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(54) **PERSONAL HEALTH MONITOR AND A METHOD FOR HEALTH MONITORING**

GESUNDHEITSMONITOR UND VERFAHREN ZUR ÜBERWACHUNG DER GESUNDHEIT

DISPOSITIF DE CONTROLE DE LA SANTE PERSONNEL ET PROCEDE DE CONTROLE DE LA  
SANTE

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(56) References cited:  
**EP-A- 1 181 888 WO-A-03/075118**  
**US-A1- 2002 128 804 US-B1- 6 478 736**  
**US-B1- 6 579 231 US-B2- 6 513 532**  
**US-B2- 6 893 396**

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## Description

### Field of the invention

**[0001]** The invention relates to personal health monitors and methods for health monitoring and especially to a personal health monitor that includes a cellular phone, hand-held device or other personal data assistant.

### Background of the invention

**[0002]** The amount of hand-held devices and personal data accessories, such as cellular phones, PDA and etc. has dramatically increased during the last two decades. Multiple vendors across the globe invest increasing amounts of research and development efforts to provide highly sophisticated, highly complex cellular phones. The data processing power, Graphical User Interface (GUI) capabilities and computational power of cellular phones dramatically increased during the last decade, as well as the amount of various applications that are supported by modern cellular phones.

**[0003]** US patent 6,579,231 of Phipps titled "Personal medical monitoring unit and system" describes a portable unit worn by a subject that includes a dedicated medical monitoring device and a dedicated data processing module.

**[0004]** US patent 6,513,532 of Mault et al. titled "Diet and activity-monitoring device" describes a diet and activity monitoring device that includes a dedicated body activity monitor.

**[0005]** Modern cellular phones are adapted to support multimedia applications, data related applications, as well as various games. There are various manners to download software that is later executed by the cellular phone. There are various operating systems that are supported by cellular phones (Such as: Symbian, Linux, BREW, REX, RTX, PALM, PPC2003 and etc.). By utilizing cross-operating system software tools, such as the JAVA™ software suit, applications can be developed almost regardless of the operation systems.

**[0006]** Cellular phone vendors have also dramatically decreased the power consumption of their cellular phones, while increasing the efficiency of cellular phone batteries, thus allowing cellular phones to operate for prolonged periods, before recharging the cellular phone battery. Nevertheless, cellular phones are periodically recharged.

**[0007]** Figure 1 illustrates a prior art cellular phone 100 that includes a power connector 50 (also referred to as battery connector) for enabling an external device to charge the battery of the cellular phone, an antenna connector 52 (for connecting the cellular phone to an external antenna, such as a car mounted antenna), as well as an additional connector 56 (also referred to as system connector) for connecting the cellular phone to external devices such as audio amplifiers, hands free kit, external memory devices, communication link (RS232,USB and

etc.), special data communication link, and the like. The connectors 50,52 and 56 could be combined in one or two connectors. Other prior art cellular phones, such as some Nokia™ cellular phones, include a system connector and a battery connector. U.S patent 6,424,842 of Winstead titled "Dual function connector for cellular phones" provides a complex dual function connector that includes multiple contacts and slots.

**[0008]** Figure 2 illustrates a prior art cellular phone 100. Cellular phone 100 includes an internal or external antenna 2, RF module 4, base-band processor 6, processor 8, display 10, microphone 12, speakerphone 14, loud speakers 16, analog voice and audio mixer 18, earphones 19, digital to analog converter (DAC) 20, memory module 22, integrated camera 24, USB interface 26, external memory interface 28 and keypad and joystick module 40, Optional Wireless link interface (such as: Bluetooth, WLAN,UWB (Ultra Wide Band)or other wireless link).

**[0009]** The internal antenna 2 can be bypassed by an external antenna 102 that is connected to cellular phone 120 via an antenna connector 54. The power supply 108 is connected on one hand to power connector 50 for recharging battery 21 and is also connected to system connector 56 to provide power from the battery 21.

**[0010]** Cellular phone 100 is capable of: (i) receiving RF signals from antenna 2 or external antenna 102, and vice versa; (ii) receiving audio signals from microphone 12 or an external microphone that may be a part of a hands-free/car-kit assembly; (iii) providing audio signals to loud speakers 16 or to external loud speakers; (iv) receiving information signals such as data and/or video signals from an internal camera 24, or external devices such as an external camera a computer or other cellular phone. Serial Interface, Data link interface or USB interface 26 and external memory interface 28 may receive signals via system connector 56.

**[0011]** Antenna 2 or external antenna 102 receives and transmits Radio Frequency (RF) signals that are provided by or received from Radio Frequency (RF) module 4. RF module 4 is connected between antenna 2 and base-band processor 6 and is able to convert RF signals to base-band signals and vice versa. Base-band processor 6, display 10 and keypad and joystick module 40, as well as integrated camera 24, USB interface 26, external memory interface 28 and digital to analog converter (DAC) 20 are controlled by and connected to processor 8 that may execute various applications. Processor 8 is controlled by a software package that may include an operating system as well as many application software, including Java engines. The software package, as well as various information are stored at memory module 22 that may include RAM as well as ROM memory cells. Memory module 22 is connected to DAC 20 and processor 8. The software package includes at least one software that is related to the transmission of information between the cellular phone and a remote station. This software is also referred to as communication related

software.

**[0012]** Cellular phone 100 is able to receive, process and generate audio signals, by DAC 20 and base-band processor 6 that are connected to analog voice and audio mixer 18 that in turn is connected to speakerphone 14, loud speakers 16 and earphones 19. Base-band processor 6 is further connected to microphone 12. Keypad and joystick module 40 includes a multi-way Joystick and multiple keys and soft keys, positioned below display 10.

**[0013]** Cellular phone 100 also includes a short-range module 5, illustrated as being connected to base-band processor 6, for short-range wireless transmission and reception of information. This short-range wireless transmission and reception can be according to various standards, including the Bluetooth, WLAN, ZigB, Wi-Fi, WLAN, UWB and other standards. It is noted that module 5 can be connected to other components of the cellular phone 100. U.S. patent application 2004/0027244 of Menard, titled "Personal medical device communication system and method" provides a description of some prior art short-range and long-range transmission methods that are known in the art.

**[0014]** The following U.S. patent applications describe cellular phones that are capable of applying short-range transmission: U.S. patent application 20030114106 of Miyatsu et al., titled "Mobile internet solution using Java application combined with local wireless interface"; U.S. patent application 2003/0045235 of Mooney et al., titled "Smart bluetooth interface gateway to mate a non-bluetooth wireless device with a bluetooth headset"; and U.S. patent application 20030235186 of Park titled "Internet cordless phone".

**[0015]** U.S. patent application 20030114106 of Miyatsu et al. describes a telecommunications system and method for downloading application software to a local communications network via an external communications network. The local communications network comprises a plurality of devices including an interface device. The interface device includes an interface for interfacing with the external communications network for downloading an application software from an application software source to the interface device via the external communications network. The local communications network preferably comprises a local wireless network, such as a Bluetooth and wireless networks, and the external communications network preferably comprises a mobile communications network for downloading application software to a mobile phone of the local wireless network.

**[0016]** A cellular phone that does not include a short-range transceiver, such as a bluetooth transceiver can be connected to an adapter or other means that facilitates short-range communication with the phone. U.S. patent application 2003/0045235 of Mooney et al. describes a smart bluetooth interface gateway device that allows a bluetooth headset to establish an audio connection and communicate with a conventional wireless phone (e.g., a wireless phone that does not have bluetooth installed). The connection is controlled merely by monitoring the

presence of sound and tones in the audio stream from an analog audio jack of a conventional wireless phone. The smart bluetooth interface gateway device is attached to the wireless phone just as a wired headset would. Use of the wireless phone is the same as if a wired headset were plugged in.

**[0017]** Various methods and devices for monitoring the health of a person are known in the art. They include special hardware for gathering and processing physiological data and a wireless device utilizes for transmitting the gathered information. The special hardware is much less sophisticated and less efficient as the hardware of cellular phones. The development of dedicated hardware is usually costly.

**[0018]** The following U.S. patents and patent applications provide a brief review of state of the art systems and devices: U.S. patent application 2004/0027244 of Menard, titled "Personal medical device communication system and method"; U.S. patent 5390238 of Kirk, et al., titled "Health support system"; U.S. patent 5566676 of Rosenfeldt et al., titled "Pressure data acquisition device for a patient monitoring system"; U.S. patent 5772586 of Heinonen et al., titled "Method for monitoring the health of a patient", U.S. patent 5840020 of Heinonen et al., titled "monitoring method and a monitoring equipment" and U.S. patent 5983193 of Heinonen et al., titled "patient's nursing apparatus and nursing system".

