UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FITBIT, INC.
Petitioner

v.

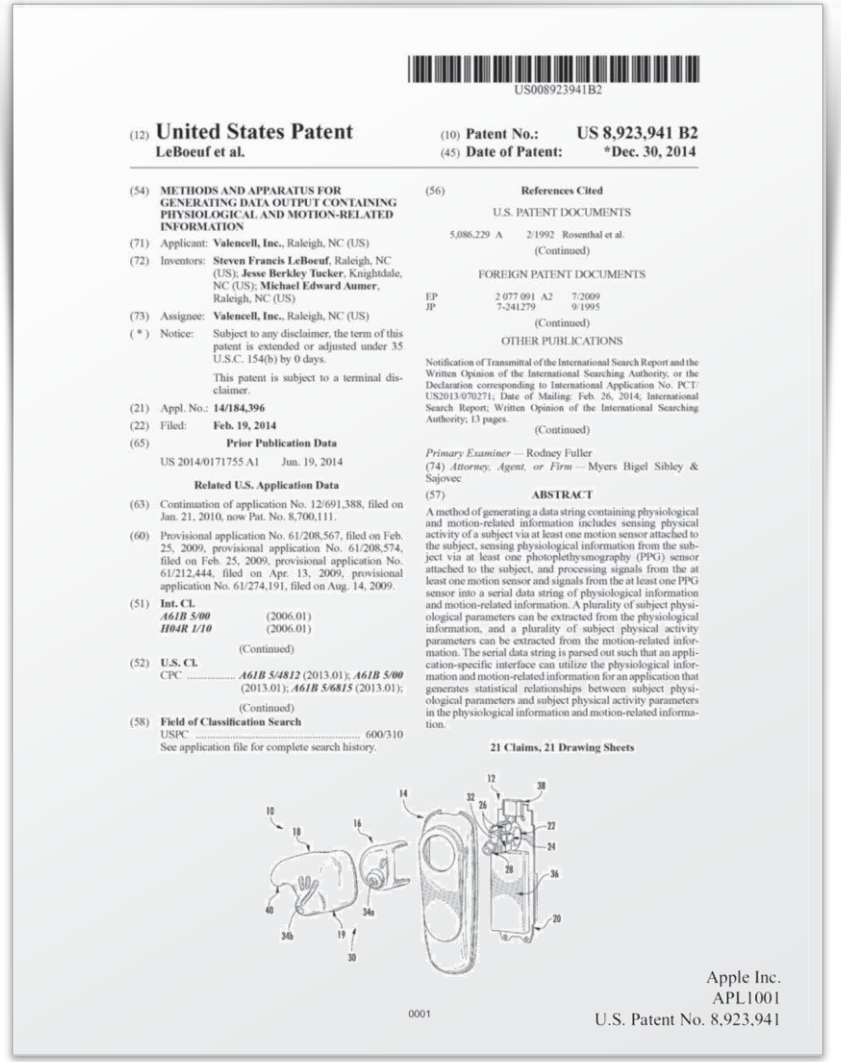
VALENCELL, INC.
Patent Owner

Case IPR2017-00319
Patent 8,923,941 B2

Petitioner's Demonstratives on Remand

December 11, 2020

U.S. Patent No. 8,923,941 – Claims



US008923941B2

(12) **United States Patent**
LeBoeuf et al.

(10) **Patent No.: US 8,923,941 B2**
(45) **Date of Patent: *Dec. 30, 2014**

(54) **METHODS AND APPARATUS FOR GENERATING DATA OUTPUT CONTAINING PHYSIOLOGICAL AND MOTION-RELATED INFORMATION**

(71) Applicant: **Valencell, Inc.**, Raleigh, NC (US)

(72) Inventors: **Steven Francis LeBoeuf**, Raleigh, NC (US); **Jesse Berkley Tucker**, Knightdale, NC (US); **Michael Edward Aumer**, Raleigh, NC (US)

(73) Assignee: **Valencell, Inc.**, Raleigh, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/184,396**

(22) Filed: **Feb. 19, 2014**

(65) **Prior Publication Data**

US 2014/0171755 A1 Jun. 19, 2014

Related U.S. Application Data

(63) Continuation of application No. 12/691,388, filed on Jan. 21, 2010, now Pat. No. 8,700,111.

(60) Provisional application No. 61/208,567, filed on Feb. 25, 2009, provisional application No. 61/208,574, filed on Feb. 25, 2009, provisional application No. 61/212,444, filed on Apr. 13, 2009, provisional application No. 61/274,191, filed on Aug. 14, 2009.

(51) **Int. Cl.**
A61B 5/00 (2006.01)
H04R 1/10 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 5/4812*** (2013.01); ***A61B 5/00*** (2013.01); ***A61B 5/6815*** (2013.01);
(Continued)

(58) **Field of Classification Search**
USPC 600/310
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,086,229 A 2/1992 Rosenthal et al.
(Continued)

FOREIGN PATENT DOCUMENTS

EP 2 077 091 A2 7/2009
JP 7-241279 9/1995
(Continued)

OTHER PUBLICATIONS

Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration corresponding to International Application No. PCT/US2013/070271; Date of Mailing: Feb. 26, 2014; International Search Report; Written Opinion of the International Searching Authority; 13 pages.
(Continued)

Primary Examiner — Rodney Fuller
(74) *Attorney, Agent, or Firm* — Myers Bigel Sibley & Sajovec

(57) **ABSTRACT**

A method of generating a data string containing physiological and motion-related information includes sensing physical activity of a subject via at least one motion sensor attached to the subject, sensing physiological information from the subject via at least one photoplethysmography (PPG) sensor attached to the subject, and processing signals from the at least one motion sensor and signals from the at least one PPG sensor into a serial data string of physiological information and motion-related information. A plurality of subject physiological parameters can be extracted from the physiological information, and a plurality of subject physical activity parameters can be extracted from the motion-related information. The serial data string is parsed out such that an application-specific interface can utilize the physiological information and motion-related information for an application that generates statistical relationships between subject physiological parameters and subject physical activity parameters in the physiological information and motion-related information.

21 Claims, 21 Drawing Sheets

0001

Apple Inc.
APL1001
U.S. Patent No. 8,923,941

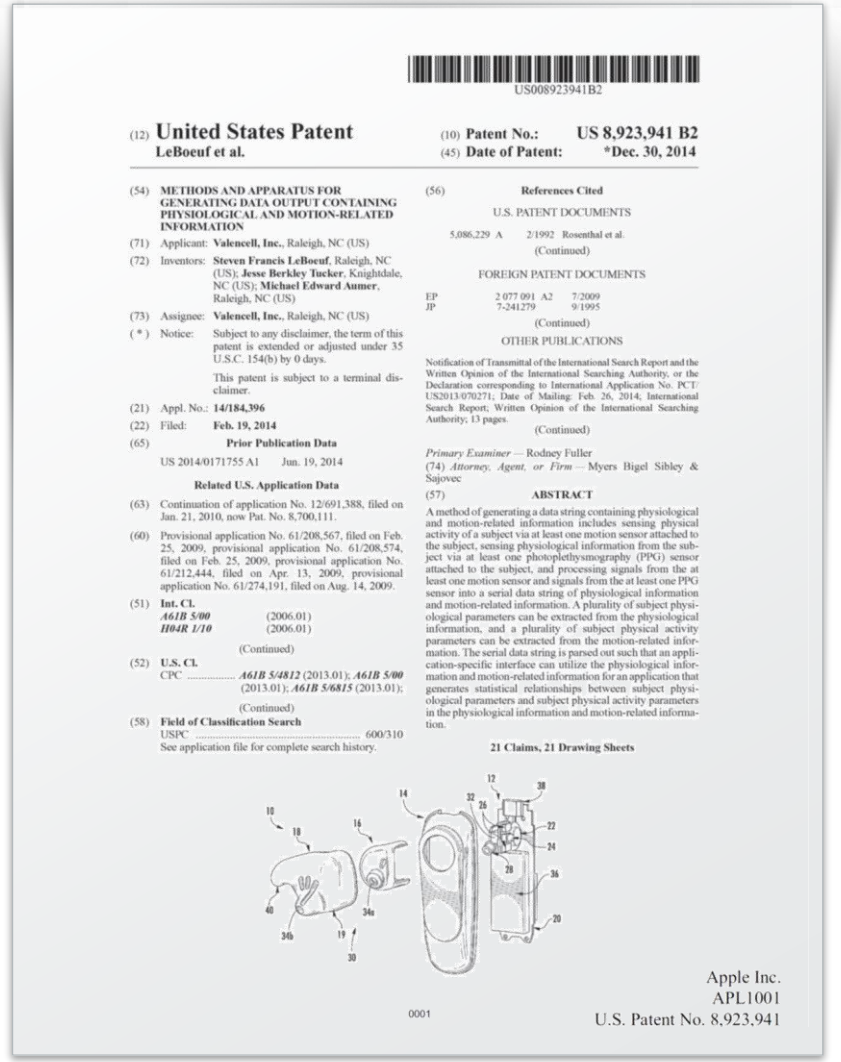
1. A method of generating data output containing physiological and motion-related information, the method comprising:

sensing physical activity and physiological information from a subject via a single monitoring device attached to the subject, wherein the monitoring device comprises at least one motion sensor for sensing the physical activity and at least one photoplethysmography (PPG) sensor for sensing the physiological information; and

processing signals from the at least one motion sensor and signals from the at least one PPG sensor via a processor of the monitoring device into a serial data output of physiological information and motion-related information, wherein the serial data output is configured such that a plurality of subject physiological parameters comprising subject heart rate and subject respiration rate can be extracted from the physiological information and such that a plurality of subject physical activity parameters can be extracted from the motion-related information.

'941 Patent, Claim 1

U.S. Patent No. 8,923,941 – Claims



US008923941B2

(12) **United States Patent**
LeBoeuf et al.

(10) **Patent No.: US 8,923,941 B2**
(45) **Date of Patent: *Dec. 30, 2014**

(54) **METHODS AND APPARATUS FOR GENERATING DATA OUTPUT CONTAINING PHYSIOLOGICAL AND MOTION-RELATED INFORMATION**

(71) Applicant: **Valencell, Inc.**, Raleigh, NC (US)

(72) Inventors: **Steven Francis LeBoeuf**, Raleigh, NC (US); **Jesse Berkley Tucker**, Knightdale, NC (US); **Michael Edward Aumer**, Raleigh, NC (US)

(73) Assignee: **Valencell, Inc.**, Raleigh, NC (US)

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(51) **Int. Cl.**
A61B 5/00 (2006.01)
H04R 1/10 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 5/4812*** (2013.01); ***A61B 5/00*** (2013.01); ***A61B 5/6815*** (2013.01);
(Continued)

(58) **Field of Classification Search**
USPC 600/310
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,086,229 A 2/1992 Rosenthal et al.
(Continued)

FOREIGN PATENT DOCUMENTS

EP 2 077 091 A2 7/2009
JP 7-241279 9/1995
(Continued)

OTHER PUBLICATIONS

Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration corresponding to International Application No. PCT/US2013/070271; Date of Mailing: Feb. 26, 2014; International Search Report; Written Opinion of the International Searching Authority; 13 pages.
(Continued)

Primary Examiner — Rodney Fuller
(74) *Attorney, Agent, or Firm* — Myers Bigel Sibley & Sajovec

(57) **ABSTRACT**

A method of generating a data string containing physiological and motion-related information includes sensing physical activity of a subject via at least one motion sensor attached to the subject, sensing physiological information from the subject via at least one photoplethysmography (PPG) sensor attached to the subject, and processing signals from the at least one motion sensor and signals from the at least one PPG sensor into a serial data string of physiological information and motion-related information. A plurality of subject physiological parameters can be extracted from the physiological information, and a plurality of subject physical activity parameters can be extracted from the motion-related information. The serial data string is parsed out such that an application-specific interface can utilize the physiological information and motion-related information for an application that generates statistical relationships between subject physiological parameters and subject physical activity parameters in the physiological information and motion-related information.

