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INTELLIGENT EARPHONE.

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The present invention discloses an intelligent earphone inside which a noise canceling module, a Bluetooth module, a built-in microphone, an external microphone and a loudspeaker are arranged; the Bluetooth module, the built-in microphone, the external microphone and the loudspeaker are electrically connected to the noise canceling module, wherein the built-in microphone and the external microphone are also electrically connected to the Bluetooth module, the built-in microphone collects and transmits a sound signal output by the loudspeaker to the Bluetooth module, the external microphone collects and transmits an external noise signal to the Bluetooth module, and the Bluetooth module regulates the volume of the intelligent earphone based on the sound signal and/or the Bluetooth module regulates the noise canceling pattern of the intelligent earphone based on the external noise signal.

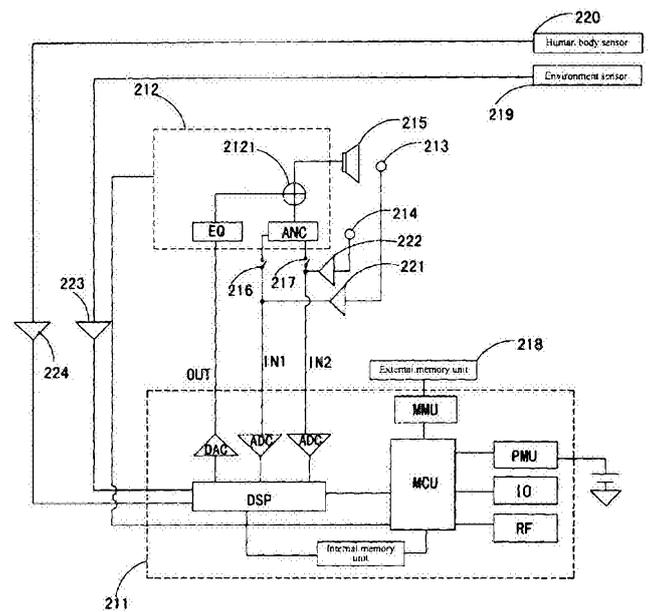


FIG. 1

INTELLIGENT EARPHONE

BACKGROUND

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Technical Field

The present invention relates to an intelligent earphone.

Related Art

10 With the more and more popularization of earphones at present, a user not only cannot regulate a noise canceling pattern and the volume of the earphone at any time and any place based on external environment but also does not choose music suitable for his or her own current somagenic need at any time based on his or her own body conditions when using the earphone produced by adopting the
15 existing technology, and thus, development of an intelligent earphone meeting the above requirements has become a problem to be urgently solved.

Summary

The technical problem solved by the present invention is to provide an
20 intelligent earphone inside which a noise canceling module, a Bluetooth module, a built-in microphone, an external microphone and a loudspeaker are arranged, and the Bluetooth module, the built-in microphone, the external microphone and the loudspeaker are electrically connected to the noise canceling module, wherein the built-in microphone and the external microphone are also electrically connected to
25 the Bluetooth module, the built-in microphone collects and transmits a sound signal output by the loudspeaker to the Bluetooth module, the external microphone collects and transmits an external noise signal to the Bluetooth module, and the Bluetooth module regulates the volume of the intelligent earphone based on the sound signal and/or the Bluetooth module regulates the noise canceling pattern of
30 the intelligent earphone based on the external noise signal.

Preferably, the built-in microphone is electrically connected to the noise canceling module through a first switch, and the Bluetooth module controls the on or off of the first switch based on the external noise signal.

5 Preferably, the external microphone is electrically connected to the noise canceling through a second switch, and the Bluetooth module controls the on or off of the second switch based on the external noise signal.

10 Preferably, the noise canceling module includes an active noise canceling unit, the Bluetooth module further includes a digital signal processing unit, the active noise canceling unit is electrically connected to the digital signal processing unit through the first switch and the second switch, the built-in microphone is electrically connected to a connection passage between the first switch and the digital signal processing unit, the external microphone is electrically connected to a connection passage between the second switch and the digital signal processing unit, the digital signal processing unit receives the sound signal and the external noise signal transmitted by the built-in microphone and/or the external microphone.

