United States Patent Application Publication	20250266219
Kind Code	A1
Publication Date	August 21, 2025
Inventor(s)	ZHANG; Kemin et al.

ECG BUTTON ASSEMBLY AND ELECTRONIC DEVICE

Abstract

This application relates to electrocardiogram (ECG) button assemblies and electronic devices. An example ECG button assembly includes a button part, a plastic tube, a metal tube, an elastic piece, and a conductive sheet. The housing is provided with a via hole, and the plastic tube is embedded in the via hole. A first through hole is provided at an interior of the plastic tube, the metal tube is embedded in the first through hole, the conductive sheet is connected to one end that is of the metal tube and that is located at an interior of the housing, and the conductive sheet is in contact with and electrically connected to a circuit board.

Inventors: **ZHANG; Kemin (Dongguan, CN), ZHAO; Menglong (Xi'an, CN), HE; Qian (Xi'an, CN), YANG; Wenjian (Dongguan, CN), LIU; Zhuang (Shenzhen, CN), LIN; Nan (Dongguan, CN)**

Applicant: **HUAWEI TECHNOLOGIES CO., LTD.** (Shenzhen, Guangdong, CN)

Family ID: **1000008628200**

Appl. No.: **18/701428**

Filed (or PCT Filed): **October 31, 2023**

PCT No.: **PCT/CN2023/128896**

Foreign Application Priority Data

CN	202222900444.3	Oct. 31, 2022

Publication Classification

Int. Cl.: **H01H13/06** (20060101); **H01H13/10** (20060101); **H01H13/52** (20060101)

U.S. Cl.:

CPC **H01H13/06** (20130101); **H01H13/10** (20130101); **H01H13/52** (20130101); H01H2013/525 (20130101)

Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to Chinese Patent Application No. 202222900444.3, filed with the China National Intellectual Property Administration on Oct. 31, 2022 and entitled “ECG BUTTON ASSEMBLY AND ELECTRONIC DEVICE”, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] This application relates to the field of electronic device technologies, and in particular, to an ECG button assembly and an electronic device.

BACKGROUND

[0003] An electrocardiogram (electrocardiogram, ECG) may reflect a health status of a user. For example, the ECG may reflect a heart disease (such as arrhythmia). Therefore, an ECG function is added to an increasing quantity of electronic devices during design and production of the electronic devices. Currently, an ECG button of an electronic device having the ECG function is usually in a square shape. In the shape of the square button, an ECG channel is as follows: button cap-spring support-screw-conductive sheet, and the conductive sheet is locked and attached to a button holder through the screw. Due to large occupied space of the ECG button, when a size of an electronic device is small, the space of the ECG button is limited.

SUMMARY

[0004] This application provides an ECG button assembly and an electronic device, so that a size of the ECG button assembly may be further reduced and an ECG circuit is conducted.

[0005] According to a first aspect, this application provides an ECG button assembly. The ECG button assembly is used in an electronic device, and the electronic device may include a housing and a circuit board located in the housing. The ECG button assembly includes a button part, a plastic tube, a metal tube, an elastic piece, and a conductive sheet. The housing is provided with a via hole, and the plastic tube may be embedded in the via hole. A first through hole is provided at an interior of the tube, the metal tube may be embedded in the first through hole, and a part of the metal tube is located at an exterior of the housing. The conductive sheet is connected to one end that is of the metal tube and that is located at an interior of the housing, and the conductive sheet is in contact with and electrically connected to the circuit board. The button part may include a button cap and a button shaft, a second through hole is provided at an interior of the metal tube, the button shaft may penetrate through the second through hole, a first end of the button shaft is located at the exterior of the housing, and the button cap is connected to the first end of the button shaft. The elastic piece is sleeved on the button shaft, one end of the elastic piece is connected to the button cap, the other end of the elastic piece is connected to the metal tube, and the button part is capable of moving in an axial direction of the button shaft relative to the housing.

