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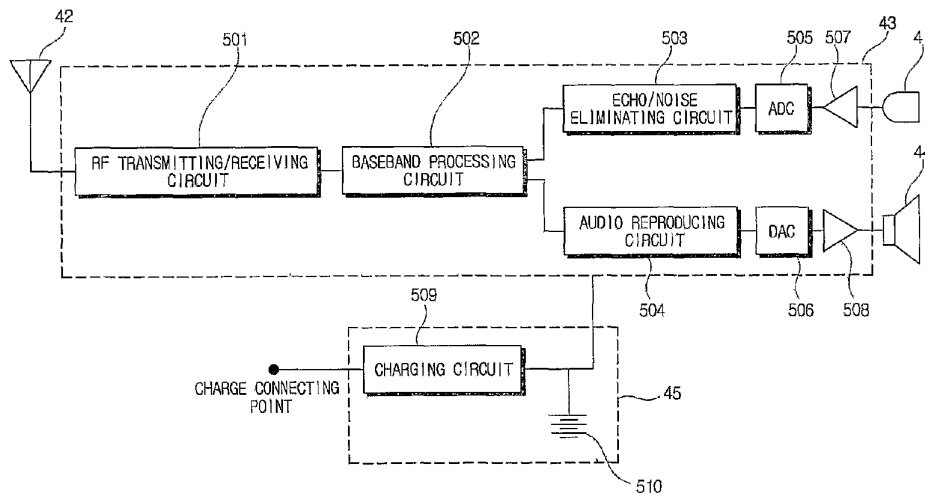
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(54) Title: WIRELESS EAR-PHONE AND PORTABLE TERMINAL USING THE SAME



(57) Abstract: A wireless earphone includes: a wireless transmitting/receiving unit for transmitting/ receiving a signal to/from the portable terminal according to a short wireless communication scheme; a voice detecting unit for detecting a user's voice signal with being inserted into an ear of the user; a signal processing unit for converting a short range wireless communication signal received through the wireless transmitting/receiving unit to an audio signal, eliminating noise and echo from a voice signal received through the voice detecting unit, converting the noise and echo eliminated voice signal to a short range wireless communication signal and transmitting the short range wireless communication signal; an output unit for outputting the audio signal received from the signal processing unit; and a power supplying unit for receiving power and being charged when the wireless stereo earphone is attached to the mobile terminal, and supplying the power to each element of the wireless earphone.

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## Description

### WIRELESS EAR-PHONE AND PORTABLE TERMINAL USING THE SAME

#### Technical Field

- [1] The present invention relates to a wireless ear-phone and a portable terminal using the same; and more particular, to a wireless stereo ear-phone and a portable terminal interacted with a wireless stereo ear-phone.

#### Background Art

- [2] A portable terminal denotes a terminal handy to carry such as a mobile communication terminal, a personal communication service (PCS) terminal, a personal digital assistant (PDA), a smart phone, a next generation mobile communication terminal, a wireless local area network (LAN) terminal, a digital multimedia broadcasting (DMB) terminal, a portable Internet terminal, a portable music reproducing device and a portable multimedia reproducing device.
- [3] A mobile communication terminal has been dramatically developed and such a development allows the mobile communication terminal to have various entertainment functions such as a game, a camera, a video player and a MP3 player as well as the communication function. Such a mobile communication terminal having various functions has been popular among users. Despite of dramatic development of the mobile communication terminal, there are still many researches in actively progress to develop mobile communication terminals to have functions of receiving a digital broadcasting, storing and reproducing multimedia files and video referencing function.
- [4] According to introduction of various functions for a mobile communication terminal, there were many peripheral devices developed and introduced in various shapes. For example, various peripheral devices connected to the mobile communication terminal through a universal serial bus (USB) port. Recently, a short range wireless communication technology such as Bluetooth technology is commonly used to connect a peripheral device to the mobile communication terminal.
- [5] Moreover, it is a current trend to integrate peripheral devices with the mobile communication terminal. For example, an external camera, an external MP3 player and a FM radio are integrally embedded into the mobile communication terminal for convenience to carry.
- [6] On the contrary, there is a peripheral device providing convenience when it is separated from the mobile communication terminal, for example, an input/output device. That is, an earphone or a headphone is generally used for reproducing multimedia files such as movie image files or reproducing music files. However, the

user may have restrictions because the conventional earphone and headphone are connected to the mobile communication terminal through a cable.