**[0019]** U.S. patent 6366871 titled "Personal ambulatory cellular health monitor for mobile patient" of Geva describes an ambulatory patient monitoring apparatus including a portable housing including at least one physiological data input device operative to gather physiological data of the patient, location determination circuitry operative to determine geographic location information of the patient, cellular telephone communications circuitry for communicating the physiological data and the geographic location information to a central health monitoring station, voice communications circuitry. The patient conducts voice communications with a clinician at the central health monitoring station, digital signal processing circuitry for processing signals associated with any of the physiological data input device, the location determination circuitry, the cellular telephone communications circuitry, and the voice communications circuitry, and control circuitry for controlling any of the digital signal processing circuitry, the physiological data input device, the location determination circuitry, the cellular telephone communications circuitry, and the voice communications circuitry.

**[0020]** There is a need to provide an efficient method for health monitoring as well as an efficient personal health monitor.

## Summary of the invention

**[0021]** The invention provides a method for health monitoring, the method includes: (i) gathering physiological data, by a physiological data input device that in-

cludes at least one sensor, an analog amplifier, an analog comparator, an analog to digital converter and a burst transmitter; (ii) transmitting the physiological data to a multi-purpose personal data accessory; (iii) executing health monitoring software, by the multi-purpose personal data accessory to process the physiological data to provide processed physiological data; and (iv) transmitting the processed physiological data via long range transmission to a remote entity. The stage of transmitting the physiological data to a multi-purpose personal data accessory involves wireless short range transmission of the physiological data, and the short range transmission involves transmitting bursts that include physiological data. The invention provides a personal health monitor that includes: (i) a physiological data input device operative to gather physiological data that includes at least one sensor, an analog amplifier, an analog comparator, an analog to digital converter and a burst transmitter adapted to wirelessly short-range transmit the physiological data to a multi-purpose personal data accessory in bursts; and (ii) a multi-purpose personal data accessory that is adapted to execute health monitoring software such as to enable the multi-purpose personal data accessory to receive the physiological data, process the physiological data to provide processed physiological data and control a long range transmission of the processed physiological data to a remote entity.

#### Brief description of the drawings

[0022] Further features and advantages of the invention will be apparent from the description below. The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Figures 1-2 are schematic diagrams of a prior art cellular phone;

Figures 3-4 and 6 are schematic illustrations of a person that is wearing single or multiple physiological data input devices and also carries a cellular phone or PDA, according to an embodiment of the invention;

Figure 5 is a schematic illustration of a medical subsystem;

Figure 6 illustrates a plug-in unit, according to an embodiment of the invention;

Figure 7 illustrates a medical center as well as devices for gathering, processing and transmitting physiological data, according to an embodiment of the invention;

Figure 8 illustrates a example of the configuration of a health monitoring software that is implemented in the Cellular phone or PDA, according to an embod-

iment of the invention; and

Figure 9 is a flow chart of method for health monitoring, according to an embodiment of the invention.

#### Detailed description of the drawings

[0023] The following description mainly refers to monitoring a health of a person. It is noted that this method and monitors can be applied to track multiple persons simultaneously, such as tracking the performances of a team of players.

[0024] The following description also refers to a cellular phone that can be provided with health monitoring software that enables the cellular phone to process physiological data, and especially without any addition of complex hardware, such as additional processors. It is noted that the invention can be applied to other multi-task and/or multi-purpose accessories, especially personal data accessories (PDAs) other than cellular phones that in turn may include palm-computers and the like.

[0025] The following description describes various transmitters, such as short-range transmitters and long-range transmitters. Each transmitter is associated with a corresponding receiver, but for simplicity of explanation a larger emphasis was placed upon the transmitters.

[0026] It is noted that according to various embodiments of the invention the cellular phone (or other personal data accessory) can include a short-range transmitter for transmitting information (such as instructions) to various components (such as physiological data input devices, adapters and the like) that are equipped with corresponding short-range receivers.

[0027] The cellular phone that is referred to in the following figures can resemble the prior art cellular phone 100 of figures 1 and 2 but in addition has health monitoring software for processing physiological data.

[0028] Figures 3-4 are schematic illustrations of a personal health monitor 1 that includes one or more physiological data input devices and a cellular phone (or another PDA), according to various embodiment of the invention. Each figure illustrates one or more physiological data input devices that may include at least one of the following devices: an electrocardiograph (ECG) input device, a device for monitoring blood oxygen saturation, a device for monitoring respiration, a device for monitoring blood glucose, a device for monitoring blood pressure, a device for monitoring lung function, a device for monitoring SpO2 saturation, a device for monitoring temperature, a device for fat analysis, a drug dispenser, drug taking reminder, a container device, a fetal heart rate monitor device for pregnancy women, EEG device and the like. Each physiological data input device includes at least one sensor and includes analog components, an analog amplifier and an analog comparator. Such a physiological data input device also includes an analog to digital converter (ADC), although such an ADC is typically located within another component that is connected to

the physiological data input device.

**[0029]** Figure 3 illustrates a person 200 that is wearing a physiological data input device 202 operative to gather physiological data. In this figure the sensors 202 are connected to person 200 by a sticker, but this is not necessarily so. The sensors 202 can be connected to an elastic stripe or some type of belt that in turn is worn by person 200.

**[0030]** The sensor 202 is connected by wire 204 to a short-range transmitter 206 or the sensor 202 is embedded in the 206. The short-range transmitter 206 is adapted to wirelessly transmit the gathered physiological data to cellular phone 210 or other personal data accessory. Either the sensor 202 or the short-range transmitter 206 include an analog to digital converter for providing a digital stream of signals representative of the physiological condition of the person 200.

**[0031]** According to the invention the short-range transmitter 206 transmits the physiological data to the cellular phone 210 in bursts. Burst transmitters do not require additional explanation. Typically, such a transmitter includes one or more buffers or other memory components (such as a stack, multiple memory cells and the like), for storing data before being transmitted in bursts. The bursts can be transmitted whenever a certain transmission condition is fulfilled (for example - the one or more buffers are full), or in a predefined manner. The burst rate is usually responsive to a ratio between the sampling-rate of the physiological data provided by the physiological data input device and between the transmission bitrate. Typically the sampling-rate is at selected such as to fulfill the Nyquist condition.

**[0032]** The short-range transmitter 206 can apply error corrections algorithms, such as CRC, in order to compensate for possible errors in the short-range transmission. The short-range transmission can be implemented in a standard manner, for example according to the Bluetooth standard, but this is not necessarily so.

**[0033]** Figure 4 illustrates another embodiment of the invention in which multiple physiological input devices 202 are connected to an adapter 214 that in turn may generate a multiplexed signal stream that includes signals from one or more of the multiple physiological input devices 202. The adapter 214 conveniently includes one or more analog to digital converters, buffers and a short-range transmitter 206.

**[0034]** According to an embodiment of the invention the adaptor 214 can include a medical sub-system that facilitates the connection of multiple physiological input devices 202 of various types. Such a medical sub-system is described, for example, in U.S. patent 6366871 titled "Personal ambulatory cellular health monitor for mobile patient" of Geva.

**[0035]** Figure 5 illustrates a medical sub-system 100 that includes a multiplexing and analog to digital converter 124 that is connected to multiple analog components such as EEG amplifier 103, ECG amplifier, respiration circuit 109, NBP circuit 113, air flow amplifier 117, SpO2

circuit 119, temperature circuit 121 and glucose circuit 123 that in turn are connected to various sensors such as EEG electrodes 101, ECG electrodes 105, a pressure cuff 110 for measuring NIBP, and an air flow sensor 114 for measuring spirometry, finger sensor 118, temperature sensor 120 and glucose sensor 122. The sensors can be connected directly to the analog circuits or via various connectors or plugs, such as plugs 102, 106, 107, 115, as well as via EEG multiplexer 104. Some of the plugs, such as plug 107, can be used for connecting a first sensor or another sensor, and the connector includes circuitry for determining which sensor is actually connected to the plug.

**[0036]** Figure 6 illustrates another embodiment of the invention in which the person 200 carries one or more physiological data input devices, comprising a sensor 202, as well as a personal location subsystem 222 capable of determining a location of the person 200. Thus, location information is also sent to the cellular phone 210 and then long-range transmitted to a remote station (not shown).

**[0037]** The personal location subsystem 222 determines the location of person 200. It usually includes known location determination circuitry such as GPS components including a GPS receiver and a filter that is tuned to a known GPS frequency for GPS satellite communication via a built-in antenna. The personal location subsystem 222 conveniently receives a pseudo range (PR) and pseudo range dot (PRD) from GPS satellites in communication range. The GPS receiver preferably operates in aided mode enabling "snapshot" operation as is known in GPS systems. The position of person 200 and velocity data is conveniently transmitted via a short-range transmitter 206 and to cellular phone 210.

**[0038]** The location of person 200 can be transmitted in predetermined events (Such as location, Distance, Velocity and such as system initialization) or automatically.

