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(54) METHOD AND DEVICE WITH CUSTOMIZABLE POWER MANAGEMENT

VERFAHREN UND VORRICHTUNG MIT ANPASSBARER LEISTUNGSVERWALTUNG

PROCÉDÉ ET DISPOSITIF À GESTION D'ÉNERGIE PERSONNALISABLE

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Description

BACKGROUND

Field

[0001] The present disclosure relates to a method and device with customizable power management.

Introduction

[0002] Watch phones have been around for some time and the form factor has not gained much consumer attention. Perhaps that is due to the fact that they are not compelling products, functional and impressive, fail to have highly desirable specifications, applications and functions, and because a user has to hold his or her arm in the air to make a call or use a headset.

[0003] However, wearable devices and watch phones do provide use cases, such as minimizing the possibility of leaving ones phone behind, not taking up valuable pocket space, and appearing to be a secret agent when making a call. Wearable devices have excellent use cases, in connection with health, medical and wellness applications requiring twenty four hour connectivity.

[0004] There is a need for enabling effective and reliable power management for wireless communication devices, including wearable devices that are smart, portable and can communicate with accessories, such as with sensors configured to monitor users health condition using various technologies or systems, such as a Personal Area Network (PAN), Body Area Network (BAN), Near Field Communication (NFC), Bluetooth or WiFi, for example.

[0005] One of the more important design challenges in wireless communication devices including wearable devices is maximizing battery life and managing power use. Now that "wireless mobility and connectivity" has become a major user expectation, users demand power longevity in such devices. As more and more features, computing power, and memory are packed into wireless communication devices and wearable devices, there is a need for enhanced functionality in such devices, with satisfactory battery life. Japan patent application publication no. JP2006-320735 (A) presents, according to the English language translation available at espacenet.com, a wearable life support apparatus including a wearable sensor group mounted on the body to acquire biological information and movement information; a signal processing means for amplifying a signal obtained by the sensor group and filtering the same; an A/D converting means for converting the above to digital signals; a condition recognizing means for recognizing the status of the user based upon the digital signals; a presenting means for presenting the recognition result to the user; a means for addressing a question about the information not recognized to the user; and an input means for inputting replies to the presented recognition result and questions. United States patent application publication no. US 2009/0247883 A1 presents a biological-body-attached data communication device which has a communication unit communicating with an external device via a biological body as a medium, a data processing unit transmitting/receiving data with the external device via the communication unit, an attachment detection unit like a heartbeat sensor detecting whether or not the biological-body-attached data communication device is attached to the biological body, and a power source unit. When the attachment detection unit detects that the device is attached to the biological body, the power source unit supplies operational power to the communication unit and the data processing unit, and when the attachment detection unit detects that the device is not attached to the biological body, the power source units terminates or suppresses power supply to those units.

[0006] There is also need to reduce the amount of power a circuit consumes and techniques to effectively manage the available power using on-device techniques, circuits and sensors.

[0007] There is a further need for methods and devices with customizable power management, to better manage power to maintain the usefulness of a device.

[0008] Thus, there is a need for improving, customizing and managing battery life in electronic devices, such as wireless communication devices, such as cell phones, wearable devices and accessories.

[0009] It would be considered an improvement in the art, if a wireless communication method and electronic devices with enhanced power management were developed. There is yet a further need to provide an intelligent method and device adapted to provide personalized and reliable battery management information to a user.

[0010] Thus, a method and device with intelligent or customized power management that addresses these needs, would be considered an improvement in the art. The subject-matter for protection is defined in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] In order to describe the manner in which the above-recited and other advantages and features of the disclosure can be obtained, a more particular description of the disclosure briefly described above will be rendered by reference to specific embodiments thereof which are illustrated in the appended drawings. Understanding that these drawings depict only typical embodiments of the disclosure and are not therefore to be considered to be limiting of its scope, the disclosure will be described and explained with additional specificity and detail through the use of the accompanying drawings in which:

Fig. 1 is an exemplary block diagram of a communication system according to one embodiment.

Fig. 2 is an exemplary block diagram of a wireless communication device with customizable power

management according to one embodiment.

Fig. 3 is an exemplary block diagram of a wireless communication method with customizable power management according to one embodiment.

