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(54) **PHYSIOLOGIC SENSOR APPARATUS**

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(52) **U.S. Cl.** **600/535**; 128/903; 600/323; 600/509

(57) **ABSTRACT**

An apparatus for sensing at least one physiological parameter of a patient and transmitting data related to the sensed physiological parameter to an external device. The apparatus comprises a detecting portion comprising at least one sensor interconnected with a connector, an acquisition portion comprising a connector interface configured to receive the connector, electronics for controlling the at least one sensor via the connector interface, receiving data related to the at least one physiological parameter from the at least one sensor via the connector interface and processing the received data, and a wireless interface for transmitting the processed data to the external device, and a power source for supplying energy to the acquisition module.

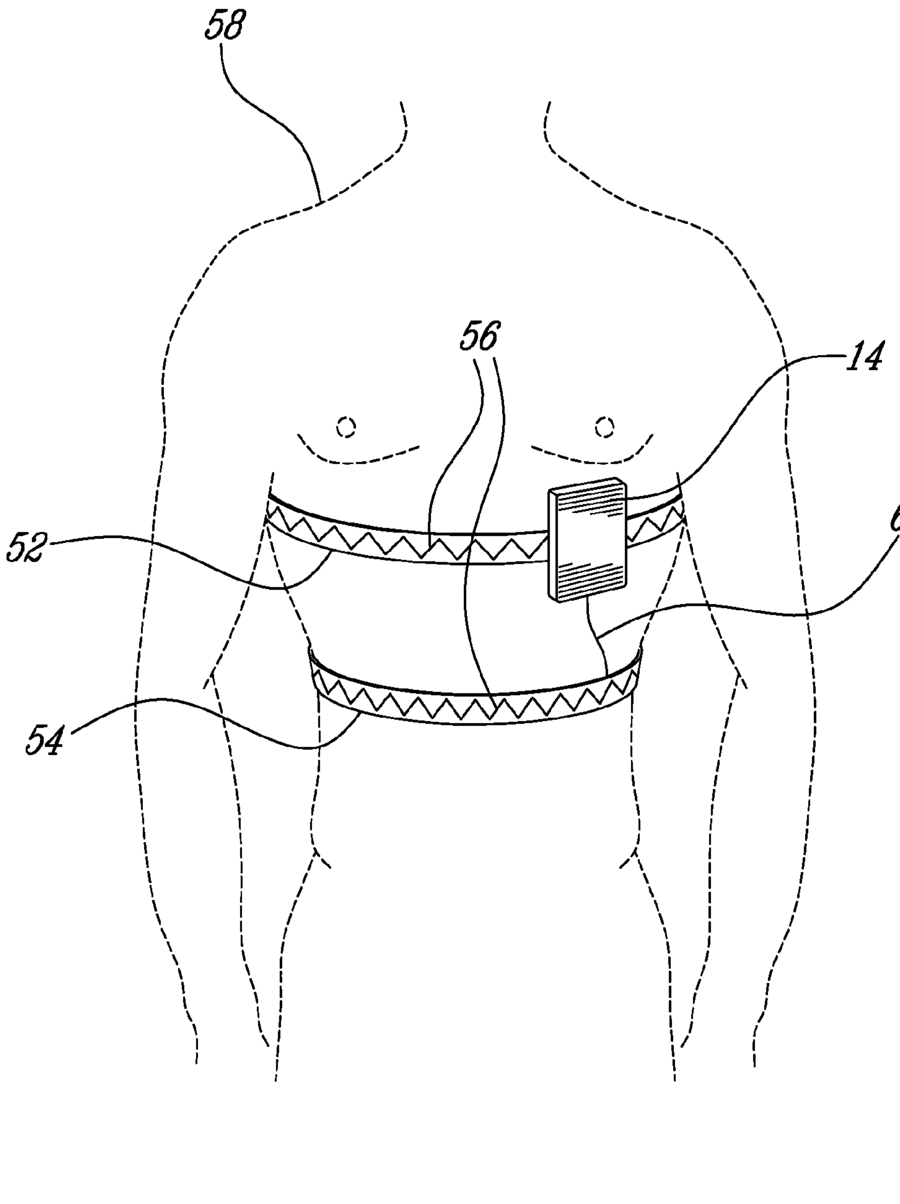
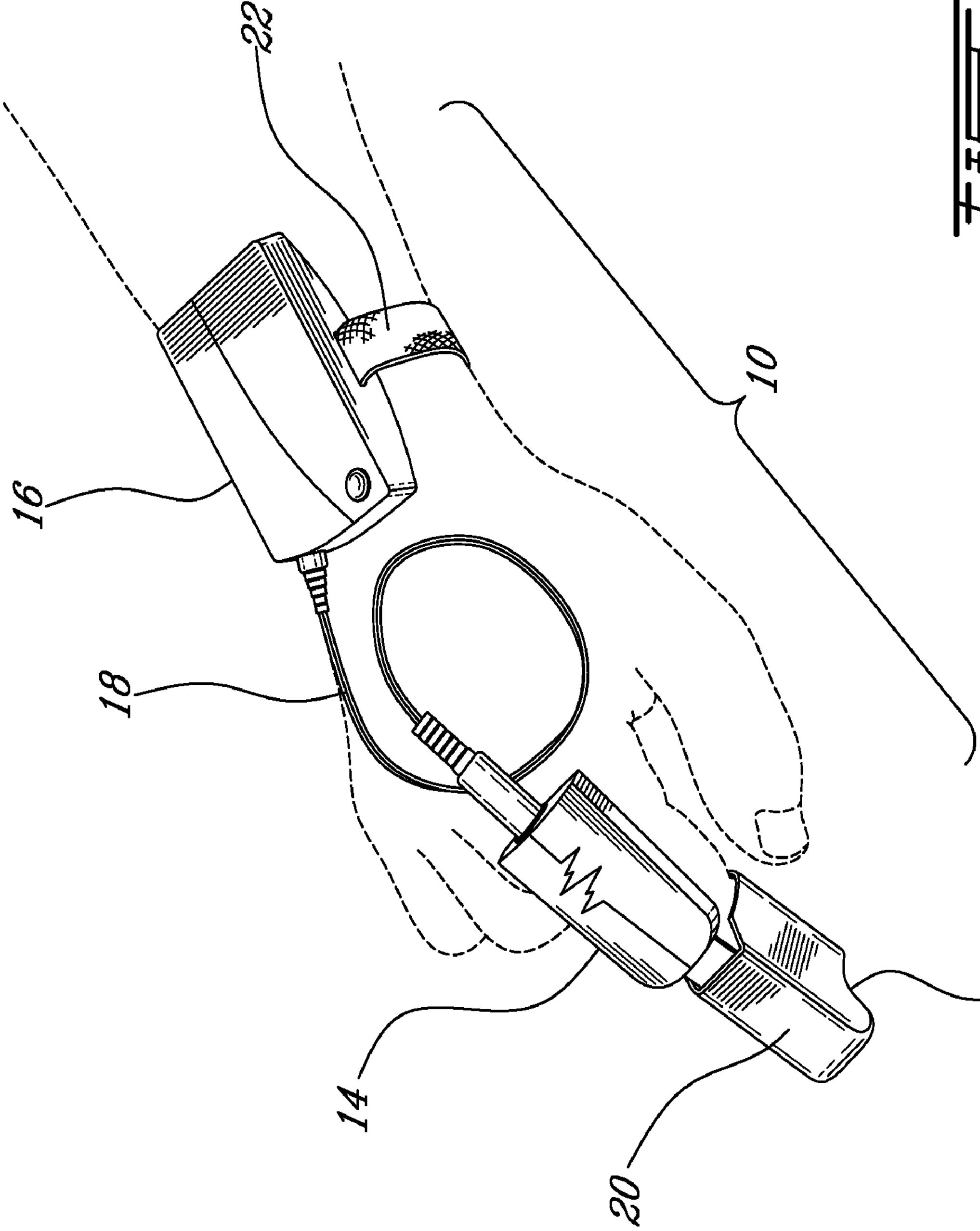