**[0039]** Reference is now made to Figure 7 which is a simplified block diagram illustrating end-to-end communication between a physiological data input devices 202 worn by two persons 200 and 201 and between a remote medical center 230, according to an embodiment of the invention.

**[0040]** The sensor 202 worn by the first person 200 is connected by wire 204 to a short-range transmitter 206. The short-range transmitter 206 transmits physiological data to cellular phone 210 where the data is processed. The cellular phone 210 is capable of determining whether to transmit the processed physiological data, to transmit a portion of the data or not to transmit it at all.

**[0041]** The cellular phone 210 is connected over a cellular network that is represented by wireless link 240 or via another network such as Internet 244 to a remote medical center 250. The remote medical station 250 can be connected to various databases and accessories 242 via another network such as the Internet 244.

**[0042]** The second person 201 also wears a sensor 202 that is connected by wire 204 to a short-range trans-

mitter 206 that in turn transmits physiological data towards short-range receivers 246 that are capable of transmitting the data to the remote medical center 250 via a WLAN, Cable TV, Satellite TV, CCTV, Telephone line, GSM/GPRS, CDMA, TDMA, iTV, Internet and other network represented by link 248. In this scenario the gathered physiological data can be analyzed by the short-range receiver 246 (or more specifically by a processor that is connected to the receiver). In case of the cable TV, CCTV, iTV, Satellite TV and etc the TV device might be the GUT interface device for user.

**[0043]** Various remote medical centers are also known as central medical monitoring stations and are known in the art. Such a center is described at U.S patent 6366871 titled "Personal ambulatory cellular health monitor for mobile patient" of Geva. It is noted that Geva describes a monitor that is capable of vocal communication with the person, and this feature can be implemented by using the cellular phone 210.

**[0044]** The physiological data input devices and the cellular phone 210 can operate in various modes that include: (i) Event recording activated by the person, either at the person initiative, a third party (such as a clinician) initiative, or pursuant to an alarm, where the person performs one or more tests and transmits processed physiological data to the remote medical center 230. In this mode the remote medical center 230 may be contacted at the beginning of the event for transmission of processed physiological data during the event or at the conclusion of the testing. (ii) Continuous monitoring where physiological data are captured periodically and transmitted to the remote medical center 230. Continuous monitoring may be provided in any of the following ways: Patient-activated event recorder where processed pre-event/event/post-event data is transmitted to the remote medical center 230; Device-activated event recorder where physiological data is detected which fall outside preset parameters; Holter-mode where processed physiological data is transmitted automatically when a buffer of an adaptor or a memory space of the cellular phone allocated for storing the processed (or non processed) physiological data becomes full; and Holter-mode where processed physiological data is transmitted by a person at any time.

**[0045]** Figure 8 illustrates a configuration of the health monitoring software 300, according to an embodiment of the invention. The health monitoring software 300 includes a driver/API 310 between the cellular phone and the wireless network for long-range transmission of processed physiological data, for example in accordance to GPRS, CDMA, GSM and the like. The health monitoring software also includes an API or driver 312 for the short-range or wired data link through which the cellular phone receives the physiological data. The health monitoring software also includes physiological data processing software components 314 as well as user interface software components 316.

**[0046]** It is noted that other software configurations can

be utilized. It is also noted that the drivers/ API can be a part of the non-medical software components of the Cellular phone. For example, a cellular phone that has an embedded short-range receiver includes a short-range communication software module, regardless the presence of the medical application.

**[0047]** The user interface component 316 can apply various known in the art techniques, such as but not limited to a menu based interface in which the person can make various selections between various options that are displayed over the display of the cellular phone. It is also noted that given the advanced multimedia capabilities of modem phones the user interface can also include receiving vocal input and outputting vocal output.

**[0048]** The physiological data processing software component 314 can apply various well-known algorithms for processing the physiological data.

**[0049]** For example, the software can enable the personal health monitor 1 to perform at least one of the following: (i) automatic arrhythmia analysis in different quantization levels (up to 8 bits) in different sampling rates (including 100 Hz), (ii) perform one lead arrhythmia detection in various noise conditions, (iii) perform continuous automatic adaptation to the patient normal heart-beat morphology, (iv) perform continuous real time processing and provide, on request, a summary of the patient heart condition, (v) perform environmental and adaptive noise/movement artifact elimination, (vi) enable the person to adjust the definitions of the pathology sequences detected by the system (for example the number of consecutive PVC heartbeats and the minimum heart rate to define VT) and others.

**[0050]** The health monitoring software 300 can detect various medical events and determine a medical state of a person. In some operational modes out of the mentioned above modes an occurrence of a medical event can initiate a transmission of processed physiological data and even cause the cellular phone 210 to generate an audio an/or visual alarm message. This health monitoring software 300 can process received physiological data to determine the occurrence of the following: isolated premature ventricular contraction (PVC), isolated premature atrial contraction (PAC), bigeminy, trigeminy, couplet, bradycardia, tachycardia, ventricular tachycardia, supra-ventricular tachycardia. The software can detect a morphology change, perform PR, ST, QRS, QT segmentation. Heart Rate Variability (HRV) analysis and QT Analysis, and the like.

**[0051]** According to various embodiments of the invention the health monitoring software 300 can cause the cellular phone to display graphs or other visual representations of the monitored physiological data. According to an embodiment of the invention the cellular phone 210 is capable of retrieving medical information related to the person, and displaying the retrieved medical information. In order to prevent unauthorized use of such a feature the cellular phone can apply various measures such as password protection, biometric measures and the like.

The following scenarios provide example of the interaction between the person and the monitor. A sugar level test includes the following stages: the person initialized the test by pressing a certain button, the person inserts a strip in a strip chamber of the plug-in device, the person places a drop of blood on the strip, the plug in sends physiological data reflecting the content of that drop to the cellular phone 210 that in turn processes the gathered physiological data to determine the level of sugar. The person can also view pervious sugar level tests, for example during a time period defined by the person. The cellular phone can display a history trend graph of results with normal level highlighted in a different color. A ECG test can include the following stages: the person presses on a certain button, the person places his fingers on an electrode, the personal physiological monitor retrieves and processes physiological data to determine the stage of the person, a cardiogram is displayed on the monitor of the cellular phone. The person can see the result of previous tests and/or determine whether to save the results of the current test, and the like.

**[0052]** Figure 9 is a flow chart of method 500 for health monitoring, according to an embodiment of the invention.

**[0053]** Method 500 starts by stage 510 of gathering physiological data, conveniently by one or more physiological data input devices. Conveniently, one of the configurations illustrated at Figures 3-4, 6 can be used. Data is gathered by one or more physiological data input device.

**[0054]** Stage 510 is followed by stage 520 of providing the physiological data to a cellular phone or other personal data accessory. This stage can include short-range transmission of the physiological data, wire based transmission and the like.

**[0055]** Stage 520 is followed by stage 530 of processing the physiological data to provide processed physiological data. Stage 530 may include applying various well-known algorithms, such as those previously mentioned.

**[0056]** Stage 530 is followed by stage 540 of transmitting the processes physiological data, conveniently to a remote medical center. This stage usually includes long-range transmission of the information.

**[0057]** According to another embodiment of the invention the analyzed physiological data as well as optional information from the personal location can be sent to a center, such as medical center 250 and may be utilized for providing and controlling a diet and/or exercise regime. For example, a person starts to run and begins to transmit location information. This location information along with the timing of its transmission can be used to determine if the person runs, the distance that he runs and even an estimated calorie consumed during this running session. This data can be added to physiological data such as heart rate and fat measurement to provide an indication about the progress of the person in a diet physical fitness regime. The cellular phone 210 can be used to send the person indications about scheduled

meals, physical exercises, and the like.

**[0058]** It will be appreciated by persons skilled in the art that the present invention is not limited to what has been particularly shown and described hereinabove. Rather, the scope of the present invention is defined only by the claims.

## Claims

1. A personal health monitor (1) comprising:

a physiological data input device (202, 202', 206) operative to gather physiological data; wherein the physiological data input device includes at least one sensor (202, 202'), an analog amplifier (108), an analog comparator, an analog to digital converter (124); in bursts; a multi-purpose personal data accessory (210), whereas the multi-purpose personal data accessory (210) is adapted to execute health monitoring software to enable the multi-purpose personal data accessory to receive the physiological data, process the physiological data to provide processed physiological data and control a long range transmission of the processed physiological data to a remote entity; and **characterised in that** the physiological data input device further comprises a burst transmitter (206) adapted to wirelessly short-range transmit the physiological data to a multi-purpose personal data accessory (210).

2. The personal health monitor (1) of claim 1 wherein the multi-purpose personal data accessory (210) is a cellular phone or Hand-Held device.

