fee Payment (PTO-85B)	13959708_NOA.pdf	55275	no	1
			7fd85de248a06bcc73fc7fdaaa9a87dfee03938b		

**Warnings:**

**Information:**

3	Fee Worksheet (SB06)	fee-info.pdf	30461	no	2
			6e993a0a9466f50a0a51991ce510f6340592e4a4		

**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>	117711
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

**PART B - FEE(S) TRANSMITTAL**

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
 or **Fax** **(571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 11/21/2016  
**Kokka & Backus, PC**  
 1 Embarcadero Center  
 Suite 4150  
 San Francisco, CA 94111-3740



Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

_____ (Depositor's name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	02/21/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZARRO CRESPO, MARCOS D	2814	381-092000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).  
 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list  
 (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, \_\_\_\_\_ 1  
 (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. \_\_\_\_\_ 2  
 \_\_\_\_\_ 3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)  
 PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.  
 (A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

4a. The following fee(s) are submitted:  
 Issue Fee  
 Publication Fee (No small entity discount permitted)  
 Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)  
 A check is enclosed.  
 Payment by credit card. Form PTO-2038 is attached.  
 The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)  
 Applicant certifying micro entity status. See 37 CFR 1.29  
 Applicant asserting small entity status. See 37 CFR 1.27  
 Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.  
**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.  
**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

**NOTE:** This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /MAULIN SHAH/ Date 01/30/2019  
 Typed or printed name MAULIN SHAH Registration No. 56,587

United States Patent and Trademark Office

- Sales Receipt -

01/30/2019 INTEFSW 00010796 13959708

02 FC:2501

480.00 OP



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1	5622
15516	7590	02/15/2019	EXAMINER	
Kokka & Backus, PC 550 S. California Ave. Suite 300 Palo Alto, CA 94306			PIZARRO CRESPO, MARCOS D	
			ART UNIT	PAPER NUMBER
			2814	
			NOTIFICATION DATE	DELIVERY MODE
			02/15/2019	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@kokkalaw.com  
kcleland@kokkalaw.com  
skokka@kokkalaw.com



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

In re application of :  
Gregory C. Burnett :  
Application No. 13/959,708 : NOTICE VACATING PETITION  
Filed: August 5, 2013 :  
Attorney Docket No. JAL-050ACON1 :

The purpose of this notice is to advise you that the decision automatically granted by Electronic Filing System (EFS) on January 30, 2019, is hereby **VACATED** for the reasons indicated below:

The record discloses the following:

- A Notice of Allowance and Fee(s) Due was mailed on November 21, 2016, which set a Non-Extendable Statutory Period for reply of three (3) months.
- A Notice Requiring Inventor's Oath or Declaration was mailed November 21, 2016, which set a Non-Extendable Statutory Period for a reply no later than the date on which the issue fee was paid.
- A Notice of Abandonment was mailed on March 10, 2017.
- On January 30, 2019, a Petition for Revival Of An Application For Patent Abandoned Unintentionally Under 37 CFR 1.137(a) was filed by EFS and automatically granted by EFS on January 30, 2019. The petition was accompanied by the issue fee payment of \$480 and the petition fee of (\$1,000).

However, the applicant failed to submit a proper oath and declaration for the inventor in the application. The oath and declaration filed on January 30, 2019, does not include the required statement that "This application was made or authorized to be made by me". See 37 CFR 1.63(a)(4).

In view of the above, the petition automatically granted by EFS on January 30, 2019, is vacated and the application remains ABANDONED.

A response to this letter must be submitted within **TWO (2) MONTHS** from the mail date of this decision. Extensions of time under 37 CFR 1.136(a) are permitted. The petition should include a cover letter entitled "Renewed Petition under 37 CFR 1.137(a)." This is not a final agency action within the meaning of 5 U.S.C. § 704.

Further correspondence with respect to this matter should be delivered through one of the following mediums:

By mail:                   Mail Stop PETITIONS  
                                  Commissioner for Patents  
                                  Post Office Box 1450  
                                  Alexandria, VA 22313-1450

By hand:                   Customer Service Window  
                                  Mail Stop Petitions  
                                  Randolph Building  
                                  401 Dulany Street  
                                  Alexandria, VA 22314

By fax:                    (571) 273-8300  
                                  ATTN: Office of Petitions

By internet:               EFS-Web  
                                  [www.uspto.gov/ebc/efs\\_help.html](http://www.uspto.gov/ebc/efs_help.html)  
                                  (for help using EFS-Web call the  
                                  Patent Electronic Business Center  
                                  at (866) 217-9197)

Any questions concerning this matter may be directed to the undersigned at (571) 272-4618.

/KIMBERLY A INABINET/  
Paralegal Specialist, OPET

<b>REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS</b>	Application Number	13/959,708
	Filing Date	August 5, 2013
	First Named Inventor	Gregory C. Burnett
	Art Unit	2814
	Examiner Name	PIZARRO CRESPO, Marcos D
	Practitioner Docket Number	

To: Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Please withdraw me as attorney or agent for the above-identified patent application, and

- all the practitioners of record;
- the practitioners (with registration numbers) of record listed on the attached paper(s); or
- the practitioners of record associated with Customer Number: 15516

NOTE: The immediately preceding box should only be marked when the practitioners were appointed using the listed Customer Number.

The reason(s) for this request are those described in 37 CFR:

- |   |  |  |
|---|--|--|
| <input type="checkbox"/> 11.116(a)(1)                       | <input type="checkbox"/> 11.116(a)(2)            | <input type="checkbox"/> 11.116(a)(3)            |
| <input checked="" type="checkbox"/> 11.116(b)(1)            | <input type="checkbox"/> 11.116(b)(2)            | <input type="checkbox"/> 11.116(b)(3)            |
| <input type="checkbox"/> 11.116(b)(4)                       | <input checked="" type="checkbox"/> 11.116(b)(5) | <input checked="" type="checkbox"/> 11.116(b)(6) |
| <input type="checkbox"/> 11.116(b)(7) Please explain below: |  |  |

**Certifications**

Check each box below that is factually correct. WARNING: If a box is left unchecked, the request will likely not be approved.

1.  I/We have given reasonable notice to the client, prior to the expiration of the response period, that the practitioner(s) intend to withdraw from employment.
2.  I/We have delivered to the client or a duly authorized representative of the client all papers and property (including funds) to which the client is entitled.
3.  I/We have notified the client of any responses that may be due and the time frame within which the client must respond.

Please provide an explanation, if necessary:

Legal representation was terminated pursuant to 37 C.F.R § 11.116 (see above) on March 4, 2018.

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

*if you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### REQUEST FOR WITHDRAWAL AS ATTORNEY OR AGENT AND CHANGE OF CORRESPONDENCE ADDRESS

Complete the following section only when the correspondence address will change. *Changes of address will only be accepted to an applicant.*

Change the correspondence address and direct all future correspondence to:

A.  The address of the applicant associated with Customer Number: .....

OR

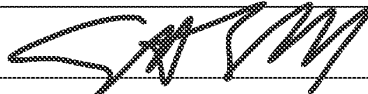
B.  Applicant

Address JAWB Acquisition, LLC 601 W. 26th Street, Suite 1762

City <b>New York</b>	State <b>NY</b>	Zip <b>10001</b>	Country <b>USA</b>
Telephone <b>(631) 495-2954</b>		Email <b>dlsetton@gmail.com</b>	

I am authorized to sign on behalf of myself and all withdrawing practitioners.

Signature



Name **Scott S. Kokka**

Registration No. **51,893**

Address **550 S. California Ave., Suite 300**

City <b>Palo Alto</b>	State <b>CA</b>	Zip <b>94306</b>	Country <b>USA</b>
-----------------------	-----------------	------------------	--------------------

Date **February 16, 2019**

Telephone No. **(650) 566-9912**

**NOTE: Withdrawal is effective when approved rather than when received.**

[Page 2 of 2]

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*



## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	35173149
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Scott Susumu Kokka/Kate Cleland
<b>Filer Authorized By:</b>	Scott Susumu Kokka
<b>Attorney Docket Number:</b>	JAL-050ACON1
<b>Receipt Date:</b>	16-FEB-2019
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	00:24:40
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Petition to withdraw attorney or agent (SB83)	13_959_708-Withdrawal.pdf	72607 <small>f199e55a1dde9f9e42c6f7884a04d8c29f337a58</small>	no	2

**Warnings:**

<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	72607
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>	

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	35715250
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Harris Wolin/Loa Heymann
<b>Filer Authorized By:</b>	Harris Wolin
<b>Attorney Docket Number:</b>	JAL-050ACON1
<b>Receipt Date:</b>	12-APR-2019
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	16:56:10
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
------------------------	----

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	jawb_8947_20190412_poa_cover.pdf	154167  <small>bb2d232b1a59f205dd4ac2089135ce9ba3f706a8</small>	no	1

**Warnings:**

<b>Information:</b>					
2	Power of Attorney	jawb_8947_8976_20190412_p oa_revoation.pdf	753662	no	3
			9b200e8f08706aedfc6cdd3c1fba73d2e39b 6ee1		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>				907829	
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

## TRANSMITTAL FOR POWER OF ATTORNEY TO ONE OR MORE REGISTERED PRACTITIONERS

NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	13959708
Filing Date	08-05-2013
First Named Inventor	Gregory C. Burnett
Title	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
Art Unit	2814
Examiner Name	PIZARRO CRESPO, MARCOS D
Attorney Docket Number	JAWB 8947

SIGNATURE of Applicant or Patent Practitioner			
Signature	/Harris A. Wolin/	Date (Optional)	
Name	Harris A. Wolin	Registration Number	39432
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

**NOTE:** This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

\*Total of 1 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**Statement under 37 C.F.R. 3.73(b) and POA**

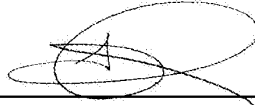
SIR:

The undersigned, who is authorized, by virtue of an attached Power of Attorney to Prosecute Applications Before the USPTO, to act on behalf of JAWB Acquisition, LLC, of 321 West 44th Street, Suite 1000, New York, NY 10036, hereby states that such Assignee is the Assignee of Record of the entire right, title and interest in the applications listed in the attached Exhibit A. The Assignee further revokes all previous powers of attorney given in such applications and hereby appoints all practitioners associated with **Customer Number 61650**. Please change the Correspondence Address for all applications listed in attached Exhibit A to the address associated with **Customer Number 61650**. Please change the **Attorney Docket Number** for all applications listed in attached Exhibit A to the New Attorney Docket Number identified in such Exhibit A.

The undersigned is authorized to act on behalf of the Assignee.

Respectfully submitted,

Myers Wolin, LLC



---

Harris A. Wolin  
Attorney for JAWB Acquisition, LLC  
Registration Number 39,432  
Date: February 25, 2019  
Telephone: 973-828-1284

# Exhibit A

*REVOCATION OF POWER OF ATTORNEY  
AND  
NEW POWER OF ATTORNEY (61650)  
AND  
CHANGE OF CORRESPONDENCE ADDRESS (61650)*

<u>SERIAL NO.</u>	<u>NEW ATTY DOCKET NUMBER</u>
13/959,708	JAWB 8947
14/224,868	JAWB 8948
14/149,805	JAWB 8949
14/215,047	JAWB 8950
14/215,051	JAWB 8951
13/431,725	JAWB 8952
13/346,719	JAWB 8953
13/919,307	JAWB 8954
13/952,532	JAWB 8955
13/954,331	JAWB 8956
14/243,747	JAWB 8957
14/519,116	JAWB 8958
13/954,367	JAWB 8959
14/105,157	JAWB 8960
14/209,959	JAWB 8961
14/281,856	JAWB 8962
13/957,337	JAWB 8963
13/184,429	JAWB 8964
13/374,746	JAWB 8965
13/830,770	JAWB 8966
13/831,698	JAWB 8967
14/640,013	JAWB 8968
13/069,264	JAWB 8969
13/917,225	JAWB 8970
13/959,683	JAWB 8971
14/070,446	JAWB 8972
14/192,432	JAWB 8973
14/637,387	JAWB 8974
13/669,375	JAWB 8975
13/948,160	JAWB 8976

Under the Paperwork Reduction Act of 1995, no person is required to respond to a collection of information unless it displays a valid OMB control number.

**POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO**

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

Practitioners associated with Customer Number: **61650**

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

The address associated with Customer Number: **61650**

OR

Firm or individual name

Address

City State Zip

Country

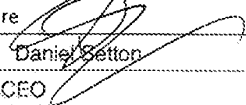
Telephone Email

Assignee name and address: **JAWS ACQUISITION, LLC**  
 321 West 44th Street, Suite 1000  
 New York, NY 10036

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

X Signature  Date **February 12, 2019**

Name **Daniel Setton** Telephone **646-677-3911**

Title **CEO**

The collection of information is required by 37 CFR 3.21, 3.32, and 3.23. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 37 U.S.C. 122 and 37 CFR 1.13 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the nature of this you require to complete file, into and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1480, Alexandria, VA 22313-1480. DO NOT SEND FEES OR CASH/PHYSICAL CURRENCY TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1480, Alexandria, VA 22313-1480.

If you need assistance in completing the form, call 1-800-Fact-3339 and select option 3.





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UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1

**CONFIRMATION NO. 5622**

15516  
Kokka & Backus, PC  
550 S. California Ave.  
Suite 300  
Palo Alto, CA 94306

**MISCELLANEOUS NOTICE**



\*OC000000107452114\*

Date Mailed: 04/17/2019

A communication which cannot be delivered in electronic form has been mailed to the applicant.


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 Alexandria, Virginia 22313-1450  
 www.uspto.gov

APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1

**CONFIRMATION NO. 5622**

15516  
 Kokka & Backus, PC  
 550 S. California Ave.  
 Suite 300  
 Palo Alto, CA 94306



\*OC000000107452114\*

Cc: MYERS WOLIN, LLC  
 100 HEADQUARTERS PLAZA  
 WEST TOWER, FLOOR 7  
 MORRISTOWN, NJ 07960-6834

Date Mailed: 04/17/2019

**DENIAL OF REQUEST FOR POWER OF ATTORNEY**

The request for Power of Attorney filed 04/12/2019 is acknowledged. However, the request cannot be granted at this time for the reason stated below.

- The Power of Attorney you provided did not comply with the new Power of Attorney rules that became effective on June 25, 2004. See 37 CFR 1.32.
- The revocation is not signed by the applicant, the assignee of the entire interest, or one particular principal attorney having the authority to revoke.
- The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73 has not been received.
- The person signing for the assignee has omitted their empowerment to sign on behalf of the assignee.
- The inventor(s) is without authority to appoint attorneys since the assignee has intervened as provided by 37 CFR 3.71.
- The signature(s) of \_\_\_\_\_, a co-inventor in this application, has been omitted. The Power of Attorney will be entered upon receipt of confirmation signed by said co-inventor(s).
- The person(s) appointed in the Power of Attorney is not registered to practice before the U.S. Patent and Trademark Office.
- Only one Customer Number can be designated for the Power of Attorney in an application. The Customer Number that was captured is the first Customer Number provided on the Power of Attorney document.





