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Kim et al.

(54) **BELT WITH HEALTH MANAGEMENT FUNCTION**

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(52) **U.S. Cl.** **600/301**

(57) **ABSTRACT**

A belt with a health management function includes a health information extraction module extracting health related information from various biomedical signals, a buckle housing the health information extraction module, and a strap connected to an end of the buckle. The health information extraction module includes a sensor module detecting various biomedical signals, and a process/extraction unit digitally processing the detected biomedical signals and extracting the health related information from the processed digital signals.

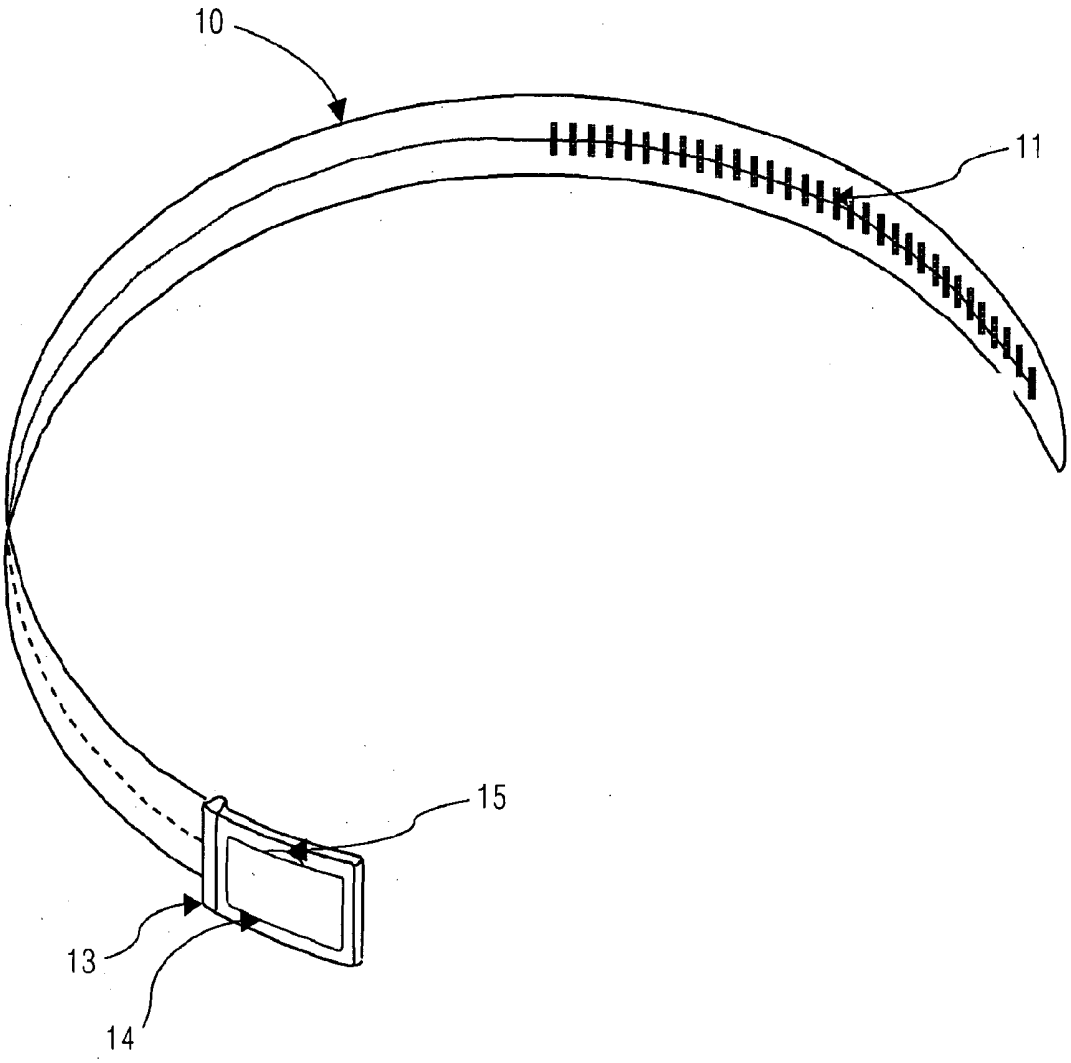


FIG. 1

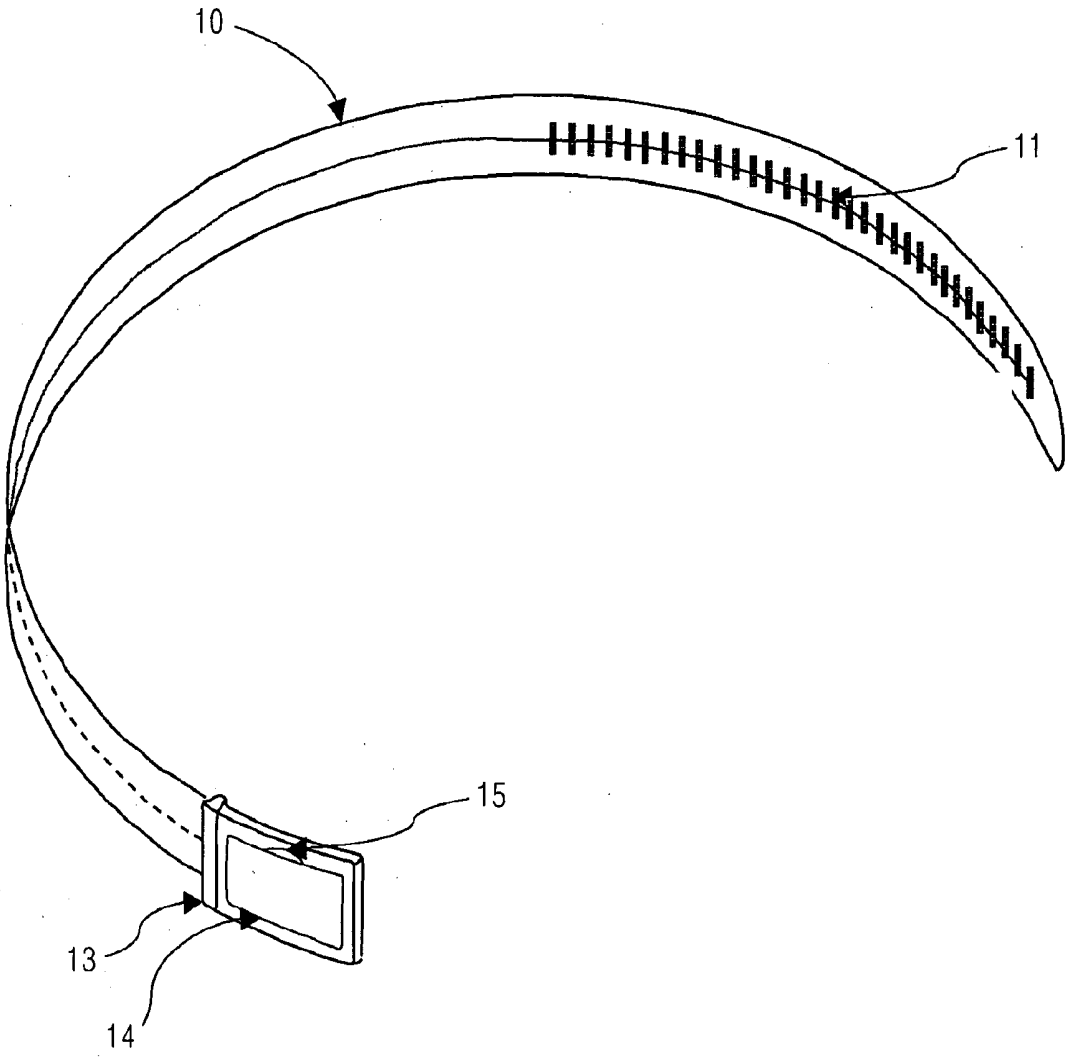


FIG. 2A

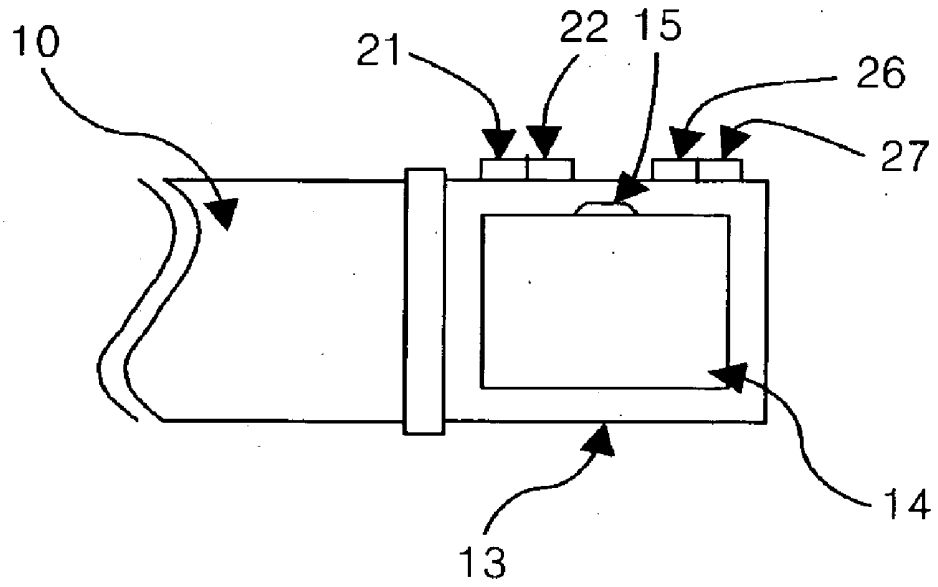