Fig. 4 is an exemplary perspective view of a wireless communication device with customizable power management according to one embodiment.

Fig.5 is an exemplary block diagram of a wireless communication customizable power management according to one embodiment, including a power management module, sensor module and processor

DETAILED DESCRIPTION

[0012] Fig. 1 is an exemplary block diagram of a system 100 according to one embodiment. The system 100 can include a network 110, a terminal 120, and a base station 130. The terminal 120 may be a wireless communication device, such as a wireless telephone, a wearable device, a cellular telephone, a personal digital assistant, a pager, a personal computer, a tablet, a selective call receiver, or any other device that is capable of sending and receiving communication signals on a network including a wireless network. The network 110 may include any type of network that is capable of sending and receiving signals, such as wireless signals. For example, the network 110 may include a wireless telecommunications network, a cellular telephone network, a Time Division Multiple Access (TDMA) network, a Code Division Multiple Access (CDMA) network, Global System for Mobile Communications (GSM), a Third Generation (3G) network, a Fourth Generation (4G) network, a satellite communications network, and other like communications systems. More generally, network 110 may include a Wide Area Network (WAN), a Local Area Network (LAN) and/or a Personal Area Network (PAN). Furthermore, the network 110 may include more than one network and may include a plurality of different types of networks. Thus, the network 110 may include a plurality of data networks, a plurality of telecommunications networks, a combination of data and telecommunications networks and other like communication systems capable of sending and receiving communication signals. In operation, the terminal 120 can include a wireless communication device and/or a wearable device 125 connected as an accessory or as stand alone devices, which communicate with the network 110 and with other devices on the network 110 by sending and receiving wireless signals via the base station 130, which may also comprise local area, and/or personal area access points, as detailed more fully herein. The terminal 120 is shown being in communication with a global positioning system (GPS) 140 satellite, global navigation satellite system (GNSS) or the like, for position sensing and determination.

[0013] Fig. 2 is an exemplary block diagram of a wireless communication device 200 configured with an energy storage device, battery or module 205, such as in the terminal 120, for example. The wireless communication device 200 can include a housing 210, a controller 220 coupled to the housing 210, audio input and output circuitry 230 coupled to the housing 210, a display 240 coupled to the housing 210, a transceiver 250 coupled to the housing 210, a user interface 260 coupled to the housing 210, a memory 270 coupled to the housing 210, an antenna 280 coupled to the housing 210 and the transceiver 250, and a removable subscriber module 285 coupled to the controller 220.

[0014] As shown in Fig. 2, the wireless communication device 200 further includes a power management module 290, sensor module 292 and processor 294, as described in more detail below.

[0015] In one embodiment, the module 290 can reside within in the controller 220, can reside within the memory 270, can be an autonomous module, can be software, can be hardware, or can be in any other format useful for a module on a wireless communication device 200.

[0016] The display 240 can be a liquid crystal display (LCD), a light emitting diode (LED) display, a plasma display, a touch screen display or any other means for displaying information. The transceiver 250 may include a transmitter and/or a receiver. The audio input and output circuitry 230 can include a microphone, a speaker, a transducer, or any other audio input and output circuitry. The user interface 260 can include a keypad, buttons, a touch screen or pad, a joystick, an additional display, or any other device useful for providing an interface between a user and an electronic device. The memory 270 may include a random access memory, a read only memory, an optical memory or any other memory that can be coupled to a wireless communication device.

[0017] In more detail, the wireless communication device 200 shown in Fig. 2, can include: a housing 210; a controller 220 coupled to the housing 210, the controller 220 configured to control the operations of the wireless communication device and a power management module 290 configured to: sense heart rate data of a user; and configure the wireless communication device's functionality, based on the sensed heart rate data, as detailed herein. The device 200 can dramatically decrease power consumption, by providing only desired functions, on demand, based on a real time attribute of a user. Advantageously, the device 200 can provide a real-time attribute of a user, which can be used to configure the functionality of a device and conserve power.

[0018] A block diagram of a wireless communication method with customizable power management 300, is shown in Fig. 3. In its simplest form, the method 300 can include: providing 310 a wireless communication device including an energy storage device; sensing 320 heart rate data of a user; and configuring 330 the wireless communication device's functionality based on the sensed heart rate data. Advantageously, the sensing step can provide heart rate data of a user, which can be used to configure the functionality of a wireless communication device and extend battery life. Advantageously, the method can provide a real-time attribute or "characteris-

tic" of a user, which can be used to configure the functionality of a device and improve a browsing experience.