[0006] In the ECG button assembly provided in this application, the button part, the elastic piece, the metal tube, and the conductive sheet are disposed. Because the foregoing mechanical parts all have a conductive characteristic, a conduction circuit of an ECG may be as follows: button cap-elastic piece-metal tube-conductive sheet-circuit board, to conduct an ECG circuit. In addition, the ECG button assembly in this application does not need an existing screw, and does not depend on the button shaft for conducting electricity, so that a conductive structure and an internal structure of the housing may be designed adaptively, to reduce a size of the ECG button assembly.

[0007] In some possible implementation solutions, a tube nut may be further disposed. The tube nut

is located at one end that is of the metal tube and that is away from the button cap. The tube nut is provided with a threaded hole, the metal tube and the tube nut are assembled in a threaded manner, and the conductive sheet is connected to a side that is of the tube nut and that is away from the metal tube. By disposing the tube nut, the tube nut may not only position the metal tube, but also conduct a circuit.

[0008] In some possible implementation solutions, after passing through the conductive sheet, a second end of the button shaft is located at a side that is of the conductive sheet and that is away from the metal tube, a limiting part is provided at the second end of the button shaft, and the limiting part is disposed around the button shaft. When the button part is in an initial state, the limiting part abuts against a surface of the side that is of the conductive sheet and that is away from the metal tube; and when the button part is pressed, the limiting part is detached from the conductive sheet. By disposing the limiting part, the button shaft may be limited when the button part is in the initial state, to avoid that the button shaft is detached from the housing.

[0009] In some possible implementation solutions, the housing includes a metal layer and a plastic layer. The plastic layer is located at a side that is of the metal layer and that faces the interior of the housing, to improve aesthetics of the electronic device.

[0010] In some possible implementation solutions, a part of the plastic tube may be located at an interior of the button cap, and in the axial direction of the button shaft, a distance between the button cap and the plastic tube is less than a distance between the button cap and the metal layer. In this way, when the button cap is pressed, the button cap may be prevented from being in contact with the metal layer. This avoids that a conduction circuit of an ECG is affected.

[0011] In some possible implementation solutions, the distance between the button cap and the metal layer ranges from 0.15 mm to 0.2 mm. The distance may prevent the button cap from being in contact with the metal layer, and may further avoid that the electronic device is not beautiful because too many parts of the button cap protrude from the housing.

[0012] In some possible implementation solutions, the metal layer is provided with an opening, a side surface that is of the plastic tube and that faces the button cap is flush with a surface that is of the plastic layer and that faces the metal layer, the plastic tube is exposed from the opening, and a part that is of the metal tube and that is located at the exterior of the housing abuts against the side surface that is of the plastic layer and that faces the metal layer. The plastic tube is exposed from the opening of the metal layer, so that contact between the metal tube and the metal layer may be avoided.

[0013] In some possible implementation solutions, a part of the metal tube is located in the button cap, and an outer diameter of the plastic tube is greater than or equal to a diameter of the button cap. Because the outer diameter of the plastic tube is greater than or equal to the diameter of the button cap, when the button cap is pressed, even if a surface of the button cap is in contact with a surface of the housing, the surface of the button cap is in contact with the plastic layer. This may better avoid contact between the button cap and the metal layer.

[0014] In some possible implementation solutions, a gasket may be provided on the part that is of the metal tube and that abuts against the plastic layer. By disposing the gasket, not only the metal tube and the plastic layer may be fastened, but also sealing performance of a joint part between the metal tube and the plastic layer may be improved.

[0015] In some possible implementation solutions, the plastic tube and the plastic layer may be of an integrated structure. This may facilitate reducing process costs.

[0016] In some possible implementation solutions, a flange is provided on a side that is of the conductive sheet and that is away from the button part, and the conductive sheet is in contact with the circuit board through the flange, to ensure that the conductive sheet is in stable contact with and electrically connected to the circuit board.