FIG. 2B

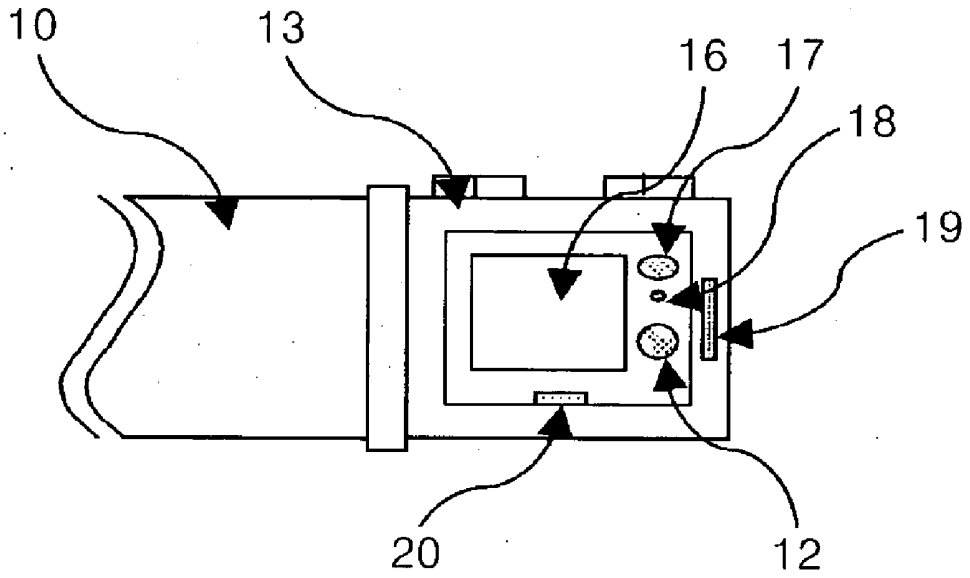


FIG. 3A

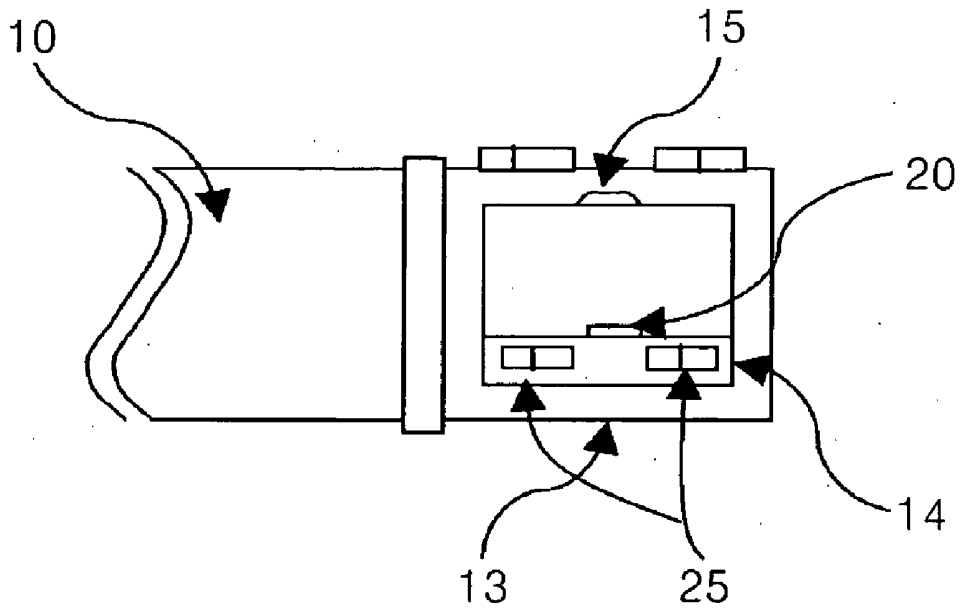


FIG. 3B

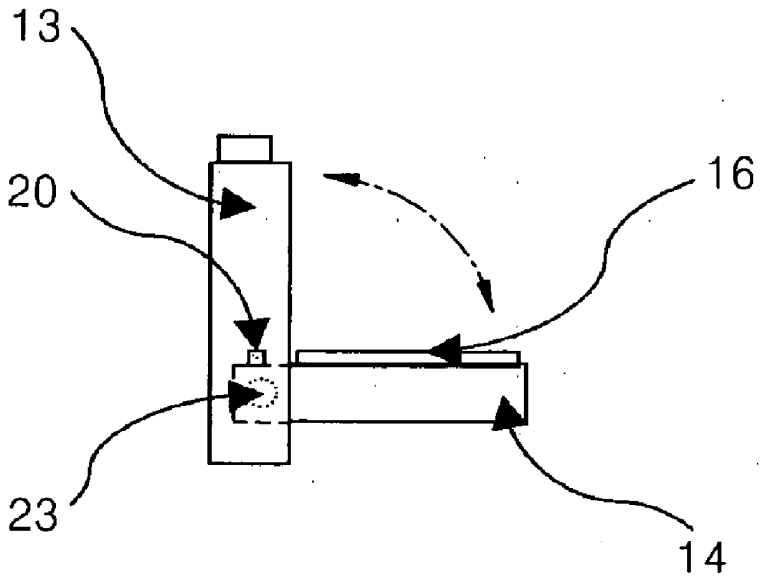


FIG. 4

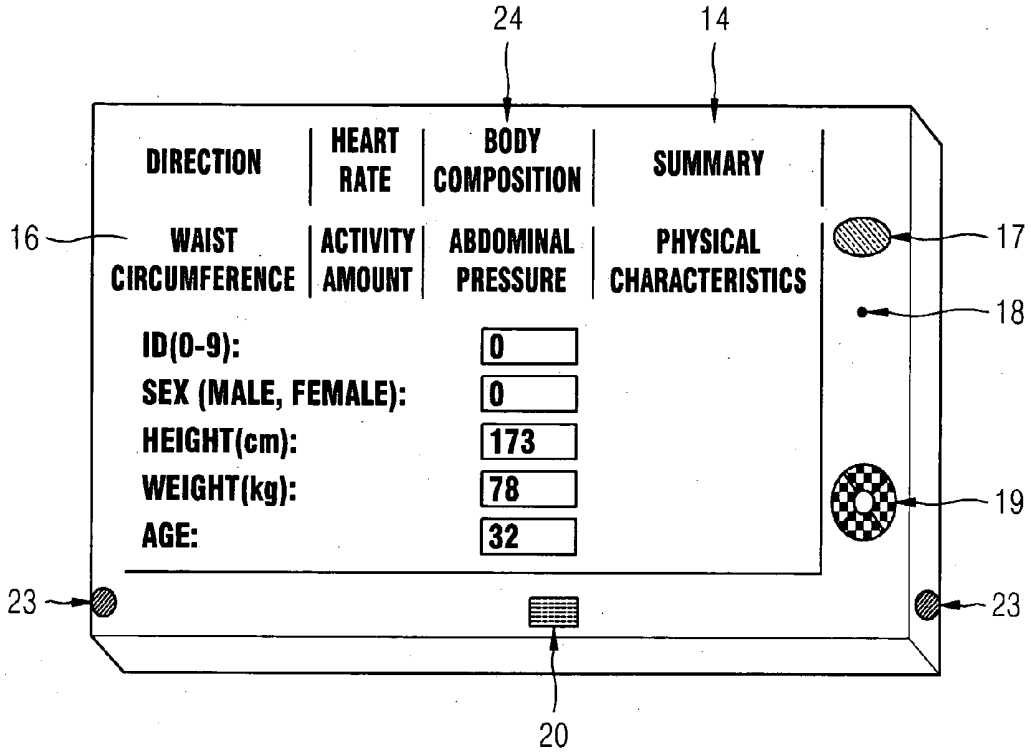

24
14
DIRECTION
HEART RATE
BODY COMPOSITION
SUMMARY
16
WAIST CIRCUMFERENCE
ACTIVITY AMOUNT
ABDOMINAL PRESSURE
PHYSICAL CHARACTERISTICS
17
18
ID(0-9):
0
SEX (MALE, FEMALE):
0
HEIGHT(cm):
173
WEIGHT(kg):
78
AGE:
32
19
23
23
20

