



(19) **United States**

(12) **Patent Application Publication**
CHO et al.

(10) **Pub. No.: US 2009/0182205 A1**

(43) **Pub. Date: Jul. 16, 2009**

(54) **MOBILE TERMINAL FOR MEASURING BIOLOGICAL SIGNAL**

Publication Classification

(76) Inventors: **Jae Geol CHO**, Yongin-si (KR);
Sang Hun Lee, Yongin-si (KR);
Chul Ho Cho, Gyeonggi-do (KR);
Sun Tae Jung, Yongin-si (KR)

(51) **Int. Cl.**
A61B 5/00 (2006.01)
A61B 5/0408 (2006.01)
(52) **U.S. Cl.** **600/301; 600/372**

Correspondence Address:
CHA & REITER, LLC
210 ROUTE 4 EAST STE 103
PARAMUS, NJ 07652 (US)

(57) **ABSTRACT**

A mobile terminal for measuring a biological signal is disclosed. The mobile terminal for measuring a biological signal includes an electrocardiogram electrode unit having a first electrode provided in a front surface of a body of the mobile terminal and a second electrode provided in a first side surface of the mobile terminal body for measuring an electrocardiogram signal through the first electrode and the second electrode, a sensor unit provided in a second side surface of the mobile terminal body for measuring a pulse wave signal, a controller provided within the mobile terminal for analyzing the electrocardiogram signal received from the electrocardiogram electrode unit and the pulse wave signal received from the sensor unit and a radio frequency unit for transmitting an analyzed result by the control of the controller.