21 Claims, 21 Drawing Sheets

0001

Apple Inc.
APL1001
U.S. Patent No. 8,923,941

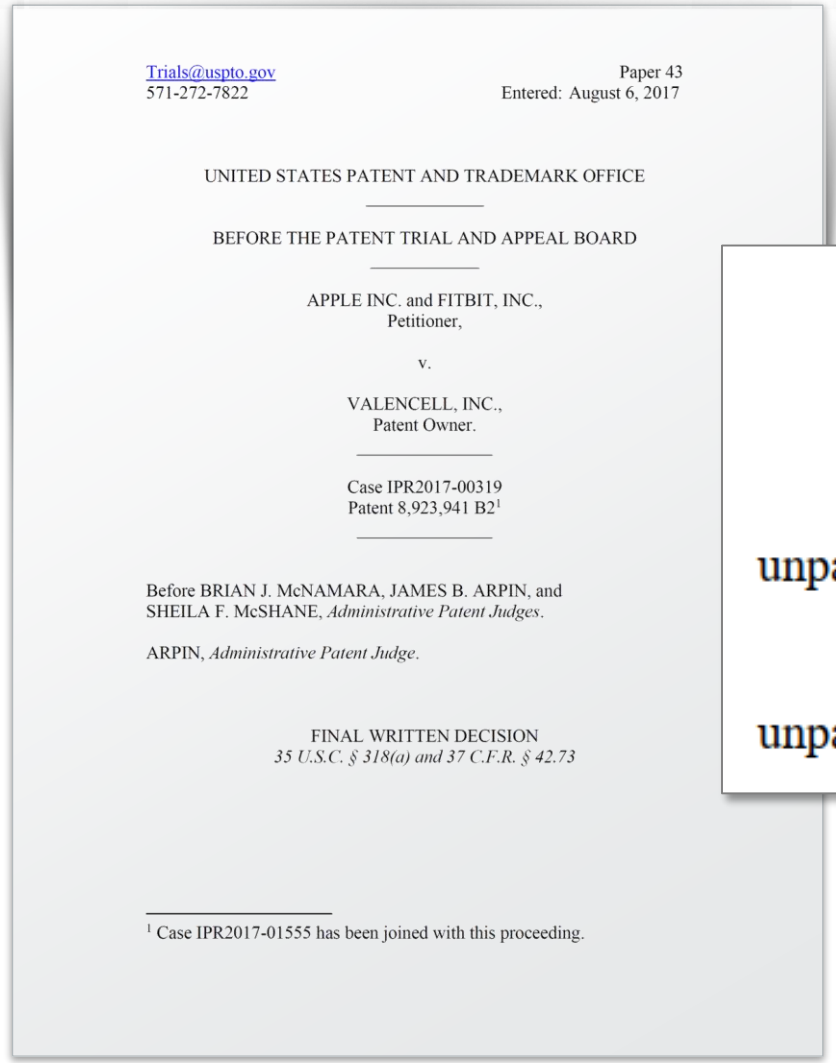
3. The method of claim **1**, wherein the serial data output is parsed out such that an application-specific interface (API) can utilize the physiological information and motion-related information for an application.

4. The method of claim **1**, wherein the application is configured to generate statistical relationships between subject physiological parameters and subject physical activity parameters in the physiological information and motion-related information.

5. The method of claim **4**, wherein the application is configured to generate statistical relationships between subject physiological parameters and subject physical activity parameters via at least one of the following: principal component analysis, multiple linear regression, machine learning, and Bland-Altman plots.

'941 Patent, Claim 3-5

The Board Previously Found Independent Claim 1 Invalid



Trials@uspto.gov
571-272-7822

Paper 43
Entered: August 6, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC. and FITBIT, INC.,
Petitioner,

v.

VALENCELL, INC.,
Patent Owner.

Case IPR2017-00319
Patent 8,923,941 B2[1]

Before BRIAN J. McNAMARA, JAMES B. ARPIN, and SHEILA F. McSHANE, *Administrative Patent Judges*.

ARPIN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

[1] Case IPR2017-01555 has been joined with this proceeding.

VI. ORDER

In consideration of the foregoing, it is

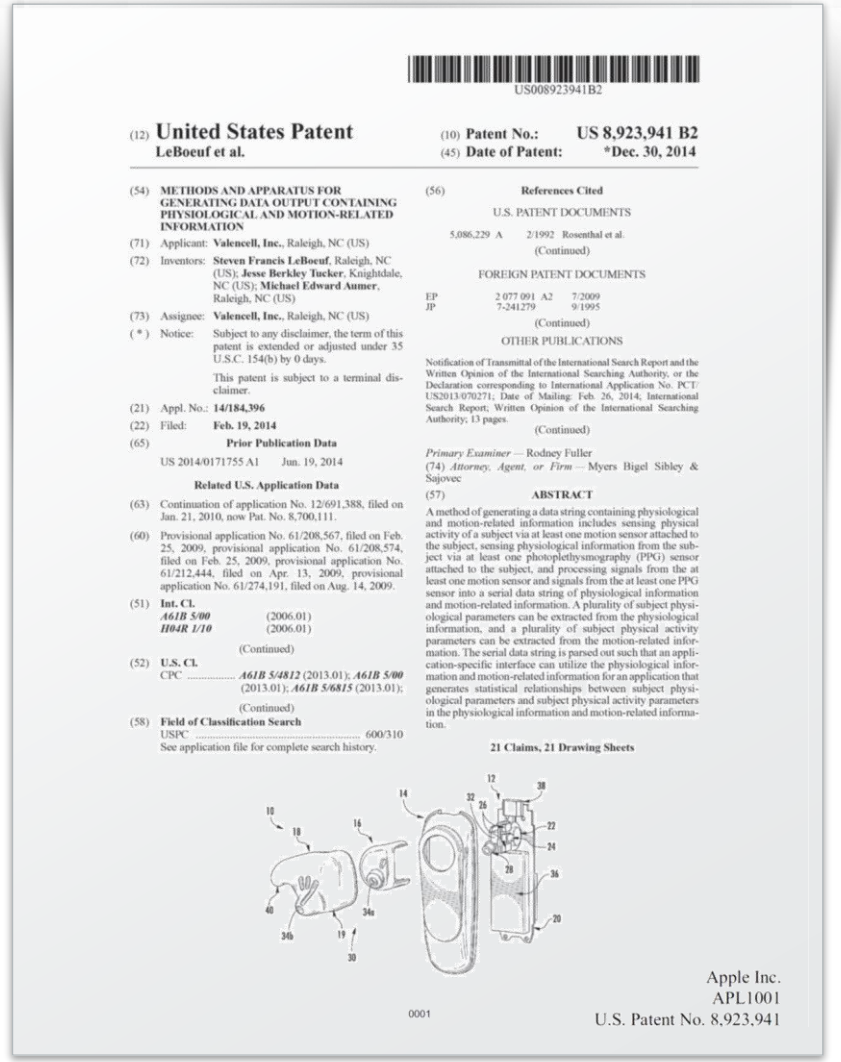
ORDERED that claims 1, 2, and 6–13 of the '941 patent are unpatentable;

FURTHER ORDERED that claims 3–5 of the '941 patent are not unpatentable; and

Paper No. 43 at 78

Claim 3

U.S. Patent No. 8,923,941 – Claim 3



US008923941B2

(12) **United States Patent**
LeBoeuf et al.

(10) **Patent No.: US 8,923,941 B2**
(45) **Date of Patent: *Dec. 30, 2014**

(54) **METHODS AND APPARATUS FOR GENERATING DATA OUTPUT CONTAINING PHYSIOLOGICAL AND MOTION-RELATED INFORMATION**

(71) Applicant: **Valencell, Inc.**, Raleigh, NC (US)

(72) Inventors: **Steven Francis LeBoeuf**, Raleigh, NC (US); **Jesse Berkley Tucker**, Knightdale, NC (US); **Michael Edward Aumer**, Raleigh, NC (US)

(73) Assignee: **Valencell, Inc.**, Raleigh, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/184,396**

(22) Filed: **Feb. 19, 2014**

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US 2014/0171755 A1 Jun. 19, 2014

Related U.S. Application Data

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(60) Provisional application No. 61/208,567, filed on Feb. 25, 2009, provisional application No. 61/208,574, filed on Feb. 25, 2009, provisional application No. 61/212,444, filed on Apr. 13, 2009, provisional application No. 61/274,191, filed on Aug. 14, 2009.

(51) **Int. Cl.**
A61B 5/00 (2006.01)
H04R 1/10 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 5/4812*** (2013.01); ***A61B 5/00*** (2013.01); ***A61B 5/6815*** (2013.01);
(Continued)

(58) **Field of Classification Search**
USPC 600/310
See application file for complete search history.

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5,086,229 A 2/1992 Rosenthal et al.
(Continued)

FOREIGN PATENT DOCUMENTS

EP 2 077 091 A2 7/2009
JP 7-241279 9/1995
(Continued)

OTHER PUBLICATIONS

Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration corresponding to International Application No. PCT/US2013/070271; Date of Mailing: Feb. 26, 2014; International Search Report; Written Opinion of the International Searching Authority; 13 pages.
(Continued)

Primary Examiner — Rodney Fuller
(74) *Attorney, Agent, or Firm* — Myers Bigel Sibley & Sajovec

(57) **ABSTRACT**

A method of generating a data string containing physiological and motion-related information includes sensing physical activity of a subject via at least one motion sensor attached to the subject, sensing physiological information from the subject via at least one photoplethysmography (PPG) sensor attached to the subject, and processing signals from the at least one motion sensor and signals from the at least one PPG sensor into a serial data string of physiological information and motion-related information. A plurality of subject physiological parameters can be extracted from the physiological information, and a plurality of subject physical activity parameters can be extracted from the motion-related information. The serial data string is parsed out such that an application-specific interface can utilize the physiological information and motion-related information for an application that generates statistical relationships between subject physiological parameters and subject physical activity parameters in the physiological information and motion-related information.

21 Claims, 21 Drawing Sheets

0001

Apple Inc.
APL1001
U.S. Patent No. 8,923,941

> **3**. The method of claim **1**, wherein the serial data output is parsed out such that an application-specific interface (API) can utilize the physiological information and motion-related information for an application.

'941 Patent, Claim 3

> The multiplexed data outputs **604** may be a serial data string of activity and physiological information **700** (FIG. **18**) parsed out specifically such that an application-specific interface (API) can utilize the data as required for a particular application. The applications may use this data to generate high-level assessments, such as overall fitness or overall health.

'941 Patent at 26:15-21

The Board's Construction of "Application-Specific Interface (API)"

The Board construed "application-specific interface (API)" to mean "an interface which enables a particular application to utilize data obtained from hardware, such as the at least one motion sensor and the at least one PPG [photoplethysmography] sensor." Board Op. at *7. We agree that this is the correct construction of this term.

Fitbit had proposed a broader construction, stating that when given its broadest reasonable interpretation, "application-specific interface (API)" renders claim 3 unpatentable as obvious in view of several cited references. Fitbit argues that the broadest reasonable interpretation of "application-specific interface (API) . . . include[s] at least an application interface that specifies how some software components should interact with each other." Fitbit

Fitbit, Inc. v. Valencell, Inc., 964 F.3d 1112, 1117 (Fed. Cir. 2020)

The Board's Construction of "Application-Specific Interface (API)"

> The Board concluded that the narrower claim construction is correct, reasoning that an "'application-specific interface (API)' is directed to a 'particular application,' rather than *broadly* to different applications." Board Op. at *7 (emphasis in original). We agree, for this interpretation conforms to the specification and the prosecution history. We, therefore, sustain the Board's construction of this term. The Board's narrowing construction may have no significance, where, as here, the claimed "application-specific interface" performs the same function as an application programming interface, i.e., "enabl[ing] a particular application to utilize data obtained from hardware." *Id.* On remand the Board may consider this aspect.

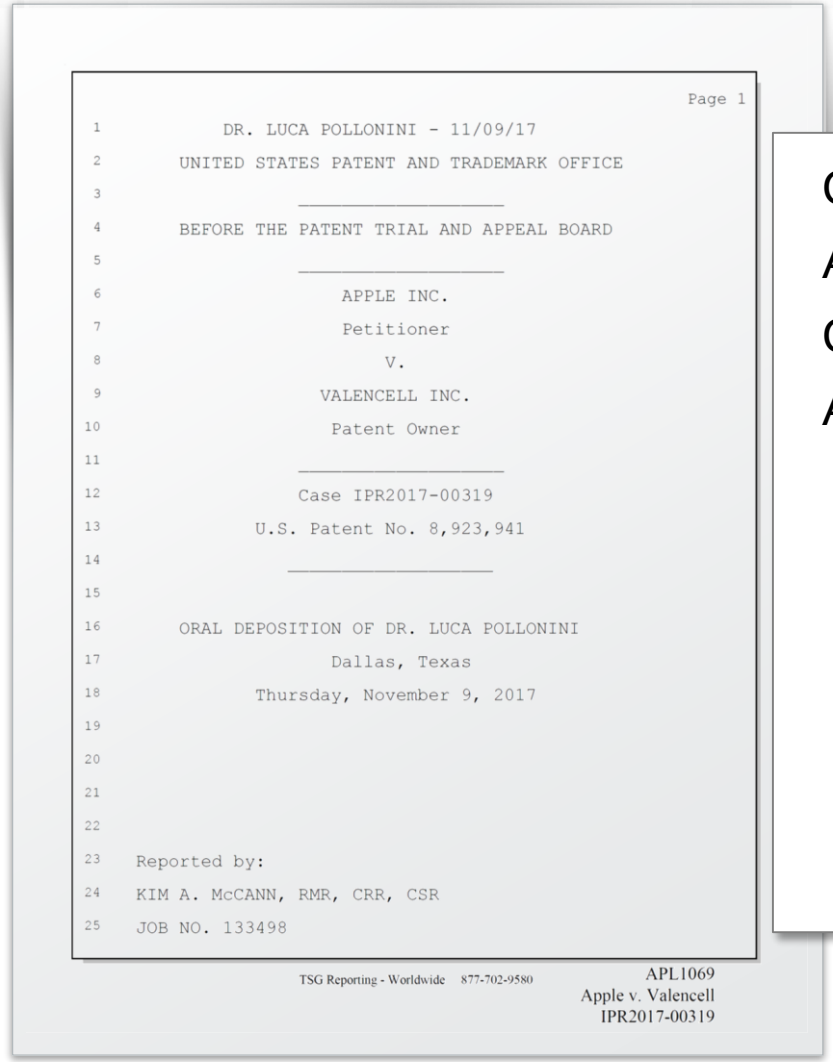
Fitbit, Inc. v. Valencell, Inc., 964 F.3d 1112, 1117 (Fed. Cir. 2020)

Valencell's Expert Admitted Application-Specific Interface "Essentially Refers" to an API

Sarrafzadeh); J.A.148. Valencell's expert, Dr. Luca Pollonini, when asked whether his "understanding is that the term application-specific interface as used in the '941 patent is the same as the commonly understood application programming interface that's known in the art," stated "yes, it's basically the same." J.A.1364 at 128:4–12 (Test. of Dr. Pollonini).