[0017] In some possible implementation solutions, the circuit board is provided with a spring sheet, and the circuit board is in contact with the conductive sheet through the spring sheet, to ensure that

the conductive sheet is in stable contact with and electrically connected to the circuit board.
[0018] In some possible implementation solutions, a first sealing ring is provided between the button shaft and the metal tube, to improve waterproof performance between the button shaft and the metal tube.
[0019] In some possible implementation solutions, a second sealing ring is provided between the metal tube and the plastic tube, to improve waterproof performance between the metal tube and the plastic tube.
[0020] According to a second aspect, this application provides an electronic device. The electronic device includes a housing and the ECG button assembly according to any possible implementation solution of the first aspect, where the ECG button assembly may be disposed on the housing.
[0021] The electronic device in this application not only may implement an ECG function, but also may facilitate controlling a size of the housing, so that the electronic device is more beautiful as a whole.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0022] FIG. **1** is a schematic diagram of a structure of a wearable device according to an embodiment of this application;
[0023] FIG. **2** is a schematic diagram of a partial structure of a wearable device according to an embodiment of this application;
[0024] FIG. **3** is a schematic diagram of a cross-sectional structure of an ECG button assembly in FIG. **2**;
[0025] FIG. **4** is a schematic diagram of a structure of a connection between a conductive sheet and a circuit board of the wearable device in FIG. **2**;
[0026] FIG. **5** is a schematic diagram of an enlarged structure of an ECG button assembly in FIG. **2**;
[0027] FIG. **6** is a schematic diagram of a partial structure of another wearable device according to an embodiment of this application;
[0028] FIG. **7** is a schematic diagram of a structure of a connection between a conductive sheet of the wearable device in FIG. **6** and a circuit board; and
[0029] FIG. **8** is a schematic diagram of a cross-sectional structure of an ECG button assembly in FIG. **6**.
REFERENCE NUMERALS
[0030] **1**: wearable device; **10**: housing; **110**: metal layer; **120**: plastic layer; **130**: circuit board; **140**: spring sheet; **20**: display assembly; **30**: ECG button assembly; **310**: button part; **311**: button shaft; **3111**: limiting part; **312**: button cap; **320**: elastic piece; **330**: plastic tube; **331**: clamping part; **340**: metal tube; **350**: tube nut; **360**: conductive sheet; **361**: flange; **370**: first sealing ring; **380**: second sealing ring; and **390**: gasket.
DESCRIPTION OF EMBODIMENTS
[0031] Terms used in the following embodiments are merely intended to describe specific embodiments, but are not intended to limit this application. Terms “one”, “a”, “the”, “the foregoing”, “this”, and “the one” of singular forms used in this specification and the appended claims of this application are also intended to include forms such as “one or more”, unless otherwise specified in the context clearly.
[0032] Reference to “an embodiment”, “some embodiments”, or the like described in this specification indicates that one or more embodiments of this application include a specific feature, structure, or characteristic described with reference to the embodiments. Therefore, statements such as “in an embodiment”, “in some embodiments”, “in some other embodiments”, and “in other

embodiments" that appear at different places in this specification do not necessarily mean references to a same embodiment. Instead, the statements mean "one or more but not all of embodiments", unless otherwise specifically emphasized in another manner. Terms "include", "comprise", "have", and their variants all mean "include but are not limited to", unless otherwise specifically emphasized in another manner.

[0033] With the development of ECG technologies, an ECG button becomes a necessary design of an electronic device. Currently, a conduction path disposed with the ECG button is usually in a square shape. In this shape of the square button, an ECG channel is: button cap-spring support-screw-conductive sheet, and the conductive sheet may be locked and attached to a button holder through the screw. To ensure that the conductive sheet is fastened to the button holder, two screws are usually disposed. This results in a large size of the ECG button. When a size of an electronic device is small, the ECG button does not have sufficient space, and a function of the ECG button is affected.

[0034] Based on this, embodiments of this application provide an ECG button part and an electronic device, so that a size of the ECG button assembly can be further reduced and conduction of the ECG button assembly can be ensured. The following describes in detail a structure of the ECG button assembly and the electronic device with reference to specific embodiments.

[0035] The ECG button assembly in embodiments of this application may be used in various electronic devices having an EGC function. The electronic device may be a wearable electronic device, for example, a watch, a band, a headset, or a helmet (for example, a virtual reality helmet), and may alternatively be a non-wearable device, for example, a portable electronic device having an ECG detection function, for example, a mobile phone, a tablet computer, or a notebook computer. An example embodiment of the portable electronic device includes but is not limited to a portable electronic device using iOS®, Android®, Microsoft®, or another operating system. It should be understood that the electronic device may not be a portable electronic device, but is a desktop computer that can detect an ECG. This is not limited in embodiments of this application. The following embodiments of this application are described by using an example in which the electronic device is a wearable device.