15 Preferably, the Bluetooth module further includes a microcontroller unit electrically connected to the digital signal processing unit, the microcontroller unit receives the sound signal transmitted by the digital signal processing unit and regulates the volume of the intelligent earphone based on the sound signal; the microcontroller unit receives the external noise signal transmitted by the digital signal processing unit and controls the on or off of the first switch and/or the second switch based on the external noise signal.

With respect to the prior art, the intelligent earphone provided by the present invention has the efficacies that:

25 1) the intelligent earphone provided by the present invention is capable of automatically regulating a noise canceling pattern based on the noisy degree of the external environment;

30 2) the intelligent earphone provided by the present invention is capable of automatically regulating the volume of the earphone based on the volume output by the loudspeaker; and

3) the intelligent earphone provided by the present invention receives data information collected by the sensors and is capable of automatically broadcasting a voice prompting message to a user.

5 **Brief Description of Drawings**

FIG.1 is a structure diagram of an intelligent earphone according to the present invention; and

FIG.2 is a flowchart of regulation of a noise canceling pattern of an intelligent earphone according to the present invention.

10

Description of Embodiments

Detailed contents and technical description of the present invention are further described taking a preferred embodiment as an example, but should not be construed as limiting upon the present invention.

15 As shown in FIG.1, an intelligent earphone 21 provided by the present invention includes a Bluetooth module 211, a noise canceling module 212, a built-in microphone 213, an external microphone 214 and a loudspeaker 215; the Bluetooth module 211, the built-in microphone 213, the external microphone 214 and the loudspeaker 215 are electrically connected to the noise canceling module 212; the
20 built-in microphone 213 and the external microphone 214 are also electrically connected to the Bluetooth module 211, the built-in microphone 213 collects and transmits a sound signal output by the loudspeaker 215 to the Bluetooth module 211, the external microphone 214 collects and transmits an external noise signal to the Bluetooth module 211, and the Bluetooth module 211 regulates the volume of
25 the intelligent earphone 21 based on the sound signal and/or the Bluetooth module 211 regulates the noise canceling pattern of the intelligent earphone 21 based on the external noise signal.

Further, the noise canceling module 212 includes an equalizer EQ, an active noise canceling unit ANC and an adder 2121, the equalizer EQ and the active noise
30 canceling unit ANC are electrically connected to the adder 2121, and the adder

2121 is electrically connected to the loudspeaker 116. The Bluetooth module 211 includes a digital signal processing unit DSP, a microcontroller unit MCU, a memory management unit MMU, a power management unit PMU, an input and output port IO and a radio frequency module RF; the digital signal processing unit DSP is electrically connected to the microcontroller unit MCU, electrically connected to the equalizer EQ through an output channel OUT, and also electrically connected to the active noise canceling unit ANC through input channels IN1 and IN2, wherein a first switch 216 is arranged on the input channel IN1 of which the two ends are electrically connected to the digital signal processing unit DSP and the active noise canceling unit ANC respectively, a second switch 217 is arranged on the input channel IN2 of which the two ends are electrically connected to the digital signal processing unit DSP and the active noise canceling unit ANC, the built-in microphone 213 is electrically connected between the first switch 216 and the digital signal processing unit DSP through an amplifier 221, the external microphone 214 is electrically connected between the second switch 217 and the digital signal processing unit DSP through another amplifier 222, the sound signal collected by the built-in microphone 213 is transmitted to the digital signal processing unit DSP via an analog-digital converter ADC, and the external noise signal collected by the external microphone 214 is transmitted to the digital signal processing unit DSP via another analog-digital converter ADC; the microcontroller unit MCU is electrically connected to the memory management unit MMU, the power management unit PMU, the input and output port IO and the radio frequency module RF, the microcontroller unit MCU receives the sound signal and the external noise signal transmitted by the digital signal processing unit DSP, and the microcontroller unit MCU regulates the volume of the intelligent earphone 21 based on the sound signal, or the microcontroller unit MCU controls the on or off of the first switch 216 and/or the second switch 217 based on the external noise signal so as to achieve the purpose of regulating the noise canceling pattern of the intelligent earphone 21, or the microcontroller unit MCU controls the on or off of the first switch 216 and/or the second switch 217 based on the external noise signal while

