

EARPHONE WIRE CONTROL DEVICE, EARPHONE, AND VOICE RECORDING SYSTEM AND METHOD

Technical Field

The present disclosure relates to voice processing technologies, and more particularly, to an earphone wire control device, an earphone, a voice recording system and a voice recording method.

Background

Currently, an earphone used in conjunction with a device such as a mobile terminal generally includes a microphone, earplugs, earplug wiring and a wire control device. The wire control device is disposed on the earplug wiring. A user may control the earphone by using the wire control device, when a voice call is made via the earphone.

However, since the same channel is used by both of the wire control device and the microphone to transmit signals to the mobile terminal, when a user presses a button of the wire control device, the channel is occupied upon turning on of the wire control device, so that the microphone cannot be used and therefore a recording function cannot be achieved. Thus, when a user needs to record voice information with an application of the mobile terminal, the user needs to press the button of the wire control device for a long time. Since the channel is occupied by the wire control device, the microphone of the earphone cannot be used, and the voice information recording is impossible.

Thus, a defect exists in the conventional earphone that the voice information recording cannot be performed by the microphone when the user presses the button of the wire control device.

Summary

Examples of the present disclosure provide an earphone wire control device, an earphone, a voice recording system and a voice recording method, so as to record voice information while a wire control device is pressed by a user.

Technical solutions of the present disclosure are as follows.

An earphone wire control device includes:

a switching unit, a first signal generating unit, a second signal generating unit and a microphone;

the switching unit and the first signal generating unit is connected in series to form a first path; the switching unit and the second signal generating unit is connected in series to form a second path; the first path, the second path and a microphone path where the microphone is located is connected in parallel;

the switching unit is to switch between the first path and the second path.

An earphone includes an above-described earphone wire control device.

A voice recording system includes: an earphone and a recording signal processing terminal;

the earphone comprises an above-described earphone wire control device and is to transmit a recording start signal and a recording stop signal to the recording signal processing terminal;

the recording signal processing terminal is to control a microphone in the earphone wire control device to record voice information after receiving the recording start signal, and to control the microphone in the earphone wire control device to stop recording the voice information after receiving the recording stop signal.

A voice recording method includes:

turning on, by a switch unit, a first path to short-circuit a microphone path where a microphone is located;

generating, by a first signal generating unit, a recording start signal; transmitting the recording start signal to a recording signal processing terminal; and cutting off the first path after the recording start signal is generated;

controlling, by the recording signal processing terminal, the microphone to record voice information after receiving the recording start signal;

turning on, by the switch unit, a second path to short-circuit the microphone path;

generating, by a second signal generating unit, a recording stop signal, transmitting the recording stop signal to the recording signal processing terminal; and cutting off the second path after the recording stop signal is generated;

controlling, by the recording signal processing terminal, the microphone to stop recording the voice information after receiving the recording stop signal.

It can be seen for the above-described technical solutions, by means of switching among the first path, the second path and the microphone path, the voice information may be recorded while the button of the wire control device is pressed, thereby overcoming the defect that the voice information cannot be recorded while the button of the wire control device is pressed since the wire control device and the microphone use the same channel in the existing earphones. Hence, operability of earphones is enhanced and combination of earphones and other devices is promoted.

Brief Description of the Drawings

Figure 1 is a schematic diagram illustrating an earphone wire control device according to various example of the present disclosure.

Figure 2 is a schematic diagram illustrating a circuit of an earphone wire control device according to various example of the present disclosure.

Figure 3 is a schematic diagram illustrating a voice recording system according to various example of the present disclosure.

Figure 4 is a schematic flowchart illustrating a voice recording method according to various example of the present disclosure.

Detailed Description

In order to make the object, technical solution and merits of the present disclosure clearer, the present disclosure will be illustrated in detail hereinafter with reference to the accompanying drawings and specific examples.

Figure 1 is a schematic diagram illustrating an earphone wire control device according to various example of the present disclosure.

As shown in Figure 1, the earphone wire control device includes a switching unit 1, a first signal generating unit 2, a second signal generating unit 3 and a microphone 4.

When the switching unit 1 is connected to the first signal generating unit 2, the switching unit 1 and the first signal generating unit 2 are connected in series to form a first path A. When the switching unit 1 is connected to the second signal generating unit 3,

the switching unit 1 and the second signal generating unit 3 are connected in series to form a second path B. The first path A and the second path B are connected in parallel with a microphone path C where the microphone 4 is located, respectively.

The switching unit 1 may be switched between the first path A and second path B. According to an example, the switch unit 1 may be an alternative switch with a variety of specific forms, such as a single-pole double-throw switch.