[0036] Refer to FIG. **1** and FIG. **2**. FIG. **1** is a schematic diagram of a structure of a wearable device **1** according to an embodiment of this application, and FIG. **2** is a schematic diagram of a partial structure of a wearable device according to an embodiment of this application. The wearable device **1** may include a housing **10**, a display assembly **20**, and an ECG button assembly **30**. The display assembly **20** is disposed on the housing **10**. One side of the display assembly **20** may be exposed to an exterior of the housing **10**, to facilitate a user to view information of the wearable device **1** through the display assembly **20**. The ECG button assembly **30** may be disposed on a side edge of the housing **10**, and a circuit board (not shown in the figure) is disposed at an interior of the housing **10**. The circuit board may be a flexible printed circuit **130** (flexible printed circuit, FPC) or a printed circuit board (printed circuit board, PCB). A part of the ECG button assembly **30** may be located at the interior of the housing **10**, and is connected to the circuit board to implement circuit conduction, to implement an ECG function of the wearable device **1**.

[0037] Refer to FIG. **2** and FIG. **3**. FIG. **3** is a schematic diagram of a sectional structure of the wearable device **1** in FIG. **2**. The ECG button assembly **30** may include a button part **310**, a plastic tube **330**, a metal tube **340**, an elastic piece **320**, and a conductive sheet **360**. A side wall of the housing **10** may be provided with a via hole. The plastic tube **330** may be embedded in the via hole. A part of the plastic tube **330** is located at the exterior of the housing **10**, and a part of the plastic tube **330** is located at the interior of the housing **10**. Specifically, the plastic tube **330** may be of a cylindrical structure or a square structure. A clamping part **331** is provided on a part that is of the plastic tube **330** and that is located in the housing **10**. A size of the clamping part **331** may be greater than a diameter of the via hole. The clamping part **331** may be clamped to an inner surface of the housing **10**, to ensure that the plastic tube **330** is not detached, through the via hole, from the

housing **10**.

[0038] A first through hole is provided at an interior of the plastic tube **330**, and the metal tube **340** may be embedded in the first through hole. Specifically, a first step structure may be provided on a side that is of the plastic tube **330** and that is located at the exterior of the housing **10**, and a second step structure may be provided on the metal tube **340**. When the metal tube **340** is embedded in the plastic tube **330**, the second step structure may fit the first step structure, so that the metal tube **340** is relatively fastened to the housing **10** under an action of the first step structure. One end of the metal tube **340** may be located at the exterior of the housing **10**, and a surface of the end that is of the metal tube **340** and that is located at the exterior of the housing **10** is lower than a surface of one end that is of the plastic tube **330** and that is located at the exterior of the housing **10**, that is, the metal tube **340** is located at the interior of the plastic tube **330**.

[0039] One end that is of the metal tube **340** and that is located at the interior of the housing **10** may be fastened to the plastic tube **330** through a tube nut **350**. The tube nut **350** is provided with a threaded hole, and a thread is provided on a part that is of the metal tube **340** and that is located in the tube nut **350**. In this way, the metal tube **340** may be connected to the tube nut **350** through threaded matching. In addition, a side that is of the tube nut **350** and that is away from the metal tube **340** may protrude in a circumferential direction of the tube nut **350**. After the tube nut **350** is connected to the metal tube **340** in a threaded manner, the protruding part may alternatively be located between the plastic tube **330**, to cooperate with the clamping part of the plastic tube **330** to position the plastic tube **330**, and keep the plastic tube **330** fastened to the housing **10**.

[0040] With reference to FIG. **3** and FIG. **4**. FIG. **4** is a schematic diagram of a structure of a connection between a conductive sheet of the wearable device in FIG. **2** and a circuit board. The conductive sheet **360** may be fastened to the side that is of the tube nut **350** and that is away from the metal tube **340**. For example, the conductive sheet **360** may be connected to the tube nut **350** in a welding manner. A flange **361** is provided on a side that is of the conductive sheet **360** and that is away from the metal tube **340**. A circuit board **130** is provided with a spring sheet **140**. The conductive sheet **360** may be in contact with the spring sheet **140** through the flange **361**, to be electrically connected to the circuit board **130**.

