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(54) HEADSET AND METHOD HAVING BIOMETRIC FEATURE DETECTION FUNCTION

KOPFHÖRER MIT ERKENNUNG VON BIOLOGISCHEN MERKMALEN, UND VERFAHREN ZUR ERKENNUNG BIOLOGISCHER MERKMALE

CASQUE ET PROCÉDÉ D'INTERACTION AVEC FONCTION DE DÉTECTION DE CARACTÉRISTIQUES BIOMÉTRIQUES

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Description

TECHNICAL FIELD

[0001] Embodiments of the present application relate to the technical field of wearable devices, and in particular, relates to a headphone with a biological feature detection function, an interaction system and a biological feature detection method.

BACKGROUND

[0002] Headphones are an entertainment tool frequently used by people, and are small in size and convenient to wear. Therefore, the headphones are widely used in people's life and work. For example, people may listen to music via the headphones while they are doing morning exercise, and may wear the headphones to watch videos, enjoy music and practice their English listening when they are going to work or going home after work.

[0003] However, with the development and advancement of science and technology, the function of the headphone is not limited to the single function of a traditional headphone. Smart headphones are being used among people. For example, smart headphones capable of detecting heart rate information of human bodies by detecting vibration at the auricle are well populated. Currently, a variety of headphones capable of detecting biological feature information of human bodies are welcome. The biological features may be categorized into physiological features (for example, fingerprint, face image, iris, palm print and the like) and behavior features (for example, gait, voice, handwriting and the like). The biological feature detection signifies identification and identity authentication of an individual based on the unique biological features of the individual.

[0004] At present, headphones capable of detecting the heat rate information of human bodies are available in the prior art. However, such information detection is practiced by using an external mechanical key on a headphone. That is, in such headphones, users' manual operations on external the mechanical key on the headphones are needed, such that the headphones are manually switchable between a voice call mode and a heart rate detection mode. For example, when a user holds too many articles on his or her hands, such headphones are not convenient to use. Therefore, the headphones in the prior art need users' manual operations on the mechanical keys on the headphones to implement the biological feature detection function. As a result, convenience of users' operation, application scope and user experience are all affected.

[0005] US 2012/0156933 A1 discloses a biosensor, smart phone and headset connected by an interface device.

[0006] US 2015/0312669 A1 discloses a user terminal device including an ear accessory.

SUMMARY

[0007] In view of the above defect of the headphone for implementing biological feature detection in the prior art, embodiments of the present application provide a headphone with a biological feature detection function, which is capable of completely automatically implementing the biological feature detection function.

[0008] To solve the above technical problem, the embodiments of the present application provides a headphone with a biological feature detection function, including: a loudspeaker for playing audios and a microphone for making calls, wherein the headphone further includes:

a biological feature detection module, configured to detect a biological feature of a user;

a mode switching module, configured to switch, under control of a control module, to determine whether the headphone is in a working mode supporting a biological feature detection mode;

a first communication module, configured to carry out communication between the headphone and a smart terminal;

a control module, configured to detect and determine whether an instruction is received from the smart terminal, and control, according to the instruction received from the smart terminal, the biological feature detection module, the mode switching module, the power management module and the first communication module to work, and further configured to parse the biological feature from the biological feature detection module under control of the instruction received from the smart terminal, and transmit the parsed biological feature to the smart terminal via the first communication module; and

a power management module, configured to supply power to modules in the headphone.

[0009] In an optional embodiment of the embodiments of the present application, the headphone includes a connection member configured to connect the headphone to the smart terminal to implement information interaction between the headphone and the smart terminal, and the smart terminal includes a headphone jack, the connection member mating with the headphone jack.

[0010] In an optional embodiment of the embodiments of the present application, the connection member includes a first end configured to be electrically connected to the headphone jack, and the mode switching module is configured to select, via switching, the connection of the first end with the microphone or connection with the first communication module, to determine whether the headphone is in the working mode supporting the biological feature detection mode.

[0011] In an optional embodiment of the embodiments of the present application, the mode switching module includes a switch array configured to select, via switching and under control of the control module, to select the connection of the first end with the microphone or connection with the first communication module, the switch array being simultaneously electrically connected to the power management module.

[0012] In an optional embodiment of the embodiments of the present application, the power management module includes a voltage conversion submodule; and when the connection member is connected to the smart terminal, the power management module is powered on by the smart terminal, and the voltage conversion submodule is configured to convert electric energy supplied by the smart terminal into power desired by the modules in the headphone to supply power to the modules.

[0013] In an optional embodiment of the embodiments of the present application, the power management module further includes a startup buffering submodule configured to buffer a power-on process, wherein the startup buffering submodule is connected between the mode switching module and the voltage conversion submodule.

[0014] In an optional embodiment of the embodiments of the present application, the power management module further includes a stabilization submodule configured to stabilize a process of supplying power to the modules in the headphone, wherein the stabilization submodule is connected between the startup buffering submodule and the switch array.

[0015] In an optional embodiment of the embodiments of the present application, the power management module further includes an energy storage submodule connected to an output terminal of the voltage conversion submodule; and when the connection member is connected to the smart terminal, the voltage conversion submodule in the power management module is configured to convert electric energy supplied by the smart terminal to charge the energy storage submodule.

[0016] In an optional embodiment of the embodiments of the present application, the connection member includes a second end configured to electrically connect the headphone jack of the smart terminal to a left sound channel of the loudspeaker and a third end configured to electrically connect the headphone jack of the smart terminal to a right sound channel of the loudspeaker; the first communication module is configured to receive an instruction from the smart terminal via the first end or the second end or the third end; and the first communication module is configured to transfer the parsed biological feature to the smart terminal via the first end.

[0017] In an optional embodiment of the embodiments of the present application, the biological feature detection mode includes: detecting a biological feature, parsing a detected biological feature, and transferring a parsed biological feature to a smart terminal.

[0018] In an optional embodiment of the embodiments of the present application, the biological feature detection module includes: a detection submodule configured to detect the biological feature of the user, and a signal processing submodule configured to process the detected biological feature.

[0019] In an optional embodiment of the embodiments of the present application, the detection submodule includes: a light source configured to irradiate a detected region of the user, a driver configured to drive the light source to emit light, an photoelectric converter configured to receive an optical signal reflected by the detected region and convert the optical signal into a current signal, a current-voltage converter configured to convert the current signal into a voltage signal, and an analog-to-digital converter configured to perform an analog-to-digital conversion for the voltage signal.

[0020] To better solve the above technical problem, the embodiments of the present application further provide a biological feature detection method based on a headphone, including the following steps:

S10: detecting and judging whether an instruction for performing biological feature detection is currently received from a smart terminal, if the instruction is received, performing step S20, and otherwise, continuously performing step S10;

S20: detecting and judging whether a call instruction is currently received from the smart terminal, if the call instruction is received, performing step S40, and otherwise, performing step S30;

S30: controlling a headphone to perform biological feature detection for a user, such that the headphone enters a working mode supporting a biological feature detection mode; and

S40: controlling the headphone to enter a working mode supporting a call mode and returning to step S10 upon completion of the call.

[0021] To better solve the above technical problem, the embodiments of the present application provide an interaction system, including a smart terminal and a headphone configured to interact with the smart terminal. The headphone is any of the above described headphones with the biological feature detection function. The smart terminal includes a second communication module which communicates with a first communication module in the headphone and a control and processing module configured to control and process an interaction process between the smart terminal and the headphone.

[0022] The headphone with the biological feature detection function according to this embodiment of the present application switches the working mode under control of the smart terminal. Therefore, the headphone is capable of implement working mode switching under control of the smart terminal, to enable the headphone

to be in the working node supporting the biological feature detection mode, so as to implement the biological feature detection function. Specifically, the power management module supplies power to the modules in the headphone, to ensure that the modules in the headphone normally work. The control module controls, according to the instruction from the smart terminal, the mode switching module to determine whether the headphone is in the working mode supporting the biological feature detection mode. Therefore, when the smart terminal issues the instruction for performing the biological feature detection, the headphone may automatically implement the biological feature detection according to the instruction from the smart terminal under control of the control module. The whole process that the headphone implements the biological feature detection function is practiced according to the instruction from the smart terminal, and during this process the user does not need to manually operate the headphone. Therefore, the biological feature detection function may be automatically implemented in the whole process, and thus the headphone has the advantages of simple and convenient operations, good user experience, wide application scope, and good practicability.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

FIG. 1 is a schematic structural diagram of an interaction system formed by a wired connection between a smart terminal and a headphone according to the present application;

FIG. 2 is a schematic structural diagram of interactions between a power management module, a biological feature detection module and a control module according to an optional embodiment of the present application;

FIG. 3 is a schematic partial structural diagram of interactions between a control module, and a mode switching module, a first communication module and a power management module according to an optional embodiment of the present application;

FIG. 4 is a schematic diagram of a biological feature detection method based on a headphone according to the present application;

FIG. 5 is a schematic diagram of a biological feature detection method based on a headphone according to an optional embodiment of the present application; and

FIG. 6 is a schematic diagram of mode switching by a mode switching module according to an optional embodiment of the present application.

DETAILED DESCRIPTION

[0024] For better understanding of embodiments of the present application, the embodiments of the present application are thoroughly described with reference to relevant accompanying drawings. The accompanying drawings show preferred embodiments of the embodiments of the present application. However, the embodiments of the present application may be implemented in a plurality of forms or ways, and are not limited to the embodiments described herein. On the contrary, the embodiments described herein are intended to make the disclosure of the embodiments of the present application more clearly and thoroughly understood.

[0025] Unless otherwise defined, all the technical and scientific terms used in this specification convey the same meanings as the meanings commonly understood by a person skilled in the art to which the embodiments of the present application pertain. Additionally, the terms used in the specification of the embodiments of the present application are merely for describing the objective of the specific embodiments, and are not intended to limit the embodiments of the present application.