(21) Appl. No.: **12/350,282**

(22) Filed: **Jan. 8, 2009**

(30) **Foreign Application Priority Data**

Jan. 10, 2008 (KR) 10-2008-0002933

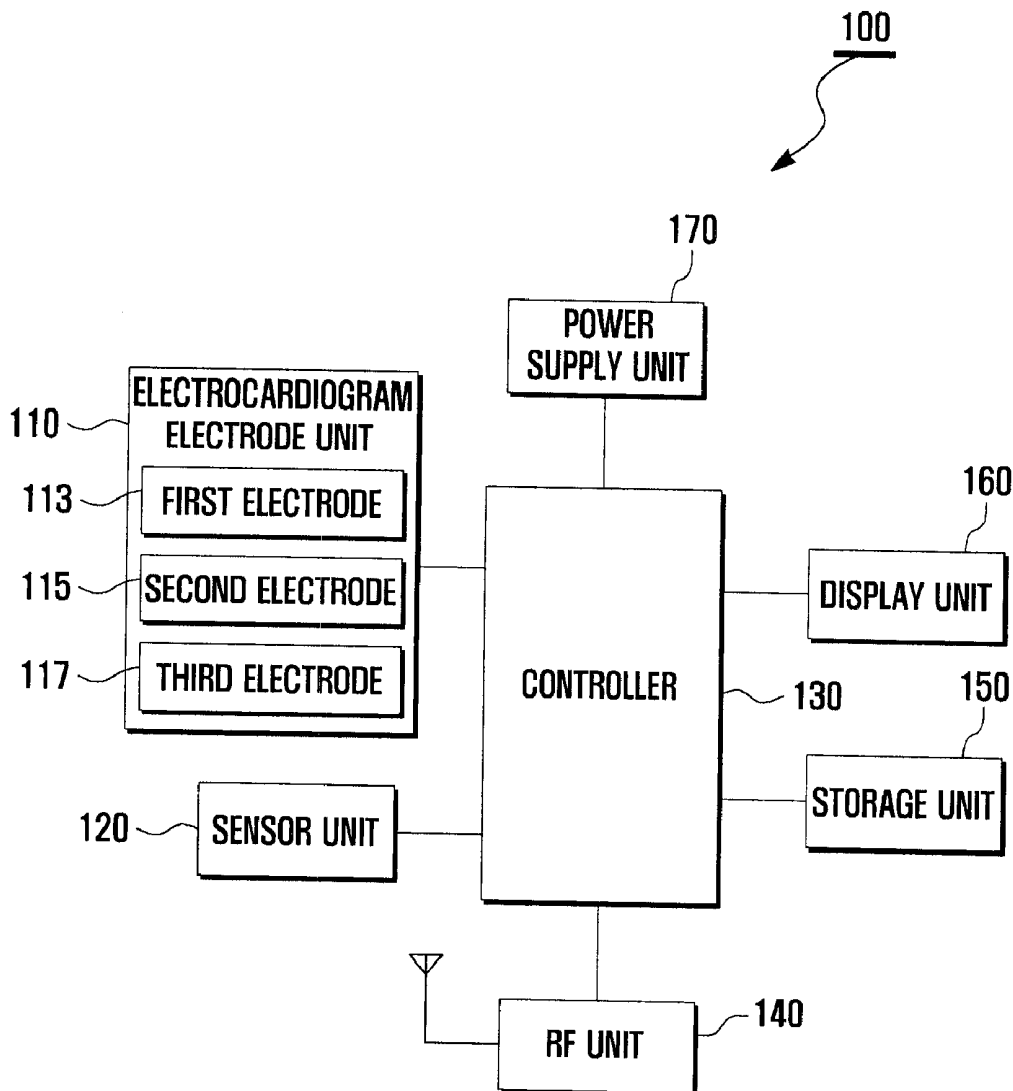


FIG. 1

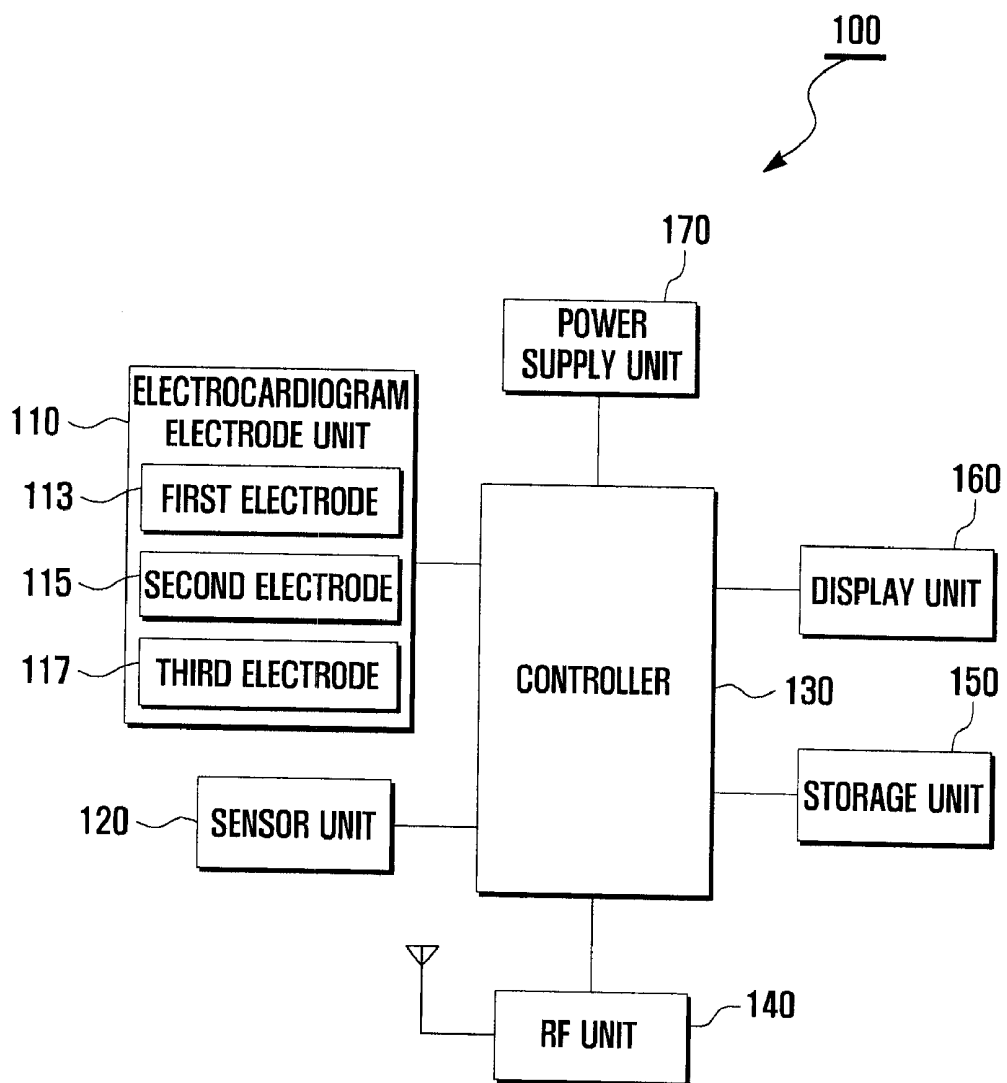


FIG. 2

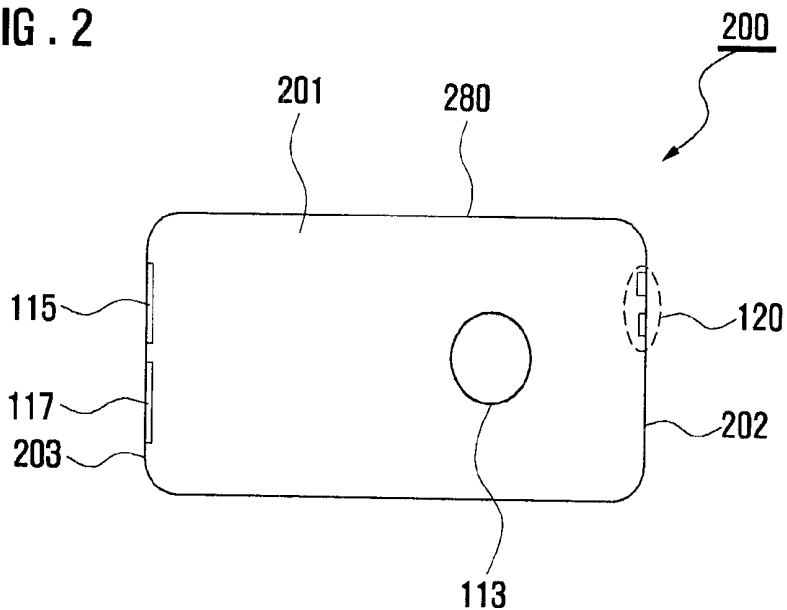