[0041] As shown in FIG. **3**, the button part **310** may include a button cap **312** and a button shaft **311**. A second through hole is provided at an interior of the metal tube **340**. A first end of the button shaft **311** is located at the exterior of the housing **10**, and a second end of the button shaft **311** may be located at the interior of the housing **10** after sequentially passing through the second through hole, the tube nut **350**, and the conductive sheet **360**. The button cap **312** is connected to the first end of the button shaft **311**. The plastic tube **330** may be located in the button cap **312** and has a specific distance from a bottom of the button cap **312**. The elastic piece **320** may be a spring. The elastic piece **320** may be sleeved on the button shaft **311**, one end of the elastic piece **320** may be connected to the button cap **312**, and the other end of the elastic piece **320** is connected to the metal tube **340**. In this embodiment, when the user presses the button cap **312**, the button shaft **311** may be driven to move in an axial direction of the button shaft **311** relative to the housing **10**, so that the button shaft **311** may be in contact with other parts in the housing **10**. It may be understood that, when the button cap **312** is pressed, because the end that is of the elastic piece **320** and that is connected to the metal tube **340** is fastened, the elastic piece **320** may be compressed and store a force. After the pressing force on the button cap **312** is loosen, the elastic piece **320** may be restored under an elastic force, to drive the button cap **312** to be restored.

[0042] The button cap **312** and the button shaft **311** may be of an integrated structure or a split structure. This is not limited in this embodiment.

[0043] It should be understood that a conduction circuit of the ECG button assembly **30** in this embodiment may be as follows: button cap **312**-elastic piece **320**-metal tube **340**-tube nut **350**-conductive sheet **360**-circuit board **130**. Because an electrical connection between the ECG button assembly **30** and the circuit board **130** does not depend on the button shaft **311**, and the ECG button

assembly **30** and the circuit board **130** are connected through another metal mechanical part instead, another metal structure may be designed adaptively based on a structure of the housing **10**. A size of the ECG button assembly **30** may be reduced and circuit conduction is ensured.

[0044] A limiting part **3111** may be provided at the second end of the button shaft **311**, and the limiting part **3111** may be disposed around the button shaft **311**. When the button part **310** is in an initial state (that is, is not pressed), because the elastic piece **320** has a function of moving the button cap **312** away from the housing **10** for the button cap **312**, the limiting part **3111** may abut against a surface of the side that is of the conductive sheet **360** and that is away from the metal tube **340**, to limit the button shaft **311**. When the button part **310** is pressed, the button shaft **311** moves away from the conductive sheet **360**. In this case, the limiting part **3111** is detached from the conductive sheet **360**.

[0045] With reference to FIG. **3** and FIG. **5**. FIG. **5** is a schematic diagram of an enlarged structure of an ECG button assembly in FIG. **2**. In this embodiment, a side wall of the housing **10** may include a plastic layer **120** or include a plastic layer **120** and a metal layer **110**. When the housing **10** includes the plastic layer **120** and the metal layer **110**, the plastic layer **120** is located at the interior, and the metal layer **110** is located at the exterior. It may be understood that the wearable device **1** may be more attractive in appearance by disposing the metal layer **110**. In addition, the plastic tube **330** and the plastic layer **120** may alternatively be of an integrated structure. Because the button cap **312** is conductive, when the housing **10** includes the metal layer **110**, a distance between the button cap **312** and the metal layer **110** may be greater than a distance between the plastic tube **330** and the bottom of the button cap **312**. When the button cap **312** is pressed, an edge of the button cap **312** is capable of moving close to the metal layer **110**. In a movement process of the button cap **312**, the plastic tube **330** is first in contact with the button cap **312**, and limits the button cap **312**, so that the button cap **312** does not continue moving towards the metal layer **110**, that is, prevents the button cap **312** from being in contact with the metal layer **110**. This avoids that circuit conduction of an ECG is affected.