[0026] Referring to FIG. 1 to FIG. 3, an embodiment of the present application provides a headphone 30 with a biological feature detection function, which may implement the basic audio playing function and call function of a headphone. The headphone 30 according to this embodiment of the present application mainly includes: a loudspeaker 22 (which is also referred to as a speaker) for playing audios and a microphone 21 for making calls. The headphone 30 further includes: a biological feature detection module 33, configured to detect a biological feature of a user; a mode switching module 31, configured to switching a working mode of the headphone 30 supporting or not supporting biological feature detection according to a decision by a control module that whether the headphone detects or not detects biological feature; a first communication module 35, configured to carry out communication between the headphone and a smart terminal; a control module 34, configured to detect and determine whether an instruction is received from the smart terminal, and control, according to the instruction received from the smart terminal, the biological feature detection module 33, the mode switching module 31, the power management module 32 and the first communication module 35 to work, and further configured to parse the biological feature from the biological feature detection module 33 under control of the instruction received from the smart terminal, and transmit the parsed biological feature to the smart terminal via the first communication module 35; and a power management module 32, configured to supply power to modules in the headphone 30.

[0027] The headphone 30 according to this embodiment of the present application may not be simultaneously in a call mode and a biological feature detection mode (that is, the headphone 30 may be in either the call mode or the biological feature detection mode). There-

fore, the mode switching module 31 needs to switch a part of working modes of the headphone 30 under control of the control module 34. That is, the headphone 30 with the biological feature detection function according to this embodiment of the present application switches the working mode under control of the smart terminal, to enable the headphone 30 to be in the working mode supporting the biological feature detection mode, so as to implement the biological feature detection function. Specifically, the power management module 32 supplies power to the modules in the headphone 30, to ensure that the modules in the headphone 30 normally work. The control module 34 controls, according to the instruction from the smart terminal, the mode switching module 31 to determine whether the headphone 30 is in the working mode supporting the biological feature detection mode. Therefore, when the smart terminal issues the instruction for performing the biological feature detection, the headphone 30 may automatically implement the biological feature detection according to the instruction from the smart terminal under control of the control module 34. The whole process that the headphone 30 implements the biological feature detection function is practiced according to the instruction from the smart terminal, and during this process the user does not need to manually operate the headphone 30. Therefore, the biological feature detection function may be automatically implemented in the whole process, and the operations are simple and convenient. In addition, the headphone 30 according to this embodiment of the present application has a loudspeaker 22 and a microphone 21, and therefore the headphone 30 supports the audio and call function. As such, the headphone 30 may simultaneously work in a biological feature detection mode and an audio mode (or in another information interaction mode). That is, the headphone 30 may select, under control of the control module 34, whether the headphone is in the working mode supporting the biological feature detection mode. The headphone 30 according to this embodiment of the present application may implement the basic audio playing functions such as listening music, answering calls and the like, and may implement the basic call function (which may be voice calls or may be a call function with the video function) of the headphone 30 by using the microphone 21. Therefore, the headphone 30 according to this embodiment of the present application has powerful functionality, and has the advantages of convenient usage, good user experience, wide application scope and good practicability.

[0028] The control module 34 is further configured to parse the biological feature from the biological feature detection module 33 under control of the instruction from the smart terminal. The parsing may include processing the biological feature as follows: for example, filtering and denoising in the early stage, information calculation and analysis of the specific signal of the biological feature and the like (for example, filtering the noise in the signal, judging and filtering the interference caused by movement, calculating the heart beat rate based on the regular variation of the voltage, processing the heart beat data into diagram data, comparing to determine whether the user's heart beat is normal and the like, and sending such parsed data to a mobile phone via the first communication module 35 such that the data is displayed to the user via the mobile phone); the parsing may also include filtering and denoising, signal modulation, demodulation and the like operations in the early stage, such that the headphone 30 provides initial data of the biological feature of the user to the mobile phone, and the mobile phone performs operations such as calculation, analysis and the like.

[0029] The headphone 30 according to this embodiment of the present application may be in a wired structure or a wireless structure. That is, the headphone may carry out information interaction with the smart terminal (for example, a mobile phone or a Pad) in a wired manner, or may carry out information interaction with the smart terminal in a wireless manner. The specific interactive communication may be based on various communication manners in the prior art, which is not described herein any further.

[0030] In an optional embodiment of the embodiments of the present application, the headphone 30 interacts with the smart terminal in a wired manner, and has the advantages of lowering the cost and the like. The embodiments of the present application are described hereinafter with reference to the wired interaction manner. Referring to FIG. 2 and FIG. 3, the headphone 30 includes a connection member 10 configured to connect the headphone to the smart terminal to implement information interaction between the headphone 30 and the smart terminal, and the smart terminal includes a headphone jack, the connection member 10 mating with the headphone jack. That is, the headphone 30 implements wired communication with the smart terminal via the connection member 10. In an optional embodiment of the embodiments of the present application, the connection member 10 includes a first end 12 configured to be electrically connected to the headphone jack, and the mode switching module 31 is configured to select, via switching, the connection of the first end 12 with the microphone or connection with the first communication module 35, to determine whether the headphone 30 is in the working mode supporting the biological feature detection mode. Referring to FIG. 1 to FIG. 6, when the first end is connected to the microphone via the mode switching module, the headphone is in the call mode, that is, the headphone may be used for making calls; and when the first end is connected to the first communication module via the mode switching module (the first end may be only electrically connected to one of the microphone and the first communication module), the headphone is in the biological feature detection mode, that is, the headphone may be also used for biological feature detection.

[0031] More optionally, the headphone 30 may be powered by the smart terminal, and when the connection

member 10 is connected to the smart terminal, the power management module 32 is powered on by the smart terminal, such that power is supplied to the modules (modules/elements in the headphone which need power) in the headphone 30. Specifically, the power management module 32 includes a voltage conversion submodule configured to convert the electric energy supplied by the smart terminal into power desired by the modules in the headphone 30, such that the modules in the headphone 30 are supplied with power. As such, the headphone 30 may be compatible with more power supply manners, such that the headphone 30 may still work even if the internal power supply is exhausted. In this way, the working duration of the headphone may be prolonged, and thus the practicability thereof is extended.

[0032] In the embodiment illustrated in FIG. 2, the mode switching module 31 is simultaneously electrically connected to the first end 12, the microphone 21, the power management module 32 and the control module 34. The mode switching module 31 includes a switch array 311 controlled by the control module 34. The switch array 311 select, via switching under control of the control module, the connection of the first end 12 with the microphone 21 or connection with the first communication module 35, such that connections or disconnections between the relevant modules in the headphone 30 and the smart terminal are controlled under the instruction from the control module 34. Optionally, the microphone 21 maintains a constantly-connected state with the first end 12 of the connection member 10 by using a part of switches in the switch array, such that the microphone 21 and the smart terminal are in a constantly-connected state. As such, the initial state of the microphone is in a connected state, such that the default initial state of the headphone 30 is a state in which the headphone is compatible with the call mode. (Nevertheless, the initial state of the headphone 30 may also be made not to support the call mode by using the switch array.) The first end 12 may select, via switching, to be electrically connected to only one of the microphone 21 and the first communication module 35 by using the switch array in the mode switching module 31, such that the headphone 30 is capable of automatically controlling the switch array according to the instruction from the smart terminal under control of the control module 34 of the headphone 30, to automatically determine whether the headphone 30 enters the working mode supporting the biological feature detection mode. Therefore, no mechanical key needs to be arranged on the headphone 30, and thus the user does not need to manually operate the mechanical key. Even in such cases, the headphone 30 is capable of automatically performing the biological feature detection operation in the whole process.

[0033] In an optional embodiment, that is, in the optional embodiment where the headphone 30 is powered by the smart terminal, the switch array 311 enables the first end 12 to be simultaneously electrically connected to the power management module 32, such that the smart terminal and the power management module 32 in the headphone 30 are constantly in an electrically connected state (nevertheless, in other embodiments, the smart terminal and the power management module 32 in the headphone 30 may not be constantly in an electrically connected state). In this way, the smart terminal may constantly supply power to the headphone 30. Specifically, when the connection member 10 is connected to the smart terminal, the power management module 32 is powered on by the smart terminal, and the voltage conversion submodule (not illustrated in the drawings) included in the power management module 32 converts the electric energy supplied by the smart terminal into power desired by the modules in the headphone 30, such that power is supplied to the modules in the headphone 30.

[0034] The power management module 32 is configured to supply power to the headphone 30 and management the power supply, and specifically supply power to the first communication module 35, the control module 34 and the biological feature detection module 33. In an optional embodiment of the embodiments of the present application, the power management module 32 further includes a startup buffering submodule 322 configured to buffer a power-on process, wherein the startup buffering submodule 322 is connected between the mode switching module 31 and the voltage conversion submodule. This ensures that the headphone 30 is normally powered on in the instant when the headphone 30 is started, which prevents the headphone 30 from being repeatedly restarted during the power-on process, and ensures constant and normal working of the headphone 30. The startup buffering submodule may be arranged between the switch array and the voltage conversion submodule, which may reduce impacts caused by spike pulses and surges to the rear end during the power-on process, that is, implementing the functions of anti-jitter and power-on delaying function or the like. The power management module 32 may include a stabilization submodule 321 configured to stabilize a process of supplying power to the modules in the headphone 30, wherein the stabilization submodule is connected between the startup buffering submodule and the switch array. That is, when the power supply switches to stay in another mode for a short time period and the instantaneous power consumption current is over great, the voltage of the headphone 30 is ensured to be above the normal operating voltage. For example, the stabilization submodule 321 may achieves the buffering and stabilization effect by using such an energy storage element as a capacitor. Optionally, the power management module 32 further includes an energy storage submodule (not illustrated in the drawings) connected to an output terminal of the voltage conversion submodule; and when the connection member 10 is connected to the smart terminal, the voltage conversion submodule in the power management module 32 is configured to convert electric energy supplied by the smart terminal to charge the energy storage submodule. This en-

sures that the headphone 30 has a backup battery, such that the headphone has more powerful functions.