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 Address: COMMISSIONER FOR PATENTS  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 www.uspto.gov

- A request under 37 CFR 1.48 to add an inventor was granted in this application, however, no power of attorney consistent with the power of attorney granted by the originally named inventive entity has been received. Thus, the addition of the inventor has resulted in the loss of power of attorney in the application. See 37 CFR 1.32(e).
- The power of attorney has not been accepted because the party who is giving power of attorney has not been identified. Power of attorney may only be signed by the applicant for patent (37 CFR 1.42) or the patent owner. A patent owner who was not the applicant must appoint any power of attorney in compliance with 37 CFR 3.71 and 3.73. See 37 CFR 1.32(b)(4).
- The power of attorney from the inventors has not been accepted because it is a copy from a prior national application for which benefit is claimed and the continuing application names an inventor who was not named as an inventor in the prior application.
- The power of attorney from the inventors has not been accepted because the power of attorney must be signed by the applicant for patent. See 37 CFR 1.32(b)(4).
- Any request to correct or update the name of the applicant must include an application data sheet (ADS) in compliance with 37 CFR 1.76 specifying the correct or updated name of the applicant in the applicant information section. Any request to change the applicant after an original applicant has been specified under 37 CFR 1.46(b) must include a new ADS in compliance with 37 CFR 1.76 specifying the applicant in the applicant information section and comply with 37 CFR 3.71 and 3.73. See 37 CFR 1.46(c).

Any inquiries regarding this notice should be directed to the Application Assistance Unit at 571-272-4200.

  
 \_\_\_\_\_  
 Application Assistance Unit  
 571-272-4200

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Suite 300  
Palo Alto, CA 94306



**Courtesy Reminder for  
Application Serial No: 13/959,708**

Attorney Docket No: JAL-050ACON1

Customer Number: 15516

Date of Electronic Notification: 04/17/2019

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

docketing@kokkalaw.com  
skokka@kokkalaw.com  
kcleland@kokkalaw.com

To view your correspondence online or update your email addresses, please visit us anytime at <https://ppair-my.uspto.gov/pair/PrivatePair>. If you have any questions, please email the Electronic Business Center (EBC) at [EBC@uspto.gov](mailto:EBC@uspto.gov) or call 1-866-217-9197.

AUG 08 2019

010/015

Small Entity Declaration

**ASSERTION OF SMALL ENTITY STATUS  
PURSUANT TO 37 C.F.R. §1.27 (c)(1)**

Commissioner for Patents  
Mail Stop M Correspondence  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

This communication hereby asserts that the above-identified patents are entitled to small entity status.

**COMPANY or FIRM  
NAME AND ADDRESS:**

JAWB Acquisition LLC  
321 West 44<sup>th</sup> Street  
New York, NY 10036

Respectfully submitted,

*Luke Conticello*

Signature  
Luke Conticello  
Printed Name  
Assignee  
Title

Reg. # If US Attorney





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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1

15516  
Kokka & Backus, PC  
550 S. California Ave.  
Suite 300  
Palo Alto, CA 94306

**CONFIRMATION NO. 5622**  
**MISCELLANEOUS NOTICE**



Date Mailed: 08/16/2019

A communication which cannot be delivered in electronic form has been mailed to the applicant.



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1

**CONFIRMATION NO. 5622**

15516  
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550 S. California Ave.  
Suite 300  
Palo Alto, CA 94306

**MISCELLANEOUS NOTICE**



Date Mailed: 08/16/2019

A communication which cannot be delivered in electronic form has been mailed to the applicant.




**UNITED STATES PATENT AND TRADEMARK OFFICE**

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APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1

**CONFIRMATION NO. 5622**

15516  
 Kokka & Backus, PC  
 550 S. California Ave.  
 Suite 300  
 Palo Alto, CA 94306



\*OC000000110457968\*

 Date Mailed: 08/16/2019
**DENIAL OF REQUEST FOR WITHDRAWAL OF ATTORNEY OR AGENT**

The request for withdrawal of attorney or agent filed 02/16/2019 is acknowledged. However, the request cannot be granted at this time for the reason stated below.

- There is not an acceptable alternate correspondence address, either in the application file or the request. Please provide a correspondence address which directs correspondence to the assignee of the entire interest or one of the inventors to which further correspondence can be directed.
- No Power of Attorney has been established in the above-identified application. Accordingly, the withdrawal cannot be accepted because the practitioner seeking to withdraw is not of record.
- The Request for Withdrawal of Attorney or Agent does not contain the proper certification statements or does not provide an acceptable explanation for a certification that cannot be made. The practitioner(s) requesting withdrawal is required to certify that the practitioner(s) has: (1) given reasonable notice to the client, prior to the expiration of the reply period, that the practitioner(s) intends to withdraw from employment; (2) delivered to the client or a duly authorized representative of the client all papers and property (including funds) to which the client is entitled; and (3) notified the client of any replies that may be due and the time frame within which the client must respond. If the practitioner cannot make all of the certifications, an explanation detailing why the certification cannot be made must be included with the Request. See Official Gazette Notice entitled "Change in Procedure for Requests to Withdraw from Representation In a Patent Application," 1329 O.G. 99 (Apr. 8, 2008) available at <http://www.uspto.gov/web/patents/patog/week15/OG/TOC.htm#ref14>.
- The Request for Withdrawal of Attorney or Agent will not be treated because a Revocation of Power of Attorney has been filed. The Revocation of Power of Attorney will be treated separately.
- The Request for Withdrawal of Attorney or Agent will not be treated because it was filed after the application was patented or abandoned.
- The Request for Withdrawal of Attorney or Agent does not include a reason for withdrawal of the attorney or agent. See 37 CFR 10.40(b) and (c).
- The Request for Withdrawal of Attorney or Agent is not properly signed. The Request must be properly signed by the attorney that is withdrawing from representation. If more than one attorney is withdrawing,



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then the Request must be signed by all withdrawing attorneys or the Request must contain a clear indication of one attorney signing on behalf of himself or herself and another.

Any inquiries regarding this notice should be directed to the Application Assistance Unit at 571-272-4200.

/garias/  
Application Assistance Unit  
571-272-4200

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**Courtesy Reminder for  
Application Serial No: 13/959,708**

Attorney Docket No: JAL-050ACON1

Customer Number: 15516

Date of Electronic Notification: 08/16/2019

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

docketing@kokkalaw.com  
skokka@kokkalaw.com  
kcleland@kokkalaw.com

To view your correspondence online or update your email addresses, please visit us anytime at <https://ppair-my.uspto.gov/pair/PrivatePair>. If you have any questions, please email the Electronic Business Center (EBC) at [EBC@uspto.gov](mailto:EBC@uspto.gov) or call 1-866-217-9197.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO**

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

Practitioners associated with Customer Number:

150413

**OR**

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

The address associated with Customer Number:


150413

**OR**

<input type="checkbox"/>	Firm or Individual Name			
<input type="checkbox"/>	Address			
<input type="checkbox"/>	City	State	Zip	
<input type="checkbox"/>	Country			
<input type="checkbox"/>	Telephone	Email		

Assignee Name and Address: JAWB Acquisition LLC  
321 West 44th Street, Suite 1000  
New York, NY 10036**A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.****SIGNATURE of Assignee of Record**

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date
Name	Daniel Setton	Telephone
Title	CEO	

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**STATEMENT UNDER 37 CFR 3.73(b)**

Applicant/Patent Owner: JAWB Acquisition LLC

Application No./Patent No.: 13/959,708

Filed/Issue Date: 08-05-2013

Titled: **FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHC**

JAWB Acquisition LLC, a corporation,  
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

- 1.  the assignee of the entire right, title, and interest in;
- 2.  an assignee of less than the entire right, title, and interest in (The extent (by percentage) of its ownership interest is \_\_\_\_\_ %); or
- 3.  the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A.  An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or a copy\* is attached.

**OR**

B.  A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: BURNETT, GREGORY C. To: ALIPHCOM

The document was recorded in the United States Patent and Trademark Office at Reel 036018, Frame 0297, or a copy\* is attached.

2. From: ALIPHCOM To: ALIPHCOM (ASSIGNMENT FOR THE BENEFIT OF CREDITORS), LLC

The document was recorded in the United States Patent and Trademark Office at Reel 043711, Frame 0001, or a copy\* is attached.

3. From: ALIPHCOM (ASSIGNMENT FOR THE BENEFIT OF CREDITORS), LLC To: JAWB ACQUISITION LLC

The document was recorded in the United States Patent and Trademark Office at Reel 043746, Frame 0693, or a copy\* is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

\*As required by 37 CFR 3.73(b)(1)(i), if a copy/copies is/are attached, the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Kinza Hecht/  
Signature

June 12, 2020  
Date

Kinza Hecht  
Printed or Typed Name

62325  
Title or Registration Number

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	39709818
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	15516
<b>Filer:</b>	Kinza Hecht/Eddie Rowell
<b>Filer Authorized By:</b>	Kinza Hecht
<b>Attorney Docket Number:</b>	JAL-050ACON1
<b>Receipt Date:</b>	12-JUN-2020
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	20:42:33
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	MARKED-UP_ADS.pdf	1506770  <small>1851dd4e5e9ffc0a4eca7832013dc45d35aac209</small>	no	9

**Warnings:**



<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
2	Power of Attorney	POA_80_JAWB_Acquisition_LL C.pdf	59925  734b2bc575fffa27ad817d4e8984f23d483e009d	no	2
<b>Warnings:</b>					
<b>Information:</b>					
3	Assignee showing of ownership per 37 CFR 3.73	3_73_Statement_JAWB_Acquis ition_LL.C.pdf	175833  d9fe9b654af847d25a0e98d65970a674307bbb43	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1742528		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

**Secrecy Order 37 CFR 5.2:**

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

**Inventor Information:**

<b>Inventor 1</b>					<input type="button" value="Remove"/>
<b>Legal Name</b>					
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Gregory	C.	Burnett		
<b>Residence Information (Select One)</b> <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Dodge Center	<b>State/Province</b>	MN	<b>Country of Residence</b>	US
<b>Mailing Address of Inventor:</b>					
<b>Address 1</b>	10550 First Timberlane Drive				
<b>Address 2</b>					
<b>City</b>	Dodge Center	<b>State/Province</b>	MN		
<b>Postal Code</b>	55057	<b>Country</b>	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the <input type="button" value="Add"/> button.					

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
<b>Customer Number</b>	<del>15516</del> 150413		
<b>Email Address</b>	patent@hard-ip.net	<input type="button" value="Add Email"/>	<input type="button" value="Remove Email"/>

**Application Information:**

<b>Title of the Invention</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		
<b>Attorney Docket Number</b>	ALI-050ACON1	<b>Small Entity Status Claimed</b>	<input checked="" type="checkbox"/>
<b>Application Type</b>	Nonprovisional		
<b>Subject Matter</b>	Utility		
<b>Total Number of Drawing Sheets (if any)</b>	17	<b>Suggested Figure for Publication (if any)</b>	1

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

**Filing By Reference:**

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

**Publication Information:**

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	<del>15510</del> 150413		

**Domestic Benefit/National Stage Information:**

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Patented	<a href="#">Remove</a>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
	Continuation of	12139333	2008-06-13	8503691	2013-08-06

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	61045377	2008-04-16
Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60954712	2007-08-08
Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60953444	2007-08-01
Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60934551	2007-06-13
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.			

### Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)<sup>i</sup> the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

<input type="button" value="Remove"/>			
Application Number	Country <sup>i</sup>	Filing Date (YYYY-MM-DD)	Access Code <sup>i</sup> (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the <b>Add</b> button.			

### Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

<p>This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.</p> <p><input type="checkbox"/> NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.</p>
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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

## Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

**NOTE:** This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

### 1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

**A. Priority Document Exchange (PDX)** - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

**B. Search Results from U.S. Application to EPO** - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

### 2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

**NOTE:** Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

## Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
<b>Applicant 1</b>			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
<input type="button" value="Clear"/>			
<input checked="" type="radio"/> Assignee	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Joint Inventor	
<input type="radio"/> Person to whom the inventor is obligated to assign.		<input type="radio"/> Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor: <input type="text"/>			
If the Applicant is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	<del>AliphCom</del> <u>JAWB Acquisition LLC</u>		
<b>Mailing Address Information For Applicant:</b>			
Address 1	<del>00 Rhode Island Street, Third Floor</del>		<u>321 West 44th Street, Suite 1000</u>
Address 2			
City	<del>San Francisco</del> <u>New York</u>	State/Province	<del>CA</del> <u>NY</u>
Country	US	Postal Code	<del>04109</del> <u>10036</u>
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

## Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	ALI-050ACON1
	Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)	

<b>Assignee 1</b>			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
If the Assignee or Non-Applicant Assignee is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	<del>AlphaCom</del> <u>JAWB Acquisition LLC</u>		
<b>Mailing Address Information For Assignee including Non-Applicant Assignee:</b>			
Address 1	<del>99 Rhode Island Street, Third Floor</del> <u>321 West 44th Street, Suite 1000</u>		
Address 2			
City	<del>San Francisco</del> <u>New York</u>	State/Province	<del>CA</del> <u>NY</u>
Country <sup>i</sup>	US	Postal Code	<del>94103</del> <u>10036</u>
Phone Number		Fax Number	
Email Address			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.			

**Signature:**

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	<u>/Kinza Hecht/</u>	Date (YYYY-MM-DD)	<u>2020-06-12</u>
First Name	<u>Kinza</u>	Last Name	<u>Hecht</u>
		Registration Number	<u>62325</u>
Additional Signature may be generated within this form by selecting the Add button.			



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1

**CONFIRMATION NO. 5622**

**POA ACCEPTANCE LETTER**

150413  
Hard IP LLC (JAWB)  
48 Speir Dr.  
South Orange, NJ 07079



\*OC000000117800624\*

Date Mailed: 06/18/2020

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 06/12/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mnguyen/



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	JAL-050ACON1

**CONFIRMATION NO. 5622**

**POWER OF ATTORNEY NOTICE**

15516  
Kokka & Backus, PC  
550 S. California Ave.  
Suite 300  
Palo Alto, CA 94306



Date Mailed: 06/18/2020

**NOTICE REGARDING CHANGE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 06/12/2020.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/mnguyen/



UNITED STATES PATENT AND TRADEMARK OFFICE

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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY.DOCKET.NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/959,708, 08/05/2013, 2814, 1820, JAL-050ACON1, 1, 1

CONFIRMATION NO. 5622
CORRECTED FILING RECEIPT

150413
Hard IP LLC (JAWB)
48 Speir Dr.
South Orange, NJ 07079



Date Mailed: 06/18/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Gregory C. Burnett, Dodge Center, MN;

Applicant(s)

JAWB Acquisition LLC, New York, NY;

Assignment For Published Patent Application

JAWB Acquisition LLC, New York, NY

Power of Attorney: The patent practitioners associated with Customer Number 150413

Domestic Priority data as claimed by applicant

This application is a CON of 12/139,333 06/13/2008 PAT 8503691
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

**Permission to Access Search Results:** No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 08/20/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/959,708**

**Projected Publication Date:** Not Applicable

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

## **PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

**LICENSE FOR FOREIGN FILING UNDER  
Title 35, United States Code, Section 184  
Title 37, Code of Federal Regulations, 5.11 & 5.15**

**GRANTED**

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

**NOT GRANTED**

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.