[0046] For example, a distance between the edge of the button cap **312** and the metal layer **110** may range from 0.15 mm to 0.2 mm. In this way, the button cap **312** does not protrude from the housing **10** too much, and contact between the button cap **312** and the metal layer **110** may also be avoided.

[0047] It should be noted that, when the housing **10** includes only the plastic layer **120**, a distance between the edge of the button cap **312** and the plastic layer **120** may be greater than or equal to the distance between the bottom of the button cap **312** and the plastic tube **330**.

[0048] In addition, a first sealing ring **370** may be disposed between the button shaft **311** and the metal tube **340**. The first sealing ring **370** may be wound around the button shaft **311**, to improve waterproof performance between the button shaft **311** and the metal tube **340**. Specifically, a first groove may be provided on the button shaft **311** in a circumferential direction of the button shaft **311**, the first sealing ring **370** may be clamped into the first groove, and the first sealing ring **370** abuts against a side wall of the metal tube **340**. There may be one or two or more first sealing rings **370**. When there are two or more first sealing rings **370**, the plurality of first sealing rings **370** may be arranged in an axial direction of the button shaft **311**.

[0049] A second sealing ring **380** may be disposed between the metal tube **340** and the plastic tube **330**, and the second sealing ring **380** may be wound around the metal tube **340**, to improve waterproof performance between the metal tube **340** and the plastic tube **330**. Specifically, a second groove may be disposed on the metal tube in a circumferential direction of the metal tube **340**, the second sealing ring **380** may be clamped into the second groove, and the second sealing ring **380** abuts against a side wall of the plastic tube **330**. There may be one or two or more second sealing rings **380**. When there are two or more second sealing rings **380**, a plurality of second sub-sealing rings may be arranged in an axial direction of the metal tube **340**.

[0050] Refer to FIG. **6** and FIG. **8**. FIG. **6** is a schematic diagram of a partial structure of another wearable device according to an embodiment of this application, and FIG. **8** is a schematic diagram

of a cross-sectional structure of an ECG button assembly in FIG. **6**. In this embodiment, a housing **10** may include a metal layer **110** and a plastic layer **120**, and an ECG button assembly **30** may include a button part, a metal tube **340**, a tube nut **350**, an elastic piece **320**, and a conductive sheet **360**.

[0051] The metal layer **110** is provided with an opening, and the plastic layer **120** is provided with a via hole. After the metal tube **340** passes through the opening of the metal layer **110** and the via hole of the plastic layer **120**, one end of the metal tube **340** is located at an interior of the housing **10**, and the other end of the metal tube is located at an exterior of the housing **10**. The tube nut **350** is located at one end of the metal tube **340** that is located at the interior of the housing **10**, and is connected to the metal tube **340** in a threaded manner. The conductive sheet **360** is fastened to a side that is of the tube nut **350** and that is away from the metal tube **340**, and the conductive sheet **360** is configured to be in contact with and electrically connected to a circuit board **130**. The button part includes a button shaft **311** and a button cap **312**. A first end of the button cap **312** is located at the exterior of the housing **10**, and a second end of the button cap **312** is located at the interior of the housing **10** after sequentially passing through the metal tube **340**, the tube nut **350**, and the conductive sheet **360**. The elastic piece **320** is sleeved on the button shaft **311**, one end of the elastic piece **320** is connected to the button cap **312**, and the other end of the elastic piece is connected to the metal tube **340**. It may be understood that, in this embodiment, a conduction circuit of the ECG button assembly **30** is: button cap **312**-elastic piece **320**-metal tube **340**-tube nut **350**-conductive sheet **360**-circuit board **130**.

[0052] A diameter of the opening of the metal layer **110** is greater than a diameter of the via hole of the plastic layer **120**. Specifically, the diameter of the opening of the metal layer **110** is greater than or equal to a diameter of the button cap **312**, that is, a part of the plastic layer **120** that directly faces the opening is exposed from the opening. A diameter of a part that is of the metal tube **340** and that is located at the exterior of the housing **10** is greater than a diameter of a part that is of the metal tube **340** and that is located in the housing **10**, so that the metal tube **340** has a step structure. A surface of the step structure that is perpendicular to an axial direction of the metal tube **340** is located at the exterior of the housing **10**, and abuts against a side surface that is of the plastic layer **120** and that faces the metal layer **110**, so that the metal tube **340** and the plastic layer **120** are relatively fastened. During specific implementation, a gasket **390** may be disposed between a step surface of the metal tube **340** and the plastic layer **120**, to ensure a stable connection relationship between the step surface of the metal tube **340** and the plastic layer **120**.