[0035] Optionally, the connection member includes a first end configured to be electrically connected to the headphone jack, and the switch array in the mode switching module selects, via switching, the connection of the first end with the microphone, the connection with the first communication module, or the connection with the power management module, to select the working mode of the headphone. That is, the first end is intermittently electrically connected to the power management module. The mode switching module selects, via switching, the connection of the first end with the microphone, the connection with the first communication module, or the connection with the power management module, to determine whether the headphone is in the working mode supporting the biological feature detection mode. That is, when the first end is connected to the microphone, the headphone is in the working mode supporting the call mode. In addition, in the biological feature detection mode, periodical switching may be carried out between the first end and the first communication module and between the first end and the power management module. When the headphone detects the biological feature of the user, within such a short time period, the first end may be temporarily disconnected from the first communication module (in this case, the first end is connected to the power management module to supply power to the biological feature detection module, that is, in the power supply mode of the headphone system), to reduce power consumption. Similarly, when data needs to be transmitted by the first communication module, the switch array may enable, under control of the control module, the first end to be only connected to the first communication module (in this case, the first end may be temporarily disconnected from the power management module, that is, in the communication mode), to upload and download of the data. In this optional manner, the power consumption of the headphone and the smart terminal may be greatly reduced.

[0036] In the embodiment illustrating the wired headphone 30, the headphone 30 is a wire-controlled headphone, and may match such a smart terminal as a mobile phone 40. At present, the headphone jack of a mobile phone generally includes four interfaces, that is, a left sound channel, a right sound channel, a ground terminal and a microphone 21 that are configured to connect the external headphone 30. Therefore, the first end 12 of the connection member 10 in the headphone 30 according to this embodiment of the present application is configured to be connected to the microphone 21 or the first communication module 35, to carry out the biological feature detection. The connection member 10 may further optionally include: a second end 13 configured to electrically connect the headphone jack of the smart terminal to the left sound channel of the loudspeaker 22, a third end 14 configured to electrically connect the headphone jack of the smart terminal to the right sound channel of the loudspeaker and the ground terminal 11. The first communication module 35 is configured to receive an instruction from the smart terminal via the first end or the second end 13 or the third end 14; and the first communication module 35 is configured to transfer the parsed biological feature to the smart terminal via the first end 12. Therefore, when the headphone 30 is inserted into the smart terminal via the connection member 10, the branch where the loudspeaker 22 of the headphone 30 is configured is constantly in an electrically connected state, so as to ensure that the headphone 30 is constantly compatible with the audio mode. Therefore, when the headphone 30 is in the biological feature detection mode, the headphone 30 is practically in the working mode supporting the biological feature detection mode and the audio mode.

[0037] The headphone 30 according to this embodiment of the present application may detect various biological features, and such a detector as a sensor configured to detect the biological feature may employ any of various sensors available in the prior art, which is not described herein any further. The biological feature detection mode may include: detecting a biological feature, parsing a detected biological feature, and transferring a parsed biological feature to a smart terminal. The biological feature includes one or any combination of: heart rate, step quantity, body temperature and blood oxygen.

[0038] In an optional embodiment of the embodiments of the present application, the biological feature detection module 33 includes: a detection submodule 332 configured to detect the biological feature of the user, and a signal processing submodule 331 configured to process the detected biological feature. Optionally, the headphone 30 supports the heart rate detection function. Therefore, the detection submodule 332 includes: a light source configured to irradiate a detected region of the user, a driver (the embodiment illustrated in FIG. 2 illustrates an LED driver) configured to drive the light source to emit light, an photoelectric converter configured to receive an optical signal reflected by the detected region and convert the optical signal into a current signal, a current-voltage converter (the embodiment illustrated in FIG. 2 illustrates an IV converter) configured to convert the current signal into a voltage signal, and an analog-to-digital converter (the embodiment illustrated in FIG. 2 illustrates an ADC, and in an embodiment, an amplifier configured to amplify the signal output by the IV converter may be configured before the ADC) configured to perform an analog-to-digital conversion for the voltage signal. The detection submodule may judge a heart rate parameter of a tested object according to the regular variation of the strength of the reflected light, such that the biological feature detection module 33 supports the heart rate detection function.

[0039] In the embodiment as illustrated in FIG. 2, the biological feature detection module 33 is configured to detect a heart rate of a human body, and includes a signal processing submodule 331 and a detection submodule

332. The signal processing submodule 331 has the following functions: acquiring a heart rate detection signal from the detection submodule 332 under control of the control module 34; and processing the acquired heart rate detection signal and transferring the data to the control module 34 for processing. The processing by the detection submodule 332 includes the following operations: the LED driver drives, under control of the control module 34, the LED to irradiate a detected region; a photosensitive diode receives an optical signal reflected by the detected region and converts the optical signal into a photocurrent signal, and the photocurrent signal experiences IV conversion, signal amplification and ADC conversion, and then converted into initial data, and the initial data is transferred to the control module 34 via the signal processing submodule 331.

[0040] Therefore, the headphone according to this embodiment of the present application needs no additional power supply, and solves the power supply and communication issues of the entire system and implements the biological feature detection function by reusing the interface of the wire-controlled headphone. The headphone according to the present application does not need an external mechanical switch to manually switch between the voice call mode and the biological feature detection mode, and is capable of simultaneously implementing the biological feature detection, the audio playing and the like functions, without affecting the normal voice call function. In addition, such headphone needs no manual operations on the external mechanical switch.

[0041] Referring to FIG. 4 and FIG. 5, an embodiment of the present application further provides a biological feature detection method based on a headphone, including the following steps:

S10: detecting and judging whether an instruction for performing biological feature detection is currently received from a smart terminal, if the instruction is received, performing step S20, and otherwise, continuously performing step S10;

S20: detecting and judging whether a call instruction is currently received from the smart terminal, if the call instruction is received, performing step S40, and otherwise, performing step S30;

S30: controlling a headphone to perform biological feature detection for a user, such that the headphone enters a working mode supporting a biological feature detection mode; and

S40: controlling the headphone to enter a working mode supporting a call mode and returning to step S10 upon completion of the call.

[0042] The biological feature detection mode includes: detecting a biological feature, parsing a detected biological feature, and transferring a parsed biological feature to a smart terminal. Therefore, in step S10, it is detected whether a user issues an instruction for detecting the biological feature via the smart terminal. If a user issues such an instruction, it is judged whether an instruction for making a call is received. That is, when the headphone fails to simultaneously implement the call and the biological feature detection, the priority of the call instruction of the headphone is higher than that of the instruction for detecting the biological feature, to ensure the basic call function of the headphone. When the instruction for detecting the biological feature is received and no call instruction is received, the headphone is controlled to enter the biological feature detection mode. In addition, in this case, the headphone may simultaneously support the biological feature detection mode and other modes (for example, the audio mode). Therefore, when the headphone starts to enter the biological feature detection mode, it signifies that the headphone enters the working mode supporting the biological feature detection mode.

[0043] Since the headphone generally needs to constantly support the audio playing function, the headphone needs to be constantly in a mode supporting audio playing. Therefore, when the headphone starts to enter the biological feature detection mode, it signifies that the headphone enters the working mode supporting the biological feature detection mode.

[0044] In an optional embodiment of the embodiments of the present application, the method further includes: in the process of performing step S30, simultaneously detecting and judging whether an instruction for stopping a biological feature detection is currently received from the smart terminal and whether a call instruction is currently received from the smart terminal, if the instruction for stopping a biological feature detection is currently received from the smart terminal, controlling the headphone to exit biological feature detection mode, and if the call instruction is received from the smart terminal, performing step S40. Therefore, the priority of the call instruction of the headphone is always higher than that of the instruction for detecting the biological feature of the headphone, to ensure the basic call function of the headphone. The headphone may simultaneously implement such functions as biological feature detection, audio playing and the like. Therefore, the basic voice call function is not affected, and no external mechanical switch and thus no manual operations are needed.

[0045] Hereinafter the process of performing the biological feature detection by using the headphone according to the embodiments of the present application is described with reference to an optional embodiment. As illustrated in FIG. 5, the initial state of the headphone is defaulted to be in the call mode, and the headphone automatically switches to the call mode before the biological feature detection is performed, such that the headphone is constantly preferentially in the call mode (that is, in a call standby state for making calls when necessary).

[0046] Step 501: The process starts, and the headphone is inserted into the smart terminal.

[0047] Step 502: The entire headphone system is powered on; and the headphone system initializes settings of a relevant register, for example, the timer, IO status and the like, and the power management module is charged.

[0048] Step 503: The headphone system is defaulted to be in a voice mode, that is, the initial state of the first end 12 is connected to the microphone.

[0049] Step 504: It is judged whether an APP of the smart terminal sends a start signal indicative of starting the biological feature detection; if no start signal is received, the voice mode is maintained; and if such a start signal is received, step 505 is performed.

[0050] Step 505: The headphone starts the biological feature detection, and transfers the acquired biological feature signal to the smart terminal.

[0051] Step 506: While step 505 is performed, instruction information sent by the smart terminal is constantly monitored.

[0052] Step 507: It is judged whether a call signal for starting a voice call is received; if no such call signal is received, the biological feature detection is continuously performed.

[0053] Step 508: If such a call signal is received, the biological feature detection is quickly interrupted, and the headphone switches to a voice call mode.

[0054] Step 509: It is judged whether the voice call is terminated; and if the voice call is terminated, it is continuously judged whether to starts the biological feature detection.