Fitbit, Inc. v. Valencell, Inc., 964 F.3d 1112, 1117 (Fed. Cir. 2020)

Valencell's Expert Admitted Application-Specific Interface "Essentially Refers" to an API



Page 1

DR. LUCA POLLONINI - 11/09/17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner
V.
VALENCELL INC.
Patent Owner

Case IPR2017-00319
U.S. Patent No. 8,923,941

ORAL DEPOSITION OF DR. LUCA POLLONINI
Dallas, Texas
Thursday, November 9, 2017

Reported by:
KIM A. McCANN, RMR, CRR, CSR
JOB NO. 133498

TSG Reporting - Worldwide 877-702-9580

APL1069
Apple v. Valencell
IPR2017-00319

Q. If it helps, I can refer you to column 26 around line 18.

A. I appreciate it.

Q. 17, 18.

A. Thank you so much. Yes, **my interpretation of this section essentially refers to an API, even if it's used as application-specific interface**, so the P -- there is kind of a mismatch between the spelled out, like, terminology and -- and the acronym for it. It -- I cannot -- I don't know exactly why the P or the programming word has been left out specifically, but it is -- in my interpretation it is definitely reasonable to assume they offer here, the inventor is referring to the API as I described before.

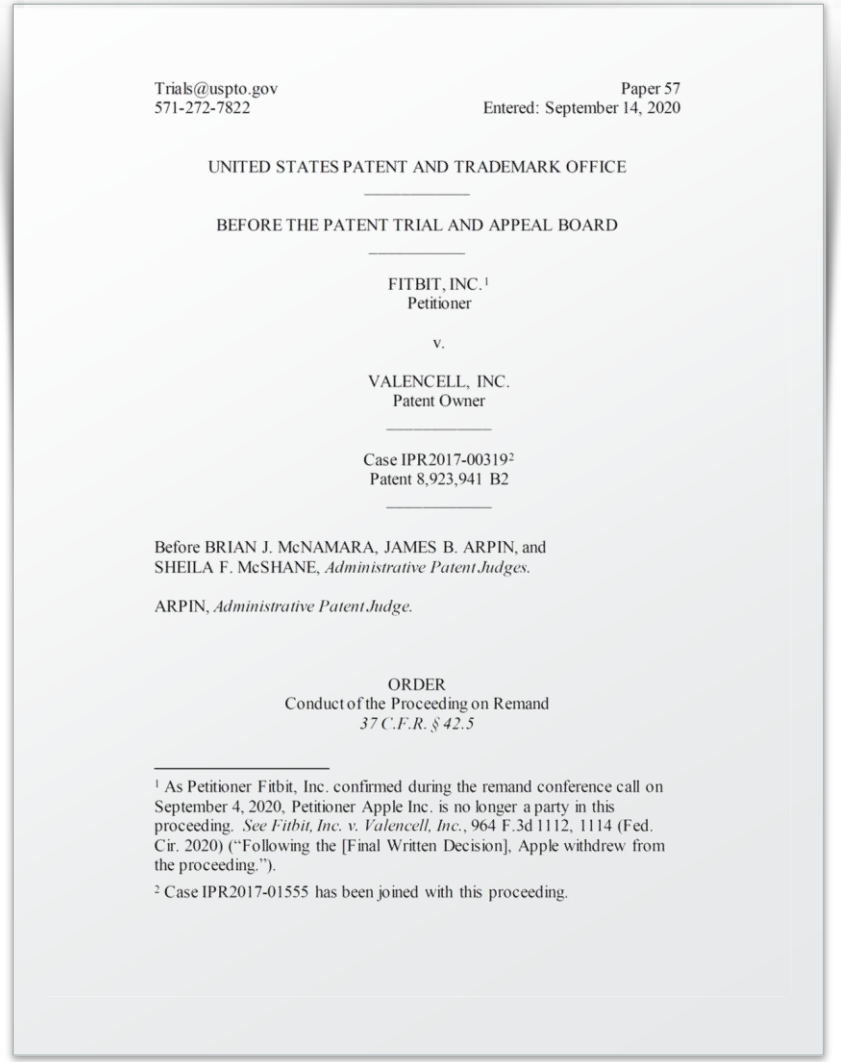
Pollonini Tr. at 127:8-23

The Federal Circuit Asked the Board to Determine "Patentability in Light of the Cited References"

> We affirm the Board's claim construction, vacate the Board's decision that claim 3 is not unpatentable, and remand for determination of patentability in light of the cited references.

Fitbit, Inc. v. Valencell, Inc., 964 F.3d 1112, 1117 (Fed. Cir. 2020)

The Board Requested Briefing on Federal Circuit's Opinion on "Application-Specific Interface"



Trials@uspto.gov
571-272-7822

Paper 57
Entered: September 14, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FITBIT, INC.[1]
Petitioner

v.

VALENCELL, INC.
Patent Owner

Case IPR2017-00319[2]
Patent 8,923,941 B2

Before BRIAN J. McNAMARA, JAMES B. ARPIN, and SHEILA F. McSHANE, *Administrative Patent Judges.*

ARPIN, *Administrative Patent Judge.*

ORDER
Conduct of the Proceeding on Remand
37 C.F.R. § 42.5

[1] As Petitioner Fitbit, Inc. confirmed during the remand conference call on September 4, 2020, Petitioner Apple Inc. is no longer a party in this proceeding. *See Fitbit, Inc. v. Valencell, Inc.*, 964 F.3d 1112, 1114 (Fed. Cir. 2020) ("Following the [Final Written Decision], Apple withdrew from the proceeding.").

[2] Case IPR2017-01555 has been joined with this proceeding.

FURTHER ORDERED that Petitioner Fitbit, Inc.'s opening brief shall be limited to addressing three issues:

(1) the patentability of claims 3–5 of Patent No. US 8,923,941 B2, on the grounds presented in the Petitioner' Apple Inc.'s Petition, namely:

References	Basis	Challenged Claim(s)
Luo and Craw	35 U.S.C. § 103(a)	3
Luo, Craw, and Wolf	35 U.S.C. § 103(a)	4 and 5
Mault, Al-Ali, and Lee	35 U.S.C. § 103(a)	3
Mault, Al-Ali, and Behar	35 U.S.C. § 103(a)	4 and 5

(2) whether our narrowing construction of the term "application-specific interface (API)" has no significance, where the claimed "application-specific interface" performs the same function as an application programming interface, i.e., "enabl[ing] a particular application to utilize data obtained from hardware"; and

Paper 57 at 10-11

Craw's "Interfaces" Enable a "Particular Application" To Utilize the Data

US 20080133699A1

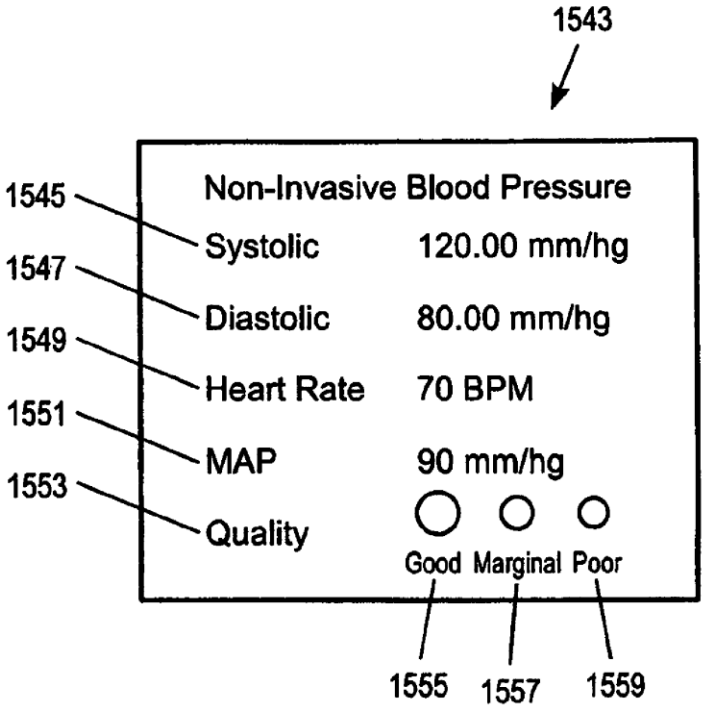
(19) United States
(12) Patent Application Publication
Craw et al.
(10) Pub. No.: US 2008/0133699 A1
(43) Pub. Date: Jun. 5, 2008

[0208] The dictionary may allow the display **1543** shown in FIG. **9**A to be built by an application supporting the dictionary relying on the dictionary to produce the interface. The same process can be applied to any newly discovered information allowing for machine perception and information plug and play.

[0256] The data dictionary used with DMOIB and string table classes may act as interfaces for managing, extracting, and displaying information from binary information streams.

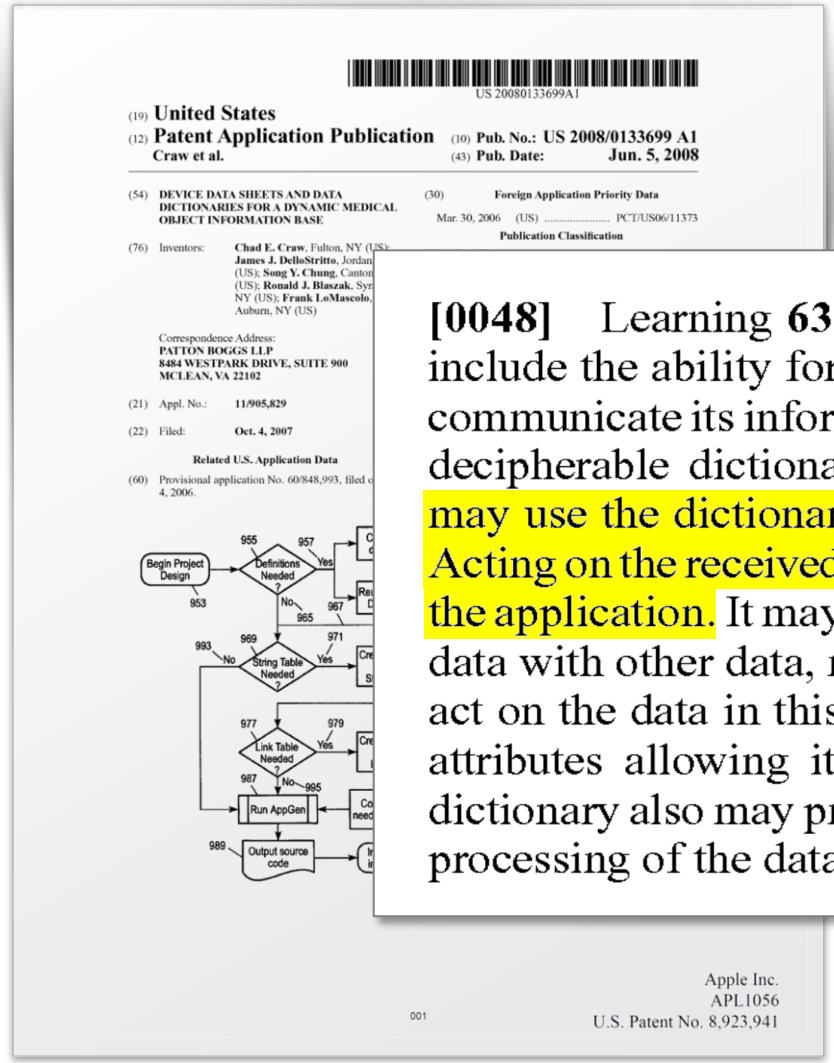
Apple Inc.
APL1056
U.S. Patent No. 8,923,941
001

FIG. 9A



Craw at ¶¶ 256, 208, and Figure 9A

Craw Discloses Tailoring the Interfaces "Depend[ing] on the Goal of the Application"



US 20080133699A1

(19) United States
(12) Patent Application Publication
Craw et al.