FIG-1



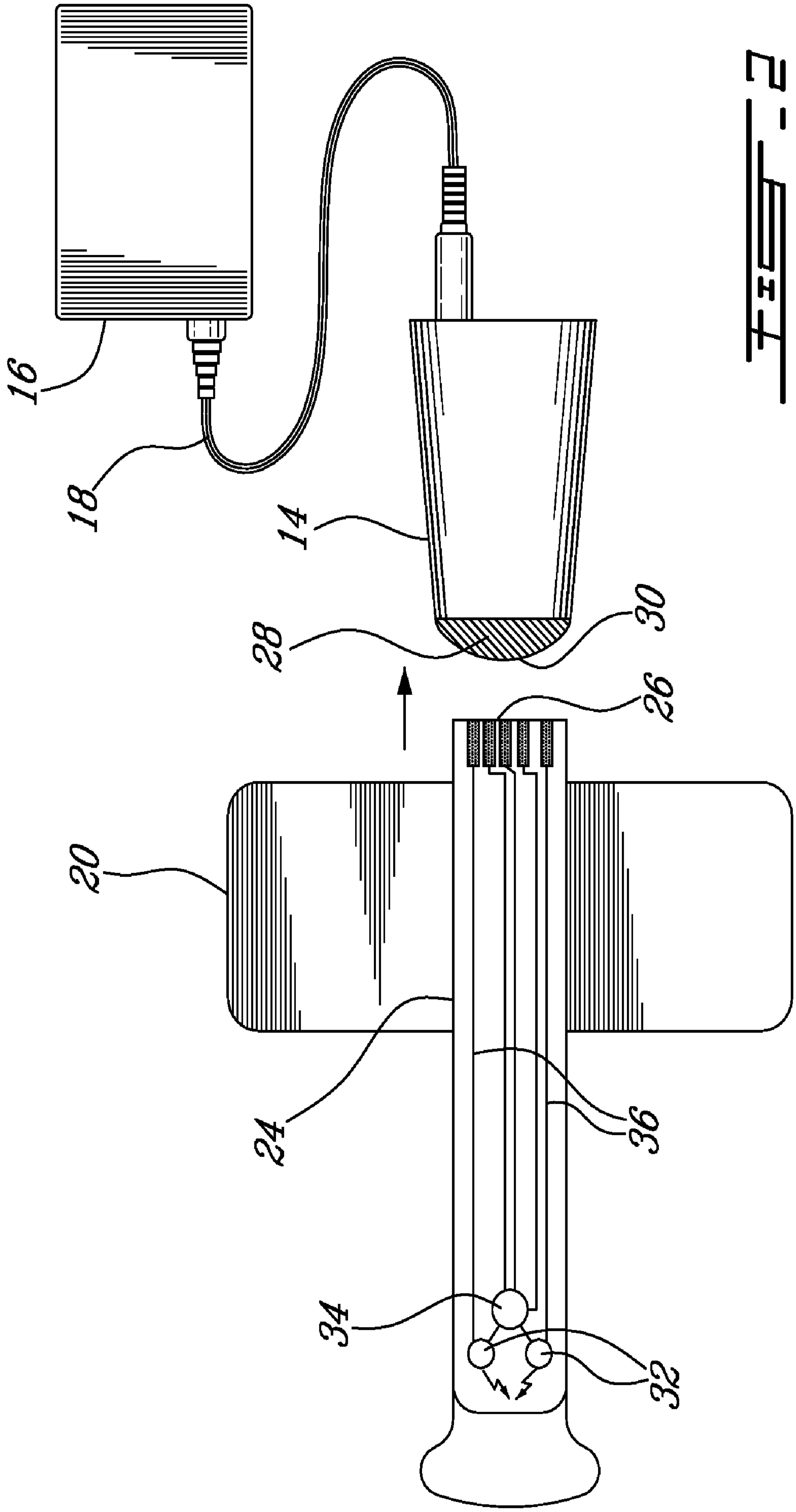


FIG. 2

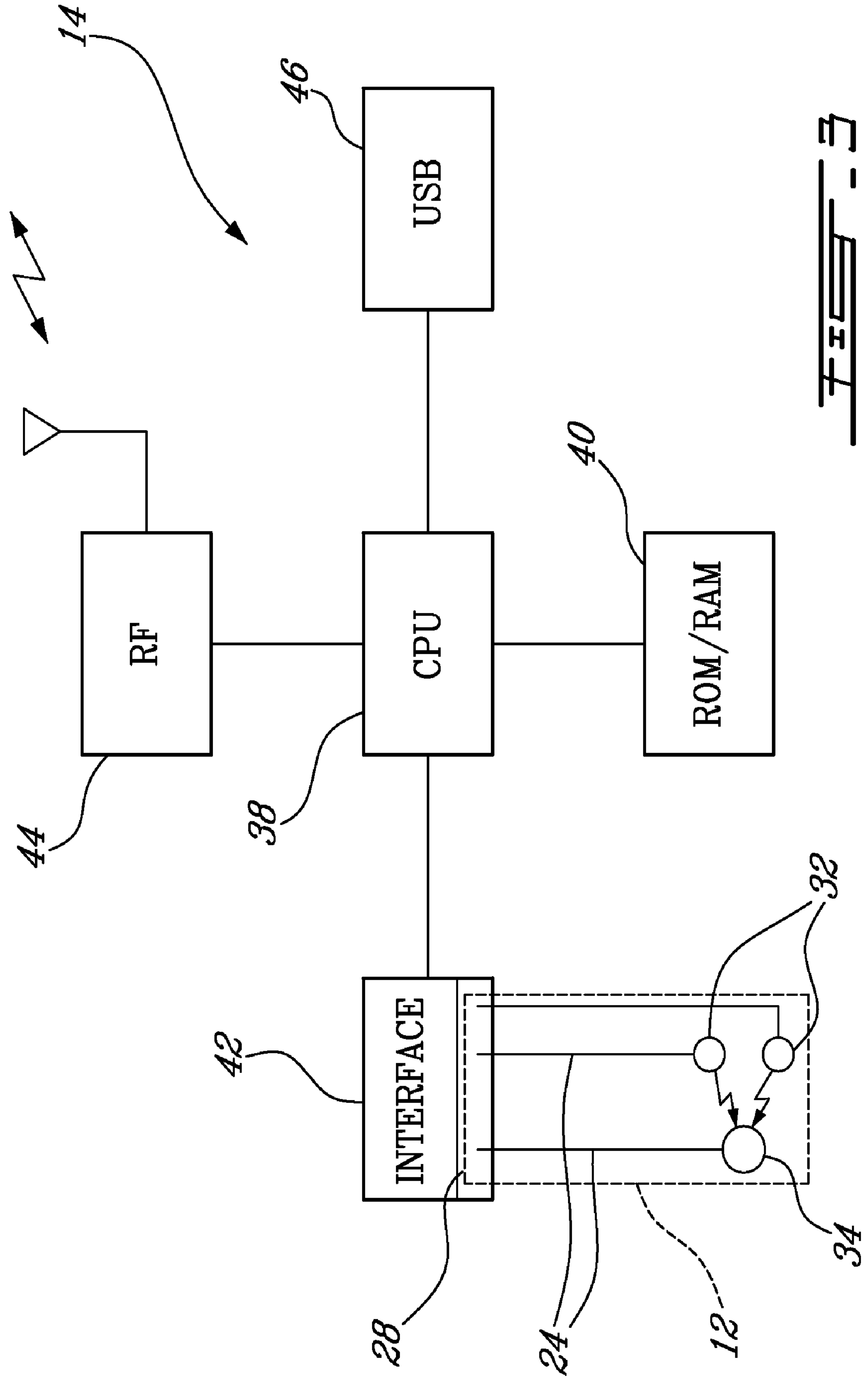


FIG. 3

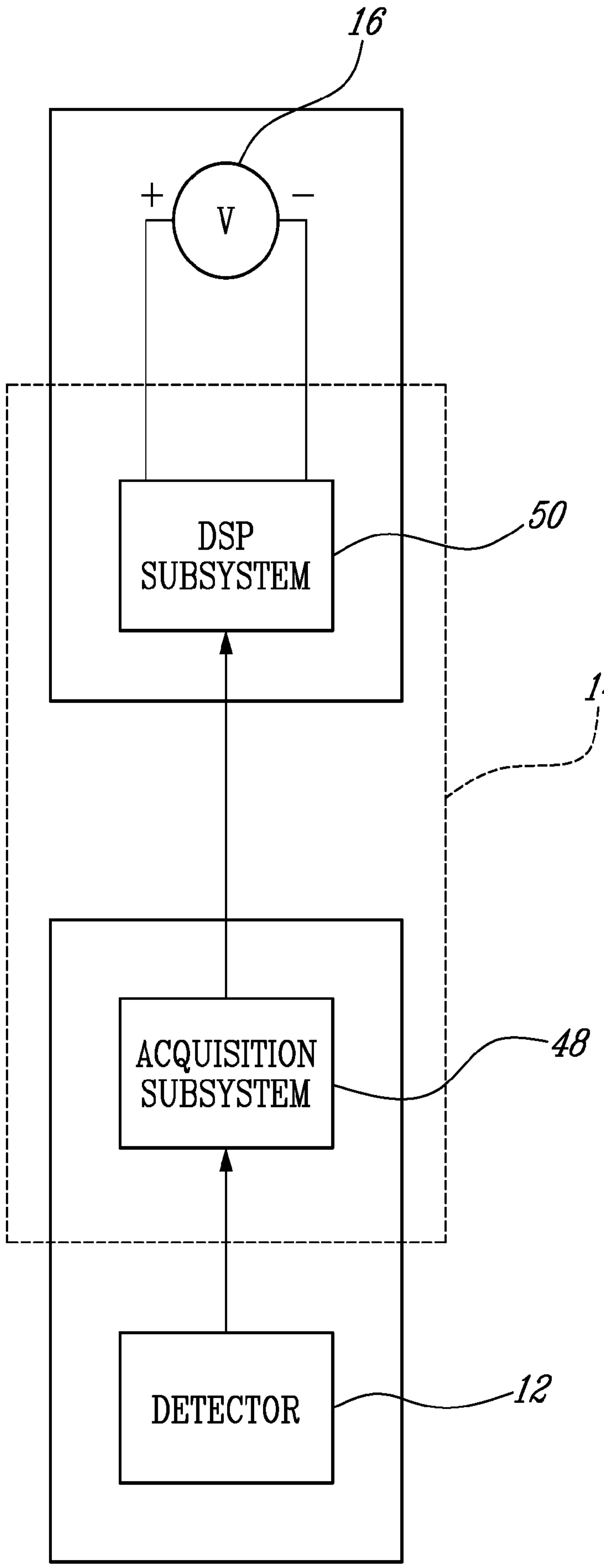

16
+
V
−