3. The personal health monitor (1) of claim 1 wherein the multi-purpose personal data accessory (210) comprises a battery and wherein the physiological data input device is adapted to receive power from the battery.

4. The personal health monitor (1) of claim 1 further comprising a location determination circuitry (222) for providing location information to the multi-purpose personal data accessory (210).

5. The personal health monitor (1) of claim 1 wherein the multi-purpose personal data accessory (210) is adapted to long range transmit the physiological data input if it determines that a medical event has occurred.

6. A method (500) for health monitoring, comprising: gathering (510) physiological data, by a physiological data input device that includes at least one sensor (202, 202'), an analog amplifier (108), an analog

comparator, an analog to digital converter (124) and a burst transmitter (206); the method comprising transmitting (520) the physiological data to a multi-purpose personal data accessory; executing (530) health monitoring software, by the multi-purpose personal data accessory to process the physiological data to provide processed physiological data; and transmitting (540) the processed physiological data via long range transmission to a remote entity, wherein the method is further **characterised in that** the stage of transmitting the physiological data to a multi-purpose personal data accessory involves wireless short range transmission of the physiological data, and wherein the wireless short range transmission involves transmitting bursts that comprise physiological data.

7. The method (500) of claim 6 wherein the multi-purpose personal data accessory is a cellular phone or Hand-Held device.
8. The method (500) of claim 6 further comprising receiving power from the multi-purpose personal data accessory.
9. The method (500) of claim 6 further comprising providing location information to the personal data accessory.
10. The method (500) of claim 6 further comprising long range transmitting the processed physiological data if a medical event occurs.
11. The personal health monitor (1) of claim 1 wherein the multi-purpose personal data accessory is an interactive television.
12. The personal health monitor (1) of claim 1 wherein the physiological data comprises a weight indication.
13. The personal health monitor (1) of claim 1 wherein said long-range transmission is performed over a network that is configured according to one of the following standards: WLAN, GSM, GPRS, CDMA, TDMA, Satellite TV, iTV, Cable TV and CCTV.
14. The personal health monitor (1) according to claim 1 wherein said short range or long range transmission involves allocating at least one SDIO/SD/MMC/CF slot.
15. The personal health monitor of claim 1 wherein the physiological data input device (202, 202') comprises a IRDA transmitter.

## Patentansprüche

1. Individualgesundheitsüberwachungsvorrichtung (1), Folgendes umfassend:

eine Eingabevorrichtung (202, 202', 206) für physiologische Daten, die funktionsfähig ist, physiologische Daten zu sammeln; wobei die Eingabevorrichtung für physiologische Daten mindestens einen Sensor (202, 202'), einen analogen Verstärker (108), einen analogen Komparator, einen AD-Wandler (124) umfasst, ein Mehrzweck-Individualdatenzubehörteil (210), wobei das Mehrzweck-Individualdatenzubehörteil (210) dazu angepasst ist, eine Gesundheitsüberwachungssoftware ablaufen zu lassen, um es dem Mehrzweck-Individualdatenzubehörteil zu ermöglichen, die physiologischen Daten aufzunehmen, die physiologischen Daten zu verarbeiten, um verarbeitete physiologische Daten bereitzustellen und eine Fernbereichsübertragung der verarbeiteten physiologischen Daten an eine abgesetzte Entität zu steuern;

und **dadurch gekennzeichnet, dass** die Eingabevorrichtung für physiologische Daten darüber hinaus einen Burstsender (206) umfasst, der zu einer drahtlosen Nahbereichsübertragung der physiologischen Daten in Bursts an das Mehrzweck-Individualdatenzubehörteil (210) angepasst ist.

2. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, wobei es sich bei dem Mehrzweck-Individualdatenzubehörteil (210) um ein Mobiltelefon oder ein Handgerät handelt.
3. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, wobei das Mehrzweck-Individualdatenzubehörteil (210) eine Batterie umfasst, und wobei die Eingabevorrichtung für physiologische Daten dazu angepasst ist, Energie aus der Batterie zu erhalten.
4. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, darüber hinaus eine Standortbestimmungsschaltung (222) umfassend, um dem Mehrzweck-Individualdatenzubehörteil (210) Standortinformationen bereitzustellen.
5. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, wobei das Mehrzweck-Individualdatenzubehörteil (210) zu einer Fernbereichsübertragung der eingegebenen physiologischen Daten angepasst ist, wenn es bestimmt, dass ein medizinisches Ereignis eingetreten ist.
6. Verfahren (500) zu Gesundheitsüberwachung, Fol-



gendes umfassend:

- Sammeln (510) physiologischer Daten durch eine Eingabevorrichtung für physiologische Daten, die mindestens einen Sensor (202, 202'), einen analogen Verstärker (108), einen analogen Komparator, einen AD-Wandler (124) und einen Burst-Sender (206) umfasst; wobei das Verfahren umfasst, die physiologischen Daten an ein Mehrzweck-Individualdatenzubehörteil zu übertragen (520); eine Gesundheitsüberwachungssoftware durch das Mehrzweck-Individualdatenzubehörteil ablaufen zu lassen (530), um die physiologischen Daten zu verarbeiten, um verarbeitete physiologische Daten bereitzustellen; und die verarbeiteten physiologischen Daten über eine Fernbereichsübertragung an eine abgesetzte Entität zu übertragen (540), wobei das Verfahren darüber hinaus **dadurch gekennzeichnet ist, dass** die Stufe des Übertragens der physiologischen Daten an das Mehrzweck-Individualdatenzubehörteil eine drahtlose Nahbereichsübertragung der physiologischen Daten mit sich bringt, und wobei es die drahtlose Nahbereichsübertragung mit sich bringt, Bursts zu übertragen, die physiologische Daten umfassen.
7. Verfahren (500) nach Anspruch 6, wobei es sich bei dem Mehrzweck-Individualdatenzubehörteil um ein Mobiltelefon oder ein Handgerät handelt.
  8. Verfahren (500) nach Anspruch 6, darüber hinaus umfassend, Energie aus dem Mehrzweck-Individualdatenzubehörteil zu erhalten.
  9. Verfahren (500) nach Anspruch 6, darüber hinaus umfassend, dem Individualdatenzubehörteil Standortinformation bereitzustellen.
  10. Verfahren (500) nach Anspruch 6, darüber hinaus eine Fernbereichsübertragung der verarbeiteten physiologischen Daten umfassend, wenn ein medizinisches Ereignis eintritt.
  11. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, wobei es sich bei dem Mehrzweck-Individualdatenzubehörteil um einen interaktiven Fernseher handelt.
  12. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, wobei die physiologischen Daten eine Gewichtsangabe umfassen.
  13. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, wobei die Fernbereichsübertragung über ein Netz erfolgt, das nach einem der folgenden Standards konfiguriert ist: WLAN, GSM,

GPRS, CDMA, TDMA, Satelliten-TV, iTV, Kabel-TV und CCTV.

14. Individualgesundheitsüberwachungsvorrichtung (1) nach Anspruch 1, wobei die Nahbereichs- oder Fernbereichsübertragung eine Zuteilung mindestens eines SDIO/SD/MMC/CF-Schlitzes mit sich bringt.
15. Individualgesundheitsüberwachungsvorrichtung nach Anspruch 1, wobei die Eingabevorrichtung (202, 202') für physiologische Daten einen IRDA-Sender umfasst.

## 15 Revendications

1. Dispositif de contrôle de la santé personnel (1) comprenant :

un dispositif d'entrée de données physiologiques (202, 202', 206) fonctionnel pour collecter des données physiologiques ; le dispositif d'entrée de données physiologiques incluant au moins un capteur (202, 202'), un amplificateur analogique (108), un comparateur analogique, et un convertisseur analogique-numérique (124) ;

un accessoire de données personnel multi-usage (210), l'accessoire de données personnel multi-usage (210) étant apte à exécuter un logiciel de contrôle de la santé pour permettre à l'accessoire de données personnel multi-usage de recevoir les données physiologiques, de traiter les données physiologiques afin de fournir des données physiologiques traitées et de commander une transmission à longue distance des données physiologiques traitées vers une entité distante ;