FIG. 3A

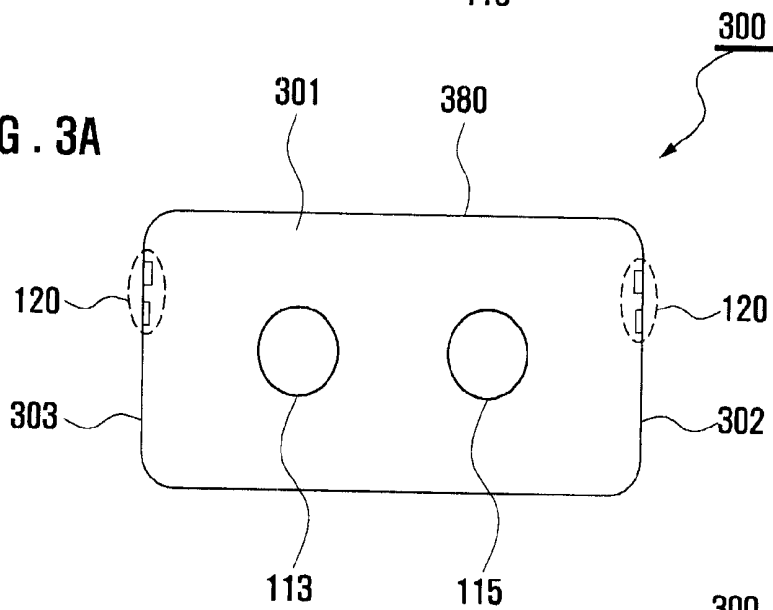


FIG. 3B

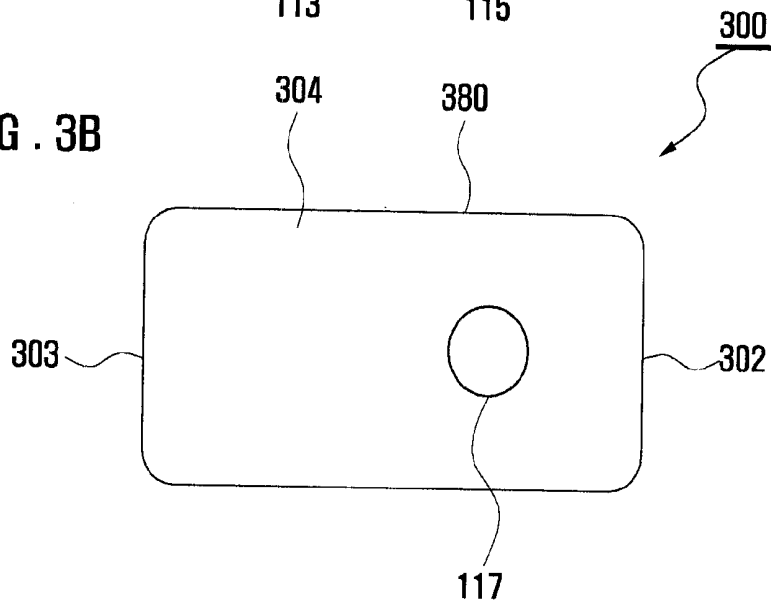


FIG . 4

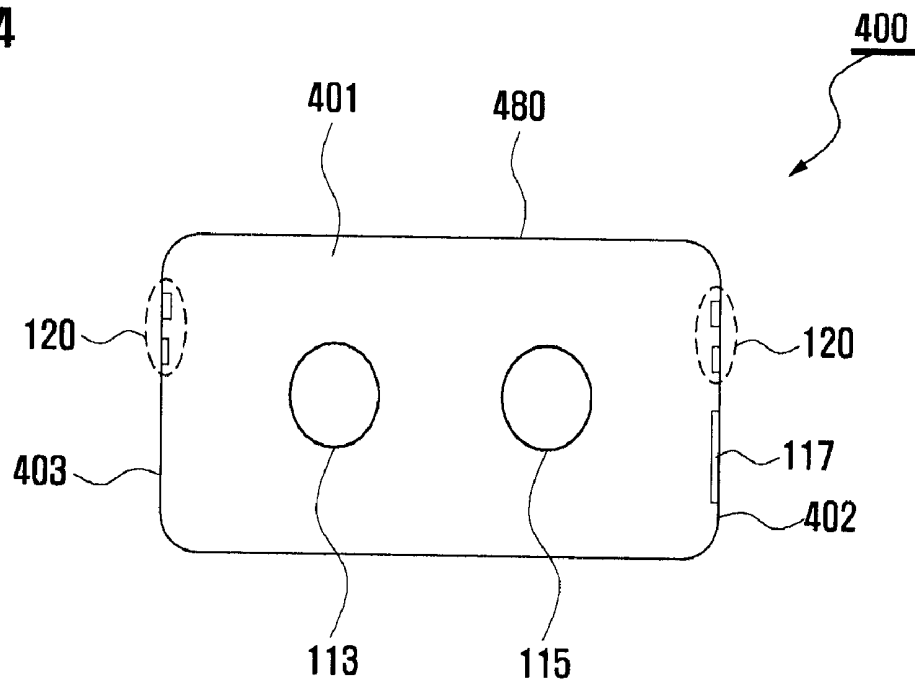


FIG . 5

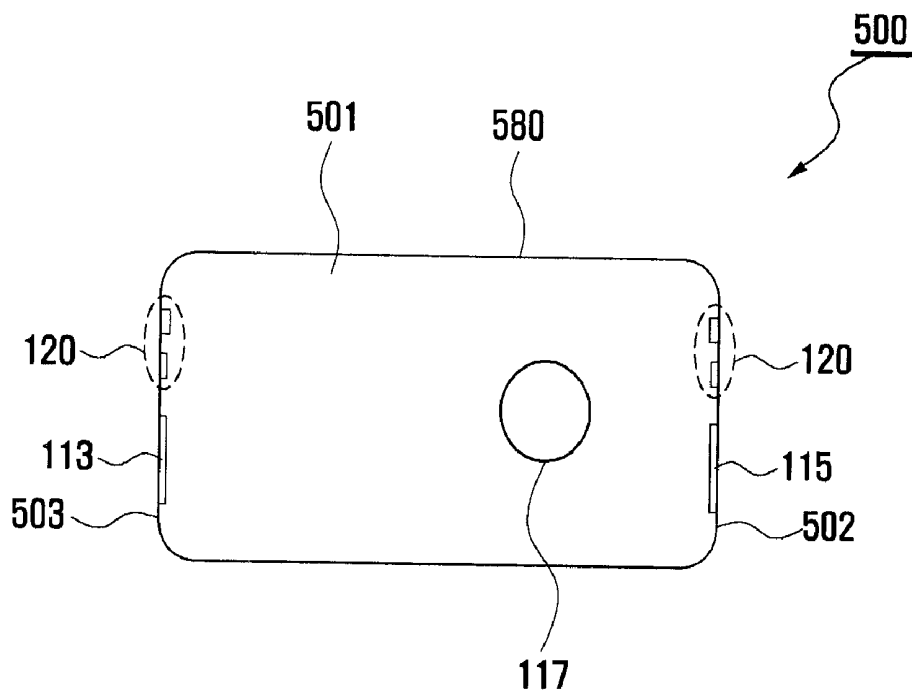
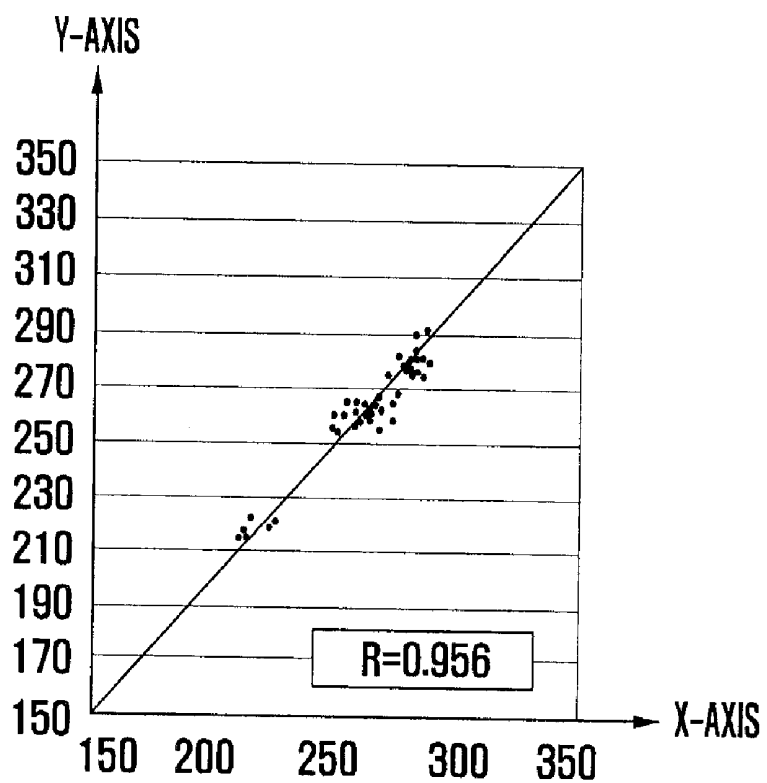