(10) Pub. No.: US 2008/0133699 A1
(43) Pub. Date: Jun. 5, 2008

(54) DEVICE DATA SHEETS AND DATA DICTIONARIES FOR A DYNAMIC MEDICAL OBJECT INFORMATION BASE

(30) Foreign Application Priority Data
Mar. 30, 2006 (US) PCT/US06/11373

Publication Classification

(76) Inventors: Chad E. Craw, Fulton, NY (US); James J. DelloStritto, Jordan (US); Song Y. Chung, Canton (US); Ronald J. Blaszak, Syr NY (US); Frank LoMascolo, Auburn, NY (US)

Correspondence Address:
PATTON BOGGS LLP
8484 WESTPARK DRIVE, SUITE 900
MCLEAN, VA 22102

(21) Appl. No.: 11/905,829

(22) Filed: Oct. 4, 2007

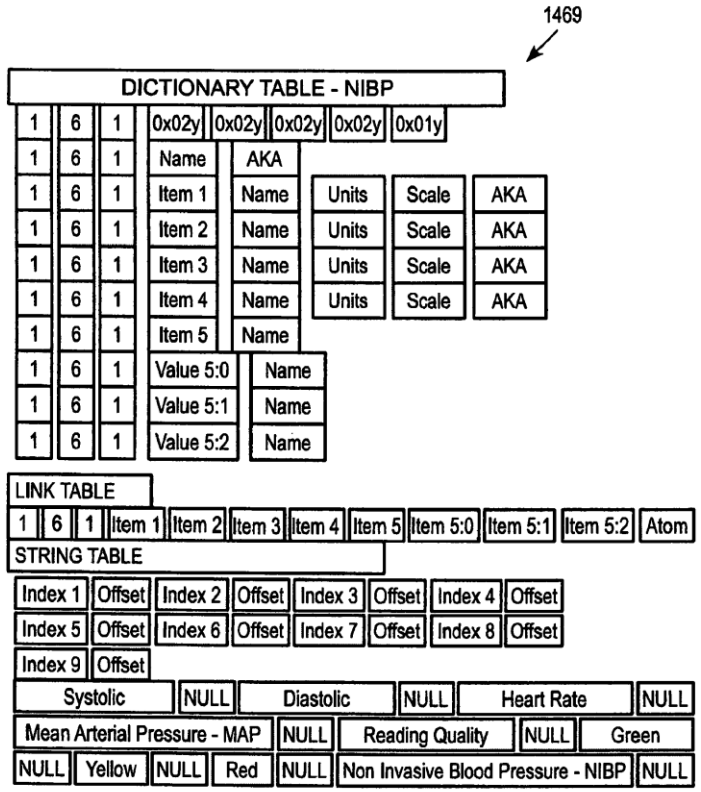
Related U.S. Application Data

(60) Provisional application No. 60/848,993, filed 4, 2006.

[0048] Learning **63** may be the second attribute and may include the ability for one network device or machine **65** to communicate its information model to another by providing a decipherable dictionary and an interpreter. The interpreter may use the dictionary to extract information and act on it. Acting on the received information may depend on the goal of the application. It may display, store, combine and/or fuse the data with other data, run algorithms, or forward the data. To act on the data in this way the data dictionary must contain attributes allowing it to perform these functions, and the dictionary also may provide many attributes used to aid in the processing of the data.

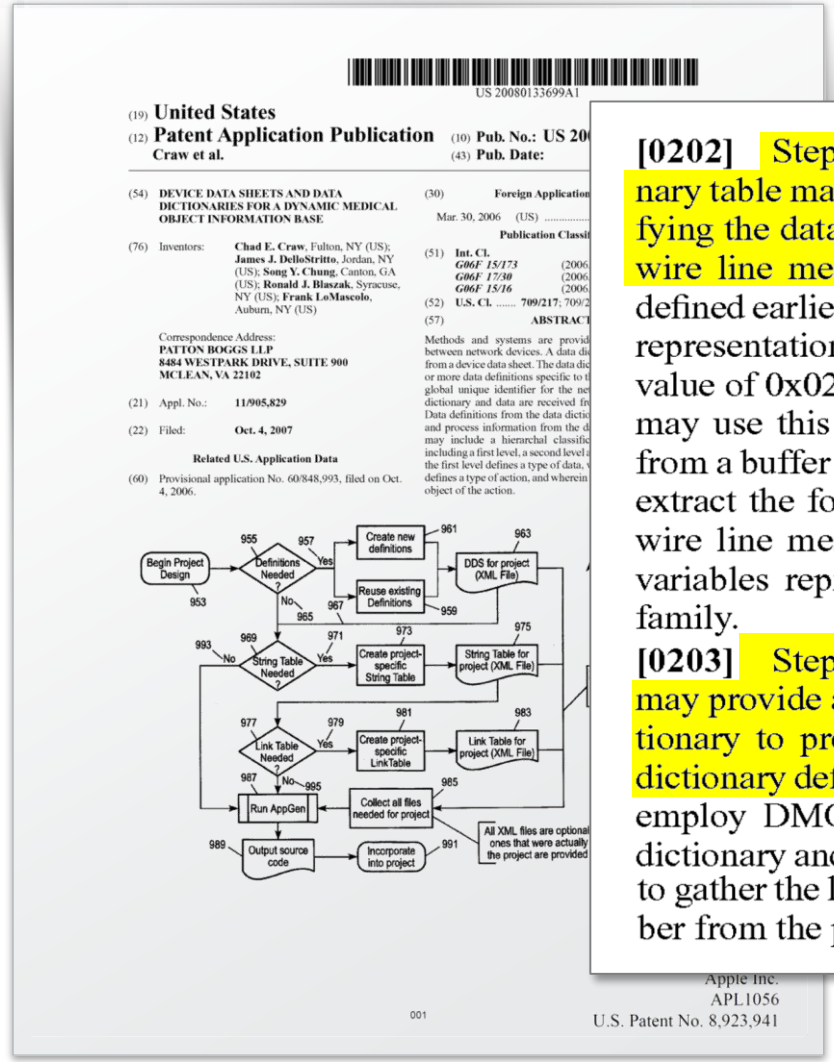
Apple Inc.
APL1056
U.S. Patent No. 8,923,941

FIG. 7H



Craw at ¶ 48 and Figure 7H

Craw Discloses Tailoring the Interfaces "Depend[ing] on the Goal of the Application"



US 20080133699A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 20**

Craw et al. (43) **Pub. Date:**

(54) **DEVICE DATA SHEETS AND DATA DICTIONARIES FOR A DYNAMIC MEDICAL OBJECT INFORMATION BASE**

(76) Inventors: **Chad E. Craw**, Fulton, NY (US); **James J. DelloStritto**, Jordan, NY (US); **Song Y. Chung**, Canton, GA (US); **Ronald J. Blaszak**, Syracuse, NY (US); **Frank LoMascolo**, Auburn, NY (US)

Correspondence Address:
PATTON BOGGS LLP
8484 WESTPARK DRIVE, SUITE 900
MCLEAN, VA 22102

(21) Appl. No.: **11/905,829**

(22) Filed: **Oct. 4, 2007**

Related U.S. Application Data

(60) Provisional application No. 60/848,993, filed on Oct. 4, 2006.

(30) **Foreign Application**

Mar. 30, 2006 (US) .....

Publication Classif

(51) **Int. Cl.**
G06F 15/173 (2006.
G06F 17/30 (2006.
G06F 15/16 (2006.

(52) **U.S. Cl.** **709/217**; 709/2

(57) **ABSTRACT**

Methods and systems are provid between network devices. A data di from a device data sheet. The data dic or more data definitions specific to t global unique identifier for the ne dictionary and data are received fr Data definitions from the data dictio and process information from the d may include a hierarchal classific including a first level, a second level the first level defines a type of data, defines a type of action, and wherein object of the action.

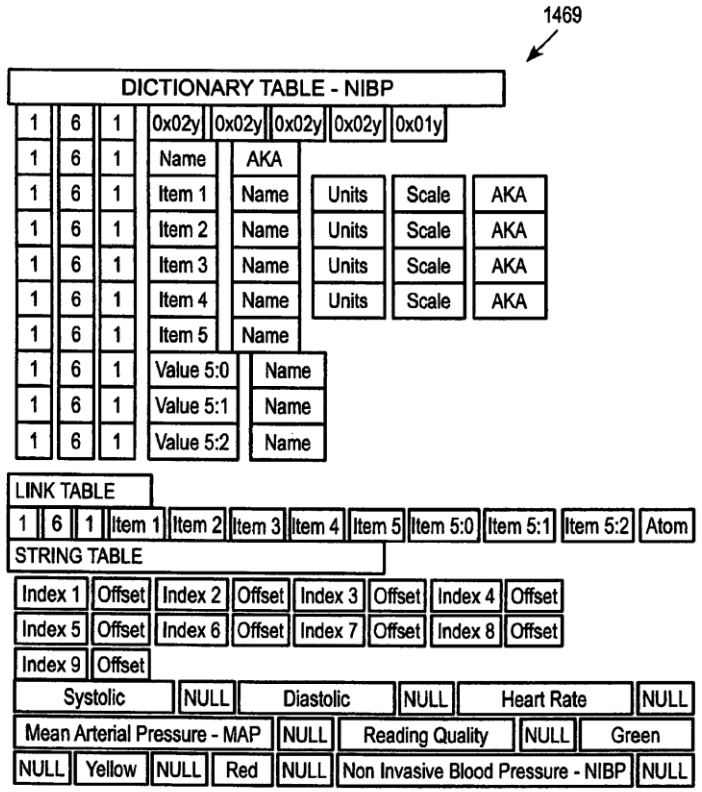
[0202] Step 1 may include extracting the data. The dictionary table may be used to recognize what to extract by specifying the data segments that encompass the structure of any wire line message received by the computer platform. As defined earlier, primitives or data segments may be electronic representations of variables carried by an atom in MOIB. A value of 0x02y may be the ID for a 16 bit numeric. DMOIB may use this information to extract 16 bits of information from a buffer of data identified as {1,6,1}. DMOIB may then extract the four other primitives or data segments from the wire line message. DMOIB may then have five separated variables representing member items of the NIBP atomic family.

[0203] Step 2 may include the display of the data. DMOIB may provide an interface to gather information from the dictionary to properly display information based on how the dictionary defines the information. Application software may employ DMOIB software components to access the base dictionary and linked string tables. The link table can be used to gather the localized (language) representation of the member from the proper string table.

Apple Inc.
APL1056
U.S. Patent No. 8,923,941

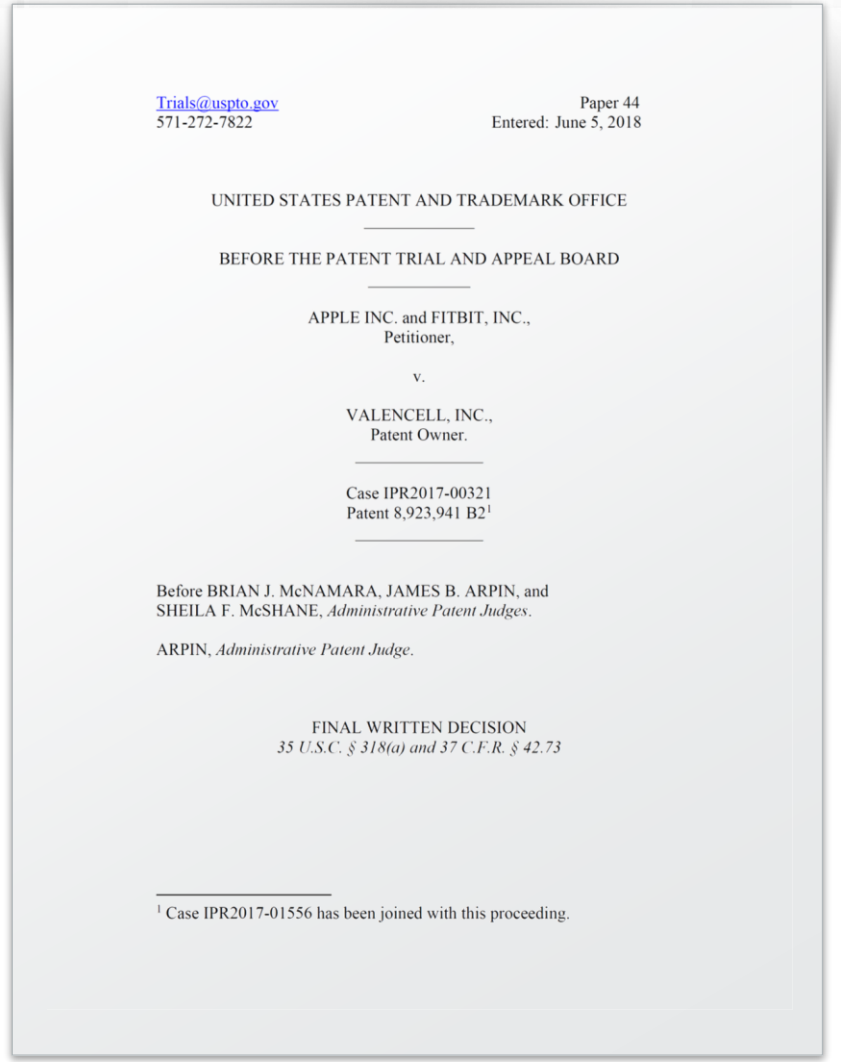
001

FIG. 7H



Craw at ¶¶ 202-203 and Figure 7H

The Board Previously Found Craw Discloses the "Application-Specific Interface (API)" Limitation



Trials@uspto.gov
571-272-7822

Paper 44
Entered: June 5, 2018

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC. and FITBIT, INC.,
Petitioner,

v.