FIG. 5

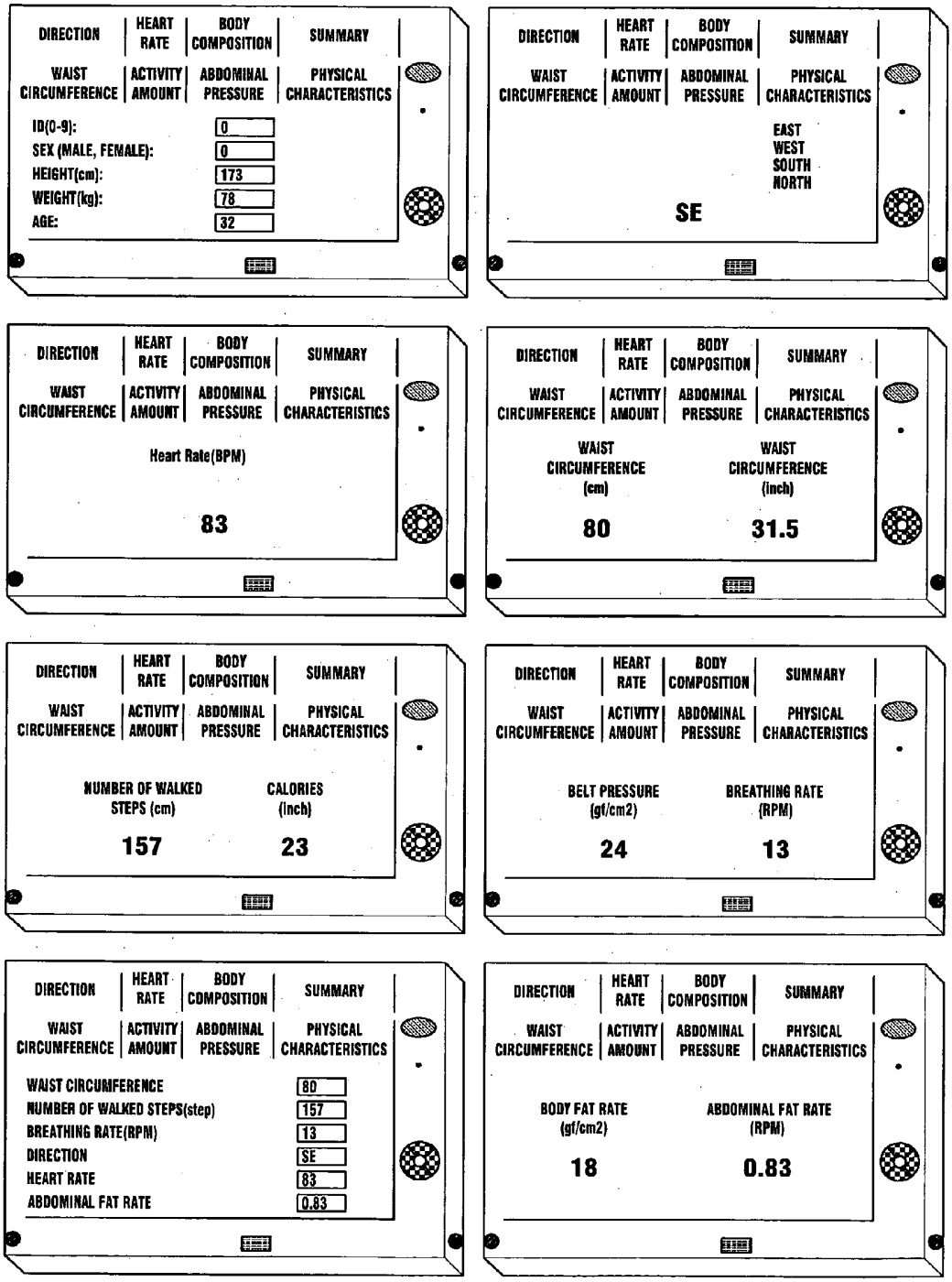

DIRECTION
HEART RATE
BODY COMPOSITION
SUMMARY
WAIST CIRCUMFERENCE
ACTIVITY AMOUNT
ABDOMINAL PRESSURE
PHYSICAL CHARACTERISTICS
ID(0-9): 0
SEX (MALE, FEMALE): 0
HEIGHT(cm): 173
WEIGHT(kg): 78
AGE: 32
EAST
WEST
SOUTH
NORTH
SE
Heart Rate(BPM)
83
WAIST CIRCUMFERENCE (cm)
WAIST CIRCUMFERENCE (inch)
80
31.5
NUMBER OF WALKED STEPS (cm)
CALORIES (inch)
157
23
BELT PRESSURE (gf/cm2)
BREATHING RATE (RPM)
24
13
WAIST CIRCUMFERENCE 80
NUMBER OF WALKED STEPS(step) 157
BREATHING RATE(RPM) 13
DIRECTION SE
HEART RATE 83
ABDOMINAL FAT RATE 0.83
BODY FAT RATE (gf/cm2)
ABDOMINAL FAT RATE (RPM)
18
0.83