[0055] Step 510: While step 506 is performed, it is judged whether the smart terminal proactively stops the biological feature detection.

[0056] Step 511: If the smart terminal proactively stops the biological feature detection, the headphone automatically switches to the voice mode; and otherwise, step 506 is continuously performed.

[0057] Optionally, the headphone selects, via the mode switching module, connection or disconnection between the first end and the first communication module of the headphone, so as to determine whether the headphone enters the working mode supporting the biological feature detection mode. That is, the working mode may be a mode simultaneously supporting a biological identification mode, an audio mode and other possible modes. The first end of the headphone and the microphone of the headphone are constantly in a connected state, such that the call function whose use frequency is generally higher than the use frequency of the biological feature detection function may be more quickly and better implemented. When the connection member of the headphone is connected to the smart terminal, the headphone is powered on by the smart terminal and the smart terminal supplies power to the headphone. The power management module of the headphone further buffers the power-on process and/or stabilizes the power supply process.

[0058] An embodiment of the present application further provides an interaction system, including a smart terminal 40 and a headphone 30 configured to interact with the smart terminal. The headphone is any of the above described headphones with the biological feature detection function. The smart terminal includes a second communication module (not illustrated in the drawings) which communicates with a first communication module in the headphone and a control and processing module 41 (that is, an APP) configured to control and process an interaction process between the smart terminal and the headphone. Such operations as calculation and analysis of the detection signal obtained by the biological feature detection module may be practiced in the control module of the headphone, or may be practiced in such a smart terminal as a mobile phone.

[0059] In conclusion, the headphone according to the embodiments of the present application has the following advantages:

1. The headphone is capable of automatically implementing the biological feature detection function in the whole process, and the headphone supports the voice call, audio playing, biological detection and the like functions.

2. In the implementation of the biological feature detection function, no additional power supply is needed, and the power supply and communication issues of the entire system are solved by reusing the interface of the wire-controlled headphone. In addition, the microphone interface is capable of both receiving signals and sending signals. That is, the issue of power supply to the headphone may be solved, the communication issue of the headphone may be solved, the issue of extracting the biological feature may be solved, and the issue of mode switching of the headphone may be solved. Limited interface resources are fully utilized, more functions are implemented without affecting the existing functions, and the usage is more convenient.

3. The headphone may simultaneously implement such functions as biological feature detection, audio playing and the like. Therefore, the basic voice call function is not affected, and no external mechanical switch and thus no manual operations are needed.

[0060] The algorithms and displays provided herein are not inherently related to any specific computer, virtual system or other device. Various general-purpose systems may also be used with the teachings herein. According to the above description, the structure required for constructing such systems is obvious. In addition, the present application is not directed to any specific programming language. It should be understood that the content of the present application described herein may be carried out utilizing various programming languages, and that the above description for a specific language is

for the sake of disclosing preferred embodiments of the present application.

[0061] Reference herein to "one embodiment", "an embodiment" or to "one or more embodiments" implies that a particular feature, structure, or characteristic described in connection with the embodiments is included in at least one embodiment of the present application. Further, it should be noted that instances of the phrase "in one embodiment" herein are not necessarily all referring to the same embodiment.

[0062] It should be noted that the above embodiments illustrate rather than limit the present application, and those skilled in the art may design alternative embodiments without departing from the scope of the appended claims. In the claims, any reference sign placed between the parentheses shall not be construed as a limitation to a claim. The word "comprise" does not exclude the presence of an element or a step not listed in a claim. The word "a" or "an" preceding an element does not exclude the presence of a plurality of such elements. The present application may be implemented by means of a hardware comprising several distinct elements and by means of a suitably programmed computer. In a unit claim enumerating several devices, several of the devices may be embodied by one and the same hardware item. Use of the words "first", "second", "third" and the like does not mean any ordering. Such words may be construed as naming.

Claims

1. A headphone (30) with a biological feature detection function, comprising a loudspeaker (22) for playing audios and a microphone (21) for making calls, wherein the headphone further comprises:

a biological feature detection module (33), configured to detect a biological feature of a user;
a mode switching module (31), configured to switching a working mode of the headphone supporting or not supporting biological feature detection according to a decision by a control module that whether the headphone detects or not detects biological feature;
a first communication module (35), configured to carry out communication between the headphone and a smart terminal (40);
a control module (34), configured to detect and determine whether an instruction is received from the smart terminal, and control, according to the instruction received from the smart terminal, the biological feature detection module, the mode switching module, a power management module (32) and the first communication module to work, and further configured to parse the biological feature from the biological feature detection module under control of the instruction received from the smart terminal, and transmit the parsed biological feature to the smart terminal via the first communication module; and
the power management module (32), configured to supply power to modules in the headphone,
wherein the headphone comprises a connection member (10) that is configured to mate with a headphone jack of the smart terminal such that the headphone is connected to the smart terminal to implement information interaction between the headphone and the smart terminal, the connection member further comprises a first end configured to be electrically connected to the headphone jack of the smart terminal, and the mode switching module is configured to select, via switching, the connection of the first end with the microphone or the connection with the first communication module, when the first end is connected via the mode switching module with the microphone, the headphone is in a calling mode; when the first end is connected via the mode switching module with the first communication module, the headphone is in a biological feature detection mode; and
charcterised in that
the mode switching module comprises a switch array (311) that is configured to select, via switching and under control of the control module (34) of the headphone, the connection of the first end with the microphone or the connection with the first communication module, and the switch array is simultaneously electrically connected to the power management module; when the headphone detects the biological feature of the user, the first end is disconnected from the first communication module and connected to the power management module; and the switch array is configured to enable, under control of the control module, the first end to be only connected to the first communication module and disconnected from the power management module when biological feature data detected by the biological feature detection module needs to be transmitted by the first communication module.

2. The headphone according to claim 1, wherein the mode switching module is configured to select, via switching, the connection of the first end with the microphone, the connection with the first communication module, or the connection with the power management module, to determine whether the headphone is in the working mode supporting the biological feature detection mode.

3. The headphone according to claim 2, wherein in a power-on or biological feature detection mode, the switch array is electrically connected to the power management module and periodically switches to be

connected to the first communication module to transmit the biological feature data, and upon entry into a working mode supporting the call mode, the switch array (311) is connected to the microphone.

4. The headphone according to claim 1, wherein the power management module comprises a voltage conversion submodule; if the connection member is connected to the smart terminal, and the power management module is powered on by the smart terminal, the voltage conversion submodule is configured to convert electric energy supplied by the smart terminal into power desired by the modules in the headphone to supply power to the modules.

5. The headphone according to claim 4, wherein the power management module further comprises a startup buffering submodule configured to buffer a power-on process, wherein the startup buffering submodule is connected between the mode switching module and the voltage conversion submodule.

6. The headphone according to claim 5 wherein the power management module further comprises a stabilization submodule configured to stabilize a process of supplying power to the modules in the headphone upon completion of power-on, wherein the stabilization submodule is connected between the startup buffering submodule and the switch array.

7. The headphone according to claim 4, wherein the power management module further comprises an energy storage submodule connected to an output terminal of the voltage conversion submodule; and when the connection member is connected to the smart terminal, the voltage conversion submodule is configured to convert electric energy supplied by the smart terminal to charge the energy storage submodule.

8. The headphone according to claim 1, wherein the connection member comprises a second end configured to electrically connect the headphone jack of the smart terminal to a left sound channel of the loudspeaker and a third end configured to electrically connect the headphone jack of the smart terminal to a right sound channel of the loudspeaker; the first communication module is configured to receive an instruction from the smart terminal via the first end or the second end or the third end; and the first communication module is configured to transfer the parsed biological feature to the smart terminal via the first end.

9. A biological feature detection method executed by a headphone as claimed in any one of claims 1-8, the biological feature detection method comprising:

S10: detecting and judging whether an instruction for performing biological feature detection is currently received from a smart terminal, if the instruction is received, performing step S20, and otherwise, continuously performing step S10;
S20: detecting and judging whether a call instruction is currently received from the smart terminal, if the call instruction is received, performing step S40, and otherwise, performing step S30;
S30: controlling a headphone to perform biological feature detection for a user, such that the headphone enters a working mode supporting a biological feature detection mode; and
S40: controlling the headphone to enter a working mode supporting a call mode and returning to step S10 upon completion of the call.

10. The method according to claim 9, further comprising: in the process of performing step S30, simultaneously detecting and judging whether an instruction for stopping a biological feature detection is currently received from the smart terminal and whether a call instruction is currently received from the smart terminal, if the instruction for stopping a biological feature detection is currently received from the smart terminal, controlling the headphone to exit biological feature detection mode, and if the call instruction is received from the smart terminal, performing step S40.

11. The method according to claim 9, wherein the instruction is received from the smart terminal via the connection member connected between the headphone and the smart terminal, and the first end of the headphone and the microphone of the headphone are in a normally-connected state.

12. The method according to claim 11, wherein when the connection member of the headphone is electrically connected to the smart terminal, the headphone is powered on via the smart terminal and the smart terminal supplies power to the headphone,
and/or, the headphone is powered on via the smart terminal and the smart terminal charges an energy storage submodule in the headphone.

13. The method according to claim11, wherein the power management module of the headphone is configured to further buffer the power-on process and/or stabilize the power supply process.