VALENCELL, INC.,
Patent Owner.

Case IPR2017-00321
Patent 8,923,941 B2[1]

Before BRIAN J. McNAMARA, JAMES B. ARPIN, and SHEILA F. McSHANE, *Administrative Patent Judges*.

ARPIN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

[1] Case IPR2017-01556 has been joined with this proceeding.

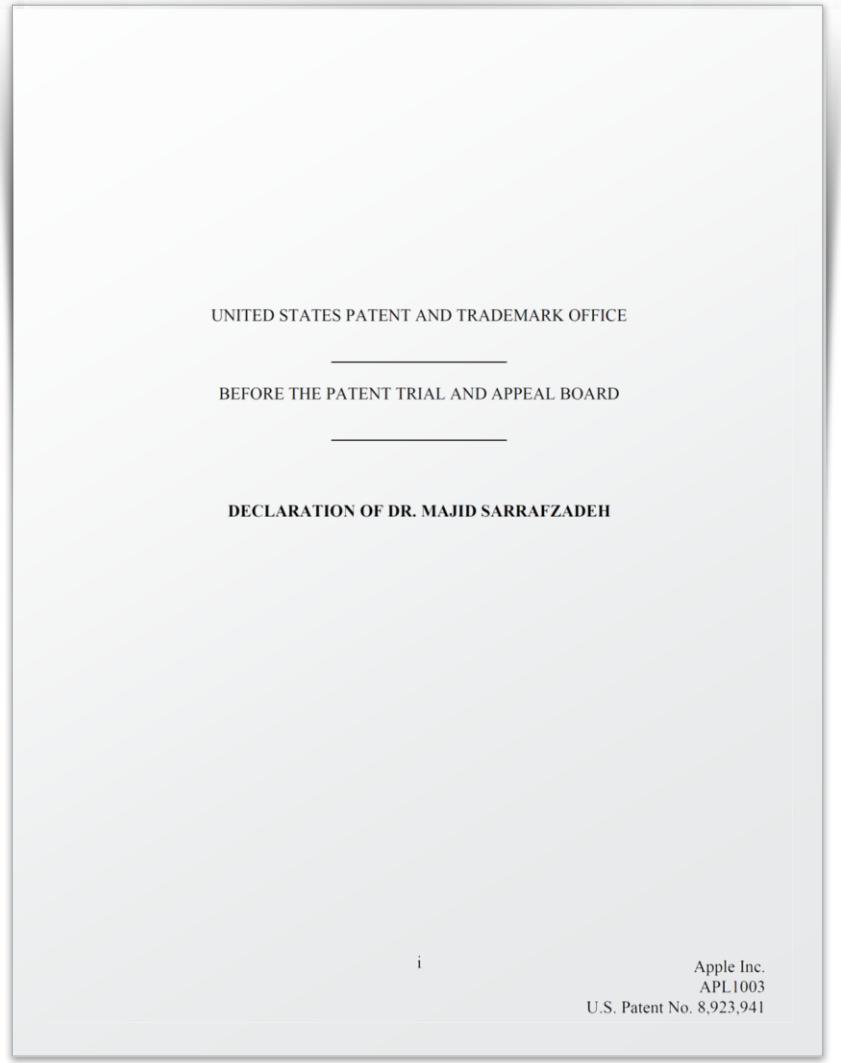
Given our understanding of the word "parsing," Craw's use of serial data packets teaches or suggests the recited parsing. Moreover, Craw relates to the communication of information to various medical devices (Ex. 2127, [57], ¶ 2) and Craw explains that:

> The design of each medical device, or any other machine performing health assessment, is dependent upon the particular subset or subsets of physiological data that the medical device or other machine processes and communicates. *The design of the software residing on the medical devices is also dependent upon the subset or subsets of physiological data or clinical outcomes that the medical device processes and communicates.*

Id. ¶ 5 (emphasis added). Thus, we are persuaded that Craw teaches or suggests that "the output data is parsed out such that an application-specific interface (API) can utilize the physiological information and motion-related information for an application," as recited in claim 22.

IPR2017-00321, Paper No. 44 at 73-74

Dr. Sarrafzadeh Explained It Would Be Obvious To Combine the Prior Art



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DECLARATION OF DR. MAJID SARRAFZADEH

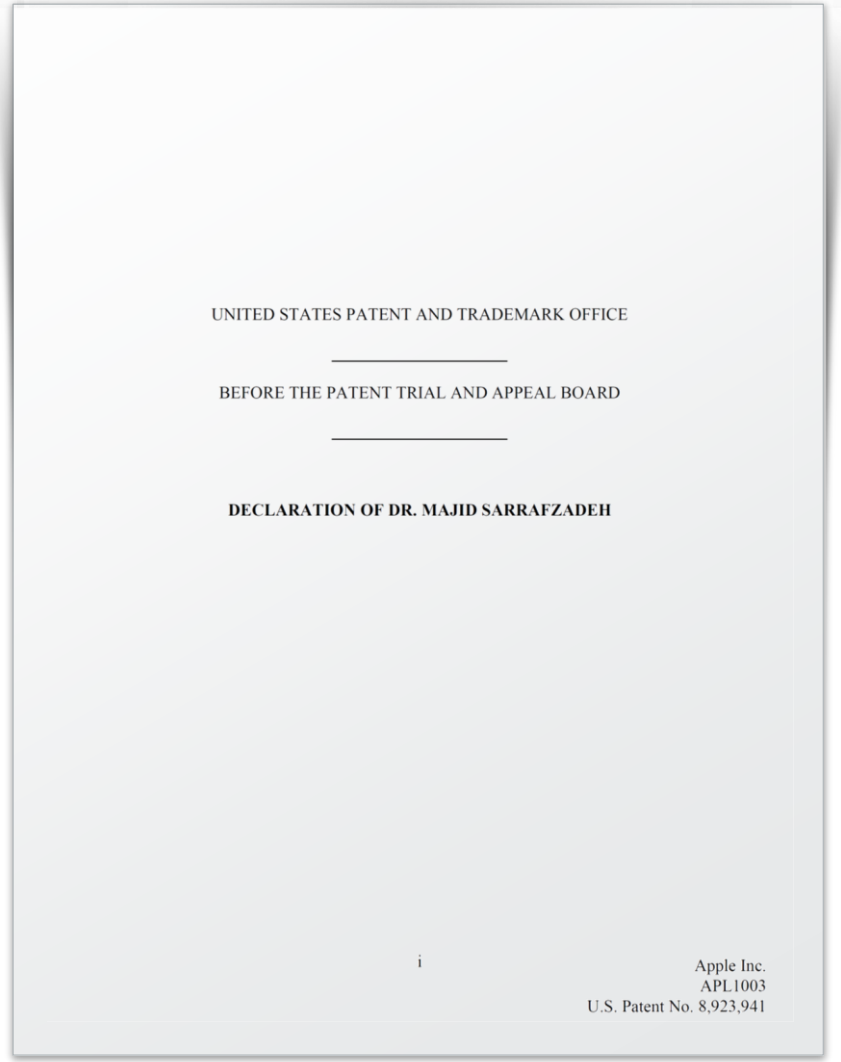
i

Apple Inc.
APL1003
U.S. Patent No. 8,923,941

90. In my opinion, it would have been obvious to combine Luo and Craw's teachings. A person of ordinary skill in the art would have understood how to configure Luo's data output into the serial format, as described by Craw, such that Luo's subject heart rate and subject respiration rate could be extracted from the physiological information and such that a plurality of subject physical activity parameters could be extracted from the motion-related information. Luo and Craw describe similar physiological monitoring devices in the same field for similar purposes of communicating physiological parameters and other related parameters. Thus, it is my opinion that implementing Craw's technique to output Luo's data would have been nothing more than the obvious use of a known signal processing technique to improve a similar physiological monitoring device.

Sarrafzadeh Decl. ¶ 90

Dr. Sarrafzadeh Explained It Would Be Obvious To Combine the Prior Art



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DECLARATION OF DR. MAJID SARRAFZADEH

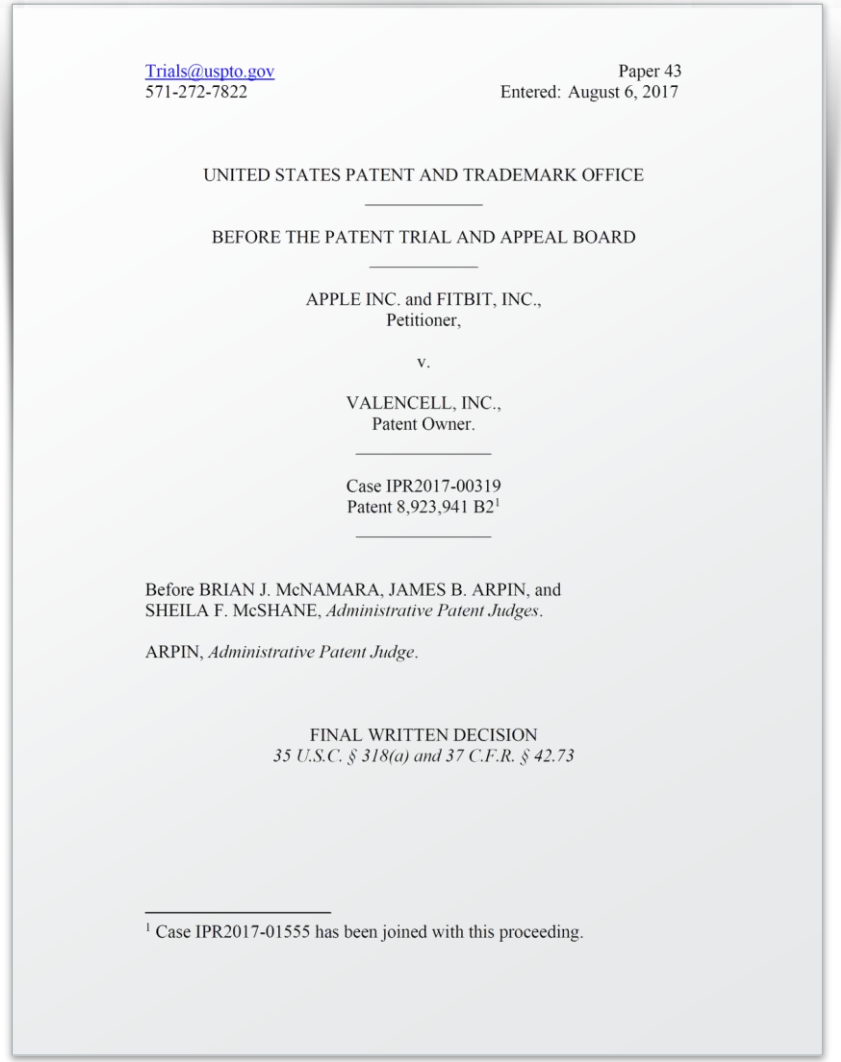
i

Apple Inc.
APL1003
U.S. Patent No. 8,923,941

93. Therefore, based on all of the above, it is my opinion that it would have been obvious to a person of ordinary skill in the art to parse out the serial data output of health information so that an API can utilize the physiological information and motion-related information for further processing, data management, and/or display.

Sarrafzadeh Decl. ¶ 92

The Board Previously Found It Would Be Obvious To Combine the Prior Art



Trials@uspto.gov
571-272-7822

Paper 43
Entered: August 6, 2017

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC. and FITBIT, INC.,
Petitioner,

v.

VALENCELL, INC.,
Patent Owner.

Case IPR2017-00319
Patent 8,923,941 B2[1]

Before BRIAN J. McNAMARA, JAMES B. ARPIN, and SHEILA F. McSHANE, *Administrative Patent Judges*.