Doc Code: PET.OP

Document Description: Petition for Review by the Office of Petitions

PTO/SB/64 (01-18)  
Approved for use through 11/30/2020. OMB 0651-0031  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)</b>	Docket Number (Optional) <b>2064-0001</b>
Page 1 of 2	

First named inventor: Gregory C. Burnett

Application No.: 13/959,708 Art Unit: 2814

Filed: August 5, 2013 Examiner: PIZARRO CRESPO, MARCOS D

Title: **FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)**

Attention: Office of Petitions  
**Mail Stop Petition**  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, VA 22313-1450  
 FAX (571) 273-8300

NOTE: If information or assistance is needed in completing this form, please contact the Office of Petitions at (571) 272-3282.

The above-identified application became abandoned for failure to file a timely and proper reply to a notice or action by the United States Patent and Trademark Office. The date of abandonment is the day after the expiration date of the period set for reply in the Office notice or action plus any extensions of time actually obtained.

**APPLICANT HEREBY PETITIONS FOR REVIVAL OF THIS APPLICATION.**

NOTE: A grantable petition requires the following items:

- (1) Petition fee;
- (2) Reply and/or issue fee;
- (3) Terminal disclaimer with disclaimer fee – required for all utility and plant applications filed before June 8, 1995, and for all design applications; and
- (4) Statement that the entire delay was unintentional.

**1. Petition fee**

- Small entity fee \$ 1000 (37 CFR 1.17(m)). Applicant asserts small entity status. See 37 CFR 1.27.
- Micro entity fee \$ \_\_\_\_\_ (37 CFR 1.17(m)). Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.
- Undiscounted fee \$ \_\_\_\_\_ (37 CFR 1.17(m)).

**2. Reply and/or fee**

- A The reply and/or fee to the above-noted Office notice or action in the form of Oath or Declaration (identify the type of reply):
  - has been filed previously on \_\_\_\_\_.
  - is enclosed herewith.
- B The issue fee and publication fee (if applicable) of \$ 480
  - has been paid previously on January 30, 2019.
  - is enclosed herewith.

This collection of information is required by 37 CFR 1.137(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 1 hour to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT  
ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(a)**

Page 2 of 2

**3. Terminal disclaimer with disclaimer fee**

- Since this utility/plant application was filed on or after June 8, 1995, no terminal disclaimer is required.
- A terminal disclaimer (and disclaimer fee (37 CFR 1.20(d)) of \$ \_\_\_\_\_) disclaiming the required period of time is enclosed herewith (see PTO/SB/63).

**4. STATEMENT:** The entire delay in filing the required reply from the due date for the required reply until the filing of a grantable petition under 37 CFR 1.137(a) was unintentional. [NOTE: The United States Patent and Trademark Office may require additional information if there is a question as to whether either the abandonment or the delay in filing a petition under 37 CFR 1.137(a) was unintentional (MPEP 711.03(c), subsections (III)(C) and (D)).]

**WARNING:**

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

/Kinza Hecht/

Signature

August 10, 2020

Date

Kinza Hecht

Typed or Printed Name

62,325

Registration Number, if applicable

Hard IP LLC

Address

212-837-8074

Telephone Number

48 Speir Drive, South Orange, NJ 07079

Address

Enclosures:

- Fee Payment
- Reply
- Terminal Disclaimer Form
- Additional sheet(s) containing statements establishing unintentional delay
- Other: \_\_\_\_\_

**CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR 1.8(a)]**

I hereby certify that this correspondence is being:

- Deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop Petition, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450.
- Transmitted by facsimile on the date shown below to the United States Patent and Trademark Office at (571) 273-8300.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Typed or printed name of person signing certificate

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)**

<b>Title of Invention</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
---------------------------	--

This statement is directed to:

The attached application,

OR

United States application or PCT international application number 13/959,708 filed on August 5, 2013.

**LEGAL NAME of inventor to whom this substitute statement applies:**

(E.g., Given Name (first and middle (if any)) and Family Name or Surname)

Gregory C. Burnett

Residence (except for a deceased or legally incapacitated inventor):

City <b>Omaha</b>	State <b>NE</b>	Country <b>US</b>
-------------------	-----------------	-------------------

Mailing Address (except for a deceased or legally incapacitated inventor):

9004 Pacific Street

City <b>Omaha</b>	State <b>NE</b>	Zip <b>68114</b>	Country <b>US</b>
-------------------	-----------------	------------------	-------------------

I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.

The above-identified application was made or authorized to be made by me.

I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

Relationship to the inventor to whom this substitute statement applies:

Legal Representative (for deceased or legally incapacitated inventor only),

Assignee,

Person to whom the inventor is under an obligation to assign,

Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or

Joint Inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- Inventor is deceased,  
 Inventor is under legal incapacity,  
 Inventor cannot be found or reached after diligent effort, or  
 Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

### WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

### PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: **Sason Gabay** Date (Optional):

Signature: **/Sason Gabay/**

### APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

**JAWB ACQUISITION LLC**

Applicant Name:

Title of Person Executing This Substitute Statement: **COO**

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

### Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City **New York** State **NY** Country **US**

### Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

321 West 44th Street, Suite 1000

City **New York** State **NY** Zip **10036** Country **US**

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450  
 or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

15516 7590 11/21/2016  
 Kokka & Backus, PC  
 1 Embarcadero Center  
 Suite 4150  
 San Francisco, CA 94111-3740

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**  
 I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Nancy Joyce Simmons	(Depositor's name)
/Nancy Joyce Simmons/	(Signature)
August 10, 2020	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	ALI-050ACON1	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	02/21/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZARRO CRESPO, MARCOS D	2814	381-092000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).  
 Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
 "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list  
 (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 Hard IP LLC  
 (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_  
 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)  
 PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE JAWB ACQUISITION LLC  
 (B) RESIDENCE: (CITY and STATE OR COUNTRY) New York, New York

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

4a. The following fee(s) are submitted:  
 Issue Fee  
 Publication Fee (No small entity discount permitted)  
 Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)  
 A check is enclosed.  
 Payment by credit card. Form PTO-2038 is attached.  
 The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)  
 Applicant certifying micro entity status. See 37 CFR 1.29  
 Applicant asserting small entity status. See 37 CFR 1.27  
 Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.  
**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.  
**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature Kinza Hecht Date August 10, 2020  
 Typed or printed name /Kinza Hecht/ Registration No. 62325

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708				
<b>Filing Date:</b>	05-Aug-2013				
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)				
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett				
<b>Filer:</b>	Kinza Hecht/Nancy Joyce Simmons				
<b>Attorney Docket Number:</b>	2064-0001				
Filed as Small Entity					
<b>Filing Fees for Utility under 35 USC 111(a)</b>					
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>	
<b>Basic Filing:</b>					
<b>Pages:</b>					
<b>Claims:</b>					
<b>Miscellaneous-Filing:</b>					
<b>Petition:</b>					
PET. REVIVE ABANDON APP, DELAY PYMT-RESP	2453	1	1000	1000	
<b>Patent-Appeals-and-Interference:</b>					
<b>Post-Allowance-and-Post-Issuance:</b>					



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>1000</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	40237858
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	150413
<b>Filer:</b>	Kinza Hecht/Nancy Joyce Simmons
<b>Filer Authorized By:</b>	Kinza Hecht
<b>Attorney Docket Number:</b>	2064-0001
<b>Receipt Date:</b>	10-AUG-2020
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	16:42:25
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1000
RAM confirmation Number	E202080G44333174
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

<b>File Listing:</b>					
<b>Document Number</b>	<b>Document Description</b>	<b>File Name</b>	<b>File Size(Bytes)/ Message Digest</b>	<b>Multi Part /.zip</b>	<b>Pages (if appl.)</b>
1	Petition for review by the Office of Petitions	2064-0001-Petition-to-Revive.pdf	218128	no	3
			b430b5714af278fa87c343ef7ec93c12c6264923		
<b>Warnings:</b>					
<b>Information:</b>					
2	Oath or Declaration filed	2064-0001-Substitute-Statement-Burnett-Signed.pdf	200939	no	3
			56d8dd2cc5098a14b3e6f08f6541f6045db74b6d		
<b>Warnings:</b>					
<b>Information:</b>					
3	Issue Fee Payment (PTO-85B)	2064-0001-Issue-fee-Transmittal.pdf	94274	no	1
			2117821a6fe1b3016115ed41f017bb5388a62ddf		
<b>Warnings:</b>					
<b>Information:</b>					
4	Fee Worksheet (SB06)	fee-info.pdf	30779	no	2
			b43e701b0ca532c0d80a26b16663e4f3688bc1e0		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			544120		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	2064-0001	5622
150413	7590	09/09/2020	EXAMINER	
Hard IP LLC (JAWB) 48 Speir Dr. South Orange, NJ 07079			PIZARRO CRESPO, MARCOS D	
			ART UNIT	PAPER NUMBER
			2814	
			NOTIFICATION DATE	DELIVERY MODE
			09/09/2020	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@dockettrak.com  
kinza@hard-ip.net  
patent@hard-ip.net



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

In re Application of :  
Burnett, Gregory, C. :  
Application No. 13/959,708 :  
Filed: 5 Aug 2013 : DECISION ON PETITION  
For: FORMING VIRTUAL :  
MICROPHONE ARRAYS USING DUAL :  
OMNIDIRECTIONAL MICROPHONE :  
ARRAY (DOMA) :

The above-identified application has been directed to the Office of Petitions for consideration of the petition under 37 CFR 1.137(a) filed August 10, 2020.

The application became abandoned February 22, 2017 for to timely submit an executed oath or declaration for each inventor on or prior to submission of the issue fee in accordance with 37 CFR 1.53(f)(3)(ii). Notice of Abandonment was mailed March 10, 2017.

A grantable petition under 37 CFR 1.137(a) must be accompanied by: (1) the required reply, unless previously filed; (2) required the petition fee; (3) a statement that the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 CFR 1.137(a) was unintentional; and (4) any terminal disclaimer (and fee as set forth in 37 CFR 1.20(d)) required by 37 CFR 1.137(d). Where there is a question as to whether either the abandonment or the delay in filing a petition under 37 CFR 1.137 was unintentional, the Director may require additional information. See, MPEP 711.03(c)(II)(C) and (D).

The instant petition fails to satisfy requirement (1) set forth above. While a substitute statement accompanies the instant petition, the substitute statement cannot be entered as the applicant was changed subsequent to the payment of the issue fee on January 30, 2019.

Be advised that further consideration of the matter of the substitute statement would require withdrawal from issue per 37 CFR 1.313(c) and a request for continued examination, including fee and submission in the form of re-submission of the substitute statement, per 37 CFR 1.114, as amendments, i.e., including amending of applicant, are not subject to entry subsequent to the payment of the issue fee.

Accordingly, the petition is **DISMISSED**.

Any request for reconsideration of this decision must be submitted within **TWO (2) MONTHS** from mail date of this decision. Extensions of time under 37 CFR 1.136(a) are permitted. The reconsideration request should include a cover letter entitled "Renewed Petition under 37 CFR 1.137(a)." This is not a final agency decision.

Further correspondence with respect to this matter should be addressed as follows:

By mail: **Mail Stop Petition**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

By facsimile: (571) 273-8300

By hand delivery: U.S. Patent and Trademark Office  
Customer Window, **Mail Stop Petition**  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Via EFS

Telephone inquiries concerning this matter may be directed to the undersigned at (571) 272-3205.

*/ALESIA M. BROWN/*

Alesia M. Brown  
Attorney Advisor  
Office of Petitions

**IN THE UNITED STATES  
PATENT AND TRADEMARK OFFICE**

Application No. : 13/959,708 Confirmation No. 5622  
Inventor : Gregory C. Burnett  
Filed : 08-05-2013  
Docket No. : 2064-0001

Title : FORMING VIRTUAL MICROPHONE ARRAYS USING  
DUAL OMNIDIRECTIONAL MICROPHONE ARRAY  
(DOMA)

**Mail Stop Petition**

Commissioner for Patents  
PO Box 1450  
Alexandria, Virginia 22313-1450.

**Renewed Petition under 37 CFR 1.137(a) and  
Petition to Withdraw from Issue Under 37 CFR 1.313(c) Accompanied by a Request  
for Continued Examination**

Sir:

A petition to revive the above-referenced patent application has been dismissed for the following reason:

A grantable petition under 37 CFR 1.137(a) must be accompanied by: (1) the required reply, unless previously filed; (2) required the petition fee; (3) a statement that the entire delay in filing

...

The instant petition fails to satisfy requirement (1) set forth above. While a substitute statement accompanies the instant petition, the substitute statement cannot be entered as the applicant was changed subsequent to the payment of the issue fee on January 30, 2019.

Be advised that further consideration of the matter of the substitute statement would require withdrawal from issue per 37 CFR 1.313(c) and a request for continued examination, including fee and submission in the form of re-submission of the substitute statement, per 37 CFR 1.114, as amendments, i.e., including amending of applicant, are not subject to entry subsequent to the payment of the issue fee.

(Dismissed petition, 9/9/2020, pg. 2.).

To satisfy requirement (1) provided above, this petition is submitted in accordance with 37 CFR 1.313(c)(2). Specifically, this petition is submitted to withdraw the above-referenced patent application from issuance because a request for continued examination (RCE) in compliance with § 1.114 is filed herewith.



In addition, filed herewith please find:

- 1) A substitute statement in lieu of an oath or declaration for a utility application for the sole inventor Gregory C. Burnett (substitute statement) signed by an officer of JAWB Acquisition LLC;
- 2) Power of Attorney;
- 3) Assignee showing ownership per 37 CFR 3.73 and
- 4) Corrected ADS

In view of the RCE and above documents, it is respectfully submitted that a change of the applicant to JAWB Acquisition LLC be recognized.

In conclusion, it is respectfully submitted that (A) the patent application be withdrawn from issuance, (B) the substitute statement be accepted and (C) the patent application be revived and no longer abandoned. It is further respectfully submitted that a Notice of Allowance be issued thereafter.