[0019] The method 300 can provide customized power management information, to conserve power.

[0020] The configuring step 330, can include controlling a user interface based on the heart rate data. For example, if the heart rate data indicates a heart rate below a certain threshold a user may want less functionality, resulting in lower power drain, and if the heart rate data indicates a heart rate above a certain threshold the user may want more functionality, as detailed below.

[0021] The method 300 can provide supplemental sensing including at least one of body temperature sensing, blood pressure sensing, glucose sensing, respiratory rate sensing, sweat sensing, moisture sensing and location sensing. Providing supplemental sensing can provide health warning information, such as location information if a warning or alarm is triggered, information for medical logging or monitoring, send alerts to a medical service center or data base, home or the like. This is discussed in greater detail, in Fig. 5.

[0022] The method 300 can display how much life the energy storage device has remaining before needing to be recharged, based on the functionality presently set. The user can utilize this information to further turn off segments or functions of the device, if desired. This feature is further detailed, in connection with Fig. 4.

[0023] The method 300 can include a prompt which can be set by a user to provide and display options to minimize power drain, at any time. Thus, a user could choose ways to minimize power drain at any time, or when a battery has reached a threshold remaining life. For example, display options can include at least one of: disabling data; enabling airplane mode; reducing display brightness; restricting application processor speed; reducing an application update rate; enabling and disabling wireless connectivity, such as WiFi and Bluetooth; enabling and disabling location tracking and disabling an application or segment of a device. As should be understood, other options are possible.

[0024] The sensing step 320 includes providing a first condition defining a low user activity range, a second condition defining a medium user activity range and a third condition defining a high user activity range, based on the sensed heart rate data of a user (heart rate attribute or characteristic). Thus, three ranges can be provided, for providing a low, medium and high consumption mode, based on the user's activity profile or settings, such as heart rate data. The first condition includes a lower number of features and functions (ie. because a user may have just awoken or is in a normal resting heart rate condition, such as about 50-70 bpm), than the second condition (ie. when a user is moderately active or involved in low impact exercising, such as about 70-170 bpm), and the second condition can be less feature rich than the third condition, when a user is working out, for example. The third condition can be high impact exercising, such as having a heart rate of about 170-180 bpm (with a feature rich setting). Heart rate ranges can vary based on a number of factors, such as age, physical condition, weight, user history, etc. and the settings can be changed in a number of ways, as detailed herein.

[0025] In one embodiment, the first, second and third conditions, include first settable features, second settable features and third settable features, to allow a user to customize a device as desired. Thus, a user can enhance a browsing experience, by programming the device.

[0026] In one embodiment, the method 300 allows a user to program a wireless communication device to reduce power drain. For example, if a user receives a notice or prompt that there is a certain threshold time of battery life remaining, a user can turn off unneeded functions or applications, etc. This can be preset by a user or set real-time after a prompt while in use.

[0027] Thus, a user can customize his or her device in any conventional way, such as by downloading, upgrading from a site, loading from a memory stick via a USB connection and the like.

[0028] The method 300 can further include indicating that a wireless communication device is in a power conserving mode, thus indicating to a user that the device is running with a lower number of features or applications, to conserve power.

[0029] The method 300 can further include providing a notification or alarm that a predetermined sensed threshold has been met. For example, a notification or alarm can be triggered when a certain high or low threshold heart rate has been reached, blood pressure, insulin level, a certain medical condition has been triggered, and other real time user attributes are sensed. The notification can be indicated locally to a user, sent remotely to a web site or dispatcher, to a certain email address, phone number or data base, if appropriately programmed. A user's location can be indicated as well, to dispatch public safety personnel, if necessary.

[0030] The method 300 can further include providing a program which includes a heuristic algorithm that collects historical user data, so that such information can be used to configure the wireless communication device's functionality based on the collected historical user data. Thus, the device will learn a user's behavior and act appropriately, such as be on when a user is awake, be in a conservation mode when the user is asleep and provide an optimal number of applications and functions, when desired.