Patentansprüche

1. Kopfhörer (30) mit einer biologischen Merkmalerkennungs-Funktion, umfassend einen Lautsprecher (22) zum Abspielen von Audios und ein Mikrofon (21)

zum Telefonieren, wobei der Kopfhörer ferner

- ein biologisches Merkmalerkennungs-Modul (33), das zum Erkennen eines biologischen Merkmals eines Benutzers eingerichtet ist,
- ein Modusumschalt-Modul (31), das zum Umschalten des Kopfhörers auf einen Betriebsmodus, der eine Erkennung eines biologischen Merkmals unterstützt oder nicht unterstützt, in Abhängigkeit von einer Feststellung durch ein Steuermodul, ob der Kopfhörer ein biologisches Merkmal erkennt oder nicht erkennt, eingerichtet ist,
- ein erstes Kommunikationsmodul (35), das zum Durchführen einer Kommunikation zwischen dem Kopfhörer und einem Smart-Endgerät (40) eingerichtet ist,
- ein Steuermodul (34), das zum Erkennen und Feststellen, ob von dem Smart-Endgerät ein Befehl empfangen wird, und zum Steuern einer Inbetriebsetzung des biologischen Merkmalerkennungs-Moduls, des Modusumschalt-Moduls, eines Strommanagement-Moduls (32) und des ersten Kommunikationsmoduls in Abhängigkeit von dem von dem Smart-Endgerät empfangenen Befehl eingerichtet und ferner zum Analysieren des biologischen Merkmals aus dem biologischen Merkmalerkennungs-Modul unter Steuerung von dem von dem Smart-Endgerät empfangenen Befehl und zum Übermitteln des analysierten biologischen Merkmals an das Smart-Endgerät über das erste Kommunikationsmodul eingerichtet ist, und
- das Strommanagement-Modul (32) umfasst, das zum Versorgen der Module in dem Kopfhörer mit Strom eingerichtet ist,

wobei der Kopfhörer ein Verbindungselement (10) umfasst, das zum Zusammenwirken mit einer Kopfhörerbuchse eines Smart-Endgeräts eingerichtet ist, so dass der Kopfhörer an das Smart-Endgerät angeschlossen ist, um einen Informationsaustausch zwischen dem Kopfhörer und dem Smart-Endgerät auszuführen, wobei das Verbindungselement ferner ein erstes Ende umfasst, das zur elektrischen Verbindung mit der Kopfhöherbuchse des Smart-Endgeräts eingerichtet ist, wobei das Modusumschalt-Modul zum Wählen der Verbindung des ersten Endes mit dem Mikrofon oder der Verbindung mit dem ersten Kommunikationsmodul durch Umschalten eingerichtet ist, wobei bei über das Modusumschalt-Modul mit dem Mikrofon verbundenem erstem Ende sich der Kopfhörer in einem Anrufmodus befindet, während bei über das Modusumschalt-Modul mit dem ersten Kommunikationsmodul verbundenem erstem Ende sich der Kopfhörer in einem biologischen Merkmalerkennungs-Modus befindet,
dadurch gekennzeichnet, dass

das Modusumschalt-Modul eine Schaltmatrix (311) umfasst, das zum Wählen der Verbindung des ersten Endes mit dem Mikrofon oder der Verbindung mit dem ersten Kommunikationsmodul durch Umschalten unter Steuerung von dem Steuermodul (34) des Kopfhörers eingerichtet ist, wobei die Schaltmatrix gleichzeitig mit dem Strommanagement-Modul elektrisch verbunden ist, wobei das erste Ende, wenn der Kopfhörer das biologische Merkmal des Benutzers erkennt, von dem ersten Kommunikationsmodul getrennt und an das Strommanagement-Modul angeschlossen wird, und wobei die Schaltmatrix dazu eingerichtet ist, unter Steuerung von dem Steuermodul die Verbindung des ersten Endes lediglich mit dem ersten Kommunikationsmodul und die Trennung von dem Strommanagement-Modul zu ermöglichen, wenn durch das biologische Merkmalerkennungs-Modul erkannte Daten durch das erste Kommunikationsmodul übermittelt werden sollen.

2. Kopfhörer nach Anspruch 1, wobei das Modusumschalt-Modul zum Wählen der Verbindung des ersten Endes mit dem Mikrofon, der Verbindung mit dem ersten Kommunikationsmodul oder der Verbindung mit dem Strommanagement-Modul durch Umschalten eingerichtet ist, um festzustellen, ob sich der Kopfhörer in dem Betriebsmodus, der den biologischen Merkmalerkennungs-Modus unterstützt, befindet.

3. Kopfhörer nach Anspruch 2, wobei in einem Einschaltmodus oder einem biologischen Merkmalerkennungs-Modus die Schaltmatrix mit dem Strommanagement-Modul elektrisch verbunden ist und zum Übermitteln der biologischen Merkmaldaten periodisch auf die Verbindung mit dem ersten Kommunikationsmodul umgeschaltet wird, wobei beim Schalten auf einen Betriebsmodus, der den Anrufmodus unterstützt, die Schaltmatrix (311) mit dem Mikrofon verbunden ist.

4. Kopfhörer nach Anspruch 1, wobei das Strommanagement-Modul ein Spannungsumwandlungs-Untermodul umfasst, wobei bei mit dem Smart-Endgerät verbundenem Verbindungselement das Strommanagement-Modul durch das Smart-Endgerät eingeschaltet wird, und wobei das Spannungsumwandlungs-Untermodul dazu eingerichtet ist, durch das Smart-Endgerät bereitgestellte elektrische Energie auf Strom, der für die Module in dem Kopfhörer benötigt wird, umzuwandeln, um die Module mit Strom zu versorgen.

5. Kopfhörer nach Anspruch 4, wobei das Strommanagement-Modul ferner ein Anlaufpuffer-Untermodul umfasst, das zum Puffern eines Einschaltvorgangs eingerichtet ist, wobei das Anlaufpuffer-Untermodul zwischen dem Modusumschalt-Modul und

dem Spannungsumwandlungs-Untermodul angeschlossen ist.

6. Kopfhörer nach Anspruch 5, wobei das Strommanagement-Modul ferner ein Stabilisierungs-Untermodul umfasst, das zum Stabilisieren eines Vorgangs, bei dem die Module in dem Kopfhörer mit Strom versorgt werden, nach Abschluss eines Einschaltvorgangs eingerichtet ist, wobei das Stabilisierungs-Untermodul zwischen dem Anlaufpuffer-Untermodul und der Schaltmatrix angeschlossen ist.

7. Kopfhörer nach Anspruch 5, wobei das Strommanagement-Modul ferner ein Energiespeicher-Untermodul umfasst, das mit einer Ausgangsklemme des Spannungsumwandlungs-Untermoduls verbunden ist, wobei bei mit dem Smart-Endgerät verbundenem Verbindungselement das Spannungsumwandlungs-Untermodul zum Umwandeln der durch das Smart-Endgerät bereitgestellten Energie eingerichtet ist, um das Energiespeicher-Untermodul aufzuladen.

8. Kopfhörer nach Anspruch 1, wobei das Verbindungselement ein zweites Ende, das zur elektrischen Verbindung der Kopfhörerbuchse des Smart-Endgeräts mit einem linken Tonkanal des Lautsprechers eingerichtet ist, und ein drittes Ende, das zur elektrischen Verbindung der Kopfhörerbuchse des Smart-Endgeräts mit einem rechten Tonkanal des Lautsprechers eingerichtet ist, umfasst, wobei das erste Kommunikationsmodul zum Empfangen eines Befehls von dem Smart-Endgerät über das erste Ende oder das zweite Ende oder das dritte Ende eingerichtet ist, und wobei das erste Kommunikationsmodul zum Übermitteln des analysierten biologischen Merkmals an das Smart-Endgerät über das erste Ende eingerichtet ist.

9. Verfahren zur Erkennung eines biologischen Merkmals, das durch einen Kopfhörer nach einem der Ansprüche 1 bis 8 ausgeführt wird, wobei das Verfahren zur Erkennung eines biologischen Merkmals Folgendes umfasst:

- S10: Erkennen und Feststellen, ob derzeit von einem Smart-Endgerät ein Befehl zum Durchführen einer biologischen Merkmalerkennung empfangen wird, wobei bei empfangenem Befehl der Schritt S20 ausgeführt und ansonsten der Schritt S10 weiter ausgeführt wird,
- S20: Erkennen und Feststellen, ob derzeit von dem Smart-Endgerät ein Anruf-Befehl empfangen wird, wobei bei empfangenem Anruf-Befehl der Schritt S40 und ansonsten der Schritt S30 ausgeführt wird,
- S30: Steuern eines Kopfhörers derart, um eine biologische Merkmalerkennung für einen Benutzer durchzuführen, so dass der Kopfhörer auf einen Betriebsmodus, der einen biologischen Merkmalerkennungs-Modus unterstützt, geschaltet wird, und
- S40: Steuern eines Kopfhörers derart, um diesen auf einen Betriebsmodus, der einen Anruf-Modus zu schalten, und Zurückkehren zu Schritt S10 beim Abschluss des Anrufs.

10. Verfahren nach Anspruch 9, das ferner Folgendes umfasst: Erkennen und Feststellen gleichzeitig beim Ausführen des Schritts S30, ob derzeit von dem Smart-Endgerät ein Befehl zum Beenden einer biologischen Merkmalerkennung empfangen wird und ob derzeit von dem Smart-Endgerät ein Anruf-Befehl empfangen wird, Steuern des Kopfhörers derart, um den biologischen Merkmalerkennungs-Modus zu verlassen, bei derzeit von dem Smart-Endgerät empfangenem Befehl zum Beenden einer biologischen Merkmalerkennung und Ausführen des Schritts S40 bei von dem Smart-Endgerät empfangenem Anruf-Befehl.

11. Verfahren nach Anspruch 9, wobei der Befehl von dem Smart-Endgerät über das zwischen dem Kopfhörer und dem Smart-Endgerät angeschlossene Verbindungselement empfangen wird, und wobei sich das erste Ende des Kopfhörers und das Mikrofon des Kopfhörers in einem normal verbundenen Zustand befinden.