DSP
SUBSYSTEM
50
14
ACQUISITION
SUBSYSTEM
48
DETECTOR
12

FIG. 4

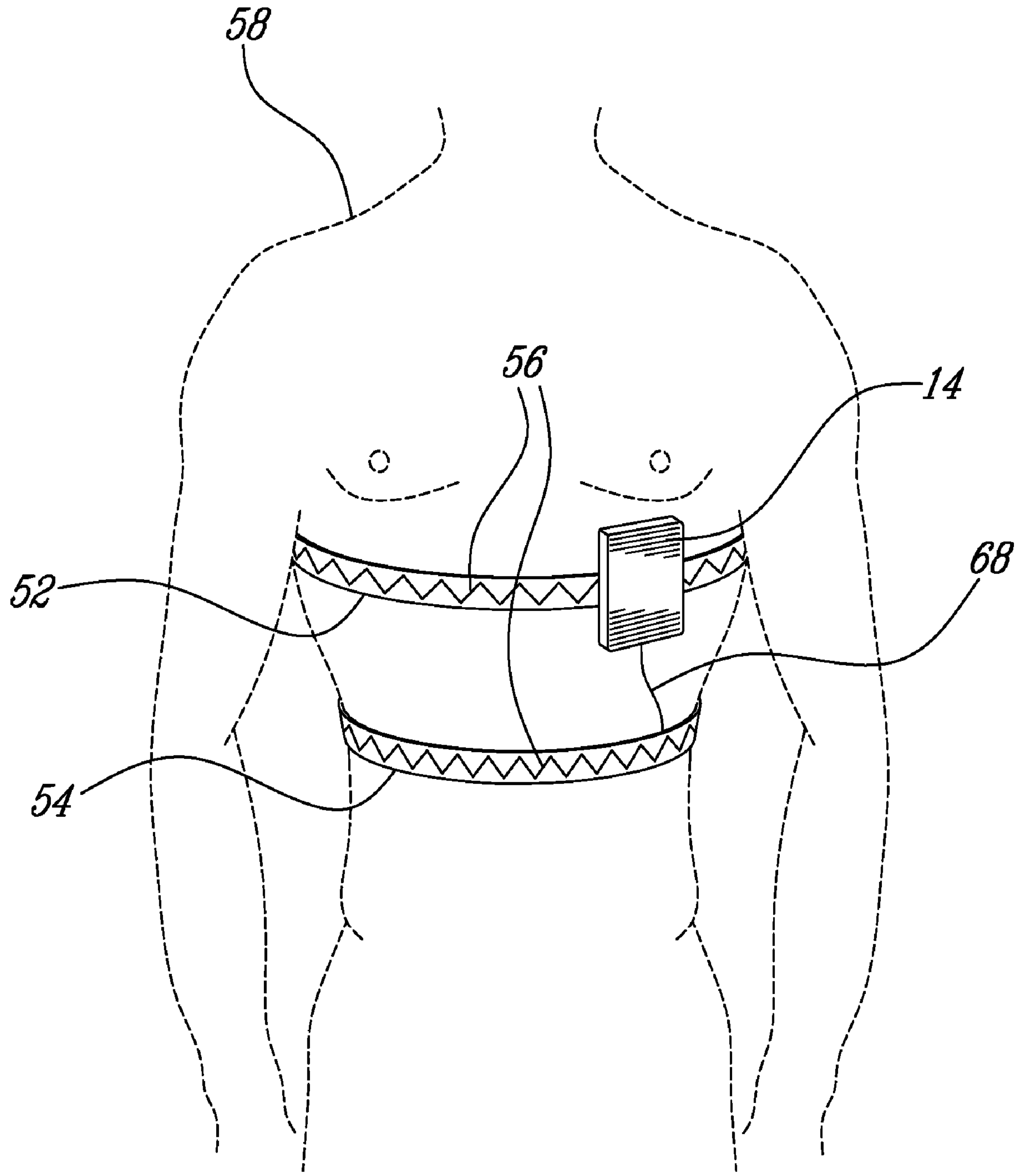


FIG. 5

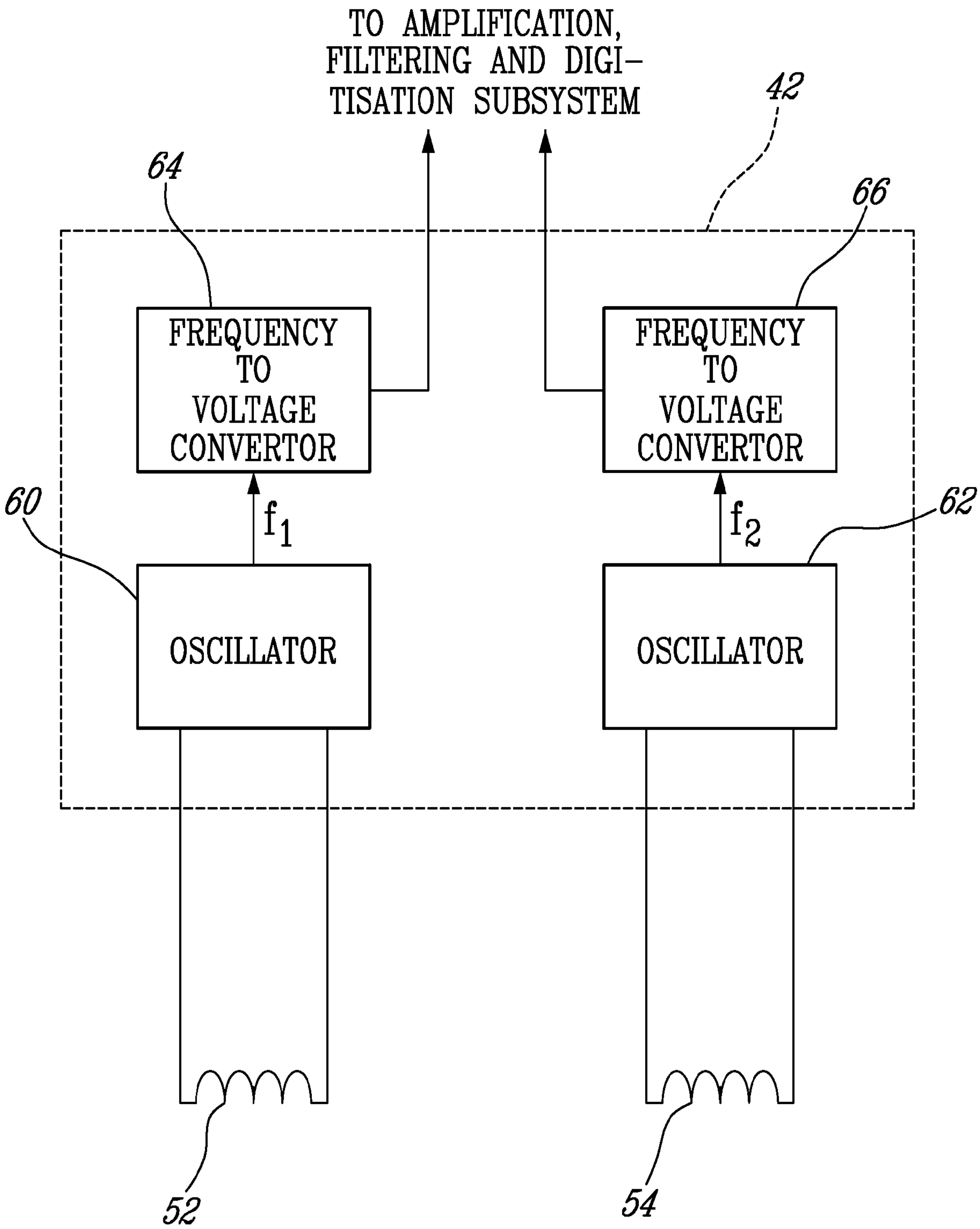

TO AMPLIFICATION, FILTERING AND DIGI-TISATION SUBSYSTEM
42
64
66
FREQUENCY TO VOLTAGE CONVERTOR
FREQUENCY TO VOLTAGE CONVERTOR
60
f1
f2
62
OSCILLATOR
OSCILLATOR
52
54