regulating the volume of the intelligent earphone 21 based on the sound signal so as to achieve the purpose of regulating the noise canceling pattern of the intelligent earphone 21. Wherein, when both of the first switch 216 and the second switch 217 are turned off, the intelligent earphone 21 is in low noise pattern; when one of the first switch 216 and the second switch 217 is turned off and the other is closed and turned on, the intelligent earphone 21 is in a common noise canceling pattern; and when both of the first switch 216 and the second switch 217 are turned on, the intelligent earphone 21 is in a deep noise canceling pattern.

More further, the intelligent earphone 21 provided by the present invention also includes an external memory unit 218, an environment sensor 219 and a human body sensor 220; the external memory unit 218 is electrically connected to the memory management unit MMU; the environment sensor 219 is electrically connected to the digital signal processing unit DSP through an amplifier 223, the digital signal processing unit DSP receives and processes environment information data collected by the environment sensor 219 to acquire an environment signal; the human body sensor 220 is electrically connected to the digital signal processing unit DSP through an amplifier 224, the digital signal processing unit DSP receives and processes human body information data collected by the human body sensor 220 to acquire a human body signal; the microcontroller unit MCU receives the environment signal and/or human body signal transmitted by the digital signal processing unit DSP, determines sound prompt messages corresponding to the environment signal and/or human body signal based on multiple sound prompt messages stored in the external memory unit 218 and processes the sound prompt messages to acquire an audio prompt signal which is finally transmitted to the loudspeaker 215 through the digital signal processing unit DSP, the output channel OUT, the equalizer EQ and the adder 2121 in sequence, and the loudspeaker 215 broadcasts the audio prompt signal.

Wherein, the environment information data includes data such as temperature, humidity and air pressure of environment; and the human body information data includes data such as temperature, heart rate and blood pressure of a human body.

For example, when the human body sensor 220 collects information data of heart rate of a user, the digital signal processing unit DSP receives and processes the information data of the heart rate of the user to acquire a heart rate signal, if the microcontroller unit MCU determines that the heart rate signal is higher than a normal heart rate value of a human body after receiving the heart rate signal transmitted by the digital signal processing unit DSP, the microcontroller unit MCU may read a sound prompt message corresponding to higher heart rate signal from multiple sound prompt messages stored in the external memory unit 218 and processes the sound prompt message to acquire an audio prompt signal, that is, it is recommended to listen relieving music because your current heart rate is too high, and the loudspeaker 215 receives and broadcasts the audio prompt signal.

As shown in FIG.2, the flowchart of regulation of the noise canceling pattern of the intelligent earphone provided by the present invention includes the following steps that:

- step S101: the intelligent earphone 21 is turned on;
- step S102: a user chooses whether a function of automatically regulating a noise canceling pattern is adopted or not;
- step S103: regulation of a noise canceling pattern is changed into manual regulation if the user does not adopt the function of automatically regulating the noise canceling pattern;
- step S104: an external microphone collects and transmits an external noise signal to a microcontroller unit MCU if the user adopts the function of automatically regulating the noise canceling pattern; and
- step S105: the microcontroller unit MCU controls the on or off of the first switch 216 and/or second switch 217 based on the external noise signal so as to regulate the noise canceling pattern of the intelligent earphone 21, when both of the first switch 216 and the second switch 217 are turned off, the intelligent earphone 21 is in low noise pattern; when one of the first switch 216 and the second switch 217 is turned off and the other is closed and turned on, the intelligent earphone 21 is in a common noise canceling pattern; and when both of the first switch 216 and the

second switch 217 are turned on, the intelligent earphone 21 is in a deep noise canceling pattern.