[0031] As previously stated, in one embodiment, the wireless communication device 200 can include: a housing 210; a controller 220 coupled to the housing 210, the controller 220 configured to control the operations of the wireless communication device and a power management module 290 configured to: sense heart rate data of a user; and configure the wireless communication device's functionality, based on the sensed heart rate data, as detailed herein. The device 200 can dramatically conserve power by providing only the desired functions or

applications, on demand when needed, and as programmed.

[0032] In Fig. 4, the wireless communication device 400 can be in the form of a wearable device 405, such as a wrist watch, cell phone accessory, wrist band, belt band, head band, neck band, ankle band, chest band and the like. As should be understood, other wearable devices are possible.

[0033] In a preferred embodiment, the wearable device 405 includes a heart rate sensor 410 embedded in a band 415 configured to provide heart rate data of a user and a battery 425. As should be understood, the sensor 410 can be embedded in a wrist-worn device, be a standalone accessory or integrated into a user's clothing, and can be placed any where in proximity to a user's body, such as near a heart, wrist, ankle, neck, etc. and can be directly connected or wirelessly connected to the power management module 290. The power management module 290 is configured to control a user interface to display options to minimize power drain. The power management module 290 is adapted and configured to allow a user to program the wireless communication device any time, to conserve power.

[0034] The wearable device 405 is couplable to a network 420 via a conventional method, as detailed herein. The wearable device 405 includes a housing 425 connectable with the band 415 with a connector 426, a UI display 430 with inset area 435 (in phantom), showing a low consumption mode, a medium consumption mode and a high consumption mode 440, 445 and 450, being displayed in inset 435, for example.

[0035] As should be understood, wireless communication device 400 can be a cell phone, smart phone, portable computing device, wearable device alone connected to a network, or with wearable device 405 and sensors that can communicate as accessories, to monitor a user's health condition using a Personal Area Network (PAN), Body Area Network (BAN), Bluetooth or WiFi.

[0036] Fig. 4 provides three exemplary potential ranges, based on heart rate data and potentially other data or attributes:

1. Low Power Consumption Mode indicates 70 bpm. Only limited functions are provided, such as certain calls, SMS and social networking feeds. Advantageously, when a user is generally inactive, such as just waking up, so is his or her device.
2. Medium Power Consumption Mode indicates 110 bpm. More functions are provided, such as certain calls, SMS, social networking feeds, Bluetooth, fitness applications and music player.
3. High Power Consumption Mode indicates 140 bpm. Many functions are provided, Such as calls, SMS, social networking feeds, Bluetooth, fitness applications, music player and GPS, WiFi, smart sensors (all sensors are become active), emergency response applications. Advantageously, when a user is resting, so is the device, and when active, as in mode 2 or 3, so is his or her device.

[0037] A user can program, customize and choose additional functions and applications, to improve a browsing experience, as desired.

[0038] Referring to Fig. 5, an exemplary embodiment of a wireless communication device including a power management module 500 (similar to item 290 in Fig. 2), sensor module 505 (see item 292) and processor 530 (see item 294), as described in more detail below. The sensor module 505 can include a plurality of sensors, such as a first sensor 510, a second sensor 515, a third sensor, 520 and a fourth sensor 525. In one embodiment, the first sensor 510 is a heart rate sensor/monitor, the second sensor 515 is a temperature sensor, the third sensor 520 in a glucose sensor and the fourth sensor 525 is a blood pressure sensor. The sensors can be embedded in a common housing of a device and are coupled with the processor 530, via wired or wirelessly, as previously detailed.

[0039] The processor 530 thus receives at least a sense heart rate data of a user from the first sensor 510 and configures a device's functionality, based on the sensed heart rate data, as detailed herein. Similarly, the processor 530 can also receive temperature data, glucose data and blood pressure data from second, third and fourth sensors 515, 520 and 525. Based on some or all of this data, a device's functionality can be configured. Stated differently, based on a sensed attribute or characteristic) of a user, the functionality of a device can be configured to best serve that user and the time. The device 200 can also dramatically conserve power by providing only the desired functions, on demand when needed.

[0040] In more detail, based on the first sensor 510 data, various measures can be applied to reduce or increase the functionality of a device and reduce power consumption, as well. Here is an illustrative example:

Condition 1: Low activity zone ranging from about 50 to 70 bpm (50% -70% of maximum prescribed heart rate zone, for a certain age and condition of a user).