FIG. 6

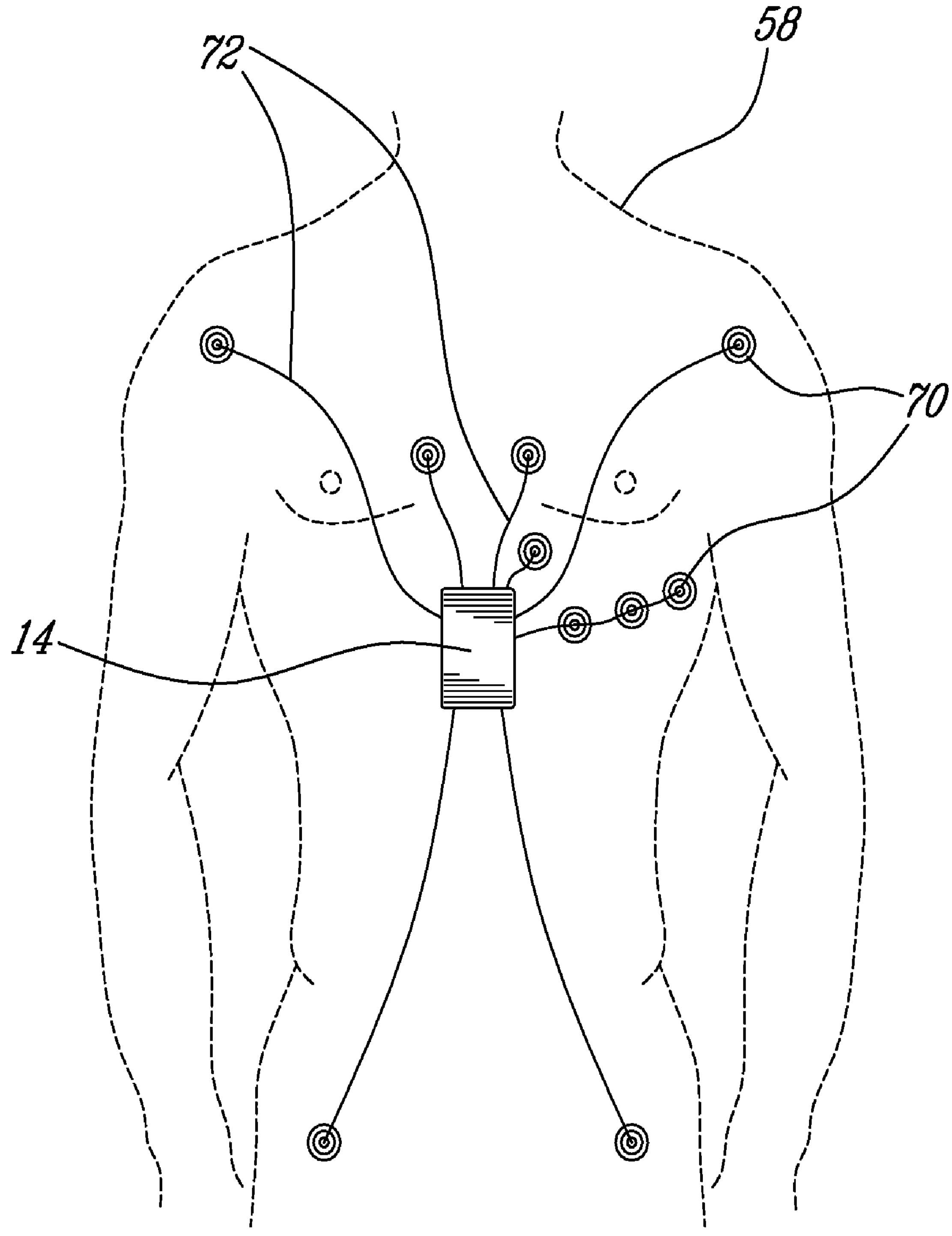


FIG. 7

PHYSIOLOGIC SENSOR APPARATUS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] The present application claims priority from U.S. Provisional Application No. 60/688,716 the entire contents of which is incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a physiologic sensor apparatus. In particular, the present invention relates to an apparatus having a multipart part design: a first part housing the detector; a second part housing an acquisition unit comprising a transmitter or transceiver (transmitter/receiver) and a third part housing a power source and which may contain electronics for carrying out electronic power management and/or to perform some less noise critical functions usually done by the acquisition unit. Each part of the design can be individually disposable, reusable and/or rechargeable.

BACKGROUND OF THE INVENTION

[0003] The prior art reveals a number of sensor devices which collect data related to one or more physiological parameters of a patient and transmit this collected data via a wireless interconnection to an external device. One drawback of such prior art devices is that the power sources are typically integrated with the data acquisition portion of the device which as a result is bulky and must be worn on a belt strapped around the patient's waste, wrist or arm. One other drawback is that the data acquisition portion of the device is typically interconnected with the physiological parameter detecting portion using an expensive shielded cable. These cables are also moderately stiff which gives rise to noise artefacts and the like being introduced into the detected signals. In these systems, the data acquisition portion is usually relatively far from the signal source (i.e. at the other end of the cable connected to the sensor) increasing thereby the system's susceptibility to noise.

[0004] Furthermore, these cables limit patient mobility and require that health care personal assistance when patient is transported from one location to another.

SUMMARY OF THE INVENTION

[0005] In order to address the above and other drawbacks, there is disclosed an apparatus for sensing at least one physiological parameter of a patient and transmitting data related to the sensed physiological parameter to an external device. The apparatus comprises a detecting portion comprising at least one sensor interconnected with a connector, an acquisition portion comprising a connector interface configured to receive the connector, electronics for controlling the at least one sensor via the connector interface, receiving data related to the at least one physiological parameter from the at least one sensor via the connector interface and processing the received data, and a wireless interface for transmitting the processed data to the external device, and a power source for supplying energy to the acquisition module.

[0006] In one embodiment, the physiological parameter of the patient is $Sp0_2$ and the sensor comprises a pair of LED emitters and a photodetector for detecting light emitted by the emitters.

[0007] In another embodiment the physiological parameter of the patient is respiration, and the sensor or acquisition unit illustratively comprises a first oscillator circuit comprising an oscillator, a first inductive elastic band configured to encircle the chest of the patient and a first output frequency which varies with a change in length of the first inductive elastic band, and a second oscillator circuit comprising an oscillator, a second inductive elastic band configured to encircle the abdomen of the patient and a second output frequency which varies with a change in length of the second inductive elastic band.

[0008] In an additional embodiment, the physiological parameter of the patient is again respiration and the sensor comprises: a first piezoelectric respiratory band comprising a piezoelectric material imbedded in a first elastic band configured to encircle the chest of the patient and a second piezoelectric respiratory band comprising a piezoelectric material imbedded in a second elastic band configured to encircle the abdomen of the patient.

[0009] In still another embodiment, the physiological parameter of the patient is an Electrocardiogram (ECG) and the sensor comprises electrodes interconnected with the connector via a lead.

[0010] There is also disclosed an apparatus for sensing at least one physiological parameter of a patient and transmitting data related to the sensed physiological parameter to an external device. The apparatus comprises a detecting/acquisition portion comprising at least one sensor, electronics operationally connected to the sensor for controlling the at least one sensor, receiving data related to the at least one physiological parameter from the at least one sensor and processing the received data, and a wireless interface for transmitting the processed data to the external device, and a power source for supplying energy to the electronics and the wireless interface.