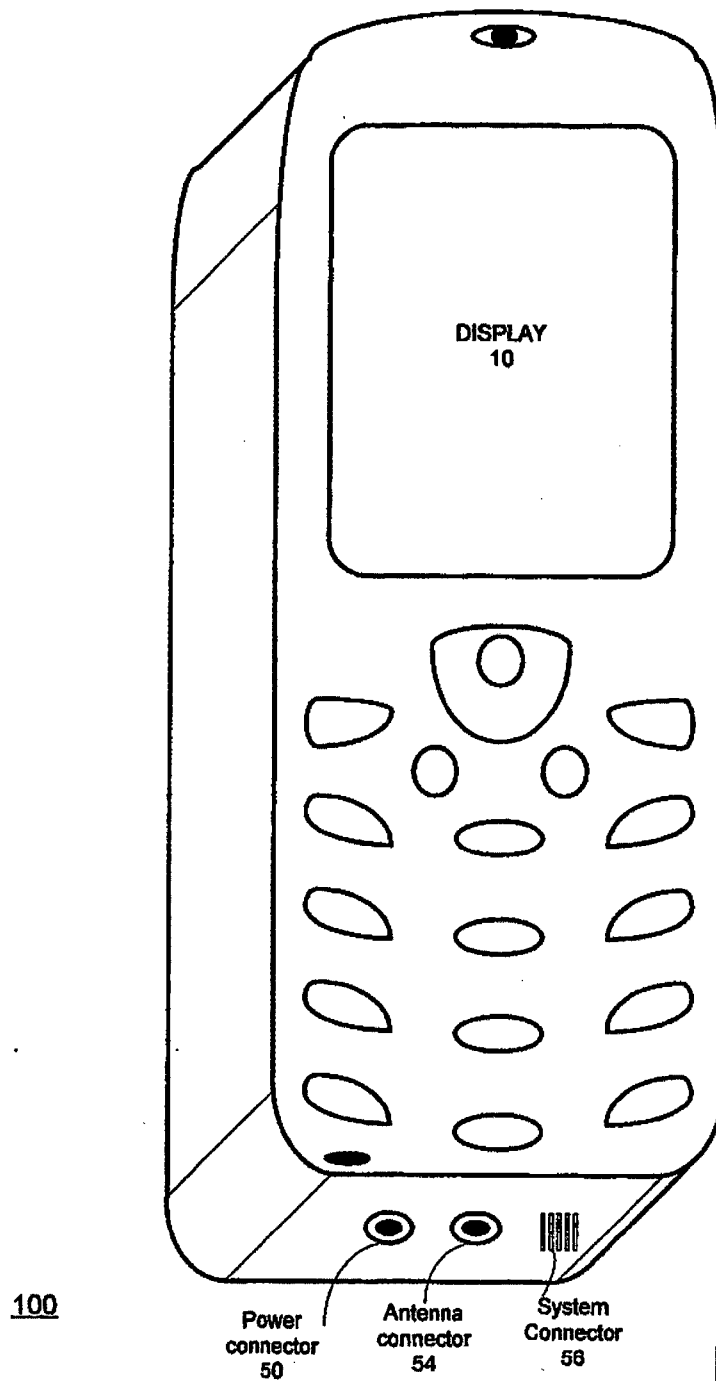
**et caractérisé en ce que** le dispositif d'entrée de données physiologiques comprend en outre un transmetteur de rafales (206) apte à transmettre sans fil, à courte distance, les données physiologiques à l'accessoire de données personnel multi-usage (210) par rafales.

2. Le dispositif de contrôle de la santé personnel (1) de la revendication 1, dans lequel l'accessoire de données personnel multi-usage (210) est un téléphone cellulaire ou un appareil portatif.

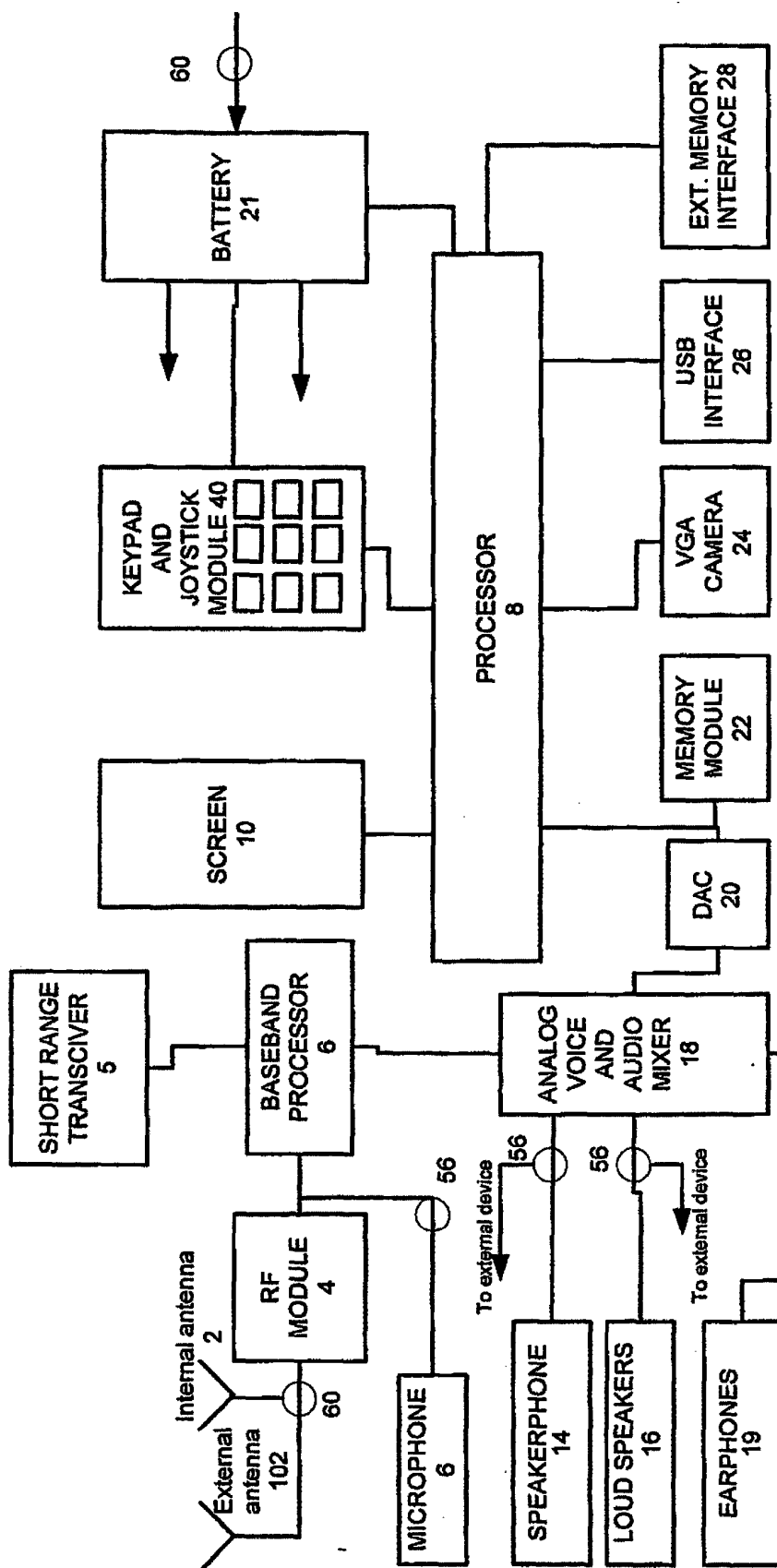
3. Le dispositif de contrôle de la santé personnel (1) de la revendication 1, dans lequel l'accessoire de données personnel multi-usage (210) comprend une batterie et dans lequel le dispositif d'entrée de données physiologiques est apte à recevoir du courant de la batterie.

4. Le dispositif de contrôle de la santé personnel (1) de

- la revendication 1, comprenant en outre un circuit de détermination d'emplacement (222) pour fournir des informations d'emplacement à l'accessoire de données personnel multi-usage (210).
5. Le dispositif de contrôle de la santé personnel (1) de la revendication 1, dans lequel l'accessoire de données personnel multi-usage (210) est apte à transmettre à longue distance les données physiologiques entrées s'il détermine qu'un événement médical s'est produit.
  6. Procédé (500) de contrôle de la santé, comprenant : la collecte (510) de données physiologiques, moyennant un dispositif d'entrée de données physiologiques qui inclut au moins un capteur (202, 202'), un amplificateur analogique (108), un comparateur analogique, un convertisseur analogique-numérique (124) et un transmetteur de rafales (206) ; le procédé comprenant la transmission (520) des données physiologiques à un accessoire de données personnel multi-usage ; l'exécution (530) d'un logiciel de contrôle de la santé, moyennant l'accessoire de données personnel multi-usage, pour traiter les données physiologiques afin de fournir des données physiologiques traitées ; et la transmission (540) des données physiologiques traitées par transmission à longue distance à une entité distante, le procédé étant en outre **caractérisé en ce que** l'étape de transmission des données physiologiques à l'accessoire de données personnel multi-usage implique une transmission sans fil à courte distance des données physiologiques, et la transmission sans fil à courte distance impliquant la transmission de rafales comprenant des données physiologiques.
  7. Le procédé (500) de la revendication 6, dans lequel l'accessoire de données personnel multi-usage est un téléphone cellulaire ou un appareil portable.
  8. Le procédé (500) de la revendication 6, comprenant en outre la réception de courant depuis l'accessoire de données personnel multi-usage.
  9. Le procédé (500) de la revendication 6, comprenant en outre la fourniture d'informations d'emplacement à l'accessoire de données personnel.
  10. Le procédé (500) de la revendication 6, comprenant en outre la transmission à longue distance des données physiologiques traitées si un événement médical se produit.
  11. Le dispositif de contrôle de la santé personnel (1) de la revendication 1, dans lequel l'accessoire de données personnel multi-usage est une télévision interactive.
  12. Le dispositif de contrôle de la santé personnel (1) de la revendication 1, dans lequel les données physiologiques comprennent une indication de poids.
  13. Le dispositif de contrôle de la santé personnel (1) de la revendication 1, dans lequel ladite transmission à longue distance est effectuée via un réseau qui est configuré en fonction d'un des standards suivants : WLAN, GSM, GPRS, AMRC, AMRT, TV par satellite TV, iTV, télédistribution, et CCTV.
  14. Le dispositif de contrôle de la santé personnel (1) selon la revendication 1, dans lequel ladite transmission à courte distance ou à longue distance implique l'affectation d'au moins un créneau SDIO/SD/MMC/CF.
  15. Le dispositif de contrôle de la santé personnel de la revendication 1, dans lequel le dispositif d'entrée de données physiologiques (202, 202') comprend un transmetteur IRDA.