FIG. 6

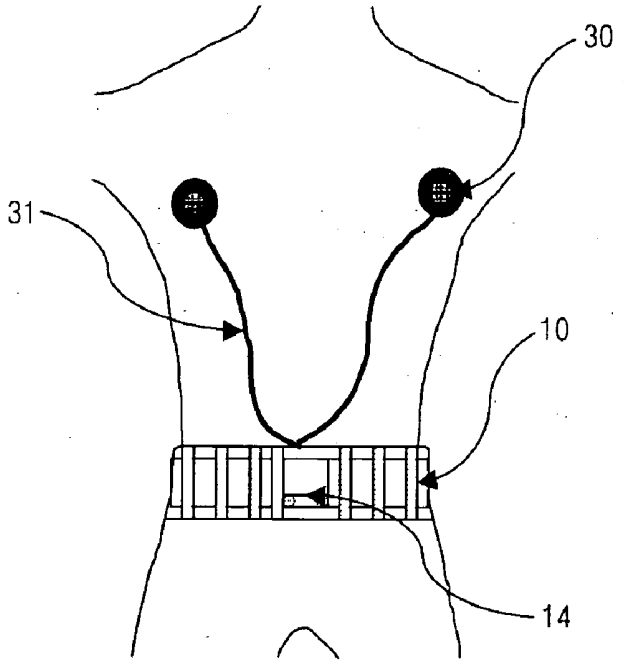


FIG. 7

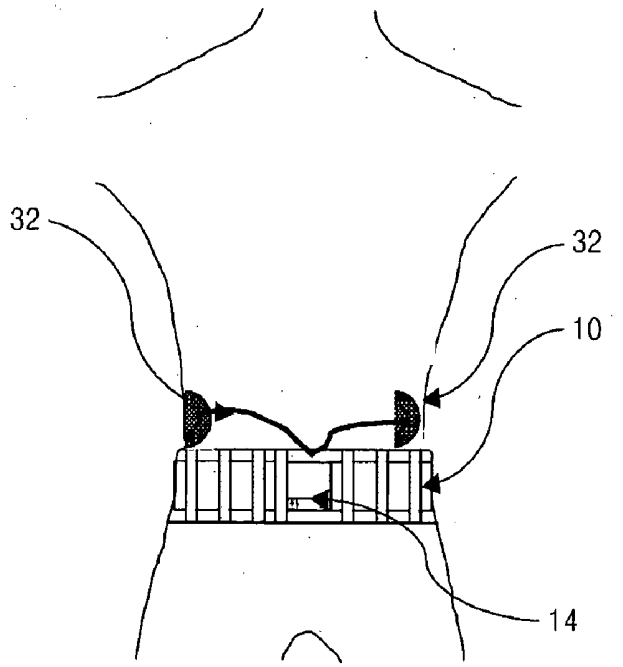


FIG. 8

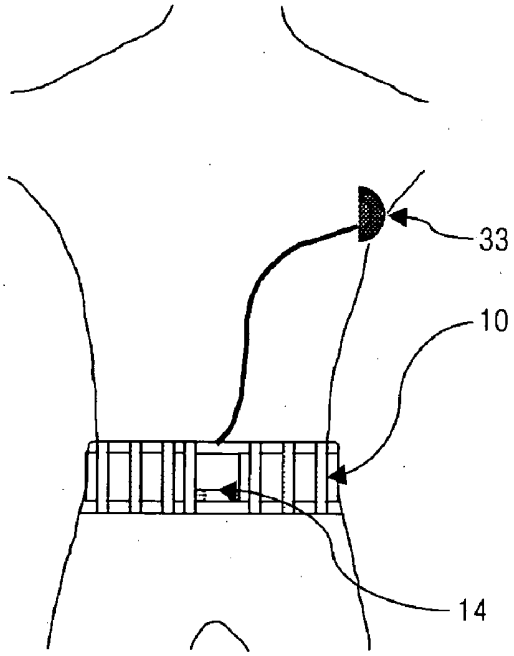


FIG. 9

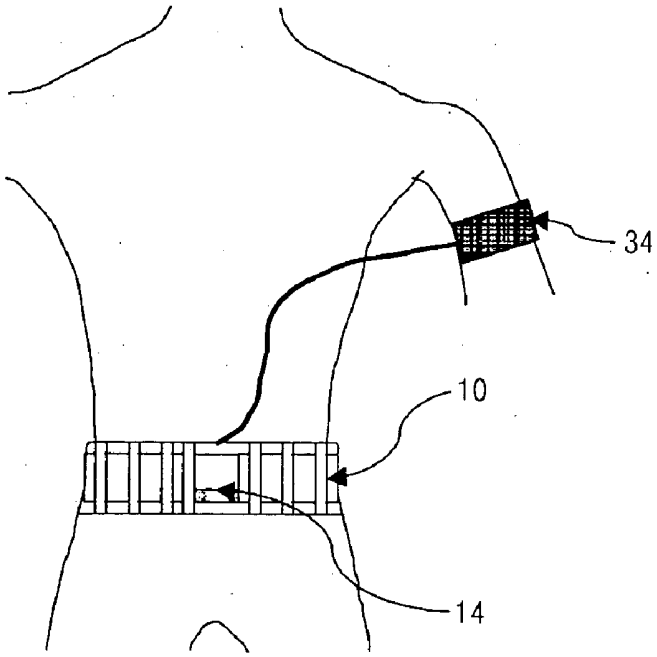
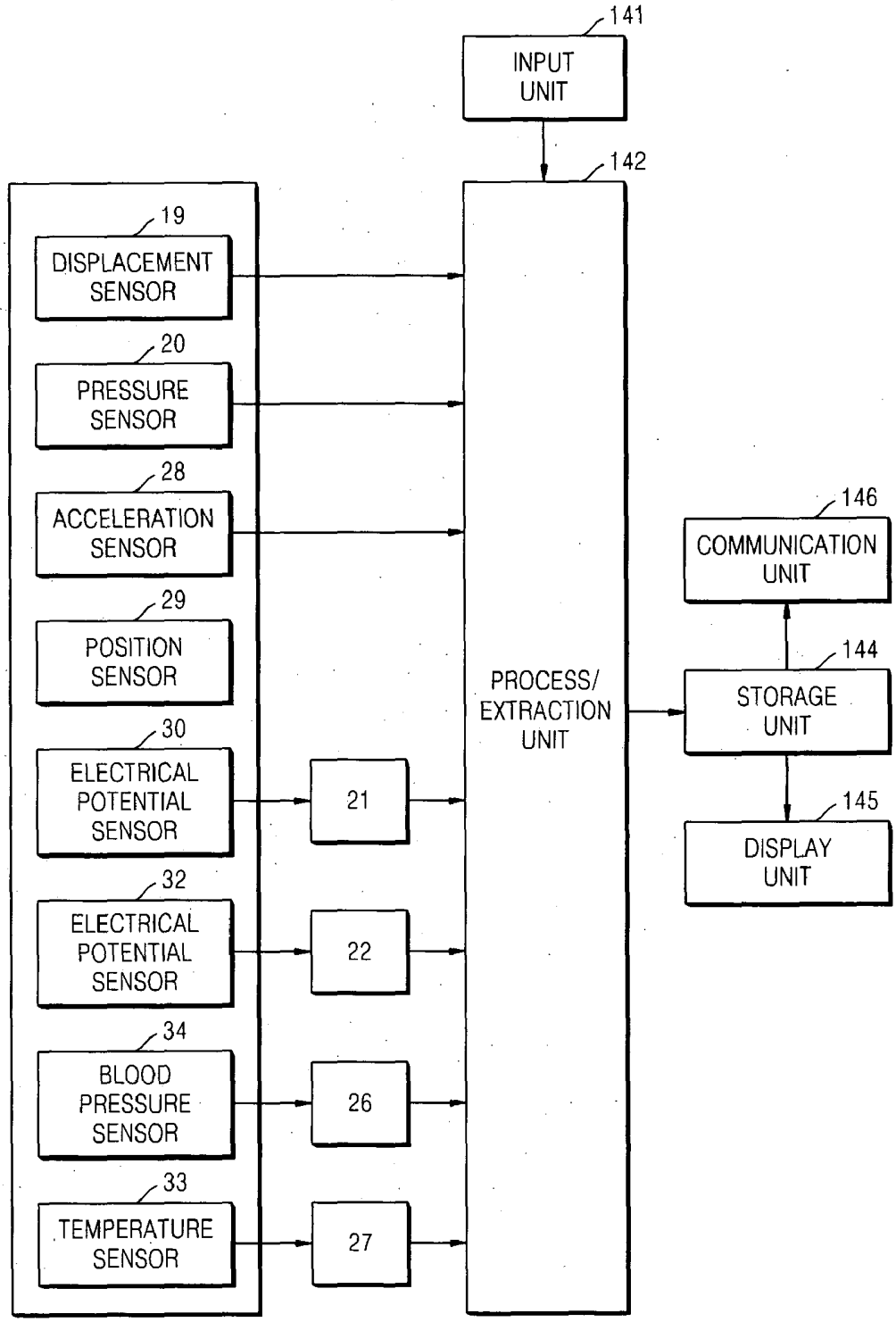