- [7] In order to overcome such an inconvenience, a wireless earphone or a wireless headset were introduced in US Patent Publication No. 2004/0141610 A1 (Jul. 22, 2004), US Patent Publication No. 2005/0204155 A1 (Oct. 14, 2004), US Patent No. 6021207A (Feb. 1, 2000) and US Patent No. 6230019 B1 (May. 8, 2001).
- [8] Also, a wireless earphone inserted into a human ear was introduced in Japan Patent Application No. 2004-220147.
- [9] According to these conventional technologies, a short range wireless communication device such as a Bluetooth transmitting/receiving device embedded in a mobile communication terminal to transmit an audio signal to the wireless earphone through a wireless link.
- [10] However, a non-rechargeable battery or a rechargeable battery is used to supply a power and the rechargeable battery is generally embedded in the wireless earphone. In case of using the rechargeable battery, the wireless earphone or the wireless headset uses different power charging units which are separately provided from the mobile wireless communication terminal. A battery running time of the wireless earphone may be different from that of the mobile communication terminal. Therefore, the wireless headset may not be available to use since the battery thereof are all used.
- [11] Since the wireless headset is an independent device from the wireless communication terminal, a user carries the wireless headset, separately. So, there is a great chance to loss the wireless headset. Since the conventional wireless headset is generally designed to be wearable at one ear only, the conventional wireless headset cannot process a stereo audio signal. In a view of the current trend of demanding the multimedia functions of the wireless communication terminal, the users cannot satisfied with the conventional mono type earphone. Therefore, there are greater demands for a high quality stereo audio device.
- [12] The conventional headset is generally designed to have a right side speaker and a left side speaker or a right side earphone and a left side earphone, which are connected by a band. And, a circuit for providing a wireless headset function is embedded at one side of the conventional headset and a rechargeable batter is disposed at other side of the conventional headset. Such a design of the conventional headset makes the conventional headset difficult to be miniaturized and makes a user inconvenient to carry.
- [13] Meanwhile, a conventional wireless earphone that is rechargeable through connecting to a wireless communication terminal was introduced in Korea Patent Publication No. 1999-0046637 and Korea Patent Publication No. 2003-0064155.
- [14] Although these conventional technologies were introduced to overcome the shortcoming of the wired earphone, it is still difficult to miniaturize the wireless

earphone or the wireless headset because a microphone must be disposed near to a mouth to guarantee a high speech quality. However, such a design makes the wireless headset to be miniaturized. On the contrary, if the microphone is disposed near to a speaker in order to miniaturize the wireless headset, the speed quality is degraded.

### **Disclosure of Invention**

#### **Technical Problem**

[15] It is, therefore, an object of the present invention to provide a wireless earphone attachable to a main body of a communication wireless terminal for transmitting/receiving a wireless communication signal to/from a mobile communication terminal by interacting with a mobile communication terminal while providing convenience a user to carry when the wireless earphone is not used.

[16] It is another object of the present invention to provide a wireless communication terminal for transmitting and receiving a short range wireless communication signal to/from the wireless earphone by interacting with the wireless earphone and for housing and recharging the wireless earphone.

#### **Technical Solution**

[17] In accordance with one aspect of the present invention, there is a wireless stereo earphone attachable to a portable terminal including: a wireless transmitting/receiving unit for transmitting/receiving a signal to/from the portable terminal according to a short wireless communication scheme; a voice detecting unit for detecting a user's voice signal with being inserted into an ear of the user; a signal processing unit for converting a short range wireless communication signal received through the wireless transmitting/receiving unit to an audio signal, eliminating noise and echo from a voice signal received through the voice detecting unit, converting the noise and echo eliminated voice signal to a short range wireless communication signal and transmitting the short range wireless communication signal; an output unit for outputting the audio signal received from the signal processing unit; and a power supplying unit for receiving power and being charged when the wireless stereo earphone is attached to the mobile terminal, and supplying the power to each element of the wireless earphone.

[18] In accordance with another aspect of the present invention, there is provided a portable terminal with an attachable wireless stereo earphone, including: an attaching/detaching unit for attaching the wireless stereo earphone to the mobile terminal or detaching the wireless stereo earphone from the portable terminal, and charging the wireless earphone by connecting a rechargeable battery of the wireless earphone to a charging circuit of the portable terminal when the wireless stereo earphone is attached to the portable terminal; a controlling unit for connecting/disconnecting a wireless

communication path between the wireless earphone and the portable terminal by sensing the wireless earphone to be attached or to be detached to/from the attaching/detaching unit, transmitting an audio signal to a short range wireless transmitting/receiving unit by sensing the wireless earphone to be separated from the attaching/detaching unit and converting a voice signal transmitted from the short range wireless transmitting/receiving unit to a wireless communication signal and radiating the wireless communication signal; and the short range wireless communication unit for connecting or disconnecting a wireless communication path between the wireless earphone and the portable terminal in response to the controlling unit, converting the audio signal received from the controlling unit to a short range wireless communication signal, outputting the short range wireless communication signal, and converting a short range wireless communication signal received from the wireless earphone to an audio signal.

### **Advantageous Effects**

- [19] A wireless earphone according to the present invention has a capability of transmitting/receiving a voice and an audio signal to/from a mobile communication terminal and has a shape of an earplug. Therefore, a user can conveniently communicate with a person on the other end of the communication link, reproduce a multimedia file, receive a broadcast program of TV and have a video conference using the wireless earphone by putting the wireless earphone into the ears. Also, the wireless earphone is easy to carry by attaching the wireless earphone to the main body of the mobile communication terminal when it is not used. That is, the wireless earphone may be protected from being lost.

### **Brief Description of the Drawings**

- [20] The above and other objects and features of the present invention will become apparent from the following description of the preferred embodiments given in conjunction with the accompanying drawings, in which:
- [21] FIG. 1 is a perspective view of a wireless earphone according to an embodiment of the present invention;
- [22] FIG. 2 is a front view illustrating a wireless earphone 100 attached or detached to/from a mobile communication terminal 200;
- [23] FIG. 3 is a side view of a mobile wireless terminal 200 with a wireless earphone 100 attached according to an embodiment of the present invention;
- [24] FIG. 4 is a cross-sectional view of a wireless earphone according to an embodiment of the present invention;
- [25] FIG. 5 is a block diagram illustrating a wireless earphone 100 according to an embodiment of the present invention;

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