12. Verfahren nach Anspruch 11, wobei bei mit dem Smart-Endgerät elektrisch verbundenem Verbindungselement des Kopfhörers der Kopfhörer über das Smart-Endgerät eingeschaltet wird und das Smart-Endgerät den Kopfhörer mit Strom versorgt, und/oder der Kopfhörer über das Smart-Endgerät eingeschaltet und durch das Smart-Endgerät ein Energiespeicher-Untermodul in dem Kopfhörer aufgeladen wird.

13. Verfahren nach Anspruch 11, wobei das Strommanagement-Modul des Kopfhörers ferner dazu eingerichtet ist, den Einschaltvorgang zu puffern und/oder Stromversorgungsvorgang zu stabilisieren.

Revendications

1. Casque (30) avec une fonction de détection de caractéristique biologique, comprenant un haut-parleur (22) pour jouer des audios et un microphone (21) pour faire des appels, dans lequel, le casque comprend en outre:

un module de détection de caractéristique biologique (33), configuré pour détecter une caractéristique biologique d'un utilisateur;

un module de commutation de mode (31), configuré pour commuter un mode de fonctionnement du casque supportant ou non une détection des caractéristique biologique selon une décision par un module de commande si le casque détecte ou non une caractéristique biologique;
un premier module de communication (35), configuré pour effectuer des communications entre le casque et un terminal intelligent (40);
un module de commande (34), configuré pour détecter et déterminer si une instruction est reçue du terminal intelligent, et commander, selon l'instruction reçue du terminal intelligent, le module de détection de caractéristique biologique, le module de commutation de mode, un module de gestion d'alimentation (32), et le premier module de communication de fonctionner, et configuré en outre pour analyser la caractéristique biologique provenant du module de détection de caractéristique biologique sous la commande de l'instruction reçue du terminal intelligent, et transmettre la caractéristique biologique analysée au terminal intelligent via le premier module de communication; et
le module de gestion d'alimentation (32), configuré pour alimenter des modules dans le casque,
dans lequel le casque comprend un membre de connexion (10) qui est configuré pour s'accoupler avec un jack de casque du terminal intelligent de sorte que le casque est connecté au terminal intelligent pour mettre en place une interaction informatique entre le casque et le terminal intelligent, le membre de connexion comprend en outre une première extrémité configurée pour être connectée électriquement au jack de casque du terminal intelligent, et le module de commutation de mode est configuré pour sélectionner, via une commutation, la connexion de la première extrémité avec le microphone ou la connexion avec le premier module de communication, lorsque la première extrémité est connectée avec le microphone via le module de commutation de mode, le casque est dans un mode d'appel; lorsque la première extrémité est connectée avec le premier module de communication via le module de commutation de mode, le casque est dans un mode de détection de caractéristique biologique; et
caractérisé en ce que le module de commutation de mode comprend un réseau de commutateur (311) qui est configuré pour sélectionner, via une commutation et sous la commande du module de commande (34) du casque, la connexion de la première extrémité avec le microphone ou la connexion avec le premier module de communication, et le réseau de commutateur est connecté électriquement au module de gestion d'alimentation simultanément; lorsque le casque détecte la caractéristique de l'utilisateur, la première extrémité est déconnectée du premier module de communication et connectée au module de gestion d'alimentation; et le réseau de commutateur est configuré pour permettre, sous la commande du module de commande, la première extrémité d'être connectée seulement au premier module de communication et déconnectée du module de gestion d'alimentation lorsque des données de caractéristique biologique détectées par le module de détection de caractéristique biologique doivent être transmises par le premier module de communication.

2. Le casque selon la revendication 1, dans lequel le module de commutation de mode est configuré pour sélectionner, via une commutation, la connexion de la première extrémité avec le microphone, la connexion avec le premier module de communication, ou la connexion avec le module de gestion d'alimentation, pour déterminer si le casque est dans le mode de fonctionnement supportant le mode de détection de caractéristique biologique.

3. Le casque selon la revendication 2, dans lequel dans un mode de détection de caractéristique biologique ou d'allumage, le réseau de commutateur est électriquement connecté au le module de gestion d'alimentation et périodiquement commuté pour être connecté au premier module de communication pour transmettre les données de caractéristique biologique, et en entrant dans un mode de fonctionnement supportant le mode d'appel, le réseau de commutateur (311) est connecté au microphone.

4. Le casque selon la revendication 1, dans lequel le module de gestion d'alimentation comprend un sous-module de conversion de voltage; si le membre de connexion est connecté au terminal intelligent, et le module de gestion d'alimentation est allumé par le terminal intelligent, le sous-module de conversion de voltage est configuré pour convertir de l'énergie électrique fournie par le terminal intelligent en une puissance désirée par les modules dans le casque pour alimenter les modules.

5. Le casque selon la revendication 4, dans lequel le module de gestion d'alimentation comprend en outre un sous-module de mise en mémoire tampon en démarrage configuré pour mettre en mémoire tampon un processus d'allumage, dans lequel le sous-module de mise en mémoire tampon en démarrage est connecté entre le module de commutation de mode et le sous-module de conversion de tension.

6. Le casque selon la revendication 5, dans lequel le module de gestion d'alimentation comprend en outre

un sous-module de stabilisation configuré pour stabiliser un processus d'alimentation aux modules dans le casque à la fin d'allumage, dans lequel le sous-module de stabilisation est connecté entre le sous-module de mise en mémoire tampon en démarrage et le réseau de commutateur.

7. Le casque selon la revendication 4, dans lequel le module de gestion d'alimentation comprend en outre un sous-module de stockage d'énergie connecté à une borne de sortie du sous-module de conversion de voltage; et lorsque le membre de connexion est connecté au terminal intelligent, le sous-module de conversion de voltage est configuré pour convertir de l'énergie électrique fournie par le terminal intelligent pour charger le sous-module de stockage d'énergie.

8. Le casque selon la revendication 1, dans lequel le membre de connexion comprend un deuxième extrémité configurée pour connecter électriquement le jack de casque du terminal intelligent à un canal sonore gauche du haut-parleur et une troisième extrémité configurée pour connecter électriquement le jack de casque du terminal intelligent à un canal sonore droit du haut-parleur; le premier module de communication est configuré pour recevoir une instruction du terminal intelligent via la première extrémité ou la deuxième extrémité ou la troisième extrémité; et le premier module de communication est configuré pour transmettre la caractéristique biologique analysée au terminal intelligent via la première extrémité.

9. Procédé de détection de caractéristique biologique exécutée par un casque selon l'une quelconque des revendications 1 à 8, le procédé de détection de caractéristique biologique comprenant:

S10: détecter et juger si une instruction pour effectuer une détection de caractéristique biologique est actuellement reçue d'un terminal intelligent, si l'instruction est reçue, effectuer l'étape S20, et sinon, effectuer de manière continue l'étape S10;
S20: détecter et juger si une instruction d'appel est actuellement reçue du terminal intelligent, si l'instruction d'appel est reçue, effectuer l'étape S40, et sinon, effectuer l'étape S30;
S30: commander un casque pour effectuer la détection de caractéristiques biologiques pour un utilisateur, de sorte que le casque entre dans un mode de fonctionnement supportant un mode de détection de fonction biologique; et
S40: commander le casque pour entrer dans un mode de fonctionnement supportant un mode d'appel et retourner à l'étape S10 à la fin de l'appel.

10. Le procédé selon la revendication 9, comprenant en outre: dans la course d'effectuer l'étape S30, détecter et juger simultanément si une instruction pour arrêter une détection de caractéristique biologique est actuellement reçue du terminal intelligent et si une instruction d'appel est actuellement reçue du terminal intelligent, si l'instruction pour arrêter une détection de caractéristique biologique est actuellement reçue du terminal intelligent, commander le casque pour quitter le mode de détection de caractéristique biologique, et si l'instruction d'appel est reçue du terminal intelligent, effectuer l'étape S40.

11. Le procédé selon la revendication 9, dans lequel l'instruction est reçue du terminal intelligent via le membre de connexion connecté entre le casque et le terminal intelligent, et la première extrémité du casque et le microphone du casque sont dans un état de connexion normale.

12. Le procédé selon la revendication 11, dans lequel, lorsque le membre de connexion du casque est connecté électriquement au terminal intelligent, le casque est allumé via le terminal intelligent et le terminal intelligent alimente le casque,
et/ou, le casque est allumé via le terminal intelligent et le terminal intelligent charge un sous-module de stockage d'énergie dans le casque.

13. Le procédé selon la revendication 11, dans lequel le module de gestion d'alimentation du casque est configuré pour mettre en mémoire tampon davantage le processus d'allumage et/ou stabiliser le processus d'alimentation.