FIG. 10


141
INPUT UNIT
142
19
DISPLACEMENT SENSOR
20
PRESSURE SENSOR
28
ACCELERATION SENSOR
29
POSITION SENSOR
30
ELECTRICAL POTENTIAL SENSOR
32
ELECTRICAL POTENTIAL SENSOR
34
BLOOD PRESSURE SENSOR
33
TEMPERATURE SENSOR
21
22
26
27
PROCESS/ EXTRACTION UNIT
146
COMMUNICATION UNIT
144
STORAGE UNIT
145
DISPLAY UNIT

BELT WITH HEALTH MANAGEMENT FUNCTION

TECHNICAL FIELD

[0001] The present invention relates to a belt, and more particularly, to a belt with a health management function.

[0002] This work was supported by the IT R&D program of MIC/IITA [2006-S-007-01, Ubiquitous Health Monitoring Module and System Development]

BACKGROUND ART

[0003] Recently, a large attention to health is increasingly being paid, as per example, the 'well-being' trend. A method of monitoring health information in a simple and easy manner is being developed. The purpose of the present invention is to provide a simple and efficient health management by providing sensor information related to health through a belt that one wears everyday.

[0004] Among conventional methods related to the present invention, a first method discloses a pressure sensor of a spring type to measure an impedance precisely and a belt including the pressure sensor and which is attachable to the human body. Thus, body fat can be measured by measuring the impedance using the pressure sensor. The method can be used for the measurement of body fat based on the measured impedance and thus, providing a health analysis.

[0005] A second method discloses a belt, having a passometer and an LCD display attached to a buckle portion of the belt, to provide information such as calories consumed and walking speed based on the number of walked steps. However, the belt may be erroneous according to users. According to a third method, a scale mark is indicated on the rear side of a belt so that, when a user wears the belt, the user reads the scale mark to identify the waist circumference. Also, by inputting height and weight information, information regarding the physical condition of an individual, such as severely obese, obese, overweight, average weight, and underweight, can be provided according to the input values.

[0006] However, the above conventional methods produce large measurement errors because the measurements are manually performed. Also, the methods fail to provide a variety of biomedical information and the measured information is not properly managed.

DISCLOSURE OF INVENTION

Technical Problem

[0007] To solve the above and/or other problems, the present invention provides a belt with a health management function, wherein the belt can process detected biomedical information to extract health information and enable scientific and efficient management of the extracted health information.

Technical Solution

[0008] According to an aspect of the present invention, a belt with a health management function comprises a health information extraction module extracting health related information from various biomedical signals, a buckle housing the health information extraction module, and a strap connected to an end of the buckle.

[0009] The health information extraction module comprises a sensor module detecting the various biomedical signals, and a process/extraction unit digitally processing the detected biomedical signals and extracting the health related information from the processed digital signals.

[0010] The health information extraction module further comprises a communication unit transmitting the health related information to the outside and a display unit displaying the health related information.

Advantageous Effects

[0011] As described above, according to the present invention, a displacement sensor, a pressure sensor, an acceleration sensor, a position sensor, an electrocardiogram measurement sensor, an impedance measurement sensor, a blood pressure measurement sensor, and a temperature measurement sensor provide information regarding the health and position of a wearer by being included in a belt. Thus, health management can be conveniently and efficiently performed. As information regarding the position of a wearer is provided, the position of the wearer can be quickly identified in an emergency case.

[0012] Also, the electrocardiogram measurement module is included in the buckle so that an electrocardiogram using an external electrical potential sensor is possible. The impedance measurement module is included in the buckle so that a body fat rate and an abdominal fat rate of the human body can be obtained and thus, facilitating the management of abdominal obesity. Also, since the blood pressure measurement module is included in the buckle, blood pressure can be measured. Since the temperature measurement module is included in the buckle, the temperature of the human body can be measured. By including a wireless communication device and storing the information in a mobile phone or a PDA, not only temporary health information can be known, however, also health management and the prevention of obesity can be continuously performed.

[0013] Thus, by providing health information to a health-concerned individual, health management can be efficiently performed by providing information regarding to health. For an obese person, an efficient obesity management is possible by providing information regarding appropriate measurements to control the obesity. For a person having a cardiovascular disease, an unexpected cardiovascular problem can be quickly coped with by providing information regarding the heart rate and continuously monitoring the information. Furthermore, health can be continuously managed through a health management program including exercise.

DESCRIPTION OF DRAWINGS

[0014] The above and other features and advantages of the present invention will become more apparent by describing in detail exemplary embodiments thereof with reference to the attached drawings in which:

[0015] FIG. **1** is a perspective view of a belt according to an embodiment of the present invention;

[0016] FIGS. **2**A and **2**B, respectively, are a front view and a rear view of the belt when a health information extraction module is closed;

[0017] FIGS. **3**A and **3**B, respectively, are a front view and a side view of the belt when the health information extraction module is opened;

[0018] FIG. **4** is a front view of when the health information extraction module is opened and in operation;

[0019] FIG. **5** illustrates examples of the health information displayed when selecting each menu tab in the health information extraction module of FIG. **4**;

[0020] FIG. **6** illustrates an example of performing an electrocardiogram by connecting a lead wire of an electrical potential sensor to a connector of the health information extraction module;

[0021] FIG. **7** illustrates an example of the measurement of body fat when a lead wire of an electrical potential sensor is connected to a connector of the health information extraction module;

[0022] FIG. **8** illustrates an example of the measurement of temperature when a lead wire of an electrical potential sensor is connected to a connector of the health information extraction module;

[0023] FIG. **9** illustrates an example of the measurement of blood pressure when a lead wire of an electrical potential sensor is connected to a connector of the health information extraction module; and

[0024] FIG. **10** is a block diagram of the health information extraction module for the measurement and extraction of health information, according to an embodiment of the present invention.