Attorney Advisor Alesia M. Brown is requested to call the undersigned at (212) 312-0598 if there remain any issues with this patent application.

**Deposit Account Authorization**

Authorization is hereby given to charge Deposit Account No. 60-0366 for any charges or shortages in fees that may be due.

Date: November 9, 2020

Respectfully submitted,

Hard IP LLC  
/Kinza Hecht/  
Kinza Hecht  
Patent Agent  
Reg. No. 62,325  
Phone: (212) 321-0598  
Email: kinza@hard-ip.net

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)

Approved for use through 11/30/2020. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

### REQUEST FOR CONTINUED EXAMINATION(RCE)TRANSMITTAL (Submitted Only via EFS-Web)

Application Number	13/959,708	Filing Date	2013-08-15	Docket Number (if applicable)	2064-0001	Art Unit	2814
First Named Inventor	Gregory C. Burnett			Examiner Name	PIZARRO CRESPO, MARCOS D.		

**This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.**  
 Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. The Instruction Sheet for this form is located at WWW.USPTO.GOV

#### SUBMISSION REQUIRED UNDER 37 CFR 1.114

Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

Consider the arguments in the Appeal Brief or Reply Brief previously filed on \_\_\_\_\_

Other \_\_\_\_\_

Enclosed

Amendment/Reply

Information Disclosure Statement (IDS)

Affidavit(s)/ Declaration(s)

Other Petition for withdrawal from issue under 1.313(c)(2) and Renewed Petition under 37 CFR 1.137(a), substitute statement, power of attorney, assignee showing ownership per 37 CFR 3.73 and corrected ADS

#### MISCELLANEOUS

Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of months \_\_\_\_\_  
 (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

Other \_\_\_\_\_

#### FEES

**The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**

The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 600366

#### SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Patent Practitioner Signature

Applicant Signature

Doc code: RCEX

Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (02-18)

Approved for use through 11/30/2020. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Signature of Registered U.S. Patent Practitioner			
Signature	Kinza Hecht/	Date (YYYY-MM-DD)	2020-11-09
Name	Kinza Hecht	Registration Number	62325

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450.

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708			
<b>Filing Date:</b>	05-Aug-2013			
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)			
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett			
<b>Filer:</b>	Kinza Hecht			
<b>Attorney Docket Number:</b>	2064-0001			
Filed as Small Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
PETITION FEE-37CFR 1.17(H) (GROUP II)	2464	1	70	70
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
<b>Extension-of-Time:</b>				
<b>Miscellaneous:</b>				
RCE- 2ND AND SUBSEQUENT REQUEST	2820	1	1000	1000
<b>Total in USD (\$)</b>				<b>1070</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	41074847
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	150413
<b>Filer:</b>	Kinza Hecht
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	2064-0001
<b>Receipt Date:</b>	09-NOV-2020
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	18:25:55
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$1070
RAM confirmation Number	E2020A9I26344589
Deposit Account	600366
Authorized User	Kinza Hecht

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.21 (Miscellaneous fees and charges)

37 CFR 1.19 (Document supply fees)

37 CFR 1.17 (Patent application and reexamination processing fees)  
 37 CFR 1.16 (National application filing, search, and examination fees)

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	2064_0001_SubStatement_Bur nett.pdf	182025	no	3
			3e0bf47d88c2e9860a18860d6044d652e20 b869c		
<b>Warnings:</b>					
<b>Information:</b>					
2	Power of Attorney	2064_0001_POA_80.pdf	254728	no	2
			c5bef4c3994b2fd3fc1f18cfe1c8982c1a263d 6e		
<b>Warnings:</b>					
<b>Information:</b>					
3	Assignee showing of ownership per 37 CFR 3.73	2064_0001_373.pdf	134406	no	2
			7f59806604d64212fa563dc7374213da74d 6a64f		
<b>Warnings:</b>					
<b>Information:</b>					
4	Application Data Sheet	2064_0001_ADS.pdf	423723	no	9
			b16d051a04c8b267f191519c694ca42a936 64d18		
<b>Warnings:</b>					
<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
5	Petition for review by the Office of Petitions	2064_0001_Petition.pdf	178958	no	2
			9d29c2ea8651c234c330f4e7bc77c8868f3a c376		
<b>Warnings:</b>					
<b>Information:</b>					
6	Request for Continued Examination (RCE)	2064_0001_RCE.pdf	1350089	no	3
			357da782250fb067332a3dba56ca5b4c3cc 037ff		
<b>Warnings:</b>					



<b>Information:</b>					
7	Fee Worksheet (SB06)	fee-info.pdf	32384	no	2
			ee900ef5e3d93cc01b77a5d071dfe993b6103632		
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>				2556313	
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

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**SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)**

<b>Title of Invention</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		
This statement is directed to:			
<input type="checkbox"/> The attached application,			
OR			
<input checked="" type="checkbox"/> United States application or PCT international application number <u>13/959,708</u> filed on <u>August 5, 2013</u> .			
<b>LEGAL NAME of inventor to whom this substitute statement applies:</b>			
(E.g., Given Name (first and middle (if any)) and Family Name or Surname)			
Gregory C. Burnett			
Residence (except for a deceased or legally incapacitated inventor):			
City	Omaha	State	NE US
Country			
Mailing Address (except for a deceased or legally incapacitated inventor):			
9004 Pacific Street			
City	Omaha	State	NE
Zip	68114	Country US	
I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.			
The above-identified application was made or authorized to be made by me.			
I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.			
Relationship to the inventor to whom this substitute statement applies:			
<input type="checkbox"/> Legal Representative (for deceased or legally incapacitated inventor only),			
<input checked="" type="checkbox"/> Assignee,			
<input type="checkbox"/> Person to whom the inventor is under an obligation to assign,			
<input type="checkbox"/> Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or			
<input type="checkbox"/> Joint Inventor.			

[Page 1 of 2]

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- Inventor is deceased,  
 Inventor is under legal incapacity,  
 Inventor cannot be found or reached after diligent effort, or  
 Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

- An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

### WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

### PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: **Sason Gabay** Date (Optional):

Signature: **/Sason Gabay/**

### APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

**JAWB ACQUISITION LLC**

Applicant Name:

Title of Person Executing This Substitute Statement: **COO**

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

### Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City **New York** State **NY** Country **US**

### Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

321 West 44th Street, Suite 1000

City **New York** State **NY** Zip **10036** Country **US**

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
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**POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO**

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

Practitioners associated with Customer Number:

150413

**OR**

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

The address associated with Customer Number:


150413

**OR**

<input type="checkbox"/>	Firm or Individual Name			
<input type="checkbox"/>	Address			
<input type="checkbox"/>	City	State	Zip	
<input type="checkbox"/>	Country			
<input type="checkbox"/>	Telephone	Email		

Assignee Name and Address: JAWB Acquisition LLC  
321 West 44th Street, Suite 1000  
New York, NY 10036**A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.****SIGNATURE of Assignee of Record**

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date
Name	Daniel Setton	Telephone
Title	CEO	

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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**STATEMENT UNDER 37 CFR 3.73(b)**

Applicant/Patent Owner: JAWB Acquisition LLC

Application No./Patent No.: 13/959,708

Filed/Issue Date: 08-05-2013

Titled: **FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHC**

JAWB Acquisition LLC, a

corporation,

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

- 1.  the assignee of the entire right, title, and interest in;
- 2.  an assignee of less than the entire right, title, and interest in  
(The extent (by percentage) of its ownership interest is \_\_\_\_\_ %); or
- 3.  the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A.  An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or a copy\* is attached.

**OR**

B.  A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: BURNETT, GREGORY C.

To: ALIPHCOM

The document was recorded in the United States Patent and Trademark Office at  
Reel 036018, Frame 0297, or a copy\* is attached.

2. From: ALIPHCOM

To: ALIPHCOM (ASSIGNMENT FOR THE BENEFIT OF CREDITORS), LLC

The document was recorded in the United States Patent and Trademark Office at  
Reel 043711, Frame 0001, or a copy\* is attached.

3. From: ALIPHCOM (ASSIGNMENT FOR THE BENEFIT OF CREDITORS), LLC

To: JAWB ACQUISITION LLC

The document was recorded in the United States Patent and Trademark Office at  
Reel 043746, Frame 0693, or a copy\* is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

\*As required by 37 CFR 3.73(b)(1)(i), if a copy/copies is/are attached, the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Kinza Hecht/

Signature

June 12, 2020

Date

Kinza Hecht

Printed or Typed Name

62325

Title or Registration Number

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

**Secrecy Order 37 CFR 5.2:**

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

**Inventor Information:**

Inventor 1 <span style="float: right;">Remove</span>				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Gregory	C.	Burnett	
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Dodge Center	State/Province	MN	Country of Residence <sup>i</sup> US
Mailing Address of Inventor:				
Address 1	10550 First Timberlane Drive			
Address 2				
City	Dodge Center	State/Province	MN	
Postal Code	55057	Country <sup>i</sup>	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. <span style="float: right;">Add</span>				

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).	
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.	
Customer Number	<del>15516</del> 150413
Email Address	patent@hard-ip.net <span style="float: right;">Add Email Remove Email</span>

**Application Information:**

Title of the Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		
Attorney Docket Number	ALI-050ACON1	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	17	Suggested Figure for Publication (if any)	1

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

**Filing By Reference:**

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

**Publication Information:**

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer number will be used for the Representative Information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	<del>15510</del> 150413		

**Domestic Benefit/National Stage Information:**

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Patented	<a href="#">Remove</a>			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
	Continuation of	12139333	2008-06-13	8503691	2013-08-06

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

Prior Application Status	Expired	<a href="#">Remove</a>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	61045377	2008-04-16
Prior Application Status	Expired	<a href="#">Remove</a>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60954712	2007-08-08
Prior Application Status	Expired	<a href="#">Remove</a>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60953444	2007-08-01
Prior Application Status	Expired	<a href="#">Remove</a>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60934551	2007-06-13
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.			

### Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)<sup>i</sup> the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

<a href="#">Remove</a>			
Application Number	Country <sup>i</sup>	Filing Date (YYYY-MM-DD)	Access Code <sup>i</sup> (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the <b>Add</b> button.			

### Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

<p>This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.</p> <p><input type="checkbox"/> NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.</p>
--

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

## Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

**NOTE:** This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

### 1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

**A. Priority Document Exchange (PDX)** - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

**B. Search Results from U.S. Application to EPO** - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

### 2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

**NOTE:** Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

## Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
<b>Applicant 1</b>			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
<input type="button" value="Clear"/>			
<input checked="" type="radio"/> Assignee	<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Joint Inventor	
<input type="radio"/> Person to whom the inventor is obligated to assign.		<input type="radio"/> Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor: <input type="text"/>			
If the Applicant is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	<del>AliphCom</del> <u>JAWB Acquisition LLC</u>		
<b>Mailing Address Information For Applicant:</b>			
Address 1	<del>00 Rhode Island Street, Third Floor</del> <u>321 West 44th Street, Suite 1000</u>		
Address 2			
City	<del>San Francisco</del> <u>New York</u>	State/Province	<del>CA</del> <u>NY</u>
Country	US	Postal Code	<del>04109</del> <u>10036</u>
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button.			

## Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	ALI-050ACON1
	Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)	

<b>Assignee 1</b>			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
If the Assignee or Non-Applicant Assignee is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	<del>AlphaCom</del> <u>JAWB Acquisition LLC</u>		
<b>Mailing Address Information For Assignee including Non-Applicant Assignee:</b>			
Address 1	<del>99 Rhode Island Street, Third Floor</del> <u>321 West 44th Street, Suite 1000</u>		
Address 2			
City	<del>San Francisco</del> <u>New York</u>	State/Province	<del>CA</del> <u>NY</u>
Country <sup>i</sup>	US	Postal Code	<del>94103</del> <u>10036</u>
Phone Number		Fax Number	
Email Address			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.			

**Signature:**

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	<u>/Kinza Hecht/</u>	Date (YYYY-MM-DD)	<u>2020-06-12</u>
First Name	<u>Kinza</u>	Last Name	<u>Hecht</u>
		Registration Number	<u>62325</u>
Additional Signature may be generated within this form by selecting the Add button.			

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON1
		Application Number	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**



## Privacy Act Statement

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The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	2064-0001

150413  
Hard IP LLC (JAWB)  
48 Speir Dr.  
South Orange, NJ 07079

**CONFIRMATION NO. 5622**  
**POA ACCEPTANCE LETTER**



Date Mailed: 11/17/2020

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 11/09/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/dtdinh/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	2064-0001	5622
150413	7590	12/31/2020	EXAMINER	
Hard IP LLC (JAWB) 48 Speir Dr. South Orange, NJ 07079			PIZARRO CRESPO, MARCOS D	
			ART UNIT	PAPER NUMBER
			2814	
			NOTIFICATION DATE	DELIVERY MODE
			12/31/2020	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@dockettrak.com  
ip@remotedocket.com  
kinza@hard-ip.net



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

In re Application of :  
Burnett, Gregory, C. :  
Application No. 13/959,708 :  
Filed: 5 Aug 2013 : DECISION ON PETITION  
For: FORMING VIRTUAL :  
MICROPHONE ARRAYS USING DUAL :  
OMNIDIRECTIONAL MICROPHONE :  
ARRAY (DOMA) :

The above-identified application has been directed to the Office of Petitions for consideration of the petition to revive under 37 CFR 1.137(a), filed November 9, 2020.

The application became abandoned February 22, 2017 for to timely submit an executed oath or declaration for each inventor on or prior to submission of the issue fee in accordance with 37 CFR 1.53(f)(3)(ii). Notice of Abandonment was mailed March 10, 2017.

A grantable petition under 37 CFR 1.137(a) must be accompanied by: (1) the required reply, unless previously filed; (2) required the petition fee; (3) a statement that the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 CFR 1.137(a) was unintentional; and (4) any terminal disclaimer (and fee as set forth in 37 CFR 1.20(d)) required by 37 CFR 1.137(d). Where there is a question as to whether either the abandonment or the delay in filing a petition under 37 CFR 1.137 was unintentional, the Director may require additional information. See, MPEP 711.03(c)(II)(C) and (D).

Further consideration of the petition to revive reflects that the instant petition fails to satisfy requirement (3) set forth above as the petition does not satisfy 37 CFR 1.137(b)(4). Petitioner submitted the required statement of unintentional delay. However, this petition to revive the abandoned application under 37 CFR 1.137(a) was filed more than two years after the date of abandonment.

The statement accompanying the instant petition is insufficient to establish that the entire period of time, from the time that a reply to the Notice was due until the filing of a grantable petition, was unintentional.