[0011] The disclosed physiologic sensor apparatus additionally aims at reducing operational cost of operation of healthcare institutions, notably in operating rooms, intensive care wards and general medical care wards. The adoption of this wireless technology reduces costs by:

- [0012] Improving reliability of monitoring and reducing measurements errors by reducing movement artefacts;
- [0013] positively impacting healthcare and medical staff work efficiency by reducing the number of times sensors need to be uninstalled and reinstalled while having to move patient from one room to another; and
- [0014] providing interoperability with both legacy and future telemetry systems, including electronic health records filing, reducing time for retrieving recorded data from a central data base, and improving data access from remote locations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] **FIG. 1** is a top perspective view of a physiologic sensor in accordance with an illustrative embodiment of the present invention mounted on a patient's finger/hand/arm;

[0016] **FIG. 2** is a top plan view of a physiologic sensor in accordance with an illustrative embodiment of the present invention;

[0017] **FIG. 3** is a schematic diagram detailing the acquisition/detector of a physiologic sensor in accordance with an illustrative embodiment of the present invention;

[0018] **FIG. 4** is a block diagram detailing the acquisition/detector of a physiologic sensor in accordance with an alternative illustrative embodiment of the present invention;

[0019] **FIG. 5** is a front plan view of a patient wearing a respiration acquisition/detector in accordance with an alternative illustrative embodiment of the present invention;

[0020] **FIG. 6** is a schematic diagram of a detector in accordance with an alternative illustrative embodiment of the present invention; and

[0021] **FIG. 7** is a front plan view of a patient wearing an ECG acquisition/detector in accordance with an alternative illustrative embodiment of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

[0022] Referring now to **FIG. 1**, a physiologic sensor apparatus, generally referred to using the reference numeral **10**, will now be described. The physiologic sensor apparatus **10** is comprised of a detector portion **12**, an acquisition portion **14** and a power source **16**. The power source **16**, such as a replaceable battery or rechargeable battery or the like, supplies the acquisition portion **14** with power via an electrical wire **18**. The detector portion **12**, which can be either reusable or disposable, is secured to a patient through the use of, for example, an adhesive elastic bandage **20** which also provides support to the acquisition portion **14** attached to the detector portion **12** although in an alternative embodiment the acquisition portion **14** could be supported independently of the detector portion **12**. Examples of suitable detector portions for use in this arrangement include those manufactured by Masimo and Nellcor, amongst others. Additionally, the power source **16** is mounted, for example, on a patient's wrist using an adjustable wrist strap **22**. Note that "patient" as used herein should not be construed as being limited to humans, but may also include animals.

[0023] As will be discussed in more detail hereinbelow, the sensor apparatus **10** illustratively senses at least one physiological parameter of a patient and transmitting data related to the sensed physiological parameter to an external device.

[0024] Separating the detector portion **12** from the acquisition portion **14** (even if they are proximate to each other) provides for the use of a disposable detector portion **12** thereby reducing the risk of transmission of disease from patient to patient.

[0025] Additionally, maintaining the detector portion **12** and acquisition portion **14** proximate to one another increases the system's immunity to noise and also resolves the problem of cable length management usually required when connecting a detector portion **12** or sensor to a separate acquisition portion **14** using a specific length of shielded cable (as the required length may vary based on sensor type, patient condition, desired position and holding method).

[0026] Referring now to **FIG. 2** in addition to **FIG. 1**, illustratively, the detector portion **12** comprises sensing electronics and conductive traces mounted on a pliant substrate **24**, for example a flexible printed circuit board (PCB), or the like. The substrate **24** also includes a connector **26**. The connector **26** is inserted, for example, into a connector receiving slot **28** machined or otherwise formed in a forward end **30** of the acquisition portion **14**. Given currently available battery sizes, removing the main power source **16** from encasement together with the electronics of the acquisition portion **14** provides for a significant reduction in the size of the acquisition portion **14**. This in turn allows the acquisition portion **14** to be attached proximate to the detector portion **12** (which is typically mounted on a finger, toe, or the like) without reduction in the functions carried out by the acquisition portion **14**. Such proximate attachment of the acquisition portion **14** to the detector portion **12** avoids the necessity of using an expensive shielded cable between the detector portion **12** and the acquisition portion **14**. It also provides better immunity from noise, artefacts introduced into the detected signal associated with cable movement and resolves the problem of cable length management required when connecting a detector to a displaced acquisition module (as otherwise the required cable length may vary with the type of detector being used, the patient, desired position and method selected for securing the detector to the patient). Additionally, by using a very flexible wire for the electrical wire **18**, which is possible as a shielded wire is no longer unnecessary, noise artefacts which would otherwise by introduced onto the detected signals by movement of the power source **16** are reduced.

[0027] By way of the acquisition portion **14** which is interconnected with the power source **16**, power is supplied to the sensing electronics mounted on a pliant substrate **24**.

[0028] Providing a power source **16** in a separate unit allows a lighter acquisition portion **14** to be provided. This approach is typically more comfortable for the patient and minimises motion artefacts arising, for example, from inertia of the heavier acquisition module. Also, when the power source **16** is provided in a separate unit, a different source of power can be selected to match the application while using the same sensor and acquisition portion **14**.

[0029] Measurements related to at least one physiological parameter are sensed by the detector portion **12** and relayed to the acquisition portion **14**. Illustratively, in order to collect SPO_2 measurements the detector portion **12** further comprises an emitter **32**, comprised of one or more LEDs or the like, and a photodetector **34** in electrical contact with the connector **26** via a network of electrically conductive traces as in **36**. As known in the art, light emitted by the LED emitters **32** is received by the photodetector **34** (typically via transmission of emitted light through a finger tip, toe or ear lobe, or reflection of the emitted light off a bone) which modulates the current flowing within the photodetector **34**. The amount of light received by the photodetector **34**, and therefore the current flowing through the photodetector **34**, varies with the amount of oxygen in the patient's blood.

[0030] Referring to **FIG. 3**, in a first illustrative embodiment the acquisition portion **14** is microprocessor (or microcontroller) controlled and takes advantage of the sensing electronics of the detector portion **12** to collect measurements related to at least one physiological parameter, illustratively blood oximetry SPO2. The acquisition unit **14** is illustratively comprised of a CPU **38** which uses programs and parameters stored in a memory **40**, illustratively ROM/

RAM or flash memory, to control the collection of measurements related to the physiological parameters being collected. Additional devices peripheral to the CPU **36** comprise a sensor interface module **42**, a wireless (RF) module **44** and optionally an external interface module **46**, which may be a Universal Serial Bus (USB) or an other type (RS-232, Ethernet, infrared or other), which are included to allow the acquisition portion **14** to both collect data, transmit collected data to external devices (not shown) as well as receive configuration and other parameters from external programming devices (also not shown).