BEST MODE

[0025] According to an aspect of the present invention, a belt with a health management function comprises a health information extraction module extracting health related information from various biomedical signals, a buckle housing the health information extraction module, and a strap connected to an end of the buckle.

[0026] The health information extraction module comprises a sensor module detecting the various biomedical signals, and a process/extraction unit digitally processing the detected biomedical signals and extracting the health related information from the processed digital signals.

[0027] The health information extraction module further comprises a communication unit transmitting the health related information to the outside and a display unit displaying the health related information.

Mode for Invention

[0028] FIG. **1** is a perspective view of a belt according to an embodiment of the present invention. Referring to FIG. **1**, the belt according to the present embodiment includes an electrical resistance body **11** provided on an inner surface of the belt and which can measure a waist circumference, a health information extraction module **14** extracting health information from a biomedical signal, a buckle **13** buckling and housing the health information extraction module **14**, a groove **15** facilitating a rotary opening/closing of the health information extraction module **14** from the buckle **13**, and a strap **10** supporting trousers.

[0029] FIG. **2**A is a front view of the belt when the health information extraction module **14** is closed. The buckle **13** fixes the strap **10** that supports trousers and simultaneously houses the health information extraction module **14**. As shown in FIG. **2**A, the groove **15** is formed in the buckle **13** to facilitate the rotation of the health information extraction module **14** from buckle **13**. Also, the buckle **13** includes electrocardiogram measurement connector **21** and body fat measurement connector **22**, which connect an electrical potential sensor and the health information extraction module **14**, for measuring electrocardiogram and body fat. The buckle **13** includes blood pressure measurement connector **26** and temperature measurement connector **27**, which connect a blood pressure sensor and a temperature sensor, for measuring blood pressure and temperature.

[0030] FIG. **2**B is a rear view of the belt when the health information extraction module **14** is closed. Referring to FIG. **2**B, a display unit **16** displaying a set screen of physical measurements and a result of measurements is provided in the health information extraction module **14**. Also, a power button **17** for turning off the power when the belt is not in use to save power and a state LED **18** indicating the state of operation are provided in the health information extraction module **14** so that a user can see whether the belt is in use or not.

[0031] Since input of physical measurements, such as age, sex, and weight, is needed to determine body fat, an input key **12** is provided as a device to input the physical measurements. A pressure sensor **20** to measure an abdominal pressure is installed in a lower portion of the health information extraction module **14**.

[0032] The pressure sensor **20** can be used to measure a waist circumference. The pressure sensor **20** enables a measurement of a waist circumference at a predetermined abdominal pressure and notifies a measurement position of the waist circumference as the state LED **18** flickers when a preset pressure is reached. A piezo-resistive silicon that outputs a change in electrical potential when receiving a force and other sorts of sensors can be used as the pressure sensor **20**. A displacement sensor **19** detecting the resistance of the belt at the set abdominal pressure is provided so that a waist circumference is automatically measured by detecting the resistance of the resistance body **11**.

[0033] FIGS. **3**A and **3**B, respectively, are a front view and a side view of the belt when the health information extraction module **14** is opened. A rotary joint **23** connects the health information extraction module **14** and the buckle **13**, so that the rotary opening and closing of the health information extraction module **14** from the buckle **13** is possible. The rotary joint **23** also transfers a measured value from the displacement sensor **19** to the health information extraction module **14**. Also, a connection portion **25** connecting the connector **21**, the connector **22**, the connector **26**, and the connector **27** to the health information extraction module **14**, which respectively measure heart status, body fat, blood pressure, and temperature, is provided in the upper portion of the health information extraction module **14**. Information can be checked through the display portion **16** and physical measurements can be input through the input key **12** when the health information extraction module **14** is opened.

[0034] FIG. **4** is a front view of when the health information extraction module **14** is opened and in operation. Referring to FIG. **4**, a menu tab **24** is provided in the upper portion of the display portion **16**, in order to input physical measurements and check information about a waist circumference, an abdominal pressure, the amount of activity, a heart rate, a body composition, and a position. Thus, the measured health information can be checked by selecting each menu tab. FIG. **5** shows health information when each menu tab is selected in the health information extraction module of FIG. **4**. In FIG. **5**, in a clockwise direction from the top left corner, a case of selecting a physical characteristics tab, a case of selecting a direction tab, a case of selecting a waist circumference tab, a case of selecting an abdominal pressure tab, a case of selecting a body composition tab, a case of selecting a summary tab,

a case of selecting an activity measurements tab, and a case of selecting a heart rate tab, are shown.

[0035] FIG. **6** illustrates an example of performing an electrocardiogram by connecting a lead wire **31** of an electrical potential sensor **30** to the electrocardiogram measurement connector **21** of the health information extraction module **14**. Referring to FIG. **6**, an electrical activity of the heart is detected by the electrical potential sensor **30** and transferred to the health information extraction module **14** through the lead wire **31** so that the health information extraction module **14** performs the electrocardiogram to obtain a heart rate.

[0036] FIG. **7** illustrates an example of the measurement of body fat when a lead wire of an electrical potential sensor **32** is connected to the body fat measurement connector **22** of the health information extraction module **14**. Referring to FIG. **7**, a body fat rate is measured by applying a weak current to the skin surface to measure an impedance.

[0037] FIG. **8** illustrates an example of the measurement of temperature when a lead wire of an electrical potential sensor **33** is connected to the temperature measurement connector **27**. FIG. **9** illustrates an example of the measurement of blood pressure when a lead wire of an electrical potential sensor **34** is connected to the blood pressure measurement connector **26** of the health information extraction module **14**. FIG. **10** is a block diagram of the health information extraction module for the measurement and extraction of health information, according to an embodiment of the present invention.

[0038] The health information extraction module **14**, as shown in FIG. **10**, includes a sensor module **141** detecting various biomedical signals, a process/extraction unit **142** processing the biomedical signals detected by the sensor module **141** and extracting health information from the processed biomedical signals, an input unit **143** through which physical measurements of a user are input, a storage unit **144** storing the extracted health information, a display unit **145** displaying the health information or allowing input of personal physical measurements, and a communication unit **146** transmitting the health information to the outside, for example, a PC, a PDA, or a mobile phone.