Conditions 2 and 3: Active activity zone ranging from about 70 to 180 bpm (70% - 90% of maximum prescribed heart rate zone, for a certain age and condition of a user). Advantageously, when a user is active, so is his or her device and when a user is inactive so is the device.

Condition 4: Caution Zone at above about 180 bpm (90-100% of max HR zone) or below a threshold of about 40 bpm.

[0041] Similar measures and features can be taken or utilized for, for example, temperature, glucose, blood pressure, etc. Various notifications or alerts can be issued, and functions turned on or off, based on information of alternate sensors, for enhanced utility. The power

management module 500 can: trigger certain programmed applications or functions based on a user attribute; and decrease power consumption based on a real time attribute. Thus, only desired functions are on, based on a program customized to a user's desires.

[0042] The program can be loadable and customizable by a user, by at least one of downloading a software program, adjusting a setting and inputting information in a profile, for example. Advantageously, in one use case, a user can load an application through a USB connection, for example, or download a program to load on a wireless communication device. Similarly, upgrades and customizations can be loaded in any customary way.

[0043] In a preferred embodiment, the program can include a heuristic predictive algorithm that collects, stores and aggregates historical information. In one embodiment, the processor 294 includes a program that can include predicting future user activity, based on historical information, such as user activity or usage stored in memory. The sensor module 292 can monitor real time user activity and provide a warning to the user, that based on the user activity or attribute, the energy storage device will not make it to the expected next charge. Advantageously, a user can then take appropriate measures, such as immediately recharging a battery, take power reduction action and the like.

[0044] In one embodiment, the program can include a heuristic predictive algorithm that collects and stores user activity or usage information. Correlating user activity and charge times, allows the program to learn and predict a user's typical usage and behavioral habits, based on the collected, stored and aggregated user behavior. Advantageously, this information can help a user manage the functioning of a device during a day and better manage power consumption.

[0045] In another embodiment, when a certain user activity threshold is reached or sensed by sensor module 292, a user can be alerted.

[0046] Advantageously, over time the program can provide typical use and power intelligence based on stored historical data or as programmed by a user.

[0047] The user may initially indicate a certain profile that they feel is indicative of their expected usage. This can be used by the device while history is gathered to personalize the usage predictions.

[0048] When a user is expecting to travel, it is anticipated that the device will learn of the impending trip from a calendar application, for example.

[0049] The devices 200 and 400 and methods 300 and 500 are preferably implemented on a programmed processor. However, the controllers, flowcharts, and modules may also be implemented on a general purpose or special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit elements, an integrated circuit, a hardware electronic or logic circuit such as a discrete element circuit, a programmable logic device, or the like. In general, any device on which resides a finite state machine capable of implementing the flowcharts shown in the figures may be used to implement the processor functions of this disclosure.

[0050] While this disclosure has been described with specific embodiments thereof, it is evident that many alternatives, modifications, and variations will be apparent to those skilled in the art. For example, various components of the embodiments may be interchanged, added, or substituted in the other embodiments. Also, all of the elements of each figure are not necessary for operation of the disclosed embodiments. For example, one of ordinary skill in the art of the disclosed embodiments would be enabled to make and use the teachings of the disclosure by simply employing the elements of the independent claims. Accordingly, the preferred embodiments of the disclosure as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the disclosure. In this document, relational terms such as "first," "second," and the like may be used solely to distinguish one entity or action from another entity or action without necessarily requiring or implying any actual such relationship or order between such entities or actions. The terms "comprises," "comprising," or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element proceeded by "a," "an," or the like does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that comprises the element. Also, the term "another" is defined as at least a second or more. The terms "including," "having," and the like, as used herein, are defined as "comprising."