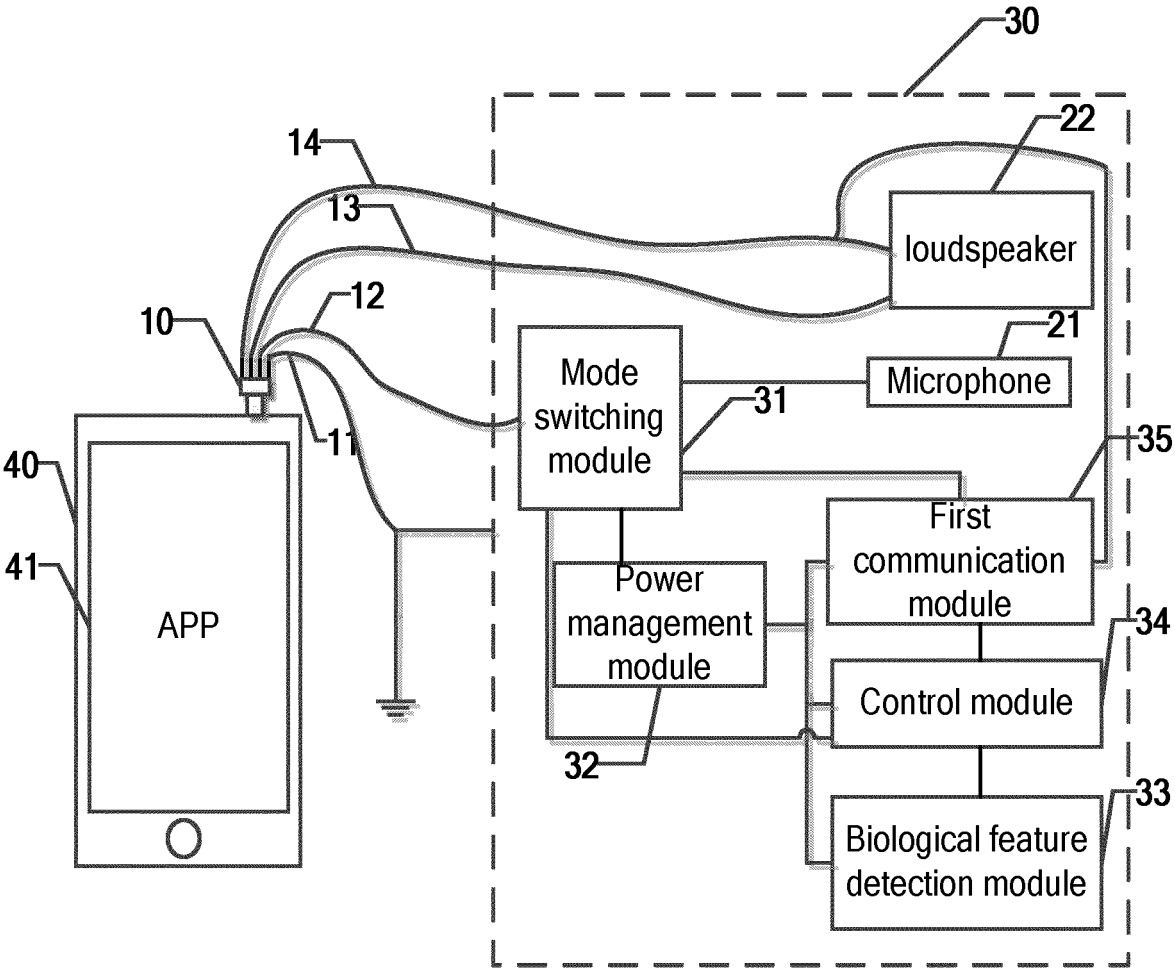
30
22
14
13
loudspeaker
12
10
21
Mode switching module
Microphone
31
11
35
40
41
APP
First communication module
Power management module
34
Control module
32
33
Biological feature detection module

FIG. 1

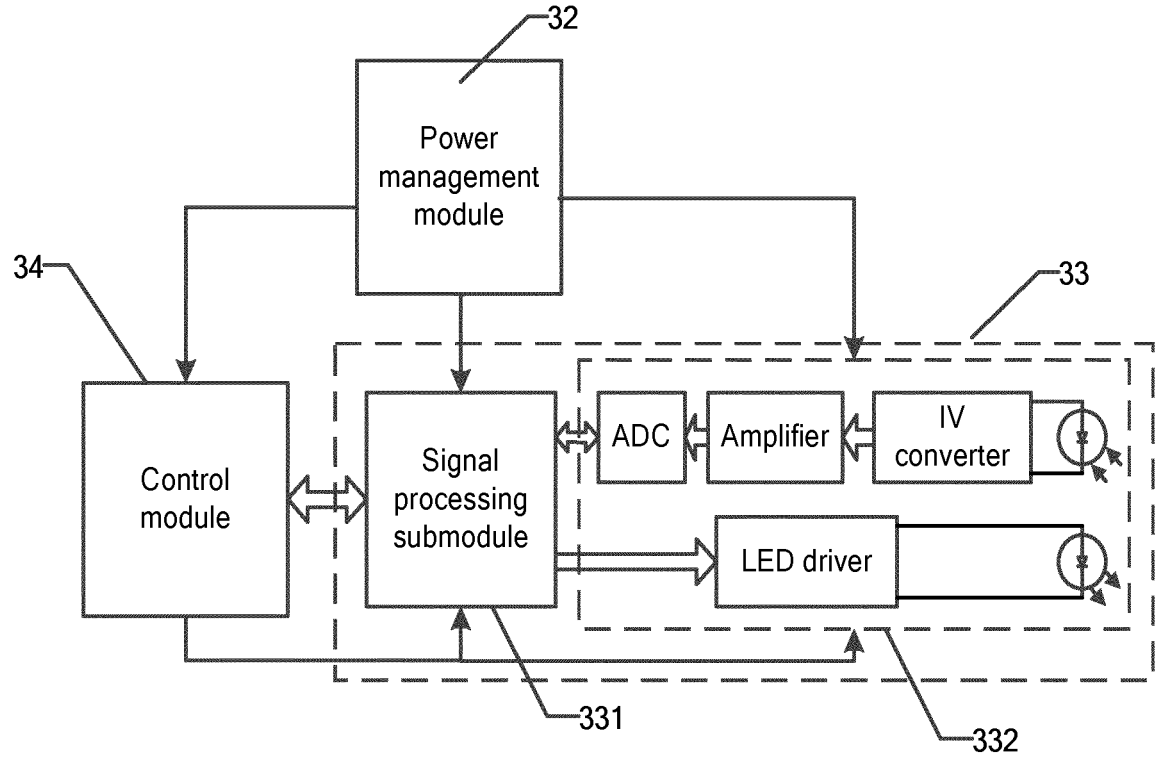
32
Power management module
34
33
Control module
Signal processing submodule
ADC
Amplifier
IV converter
LED driver
331
332

FIG. 2

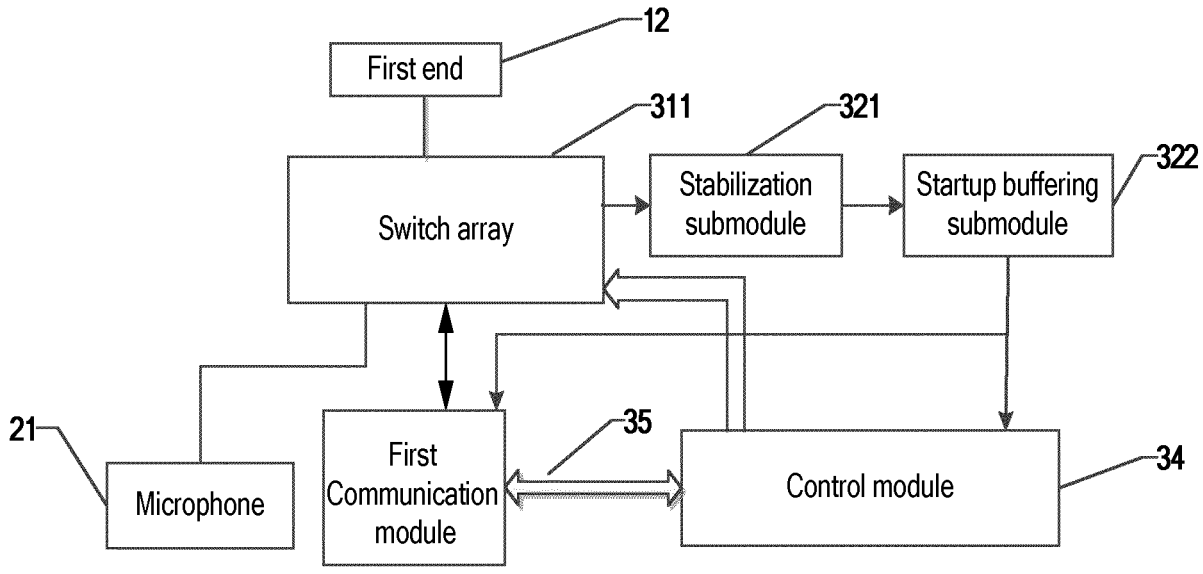
12
First end
311
321
322
Switch array
Stabilization submodule
Startup buffering submodule
21
Microphone
First Communication module
35
Control module
34

