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(54) **ASSEMBLED WEARABLE ELECTRONIC DEVICE**

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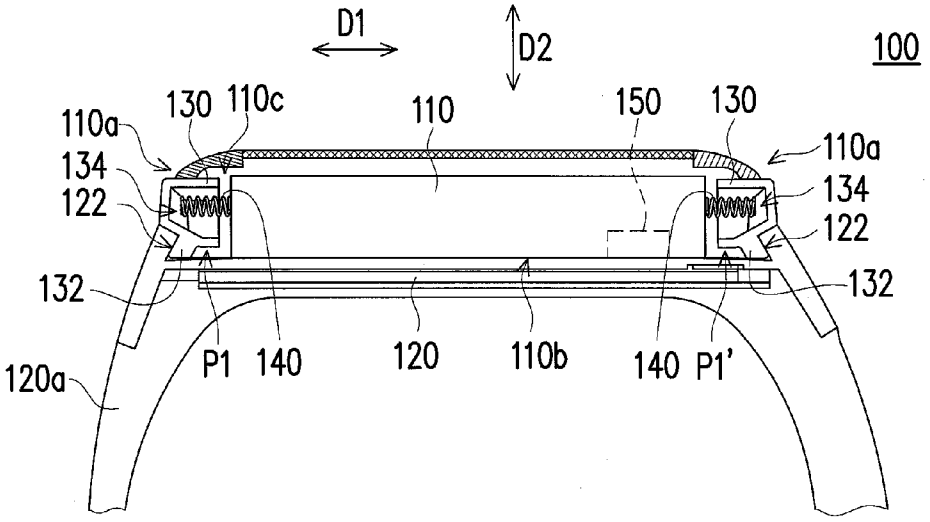
CPC ***H01Q 1/273*** (2013.01); ***G04R 60/12*** (2013.01); ***G06F 1/163*** (2013.01)

(57) **ABSTRACT**

An assembled wearable electronic device includes a first body, a second body and an engaging assembly. The first body has a primary system for providing the independent operation of the first body and producing a related first data. The second body has a secondary system and a fixing assembly. The secondary system is for providing the independent operation of the second body and producing a related second data. The engaging assembly is disposed at one of the first and second bodies. When the engaging assembly is located at a first position, the first and second bodies contact each other to be combined through the engaging assembly. When the engaging assembly moves to a second position, the first and second bodies are configured to be separated from each other. When the first and second bodies are connected to each other, the second data is read by the primary system.