The above description is a preferred embodiment of the present invention, but does not limit the scope of the present invention. Various corresponding
5 modifications and variations can be made by those skilled in the art according to the present invention without departing from the spirit and substances of the present invention, however, these corresponding modifications and variations are all included within the protection scope of the appended claims of the present
10 invention.

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REVENDEICATIONS

5 1. Ecouteur intelligent (21) dans lequel un module supprimeur de bruit (212),
un module Bluetooth(211), un microphone intégré (213), un microphone externe
(214) et un haut-parleur (215) sont disposés, le module Bluetooth (211), le
microphone intégré (213), le microphone externe (214) et le haut-parleur (215)
étant connectés électriquement au module supprimeur de bruit (212), caractérisé
10 en ce que le microphone intégré (213) et le microphone externe (214) sont
également connectés au module Bluetooth (211), le microphone intégré (213)
recueille et transmet un signal sonore issu du haut-parleur (215) vers le module
Bluetooth (211) le microphone externe (214) recueille et transmet le signal d'un
bruit extérieur vers le module Bluetooth (211) et le module Bluetooth (211) régule le
15 volume de l'écouteur intelligent d'après le signal sonore et/ou ce module Bluetooth
(211) régule la forme du signal supprimeur de bruit de l'écouteur intelligent (21) en
fonction du bruit extérieur.

 2. Ecouteur intelligent (21) suivant la revendication 1 caractérisé en ce que le
microphone intégré (213) est connecté électriquement au module supprimeur de
20 bruit (212) via un premier interrupteur (216), le module Bluetooth (211) contrôlant
les positions marche ou arrêt de ce premier interrupteur (216) en fonction du bruit
extérieur.

 3. Ecouteur intelligent (21) suivant la revendication 2 caractérisé en ce que le
microphone externe (214) est connecté électriquement au module supprimeur de
25 bruit (212) via un deuxième interrupteur (217), le module Bluetooth (211) contrôlant
les positions marche ou arrêt de ce deuxième interrupteur (217) en fonction du bruit
extérieur.

 4. Ecouteur intelligent (21) suivant la revendication 3 caractérisé en ce que le
module supprimeur de bruit (212) comprend une unité de suppression de bruit
30 active, le module Bluetooth (211) comprenant en outre une unité de traitement de

signal digital, l'unité de suppression de bruit active étant connectée électriquement à l'unité de traitement de signal digital, via le premier (216) et le deuxième interrupteur (217), le microphone intégré (213) étant connecté électriquement à un passage de connexion entre le premier interrupteur (216) et l'unité de traitement de
5 signal digital, le microphone externe étant connecté électriquement à un passage de connexion entre le deuxième interrupteur (217) et l'unité de traitement de signal digital, l'unité de traitement de signal digital recevant le signal acoustique et le signal de bruit extérieur transmis par le microphone intégré (213) et/ou le microphone externe (214).

10 5. Ecouteur intelligent (21) suivant la revendication 4 caractérisé en ce que le module Bluetooth comprend en outre un microcontrôleur connecté électriquement à l'unité de traitement de signal digital, ce microcontrôleur recevant le signal acoustique transmis par l'unité de traitement de signal digital et réglant le volume de l'écouteur intelligent (21) en fonction du signal acoustique ; le microcontrôleur
15 reçoit le signal du bruit extérieur transmis par l'unité de traitement de signal digital et contrôle la position « marche » ou « arrêt » du premier interrupteur et/ou le deuxième interrupteur en fonction du signal de bruit extérieur.