[0031] Still referring to **FIG. 3**, in order to collect measurements, the CPU **38** communicates with the interface module **42** which in turn controls the electronics of the detector **12** according to commands received from the CPU **38**. As discussed above, in the illustrated example the electronics of the detector **12** comprise a pair of LED emitters **32** and a photodetector **34** which are interconnected with the interface module **42** via a series of electrically conductive traces **36** and the connector receiving slot **28** in the acquisition portion **14**. The interface module **42** collects raw analog data from these electronics, whereby collected data is pre-processed by the interface module **42** prior to transfer to the CPU **38**. Typical pre-processing includes, for example, amplifying and filtering of the analog signal and converting the analog signal into digital data.

[0032] Still referring to **FIG. 3**, in order to further process the digitized data the CPU **38** (or a Floating Point Unit, FPU) or the like as well as an onboard program allows, for example, an SPO_2 measurement algorithm to be applied to the digitized data. The CPU **38** also is illustratively able to store the results of such further processing in the memory **40** for subsequent retrieval and additional processing as required. Furthermore, the CPU **38** may transfer data to other external devices (not shown) via the wireless RF interface **44** or, optionally, provide for downloading of the data to such external devices via the external bus interface module **46**, which, as stated above, may be an Universal Serial Bus (USB) or an other type (RS-232, Ethernet, infrared or the like).

[0033] Alternatively, the acquisition portion **14** could simply transmit a digitised version of the stream of raw analog data to an external device (not shown) which could subsequently carry out the processing to minimise power consumption and dimension of the acquisition unit.

[0034] The degree of post processing carried out may vary between specific applications. For example, increased post processing may be carried out where it is wished to reduce the RF bandwidth in hostile electromagnetic interference environments or less intensive (representation of the digitized analog raw data to an external device for further processing) in order to minimize power consumption and space.

[0035] Still referring to **FIG. 3**, interface (**42**) includes signal conditioning and an analog to digital converter. However, the analog to digital converter and RAM/ROM (**40**) can be integrated into the CPU (**38**), saving more space. The acquisition module may be based on discrete electronics (commercially available) or on a custom design to further decrease dimension.

[0036] The CPU **38** may transfer data to other external devices (not shown) via the wireless RF interface **44**. In some specific applications, the CPU **38** may store the values (data) acquired by the acquisition portion **14** into the memory unit **40**, for a determined period (number of hours), then CPU **38** may download the stored values (data) to other external devices (not shown) via the External Bus Interface **46** (USB or other).

[0037] Note that although the above illustrative embodiment of the present invention discloses a physiologic sensor apparatus **10** comprised of a separate detector portion **12**, acquisition portion **14** and power source **16**, it is within the scope of the present invention to integrate the detector portion **12**, acquisition portion **14** and power source **16** into a single unit, or alternatively, to integrate the acquisition portion **14** together with the power source **16** or the detector portion **12** together with the acquisition portion **14**.

[0038] Similarly, and referring to **FIG. 4**, in an alternative embodiment the acquisition portion **14** may be divided into an analog acquisition subsystem **48** and a digital signal processing subsystem **50**. In this regard, the analog acquisition subsystem **48** would typically comprise filters and other elements (not shown) to condition the analog signals and the digital signal processing subsystem **50** would comprise an A/D converter, digital processing unit and the RF transmitter or transceiver (also not shown). This would allow, for example and as illustrated, the analog acquisition subsystem **48** to be integrated in the same unit together with the detector portion **12** and the digital signal processing subsystem **50** to be integrated in the same unit together with the power source **16**. This will typically simplify miniaturisation of the detector portion **12** and acquisition portion **14** (through, for example, the use of less electronics) which will in turn decrease movement artefacts while increasing patient comfort.

[0039] Referring now to **FIG. 5**, in an alternative embodiment of the present invention the separate detector portion can be a Respiratory Inductive Plethysmograph or RIP. As known in the art, an inductive plethysmograph is a non-invasive method to monitor patient ventilation by measuring the variation in the cross sectional area of the chest and the abdomen. Typically, first and second inductive elastic bands **52**, **54** each illustratively comprising an inductive coil **56**, for example a wire sewn in the elastic band in a zig zag fashion, which encircles the chest and the abdomen of the patient **58**.

[0040] Referring now to **FIG. 6**, illustratively each inductive band **52**, **54** forms an inductive element in a LC tank circuit (not shown), which determines the resonant frequency of a pair of oscillator circuits **60**, **62** (illustratively Colpitt's oscillators) located in the interface **42** of the acquisition module **14**. By measuring the oscillator frequency, changes in cross sectional area that occur in the elastic bands **52**, **54** during breathing can be measured. Illustratively, a pair of frequency to voltage converters **64**, **66** are provided to track the frequency change and produce a signal proportional to the oscillator frequency f_1, f_2 that can be amplified, filtered and digitized by amplification, filtering and digitising subsystems (all not shown).

[0041] Referring back to **FIG. 5**, as discussed above, each of the inductive bands **52**, **54** encircle the chest and abdomen of a patient **58**. Each band **52**, **54** may have its own acquisition module **14** secured to it. Alternatively, and as illustrated in **FIG. 4**, a single acquisition module **14** may be shared by both bands **52**, **54** and secured on one of the bands **52** or **54**. In this case, a cable **68** is used to interconnect the second band **54** to the acquisition module **14**. A connector interface such as the one illustrated in **FIG. 5** is used to connect the acquisition module to the wire sewn in the elastic band.

[0042] In an alternative embodiment, the inductive plethysmograph could be replaced with a piezoelectric version of the same. In this regard, the manner of functioning of the piezoelectric based plethysmograph is analogous to that of the inductive plethysmograph. However, the pair of inductive bands **52**, **54** are replaced with a pair of piezoelectric film-based respiratory bands. As known in the art, when piezoelectric materials are subject to mechanical forces a measurable electrical potential arises within the material. As inhalation and exhalation give rise to mechanical forces being exerted on the piezoelectric film-based respiratory bands, and therefore a measurable potential, this measurable potential may serve as input to the amplification, filtering and digitising subsystems without the necessity of first providing an oscillator circuit and a frequency to voltage converter.

[0043] Referring now to **FIG. 7**, in still another alternative embodiment of the present invention the separate detector portion **12** can be an Electrocardiogram or ECG. As known in the art, the detecting portion of the ECG comprises a series of electrodes as in **70** which are attached to the patient **58** at certain predetermined locations on the patient **58**. For example, in a 12 lead configuration six (6) electrodes as in **70** are placed on the chest and the remaining electrodes placed at locations based on Einthoven's triangle, such as the shoulders and thighs (as shown) or wrists and ankles (not shown). The electrodes as in **70** are in turn connected to the acquisition module **14** via a series of leads **72**. Note that although a ten (10) electrode, twelve (12) lead placement is shown in **FIG. 7**, other configurations, such as 3 lead or 5 lead are known in the art and within the scope of the present. For example, a 3-lead standard electrode position is right arm, left arm and left leg. It is foreseen in the context of the present invention to use standard off-the-shelf electrodes for all of the above. The acquisition module **14** may be strapped to the arm, chest or any other patient location or placed into a pocket.