The USPTO requires additional information concerning whether a delay in seeking the revival of an abandoned application was unintentional where the petition to revive was filed more than two

years after the date the application became abandoned. See, Clarification of the Practice for Requiring Additional Information in Petitions Filed in Patent Applications and Patents Based on Unintentional Delay, 85 FR 12222 (March 2, 2020). Therefore, additional information that provides an explanation of the circumstances surrounding the delay that establishes the entire delay was unintentional is required.

The USPTO is concerned with three periods of delay. Petitioner is reminded the burden of proof to establish that the delay from the due date for the reply until the filing of a grantable petition was unintentional within the meaning of 35 U.S.C. 27 and 37 CFR 1.137 rests with the petitioner. See, MPEP 711.03(c)(II)(F).

The first period of delay petitioner must address on renewed petition is the delay in filing the reply that originally resulted in the abandonment of this application. Petitioner must explain the delay between when the reply was due and when the reply was filed.

The second period of delay petitioner must address on renewed petition is the delay in filing the initial petition pursuant to 37 CFR 1.137(a). Petitioner must explain why the petition was not filed until August 10, 2020. It is noted that the record fails to reflect that petitioners herein timely sought further consideration of the matter of abandonment subsequent to the mailing of the petition decision mailed February 12, 2019 until August 10, 2020.

The third period of delay petitioner must address on renewed petition is the delay in filing a *grantable* petition pursuant to 37 CFR 1.137(a).

When addressing each of these three periods of delay, petitioner is reminded that where the petitioner deliberately permits an application to become abandoned (*e.g.*, due to a conclusion the claims are unpatentable, a rejection in an Office action cannot be overcome, or the invention lacks sufficient commercial value to justify continued prosecution), the abandonment of such application is considered to be a deliberately chosen course of action, and the resulting delay cannot be considered as “unintentional” within the meaning of 37 CFR 1.137. See, In re Application of G, 11 USPQ2d 1378, 1380 (Comm’r Pat. 1989). Similarly, an intentional course of action is not rendered unintentional when, upon reconsideration, the applicant changes his or her mind as to the course of action that should have been taken. See, In re Maldague, 10 USPQ2d 1477, 1478 (Comm’r Pat. 1988). Petitioner’s failure to carry the burden of proof to establish that the “entire” delay was “unintentional” may lead to the denial of a petition under 37 CFR 1.137, regardless of the circumstances that originally resulted in the abandonment of the application.

Petitioner should note that the party whose delay is relevant is the party having the right or authority to file the response in the above identified application. When the applicant assigns the entire right, title, and interest in an invention to a third party (and thus does not retain any legal or equitable interest in the invention), the applicant’s delay is irrelevant in evaluating whether the delay was unintentional. See, Kim v. Quigg, 718 F. Supp. 1280, 1284, 12 USPQ2d 1604, 1607-08 (E.D. Va. 1989). See, MPEP 711.03(c)(II)(C)-(F) for additional guidance on the information required to establish that the entire delay was unintentional.

Please note that a renewed petition fee is not required to seek reconsideration of this decision.

Accordingly, the petition is **DISMISSED**.

Any request for reconsideration of this decision must be submitted within **TWO (2) MONTHS** from mail date of this decision. Extensions of time under 37 CFR 1.136(a) are permitted. The reconsideration request should include a cover letter entitled "Renewed Petition under 37 CFR 1.137(a)." This is not a final agency decision.

Further correspondence with respect to this matter should be addressed as follows:

By mail: **Mail Stop Petition**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

By facsimile: (571) 273-8300

By hand delivery: U.S. Patent and Trademark Office  
Customer Window, **Mail Stop Petition**  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314

Via EFS

Telephone inquiries concerning this matter may be directed to the undersigned at (571) 272-3205.

*/ALEZIA M. BROWN/*

Alesia M. Brown  
Attorney Advisor  
Office of Petitions

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Gregory C. Burnett

Application No.: 13/959,708

Filed: 08-05-2013

Title: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Confirmation No.: 5622

Examiner: PIZARRO CRESPO, MARCOS D.

Group Art Unit: 2814

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**RENEWED PETITION UNDER 37 CFR 1.137(A)**

Sir:

In response to the Decision on Petition mailed December 31, 2020 (hereinafter “Decision”), this renewed petition under 37 CFR 1.137(a) is respectfully submitted.

The Decision states:

A grantable petition under 37 CFR 1.137(a) must be accompanied by ... (3) a statement that the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 CFR 1.137(a) was unintentional ... See, MPEP 711.03(c)(II)(C) and (D) ...

The USPTO requires additional information concerning whether a delay in seeking the revival of an abandoned application was unintentional where the petition to revive was filed more than two years after the date the application became abandoned ... Therefore, additional information that provides an explanation of the circumstances surrounding the delay that establishes the entire delay was unintentional is required.

The USPTO is concerned with three periods of delay. Petitioner is reminded the burden of proof to establish that the delay from the due date for the reply until the filing of a grantable petition was unintentional within the meaning of 35 U.S.C. 27 and 37 CFR 1.137 rests with the petitioner. See, MPEP 711.03(c)(II)(F).

The first period of delay petitioner must address on renewed petition is the delay in filing the reply that originally resulted in the abandonment of this application. Petitioner must explain the delay between when the reply was due and when the reply was filed.

The second period of delay petitioner must address on renewed petition is the delay in filing the initial petition pursuant to 37 CFR 1.137(a). Petitioner must explain why this petition was not filed until August 10, 2020. It is noted that the record fails to reflect that petitioners herein timely sought further consideration of the matter of abandonment subsequent to the mailing of the petition decision mailed February 12, 2019 until August 10, 2020.

The third period of delay petitioner must address on renewed petition is the delay in filing a grantable petition pursuant to 37 CFR 1.137(a).  
(Decision, pgs. 1-2)

Submitted herewith are affidavits of Michael Luna (“Luna affidavit”) and Daniel Setton (“Setton affidavit”). The Luna and Setton affidavits provide details regarding any delays. Specifically, the Luna affidavit states that the above-referenced patent application originally went abandoned on February 22, 2017 due to unavailable funds. The Luna affidavit further states that the original assignee ALIPHCOM (based on the assignment from the inventor to ALIPHCOM that was recorded with the USPTO’s assignment branch and accorded reel/frame no. 035352/0324) “was shut down and an assignment for the benefit of creditors was initiated in June 2017,” (Luna affidavit, pg. 1).

The Setton affidavit states that JAWB ACQUISITION LLC is the current assignee (the assignment from ALIPHCOM (ASSIGNMENT FOR THE BENEFIT OF CREDITORS), LLC to JAWB ACQUISITION LLC was recorded with the USPTO’s assignment branch and accorded reel/frame no. 043746/0693). The Setton affidavit further provides details regarding “the second period of delay” mentioned above.

With respect to “the third period of delay” mentioned above, the following details are provided. It is respectfully submitted that the Decision was mailed on December 31, 2020. On January 15, 2021, I received Michael Luna’s signed affidavit.

After receiving that affidavit, I made attempts to obtain another affidavit from an officer at JAWB ACQUISITION LLC detailing the events that happened after Michael Luna was no longer involved. Ultimately, I obtained the affidavit of Daniel Setton who is the CEO of JAWB ACQUISITION LLC. The Setton affidavit was executed on March 29, 2021. Thus, it is respectfully submitted that the third period’s delay detailed above was unintentional.

As detailed in the Luna and Setton affidavits and in view of the information provided above, it is respectfully submitted that the delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 CFR 1.137(a) is unintentional.

The petition to revive fee (code 2453) amounting to \$1000 for a small-entity was previously submitted. If, however, additional fees are required, the Commissioner is



hereby authorized to charge any additional fees or credit any overpayment to Deposit Account 60-0366.

Date: March 30, 2021

Respectfully submitted,

Hard IP LLC

/Kinza Hecht/

Kinza Hecht

Patent Agent

Reg. No. 62,325

Phone No.: 212 321 0598

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	42317240
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	150413
<b>Filer:</b>	Kinza Hecht
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	2064-0001
<b>Receipt Date:</b>	30-MAR-2021
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	11:04:35
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Affidavit-not covered under specific rule	2064-0001_Affidavit_Luna.pdf	189453 <small>51d4013e93311a4db61a4d48b56804c6d4393d66</small>	no	2

**Warnings:**

The PDF file has been signed with a digital signature and the legal effect of the document will be based on the contents of the file not the digital signature.

**Information:**

2	Affidavit-not covered under specific rule	2064-0001_Affidavit_Setton.pdf	79009	no	3
			0f81caf7b6e2516d84a6aefe2cac2014607449a8		

**Warnings:**

**Information:**

3	Petition for review by the Office of Petitions	2064-0001_RENEWED_PETITION.pdf	68386	no	3
			de708cf718b7e08fce4a9df69bf51af19c8e4a55		

**Warnings:**

**Information:**

<b>Total Files Size (in bytes):</b>		336848
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**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Gregory C. Burnett

Application No.: 13/959,708

Filed: 08-05-2013

Title: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Confirmation No.: 5622

Examiner: PIZARRO CRESPO, MARCOS D.

Group Art Unit: 2814

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**AFFIDAVIT**

Dear Sir:

I, Michael Luna, hereby declare:

1. I am over eighteen (18) years of age, and have personal knowledge of the facts stated herein.
2. The above-identified patent application was originally owned by ALIPHCOM.
3. An assignment from the inventor to ALIPHCOM was recorded on April 7, 2015 with the United States Patent and Trademark Office (USPTO) and accorded reel/frame number: 035352/0324.
4. I was the Chief Technology Officer (CTO) of ALIPHCOM from December 2007 until it was shut down and an assignment for the benefit of creditors was initiated in June 2017. During my tenure I was responsible for management of ALIPHCOM's intellectual property portfolio.

5. Kokka and Backus, LLC was the law firm tasked with handling our patent portfolio including the above-identified patent application.
6. Between 2015 and 2017 ALIPHCOM suffered funding/financial issues.
7. I instructed Kokka and Backus, LLC and CPA Global to employ procedures to ensure that patent applications (including the above-identified application) were, on a timely basis, diligently prosecuted and that fees were paid. Such procedures continued until funds were no longer available to ALIPHCOM to pay Kokka and Backus, LLC and CPA Global for their fees.
8. As a result, on February 22, 2017, the above-identified patent application went abandoned.
9. At no point did I intend to allow the above-referenced patent application to go abandoned.
10. On information and belief, these statements are believed to be true; and these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

Dated: 1/15/2021 | 15:41 PST

DocuSigned by:  
*Michael Luna*  
CC01DA63598146A  
\_\_\_\_\_  
Michael Luna

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Inventor(s): Gregory C. Burnett

Application No.: 13/959,708

Filed: 08-05-2013

Title: FORMING VIRTUAL MICROPHONE  
ARRAYS USING DUAL  
OMNIDIRECTIONAL MICROPHONE  
ARRAY (DOMA)

Confirmation No.: 5622

Examiner: PIZARRO CRESPO, MARCOS D.

Group Art Unit: 2814

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**AFFIDAVIT**

Dear Sir:

I, Daniel Setton, hereby declare:

1. I am over eighteen (18) years of age, and have personal knowledge of the facts stated herein.
2. An assignment from the sole inventor to ALIPHCOM was recorded on April 7, 2015 with the United States Patent and Trademark Office (USPTO) and accorded reel/frame number: 035352/0324.
3. An assignment from ALIPHCOM to ALIPHCOM (assignment for the benefit of credits), LLC was recorded on August 29, 2017 with the USPTO and accorded reel/frame number: 043711/0001.
4. An assignment from ALIPHCOM (assignment for the benefit of credits), LLC to JAWB ACQUISITION LLC was recorded on September 1, 2017 with the USPTO and accorded reel/frame number: 043746/0693.

5. I became the CEO of JAWB ACQUISITION LLC around July 2017. As CEO, I am responsible for management of JAWB ACQUISITION LLC's intellectual property portfolio.
6. I became aware that the above-referenced patent application went abandoned around Q2 2018.
7. I had engaged CSC Global and the following law firms to assess JAWB ACQUISITION LLC's very robust patent portfolio: Envision IP, Dallal Firm and Myers Wolin. I had tasked Envision IP to handle JAWB ACQUISITION LLC's patent portfolio and to revive various abandoned patent applications including the above-identified patent application.
8. I retained Envision IP around Q2 of 2018 and instructed Envision IP to revive various abandoned patent applications including the above-identified patent application around Q4/2018 to Q1/2019.
9. However, the above-identified patent application was not revived, and the inventor's oath/declaration document was not filed.
10. In February of 2019, I instructed Myers and Wolin to retain power of attorney for the above-referenced patent application. However, accordingly to the file history of the above-referenced patent application, it appears that the request to obtain power of attorney was denied on April 17, 2019.
11. On June 3, 2020, I retained Hard IP LLC to revive the above-referenced patent application.

12. After making efforts to obtain the inventor's signature for the declaration document, Hard IP LLC filed either a substitute statements for the inventor in August of 2020. Hard IP LLC filed a petition to revive the abandoned application on August 10, 2020.
13. The petition to revive was dismissed on December 31, 2020. I am filing this affidavit to detail the timeline of events.
14. At no point did I intend to allow the above-referenced patent application to stay abandoned. It was my intention to revive the above-identified application.
15. On information and belief, these statements are believed to be true; and these statements are made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

Dated: March 29, 2021

  
\_\_\_\_\_  
Daniel Setton



## Electronic Patent Application Fee Transmittal

<b>Application Number:</b>	13959708			
<b>Filing Date:</b>	05-Aug-2013			
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)			
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett			
<b>Filer:</b>	Kinza Hecht			
<b>Attorney Docket Number:</b>	2064-0001			
Filed as Small Entity				
<b>Filing Fees for Utility under 35 USC 111(a)</b>				
<b>Description</b>	<b>Fee Code</b>	<b>Quantity</b>	<b>Amount</b>	<b>Sub-Total in USD(\$)</b>
<b>Basic Filing:</b>				
<b>Pages:</b>				
<b>Claims:</b>				
<b>Miscellaneous-Filing:</b>				
<b>Petition:</b>				
<b>Patent-Appeals-and-Interference:</b>				
<b>Post-Allowance-and-Post-Issuance:</b>				
<b>Extension-of-Time:</b>				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 1 month with \$0 paid	2251	1	110	110
<b>Miscellaneous:</b>				
<b>Total in USD (\$)</b>				<b>110</b>

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	42317257
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	150413
<b>Filer:</b>	Kinza Hecht
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	2064-0001
<b>Receipt Date:</b>	30-MAR-2021
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	11:05:47
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	\$110
RAM confirmation Number	E20213TB06061214
Deposit Account	600366
Authorized User	Kinza Hecht

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)  
 37 CFR 1.21 (Miscellaneous fees and charges)

**File Listing:**

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Fee Worksheet (SB06)	fee-info.pdf	31116 8d405c14939bd5a659ce3af456366cdc1d3efb0	no	2

**Warnings:**

**Information:**

**Total Files Size (in bytes):** 31116

**This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.**

**New Applications Under 35 U.S.C. 111**

**If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.**

**National Stage of an International Application under 35 U.S.C. 371**

**If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.**

**New International Application Filed with the USPTO as a Receiving Office**

**If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.**



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
**United States Patent and Trademark Office**  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	2064-0001	5622
150413	7590	06/15/2021	EXAMINER	
Hard IP LLC (JAWB) 48 Speir Dr. South Orange, NJ 07079			PIZARRO CRESPO, MARCOS D	
			ART UNIT	PAPER NUMBER
			2814	
			NOTIFICATION DATE	DELIVERY MODE
			06/15/2021	ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@dockettrak.com  
ip@remotedocket.com  
kinza@hard-ip.net



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

In re Application of :  
Burnett, Gregory, C. :  
Application No. 13/959,708 : DECISION ON PETITION  
Filed: 5 Aug 2013 :  
Attorney Dkt. No.: 2064-0001 :

The above-identified application has been directed to the Office of Petitions for consideration of the petition to revive under 37 CFR 1.137(a), filed March 30, 2021.