When the switching unit 1 is a single-pole double-throw switch, it may include a moving end and two fixed ends. The moving end which is generally the end connected to a handle of the switch is connected to an incoming line of a power supply (i.e. an end to which the current flows). The two fixed ends are connected to both ends of the power supply respectively, i.e. connected to the first signal generating unit 2 and the second signal generating unit 3 respectively.

When the switch unit 1 is switched to the first path A, the microphone path C is short-circuited. The first signal generating unit 2 generates a recording start signal firstly, and cuts off the first path A immediately after generating the recording start signal. After the first path A is cut off, the microphone path C is turned on.

When the switch unit 1 is switched to the second path B, the microphone path C is short-circuited. The second signal generating unit 3 generates a recording stop signal, and cuts off the second path B immediately after generating the recording stop signal. After the second path B is cut off, the microphone path C is turned on.

According to the example, the switching unit 1, the first signal generating unit 2 and the second signal generating unit 3 constitutes a control circuit for the microphone 4, and the control circuit is connected with the microphone 4 in parallel. According to an example, the control circuit consists of a mirror circuit including two halves, the principle of the two halves of the mirror circuit is the same or similar, and each half may achieve a function like a time relay.

Each of the first signal generating unit 2 and the second signal generating unit 3 has a signal generating function and a circuit cut-off function.

1) Referring to the signal generating function, an electrical signal which can be

recognized by a mobile terminal (such as a mobile phone) is generated after the circuit is turned on.

2) Referring to the circuit cut-off function, the circuit is automatically cut off after the electrical signal is generated as required, so as to hand over the occupied path to the microphone.

According to an example, when a user needs to record voice information, the user may firstly press a button on the earphone wire control device, correspondingly, the switching unit 1 is switched to the first path A, and the first path A is turned on. At this time, the first signal generating unit 2 in the first path A occupies the entire path, the microphone 4 is short-circuited, and the microphone 4 cannot work since its channel is occupied. The first signal generating unit 2 generates a recording start signal and sends the recording start signal to sound processing software in the mobile terminal. The sound processing software in the mobile terminal activates a function relating to recording after receiving the recording start signal. After the recording start signal is generated, the first signal generating unit 2 in the first signal path A immediately cuts off the first path A and releases the path so that the microphone 4 may work normally. Because above-mentioned actions are done quickly, the user can speak to the microphone after pressing the button on the earphone wire control device.

When finishing recording the voice information, the user releases the button on the earphone wire control device, correspondingly, the switching unit 1 is switched to the second path B, and the second path B is turned on. At this time, the microphone 4 is short-circuited, and the second signal generating unit 3 on the second path B occupies the path and starts working. The second signal generating unit 3 sends a signal to notify the voice processing software in the mobile terminal to end recording, thereafter the second signal generating unit 3 itself cuts off the second path B and hands over the corresponding path.

According to an example, the first signal generating unit 2 and the second signal generating unit 3 may include capacitors, resistors, transistors and the like.

Figure 2 is a schematic diagram illustrating a circuit of an earphone wire control device according to various example of the present disclosure.

A single-pole double-throw switch 1 in Figure 2 corresponds to the switching unit 1 in Figure 1. A capacitor 21, a Zener diode 22, a transistor 23 and a resistor 24 in Figure 2 correspond to the first signal generating unit 2 in Figure 1. A capacitor 31, a Zener diode 32, a transistor 33 and a resistor 34 in figure 2 corresponds to the first signal generating unit 3 in Figure 1.

As shown in Figure 2, the capacitor 21, the Zener diode 22, the transistor 23, the resistor 24 and the capacitor 31, the Zener diode 32, the transistor 33 and the resistor 34 constitute a mirror circuit which is symmetrical in left and right.

An anode of the capacitor 21 is connected to the single-pole double-throw switch 1 and a cathode of the capacitor 21 is connected to both of an end of the resistor 24 and an anode of the Zener diode 22. A cathode of the Zener diode 22 is connected to a base of the transistor 23. A collector of the transistor 23 is connected to a power supply U and an emitter of the transistor 23 is grounded.

An anode of the capacitor 31 is connected to the single-pole double-throw switch 1 and a cathode of the capacitor 31 is connected to both of an end of the resistor 34 and an anode of the Zener diode 32. A cathode of the Zener diode 32 is connected to a base (B) of the transistor 33. A collector (C) of the transistor 33 is connected to the power supply U and an emitter (E) of the transistor 33 is grounded.

Referring to Figure 2, in operation, at the moment when the single-pole double-throw switch 1 in the circuit is switched to the right from the left, the capacitor (C) 21 in the right whose voltage is 0 starts to be charged, the voltage of the resistor (R) 24 in the right is larger than the sum of the break-over voltage between BE of the transistor 23 in the right and the voltage stabilization value of the Zener diode 22, and therefore the transistor 23 is turned on and the microphone is short-circuited. It can be seen that the voltage U of the control circuit is 0, which means the control circuit sends a control signal with low level, i.e., the recording start signal.