FIG . 6



MOBILE TERMINAL FOR MEASURING BIOLOGICAL SIGNAL

CLAIM OF PRIORITY

[0001] This application claims the benefit of the earlier filing date, pursuant to 35 USC 119, to that patent application entitled "MOBILE TERMINAL FOR MEASURING BIOLOGICAL SIGNAL" filed in the Korean Intellectual Property Office on Jan. 10, 2008 and assigned Serial No. 10-2008-0002933, the contents of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a biological signal measurement, and more particularly, to a mobile terminal for measuring a biological signal that can be carried by a user.

[0004] 2. Description of the Related Art

[0005] A ubiquitous environment relates to a technology whereby various information can be transmitted and received by freely connecting to a network almost regardless of time and location, with which many users can share various information.

[0006] Particularly, healthcare can be provided in a ubiquitous environment (U-healthcare), whereby a user can receive a medical treatment service through a network without visiting a medical facility and the user's health state can be inspected at any time. Various appliances have now been developed for the provision of U-healthcare.

[0007] In general, a user measures electrocardiogram signals and a pulse wave of the heart using medical measurement instruments having a patch type electrocardiogram electrode and a clip type optical sensor. Because such medical measurement instruments have several connection leads for connecting electrocardiogram electrodes and optical sensors and have a large bulk, generally the user cannot perform an electrocardiogram inspection while carrying the instruments.

SUMMARY OF THE INVENTION

[0008] The present invention provides a mobile terminal that can measure an electrocardiogram signal and a pulse wave and that can be carried by a user.

[0009] In accordance with an aspect of the present invention, a mobile terminal for measuring a biological signal includes an electrocardiogram electrode unit having a first electrode provided in a front surface of a body of the mobile terminal and a second electrode provided in a first side surface of the mobile terminal body for measuring an electrocardiogram signal through the first electrode and the second electrode, a sensor unit provided in a second side surface of the mobile terminal body for measuring a pulse wave signal, a controller provided within the mobile terminal for analyzing the electrocardiogram signal received from the electrocardiogram electrode unit and the pulse wave signal received from the sensor unit and a radio frequency (RF) unit for transmitting an analyzed result by the control of the controller.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The above features and advantages of the present invention will be more apparent from the following detailed description in conjunction with the accompanying drawings, in which:

[0011] FIG. 1 is a block diagram illustrating a configuration of a mobile terminal for measuring a biological signal according to an exemplary embodiment of the present invention;

[0012] FIG. 2 is a plan view illustrating a mobile terminal for measuring a biological signal having one sensor unit and three electrocardiogram electrodes according to another exemplary embodiment of the present invention;

[0013] FIGS. 3A and 3B are plan views illustrating a mobile terminal for measuring a biological signal having two sensor units and three electrocardiogram electrodes according to another exemplary embodiment of the present invention;

[0014] FIG. 4 is a plan view illustrating a mobile terminal for measuring a biological signal having two sensor units and three electrocardiogram electrodes according to another exemplary embodiment of the present invention;

[0015] FIG. 5 is a plan view illustrating a mobile terminal for measuring a biological signal having two sensor units and three electrocardiogram electrodes according to another exemplary embodiment of the present invention; and

[0016] FIG. 6 is a graph illustrating measurement results measured in a mobile terminal and a medical measurement instrument according to another exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0017] Exemplary embodiments of the present invention are described in detail with reference to the accompanying drawings. The same reference numbers are used throughout the drawings to refer to the same or like parts. The views in the drawings are schematic views only, and are not intended to be to scale or correctly proportioned. Detailed descriptions of well-known functions and structures incorporated herein may be omitted to avoid obscuring the subject matter of the present invention.

[0018] In the following description, a 'mobile terminal' can transmit and receive data to and from various terminals and includes almost all types of portable terminals that can be carried in the hand of a user. The mobile terminal includes, for example, a cellular phone, Moving Picture Experts Group layer-3 (mp3) player, and portable medical measurement terminal. Further, the mobile terminal may include accessories for use by attaching to the cellular phone or the terminal.

[0019] A 'terminal' includes information processing appliances and/or applications for transmitting and receiving data and for processing the transmitted and received data. The terminal includes at least one of a mobile terminal, a computer, and medical appliances.

[0020] FIG. 1 is a block diagram illustrating a configuration of a mobile terminal for measuring a biological signal according to an exemplary embodiment of the present invention.

[0021] Referring to FIG. 1, a mobile terminal 100 includes an electrocardiogram electrode unit 110, sensor unit 120, controller 130, RF unit 140, storage unit 150, display unit 160, power supply unit 170, and terminal body (not shown in FIG. 1).