The application became abandoned February 22, 2017 for to timely submit an executed oath or declaration for each inventor on or prior to submission of the issue fee in accordance with 37 CFR 1.53(f)(3)(H). Notice of Abandonment was mailed March 10, 2017.

A grantable petition pursuant to 37 C.F.R. § 1.137(a) must be accompanied by: (1) the required reply to the outstanding Office action or notice, unless previously filed; (2) the petition fee as set forth in 37 C.F.R. § 1.17(m); (3) a statement that the entire delay in filing the required reply from the due date for the reply until the filing of a grantable petition pursuant to 37 C.F.R. § 1.137(b) was unintentional; and (4) any terminal disclaimer (and fee set forth in 37 C.F.R. § 1.20(d)) required pursuant to 37 C.F.R. § 1.137(c).

The instant petition has been carefully considered and found in compliance with the requirements above. The required reply has been submitted. Receipt is acknowledged of the required petition fee. Lastly, a proper statement and explanation of unintentional delay have been submitted.

In view thereof, the petition to revive under 37 CFR 1.137(a) is hereby **GRANTED**.

Telephone inquiries concerning this matter may be directed to the undersigned at (571) 272-3205.

/ALESIA M. BROWN/

Alesia M. Brown  
Attorney Advisor  
Office of Petitions



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

Table with columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
13/959,708 08/05/2013 Gregory C. Burnett 2064-0001 5622
150413 7590 07/13/2021
Hard IP LLC (JAWB)
48 Speir Dr.
South Orange, NJ 07079
EXAMINER
PIZARRO CRESPO, MARCOS D
ART UNIT PAPER NUMBER
2814
NOTIFICATION DATE DELIVERY MODE
07/13/2021 ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@dockettrak.com
ip@remotedocket.com
kinza@hard-ip.net



UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents  
United States Patent and Trademark Office  
P.O. Box 1450  
Alexandria, VA 22313-1450  
www.uspto.gov

In re Application of :  
Burnett, Gregory, C. :  
Application No. 13/959,708 :  
Filed: August 5, 2013 : DECISION GRANTING PETITION  
Attorney Docket NO. 2064-0001 : UNDER 37 CFR 1.313(c)(2)  
For: FORMING VIRTUAL :  
MICROPHONE ARRAYS USING DUAL :  
OMNIDIRECTIONAL MICROPHONE :  
ARRAY (DOMA) :

This is a decision on the petition under 37 CFR 1.313(c)(2), filed November 9, 2020, to withdraw the above-identified application from issue after payment of the issue fee.

The petition is **GRANTED**.

The above-identified application is withdrawn from issue for consideration of a submission under 37 CFR 1.114 (request for continued examination). *See* 37 CFR 1.313(c)(2).

***Petitioner is advised that the issue fee paid on August 10, 2020 cannot be refunded. If, however, this application is again allowed, petitioner may request that it be applied towards the issue fee required by the new Notice of Allowance.<sup>1</sup>***

This application is being referred to Technology Center Art Unit 2814 for processing of the request for continued examination under 37 CFR 1.114 and for consideration of the request to change applicant's name by way of application data sheet (ADS) filed and the substitute statement in lieu of the inventor's oath or declaration.

Telephone inquiries regarding this decision should be directed to undersigned at (571) 272-1642.

---

<sup>1</sup> *The request to apply the issue fee to the new Notice may be satisfied by completing and returning the new Part B – Fee(s) Transmittal Form (along with any balance due at the time of submission). Petitioner is advised that the Issue Fee Transmittal Form must be completed and timely submitted to avoid abandonment of the application.*



All other inquiries regarding the examination of this application should be directed to the Technology Center at their customer service line (571) 272-2815.

/April M. Wise/  
Paralegal Specialist, Office of Petitions

Doc Code: PA..  
 Document Description: Power of Attorney

PTO/AIA/82B (07-13)  
 Approved for use through 03/31/2021. OMB 0651-0035  
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number

<b>POWER OF ATTORNEY BY APPLICANT</b>							
I hereby revoke all previous powers of attorney given in the application identified in <u>either</u> the attached transmittal letter or the boxes below.							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">Application Number</th> <th style="width: 50%;">Filing Date</th> </tr> <tr> <td style="height: 20px;"> </td> <td> </td> </tr> </table>		Application Number	Filing Date				
Application Number	Filing Date						
(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)							
<input checked="" type="checkbox"/>	I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above:		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;">21125</td> </tr> </table>	21125			
21125							
<b>OR</b>							
<input type="checkbox"/>	I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)						
<b>Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:</b>							
<input checked="" type="checkbox"/>	The address associated with the above-mentioned Customer Number						
<b>OR</b>							
<input type="checkbox"/>	The address associated with Customer Number: <table border="1" style="width: 100%; height: 20px; border-collapse: collapse;"></table>						
<b>OR</b>							
<input type="checkbox"/>	Firm or Individual Name						
Address							
City		State	Zip				
Country							
Telephone		Email					
I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px;">Jawbone Innovations, LLC</td> </tr> </table>				Jawbone Innovations, LLC			
Jawbone Innovations, LLC							
<input type="checkbox"/>	Inventor or Joint Inventor (title not required below)						
<input type="checkbox"/>	Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)						
<input checked="" type="checkbox"/>	Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)						
<input type="checkbox"/>	Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)						
<b>SIGNATURE of Applicant for Patent</b>							
The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).							
Signature	<i>York Eggleston</i>	Date (Optional)	5/25/2021				
Name	York Eggleston						
Title	Manager						
<b>NOTE:</b> Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.							
<input type="checkbox"/>	Total of 1 forms are submitted.						

**STATEMENT UNDER 37 CFR 3.73(c)**Applicant/Patent Owner: JAWB Acquisitions LLCApplication No./Patent No.: 13/959,708 Filed/Issue Date: August 5, 2013Titled: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL  
MICROPHONE ARRAY (DOMA)Jawbone Innovations, LLC, a Limited Liability Company  
(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1.  The assignee of the entire right, title, and interest.
2.  An assignee of less than the entire right, title, and interest (check applicable box):
- The extent (by percentage) of its ownership interest is \_\_\_\_\_%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

--

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3.  The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

--

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4.  The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A.  An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.
- B.  A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Gregory C. Burnett To: ALIPHCOM, INC.  
The document was recorded in the United States Patent and Trademark Office at  
Reel 035352, Frame 0324, or for which a copy thereof is attached.

2. From: Gregory C. Burnett To: ALIPHCOM  
The document was recorded in the United States Patent and Trademark Office at  
Reel 036018, Frame 0297, or for which a copy thereof is attached.

**STATEMENT UNDER 37 CFR 3.73(c)**

3. From: ALIPHCOM DBA JAWBONE To: ALIPHCOM, LLC  
 The document was recorded in the United States Patent and Trademark Office at  
 Reel 043637 , Frame 0796 , or for which a copy thereof is attached.
4. From: ALIPHCOM To: ALIPHCOM (ASSIGNMENT FOR THE  
 BENEFIT OF CREDITORS), LLC  
 The document was recorded in the United States Patent and Trademark Office at  
 Reel 043711 , Frame 0001 , or for which a copy thereof is attached.
5. From: ALIPHCOM, LLC To: JAWB ACQUISITION, LLC  
 The document was recorded in the United States Patent and Trademark Office at  
 Reel 043638 , Frame 0025 , or for which a copy thereof is attached.
- ALIPHCOM (ASSIGNMENT FOR THE  
 6. From: BENEFIT OF CREDITORS), LLC To: JAWB ACQUISITION, LLC  
 The document was recorded in the United States Patent and Trademark Office at  
 Reel 043746 , Frame 0693 , or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Mark S. Leonardo/  
 Signature

July 14, 2021  
 Date

Mark S. Leonardo  
 Printed or Typed Name

41,433  
 Title or Registration Number

**STATEMENT UNDER 37 CFR 3.73(c)**

7. From: JAWB ACQUISITION, LLC To: JI Audio Holdings LLC  
The document was recorded in the United States Patent and Trademark Office at  
Reel 056821 , Frame 0728 , or for which a copy thereof is attached.
8. From: JI Audio Holdings LLC To: Jawbone Innovations, LLC  
The document was recorded in the United States Patent and Trademark Office at  
Reel 056833 , Frame 0960 , or for which a copy thereof is attached.
9. From: \_\_\_\_\_ To: \_\_\_\_\_  
The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_ , Frame \_\_\_\_\_ , or for which a copy thereof is attached.
10. From: \_\_\_\_\_ To: \_\_\_\_\_  
The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_ , Frame \_\_\_\_\_ , or for which a copy thereof is attached.

5218217.1

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	43253553
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	150413
<b>Filer:</b>	Mark S. Leonardo
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	2064-0001
<b>Receipt Date:</b>	14-JUL-2021
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	20:14:48
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	122174-10134_ADS_corrected.pdf	843272 <small>69175dad4b245b9612d326b6b751dfc6cbcb9a3a7</small>	no	9

**Warnings:**

<b>Information:</b>					
This is not an USPTO supplied ADS fillable form					
2	Power of Attorney	122174_Jawbone_POA_executed.pdf	223726 c3be042904ae588b5c4d63853d8861bee83ff9f3	no	1
<b>Warnings:</b>					
The PDF file has been signed with a digital signature and the legal effect of the document will be based on the contents of the file not the digital signature.					
<b>Information:</b>					
3	Assignee showing of ownership per 37 CFR 3.73	122174-10134_Statement_3_73.pdf	150039 ee746726b3e22c1df8b261d28a7217d7b9db8555	no	3
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			1217037		
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALL-050ACON4 122174-10134
		Application Number	13/959,708
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

**Secrecy Order 37 CFR 5.2:**

<input type="checkbox"/>	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
--------------------------	---

**Inventor Information:**

Inventor 1 <span style="float: right;">Remove</span>				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Gregory	C.	Burnett	
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City	Dodge Center	State/Province	MN	Country of Residence US
Mailing Address of Inventor:				
Address 1	10550 First Timberlane Drive			
Address 2				
City	Dodge Center	State/Province	MN	
Postal Code	55057	Country	US	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. <span style="float: right;">Add</span>				

**Correspondence Information:**

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
<input type="checkbox"/> An Address is being provided for the correspondence information of this application.			
Customer Number	450443 21125		
Email Address	patent@hard-ip.net	doctet@nutterl.com	<span>Add Email</span> <span>Remove Email</span>

**Application Information:**

Title of the Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		
Attorney Docket Number	ALL-050ACON4 122174-10134	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	17	Suggested Figure for Publication (if any)	1



<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON4 122174-10134
		Application Number	13/959,708
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

**Filing By Reference:**

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

**Publication Information:**

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

**Representative Information:**

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer number will be used for the Representative information during processing.

Please Select One:	<input checked="" type="radio"/> Customer Number	<input type="radio"/> US Patent Practitioner	<input type="radio"/> Limited Recognition (37 CFR 11.9)
Customer Number	450443 21125		

**Domestic Benefit/National Stage Information:**

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status		Patented	<a href="#">Remove</a>		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13959708	Continuation of	12139333	2008-06-13	8503691	2013-08-06

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON4 122174-10134
		Application Number	13/959,708
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	61045377	2008-04-16
Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60954712	2007-08-08
Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60953444	2007-08-01
Prior Application Status	Expired	<input type="button" value="Remove"/>	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
12139333	Claims benefit of provisional	60934551	2007-06-13
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.			

### Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)<sup>1</sup> the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

<input type="button" value="Remove"/>			
Application Number	Country <sup>1</sup>	Filing Date (YYYY-MM-DD)	Access Code <sup>1</sup> (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the <b>Add</b> button.			

### Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	<del>ALI-050ACON4</del> 122174-10134
		Application Number	13/959,708
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

<p>This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.</p> <p><input type="checkbox"/> NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.</p>
--

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	ALI-050ACON4 122174-10134
		Application Number	13/959,708
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

## Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

**NOTE:** This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

### 1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

**A. Priority Document Exchange (PDX)** - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

**B. Search Results from U.S. Application to EPO** - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

### 2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

**NOTE:** Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	ALI-050ACON4 122174-10134
	Application Number	13/959,708
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)	

### Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

**Applicant 1**

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Assignee       Legal Representative under 35 U.S.C. 117       Joint Inventor

Person to whom the inventor is obligated to assign.       Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here.

Organization Name      ~~JAWB Acquisition LLC~~      Jawbone Innovations, LLC

**Mailing Address Information For Applicant:**

Address 1      ~~321 West 44th Street, Suite 1000~~      100 West Houston Street

Address 2

City      ~~New York~~      Marshall      State/Province      ~~NY~~      TX

Country | US      Postal Code      ~~40036~~      75670

Phone Number      Fax Number

Email Address

Additional Applicant Data may be generated within this form by selecting the Add button.

### Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

<b>Application Data Sheet 37 CFR 1.76</b>	Attorney Docket Number	ALI-050ACON4	122174-10134
	Application Number	13/959,708	
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

<b>Assignee 1</b>			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.			
If the Assignee or Non-Applicant Assignee is an Organization check here. <input checked="" type="checkbox"/>			
Organization Name	JAWB Acquisition LLC Jawbone Innovations, LLC		
<b>Mailing Address Information For Assignee including Non-Applicant Assignee:</b>			
Address 1	321 West 44th Street, Suite 1000		100 West Houston Street
Address 2			
City	New York	Marshall	State/Province NY TX
Country <sup>i</sup>	US		Postal Code 40036 75670
Phone Number			Fax Number
Email Address			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.			

**Signature:**

**NOTE:** This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Mark S. Leonardo/		Date (YYYY-MM-DD)	2021-07-14
First Name	Mark	Last Name	Leonardo	Registration Number 41,433
Additional Signature may be generated within this form by selecting the Add button.				