After a period of time which may be determined by the values of the capacitor (C) 21 and the resistance (R) 24 and may be very short, the voltage of the capacitance (C) 21 in the right is gradually increased and the voltage of the resistor (R) 24 in the right is gradually decreased. When the voltage of the resistor (R) 24 is smaller than the sum of the

break-over voltage between BE of the transistor 23 in the right and the voltage stabilization value of the Zener diode 22, the transistor 23 is turned off, the voltage across both ends of the control circuit is recovered, which means the control circuit stops sending low level signals, and the microphone has begun to record voice information.

Referring to figure 2, when the single-pole double-throw switch 1 is switched to the left from the right, the circuit in the right is turned off, and the circuit in the left repeats the similar operations of the circuit in the right.

Specifically, at the moment when the single-pole double-throw switch 1 in the circuit is switched to the left from the right, the capacitor (C) 31 in the left whose voltage is 0 starts to be charged, the voltage of the resistor (R) 34 in the right is larger than the sum of the break-over voltage between BE of the transistor 33 in the left and the voltage stabilization value of the Zener diode 32, and therefore the transistor 33 is turned on and the microphone is short-circuited. It can be seen that the voltage U of the control circuit is 0, which means the control circuit sends a control signal with low level, i.e., the recording stop signal.

After a period of time which may be determined by the values of the capacitor (C) 21 and the resistance (R) 24 and may be very short, the voltage of the capacitance (C) 31 in the left is gradually increased and the voltage of the resistor (R) 34 in the left is gradually decreased. When the voltage of the resistor (R) 34 is smaller than the sum of the break-over voltage between BE of the transistor 33 in the left and the voltage stabilization value of the Zener diode 32, the transistor 33 is turned off, the voltage across both ends of the control circuit is recovered, which means the control circuit stops sending low level signals, and the microphone has finished recording the voice information.

According to an example, the processing of switching the single-pole double-throw switch from the left to the right corresponds to pressing a recording button by the user, and the user is ready to start talking, at this time the control circuit sends the recording start signal, and then automatically ends occupation of the channel so that the channel may be used by the microphone to work normally.

The processing of switching the single-pole double-throw switch from the right to the left corresponds to releasing the recording button by the user, at this time the control

circuit sends the recording stop signal, and then automatically ends occupation of the channel.

In a signal processing terminal, such as a mobile terminal, when a first control signal, i.e., the recording start signal is received from the earphone, a recording function is started and voice information of the user is started to be recorded. When a second control signal, i.e., the recording stop signal is received from the earphone, the recording of the voice information is stopped, and then the recorded voice information is processed.

In the above descriptions the earphone wire control device is described with specific electrical elements such as resistors, capacitors and transistors, those skilled in the art will realize that this detailed circuit configuration shown in figure 2 is merely exemplary, and is not intend to limit the protection scope of the present disclosure.

The earphone wire control device described in the foregoing descriptions may be applied to a variety of earphones, such as dynamic earphones, moving iron type earphones, electrostatic earphones and equal magnetic earphones. Moreover, based on wearing types, the earphone wire control device described in the foregoing descriptions may be applied to earplug type earphones, coped lug type earphones, in-ear earphones, headphones, and so on.

Examples of the present disclosure also provide a voice recording system.

Figure 3 is a schematic diagram illustrating a voice recording system according to various example of the present disclosure.

As shown figure 3, the voice recording system includes an earphone 301 and a recording signal processing terminal 302. The earphone includes the above-described earphone wire control device, and is capable of sending the recording start signal and the recording stop signal generated by the earphone wire control device to the recording signal processing terminal 302.

The recording signal processing terminal controls the microphone in the earphone wire control device to record voice information after receiving the recording start signal, and controls the microphone to stop recording the voice information after receiving the recording stop signal.

According to an example, the recording signal processing terminal 302 may be a mobile terminal, a notebook computer, a tablet computer or a personal digital assistant (PDA), and so on.

Although some examples of the recording signal processing terminal are provided, those skilled in the art will realize that the protection scope of examples of the present disclosure is not limited thereto.

Examples of the present disclosure also provide a voice recording method.

Figure 4 is a schematic flowchart illustrating a voice recording method according to various example of the present disclosure.

As shown in figure 4, the method comprises the following processing.

At 401, a switch unit turns on a first path, and a microphone path is short-circuited.

At 402, a recording start signal is generated and the recording start signal is transmitted to a recording signal processing terminal. The first path is cut off after the recording start signal is generated so that the microphone path is turned on. The recording signal processing terminal controls the microphone to record voice information after receiving the recording start signal.