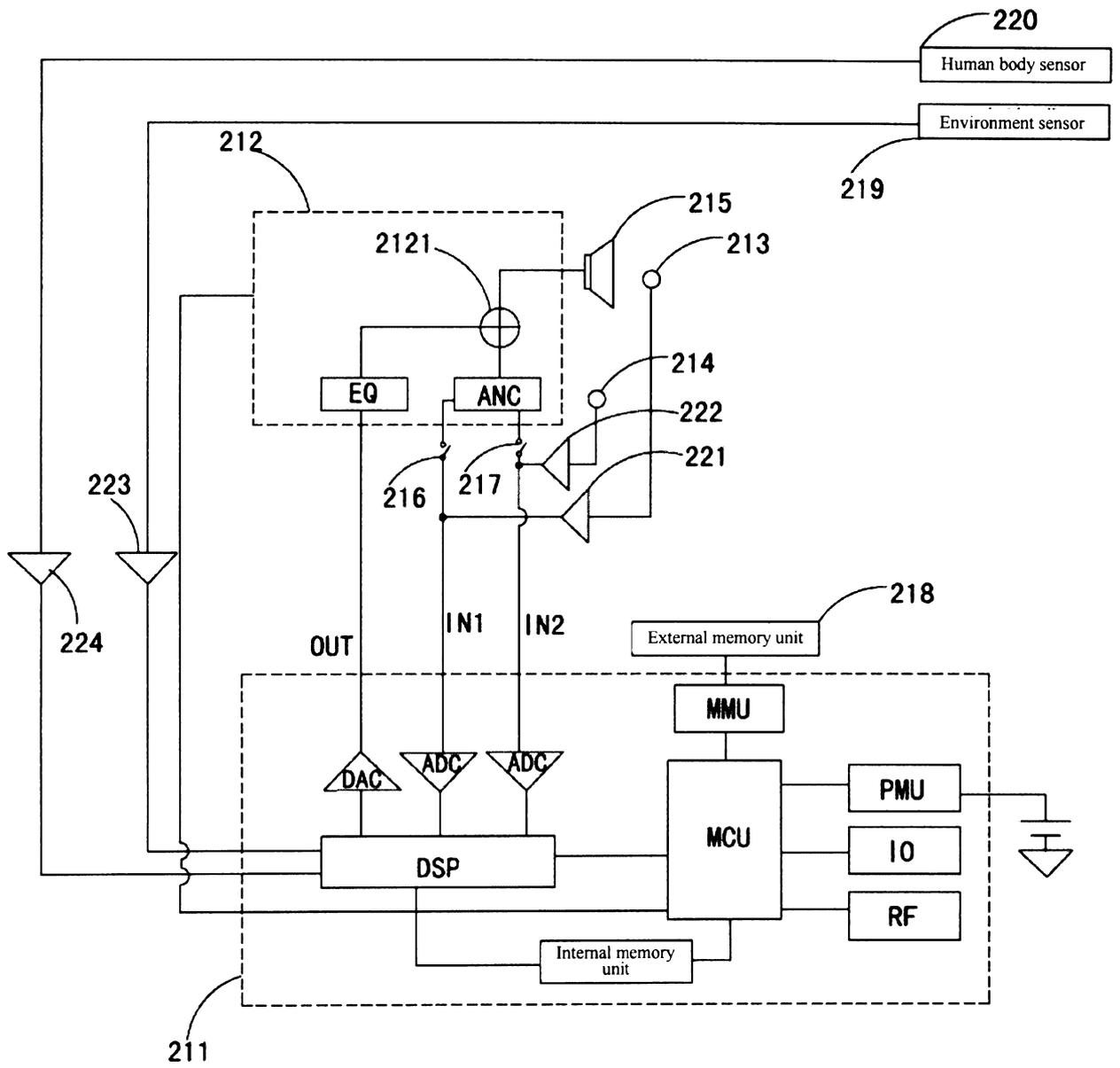


FIG. 1

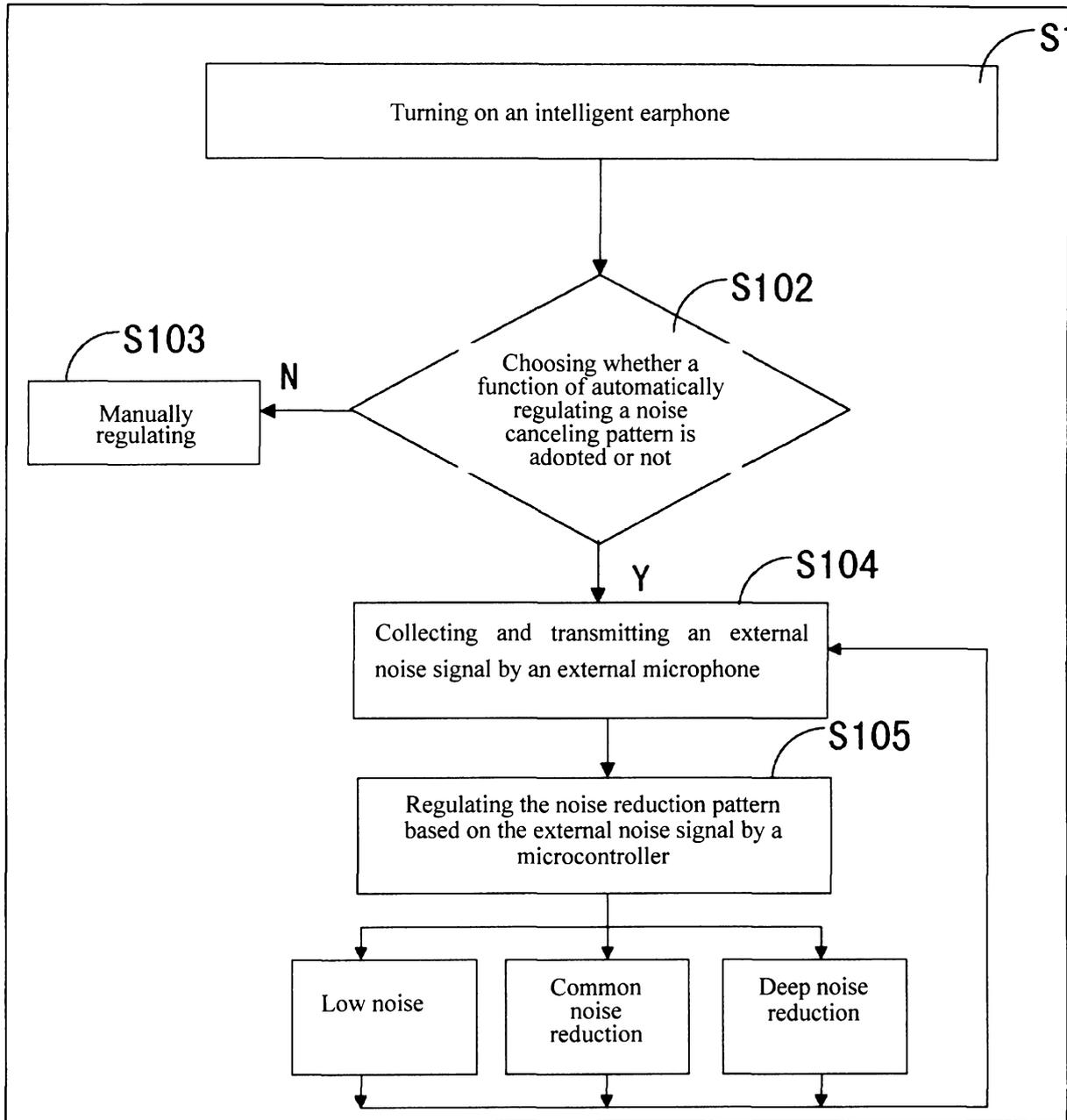


FIG. 2

ABSTRACT**INTELLIGENT EARPHONE**

5 The present invention discloses an intelligent earphone inside which a noise canceling module, a Bluetooth module, a built-in microphone, an external microphone and a loudspeaker are arranged; the Bluetooth module, the built-in microphone, the external microphone and the loudspeaker are electrically connected to the noise canceling module, wherein the built-in microphone and the
10 external microphone are also electrically connected to the Bluetooth module, the built-in microphone collects and transmits a sound signal output by the loudspeaker to the Bluetooth module, the external microphone collects and transmits an external noise signal to the Bluetooth module, and the Bluetooth module regulates the volume of the intelligent earphone based on the sound signal and/or the Bluetooth
15 module regulates the noise canceling pattern of the intelligent earphone based on the external noise signal.

Fig. 1

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