[0022] The electrocardiogram electrode unit 110 includes a first electrode 113 and a second electrode 115 having different polarity and measures a biological electrocardiogram signal when in contact with a part of a user's body. The electrocardiogram electrode unit 110 further includes a third electrode 117. An error of an electrocardiogram signal measured through the first electrode 113 and the second electrode 115 may be reduced by using the third electrode 117. In the

exemplary embodiment, the first electrode **113** is an electrode having positive (+) polarity, the second electrode **115** is an electrode having negative (-) polarity, and the third electrode **117** is an electrode having a ground polarity. The electrocardiogram electrode unit **110** measures an electrocardiogram signal by a sequential change of a myocardium cellular operation potential that is generated according to the user's heartbeat using a potential difference of the first electrode **113** and the second electrode **115** relative to the third electrode **117**. The electrocardiogram electrode unit **110** is mounted in the terminal body of the mobile terminal **100** to contact a part of the user's body. Upon contacting a part of the user's body, the contact with a part of the user's body is detected and the electrocardiogram electrode unit **110** measures an electrocardiogram signal and outputs the measured electrocardiogram signal to the controller **130**. One of the electrodes **113**, **115**, and **117**, included in the electrocardiogram electrode unit **110**, may further be set as a switch, so that when the electrode that is set as a switch is triggered, the electrocardiogram electrode unit **110** measures an electrocardiogram signal and outputs the measured electrocardiogram signal to the controller **130**.

[0023] The sensor unit **120** includes an optical sensor, e.g. a reflective optical sensor. The sensor unit **120** measures a biological pulse wave signal when contacting a part of the user's body and outputs the measured pulse wave signal to the controller **130**. Particularly, the reflective optical sensor includes a light-emitting diode (LED) for emitting light and a photo diode for determining a scattered light amount. When the user contacts a part of their body (for example, a finger) with the reflective optical sensor, the LED of the reflective optical sensor emits light to the contacted part of the user's body. The photodiode of the reflective optical sensor measures the amount of light reflected from the contacted part of the user's body and the reflective optical sensor outputs the measured light amount to the controller **130**. The light amount measured by the photo diode changes according to a quantity of red blood corpuscles flowing within the body. The amount of light measured depends on a change of blood flow caused by the user's heartbeat. A pulse wave can be measured from the change of the measured light amount.

[0024] In the exemplary embodiment, the sensor unit **120** is a reflective optical sensor. However the sensor unit **120** may be a more complex sensor that can measure a pulse, subcutaneous fat thickness, body fat rate, skin color, and pulse wave signal of the user. The sensor unit **120** may be mounted at the outside of the mobile terminal **100** in order to contact a part of the user's body.

[0025] The controller **130** is provided within the mobile terminal **100** and controls general operations and states of constituent units provided in the mobile terminal **100**. Particularly, when power is supplied through the power supply unit **170**, the controller **130** determines whether a contact is detected in the electrocardiogram electrode unit **110** and the sensor unit **120**, or whether an electrode, that is set as a switch, is triggered. If a contact is detected, or if an electrode that is set as a switch is triggered, the controller **130** analyzes an electrocardiogram signal received through the electrocardiogram electrode unit **110** and a pulse wave signal received through the sensor unit **120** to determine a pulse wave transmission time period. The pulse wave transmission time period is a time period in which a pulsation pressure wave is transmitted from a main artery valve to a peripheral portion, and is used to determine a vein elasticity degree. Specifically, a vein

elasticity degree can be determined from a pulse wave transmitting velocity calculated by dividing a vein length by the measured pulse wave transmission time period. The vein length is obtained either by the user measuring a distance from a neck to a fingertip and directly inputting the distance to the mobile terminal **100**, or is obtained through the user's body information (for example, a height and sex distinction) that may be downloaded from another terminal and input to the mobile terminal **100**.

[0026] The RF unit **140** performs a communication function with other terminals. The RF unit **140** may perform short range communication using means such as Bluetooth and a wireless communication function using means such as wireless local area network (WLAN). Accordingly, the RF unit **140** transmits the pulse wave transmission time period determined by the controller **130** and transmits data corresponding to a vein elasticity degree determined using the pulse wave transmission time period to another terminal (not shown).

[0027] The storage unit **150** stores application programs necessary for operation of the mobile terminal **100**, and stores data generated according to operation of the mobile terminal **100** and data received from the controller or via the RF unit **140**. Particularly, the storage unit **150** stores an electrocardiogram signal and a pulse wave signal measured through the electrocardiogram electrode unit **110** and the sensor unit **120**, respectively, under the control of the controller **130** and stores the pulse wave transmission time period determined by analyzing the measured electrocardiogram signal and pulse wave signal.

[0028] The display unit **160** displays information related to a state and operation of the mobile terminal **100**. For example, the display unit **160** may display an electrocardiogram signal and a pulse wave signal, measured under the control of the controller **130**, with a graph and may display a pulse wave transmission time period determined through the electrocardiogram signal and the pulse wave signal.

[0029] The power supply unit **170** controls power supplied of the mobile terminal **100**. The power supply unit **170** includes a button, and when the button is pressed by the user, the controller **130** detects the action and controls the power supply unit **170** to supply power to units of the mobile terminal **100**.

[0030] When power is supplied through the power supply unit **170**, the controller **130** controls the electrocardiogram electrode unit **110** and the sensor unit **120** to measure an electrocardiogram signal and a pulse wave signal, respectively. The controller **130** determines a pulse wave transmission time period through the measured electrocardiogram signal and pulse wave signal and determines a vein elasticity degree through the determined pulse wave transmission time period. The controller **130** may transmit the determined pulse wave transmission time period and vein elasticity degree to another terminal (not shown) through the RF unit **140**, or control the display unit **160** to display the pulse wave transmission time period and vein elasticity degree. Further, the controller **130** may control the storage unit **150** to store the measured electrocardiogram signal and pulse wave signal, and the determined pulse wave transmission time period. Although the invention is described with regard to providing a vein elasticity degree, it would be recognized other similar body characteristics associated with blood measurement may be determined and provided to a display or another terminal.