At 403, the switch unit turns on a second path, and the microphone path is short-circuited.

At 404, a recording stop signal is generated and the recording stop signal is transmitted to the recording signal processing terminal. The second path is cut off after the recording stop signal is generated. The recording signal processing terminal controls the microphone to stop recording the voice information after receiving the recording stop signal.

According to an example, the recording signal processing terminal may be a mobile terminal, a notebook computer, a tablet computer or a PDA, and so on.

In summary, according to the examples of the present disclosure, by means of switching among the first path, the second path and the microphone path, the voice

information may be recorded while the button of the wire control device is pressed, thereby overcoming the defect that the voice information cannot be recorded while the button of the wire control device is pressed since the wire control device and the microphone use the same channel in the existing earphones. Hence, operability of earphones is enhanced and combination of earphones and other devices is promoted.

It should be understood that the above description just displays preferred examples of the present disclosure and is in no way intended to limit the scope of the present disclosure. Any modifications, equivalents, improvements and the like made within the spirit and principle of the present disclosure should be encompassed in the scope of the present disclosure.

Claims

1. An earphone wire control device, comprising a switching unit (1), a first signal generating unit (2), a second signal generating unit (3) and a microphone (4);

the switching unit (1) and the first signal generating unit (2) being connected in series to form a first path; the switching unit (1) and the second signal generating unit (3) being connected in series to form a second path; the first path, the second path and a microphone path where the microphone (4) is located being connected in parallel;

wherein the switching unit (1) is to switch between the first path and the second path.

2. The earphone wire control device according to claim 1, wherein

when the switching unit (1) turns on the first path, the microphone path is short-circuited, the first signal generating unit (2) generates a recording start signal and cuts off the first path after generating the recording start signal;

when the switching unit (1) turns on the second path, the microphone path is short-circuited, the second signal generating unit (3) generates a recording stop signal and cuts off the second path after generating the recording stop signal.

3. The earphone wire control device according to claim 1, wherein the first signal generating unit (2) and the second signal generating unit (3) form a mirror circuit with same configuration.

4. The earphone wire control device according to claim 1, wherein the switching unit (1) is a single-pole double-throw switch.

5. The earphone wire control device according to claim 4, wherein the first signal generating unit (2) comprises a capacitor (21), a Zener diode (22), a transistor (23) and a resistor (24);

an anode of the capacitor (21) is connected to the single-pole double-throw switch and a cathode of the capacitor (21) is connected to both of an end of the resistor (24) and an anode of the Zener diode (22); a cathode of the Zener diode (22) is connected to a base

of the transistor (23); a collector of the transistor (23) is connected to a power supply and an emitter of the transistor (23) is grounded.

6. The earphone wire control device according to claim 4, wherein the second signal generating unit (3) comprises a capacitor (31), a Zener diode (32), a transistor (33) and a resistor (34),

an anode of the capacitor (31) is connected to the single-pole double-throw switch and a cathode of the capacitor (31) is connected to both of an end of the resistor (34) and an anode the Zener diode (32); a cathode of the Zener diode (32) is connected to a base of the transistor (33); a collector of the transistor (33) is connected to a power supply and an emitter of the transistor (33) is grounded.

7. An earphone comprising an earphone wire control device according to any one of claims 1-6.

8. A voice recording system, comprising an earphone and a recording signal processing terminal;

wherein the earphone comprises an earphone wire control device according to any one of claims 1-6, and is to transmit a recording start signal and a recording stop signal to the recording signal processing terminal;

the recording signal processing terminal is to control a microphone (4) in the earphone wire control device to record voice information after receiving the recording start signal, and to control the microphone (4) in the earphone wire control device to stop recording the voice information after receiving the recording stop signal.

9. The voice recording system according to claim 8, wherein the recording signal processing terminal is a mobile terminal, a notebook computer, a tablet computer or a personal digital assistant (PDA).

10. A voice recording method, comprising:

turning on, by a switch unit, a first path to short-circuit a microphone path where a microphone is located;

generating, by a first signal generating unit, a recording start signal; transmitting the

recording start signal to a recording signal processing terminal; and cutting off the first path after the recording start signal is generated;

controlling, by the recording signal processing terminal, the microphone to record voice information after receiving the recording start signal;

turning on, by the switch unit, a second path to short-circuit the microphone path;

generating, by a second signal generating unit, a recording stop signal, transmitting the recording stop signal to the recording signal processing terminal; and cutting off the second path after the recording stop signal is generated;

controlling, by the recording signal processing terminal, the microphone to stop recording the voice information after receiving the recording stop signal.

11. The voice recording method according to claim 10, wherein the recording signal processing terminal is a mobile terminal, a notebook computer, a tablet computer or a personal digital assistant.