Claims

1. A method comprising:

sensing, by a wearable device (405, 410), a heart rate of a user wearing the wearable device;

responsive to determining, by the wearable device, that the heart rate of the user indicates that the user is at rest, configuring, by the wearable device, the wearable device to provide a first set of functions in a low power consumption mode (440);

responsive to determining, by the wearable device, that the heart rate of the user indicates that the user is involved in low impact exercising, configuring, by the wearable device, the wearable device to provide a second set of functions in a medium power consumption mode (445), wherein the second set of functions is different from the first set of functions; and

responsive to determining, by the wearable de-

vice, based at least in part on the heart rate of the user, that the heart rate of the user indicates that the user is involved in high impact exercising, configuring, by the wearable device, the wearable device to provide a third set of functions in a high power consumption mode (450), wherein the third set of functions is different from each of the first set of functions and the second set of functions, wherein the first set of functions includes fewer functions than the second set of functions and the second set of functions includes fewer functions than the third set of functions, wherein configuring the wearable device to provide the third set of functions comprises:

activating sensors of the wearable device so that all sensors are active; and
sensing, by the wearable device, at least one of a body temperature, blood pressure, glucose level, respiratory rate, sweat level, moisture level and location of the user.

2. The method of claim 1, further comprising:
outputting, by the wearable device, a user interface configured based on whether the wearable device is currently configured to provide the first set of functions, the second set of functions, or the third set of functions.

3. The method of claim 1, further comprising:
determining, by the wearable device, based at least in part on the heart rate of the user and the at least one of the body temperature, blood pressure, glucose level, respiratory rate, sweat level, moisture level, or location, whether to configure the wearable device with one of the first set of functions, the second set of functions, or the third set of functions.

4. The method of claim 1, further comprising outputting, by the wearable device, for display, an amount of time remaining before the wearable device needs to be recharged.

5. The method of claim 1, further comprising outputting, by the wearable device, a graphical user interface including options to minimize power drain including at least one of: disabling data; enabling airplane mode; reducing display brightness; restricting application processor speed; disabling an application; enabling and disabling wireless connectivity; enabling and disabling location tracking; disabling segments of a wireless communication device; and reducing an application update rate.

6. The method of claim 1, wherein the first set of functions includes first user configurable features, the second set of functions includes second user configurable features and the third set of functions includes third user configurable features.

7. The method of claim 1, further comprising outputting, by the wearable device, an indication that the wearable device is operating in a power conserving mode.

8. The method of claim 1, further comprising:
configuring, by the wearable device, based on historical user data, functionally of the wearable device.

9. The method of claim 8, further comprising:

predicting, by the wearable device, based on the historical user data, a future activity of the user; and
configuring, by the wearable device, based on the future activity of the user, the wearable device to provide one of the first set of functions, the second set of functions, or the third set of functions.

10. A device (400) comprising means for performing the methods of any of claims 1-9.

Patentansprüche

1. Verfahren, umfassend:

Erfassen, durch eine tragbare Vorrichtung (405, 410), einer Herzfrequenz eines Benutzers, der die tragbare Vorrichtung trägt;
als Reaktion auf ein Ermitteln, durch die tragbare Vorrichtung, dass die Herzfrequenz des Benutzers anzeigt, dass der Benutzer ruht, Konfigurieren, durch die tragbare Vorrichtung, der tragbaren Vorrichtung dafür, in einem Modus (440) mit geringer Stromaufnahme einen ersten Satz von Funktionen bereitzustellen;
als Reaktion auf ein Ermitteln, durch die tragbare Vorrichtung, dass die Herzfrequenz des Benutzers anzeigt, dass der Benutzer ein leichtes Training durchführt, Konfigurieren, durch die tragbare Vorrichtung, der tragbaren Vorrichtung dafür, einen zweiten Satz von Funktionen in einem Modus (445) mit mittlerer Stromaufnahme bereitzustellen, wobei sich der zweite Satz von Funktionen von dem ersten Satz von Funktionen unterscheidet; und
als Reaktion auf das Ermitteln, durch die tragbare Vorrichtung zumindest teilweise basierend auf der Herzfrequenz des Benutzers, dass die Herzfrequenz des Benutzers anzeigt, dass der Benutzer ein starkes Training durchführt, Konfigurieren, durch die tragbare Vorrichtung, der tragbaren Vorrichtung dafür, einen dritten Satz von Funktionen in einem Modus mit hoher Stromaufnahme (450) bereitzustellen, wobei

sich der dritte Satz von Funktionen von jedem von dem ersten Satz von Funktionen und dem zweiten Satz von Funktionen unterscheidet, wobei der erste Satz von Funktionen weniger Funktionen als der zweite Satz von Funktionen beinhaltet und der zweite Satz von Funktionen weniger Funktionen als der dritte Satz von Funktionen beinhaltet, wobei das Konfigurieren der tragbaren Vorrichtung dafür, den dritten Satz von Funktionen bereitzustellen, Folgendes umfasst:

Aktivieren von Sensoren der tragbaren Vorrichtung, sodass alle Sensoren aktiv sind; und
Erfassen, durch die tragbare Vorrichtung, zumindest eines von Körpertemperatur, Blutdruck, Blutzuckerspiegel, Atemfrequenz, Schweißniveau, Feuchtigkeitsniveau und Standort des Benutzers.

2. Verfahren nach Anspruch 1, ferner umfassend:
Ausgeben, durch die tragbare Vorrichtung, einer Benutzeroberfläche, die basierend darauf konfiguriert ist, ob die tragbare Vorrichtung zur Zeit dafür konfiguriert ist, den ersten Satz von Funktionen, den zweiten Satz von Funktionen oder den dritten Satz von Funktionen bereitzustellen.

3. Verfahren nach Anspruch 1, ferner umfassend:
Ermitteln, durch die tragbare Vorrichtung, zumindest teilweise basierend auf der Herzfrequenz des Benutzers und dem zumindest einen von der Körpertemperatur, dem Blutdruck, dem Blutzuckerspiegel, der Atemfrequenz, des Schweißniveaus, des Feuchtigkeitsniveaus oder dem Standort, ob die tragbare Vorrichtung mit einem von dem ersten Satz von Funktionen, zweiten Satz von Funktionen oder dem dritten Satz von Funktionen konfiguriert werden soll.

4. Verfahren nach Anspruch 1, ferner umfassend Ausgeben, durch die tragbare Vorrichtung, zur Anzeige, einer verbleibenden Zeitdauer, bis die tragbare Vorrichtung wieder aufgeladen werden muss.

5. Verfahren nach Anspruch 1, ferner umfassend Ausgeben, durch die tragbare Vorrichtung, einer grafischen Benutzeroberfläche, die Optionen zur Minimierung der Stromaufnahme beinhaltet, die zumindest eines von Folgendem beinhalten: Deaktivieren der Datenverbindung, Aktivieren des Flugzeugmodus, Reduzieren der Anzeigehelligkeit, Einschränken der Prozessorgeschwindigkeit für eine Anwendung, Deaktivieren einer Anwendung, Aktivieren und Deaktivieren der drahtlosen Konnektivität, Aktivieren und Deaktivieren der Standortverfolgung, Deaktivieren von Teilen eines drahtlosen Kommunikationsgeräts und Reduzieren einer Anwendungsaktualisierungsrate.

6. Verfahren nach Anspruch 1, wobei der erste Satz von Funktionen erste benutzerkonfigurierbare Merkmale beinhaltet, der zweite Satz von Funktionen zweite benutzerkonfigurierbare Merkmale beinhaltet und der dritte Satz von Funktionen dritte benutzerkonfigurierbare Merkmale beinhaltet.

7. Verfahren nach Anspruch 1, ferner umfassend Ausgeben, durch die tragbare Vorrichtung, einer Angabe darüber, dass die tragbare Vorrichtung in einem Stromsparmodus arbeitet.

8. Verfahren nach Anspruch 1, ferner umfassend:
Konfigurieren, durch die tragbare Vorrichtung, basierend auf historischen Benutzerdaten, der Funktionalität der tragbaren Vorrichtung.

9. Verfahren nach Anspruch 8, ferner umfassend:

Vorhersagen, durch die tragbare Vorrichtung, basierend auf den historischen Benutzerdaten, einer zukünftigen Aktivität des Benutzers; und
Konfigurieren der tragbaren Vorrichtung, durch die tragbare Vorrichtung, basierend auf der zukünftigen Aktivität des Benutzers, dafür, einen von dem ersten Satz von Funktionen, dem zweiten Satz von Funktionen oder dem dritten Satz von Funktionen bereitzustellen.