[0053] It may be understood that, when the diameter of the opening of the metal layer **110** is greater than the diameter of the button cap **312**, an edge of the button cap **312** directly faces a structure of the plastic layer **120**, that is, the button cap **312** may be in direct contact with the plastic layer **120** without affecting circuit conduction of an ECG. Therefore, a relationship between a size between the edge of the button cap **312** and the plastic layer **120** and a size between a bottom of the button cap **312** and the metal tube **340** is not limited in this embodiment.

[0054] In addition, it should be noted that the ECG button assembly **30** in this embodiment may also be considered as including a plastic tube. A side surface that is of the plastic tube and that faces the button cap **312** is flush with a surface of the plastic layer **120**, and the plastic tube and the plastic layer **120** are of an integrated structure.

[0055] FIG. **7** is a schematic diagram of a structure of a connection between a conductive sheet of the wearable device in FIG. **6** and a circuit board. As an implementation solution, a spring sheet **140** may be disposed on the circuit board **130**, and the conductive sheet **360** may be electrically connected to the circuit board **130** through the spring sheet **140**.

[0056] It may be understood that the housing in embodiments of this application may be a metal housing, a non-metal housing, or a metal and non-metal injection-molding housing. This is not limited in this embodiment.

[0057] The foregoing descriptions are merely specific implementations of this application, but are

not intended to limit the protection scope of this application. Any variation or replacement readily figured out by a person skilled in the art within the technical scope disclosed in this application shall fall within the protection scope of this application. Therefore, the protection scope of this application should be subject to the protection scope of the claims.

Claims

1. An electrocardiogram (ECG) button assembly, used in an electronic device, wherein: the electronic device comprises a housing and a circuit board located in the housing, and the ECG button assembly comprises a button part, a plastic tube, a metal tube, an elastic piece, and a conductive sheet; the housing is provided with a via hole, and the plastic tube is embedded in the via hole; a first through hole is provided at an interior of the plastic tube, the metal tube is embedded in the first through hole, a part of the metal tube is located at an exterior of the housing, the conductive sheet is connected to one end that is of the metal tube and that is located at an interior of the housing, and the conductive sheet is in contact with and electrically connected to the circuit board; the button part comprises a button cap and a button shaft, a second through hole is provided at an interior of the metal tube, the button shaft penetrates through the second through hole, a first end of the button shaft is located at the exterior of the housing, and the button cap is connected to the first end of the button shaft; and the elastic piece is sleeved on the button shaft, one end of the elastic piece is connected to the button cap, the other end of the elastic piece is connected to the metal tube, and the button part is configured to move in an axial direction of the button shaft relative to the housing.
2. The ECG button assembly according to claim 1, wherein the ECG button assembly further comprises a tube nut, and the tube nut is located at one end that is of the metal tube and that is away from the button cap; the tube nut is provided with a threaded hole, and the metal tube and the tube nut are assembled in a threaded manner; and the conductive sheet is connected to a side that is of the tube nut and that is away from the metal tube.
3. The ECG button assembly according to claim 1, wherein after passing through the conductive sheet, a second end of the button shaft is located at a side that is of the conductive sheet and that is away from the metal tube, a limiting part is provided at the second end of the button shaft, and the limiting part is disposed around the button shaft; and when the button part is in an initial state, the limiting part abuts against a surface of the side that is of the conductive sheet and that is away from the metal tube, and when the button part is pressed, the limiting part is detached from the conductive sheet.
4. The ECG button assembly according to claim 1, wherein the housing comprises a metal layer and a plastic layer, and the plastic layer is located at a side that is of the metal layer and that faces the interior of the housing.
5. The ECG button assembly according to claim 4, wherein a part of the plastic tube is located at an interior of the button cap, and in the axial direction of the button shaft, a distance between the button cap and the plastic tube is less than a distance between the button cap and the metal layer.
6. The ECG button assembly according to claim 5, wherein the distance between the button cap and the metal layer ranges from 0.15 mm to 0.2 mm.
7. The ECG button assembly according to claim 4, wherein the metal layer is provided with an opening, a side surface that is of the plastic tube and that faces the button cap is flush with a surface that is of the plastic layer and that faces the metal layer, the plastic tube is exposed from the opening, and a part that is of the metal tube and that is located at the exterior of the housing abuts against the side surface that is of the plastic layer and that faces the metal layer.
8. The ECG button assembly according to claim 7, wherein a part of the metal tube is located in the button cap, and an outer diameter of the plastic tube is greater than or equal to a diameter of the button cap.