**FIGURE 1**



**FIGURE 2**

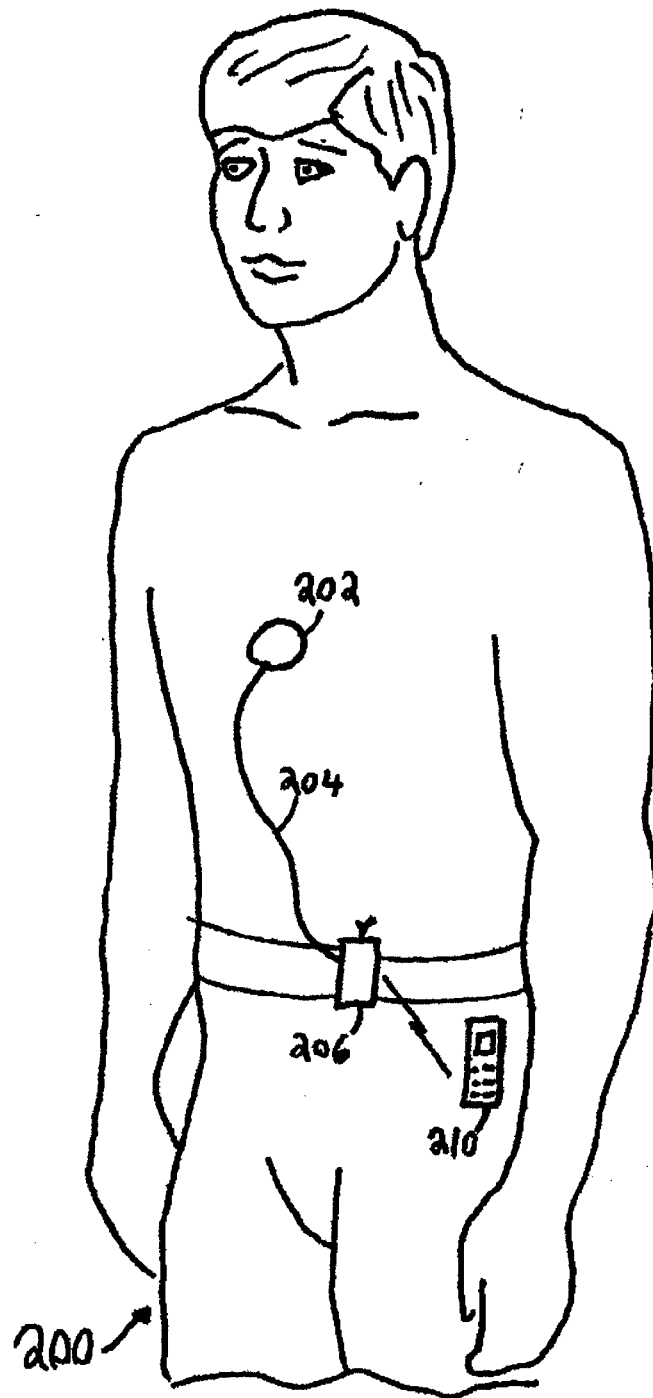


FIGURE 3

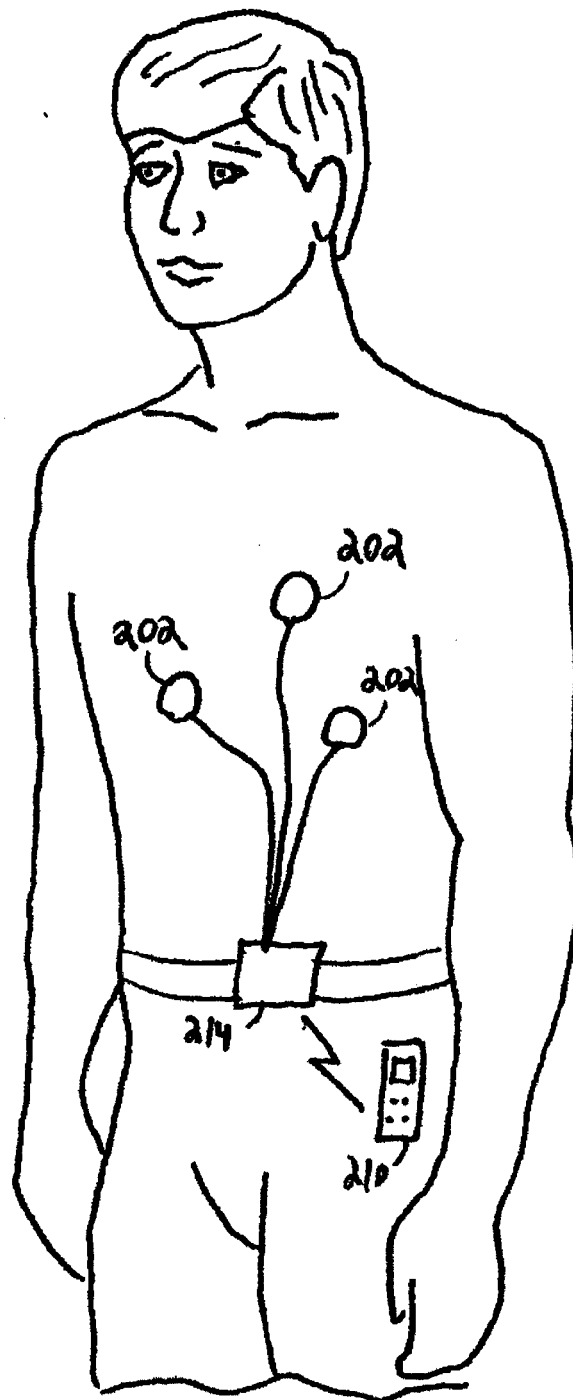
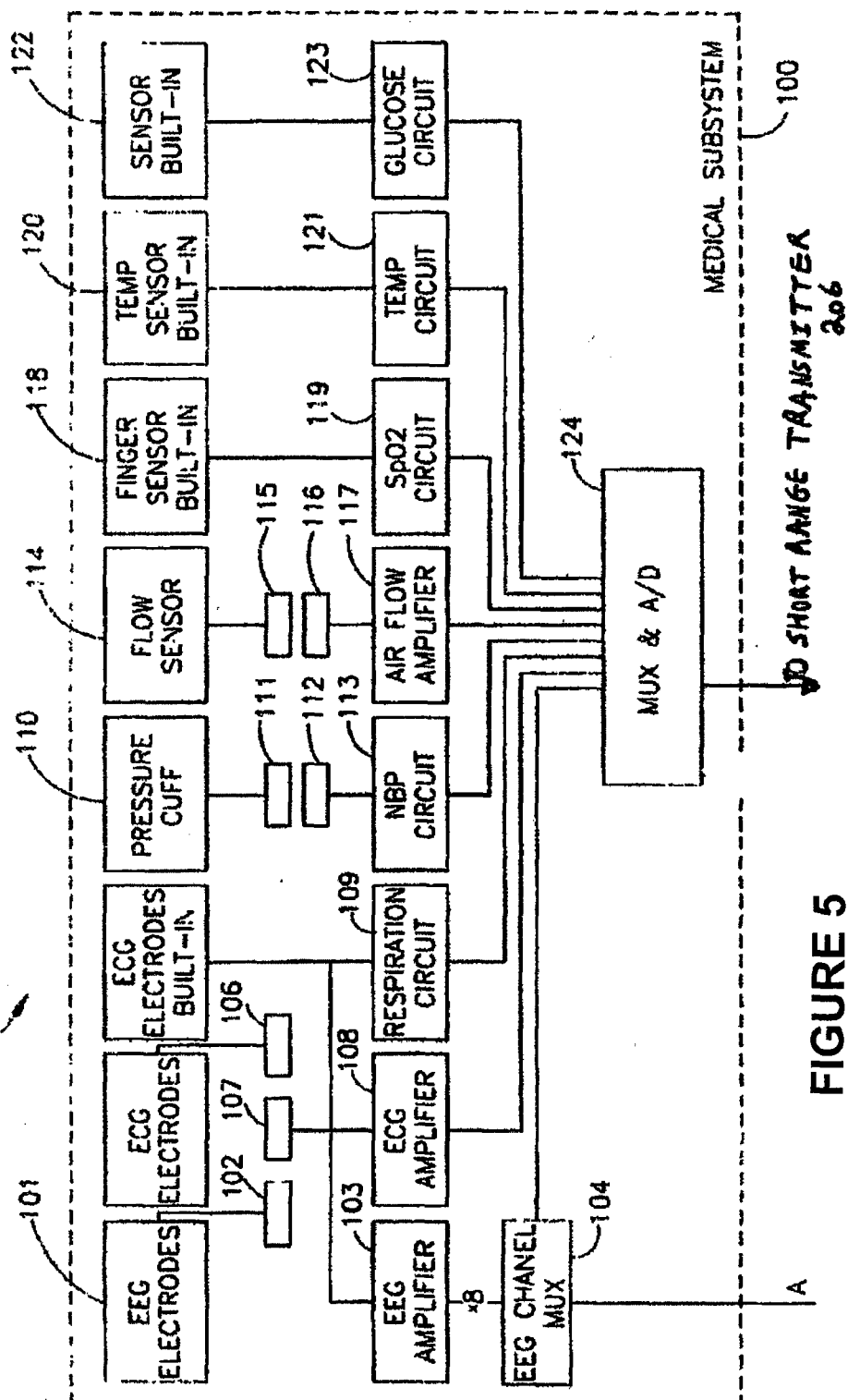