[0044] A connector interface (not shown) is provided for connecting the leads as in **72** to the acquisition module **14**. Alternatively, the ends of leads as in **72** from a plurality electrodes as in **70** may be grouped to form a single cable which is plugged into the connector interface of the acquisition module **14**. Alternatively, the leads as in **72** from the electrodes as in **70** may be replaced by conductive traces routed on a flexible substrate (for example a flexible printed circuit board, not shown) that connect to the acquisition module **14**. The flexible substrate may also act as a holder for the acquisition module **14**.

[0045] The acquisition module **14** illustratively processes the electrode potential from the electrical activity of the heart collected by the electrodes as in **70** and may carry out a number of signal conditioning operations, for example amplification, filtering and digitizing of the signals collected via the electrodes as in **70** and delivered to the acquisition module **14** via the leads as in **72**.

[0046] Although the present invention has been described hereinabove by way of illustrative embodiments thereof, these embodiments can be modified at will without departing from the spirit and nature of the subject invention.

What is claimed is:

1. An apparatus for sensing at least one physiological parameter of a patient and transmitting data related to the sensed physiological parameter to an external device, the apparatus comprising:

a detecting portion comprising at least one sensor interconnected with a connector;

an acquisition portion comprising:

a connector interface configured to receive said connector;

electronics for controlling said at least one sensor via said connector interface, receiving output related to the at least one physiological parameter from said at least one sensor via said connector interface and processing said received output into data; and

a wireless interface for transmitting said processed data to the external device; and

a power source for supplying energy to said acquisition module.

2. The apparatus of claim 1, wherein acquisition portion comprises an analog acquisition subsystem and a digital signal processing subsystem and further wherein said analog acquisition subsystem and said detector portion are within a first unit and said digital signal processing subsystem is within a second unit separate from said first unit.

3. The apparatus of claim 2, wherein said digital signal processing subsystem and said power source are within said second unit.

4. The apparatus of claim 1, wherein said power source is a battery.

5. The apparatus of claim 4, wherein said battery is rechargeable.

6. The apparatus of claim 4, wherein said battery is disposable.

7. The apparatus of claim 1, wherein said acquisition portion and said power source are within a single unit.

8. The apparatus of claim 7, wherein said detecting portion, said acquisition portion and said power source are within a single unit.

9. The apparatus of claim 1, wherein said detector is disposable.

10. The apparatus of claim 1, wherein said detector is reusable.

11. The apparatus of claim 1, wherein said connector and each of said at least one sensor are mounted on a flexible substrate and interconnected via at least one conductive trace on said flexible substrate.

12. The apparatus of claim 1, wherein the at least one physiological parameter of the patient is $Sp0_2$, wherein said sensor comprises a pair of LED emitters and a photodetector for detecting light emitted by said emitters, and further wherein said output comprises an amount of light received by said photodetector, said amount of light varying in response to a change in a blood oxygen of the patient.

13. The apparatus of claim 1, wherein the at least one physiological parameter of the patient is respiration, and further wherein said at least one sensor comprises:

a first oscillator circuit comprising an oscillator and a first inductive elastic band configured to encircle the chest of the patient; and

a second oscillator circuit comprising an oscillator, a second inductive elastic band configured to encircle the abdomen of the patient;

wherein said output comprises a first output frequency which varies with a change in length of said first inductive elastic band and a second output frequency which varies with a change in length of said second inductive elastic band.

14. The apparatus of claim 13, wherein each of said oscillators is a Colpitt's oscillator.

15. The apparatus of claim 1, wherein the at least one physiological parameter of the patient is respiration, and further wherein said at least one sensor comprises:

a first inductive elastic band configured to encircle the chest of the patient; and

a second inductive elastic band configured to encircle the abdomen of the patient;

wherein said output comprises a first inductance which varies with a change in length of said first inductive elastic band and a second inductance which varies with a change in length of said second inductive elastic band.

16. The apparatus of claim 1, wherein the at least one physiological parameter of the patient is respiration, and further wherein said at least one sensor comprises:

a first piezoelectric respiratory band comprising a piezoelectric material imbedded in a first elastic band configured to encircle the chest of the patient; and

a second piezoelectric respiratory band comprising a piezoelectric material imbedded in a second elastic band configured to encircle the abdomen of the patient;

wherein said output comprises a first output voltage which varies with a change in length of said first elastic band and a second output voltage which varies with a change in length of said second elastic band.

17. The apparatus of claim 1, wherein the patient has a heart, the at least one physiological parameter of the patient is an ECG, wherein said at least one sensor comprises at least three (3) electrodes interconnected with said connector via a lead and further wherein said output comprises a voltage for each of said electrodes which varies in response to a change in an electrical activity of the heart.

18. An apparatus for sensing at least one physiological parameter of a patient and transmitting output related to the sensed physiological parameter to an external device, the apparatus comprising:

a detecting/acquisition portion comprising:

at least one sensor;

electronics operationally connected to said sensor for controlling said at least one sensor, receiving output related to the at least one physiological parameter from said at least one sensor and processing said received output; and

a wireless interface for transmitting said processed output to the external device; and

a power source for supplying energy to said electronics and said wireless interface.

19. The apparatus of claim 18, wherein said detecting/acquisition portion are within a single unit and said power source is an external power source.

20. The apparatus of claim 18, wherein said detecting/acquisition portion and said power source are within a single unit.

* * * * *

专利名称(译)	生理传感器装置		
公开(公告)号	US20060282001A1	公开(公告)日	2006-12-14
申请号	US11/423016	申请日	2006-06-08
[标]发明人	NOEL MICHEL DUMONT SYLVAIN		
发明人	NOEL, MICHEL DUMONT, SYLVAIN		
IPC分类号	A61B5/08 A61B5/00 A61B5/04		
CPC分类号	A61B5/0402 A61B5/0816 A61B5/14552 A61B2562/24 A61B5/6838 A61B2562/182 A61B5/6826		
优先权	60/688716 2005-06-09 US		
外部链接	Espacenet USPTO		

摘要(译)

一种用于感测患者的至少一个生理参数并将与所感测的生理参数相关的数据发送到外部设备的装置。该装置包括：检测部分，包括至少一个与连接器互连的传感器;获取部分，包括配置成接收连接器的连接器接口;电子器件，用于通过连接器接口控制至少一个传感器，接收与至少一个相关的数据来自至少一个传感器的生理参数经由连接器接口并处理所接收的数据，以及用于将处理后的数据发送到外部设备的无线接口，以及用于向获取模块供应能量的电源。