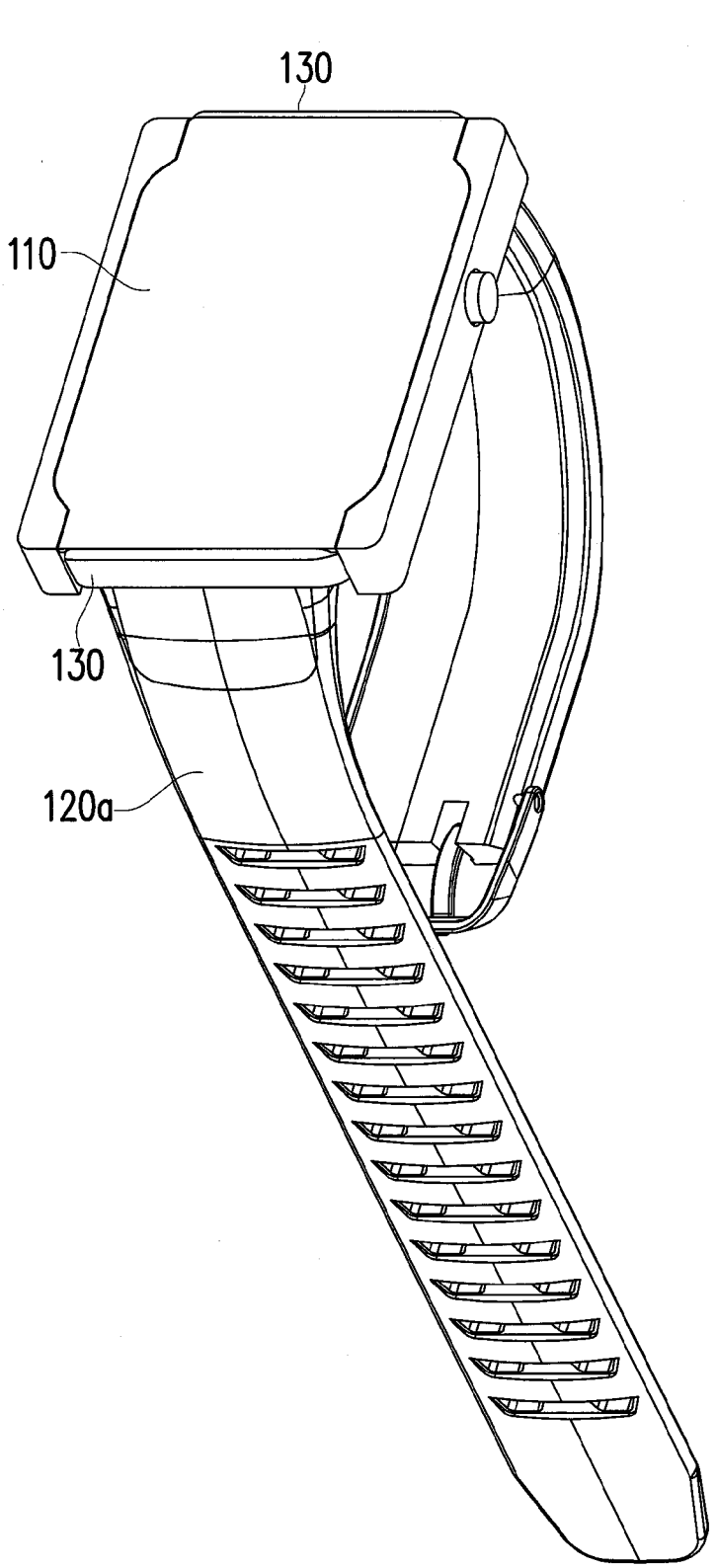


FIG. 1

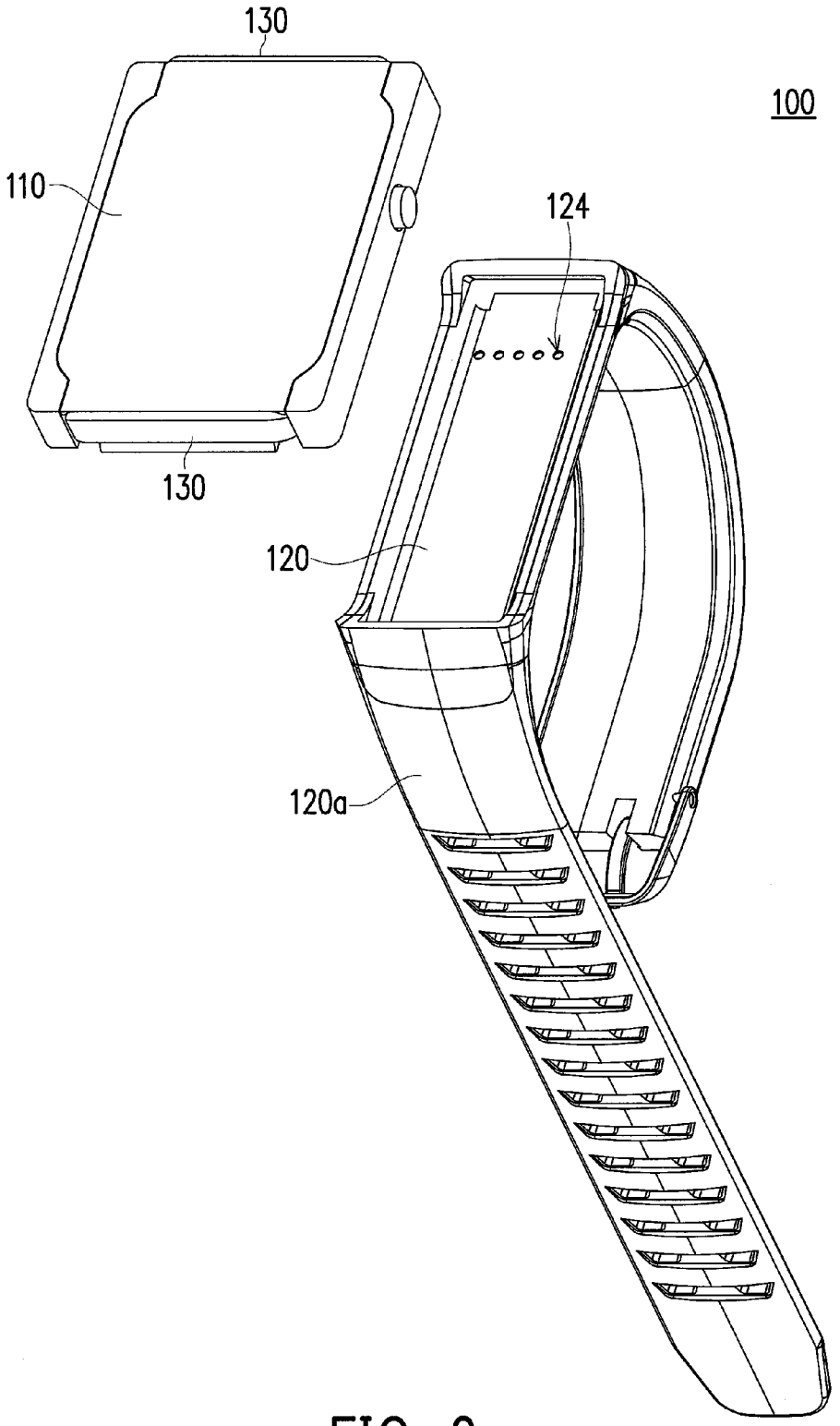


FIG. 2

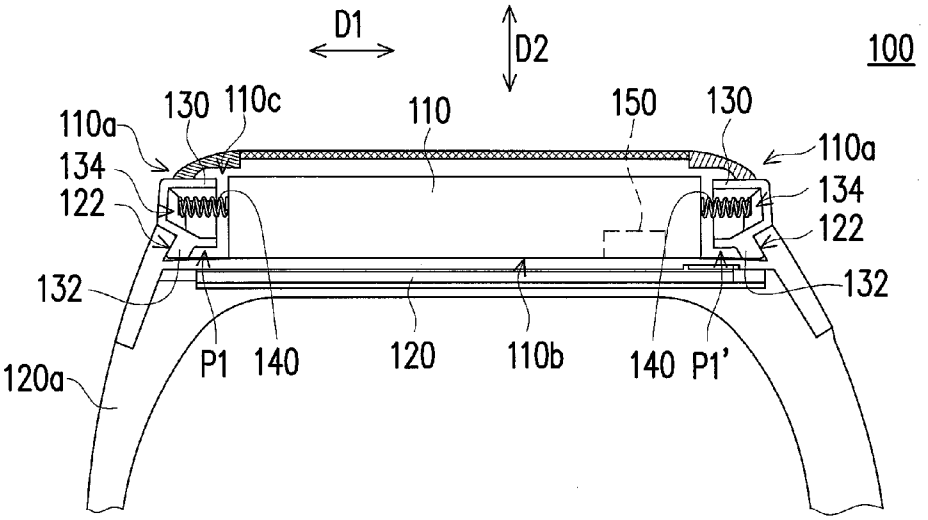
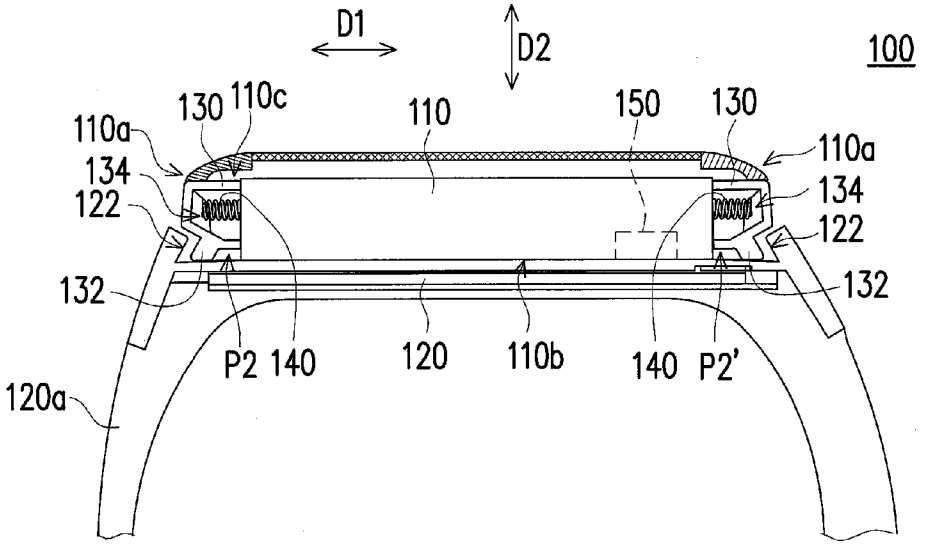

D1
D2
100
130
110c
110
150
130
110a
110a
134
122
134
122
132
132
120a
P1
140
120
110b
140
P1'

FIG. 3A