FIGURE 4



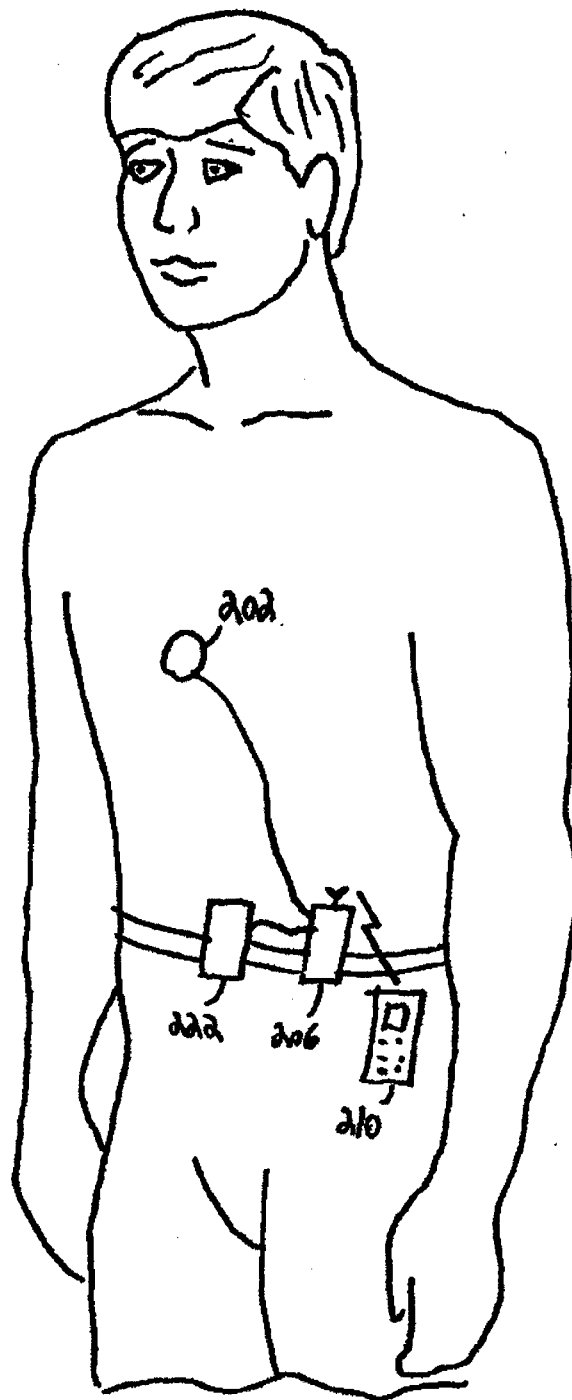


FIGURE 6



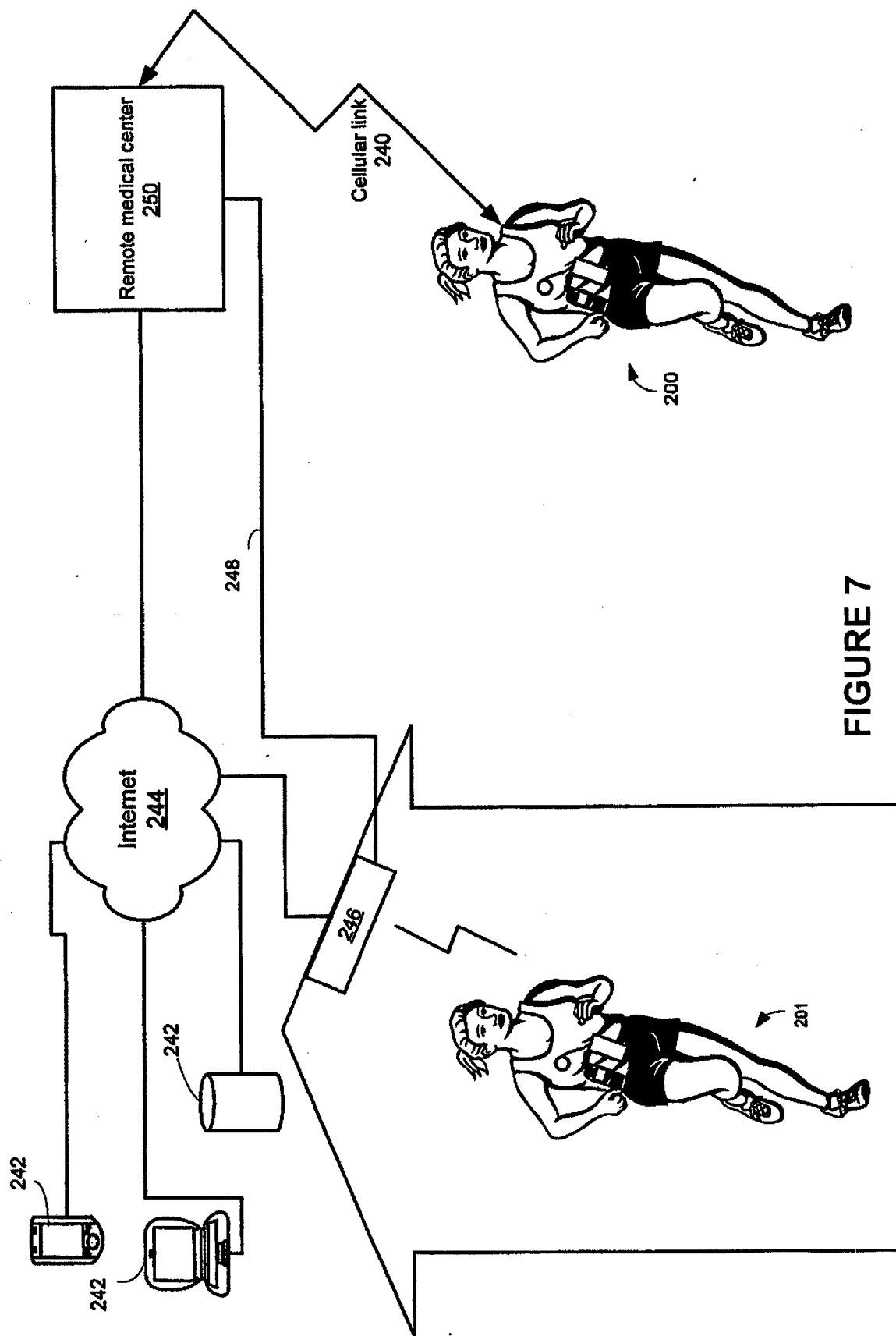
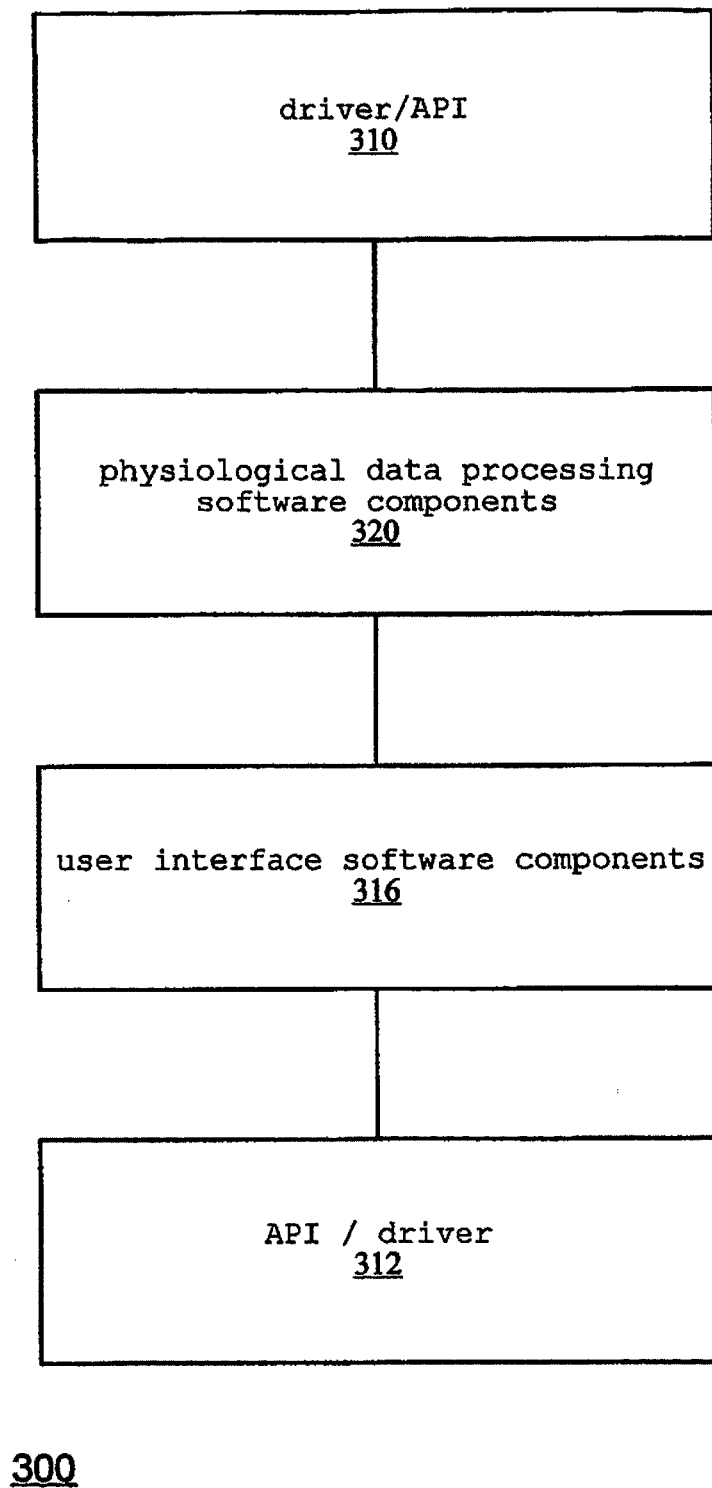
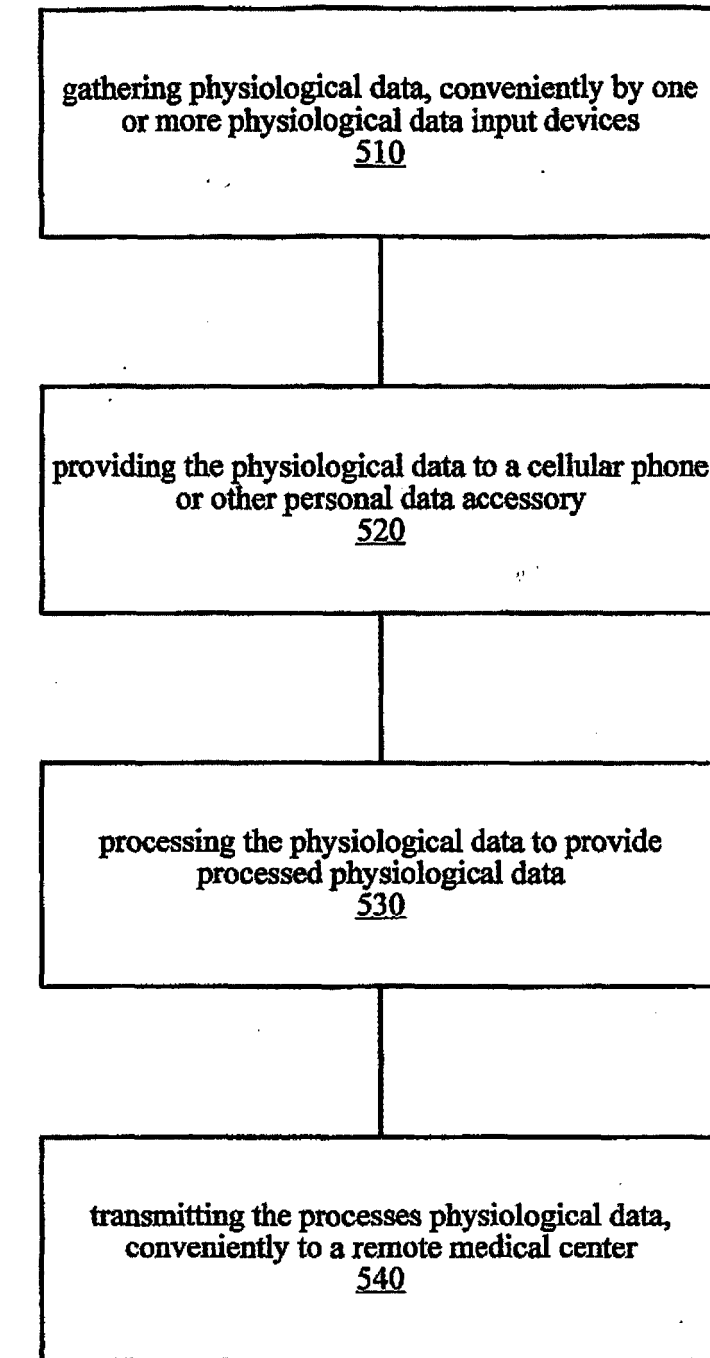


FIGURE 7



**FIGURE 8**



500

**FIGURE 9**

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- US 6579231 B, Phipps **[0003]**
- US 6513532 B, Mault **[0004]**
- US 6424842 B, Winstead **[0007]**
- US 20040027244 A, Menard **[0013] [0018]**
- US 20030114106 A, Miyatsu **[0014] [0015]**
- US 20030045235 A, Mooney **[0014] [0016]**
- US 20030235186 A, Park **[0014]**
- US 5390238 A, Kirk **[0018]**
- US 5566676 A, Rosenfeldt **[0018]**
- US 5772586 A, Heinonen **[0018]**