[0039] The sensor module **141** is a module formed of the displacement sensor **19**, an acceleration sensor **28**, the pressure sensor **20**, a position sensor **29**, the electrical potential sensors **30** and **32**, the blood pressure sensor **34**, and the temperature sensor **33**. The acceleration sensor **28** is for extracting the amount of activity of a user using information regarding the number of walked steps and consumed calories. The position sensor **29** is for extracting information regarding the present position of a user.

[0040] The process/extraction unit **142** performs a predetermined signal process including filtering with respect to a biomedical signal measured from the sensors and extracts health information through a health information extraction algorithm by digitizing the processed signal. The extracted health information is stored in the storage unit **144** and provided to a user through a display device such as an LCD by the display unit **145**. Also, the communication unit **146** can transmit information to a PDA, a mobile phone, or a PC of a wearer using wired/wireless communication devices such as a wired communication using a USB or a wireless communication using Bluetooth.

[0041] While this invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by one skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

[0042] As described above, according to the present invention, a displacement sensor, a pressure sensor, an acceleration sensor, a position sensor, an electrocardiogram measurement sensor, an impedance measurement sensor, a blood pressure measurement sensor, and a temperature measurement sensor provide information regarding the health and position of a wearer by being included in a belt. Thus, health management can be conveniently and efficiently performed. As information regarding the position of a wearer is provided, the position of the wearer can be quickly identified in an emergency case.

[0043] Also, the electrocardiogram measurement module is included in the buckle so that an electrocardiogram using an external electrical potential sensor is possible. The impedance measurement module is included in the buckle so that a body fat rate and an abdominal fat rate of the human body can be obtained and thus, facilitating the management of abdominal obesity. Also, since the blood pressure measurement module is included in the buckle, blood pressure can be measured. Since the temperature measurement module is included in the buckle, the temperature of the human body can be measured. By including a wireless communication device and storing the information in a mobile phone or a PDA, not only temporary health information can be known, however, also health management and the prevention of obesity can be continuously performed.

[0044] Thus, by providing health information to a health-concerned individual, health management can be efficiently performed by providing information regarding to health. For an obese person, an efficient obesity management is possible by providing information regarding appropriate measurements to control the obesity. For a person having a cardiovascular disease, an unexpected cardiovascular problem can be quickly coped with by providing information regarding the heart rate and continuously monitoring the information. Furthermore, health can be continuously managed through a health management program including exercise.

1. A belt with a health management function, the belt comprising:

a health information extraction module extracting health related information from various biomedical signals;

a buckle housing the health information extraction module; and

a strap connected to an end of the buckle.

2. The belt of claim **1**, wherein the health information extraction module comprises:

a sensor module detecting the various biomedical signals; and

a process/extraction unit digitally processing the detected biomedical signals and extracting the health related information from the processed digital signals.

3. The belt of claim **2**, wherein the health information extraction module further comprises:

a communication unit transmitting the health related information to the outside; and

a display unit displaying the health related information.

4. The belt of claim **2**, wherein the sensor module includes a pressure sensor so that the process/extraction unit extracts abdominal pressure information.

5. The belt of claim **4**, wherein the process/extraction unit further extracts waist circumference information from the extracted abdominal pressure information.

6. The belt of claim **2**, wherein resistors are provided on an inner surface of the strap, and a displacement sensor is included in the sensor module to detect a change in the resistance of the resistors so that the process/extraction unit extracts waist circumference information.

7. The belt of claim **2**, wherein an acceleration sensor is provided in the sensor module so that the process/extraction unit extracts information regarding the number of walked steps and information regarding consumed calories.

8. The belt of claim **2**, wherein a position sensor is provided in the sensor module so that the process/extraction unit extracts information regarding the position of a user.

9. The belt of claim **2**, wherein an electrical potential sensor for an electrocardiogram is provided in the sensor module and the electrical potential sensor is connected to a connector, for the electrocardiogram, provided in the health information extraction module, through a lead wire, so that the process/extraction unit extracts information regarding the electrocardiogram of a user.

10. The belt of claim **2**, wherein an electrical potential sensor for a measurement of body fat is provided in the sensor module and the electrical potential sensor is connected to a connector, for the measurement of body fat, provided in the health information extraction module, through a lead wire, so that the process/extraction unit extracts information regarding body fat of a user.

11. The belt of claim **2**, wherein a temperature sensor for a measurement of temperature is provided in the sensor module and the temperature sensor is connected to a connector, for the measurement of temperature, provided in the health information extraction module, through a lead wire, so that the process/extraction unit extracts information regarding the temperature of a user.

12. The belt of claim **2**, wherein a blood pressure sensor for a measurement blood pressure is provided in the sensor module and the electrical potential sensor is connected to a connector, for the measurement of blood pressure, provided in the health information extraction module, through a lead wire, so that the process/extraction unit extracts information regarding the blood pressure of a user.

13. The belt of claim **1**, wherein a groove is formed in a surface of the buckle to facilitate a rotary opening/closing of the health information extraction module from the buckle.

* * * * *

专利名称(译)	带健康管理功能		
公开(公告)号	US20100240967A1	公开(公告)日	2010-09-23
申请号	US12/600182	申请日	2008-03-27
当前申请(专利权)人(译)	电子通信研究院 韩国产学合作基础天主教大学		
[标]发明人	KIM SEUNGHWAN PARK SUN HEE OH SOO YOUNG PYUN KWANG HO KIM KYUNG SOO SHIM IN SOP LA HYEN OH CHOI CHANG JIN KIM SE HONG		
发明人	KIM, SEUNGHWAN PARK, SUN-HEE OH, SOO-YOUNG PYUN, KWANG-HO KIM, KYUNG-SOO SHIM, IN-SOP LA, HYEN-OH CHOI, CHANG-JIN KIM, SE-HONG		
IPC分类号	A61B5/00		
CPC分类号	A61B5/02055 A61B5/021 A61B5/0402 A61B5/6831 A61B5/107 A61B5/11 A61B5/0537		
优先权	1020070046631 2007-05-14 KR		
外部链接	Espacenet USPTO		

摘要(译)

具有健康管理功能的带包括健康信息提取模块，其从各种生物医学信号中提取健康相关信息，包含健康信息提取模块的带扣，以及连接到带扣的一端的带子。健康信息提取模块包括检测各种生物医学信号的传感器模块，以及对检测到的生物医学信号进行数字处理并从处理后的数字信号中提取健康相关信息的处理/提取单元。