ARPIN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

[1] Case IPR2017-01555 has been joined with this proceeding.

performing the same function." Ex. 1056 ¶ 107. Thus, we are persuaded that Lou and Craw are directed to sufficiently similar technology and problems, such that their teachings would be found pertinent by persons of ordinary skill in the relevant art.

Paper No. 43 at 34

However, Patent Owner provides no evidence – not even testimony by its own declarant – to support this contention. Consequently, we are persuaded that Petitioner has shown sufficient reason with supporting evidence for a person of ordinary skill in the relevant art to have combined the teachings of Luo and Craw to achieve the recited method of claim 1. *See* Pet. 25–26; Reply 14–15.

Paper No. 43 at 42

Valencell Bears the "Burden of Production" on "Unexpected Results"

> Thus, DuPont demonstrated that the prior art as a whole—three references each disclosing the same oxidation reaction of HMF or an HMF derivative to FDCA—taught the claimed reaction, as well as conditions either identical to or overlapping with those of claims 1–5. Under our precedent, this showing based on the prior art shifted the burden of production to the patent owner to demonstrate teaching away, unexpected results, or some other evidence of nonobviousness.[15] *E.g.*, *Galderma*, 737 F.3d at 738; *Iron Grip Barbell*, 392 F.3d at 1322; *see Applied Materials*, 692 F.3d at 1298 ("Evidence that the variables interacted in an unpredictable or unexpected way could render the combination nonobvious . . . ."). Furanix and Synvina have failed to do so.

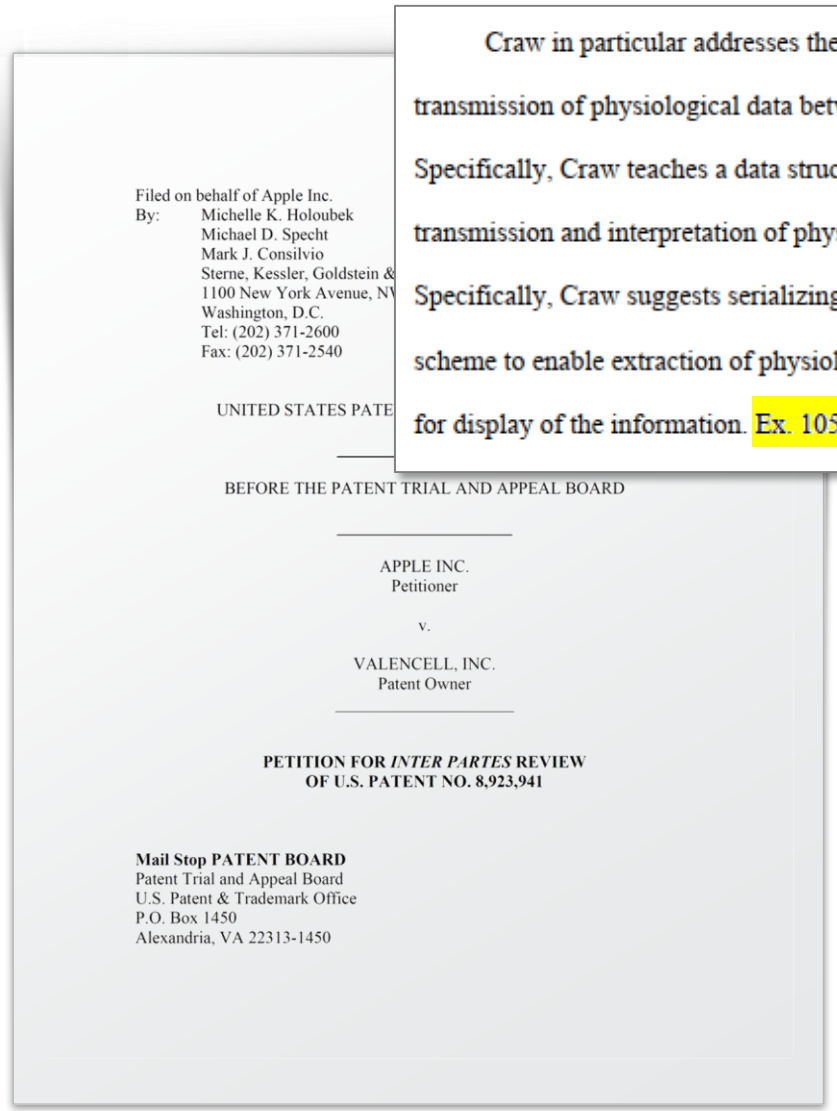
E.I. DuPont de Nemours & Co. v. Synvina C.V., 904 F.3d 996, 1011 (Fed. Cir. 2018)

Board Should Consider Invalidity Under New Construction of "Application-Specific Interface"

The Board's error was parsing Ericsson's arguments on reply with too fine of a filter. Given the acknowledgment in the patent that interleaving was known in the art, Ericsson was entitled to argue on reply that the distinction in the specific type of interleaving between Reed and the '831 would have been insubstantial to a person of skill in the art. The error was exacerbated by the fact that the significance of interleaving arose *after* the Petition was filed, in that the Board adopted a different construction of the "encoding" terms after the Petition instituting *inter partes* review was granted. Additionally, as the missing interleaving limitation was the essential basis of the Board's decision in concluding that claim 1 had not been shown unpatentable, Ericsson should have been given an opportunity to respond. *See* 5 U.S.C.

Ericsson Inc. v, Intellectual Ventures I LLC, 901 F.3d 1374, 1380 (Fed. Cir. 2018)

Fitbit Is Not Relying "on Previously Unidentified Portions of a Prior-Art Reference"



Filed on behalf of Apple Inc.
By: Michelle K. Holoubek
Michael D. Specht
Mark J. Consilvio
Sterne, Kessler, Goldstein &
1100 New York Avenue, N
Washington, D.C.
Tel: (202) 371-2600
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UNITED STATES PATE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner

v.

VALENCELL, INC.
Patent Owner

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,923,941

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Craw in particular addresses the problem of inoperability and seamless transmission of physiological data between varied computing environments. Specifically, Craw teaches a data structure and classification scheme for the transmission and interpretation of physiological information and related data. Specifically, Craw suggests serializing data for transmission using a classification scheme to enable extraction of physiological parameters by a recipient device, *e.g.*, for display of the information. Ex. 1056, ¶¶0200-0216. It would have been obvious

Petition at 25

E. Claim 3

Though Luo does not expressly disclose that the serial data output is parsed out such that an API can utilize the physiological information and motion-related information for an application, the combination of Luo and Craw suggests such a feature. First, Luo teaches that its health monitoring device is configured to regularly extract and transmit historical and current health information to external computers and devices for health monitoring and evaluation. Ex. 1055, ¶¶0033-0041; Ex. 1003, ¶92. Second, as discussed above, Craw suggests configuring this data into a serial output string of physiological and physical activity parameters. Third, Craw teaches that a device receiving such a serial output string would have been able to extract the parameters from the serial data string (*e.g.*, for appropriate display of the health information). Ex. 1056, ¶0048, 0149, 0202-0203; Ex. 1003, ¶92. And fourth, Craw teaches that a data dictionary used with data classes acts as an API for managing, extracting, and displaying information from information data streams. Ex. 1056, ¶0256; Ex. 1003, ¶92. Therefore, it would have been obvious to a POSA to parse out the serial data output of health information so that an API can utilize the physiological information and motion-related information for further processing, data management, and/or display. Ex. 1003, ¶93.

Petition at 27

Fitbit Previously Made the Same Arguments in its Additional Briefing

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner

v.

VALENCELL, INC.
Patent Owner

Case IPR2017-00319[1]
Patent 8,923,941

PETITIONER APPLE INC.'S ADDITIONAL BRIEFING REGARDING CLAIMS PREVIOUSLY DENIED INSTITUTION

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P.O. Box 1450
Alexandria, VA 22313-1450

[1] Case IPR2017-01555 has been joined with this proceeding.

If it had done so, the Board would have seen that the Petition includes a sufficient challenge to claim 3, even if the Board disagreed with Apple's claim construction. While APIs were generally well-known means of allowing different technologies to work together, different APIs were designed for specific uses. (Pet., 56.) In each of the combinations presented by Apple, a specific API is applied for a specific application, thus satisfying the purported intent in the '941 patent specification that the interface "can *utilize* the data as required for a particular application." (*See*, Pet., 27-28 (Luo in view of Craw) and 55-59 (Mault in view of Al-Ali, in further view of Lee); *see also*, Pet'rs Request for Reh'g, 2-4.) Accordingly, the Petition not only presented a reasonable likelihood that claim 3 would have been obvious, but the Petition and supporting evidence also proved by a preponderance of the evidence that claim 3 would have been obvious. The Board should find claim 3 obvious for the reasons set forth in Apple's Petition.

Paper No. 40 at 5-6

Fitbit Previously Made the Same Arguments in its Additional Briefing

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner

v.

VALENCELL, INC.
Patent Owner

Case IPR2017-00319
U.S. Patent No. 8,923,941

PETITIONER'S REQUEST FOR REHEARING OF INSTITUTION DECISION

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Alexandria, VA 22313-1450

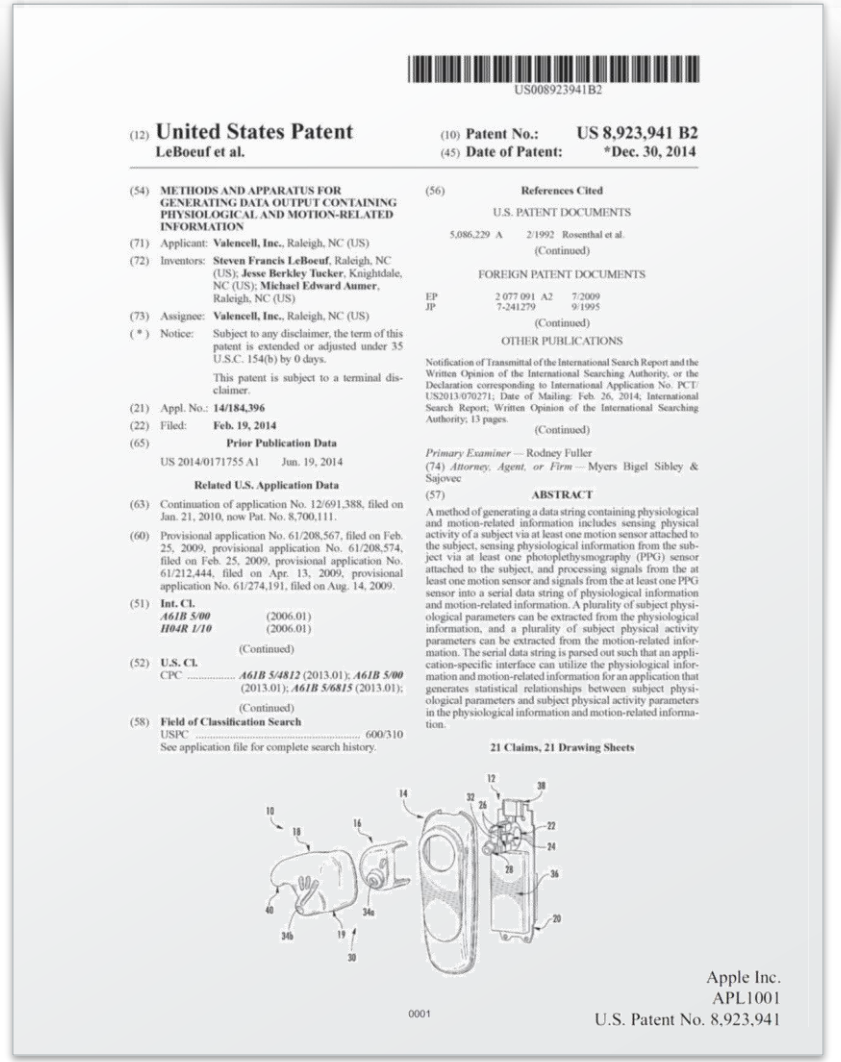
The Petition stated that the referenced data dictionary of Craw "acts as an API." Petition, p. 27. But the Petition also stated that "Craw teaches that a device receiving such a serial output string would have been able to extract the parameters from the serial data string (*e.g.*, for appropriate display of the health information)." *Id.* Here, the Petition cites to Craw, ¶0048, which states, "[a]cting on the received information may ***depend on the goal of the application***." The Petition also cites to Craw, ¶0202, which states, "[t]he dictionary table may be used to ***recognize what to extract by specifying the data segments*** that encompass the structure of any wire line message received by the computer platform."

These statements in Craw indicate that, when implemented, the data dictionary is directed to a particular application. The Petition further supports this,

Paper No. 13 at 2

Claims 4-5

U.S. Patent No. 8,923,941 – Claims 4-5



US008923941B2

(12) **United States Patent**
LeBoeuf et al.