D1
D2
100
130
110c
110
150
130
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134
122
134
122
132
132
120a
P2
140
120
110b
140
P2'

FIG. 3B

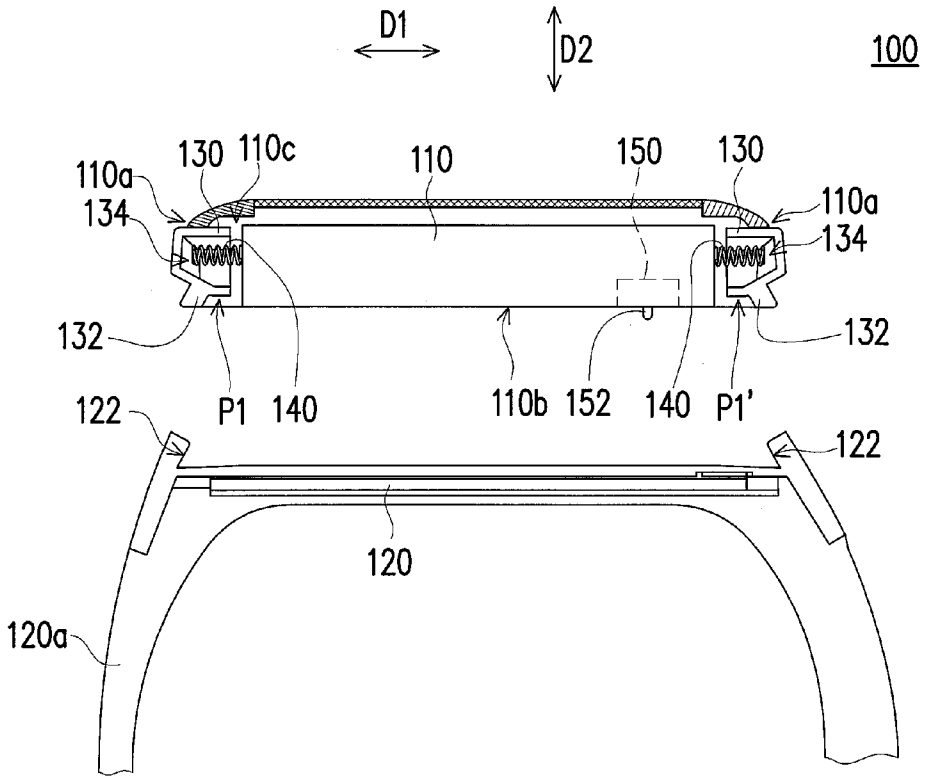
D1
D2
100
110a
130
110c
110
150
130
110a
134
134
132
132
P1
140
110b
152
140
P1'
122
122
120
120a