[0031] FIG. 2 is a plan view illustrating a mobile terminal for measuring a biological signal having one sensor unit and

three electrocardiogram electrodes according to another exemplary embodiment of the present invention.

[0032] As shown in FIG. 2, a mobile terminal 200 for measuring a biological signal has the sensor unit 120 at an upper end of a right side surface 202 of a terminal body 280. The sensor unit 120 uses an optical sensor, and the optical sensor includes a Light Emitting Diode (LED) for emitting light and a photo diode (PD) for measuring an amount of light reflected from the body.

[0033] The first electrode 113 of the electrocardiogram electrode unit 110 is provided on a front surface 201 of the terminal body 280, and the second electrode 115 and third electrode 117 of the electrocardiogram electrode unit 110 are provided at a side surface of the terminal body 280. In this illustrated case, a left side surface 203. The first electrode 113 is set as a switch, and when the first electrode 113 is triggered, the controller 130 determines this as a start instruction for measuring a biological signal.

[0034] Accordingly, when the user intends to measure a biological signal of a hand and arm using the mobile terminal 200, the user contacts a finger with the optical sensor of the sensor unit 120 and contacts another finger of the same hand with the first electrode 113. The user contacts the left side surface 203 at which the second electrode 115 and the third electrode 117 are provided with the arm of the hand opposite to that contacting the sensor unit 120 and then triggers the first electrode 113. The controller 130 detects the triggering action and determines a pulse wave transmission time period using an electrocardiogram signal and a pulse wave signal measured through the electrocardiogram electrode unit 110 and the sensor unit 120, respectively. The controller 130 determines a vein elasticity degree using the determined pulse wave transmission time period. Thereafter, the controller 130 transmits the determined vein elasticity degree to another terminal through the RF unit 140 and controls the storage unit 150 to store the measured pulse wave signal and electrocardiogram signal, pulse wave transmission time period, and vein elasticity degree.

[0035] In the mobile terminal 200 according to the present exemplary embodiment, the sensor unit 120 is provided in the right side surface 202, and the first electrode is set as a switch to measure a biological signal. However, it would be recognized that however the sensor unit 120 may be provided in the left side surface 203, and the second electrode 115 and the third electrode 117 may be provided in the right side surface 202. Further, although not shown in FIG. 2, the power supply unit 170 may be provided adjacent to the sensor unit 120, and the display unit 160 may be provided adjacent to the first electrode 113.

[0036] The controller 130 may control the display unit 160 to display the measured electrocardiogram signal, pulse wave signal, and pulse wave transmission time period. Further, the mobile terminal 200 having the configuration of FIG. 2 can determine a pulse wave transmission time period of an arm contacting the optical sensor of the sensor unit 120.

[0037] FIGS. 3A to 5 illustrate configurations of a mobile terminal that can determine a pulse wave transmission time period of both arms simultaneously.

[0038] FIGS. 3A and 3B are plan views illustrating a mobile terminal for measuring a biological signal having two sensor units and three electrocardiogram electrodes according to another exemplary embodiment of the present invention.

[0039] Referring to FIG. 3A, a mobile terminal 300 has two sensor units 120 provided at an upper end of the right and left side surfaces 302 and 303 of the terminal body 380 and has first electrode 113 and second electrode 115 provided at the front surface 301 of the terminal body 380.

[0040] As shown in FIG. 3B, the mobile terminal 300 has third electrode 117 provided at a rear side 304 of the terminal body 380, at a position of the rear side 304 corresponding to the position of second electrode 115 on the front surface 301 of the terminal body 380. Although not shown in FIGS. 3A and 3B, the mobile terminal 300 may further include the power supply unit 170 and the display unit 160. Accordingly, power is supplied to the mobile terminal through the power supply unit 170 and the user contacts a finger of one hand with one of the sensor units 120 and a finger of the other hand with the other sensor unit 120. The user then contacts another finger of one hand with the first electrode 113 and another finger of the other hand contacts the second electrode 115 of the first surface 301 of the terminal body 380, and contacts a third finger of the hand contacting the second electrode 115 to the third electrode 117.

[0041] The controller 130 determines a pulse wave transmission time period by analyzing an electrocardiogram signal and a pulse wave signal measured through the electrocardiogram electrode unit 110 and the sensor unit 120, respectively. The controller 130 then determines a vein elasticity degree using the determined pulse wave transmission time period. Thereafter, the controller 130 transmits the determined vein elasticity degree to another terminal through the RF unit 140 and controls the storage unit 150 to store the measured pulse wave signal and electrocardiogram signal, pulse wave transmission time period, and vein elasticity degree.

[0042] FIG. 4 is a plan view illustrating a mobile terminal for measuring a biological signal having two sensor units and three electrocardiogram electrodes according to another exemplary embodiment of the present invention.

[0043] Referring to FIG. 4, a mobile terminal 400 has two sensor units 120 provided at an upper end of the right side surface 402 and the left side surface 403 of the terminal body 480 and has the first electrode 113 and the second electrode 115 provided at the front surface 401 of the terminal body 480. Further, the mobile terminal 400 has the third electrode 117 provided at a lower end of either the right side surface 402 or the left side surface 403 at which the sensor unit 120 is provided. Preferably, the third electrode 117 is positioned at the side surface nearest to the second electrode 115. The controller 130 determines a pulse wave transmission time period by analyzing an electrocardiogram signal and a pulse wave signal measured through the electrocardiogram electrode unit 110 and the sensor unit 120, respectively. Further, the controller 130 transmits the determined pulse wave transmission time period through the RF unit 140 to another terminal. Although not shown in FIG. 4, the mobile terminal 400 may further include the power supply unit 170 and the display unit 160.

[0044] FIG. 5 is a plan view illustrating a mobile terminal for measuring a biological signal having two sensor units and three electrocardiogram electrodes according to another exemplary embodiment of the present invention.