(10) **Patent No.: US 8,923,941 B2**
(45) **Date of Patent: *Dec. 30, 2014**

(54) **METHODS AND APPARATUS FOR GENERATING DATA OUTPUT CONTAINING PHYSIOLOGICAL AND MOTION-RELATED INFORMATION**

(71) Applicant: **Valencell, Inc.**, Raleigh, NC (US)

(72) Inventors: **Steven Francis LeBoeuf**, Raleigh, NC (US); **Jesse Berkley Tucker**, Knightdale, NC (US); **Michael Edward Aumer**, Raleigh, NC (US)

(73) Assignee: **Valencell, Inc.**, Raleigh, NC (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/184,396**

(22) Filed: **Feb. 19, 2014**

(65) **Prior Publication Data**

US 2014/0171755 A1 Jun. 19, 2014

Related U.S. Application Data

(63) Continuation of application No. 12/691,388, filed on Jan. 21, 2010, now Pat. No. 8,700,111.

(60) Provisional application No. 61/208,567, filed on Feb. 25, 2009, provisional application No. 61/208,574, filed on Feb. 25, 2009, provisional application No. 61/212,444, filed on Apr. 13, 2009, provisional application No. 61/274,191, filed on Aug. 14, 2009.

(51) **Int. Cl.**
A61B 5/00 (2006.01)
H04R 1/10 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***A61B 5/4812*** (2013.01); ***A61B 5/00*** (2013.01); ***A61B 5/6815*** (2013.01);
(Continued)

(58) **Field of Classification Search**
USPC 600/310
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,086,229 A 2/1992 Rosenthal et al.
(Continued)

FOREIGN PATENT DOCUMENTS

EP 2 077 091 A2 7/2009
JP 7-241279 9/1995
(Continued)

OTHER PUBLICATIONS

Notification of Transmittal of the International Search Report and the Written Opinion of the International Searching Authority, or the Declaration corresponding to International Application No. PCT/US2013/070271; Date of Mailing: Feb. 26, 2014; International Search Report; Written Opinion of the International Searching Authority; 13 pages.
(Continued)

Primary Examiner — Rodney Fuller
(74) *Attorney, Agent, or Firm* — Myers Bigel Sibley & Sajovec

(57) **ABSTRACT**

A method of generating a data string containing physiological and motion-related information includes sensing physical activity of a subject via at least one motion sensor attached to the subject, sensing physiological information from the subject via at least one photoplethysmography (PPG) sensor attached to the subject, and processing signals from the at least one motion sensor and signals from the at least one PPG sensor into a serial data string of physiological information and motion-related information. A plurality of subject physiological parameters can be extracted from the physiological information, and a plurality of subject physical activity parameters can be extracted from the motion-related information. The serial data string is parsed out such that an application-specific interface can utilize the physiological information and motion-related information for an application that generates statistical relationships between subject physiological parameters and subject physical activity parameters in the physiological information and motion-related information.

21 Claims, 21 Drawing Sheets

0001

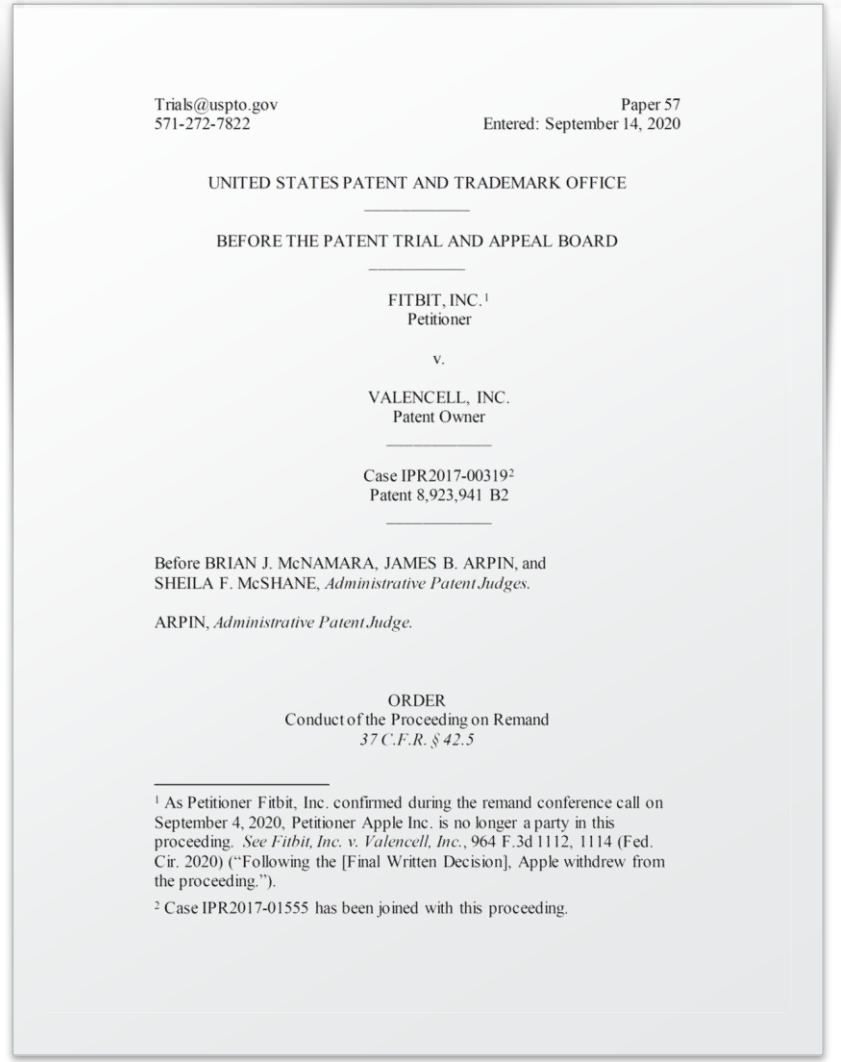
Apple Inc.
APL1001
U.S. Patent No. 8,923,941

4. The method of claim **1**, wherein the application is configured to generate statistical relationships between subject physiological parameters and subject physical activity parameters in the physiological information and motion-related information.

5. The method of claim **4**, wherein the application is configured to generate statistical relationships between subject physiological parameters and subject physical activity parameters via at least one of the following: principal component analysis, multiple linear regression, machine learning, and Bland-Altman plots.

'941 Patent, Claim 4-5

The Board Requested Briefing on "Claims 4 and 5, Assuming Their Dependence from Claim 3"



Trials@uspto.gov
571-272-7822

Paper 57
Entered: September 14, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FITBIT, INC.[1]
Petitioner

v.

VALENCELL, INC.
Patent Owner

Case IPR2017-00319[2]
Patent 8,923,941 B2

Before BRIAN J. McNAMARA, JAMES B. ARPIN, and SHEILA F. McSHANE, *Administrative Patent Judges.*

ARPIN, *Administrative Patent Judge.*

ORDER
Conduct of the Proceeding on Remand
37 C.F.R. § 42.5

[1] As Petitioner Fitbit, Inc. confirmed during the remand conference call on September 4, 2020, Petitioner Apple Inc. is no longer a party in this proceeding. *See Fitbit, Inc. v. Valencell, Inc.*, 964 F.3d 1112, 1114 (Fed. Cir. 2020) ("Following the [Final Written Decision], Apple withdrew from the proceeding.").

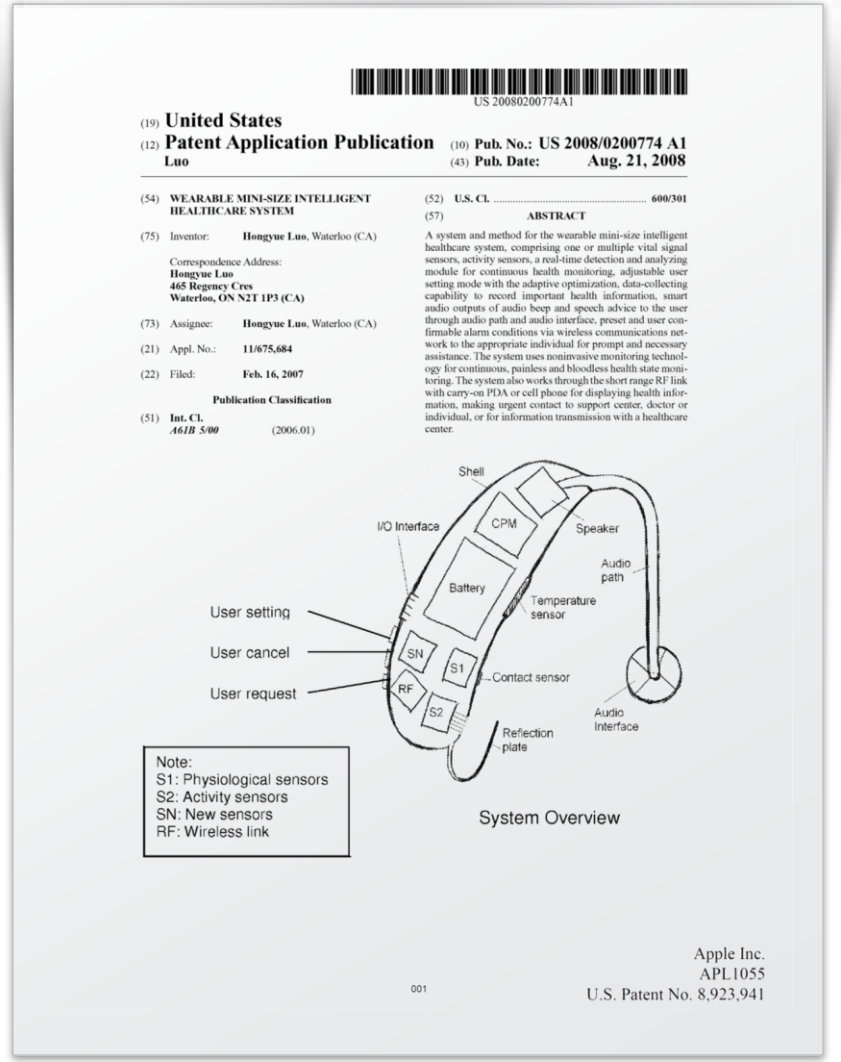
[2] Case IPR2017-01555 has been joined with this proceeding.

FURTHER ORDERED that Petitioner Fitbit, Inc.'s opening brief shall be limited to addressing three issues:

(3) the patentability of claims 4 and 5, assuming their dependence from claim 3, as rendered obvious over the combined teachings of Lou, Craw, and Wolf and/or Mault, Al-Ali, and Behar;

Paper 57 at 10-11

Luo Discloses Generating Relationships Between Physiological and Physical Activity Parameters



US 20080200774A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2008/0200774 A1**

Luo (43) **Pub. Date: Aug. 21, 2008**

(54) **WEARABLE MINI-SIZE INTELLIGENT HEALTHCARE SYSTEM**

(75) Inventor: **Hongyue Luo**, Waterloo (CA)

Correspondence Address:
Hongyue Luo
465 Regency Cres
Waterloo, ON N2T 1P3 (CA)

(73) Assignee: **Hongyue Luo**, Waterloo (CA)

(21) Appl. No.: **11/675,684**

(22) Filed: **Feb. 16, 2007**

Publication Classification

(51) **Int. Cl.**
A61B 5/00 (2006.01)

(52) **U.S. Cl.** **600/301**

(57) **ABSTRACT**

A system and method for the wearable mini-size intelligent healthcare system, comprising one or multiple vital signal sensors, activity sensors, a real-time detection and analyzing module for continuous health monitoring, adjustable user setting mode with the adaptive optimization, data-collecting capability to record important health information, smart audio outputs of audio beep and speech advice to the user through audio path and audio interface, preset and user confirmable alarm conditions via wireless communications network to the appropriate individual for prompt and necessary assistance. The system uses noninvasive monitoring technology for continuous, painless and bloodless health state monitoring. The system also works through the short range RF link with carry-on PDA or cell phone for displaying health information, making urgent contact to support center, doctor or individual, or for information transmission with a healthcare center.