FIG. 3

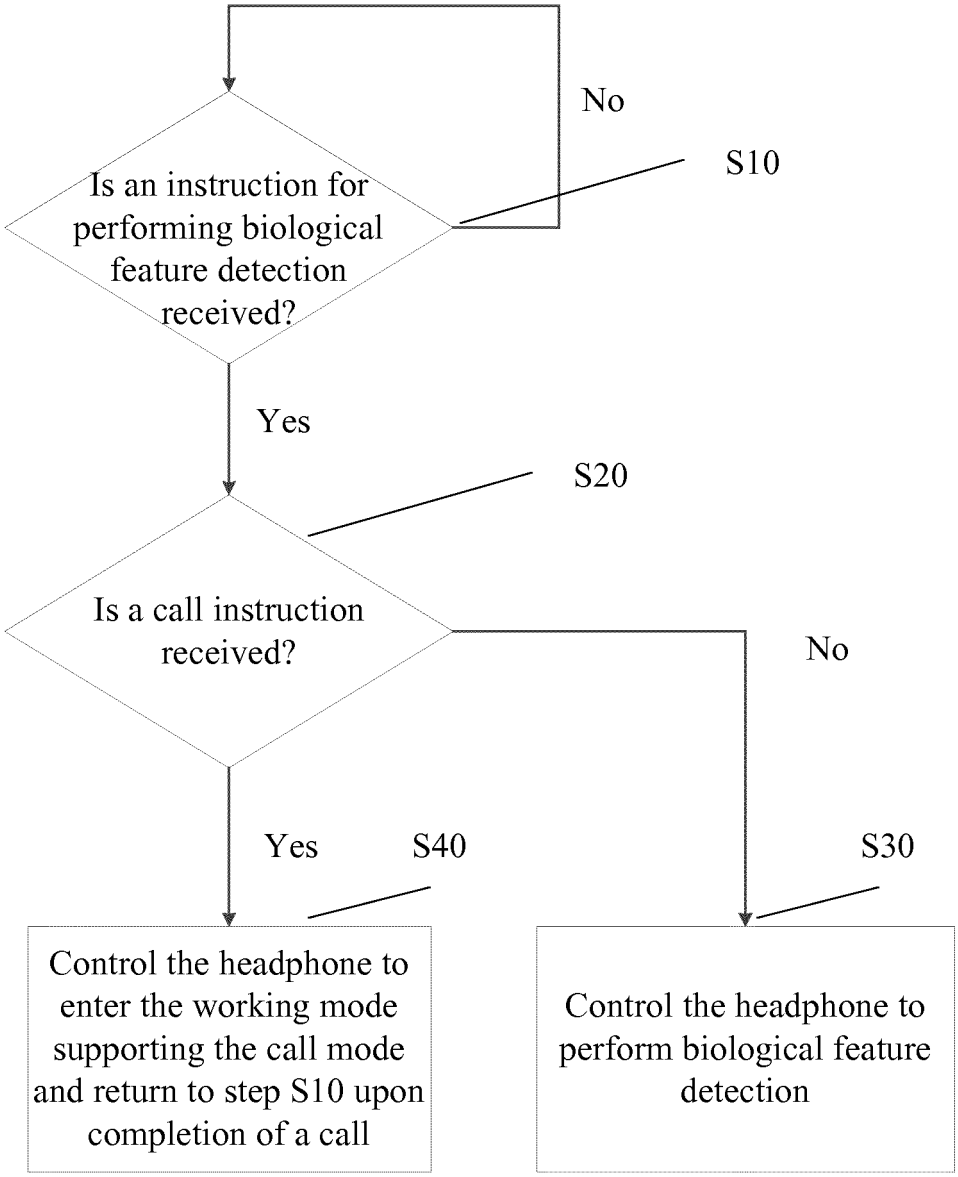
No
S10
Is an instruction for performing biological feature detection received?
Yes
S20
Is a call instruction received?
No
Yes
S40
S30
Control the headphone to enter the working mode supporting the call mode and return to step S10 upon completion of a call
Control the headphone to perform biological feature detection

FIG. 4

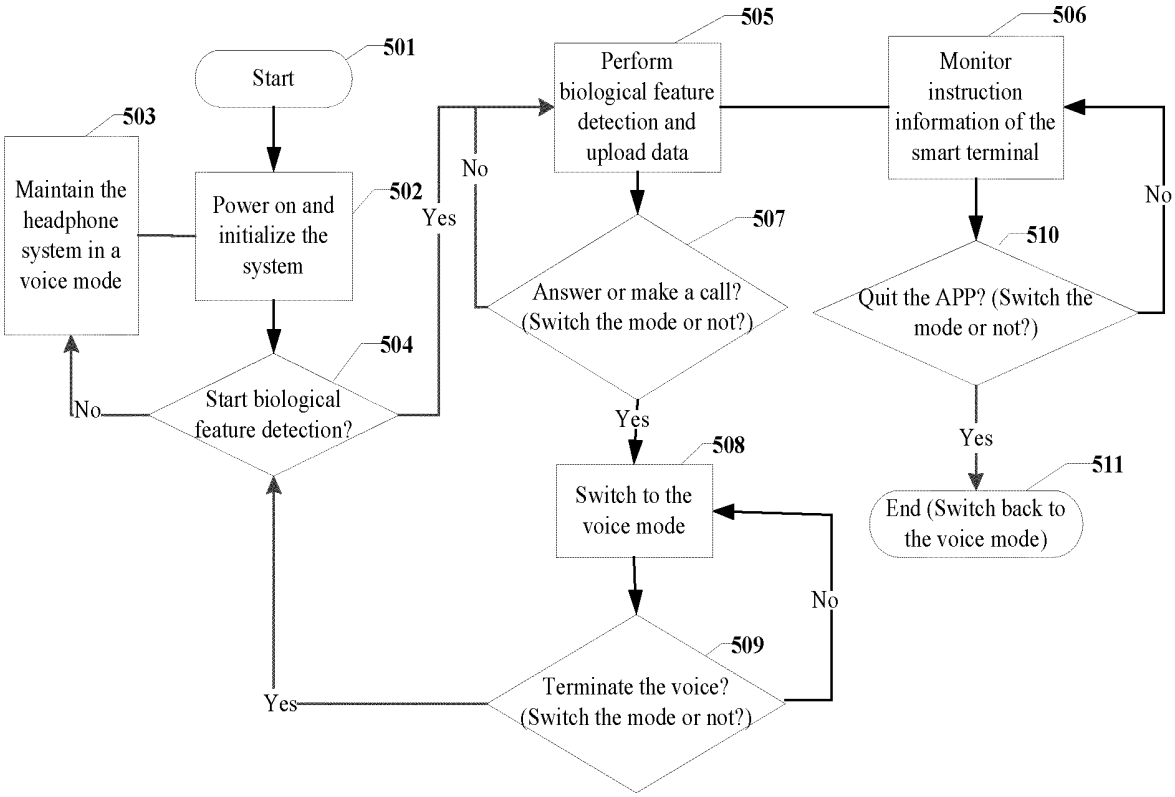
Start
501
Power on and initialize the system
502
Start biological feature detection?
504
No
Yes
Maintain the headphone system in a voice mode
503
Perform biological feature detection and upload data
505
Answer or make a call? (Switch the mode or not?)
507
No
Yes
Switch to the voice mode
508
Terminate the voice? (Switch the mode or not?)
509
No
Yes
Monitor instruction information of the smart terminal
506
Quit the APP? (Switch the mode or not?)
510
No
Yes
End (Switch back to the voice mode)
511

FIG. 5

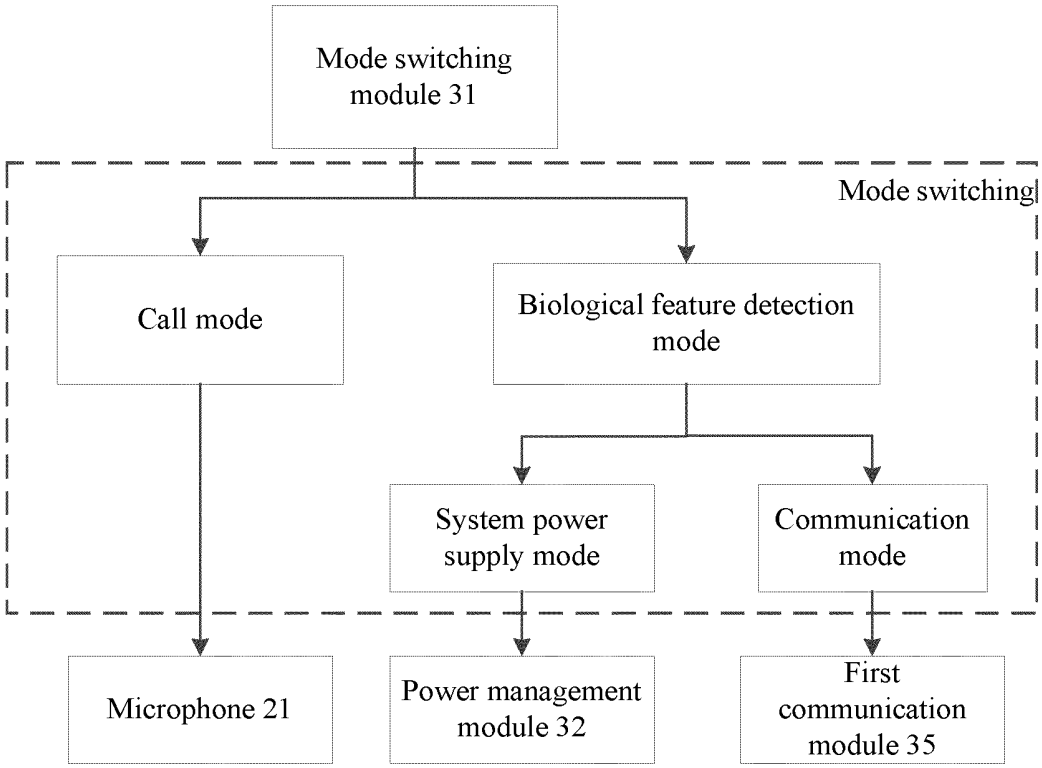
Mode switching module 31
Mode switching
Call mode
Biological feature detection mode
System power supply mode
Communication mode
Microphone 21
Power management module 32
First communication module 35

FIG. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 20120156933 A1 **[0005]**
- US 20150312669 A1 **[0006]**

专利名称(译)	具有生物特征检测功能的耳机和方法		
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申请(专利权)人(译)	深圳市GOODIX TECHNOLOGY CO.，LTD.		
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发明人	LIU, CHANG WANG, HAIXIANG LIU, HEXING ZHAO, LEI		
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优先权	201610005702.8 2016-01-05 CN		
其他公开文献	EP3322199A4 EP3322199A1		
外部链接	Espacenet		

摘要(译)

本申请实施例提供了一种具有生物特征检测功能的耳机，交互系统及生物特征检测方法。该耳机包括：扬声器，麦克风，被配置为检测用户的生物特征的生物特征检测模块，被配置为在控制模块的控制下进行切换以确定该耳机是否处于工作模式的模式切换模块。为了支持生物特征检测模式，第一通信模块，控制模块和电源管理模块被配置为向耳机中的模块供电。所述控制模块，用于检测并确定是否从所述智能终端接收到指令，并根据从所述智能终端接收到的指令，控制所述生物特征检测模块，所述模式切换模块，所述电源管理模块和所述第一通信模块工作，并进一步配置为在从智能终端接收的指令的控制下，从生物特征检测模块解析生物特征，并通过第一通信模块将解析后的生物特征发送至智能终端。根据本发明实施例的耳机能够自动实现生物特征检测功能。