[0045] Referring to FIG. 5, a mobile terminal 500 has two sensor units 120 provided at an upper end of the right side surface 502 and the left side surface 503 of the terminal body 580 and has a first electrode 113 and a second electrode 115 at a lower end of the left side surfaces 503 and the right side

surface 502, respectively, at which the sensor units 120 are provided. The third electrode 117 is provided at the front surface 501 of the terminal body 580. In this case, the user contacts a finger of one hand with the left side surface 503 and a finger of the other hand with the right side surface 502 of the mobile terminal 500, and contacts another finger of either hand with the third electrode 117. Accordingly, the controller 130 determines a pulse wave transmission time period through an electrocardiogram signal and a pulse wave signal measured through the electrocardiogram electrode unit 110 and the sensor unit 120, respectively. The controller 130 determines a vein elasticity degree using the determined pulse wave transmission time period. Thereafter, the controller 130 transmits the determined vein elasticity degree to another terminal through the RF unit 140 and controls the storage unit 150 to store the measured pulse wave signal and electrocardiogram signal, pulse wave transmission time period, and vein elasticity degree. Although not shown in FIG. 5, the mobile terminal 500 may further include the power supply unit 170 and the display unit 160.

[0046] The mobile terminal of the above-described exemplary embodiments measures a biological signal with a method similar to that of medical measurement instruments.

[0047] FIG. 6 is a graph comparing a biological signal measured using a mobile terminal described herein and that measured using a medical measurement instrument in the same condition.

[0048] In FIG. 6, the X-axis represents a vein elasticity degree determined using the medical measurement instrument and the Y-axis represents a vein elasticity degree determined using the mobile terminal according to the present invention. A correlation coefficient R represents a degree to which a vein elasticity degree determined using the mobile terminal correlates with that determined using a medical measurement instrument, wherein when a value of the X-axis equates to a value of the Y-axis, the correlation coefficient R is equal to 1.

[0049] Referring to FIG. 6, a correlation coefficient R between a biological signal determined using the mobile terminal according to the present invention and a biological signal determined using the medical measurement instrument in the same condition is equal to 0.956.

[0050] In the foregoing descriptions of exemplary embodiments of the mobile terminal according to the present invention, a position at which the electrocardiogram electrode unit 110 and the sensor unit 120 are provided is described. However, the positions at which the electrocardiogram electrode unit 110 and the sensor unit 120 are provided are not limited thereto, and the electrocardiogram electrode unit 110 and the sensor unit 120 may be provided at various positions of the mobile terminal. For example, in the mobile terminal, the display unit 160 may be provided in the front surface of the terminal body, the sensor unit 120 may be provided at an upper edge of the terminal body, or the sensor unit 120 may be provided at a lower edge thereof. Further, in the exemplary embodiments of the present invention, the mobile terminal has a quadrangular shape, however the present invention is not limited thereto and may be formed in various shapes such as an oval shape.

[0051] As described above, according to the present invention, a user can inspect an electrocardiogram and pulse wave without visiting a medical facility using a mobile terminal having two or more electrodes and at least one optical sensor. Because information about the electrocardiogram and pulse

wave inspected through the mobile terminal can be transmitted to another terminal using a wireless transmission, a vein health condition value can be measured and analyzed by health care personnel without requiring the user to visit a medical facility.

[0052] The above-described methods according to the present invention can be realized in hardware or as software or computer code that can be stored in a recording medium such as a CD ROM, an RAM, a floppy disk, a hard disk, or a magneto-optical disk or downloaded over a network, so that the methods described herein can be executed by such software using a general purpose computer, or a special processor or in programmable or dedicated hardware, such as an ASIC or FPGA. As would be understood in the art, the computer, the processor or the programmable hardware include memory components, e.g., RAM, ROM, Flash, etc. that may store or receive software or computer code that when accessed and executed by the computer, processor or hardware implement the processing methods described herein.

[0053] Although the invention has been described with regard to the electrodes and/or sensors being placed "in" the mobile terminal, it would be recognized that the access points to the electrodes and/or sensors are placed "on" the mobile terminal. It would be understood that when referring to the electrodes and/or sensors, reference is also made to the ability to access the corresponding electrodes and/or sensors. Hence, while the sensors may be placed in the mobile device, the access to the sensors may be placed on the mobile device. Similarly, the electrodes and/or sensors may be surface mounted onto the mobile device. In addition combinations of placement of electrodes and/or sensor "in" and "on" the mobile device are considered within the scope of the invention. Hence, the terms "in" and "on" with regard to the electrodes and/or sensors are used interchangeably herein.

[0054] Although exemplary embodiments of the present invention have been described in detail hereinabove, it should be clearly understood that many variations and modifications of the basic inventive concepts herein described, which may appear to those skilled in the art, will still fall within the spirit and scope of the exemplary embodiments of the present invention as defined in the appended claims.

What is claimed is:

1. A mobile terminal for measuring a biological signal, comprising:

an electrocardiogram electrode unit having a first electrode provided on a front surface of a body of the mobile terminal and a second electrode provided on a first side surface of the mobile terminal body for measuring an electrocardiogram signal through the first electrode and the second electrode;

a sensor unit provided on a second side surface of the mobile terminal body for measuring a pulse wave signal;

a controller provided within the mobile terminal for analyzing the electrocardiogram signal received from the electrocardiogram electrode unit and the pulse wave signal received from the sensor unit; and

a radio frequency (RF) unit for transmitting an analyzed result under the control of the controller.