System Overview

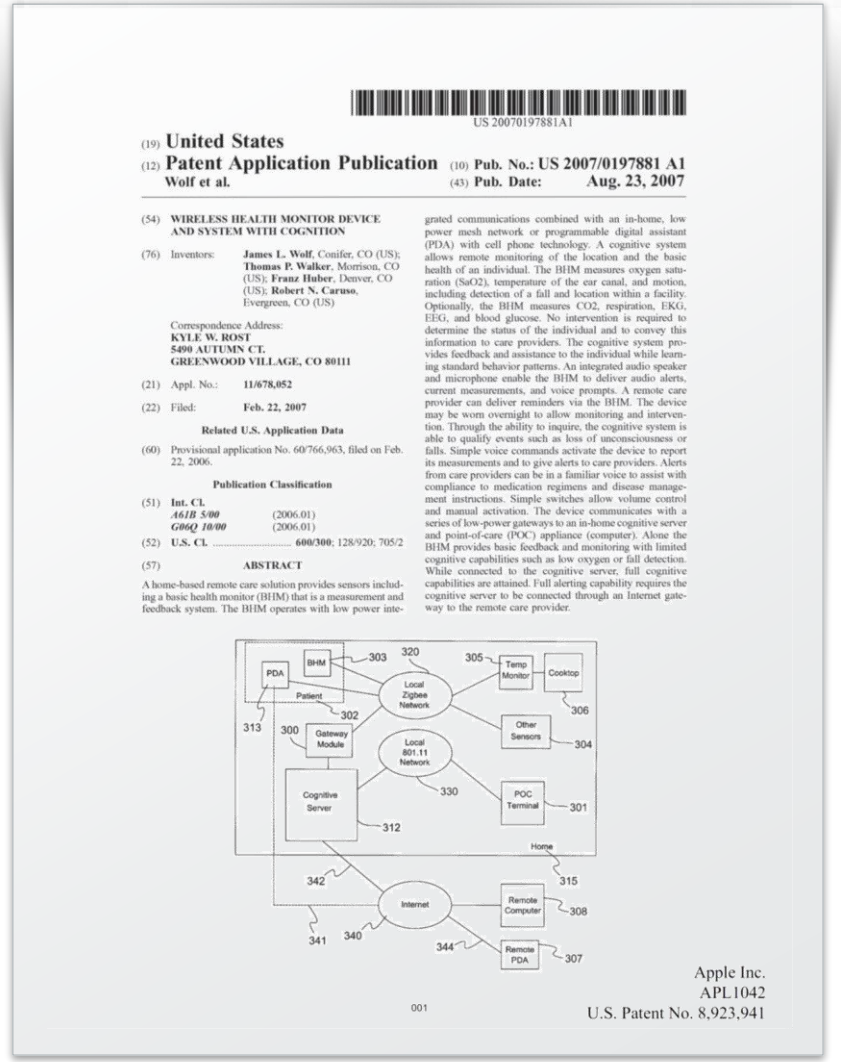
001

Apple Inc.
APL1055
U.S. Patent No. 8,923,941

[0031] With the integration of the physiological signal monitoring and physic activity monitoring, the present monitoring system can make more intelligent and more reliable health detection since the health condition can be highly associated with the user's physical activity condition. For example, at normal resting condition, a heart rate of 60~100 per minute for a subject can be treated as normal. A jump to 120 or higher at the same activity condition for the same subject can imply a health condition change. However, if the subject is going through a activity change from the resting condition to run condition, such a heart rate jump can be considered as normal because the intense activity usually results in a heart rate jump within a certain range. If the heart rate jumps much higher than the normal range, it is still necessary to be detected as the health problem. In the case that the heart rate becomes very low, it is another important health condition to identify. In another case, if the heart rate becomes irregular, such as missing heart beat or irregular beat duration along time, it can also imply a heart issue.

Luo at 0031

Wolf Discloses Generating Statistical Relationships and Machine Learning



US 20070197881A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2007/0197881 A1**

Wolf et al. (43) **Pub. Date: Aug. 23, 2007**

(54) **WIRELESS HEALTH MONITOR DEVICE AND SYSTEM WITH COGNITION**

(76) Inventors: **James L. Wolf**, Conifer, CO (US); **Thomas P. Walker**, Morrison, CO (US); **Franz Huber**, Denver, CO (US); **Robert N. Caruso**, Evergreen, CO (US)

Correspondence Address:
KYLE W. ROST
5490 AUTUMN CT.
GREENWOOD VILLAGE, CO 80111

(21) Appl. No.: **11/678,052**

(22) Filed: **Feb. 22, 2007**

Related U.S. Application Data

(60) Provisional application No. 60/766,963, filed on Feb. 22, 2006.

Publication Classification

(51) **Int. Cl.**
A61B 5/00 (2006.01)
G06Q 10/00 (2006.01)

(52) **U.S. Cl.** **600/300**; 128/920; 705/2

(57) **ABSTRACT**

A home-based remote care solution provides sensors including a basic health monitor (BHM) that is a measurement and feedback system. The BHM operates with low power integrated communications combined with an in-home, low power mesh network or programmable digital assistant (PDA) with cell phone technology. A cognitive system allows remote monitoring of the location and the basic health of an individual. The BHM measures oxygen saturation (SaO2), temperature of the ear canal, and motion, including detection of a fall and location within a facility. Optionally, the BHM measures CO2, respiration, EKG, EEG, and blood glucose. No intervention is required to determine the status of the individual and to convey this information to care providers. The cognitive system provides feedback and assistance to the individual while learning standard behavior patterns. An integrated audio speaker and microphone enable the BHM to deliver audio alerts, current measurements, and voice prompts. A remote care provider can deliver reminders via the BHM. The device may be worn overnight to allow monitoring and intervention. Through the ability to inquire, the cognitive system is able to qualify events such as loss of unconsciousness or falls. Simple voice commands activate the device to report its measurements and to give alerts to care providers. Alerts from care providers can be in a familiar voice to assist with compliance to medication regimens and disease management instructions. Simple switches allow volume control and manual activation. The device communicates with a series of low-power gateways to an in-home cognitive server and point-of-care (POC) appliance (computer). Alone the BHM provides basic feedback and monitoring with limited cognitive capabilities such as low oxygen or fall detection. While connected to the cognitive server, full cognitive capabilities are attained. Full alerting capability requires the cognitive server to be connected through an Internet gateway to the remote care provider.

Apple Inc.
APL1042
U.S. Patent No. 8,923,941

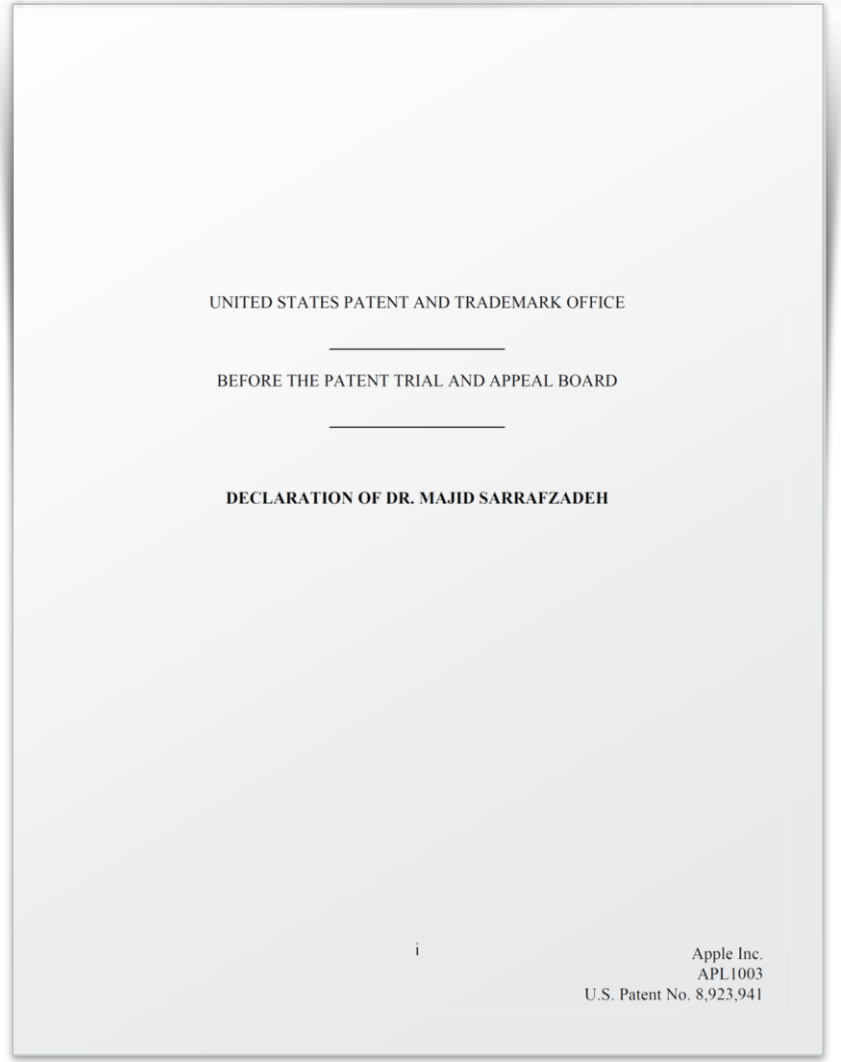
001

[0019] In the preferred embodiment the BHM will be worn around the ear in the same manner as a conventional hearing aid or the recently introduced Bluetooth wireless headsets or earpieces. The BHM will be able to measure oxygen saturation (SaO2), temperature of the ear canal, and motion, including detection of a fall. A key feature is that no intervention will be required to determine the status of the individual and to convey this information to care providers. A cognitive system provides feedback and assistance to the individual while learning standard behavior patterns.

[0062] Cognitive operation software components of the various devices and system are shown in FIG. **6**. An upper block **630** is the BHM software block diagram. A lower block **632** is the PC software block diagram showing the cognitive server. BHM software routines include SpO2 measurement subroutine **601**, a motion measurement subroutine **602**, a body position measurement subroutine **603**, and a temperature measurement subroutine **604**. The subroutines communicate through Baysian filters **605**, consisting of statistical filter subroutines, with a level one multiparameter inference engine **606** within the BHM. A probability object server **607** carries out Baysian probability distributions object server subroutines and communicates through a wireless link **608** carrying out wireless communications subroutines inclusive of the ZigBee software stack **506** and the Chipcon wireless ZigBee transceiver **507**.

Wolf at 0019, 0062

Dr. Sarrafzadeh Explained It Would Be Obvious To Combine the Prior Art



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DECLARATION OF DR. MAJID SARRAFZADEH

i

Apple Inc.
APL1003
U.S. Patent No. 8,923,941

104. As I have discussed above, it is my opinion that Wolf teaches a health monitoring device very similar to the device of Luo. Not only are the structures of the monitoring devices similar, the operation and functions are also similar. For example, both Luo and Wolf correlate multiple parameters to assess certain conditions of the subject, such as conditions related to fall detection. However, Wolf has the added advantage of a cognitive inference engine to reduce uncertainties regarding the health state of the monitored subject. Ex. 1042, ¶ 0024. This, it is my opinion that it would have been obvious to combine the method suggested by Luo and Craw with an application like the cognitive engine of Wolf to improve health state determinations. Thus, combining the teachings of Luo, Craw, and Wolf constitutes the obvious use a known machine learning technique to improve similar health monitoring devices in the same way.

Sarrafzadeh Decl. ¶104

The Federal Circuit Asked the Board to "Resolve Patentability Issues" of "Corrected" Claims 4-5

We conclude that the Agency's treatment of this error as the basis of a Final Written Decision of patentability is not a reasonable resolution, and does not comport with the Agency's assignment to resolve patentability issues. On the correct antecedent basis, the petition's issue of obviousness may be resolved by the Board, in furtherance of resolution of the parties' dispute in concurrent district court litigation.

The Board's Final Written Decision on the ground of "absence of antecedent" basis is vacated. On remand the Board shall determine patentability of corrected claims 4 and 5 on the asserted grounds of obviousness.

Fitbit, Inc. v. Valencell, Inc., 964 F.3d 1112, 1120 (Fed. Cir. 2020)

Fitbit Previously Made the Same Arguments in its Additional Briefing

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.
Petitioner

v.

VALENCELL, INC.
Patent Owner

Case IPR2017-00319[1]
Patent 8,923,941

PETITIONER APPLE INC.'S ADDITIONAL BRIEFING REGARDING CLAIMS PREVIOUSLY DENIED INSTITUTION

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P.O. Box 1450
Alexandria, VA 22313-1450

[1] Case IPR2017-01555 has been joined with this proceeding.

These facts indicate that patent claim 4's dependence on claim 1 is a typographical error and that patent claim 4 should depend on patent claim 3, which recites "an application." This error results in patent claim 4 lacking antecedent basis

Paper No. 40 at 6

B. Should the Board should reach the merits of claims 4 and 5, it should find them obvious.

Apple's Petition, supported by Dr. Sarrafzadeh's declaration, demonstrates by a preponderance of the evidence that claims 4 and 5 would have been obvious over Luo in view of Craw and Wolf (Pet., 15-27, 29-32), explaining that although the combination of Luo and Craw does not expressly disclose an application that "'is configured to generate statistical relationships' as recited in claim 4, applications that generated statistical relationships between physical activity and physiological parameters were known in the art as evidenced by Wolf." (*Id.*, 29.) The Petition then resolves the *Graham* factual inquiries, explaining what Wolf teaches and why a POSA would have combined Luo, Craw, and Wolf, concluding that claims 4-5 would have been obvious. (*Id.*, 30-32.)

Paper No. 40 at 7