FIG. 3C

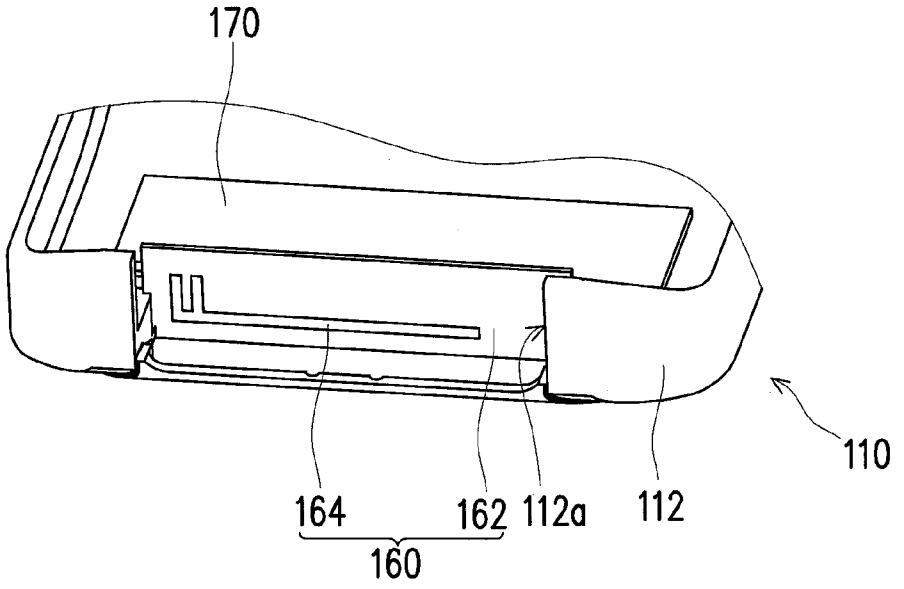

FIG. 4

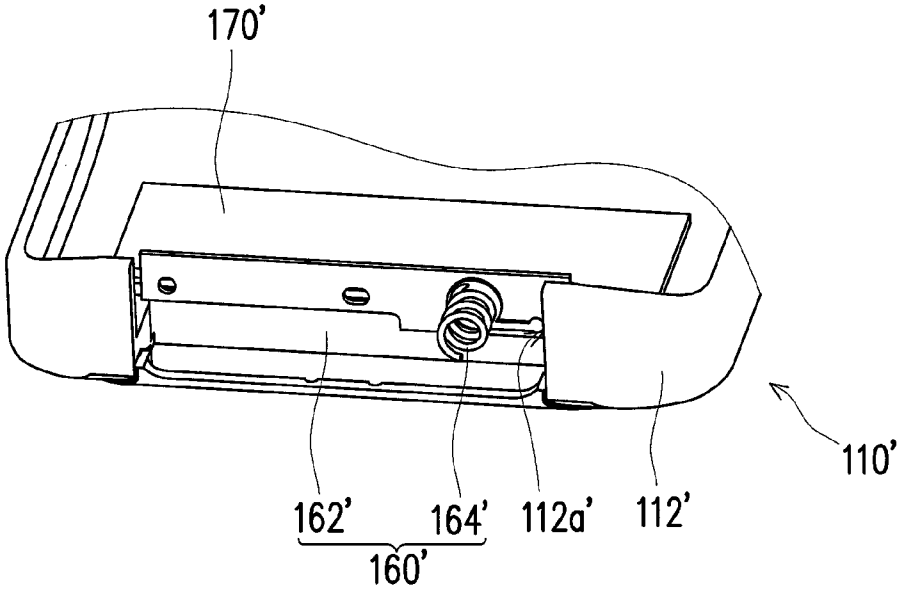

FIG. 5

ASSEMBLED WEARABLE ELECTRONIC DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims the priority benefits of U.S. provisional application Ser. No. 61/904,443, filed on Nov. 14, 2013. The entirety of the above-mentioned patent applications is hereby incorporated by reference herein and made a part of this specification.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The invention generally relates to an electronic device, and more particularly, to an assembled wearable electronic device.

[0004] 2. Description of Related Art

[0005] In recent years, along with the prosperity and development of mobile communication technology, the function of a mobile communication device gets more and more versatile. In order to meet the market trend and the expectation of consumer, the assembled wearable electronic device such as a smart watch attracts the people gradually.

[0006] In general, a smart watch is composed of a first body (such as a portion of the watch body) and a second body (such as another portion of the watch body and a watch band). The first body is fixed at the second body, and the user wears the smart watch on the wrist thereof through the second body. In order to be compact and convenience for wearing, the appearance of a smart watch is also an important factor to affect the purchasing motivation of the consumers. However, the second body of the current smart watch is mostly not replaceable, which reduces the variety of the smart watch appearance and the purchasing motivation of the consumers.

SUMMARY OF THE INVENTION

[0007] Accordingly, the present invention is directed to an assembled wearable electronic device, wherein the second body is convenient to be replaced.

[0008] An assembled wearable electronic device of the invention includes a first body, a second body and an engaging assembly. The first body has at least one function and a primary system for providing the independent operation of the first body and producing a related first data. The second body has at least one function, a secondary system and a fixing assembly, in which the secondary system is for providing the independent operation of the second body and producing a related second data, and the second body is fixed at a fixed object through the fixing assembly. The engaging assembly is disposed at one of the first body and the second body, in which when the engaging assembly is located at a first position, the first body and the second body contact each other to be combined through the engaging assembly. When the engaging assembly moves to a second position, the first body and the second body are configured to be separated from each other. When the first body and the second body are connected to each other, at least partial the second data of the secondary system is read through the operation of the primary system.

[0009] In an embodiment of the invention, the above-mentioned assembled wearable electronic device further includes an electrical connection module disposed at a bottom surface of the first body, in which the first body is electrically connected to the second body through the electrical connection module.

[0010] In an embodiment of the invention, the above-mentioned engaging assembly has two engaging members, and when the first body and the second body are combined, the two engaging members are respectively located at the two sides of the first body.

[0011] In an embodiment of the invention, the above-mentioned engaging assembly further includes an electrical connection module disposed at one of the two engaging members, and the first body is electrically connected to the second body through the electrical connection module.

[0012] In an embodiment of the invention, the above-mentioned engaging assembly employs at least one hook disposed at one of the first body and the second body and employs at least one locking slot disposed at the other one of the first body and the second body, and when the engaging assembly is located at the first position, the hook is inserted into the locking slot such that the first body and the second body contact each other.

[0013] In an embodiment of the invention, the above-mentioned engaging assembly further includes at least one elastic member, one end of the elastic member is connected to one of the first body and the second body, the other end of the elastic member is connected to the hook, and the hook is configured to be positioned at the first position through the elastic force of the elastic member and withstand the elastic force of the elastic member to move to the second position.

[0014] In an embodiment of the invention, one of the first body and the second body has an accommodation portion and at least a portion of the engaging assembly is accommodated in the accommodation portion.

[0015] In an embodiment of the invention, the above-mentioned engaging assembly is slidably disposed at one of the first body and the second body in a first direction, the first body and the second body are configured to be separated from each other in a second direction and the first direction is perpendicular to the second direction.

[0016] In an embodiment of the invention, the above-mentioned assembled wearable electronic device further includes an antenna module, in which the first body has a metal casing, the metal casing has an opening and the antenna module is disposed in the metal casing and aligned to the opening.

[0017] In an embodiment of the invention, the above-mentioned antenna module includes a substrate and a circuit antenna, the substrate is disposed in the metal casing and the circuit antenna is disposed on the substrate.

[0018] In an embodiment of the invention, the above-mentioned engaging assembly includes a helical antenna and a hook, and the helical antenna is connected between one of the first body and the second body and the hook.

[0019] In an embodiment of the invention, the above-mentioned helical antenna receives and transmits a wireless signal, and the length of the helical antenna is equal to ¼ of wavelength of the wireless signal.

[0020] In an embodiment of the invention, the above-mentioned primary system includes a primary control module, a primary power module, a primary memory module, a primary input module, a display module and a transferring module.

[0021] In an embodiment of the invention, the above-mentioned secondary system includes a secondary control module, a secondary power module, a secondary memory module, a secondary input module and a detection module.

[0022] In an embodiment of the invention, the above-mentioned detection module is a physiological detection module, an environment detection module, a position detection module or a direction detection module.

[0023] Based on the depiction above, the assembled wearable electronic device of the invention has a movable engaging assembly, the first body and the second body thereof can be combined through the engaging assembly, and the engaging assembly is configured to move such that the first body and the second body are separated from each other. In this way, the user can conveniently combine the first body and the second body or separate the first body and the second body from each other to replace the second body, which is helpful to increase the variety of the appearance of the assembled wearable electronic device.

[0024] In order to make the features and advantages of the present invention more comprehensible, the present invention is further described in detail in the following with reference to the embodiments and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. **1** is a three-dimensional diagram of an assembled wearable electronic device according to an embodiment of the invention.

[0026] FIG. **2** is an explored diagram of the assembled wearable electronic device of FIG. **1**.

[0027] FIGS. **3**A-**3**C are diagrams of flowchart for detaching the assembled wearable electronic device of FIG. **1**.

[0028] FIG. **4** is a diagram of the partial parts of the first body in FIG. **1**.

[0029] FIG. **5** is a diagram of the partial parts of a first body according to another embodiment of the invention.

DESCRIPTION OF THE EMBODIMENTS

[0030] FIG. **1** is a three-dimensional diagram of an assembled wearable electronic device according to an embodiment of the invention and FIG. **2** is an explored diagram of the assembled wearable electronic device of FIG. **1**. Referring to FIGS. **1** and **2**, an assembled wearable electronic device **100** of the embodiment is, for example, a smart watch and includes a first body **110**, a second body **120** and an engaging assembly. The engaging assembly is disposed at the first body **110** and has two engaging members **130**. The first body **110** is a portion of the watch body and has at least one function and a primary system. The primary system is for providing the independent operation of the first body **110** and producing a related first data. The second body **120** includes the other portion of the watch body and has at least one function, a secondary system and a fixing assembly **120***a*, and the secondary system is for providing the independent operation of the second body **120** and producing a related second data. The fixing assembly **120***a* is, for example, a watch band. The second body **120** is fixed at a fixed object (for example, the user's wrist) through the fixing assembly **120***a*. Each of the engaging members **130** is movably disposed at the first body **110** and can be engaged with the second body **120** such that the first body **110** and the second body **120** are combined as shown by FIG. **1**. When the engagement between the engaging members **130** and the second body **120** is released, the first body **110** and the second body **120** are separated from each other as shown by FIG. **2**.

[0031] In the embodiment, the aforementioned primary system of the first body **110**, for example, includes a primary control module, a primary power module, a primary memory module, a primary input module, a display module and a transferring module. The aforementioned secondary system, for example, includes a secondary control module, a secondary power module, a secondary memory module, a secondary input module and a detection module. Moreover, the detection module is, for example, a physiological detection module, an environment detection module, a position detection module or a direction detection module.

[0032] In the embodiment, when the second body **120** is independently operated, the secondary control module makes the data produced by the detection module, the input module or other secondary system during independent operation stored into the secondary memory module to serve as a second data (for example, a heartbeat data for the physiological detection module to produce during detecting the physiological of the user). Then, when the first body **110** and the second body **120** are connected to each other, the second data of the second body **120** is read through the operation of the primary control module of the first body **110**. At the time, the second data, for example the heartbeat data, is transferred to other electronic devices or to a cloud storage database through a transferring module of the primary system (for example, a Bluetooth communications module) for further storage or analysis.

[0033] FIGS. **3**A-**3**C are diagrams of flowchart for detaching the assembled wearable electronic device of FIG. **1**. Referring to FIGS. **3**A-**3**C, specifically, each engaging member **130** of the engaging assembly is slidably disposed at the first body **110** in a first direction D1. When the two engaging members **130** of the engaging assembly respectively move to a first position P1 and a first position P1' shown by FIG. **3**A, the two engaging members **130** are respectively located at the two opposite sides **110***a* of the first body **110** to be engaged with the second body **120**, so that the first body **110** and the second body **120** are combined. The user can apply a force onto the two engaging members **130** of the engaging assembly such that the two engaging members **130** of the engaging assembly respectively move to a second position P2 and a second position P2' shown by FIG. **3**B. At the time, the two engaging members **130** are not engaged with the second body **120** any more, and the first body **110** and the second body **120** are configured to be separated from each other in a second direction D2 perpendicular to the first direction D1. Thus, the user can easily combine the first body **110** and the second body **120** or separate the first body **110** from the second body **120** to replace the second body **120**, which is helpful to increase the variety of the appearance of the assembled wearable electronic device **100**.

[0034] In more details, the engaging assembly of the assembled wearable electronic device **100** in the embodiment includes at least one elastic member **140** (two ones are given in FIG. **3**), one hook **132** of the engaging assembly is employed and disposed at the first body **110** (two ones are given in FIG. **3**), and at least one locking slot **122** is disposed at the second body **120** (two ones are given in FIG. **3**). Each hook **132** is a portion of the corresponding engaging member **130**. One end of each the elastic member **140** is connected to the first body **110**, while the other end of each the elastic member **140** is connected to the corresponding hook **132**. The two hooks **132** are configured to be positioned respectively at the first position P1 and the first position P1' in FIG. **3**A through the elastic force between the two elastic members **140**. At the time, the hook **132** of each the engaging member

130 is inserted into the corresponding locking slot 122 such that the first body 110 and the second body 120 contact each other. When the user applies a force onto the two engaging members 130 to enable the two hooks 132 withstanding the elastic force between the two elastic members 140 to respectively move to the first position P1 and the first position P1' as shown by FIG. 3B, each of the hooks 132 moves from the corresponding locking slot 122, so that the first body 110 and the second body 120 are separated from each other as shown by FIG. 3C. Once the first body 110 and the second body 120 are separated from each other and the user does not apply forces onto the engaging members 130 any more, the two engaging members 130, through the elastic force between the two elastic members 140, would respectively resume to the first position P1 and the first position P1' shown by FIG. 3C.

[0035] When the user wants to make the first body 110 as shown by FIG. 3C and the second body 120 combined again, the user can apply forces onto the two engaging members 130 to move the two engaging members 130 to the first position P1 and the first position P1' and move the first body 110 onto the second body 120 as shown by FIG. 3B. Then, the user releases two engaging members 130, so that the two engaging members 130, through the elastic force between the two elastic members 140, would respectively resume to the first position P1 and the first position P1' shown by FIG. 3A to complete the assembling between the first body 110 and the second body 120.

[0036] The invention does not limit the disposing positions of the engaging members and the elastic member. In other embodiments, each of the engaging members is movably disposed at (for example, slidably disposed at) the second body, each of the locking slots is formed at the first body, and the two ends of each of the elastic members are respectively connected between the second body and the corresponding engaging member, so that each of the engaging members and the first body engaged with each other through the elastic force of the elastic members, which can withstand the elastic force of the elastic members to disengage the engaging members from the first body so that the first body and the second body are separated from each other.

[0037] As shown by FIGS. 3A-3C, each of the engaging members 130 in the embodiment has an accommodation slot 134, and each of the elastic members 140 is, for example, a compression spring and at least partially accommodated in the corresponding accommodation slot 134 to save the layout space in the first body 110. In other embodiments, each engaging member and the corresponding elastic member can be an all-in-one metal structure, which the invention is not limited to. In addition, the first body 110 has an accommodation portion 110*c*, at least a portion of the two engaging members 130 of the engaging assembly is accommodated in the accommodation portion 110*c*. In other embodiments, the accommodation portion can be formed at the second body, which the invention is not limited to.

[0038] In the embodiment, the first body 110 has a bottom surface 110*b*, and the bottom surface 110*b* is between the two sides 110*a* of the first body 110. The assembled wearable electronic device 100 includes an electrical connection module 150 disposed at the bottom surface 110*b* of the first body 110. When the first body 110 and the second body 120 are combined as shown by FIGS. 1 and 3A, the first body 110 is electrically connected to the second body 120 through the electrical connection module 150. The electrical connection module 150 of the embodiment can be, for example, a pogo pin 152 as shown by FIG. 3C and electrically connected to the connection portion 124 of the second body 120 (shown in FIG. 2), which the invention is not limited to. In other embodiments, the electrical connection module 150 can use other appropriate forms of connection interfaces for electrically connection. In addition, the invention does not limit the disposing position of the electrical connection module 150. The engaging assembly can include the electrical connection module and the electrical connection module can be disposed at one of the two engaging members 130, so that the first body 110 is electrically connected to the second body 120 through the electrical connection module at the engaging member 130.

[0039] FIG. 4 is a diagram of the partial parts of the first body in FIG. 1. Referring to FIGS. 1 and 4, the assembled wearable electronic device 100 of the embodiment includes an antenna module 160. The first body 110 has a metal casing 112, the metal casing 112 has an opening 112*a* to provide a space required by disposing the engaging members 130 and the elastic member 140 (shown by FIGS. 3A-3C). The antenna module 160 is disposed in the metal casing 112 and aligned to the opening 112*a*. The engaging member 130 covers the opening 112*a* and the material of the engaging member 130 is, for example, non-metal to avoid the antenna module 160 from reducing the capability to transmit and receive wireless signal due to the shielding of the metal part. In the embodiment, the antenna module 160 includes a substrate 162 and a circuit antenna 164. The substrate 162 is disposed in the metal casing 112, and the circuit antenna 164 is disposed on the substrate 162 to be electrically connected to a circuit board 170 in the metal casing 112. The first body 110 can transmit and receive wireless signal through the circuit antenna 164. The invention does not limit the form of the antenna module, refer to the following figure and the example.

[0040] FIG. 5 is a diagram of the partial parts of a first body according to another embodiment of the invention. In the embodiment of FIG. 5, the layout and actions of a first body 110', a metal casing 112', an opening 112*a*' and a circuit board 170' are similar to the layout and actions of the first body 110, the metal casing 112, the opening 112*a* and the circuit board 170, which is omitted to describe. The unique of the embodiment of FIG. 5 from the embodiment of FIG. 4 rests in that the antenna module 160' includes a substrate 162' and a helical antenna 164', the substrate 162' is disposed in the metal casing 112' the helical antenna 164' is disposed on the substrate 162' and electrically connected to the circuit board 170' in the metal casing 112'. The helical antenna 164' is to transmit and receive wireless signal, wherein the length of the helical antenna 164' is, for example, equal to ¼ of the wavelength of the wireless signal. In addition, the engaging members 130 and the hooks 132 of FIG. 3A can be disposed at the opening 112*a*' of the metal casing 112', and the helical antenna 164' can be connected between the substrate 162' of the first body 110' and the hooks 132 of the engaging members 130. At the time, the helical antenna 164' and the hooks 132 of the engaging members 130 together form the engaging assembly. The function of the helical antenna 164' is similar to the function of the elastic member 140 shown by FIG. 3A. The engaging members 130 are configured to be positioned through the elastic force of the helical antenna 164'. In other embodiments, the helical antenna can be disposed and connected between the second body and the hooks, which the invention is not limited to.

[0041] In summary, the assembled wearable electronic device of the invention has a movable engaging assembly, the first body and the second body thereof can be combined through the engaging assembly, and the engaging assembly is configured to move such that the first body and the second body are separated from each other. In this way, the user can conveniently combine the first body and the second body or separate the first body and the second body from each other to replace the second body, which is helpful to increase the variety of the appearance of the assembled wearable electronic device. In addition, the metal casing of the first body has an opening to provide a space required to dispose the engaging assembly. The antenna module can be disposed in the metal casing and aligned to the opening to avoid the antenna module from reducing the capability to transmit and receive wireless signal due to the shielding of the metal casing.

[0042] It will be apparent to those skilled in the art that the descriptions above are several preferred embodiments of the present invention only, which does not limit the implementing range of the present invention. Various modifications and variations can be made to the structure of the present invention without departing from the scope or spirit of the invention. In view of the foregoing, the protective scope of the present invention is given by the following claims and their equivalents.

What is claimed is:

1. An assembled wearable electronic device, comprising:

a first body, having at least one function and a primary system for providing the independent operation of the first body and producing a related first data;

a second body, having at least one function, a secondary system and a fixing assembly, wherein the secondary system is for providing the independent operation of the second body and producing a related second data, and the second body is fixed at a fixed object through the fixing assembly; and

an engaging assembly, disposed at one of the first body and the second body, wherein when the engaging assembly is located at a first position, the first body and the second body contact each other to be combined through the engaging assembly; when the engaging assembly moves to a second position, the first body and the second body are configured to be separated from each other; when the first body and the second body are connected to each other, at least partial the second data of the secondary system is read through the operation of the primary system.

2. The assembled wearable electronic device as claimed in claim **1**, further comprising an electrical connection module disposed at a bottom surface of the first body, wherein the first body is electrically connected to the second body through the electrical connection module.

3. The assembled wearable electronic device as claimed in claim **1**, wherein the engaging assembly has two engaging members, and when the first body and the second body are combined, the two engaging members are respectively located at two sides of the first body.

4. The assembled wearable electronic device as claimed in claim **3**, wherein the engaging assembly further comprises an electrical connection module disposed at one of the two engaging members, and the first body is electrically connected to the second body through the electrical connection module.

5. The assembled wearable electronic device as claimed in claim **1**, wherein the engaging assembly employs at least one hook disposed at one of the first body and the second body and employs at least one locking slot disposed at the other one of the first body and the second body, and when the engaging assembly is located at the first position, the hook is inserted into the locking slot such that the first body and the second body contact each other.

6. The assembled wearable electronic device as claimed in claim **5**, wherein the engaging assembly further comprises at least one elastic member, one end of the elastic member is connected to one of the first body and the second body, the other end of the elastic member is connected to the hook, and the hook is configured to be positioned at the first position through the elastic force of the elastic member and withstand the elastic force of the elastic member to move to the second position.

7. The assembled wearable electronic device as claimed in claim **6**, wherein one of the first body and the second body has an accommodation portion and at least a portion of the engaging assembly is accommodated in the accommodation portion.

8. The assembled wearable electronic device as claimed in claim **1**, wherein the engaging assembly is slidably disposed at one of the first body and the second body in a first direction, the first body and the second body are configured to be separated from each other in a second direction, and the first direction is perpendicular to the second direction.

9. The assembled wearable electronic device as claimed in claim **1**, further comprising an antenna module, wherein the first body has a metal casing, the metal casing has an opening, and the antenna module is disposed in the metal casing and aligned to the opening.

10. The assembled wearable electronic device as claimed in claim **9**, wherein the antenna module comprises a substrate and a circuit antenna, the substrate is disposed in the metal casing and the circuit antenna is disposed on the substrate.

11. The assembled wearable electronic device as claimed in claim **1**, wherein the engaging assembly comprises a helical antenna and a hook, and the helical antenna is connected between one of the first body and the second body and the hook.

12. The assembled wearable electronic device as claimed in claim **11**, wherein the helical antenna receives and transmits a wireless signal, and length of the helical antenna is equal to ¼ of wavelength of the wireless signal.

13. The assembled wearable electronic device as claimed in claim **11**, wherein the primary system comprises a primary control module, a primary power module, a primary memory module, a primary input module, a display module and a transferring module.

14. The assembled wearable electronic device as claimed in claim **11**, wherein the secondary system comprises a secondary control module, a secondary power module, a secondary memory module, a secondary input module and a detection module.

15. The assembled wearable electronic device as claimed in claim **14**, wherein the detection module is a physiological detection module, an environment detection module, a position detection module or a direction detection module.

* * * * *