- US 5840020 A, Heinonen **[0018]**
- US 5983193 A, Heinonen **[0018]**
- US 6366871 B **[0019] [0034] [0043]**

专利名称(译)	个人健康监测和健康监测方法		
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[标]申请(专利权)人(译)	卡式监控科学保健有限公司		
申请(专利权)人(译)	CARD GUARD科技有限公司生存.		
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优先权	10/876139 2004-06-23 US		
其他公开文献	EP1893076A4 EP1893076A2		
外部链接	<a href="#">Espacenet</a>		

#### 摘要(译)

本发明提供一种个人健康监视器，其包括可操作以收集生理数据的生理数据输入设备；个人数据附件，而个人数据附件适于执行健康监测软件，例如使个人数据附件能够接收生理数据，处理生理数据以提供生理数据并控制处理的远程传输生理数据到远程实体。本发明提供一种健康监测方法，该方法包括：采集生理数据，将生理数据提供给个人数据配件；执行健康监测软件处理生理数据，提供处理后的生理数据；并传输处理过的生理数据。

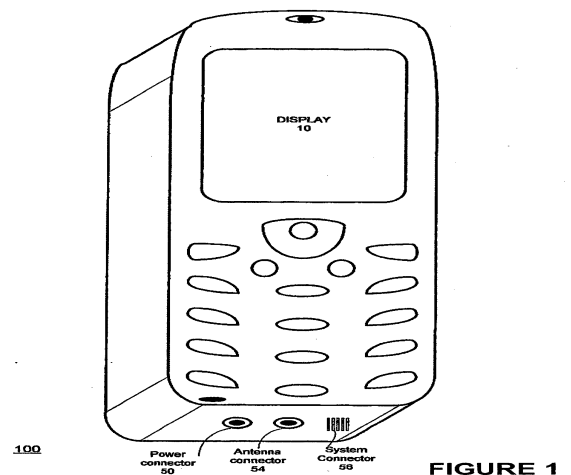


FIGURE 1