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	<del>ALI-050ACON4</del> <u>122174-10134</u>
		Application Number	<u>13/959,708</u>
Title of Invention	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

## Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the international Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.





UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	122174-10134

**CONFIRMATION NO. 5622**

**POA ACCEPTANCE LETTER**

21125  
NUTTER MCCLENNEN & FISH LLP  
SEAPORT WEST  
155 SEAPORT BOULEVARD  
BOSTON, MA 02210-2604



Date Mailed: 07/19/2021

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 07/14/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/hteffer/



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Alexandria, Virginia 22313-1450  
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/959,708	08/05/2013	Gregory C. Burnett	122174-10134

150413  
Hard IP LLC (JAWB)  
48 Speir Dr.  
South Orange, NJ 07079

**CONFIRMATION NO. 5622**  
**POWER OF ATTORNEY NOTICE**



Date Mailed: 07/19/2021

**NOTICE REGARDING CHANGE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 07/14/2021.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/hteffer/



UNITED STATES PATENT AND TRADEMARK OFFICE

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Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

21125 7590 08/02/2021
NUTTER MCCLENNEN & FISH LLP
SEAPORT WEST
155 SEAPORT BOULEVARD
BOSTON, MA 02210-2604

EXAMINER
PIZARRO CRESPO, MARCOS D

ART UNIT 2814
PAPER NUMBER

DATE MAILED: 08/02/2021

Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO. Values: 13/959,708, 08/05/2013, Gregory C. Burnett, 122174-10134, 5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

Table with 7 columns: APPLN. TYPE, ENTITY STATUS, ISSUE FEE DUE, PUBLICATION FEE DUE, PREV. PAID ISSUE FEE, TOTAL FEE(S) DUE, DATE DUE. Values: nonprovisional, SMALL, \$600, \$0.00, \$480.00, \$120, 11/02/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

**PART B - FEE(S) TRANSMITTAL**

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21125 7590 08/02/2021  
 NUTTER MCCLENNEN & FISH LLP  
 SEAPORT WEST  
 155 SEAPORT BOULEVARD  
 BOSTON, MA 02210-2604

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

_____ (Typed or printed name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	08/05/2013	Gregory C. Burnett	122174-10134	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$480.00	\$120	11/02/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZARRO CRESPO, MARCOS D	2814	381-092000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address Form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively, _____ 1</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. _____ 2</p> <p>_____ 3</p>
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE \_\_\_\_\_ (B) RESIDENCE: (CITY and STATE OR COUNTRY) \_\_\_\_\_

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

4a. Fees submitted:  Issue Fee  Publication Fee (if required)  Advance Order - # of Copies \_\_\_\_\_

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

Electronic Payment via EFS-Web  Enclosed check  Non-electronic payment by credit card (Attach form PTO-2038)

The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. \_\_\_\_\_

5. Change in Entity Status (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29

Applicant asserting small entity status. See 37 CFR 1.27

Applicant changing to regular undiscounted fee status.

**NOTE:** Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

**NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

**NOTE:** Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

**NOTE:** This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_



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UNITED STATES DEPARTMENT OF COMMERCE
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Table with 5 columns: APPLICATION NO., FILING DATE, FIRST NAMED INVENTOR, ATTORNEY DOCKET NO., CONFIRMATION NO.
Row 1: 13/959,708, 08/05/2013, Gregory C. Burnett, 122174-10134, 5622
Row 2: 21125, 7590, 08/02/2021, NUTTER MCCLENNEN & FISH LLP, SEAPORT WEST, 155 SEAPORT BOULEVARD, BOSTON, MA 02210-2604
Row 3: EXAMINER PIZARRO CRESPO, MARCOS D
Row 4: ART UNIT 2814, PAPER NUMBER

DATE MAILED: 08/02/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

### Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b> 13/959,708	<b>Applicant(s)</b> Burnett, Gregory C.	
	<b>Examiner</b> MARCOS D PIZARRO	<b>Art Unit</b> 2814	<b>AIA (FITF) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1.  This communication is responsive to the submission filed on 11/9/2020.  
 A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.
2.  An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.
3.  The allowed claim(s) is/are 2-21. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).
4.  Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

**Certified copies:**

- a)  All      b)  Some      \*c)  None of the:
1.  Certified copies of the priority documents have been received.
  2.  Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3.  Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5.  CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
 including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6.  DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |   |   |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892)  | 5. <input checked="" type="checkbox"/> Examiner's Amendment/Comment       |
| 2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date _____.          | 6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| 3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material _____. | 7. <input type="checkbox"/> Other _____.                                  |
| 4. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date _____.                            |   |

/Marcos D. Pizarro/  
Primary Examiner, Art Unit 2814

Attorney's Docket Number: ALI-050ACON1  
Filing Date: 8/5/2013  
Applicant: Burnett

Examiner: Marcos D. Pizarro

**Detailed Action / Examiner's Comment**

This Office action responds to the submission filed on 11/9/2020.

***Notice of Pre-AIA or AIA Status***

1. The present application is being examined under the pre-AIA first to invent provisions. In the event the determination of the status of the application as subject to pre-AIA is incorrect, any correction of the statutory basis for a rejection, as subject to AIA instead, will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

***Terminal Disclaimer***

2. The terminal disclaimers filed on 11/2/2015 disclaiming the terminal portion of any patent granted on this application, which would extend beyond the expiration date of U.S. Patent No. 8,494,177 and any patent issued on U.S. Application No. 13/948,160 has been reviewed and is accepted.

***Reasons for Allowance***

3. Claims 2-21 are allowed.

4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Allowance."




### ***Conclusion***

5. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is (571) 273-8300. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marcos D. Pizarro at (571) 272-1716 and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via [Marcos.Pizarro@USPTO.gov](mailto:Marcos.Pizarro@USPTO.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on 571-272-1705. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either private PAIR or public PAIR. Status information for unpublished applications is available through private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marcos D. Pizarro/  
Primary Examiner, Art Unit 2814


MP/mp  
26 July 2021

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent Under Reexamination</b> Burnett, Gregory C.
	<b>Examiner</b> MARCOS D PIZARRO	<b>Art Unit</b> 2814

CPC						
Symbol				Type	Version	
H04R	/	1	/	1091	F	2013-01-01
G10L	/	21	/	0208	I	2013-01-01
H04R	/	1	/	406	I	2013-01-01
H04R	/	3	/	005	I	2013-01-01
H04R	/	3	/	04	I	2013-01-01
H04R	/	3	/	002	I	2013-01-01
G10L	/	2021	/	02165	A	2013-01-01
H04R	/	2460	/	01	A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version
/	/			

NONE	<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20
/Marcos D. Pizarro/ Primary Examiner, Art Unit 2814	26 July 2021	O.G. Print Claim(s)
(Primary Examiner)	(Date)	1
		O.G. Print Figure
		5


<b>Issue Classification</b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent Under Reexamination</b> Burnett, Gregory C.
	<b>Examiner</b> MARCOS D PIZARRO	<b>Art Unit</b> 2814

<b>INTERNATIONAL CLASSIFICATION</b>			
<b>CLAIMED</b>			
H04R		3	00
<b>NON-CLAIMED</b>			

<b>US ORIGINAL CLASSIFICATION</b>	
<b>CLASS</b>	<b>SUBCLASS</b>
381	92

<b>CROSS REFERENCES(S)</b>					
<b>CLASS</b>	<b>SUBCLASS (ONE SUBCLASS PER BLOCK)</b>				
381	94.7				
704	233				


NONE		<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20	
/Marcos D. Pizarro/ Primary Examiner, Art Unit 2814	26 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	5

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent Under Reexamination</b> Burnett, Gregory C.
	<b>Examiner</b> MARCOS D PIZARRO	<b>Art Unit</b> 2814

Claims renumbered in the same order as presented by applicant  
  CPA  
  T.D.  
  R.1.47


CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
7	2	18	11	5	20										
8	3	19	12	6	21										
9	4	20	13												
14	5	12	14												
15	6	13	15												
16	7	1	16												
10	8	2	17												
11	9	3	18												
17	10	4	19												

NONE	<b>Total Claims Allowed:</b>	
(Assistant Examiner)	(Date)	20
/Marcos D. Pizarro/ Primary Examiner, Art Unit 2814	26 July 2021	O.G. Print Claim(s)
(Primary Examiner)	(Date)	1
		O.G. Print Figure
		5

<b><i>Index of Claims</i></b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent Under Reexamination</b> Burnett, Gregory C.
	<b>Examiner</b> MARCOS D PIZARRO	<b>Art Unit</b> 2814

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

CLAIMS									
<input type="checkbox"/> Claims renumbered in the same order as presented by applicant <input type="checkbox"/> CPA <input checked="" type="checkbox"/> T.D. <input type="checkbox"/> R.1.47									
CLAIM		DATE							
Final	Original	05/08/2014	10/14/2014	04/30/2015	01/13/2016	11/15/2016	07/26/2021		
	1	✓	-	-	-	-	-		
7	2		✓	✓	=	=	=		
8	3		✓	✓	=	=	=		
9	4		✓	✓	=	=	=		
14	5		✓	✓	=	=	=		
15	6		✓	✓	=	=	=		
16	7		✓	✓	=	=	=		
10	8		✓	✓	=	=	=		
11	9		✓	✓	=	=	=		
17	10		✓	✓	=	=	=		
18	11		✓	✓	=	=	=		
19	12		✓	✓	=	=	=		
20	13		✓	✓	=	=	=		
12	14		✓	✓	=	=	=		
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2	17		✓	✓	=	=	=		
3	18		✓	✓	=	=	=		
4	19		✓	✓	=	=	=		
5	20		✓	✓	=	=	=		
6	21		✓	✓	=	=	=		

<b><i>Search Notes</i></b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent Under Reexamination</b> Burnett, Gregory C.
	<b>Examiner</b> MARCOS D PIZARRO	<b>Art Unit</b> 2814

CPC - Searched*		
Symbol	Date	Examiner
H04R3 / 002, 005, 04	07/26/2021	/MP/
G10L2021 / 02165	07/26/2021	/MP/
G10L21 / 0208	07/26/2021	/MP/
H04R1 / 1091, 406	07/26/2021	/MP/
H04R2460 / 01	07/26/2021	/MP/


CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner
381	92, 94.7	11/15/2016	MP
704	233	11/15/2016	MP

\* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
H04R3 / 002, 005, 04	07/26/2021	/MP/
G10L2021 / 02165	07/26/2021	/MP/
G10L21 / 0208	07/26/2021	/MP/
H04R1 / 1091, 406	07/26/2021	/MP/
H04R2460 / 01	07/26/2021	/MP/
USPat/PGPub classification and text search. See EAST Search History.	07/26/2021	/MP/

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<b><i>Search Notes</i></b> 	<b>Application/Control No.</b> 13/959,708	<b>Applicant(s)/Patent Under Reexamination</b> Burnett, Gregory C.
	<b>Examiner</b> MARCOS D PIZARRO	<b>Art Unit</b> 2814

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
H04R3	002, 005, 04	07/26/2021	/MP/
G10L2021	02165	07/26/2021	/MP/
G10L21	0208	07/26/2021	/MP/
H04R1	1091, 406	07/26/2021	/MP/
H04R2460	01	07/26/2021	/MP/

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## EAST Search History

### EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"20140185825"	US-PGPUB; USPAT	OR	OFF	2021/07/26 13:25
L2	1	"20020110256"	US-PGPUB; USPAT	OR	OFF	2021/07/26 13:25
L5	2,204	h04R1/1091.cpc.	US-PGPUB; USPAT	OR	ON	2021/07/26 13:28
L6	3,569	h04R1/406.cpc.	US-PGPUB; USPAT	OR	ON	2021/07/26 13:28
L7	46	5 and 6	US-PGPUB; USPAT	OR	ON	2021/07/26 13:28
L9	11,814	h04r3/002,005,04.cpc.	US-PGPUB; USPAT	OR	ON	2021/07/26 13:29
L10	5,727	5 6	US-PGPUB; USPAT	OR	ON	2021/07/26 13:29
L11	2,784	9 and 10	US-PGPUB; USPAT	OR	ON	2021/07/26 13:29
L12	1,391	h04r2460/01.cpc.	US-PGPUB; USPAT	OR	ON	2021/07/26 13:30
L13	73	11 and 12	US-PGPUB; USPAT	OR	ON	2021/07/26 13:30
L14	4,513	g10I21/0208.cpc.	US-PGPUB; USPAT	OR	ON	2021/07/26 13:31
L15	101	14 and 12	US-PGPUB; USPAT	OR	ON	2021/07/26 13:32
L16	725	g10I2021/02165.cpc.	US-PGPUB; USPAT	OR	ON	2021/07/26 13:33

### EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	41	burnett.in. and (virtual adj microphone)	US- PGPUB	OR	ON	2021/07/26 13:25
L4	113	(virtual adj microphone).clm.	US- PGPUB	OR	ON	2021/07/26 13:25

7/26/21 1:34:02 PM

C:\Users\mpizarro\Documents\EAST\Workspaces\%13959708.wsp







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BIB DATA SHEET

CONFIRMATION NO. 5622

<b>SERIAL NUMBER</b> 13/959,708	<b>FILING or 371(c) DATE</b> 08/05/2013 <b>RULE</b>	<b>CLASS</b> 381	<b>GROUP ART UNIT</b> 2814	<b>ATTORNEY DOCKET NO.</b> 122174-10134	
<b>APPLICANTS</b> JAWB Acquisition LLC, New York, NY; <b>INVENTORS</b> Gregory C. Burnett, Dodge Center, MN; <b>** CONTINUING DATA *****</b> This application is a CON of 12/139,333 06/13/2008 PAT 8503691 which claims benefit of 60/934,551 06/13/2007 and claims benefit of 60/953,444 08/01/2007 and claims benefit of 60/954,712 08/08/2007 and claims benefit of 61/045,377 04/16/2008 <b>** FOREIGN APPLICATIONS *****</b> <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED *** SMALL ENTITY **</b> 08/20/2013					
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and /MARCOS D PIZARRO/ Acknowledged _____ Examiner's Signature	<input type="checkbox"/> Met after Allowance _____ Initials	<b>STATE OR COUNTRY</b> MN	<b>SHEETS DRAWINGS</b> 17	<b>TOTAL CLAIMS</b> 1	<b>INDEPENDENT CLAIMS</b> 1
<b>ADDRESS</b> NUTTER MCCLENNEN & FISH LLP SEAPORT WEST 155 SEAPORT BOULEVARD BOSTON, MA 02210-2604 UNITED STATES					
<b>TITLE</b> FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)					
<b>FILING FEE RECEIVED</b> 1820	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		