2. The mobile terminal of claim 1, wherein the electrocardiogram electrode unit has a third electrode provided on the first side surface of the mobile terminal body adjacent to the second electrode,

- wherein the first, second, and third electrodes represent a positive (+) electrode, negative (-) electrode, and ground electrode, respectively.
3. The mobile terminal of claim 1, further comprising a display unit provided on the front surface of the mobile terminal body adjacent to the first electrode,
wherein the controller controls the display unit to display the analyzed result.
4. The mobile terminal of claim 1, wherein the sensor unit comprises a reflective optical sensor.
5. A mobile terminal for measuring a biological signal, comprising:
an electrocardiogram electrode unit having:
a first electrode and a second electrode provided on a front surface of a body of the mobile terminal and a third electrode provided on a rear surface of the mobile terminal body, said electrodes provides means for measuring an electrocardiogram signal;
at least one sensor unit provided on a first side surface and at least one sensor unit provided on a second side surface of the mobile terminal body for measuring a pulse wave signal;
a controller within the mobile terminal for analyzing the electrocardiogram signal received from the electrocardiogram electrode unit and the pulse wave signal received from the sensor unit; and
an RF unit for transmitting an analyzed result under the control of the controller.
6. A mobile terminal for measuring a biological signal, comprising:
at least one sensor unit provided on a first side surface of a body of the mobile terminal and at least one sensor unit provided on a second side surface of the mobile terminal body, said first and second side sensor units for measuring a pulse wave signal;
an electrocardiogram electrode unit having a first electrode and a second electrode provided in a front surface of the mobile terminal body and a third electrode provided in one of the first side surface and the second side surface of the mobile terminal body adjacent to the corresponding sensor unit, said electrocardiogram electrode unit measuring an electrocardiogram signal through the first electrode, the second electrode, and the third electrode;
a controller for analyzing the electrocardiogram signal received from the electrocardiogram electrode unit and the pulse wave signal received from the sensor unit; and
an RF unit for transmitting an analyzed result under the control of the controller.
7. A mobile terminal for measuring a biological signal, comprising:
at least one sensor unit provided in a first side surface of a body of the mobile terminal and at least one sensor unit provided in a second side surface of the mobile terminal body, said first and second sensor units for measuring a pulse wave signal;
an electrocardiogram electrode unit having a first electrode provided in the first side surface and a second electrode provided in the second side surface of the mobile terminal body adjacent to the sensor units provided therein and a third electrode provided in the mobile terminal body, said first, second and third electrodes, in combination, measuring an electrocardiogram signal;
a controller provided for analyzing the electrocardiogram signal received from the electrocardiogram electrode unit and the pulse wave signal received from the sensor unit; and
an RF unit for transmitting an analyzed result under the control of the controller.
8. A device comprising:
a processor in communication with a memory, the memory including code, which when accessed by the processor causes the processor to:
receive a signal from each of a plurality of electrodes and determine an electrocardiogram signal from the received electrode signals;
receive a signal from each of at least one sensor unit and measuring a pulse wave signal from the received sensor unit signals;
determine a pulse wave transmission time period from the electrocardiogram signal and the pulse wave signal;
determine a length;
determine a body characteristic from said electrocardiogram signal, said pulse signal transmission time period and said length; and
provide at least said body characteristic to an external device.
9. The device of claim 8, wherein said electrodes have different polarities.
10. The device of claim 8, wherein at least one of said electrodes represents a switch, which when contacted triggers measuring of said electrocardiogram signal.
11. The device of claim 8, wherein said at least one sensor unit comprises:
at least one light source for emitting a light; and
at least one receiving device for measuring an amount of said emitted light that has been reflected.
12. The device of claim 11, wherein said at least one sensor unit provides a measure of at least one of: subcutaneous fat thickness, a body fat rate, and a skin color.
13. The device of claim 8, wherein said pulse wave transmission time period is a time period in which a pulsation pressure wave is transmitted from a main artery valve to a peripheral portion.
14. The device of claim 8, wherein said determined length represents a vein length.
15. The device of claim 14, wherein said length is selected from one of: a measured length and a provided length.
16. The device of claim 15, wherein said external device is at least one selected from the group consisting of: a short-range communication device, a wireless transmission device and a display device.
17. The device of claim 8, wherein the processor further executes code for:
storing at least said body characteristic in said memory,
18. The device of claim 14, wherein said body characteristic is a vein elasticity degree.
19. The device of claim 8 further comprising:
housing for housing said processor and memory, and
a plurality of electrodes providing said electrodes signals to said processor, said electrodes being positioned on at least one surface of said housing.
20. The device of claim 19, wherein said at least one sensor unit positioned on a side surface of said housing.

- 21. The device of claim 8, further comprising:
an input device for providing information to said processor.
- 22. The device of claim 21, wherein said provided length is provided through said input device.
- 23. The device of claim 15, wherein said provided length is provided through a lookup table stored in said memory.

- 24. The device of claim 8, wherein said processor executes code for:
providing at least one of said electrocardiogram signal, said pulse wave signal and said pulse wave transmission time period to said external device.

* * * * *

专利名称(译)	用于测量生物信号的移动终端		
公开(公告)号	US20090182205A1	公开(公告)日	2009-07-16
申请号	US12/350282	申请日	2009-01-08
[标]申请(专利权)人(译)	曹在GEOL 李相HUN CHO CHUL HO 郑善TAE		
申请(专利权)人(译)	CHO , JAE GEOL LEE , SANG HUN CHO , CHUL HO JUNG , SUN TAE		
当前申请(专利权)人(译)	SAMSUNG ELECTRONICS CO. , LTD.		
[标]发明人	CHO JAE GEOL LEE SANG HUN CHO CHUL HO JUNG SUN TAE		
发明人	CHO, JAE GEOL LEE, SANG HUN CHO, CHUL HO JUNG, SUN TAE		
IPC分类号	A61B5/00 A61B5/0408		
CPC分类号	A61B5/0006 A61B5/02416 A61B5/6898 A61B5/0404 A61B2560/0468 A61B5/02438 A61B5/0261 G06F19/3418		
优先权	1020080002933 2008-01-10 KR		
其他公开文献	US9326694		
外部链接	Espacenet USPTO		

摘要(译)

公开了一种用于测量生物信号的移动终端。用于测量生物信号的移动终端包括：心电图电极单元，具有设置在移动终端的主体的前表面中的第一电极；以及第二电极，设置在移动终端主体的第一侧表面中，用于通过移动终端主体测量心电图信号。第一电极和第二电极，设置在移动终端主体的第二侧表面中用于测量脉搏波信号的传感器单元，设置在移动终端内的控制器，用于分析从心电图电极单元接收的心电图信号和脉冲从传感器单元接收的波信号和用于通过控制器的控制发送分析结果的射频单元。