9. The ECG button assembly according to claim 7, wherein a gasket is provided on the part that is of the metal tube and that abuts against the plastic layer.
10. The ECG button assembly according to claim 4, wherein the plastic tube and the plastic layer are of an integrated structure.
11. The ECG button assembly according to claim 1, wherein a flange is provided on a side that is of the conductive sheet and that is away from the button part, and the conductive sheet is in contact with the circuit board through the flange.
12. The ECG button assembly according to claim 1, wherein the circuit board is provided with a spring sheet, and the circuit board is in contact with the conductive sheet through the spring sheet.
13. The ECG button assembly according to claim 1, wherein a first sealing ring is provided between the button shaft and the metal tube.
14. The ECG button assembly according to claim 1, wherein a second sealing ring is provided between the metal tube and the plastic tube.
15. An electronic device, comprising a housing and an electrocardiogram (ECG) button assembly, wherein: the ECG button assembly is disposed on the housing, and the ECG button assembly comprises a button part, a plastic tube, a metal tube, an elastic piece, and a conductive sheet; the housing is provided with a via hole, and the plastic tube is embedded in the via hole; a first through hole is provided at an interior of the plastic tube, the metal tube is embedded in the first through hole, a part of the metal tube is located at an exterior of the housing, the conductive sheet is connected to one end that is of the metal tube and that is located at an interior of the housing, and the conductive sheet is in contact with and electrically connected to a circuit board of the electronic device; the button part comprises a button cap and a button shaft, a second through hole is provided at an interior of the metal tube, the button shaft penetrates through the second through hole, a first end of the button shaft is located at the exterior of the housing, and the button cap is connected to the first end of the button shaft; and the elastic piece is sleeved on the button shaft, one end of the elastic piece is connected to the button cap, the other end of the elastic piece is connected to the metal tube, and the button part is configured to move in an axial direction of the button shaft relative to the housing.
16. The electronic device according to claim 15, wherein the ECG button assembly further comprises a tube nut, and the tube nut is located at one end that is of the metal tube and that is away from the button cap; the tube nut is provided with a threaded hole, and the metal tube and the tube nut are assembled in a threaded manner; and the conductive sheet is connected to a side that is of the tube nut and that is away from the metal tube.
17. The electronic device according to claim 15, wherein after passing through the conductive sheet, a second end of the button shaft is located at a side that is of the conductive sheet and that is away from the metal tube, a limiting part is provided at the second end of the button shaft, and the limiting part is disposed around the button shaft; and when the button part is in an initial state, the limiting part abuts against a surface of the side that is of the conductive sheet and that is away from the metal tube, and when the button part is pressed, the limiting part is detached from the conductive sheet.
18. The electronic device according to claim 15, wherein the housing comprises a metal layer and a plastic layer, and the plastic layer is located at a side that is of the metal layer and that faces the interior of the housing.
19. The electronic device according to claim 18, wherein a part of the plastic tube is located at an interior of the button cap, and in the axial direction of the button shaft, a distance between the button cap and the plastic tube is less than a distance between the button cap and the metal layer.
20. The electronic device according to claim 18, wherein the metal layer is provided with an opening, a side surface that is of the plastic tube and that faces the button cap is flush with a surface that is of the plastic layer and that faces the metal layer, the plastic tube is exposed from the

opening, and a part that is of the metal tube and that is located at the exterior of the housing abuts against the side surface that is of the plastic layer and that faces the metal layer.