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Table with 7 columns: APPLICATION NUMBER, FILING or 371(c) DATE, GRP ART UNIT, FIL FEE REC'D, ATTY. DOCKET NO, TOT CLAIMS, IND CLAIMS. Row 1: 13/959,708, 08/05/2013, 2814, 1820, 122174-10134, 1, 1

CONFIRMATION NO. 5622
CORRECTED FILING RECEIPT

21125
NUTTER MCCLENNEN & FISH LLP
SEAPORT WEST
155 SEAPORT BOULEVARD
BOSTON, MA 02210-2604



Date Mailed: 08/10/2021

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Gregory C. Burnett, Dodge Center, MN;

Applicant(s)

Jawbone Innovations, LLC, Marshall, TX;

Assignment For Published Patent Application

Jawbone Innovations, LLC, Marshall, TX

Power of Attorney: The patent practitioners associated with Customer Number 21125

Domestic Priority data as claimed by applicant

This application is a CON of 12/139,333 06/13/2008 PAT 8503691
which claims benefit of 60/934,551 06/13/2007
and claims benefit of 60/953,444 08/01/2007
and claims benefit of 60/954,712 08/08/2007
and claims benefit of 61/045,377 04/16/2008

Foreign Applications for which priority is claimed (You may be eligible to benefit from the Patent Prosecution Highway program at the USPTO. Please see http://www.uspto.gov for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: No

**Permission to Access Search Results:** No

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

**If Required, Foreign Filing License Granted:** 08/20/2013

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/959,708**

**Projected Publication Date:** Not Applicable

**Non-Publication Request:** No

**Early Publication Request:** No

**\*\* SMALL ENTITY \*\***

**Title**

FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

**Preliminary Class**

381

**Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications:** No

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For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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21125 7590 08/02/2021  
 NUTTER MCCLENNEN & FISH LLP  
 Seaport West  
 155 Seaport Boulevard  
 Boston, Massachusetts 02210-2604

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Jeffrey T. Klayman	(Typed or printed name)
/Jeffrey T. Klayman, #39,250/	(Signature)
August 12, 2021	(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
13/959,708	08/05/2013	Gregory C. Burnett	122174-10134	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN: TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$480.00	\$120	11/02/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZZARO CRESPO, MARCOS D	2814	381-092000

<p>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363)</p> <p><input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.</p> <p><input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. <b>Use of a Customer Number is required.</b></p>	<p>2. For printing on the patent front page, list</p> <p>(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,</p> <p>(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.</p>
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1. Nutter McClennen & Fish LLP
- 2.
- 3.

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: **Jawbone Innovations, LLC**

(B) RESIDENCE: (CITY AND STATE or COUNTRY) **Marshall, Texas**

Please check the appropriate assignee category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

4a. Fees Submitted:  Issue Fee  Publication Fee (if required)  Advance Order - # of Copies \_\_\_\_\_

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Applicant asserting small entity status. See 37 CFR 1.27. NOTE: If the application was previously under micro entity status, checking this box will be taken as a notification of loss of entitlement to micro entity status.

Applicant changing to regular undiscounted fee status. NOTE: Checking this box will be taken as a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature	/Jeffrey T. Klayman, #39,250/	Date	August 12, 2021
Typed or printed name	Jeffrey T. Klayman	Registration No.	39,250

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	43496165
<b>Application Number:</b>	13959708
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5622
<b>Title of Invention:</b>	FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)
<b>First Named Inventor/Applicant Name:</b>	Gregory C. Burnett
<b>Customer Number:</b>	21125
<b>Filer:</b>	Jeffrey T. Klayman
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	122174-10134
<b>Receipt Date:</b>	12-AUG-2021
<b>Filing Date:</b>	05-AUG-2013
<b>Time Stamp:</b>	15:39:49
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	no
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### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	122174-10134_issue_fee_trans mittal.pdf	142012 680d867689e377a9e0ec3a19a8a59306a5649d25	no	1

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<b>Information:</b>	
<b>Total Files Size (in bytes):</b>	142012
<p><b>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</b></p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  <b>If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</b></p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  <b>If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</b></p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  <b>If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</b></p>	

*fw*

**PART B-FEE(S) TRANSMITTAL**

Complete and send this form, together with the applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

By fax, send to: (571) 273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

21125 7590 08/02/2021  
NUTTER MCCLENNEN & FISH LLP  
Seaport West  
155 Seaport Boulevard  
Boston, Massachusetts 02210-2604



Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Jeffrey T. Klayman	(Typed or printed name)
/Jeffrey T. Klayman, #39,250/	(Signature)
August 12, 2021	(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
13/959,708	08/05/2013	Gregory C. Burnett	122174-10134	5622

TITLE OF INVENTION: FORMING VIRTUAL MICROPHONE ARRAYS USING DUAL OMNIDIRECTIONAL MICROPHONE ARRAY (DOMA)

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$600	\$0.00	\$480.00	\$120	11/02/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
PIZZARO CRESPO, MARCOS D	2814	381-092000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363)

Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

"Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1. Nutter McClellenn & Fish LLP

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: **Jawbone Innovations, LLC**

(B) RESIDENCE: (CITY and STATE or COUNTRY) **Marshall, Texas**

Please check the appropriate category or categories (will not be printed on the patent):  Individual  Corporation or other private group entity  Government

4a. Fees Submitted:  Issue Fee  Publication Fee (if required)  Advance Order - # of Copies \_\_\_\_\_

4b. Method of Payment (Please first reapply any previously paid fee shown above):

Electronic Payment via EFS-Web  Enclosed check  Non-electronic payment by credit card (Attach form PTO-2038)

The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 141449

5. Change of Entity Status (from status indicated above)

Applicant certifying micro entity status. See 37 CFR 1.29. NOTE: Absent a valid Certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

Applicant asserting small entity status. See 37 CFR 1.27. NOTE: If the application was previously under micro entity status, checking this box will be taken as a notification of loss of entitlement to micro entity status.

Applicant changing to regular undiscounted fee status. NOTE: Checking this box will be taken as a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature: /Jeffrey T. Klayman, #39,250/ Date: August 12, 2021  
Typed or printed name: Jeffrey T. Klayman Registration No.: 39,250



# United States Patent and Trademark Office

*Office of the Chief Financial Officer*

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Sale Item Reference Number	Effective Date
13959708	08/12/2021

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20218C039280826	2501	UTILITY APPL ISSUE FEE	\$480.00	Sale
I20218C039280826	2501	UTILITY APPL ISSUE FEE	\$120.00	Deposit Account



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United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/959,708	09/14/2021	11122357	122174-10134	5622

21125 7590 08/25/2021  
NUTTER MCCLENNEN & FISH LLP  
SEAPORT WEST  
155 SEAPORT BOULEVARD  
BOSTON, MA 02210-2604

## ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Gregory C. Burnett, Dodge Center, MN;  
Jawbone Innovations, LLC, Marshall, TX;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit [SelectUSA.gov](http://SelectUSA.gov).

AO 120 (Rev. 08/10)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF</b> <b>AN ACTION REGARDING A PATENT</b> <b>OR TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas - Waco Division on the following  Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.);

DOCKET NO. 6:21-cv-00984	DATE FILED September 23, 2021	U.S. DISTRICT COURT Western District of Texas - Waco Division
PLAINTIFF  Jawbone Innovations, LLC		DEFENDANT  Apple Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,019,091	2/8/2005	Jawbone Innovations, LLC
2 7,246,058	7/17/2007	Jawbone Innovations, LLC
3 8,280,072	10/2/2012	Jawbone Innovations, LLC
4 8,321,213	11/27/2012	Jawbone Innovations, LLC
5 8,326,611	12/4/2012	Jawbone Innovations, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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AO 120 (Rev. 08/10)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE                  FILING OR DETERMINATION OF                  AN ACTION REGARDING A PATENT                  OR TRADEMARK</b>
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DOCKET NO. 6:21-cv-00984	DATE FILED September 23, 2021	U.S. DISTRICT COURT Western District of Texas - Waco Division
PLAINTIFF  Jawbone Innovations, LLC		DEFENDANT  Apple Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 10,799,080	9/15/2020	Jawbone Innovations, LLC
2 11,122,357	9/14/2021	Jawbone Innovations, LLC
3 8,467,543	6/18/2014	Jawbone Innovations, LLC
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In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
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AO 120 (Rev. 08/10)

<b>TO:</b> <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF</b> <b>AN ACTION REGARDING A PATENT</b> <b>OR TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Texas - Waco Division on the following

Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 6:21-cv-00985	DATE FILED September 23, 2021	U.S. DISTRICT COURT <b>Western District of Texas - Waco Division</b>
PLAINTIFF  Jawbone Innovations, LLC		DEFENDANT  Google LLC
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,019,091	2/8/2005	Jawbone Innovations, LLC
2 7,246,058	7/17/2007	Jawbone Innovations, LLC
3 8,280,072	10/2/2012	Jawbone Innovations, LLC
4 8,321,213	11/27/2012	Jawbone Innovations, LLC
5 8,326,611	12/4/2012	Jawbone Innovations, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
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<b>TO:</b> <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF</b> <b>AN ACTION REGARDING A PATENT</b> <b>OR TRADEMARK</b>
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PLAINTIFF  Jawbone Innovations, LLC		DEFENDANT  Google LLC
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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2 11,122,357	9/14/2021	Jawbone Innovations, LLC
3 8,467,543	6/18/2014	Jawbone Innovations, LLC
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# AMENDED

AG 120 (Rev. 08/10)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> P.O. Box 1459 Alexandria, VA 22313-1459	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court **for the Eastern District of Texas, Marshall Division** on the following

Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.)

DOCKET NO. <b>2:21-cv-00186-JRG</b>	DATE FILED <b>10/26/2021</b>	U.S. DISTRICT COURT <b>for the Eastern District of Texas, Marshall Division</b>
PLAINTIFF  <b>JAWBONE INNOVATIONS, LLC</b>		DEPENDANT  <b>SAMSUNG ELECTRONICS CO. LTD. and SAMSUNG ELECTRONICS AMERICA, INC.</b>
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 <b>8,019,091</b>	<b>9/13/2011</b>	<b>Jawbone Innovations, LLC</b>
2 <b>8,280,072</b>	<b>10/2/2012</b>	<b>Jawbone Innovations, LLC</b>
3 <b>7,246,058</b>	<b>7/17/2007</b>	<b>Jawbone Innovations, LLC</b>
4 <b>10,779,080</b>	<b>9/15/2020</b>	<b>Jawbone Innovations, LLC</b>
5 <b>11,122,357</b>	<b>9/14/2021</b>	<b>Jawbone Innovations, LLC</b>

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK
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DECISION/JUDGEMENT
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AG 120 (Rev. 08/16)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> P.O. Box 1459 Alexandria, VA 22313-1459	<b>REPORT ON THE                  FILING OR DETERMINATION OF AN                  ACTION REGARDING A PATENT OR                  TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court **for the Eastern District of Texas, Marshall Division** on the following

Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.);

DOCKET NO. <b>2:21-cv-00186-JRG</b>	DATE FILED <b>10/26/2021</b>	U.S. DISTRICT COURT <b>for the Eastern District of Texas, Marshall Division</b>
PLAINTIFF  <b>JAWBONE INNOVATIONS, LLC</b>		DEPENDANT  <b>SAMSUNG ELECTRONICS CO. LTD. and SAMSUNG ELECTRONICS AMERICA, INC.</b>
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 <b>8,467,543</b>	<b>6/18/2013</b>	<b>Jawbone Innovations, LLC</b>
2 <b>8,503,691</b>	<b>8/6/2013</b>	<b>Jawbone Innovations, LLC</b>
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In the above—entitled case, the following patent(s) trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
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In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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AG 120 (Rev. 08/15)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> P.O. Box 1450 Alexandria, VA 22313-1450	<b>REPORT ON THE                  FILING OR DETERMINATION OF AN                  ACTION REGARDING A PATENT OR                  TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following

Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.)

DOCKET NO. 2:21-cv-00435	DATE FILED 11/29/2021	U.S. DISTRICT COURT for the Eastern District of Texas, Marshall Division
PLAINTIFF  Jawbone Innovations, LLC		DEPENDANT  Amazon.com, Inc. and Amazon.com Services, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,019,091	9/13/2011	Jawbone Innovations, LLC
2 7,246,058	7/17/2007	Jawbone Innovations, LLC
3 8,280,072	10/2/2012	Jawbone Innovations, LLC
4 8,321,213	11/17/2012	Jawbone Innovations, LLC
5 8,326,611	12/4/2012	Jawbone Innovations, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY	<input type="checkbox"/> Amendment	<input type="checkbox"/> Answer	<input type="checkbox"/> Cross Bill	<input type="checkbox"/> Other Pleading
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK			
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AG 120 (Rev. 08/15)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	<b>REPORT ON THE                  FILING OR DETERMINATION OF AN                  ACTION REGARDING A PATENT OR                  TRADEMARK</b>
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Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.)

DOCKET NO. 2:21-cv-00435	DATE FILED 11/29/2021	U.S. DISTRICT COURT for the Eastern District of Texas, Marshall Division
PLAINTIFF  Jawbone Innovations, LLC		DEPENDANT  Amazon.com, Inc. and Amazon.com Services, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 10,779,080	9/15/2020	Jawbone Innovations, LLC
2 11,122,357	9/14/2021	Jawbone Innovations, LLC
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AO 120 (Rev. 08/10)

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 Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.):

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PLAINTIFF  Jawbone Innovations, LLC		DEFENDANT  Amazon.com, Inc. and Amazon.com Services, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,019,091	9/13/2011	Jawbone Innovations, LLC
2 7,246,058	7/17/2007	Jawbone Innovations, LLC
3 8,280,072	10/2/2012	Jawbone Innovations, LLC
4 8,321,213	11/17/2012	Jawbone Innovations, LLC
5 8,326,611	12/4/2012	Jawbone Innovations, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY
	<input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK
1	
2	
3	
4	
5	

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
 Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy

AO 120 (Rev. 08/10)

<b>TO:</b> Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	<b>REPORT ON THE                  FILING OR DETERMINATION OF AN                  ACTION REGARDING A PATENT OR                  TRADEMARK</b>
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court for the Eastern District of Texas, Marshall Division on the following  
 Trademarks or  Patents. (  the patent action involves 35 U.S.C. § 292.)

DOCKET NO. 2:21-cv-00435	DATE FILED 11/29/2021	U.S. DISTRICT COURT for the Eastern District of Texas, Marshall Division
PLAINTIFF Jawbone Innovations, LLC		DEFENDANT Amazon.com, Inc. and Amazon.com Services, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 10,779,080	9/15/2020	Jawbone Innovations, LLC
2 11,122,357	9/14/2021	Jawbone Innovations, LLC
3 8,467,543	6/18/2013	Jawbone Innovations, LLC
4		
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input type="checkbox"/> Other Pleading		
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK	
1			
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3			
4			
5			

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
 Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy