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(54) **PROCESSING DEVICE**

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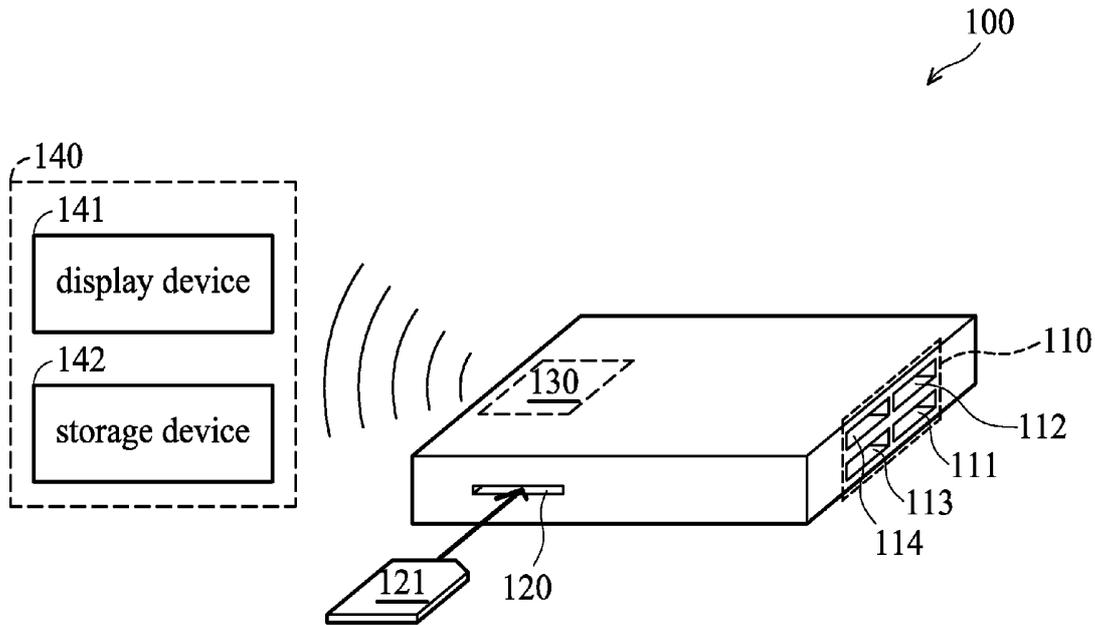
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(57) **ABSTRACT**

A processing device including an interface unit, a first slot, and a transmission unit is provided. The interface unit is configured to receive a plurality of physiological monitoring signals. The first slot is configured to hold a first analysis module. When the first analysis module is inserted into the first slot, the first analysis module analyzes a first signal group to generate a first analysis result. The first signal group includes at least two of the physiological monitoring signals. The transmission unit outputs the first analysis result to at least one external device.



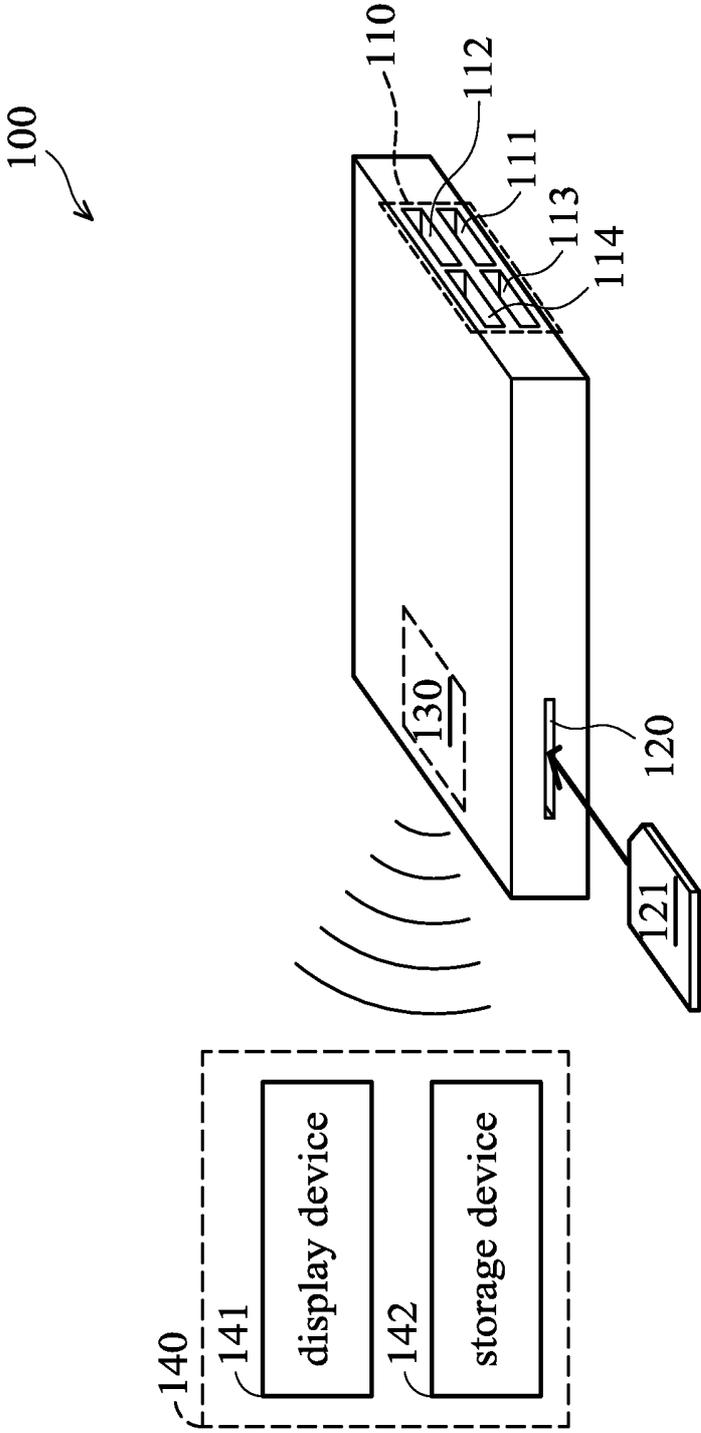


FIG. 1

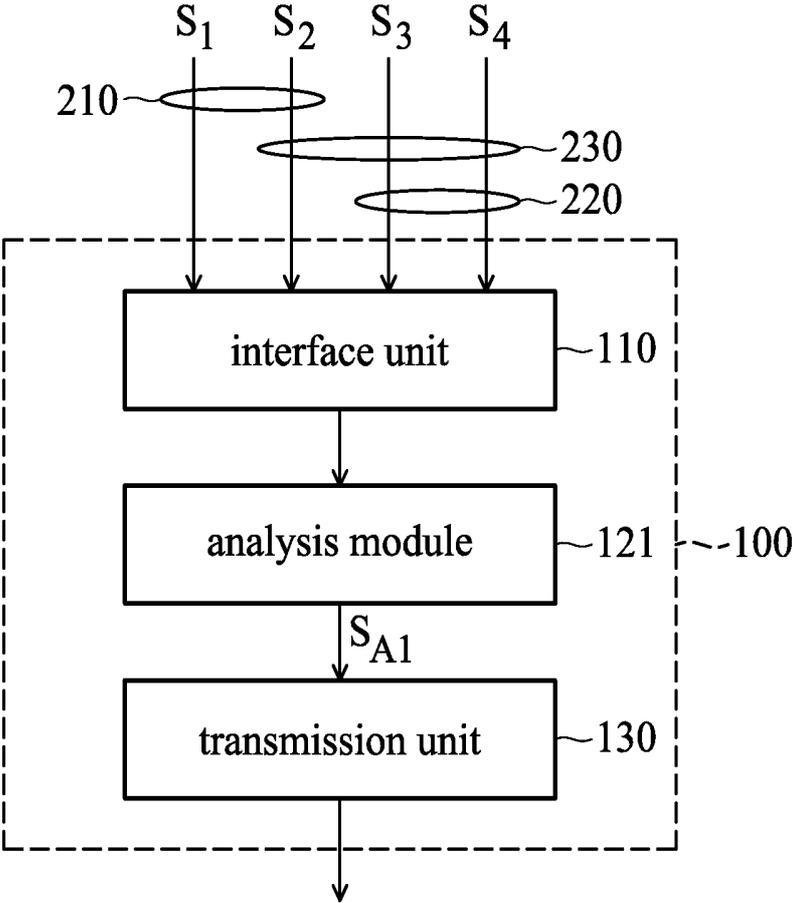


FIG. 2

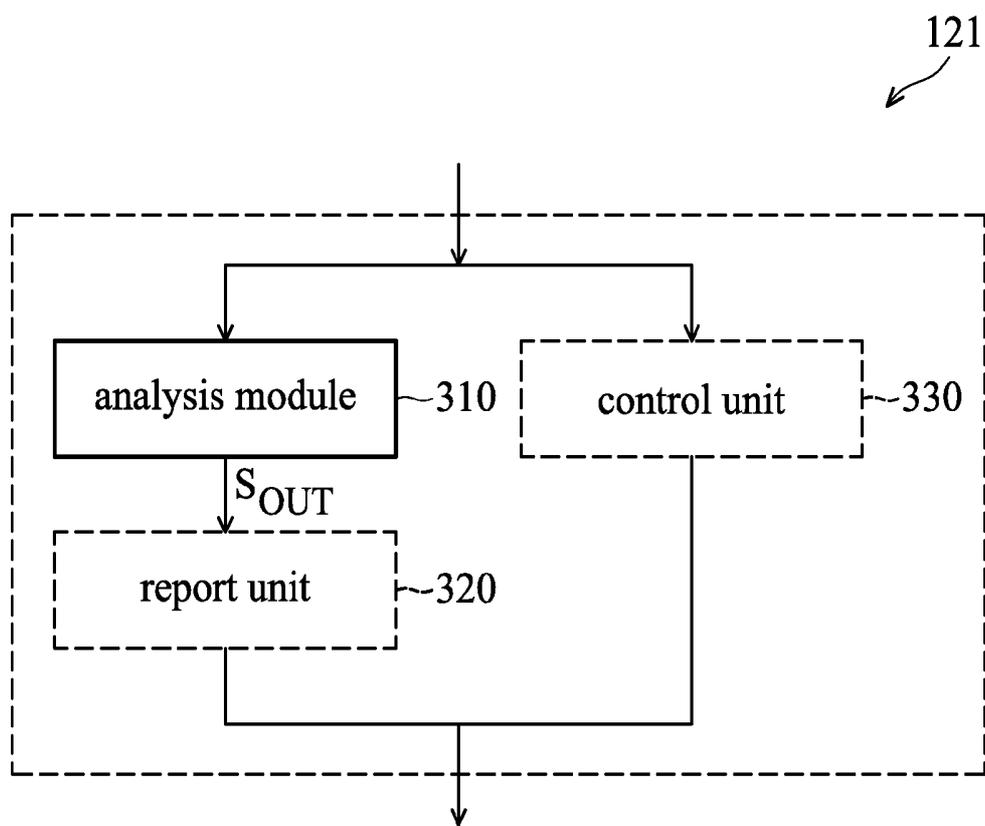


FIG. 3

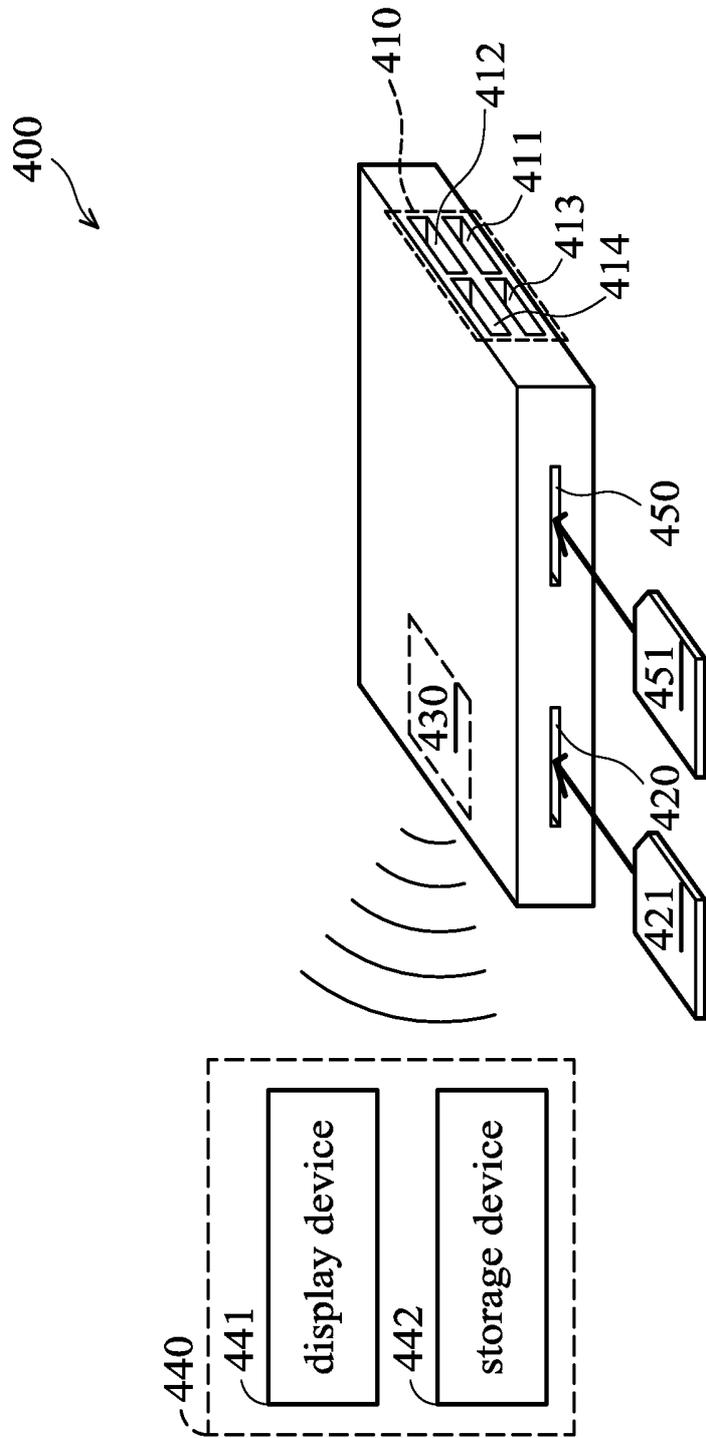


FIG. 4

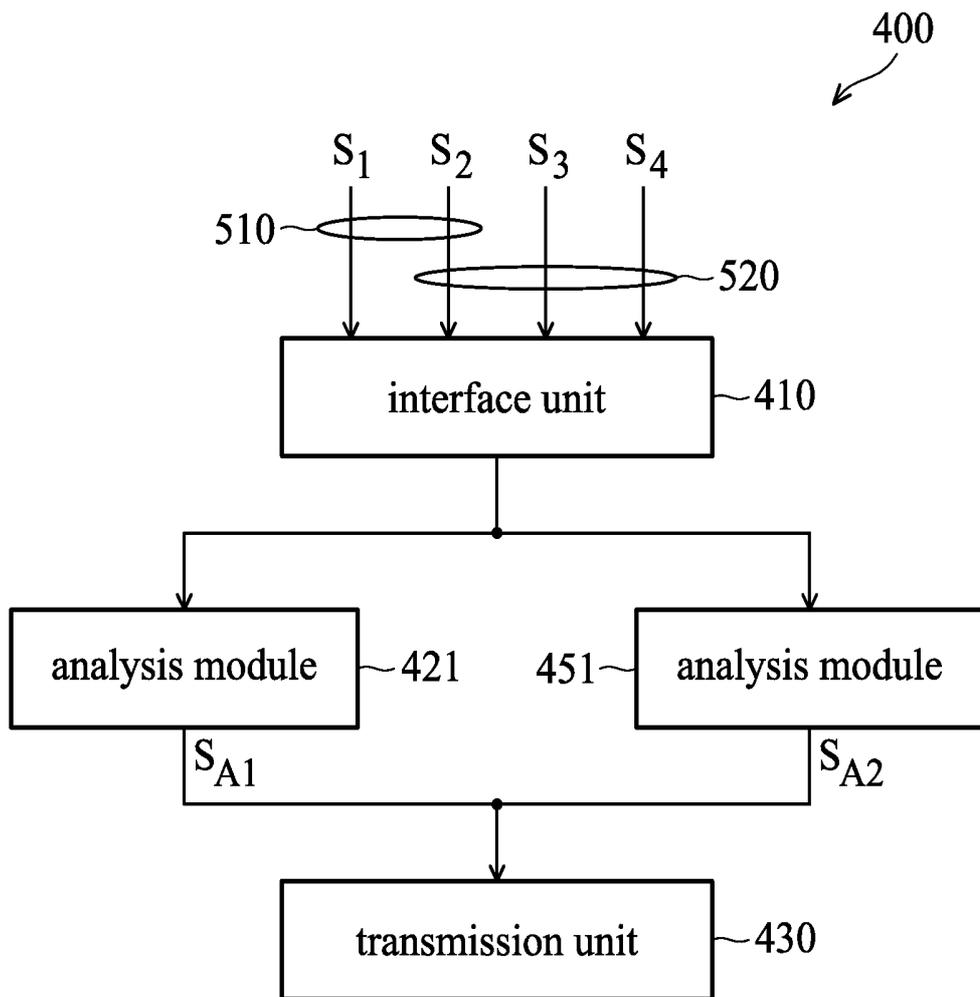


FIG. 5

PROCESSING DEVICE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The invention relates to a processing device, and more particularly to a processing device for physiological symptoms.

[0003] 2. Description of the Related Art

[0004] Physiological monitors are common medical apparatuses to measure physiological parameters. Doctors and nurses diagnose and treat sick people according to measured physiological indexes. However, different physiological indexes (e.g. electrocardiogram (ECG), blood pressure, temperature and respiration) are captured by different physiological monitors. The cost of monitoring is increased and the complexity of measurement is increased.

BRIEF SUMMARY OF THE INVENTION

[0005] In accordance with an embodiment, a processing device comprises an interface unit, a first slot, and a transmission unit. The interface unit is configured to receive a plurality of physiological monitoring signals. The first slot is configured to hold a first analysis module. When the first analysis module is inserted into the first slot, the first analysis module analyzes a first signal group to generate a first analysis result. The first signal group comprises at least two of the physiological monitoring signals. The transmission unit outputs the first analysis result to at least one external device.

[0006] A detailed description is given in the following embodiments with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The invention can be more fully understood by referring to the following detailed description and examples with references made to the accompanying drawings, wherein:

[0008] FIG. 1 is an appearance diagram of an exemplary embodiment of a processing device according to an embodiment of the present invention;

[0009] FIG. 2 is a schematic diagram of an exemplary embodiment of a processing device according to an embodiment of the present invention;

[0010] FIG. 3 is a schematic diagram of an exemplary embodiment of an analysis module according to an embodiment of the present invention;

[0011] FIG. 4 is a schematic diagram of another exemplary embodiment of a processing device according to an embodiment of the present invention; and

[0012] FIG. 5 is a schematic diagram of another exemplary embodiment of a processing device according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The following description is of the best-contemplated mode of carrying out the invention. This description is made for the purpose of illustrating the general principles of the invention and should not be taken in a limiting sense. The scope of the invention is best determined by reference to the appended claims.

[0014] FIG. 1 is an appearance diagram of an exemplary embodiment of a processing device according to an embodiment of the present invention. The processing device 100 comprises an interface unit 110, a slot 120 and a transmission

unit 130. The interface unit 110 comprises jacks 111-114. The invention does not limit the number of jacks nor the shape of each jack. In this embodiment, each jack is coupled to a corresponding monitoring device (not shown) to receive at least one physiological monitoring signal. In one embodiment, a monitoring device may generate various physiological monitoring signals.

[0015] The monitoring device detects a physiological symptom, such as an electroencephalography (EEG) signal, a phonocardiograph (PCG) signal, an impedance cardiogram (ICG) signal, a photoplethysmogram (PPG) signal, a blood pressure signal, an electrocardiogram (ECG) signal, a respiration signal, an electromyography (EMG) signal and a heart rate signal. The monitoring device provides physiological monitoring signals to the interface unit 110.

[0016] The slot 120 is configured to hold an analysis module 121. The invention does not limit the size of the analysis module 121. In one embodiment, the shape of the analysis module 121 is similar to a secure digital card. When the analysis module 121 is inserted into the slot 120, the analysis module 121 analyzes the physiological monitoring signals received by at least two jacks to generate an analysis result.

[0017] Different analysis modules analyze different physiological monitoring signals. For example, if the analysis module 121 is a cardiopulmonary function analysis module, the analysis module 121 analyzes the physiological monitoring signals received by the jacks 111 and 112 to generate an analysis result. The physiological monitoring signals received by the jacks 111 and 112 may comprise an ECG signal and a respiration signal. If the analysis module 121 is a blood pressure modulating module, the analysis module 121 analyzes the physiological monitoring signals received by the jacks 112 and 113 to generate another analysis result. The physiological monitoring signals received by the jacks 112 and 113 may comprise a ECG signal and a blood pressure signal. In this case, the same physiological monitoring signal may be utilized by different analysis modules. In other embodiments, different analysis modules utilize different physiological monitoring signals.

[0018] The transmission unit 130 transmits the analysis result to an external device 140 according to a wireless transmission technology or a wired transmission technology. The invention does not limit the type of external device 140. In one embodiment, the external device 140 comprises a display device 141. The display device 141 displays a text or an image representing the analysis result generated by the analysis module 121. In one embodiment, the display device 141 is a smart phone or a monitor.

[0019] In other embodiments, the external device 140 further comprises a storage device 142 to store the analysis result generated by the analysis module 121. For example, the storage device 142 is a smart phone, a host, or a server. In some embodiments, the transmission unit 130 communicates with the display device 141 according to a wired transmission technology and communicates with the storage device 142 according to a wireless transmission technology. In some embodiments, the transmission unit 130 transmits data to a cloud via the Internet.

[0020] FIG. 2 is a schematic diagram of an exemplary embodiment of a processing device according to an embodiment of the present invention. In order to clearly interpret this embodiment, only physiological monitoring signals $S_1 \sim S_4$

are shown. The analysis module **121** analyzes at least two of the physiological monitoring signals $S_1 \sim S_4$ to generate an analysis result S_{A1} .

[0021] For example, when the analysis module **121** is a first category of analysis module (e.g. a cardiopulmonary function analysis module), the analysis module **121** analyzes the signal group **210**. The signal group **210** comprises the physiological monitoring signals S_1 and S_2 . When the analysis module **121** is a second category of analysis module (e.g. a blood pressure analysis module), the analysis module **121** analyzes the signal group **220**. The signal group **220** comprises the physiological monitoring signals S_3 and S_4 . When the analysis module **121** is a third category of analysis module, the analysis module **121** analyzes the signal group **230**. The signal group **230** comprises the physiological monitoring signals $S_2 \sim S_4$.

[0022] Different kinds of analysis modules generate different analysis results. The user obtains the physiological symptom of a patient according to the analysis result. Since the processing device **100** comprises a slot **120**, a user is capable of inserting the appropriate analysis module into the slot **120**, and the utility of the processing device is increased.

[0023] In other embodiments, the analysis module **121** controls the transmission unit **130** to selectively transmit the analysis result S_{A1} to an appropriate external device. For example, if the analysis module **121** is to a first category of analysis modules, the analysis module **121** directs the transmission unit **130** to transmit the analysis result S_{A1} to a first external device, and if the analysis module **121** is to a second category of analysis modules, the analysis module **121** directs the transmission unit **130** to transmit the analysis result S_{A1} to a second external device.

[0024] The invention does not limit the internal structure of analysis module **121**. Any circuit structure can serve as an analysis module **121**, as long as the circuit structure is capable of analyzing physiological monitoring signals. FIG. **3** is a schematic diagram of an exemplary embodiment of an analysis module according to an embodiment of the present invention. In one embodiment, the analysis module **121** comprises an analysis unit **310**. The analysis unit **310** analyzes at least two of the physiological monitoring signals $S_1 \sim S_4$ to generate an output signal S_{OUT} . In this case, the transmission unit **130** directly receives and transmits the output signal S_{OUT} to the external device.

[0025] In another embodiment, the analysis module **121** further comprises a report unit **320**. The report unit **320** collects the output signal S_{OUT} to generate a report result S_{A1} . For example, the report unit **320** outputs an analysis result S_{A1} at fixed time intervals. Therefore, a user can detect changes in the physiological symptoms of a patient according to the analysis result displayed by the external device.

[0026] In other embodiments, the report unit **320** is disposed in an external device to report the analysis result S_{A1} output from the transmission unit **130**. In one embodiment, the external device displays text or an image to represent the analysis result S_{A1} . In another embodiment, the external device stores the analysis result S_{A1} .

[0027] In some embodiments, the analysis module **121** further comprises a control unit **330** to detect some sudden conditions. When the states of at least two of the physiological monitoring signals $S_1 \sim S_4$ conform to a dangerous state, the control unit **330** sends an alarm signal. For example, during analysis period, if the cardiopulmonary function of a patient is abnormal, the control unit **330** immediately sends

an alarm signal to notify medical personnel. In other embodiments, the control unit **330** can be disposed outside of the external device.

[0028] FIG. **4** is a schematic diagram of another exemplary embodiment of a processing device according to an embodiment of the present invention. FIG. **4** is similar to FIG. **1** except for the addition of a slot **450**. The slot **450** is configured to hold an analysis module **451**. In one embodiment, the analysis modules **421** and **451** can be simultaneously inserted into the slots **420** and **450** respectively. The transmission unit **430** successively provides the analysis results generated by the analysis modules **421** and **451** to the external device **440**.

[0029] In one embodiment, the transmission unit **430** provides different analysis results to the same external device, such as the display device **441**. In another embodiment, the transmission unit **430** provides different analysis results to different external devices. For example, the transmission unit **430** provides the analysis result generated by the analysis module **421** to the display device **441** and provides the analysis result generated by the analysis module **451** to the storage device **442**. In other embodiments, the transmission unit **430** transmits data to an external device according to a wireless transmission technology and transmits data to another external device according to a wired transmission technology.

[0030] FIG. **5** is a schematic diagram of another exemplary embodiment of a processing device according to an embodiment of the present invention. The physiological monitoring signals S_1 and S_2 constitute the signal group **510** and the physiological monitoring signals $S_2 \sim S_4$ constitute the signal group **520**. In this embodiment, each of the analysis modules **421** and **451** utilizes the physiological monitoring signal S_2 , but the disclosure is not limited thereto. In other embodiments, the physiological monitoring signals analyzed by the analysis module **421** are different from the physiological monitoring signals analyzed by the analysis module **451**.

[0031] The analysis module **421** analyzes the signal group **510** to generate the analysis result S_{A1} . The analysis module **451** analyzes the signal group **520** to generate the analysis result S_{A2} . The invention does not limit the sequence for which the analysis modules **421** and **451** analyze the physiological monitoring signals. In one embodiment, the priority of the slot **420** is higher than the priority of the slot **450**. Therefore, when the analysis modules **421** and **451** are inserted into the slots **420** and **450** respectively, the analysis module **421** first analyzes the physiological monitoring signals. After the analysis module **421** finishes the analysis, the analysis module **451** starts analyzing the physiological monitoring signals. In some embodiments, the analysis modules operate simultaneously.

[0032] The transmission unit **430** successively outputs the analysis results S_{A1} and S_{A2} to the external device. In one embodiment, all external devices receive the analysis results S_{A1} and S_{A2} . Therefore, a user can watch different physiological symptoms in a single external device. In other embodiments, some external devices receive the analysis result S_{A1} or S_{A2} .

[0033] Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art

and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

[0034] While the invention has been described by way of example and in terms of the preferred embodiments, it is to be understood that the invention is not limited to the disclosed embodiments. On the contrary, it is intended to cover various modifications and similar arrangements (as would be apparent to those skilled in the art). Therefore, the scope of the appended claims should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements.

What is claimed is:

1. A processing device, comprising:
 - an interface unit configured to receive a plurality of physiological monitoring signals;
 - a first slot configured to hold a first analysis module, wherein when the first analysis module is inserted into the first slot, the first analysis module analyzes a first signal group to generate a first analysis result, and the first signal group comprises at least two of the physiological monitoring signals; and
 - a transmission unit outputting the first analysis result to at least one external device.
2. The processing device as claimed in claim 1, wherein when a second analysis module is inserted into the first slot, the second analysis module analyzes a second signal group to generate a second analysis result different from the first analysis result, and the second signal group comprises at least two of the physiological monitoring signals.
3. The processing device as claimed in claim 2, wherein at least one physiological monitoring signal among the first signal group is the same as at least one physiological monitoring signal among the second signal group.
4. The processing device as claimed in claim 1, further comprising:
 - a second slot configured to hold a second analysis module, wherein when the second analysis module is inserted into the second slot, the second analysis module analyzes a second signal group to generate a second analysis result, and the second signal group comprises at least two of the physiological monitoring signals.
5. The processing device as claimed in claim 4, wherein at least one physiological monitoring signal among the first

signal group is the same as at least one physiological monitoring signal among the second signal group.

6. The processing device as claimed in claim 4, wherein the transmission unit outputs the first analysis result to a first external device and outputs the second analysis result to a second external device.

7. The processing device as claimed in claim 4, wherein the transmission unit outputs the first and second analysis results to the external device.

8. The processing device as claimed in claim 1, wherein the external device displays the first analysis result as text or an image.

9. The processing device as claimed in claim 1, wherein the first analysis module comprises an analysis unit to analyze the first signal group to generate an output signal.

10. The processing device as claimed in claim 9, wherein the transmission unit serves the output signal as the first analysis result and outputs the output signal to the external device, and the external device further comprises a report unit collects the output signal to generate a report result.

11. The processing device as claimed in claim 9, wherein the external device is a storage device storing the report result.

12. The processing device as claimed in claim 9, wherein the external device is a display device displaying the report result as text or an image.

13. The processing device as claimed in claim 9, wherein the first analysis module further comprises a report unit collecting the output signal to generate the first analysis result.

14. The processing device as claimed in claim 13, wherein the first analysis module further comprises a control unit, and when a state of the first signal group conforms to a danger state, the control unit sends an alarm signal.

15. The processing device as claimed in claim 1, wherein the transmission unit outputs the first analysis result according to a wired transmission technology or a wireless transmission technology.

16. The processing device as claimed in claim 1, wherein the physiological monitoring signals comprise at least two of an electroencephalography (EEG) signal, a phonocardiograph (PCG) signal, an impedance cardiogram (ICG) signal, a photoplethysmogram (PPG) signal, a blood pressure signal, an electrocardiogram (ECG) signal, a respiration signal, an electromyography (EMG) signal and a heart rate signal.

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专利名称(译)	加工设备		
公开(公告)号	US20160143597A1	公开(公告)日	2016-05-26
申请号	US14/552148	申请日	2014-11-24
[标]申请(专利权)人(译)	华邦电子股份有限公司		
申请(专利权)人(译)	华邦电子.		
当前申请(专利权)人(译)	华邦电子.		
[标]发明人	CHANG CHIA CHI HSIAO TZU CHIEN		
发明人	CHANG, CHIA-CHI HSIAO, TZU-CHIEN		
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外部链接	Espacenet USPTO		

摘要(译)

提供了一种处理装置，包括接口单元，第一插槽和传输单元。接口单元被配置为接收多个生理监测信号。第一插槽配置为保持第一分析模块。当第一分析模块插入第一槽时，第一分析模块分析第一信号组以产生第一分析结果。第一信号组包括至少两个生理监测信号。传输单元将第一分析结果输出到至少一个外部设备。