10. Vorrichtung (400), umfassend Mittel zum Durchführen der Verfahren nach einem der Ansprüche 1-9.

Revendications

1. Procédé comprenant :

la détection, par un dispositif portable (405, 410), d'une fréquence cardiaque d'un utilisateur portant le dispositif portable ;
en réponse à la détermination, par le dispositif portable, que la fréquence cardiaque de l'utilisateur indique que l'utilisateur est au repos, la configuration, par le dispositif portable, du dispositif portable pour fournir un premier ensemble de fonctions dans un mode de consommation d'énergie faible (440) ;
en réponse à la détermination, par le dispositif portable, que la fréquence cardiaque de l'utilisateur indique que l'utilisateur est impliqué dans un exercice à faible impact, la configuration, par le dispositif portable, du dispositif portable pour fournir un deuxième ensemble de fonctions dans un mode de consommation d'énergie moyen (445), dans lequel le deuxième ensemble de fonctions est différent du premier ensem-

ble de fonctions ; et
en réponse à la détermination, par le dispositif portable, sur base au moins en partie de la fréquence cardiaque de l'utilisateur, que la fréquence cardiaque de l'utilisateur indique que l'utilisateur est impliqué dans un exercice à impact élevé, la configuration, par le dispositif portable, du dispositif portable pour fournir un troisième ensemble de fonctions dans un mode de consommation d'énergie élevé (450), dans lequel le troisième ensemble de fonctions est différent de chacun du premier ensemble de fonctions et du deuxième ensemble de fonctions, dans lequel le premier ensemble de fonctions comprend moins de fonctions que le deuxième ensemble de fonctions et le deuxième ensemble de fonctions comprend moins de fonctions que le troisième ensemble de fonctions, dans lequel la configuration du dispositif portable pour fournir le troisième ensemble de fonctions comprend :

l'activation de capteurs du dispositif portable afin que tous les capteurs soient actifs ; et
la détection, par le dispositif portable, d'au moins un de la température corporelle, de la tension artérielle, du taux de glucose, de la fréquence respiratoire, du niveau de transpiration, du niveau d'humidité et de l'emplacement de l'utilisateur.

2. Procédé selon la revendication 1, comprenant en outre :
l'émission, par le dispositif portable, d'une interface utilisateur configurée sur base de si le dispositif portable est actuellement configuré pour fournir le premier ensemble de fonctions, le deuxième ensemble de fonctions, ou le troisième ensemble de fonctions.

3. Procédé selon la revendication 1, comprenant en outre :
la détermination, par le dispositif portable, sur base au moins en partie de la fréquence cardiaque de l'utilisateur et de l'au moins un de la température corporelle, de la tension artérielle, du taux de glucose, de la fréquence respiratoire, du niveau de transpiration, du niveau d'humidité ou de l'emplacement, de s'il faut configurer le dispositif portable avec un du premier ensemble de fonctions, du deuxième ensemble de fonctions, ou du troisième ensemble de fonctions.

4. Procédé selon la revendication 1, comprenant en outre l'émission, par le dispositif portable, pour affichage, d'une quantité de temps restant avant que le dispositif portable ne doive être rechargé.

5. Procédé selon la revendication 1, comprenant en outre l'émission, par le dispositif portable, d'une interface utilisateur graphique, comprenant des options pour minimiser la consommation d'énergie comprenant au moins un de : la désactivation de données ; l'activation du mode avion ; la réduction de luminosité d' affichage ; la limitation de la vitesse du processeur d'application ; la désactivation d'une application ; l'activation et la désactivation de la connectivité sans fil ; l'activation et désactivation du suivi de localisation ; la désactivation de segments d'un dispositif de communication sans fil ; et la réduction du taux de mise à jour de l'application.

6. Procédé selon la revendication 1, dans lequel le premier ensemble de fonctions comprend des caractéristiques configurables de premier utilisateur, le deuxième ensemble de fonctions comprend des caractéristiques configurables de deuxième utilisateur et le troisième ensemble de fonctions comprend des caractéristiques configurables de troisième utilisateur.

7. Procédé selon la revendication 1, comprenant en outre l'émission, par le dispositif portable, d'une indication que le dispositif portable fonctionne en mode de gestion d'énergie.

8. Procédé selon la revendication 1, comprenant en outre :
la configuration, par le dispositif portable, sur base de données d'utilisateur historique, fonctionnellement du dispositif portable.

9. Procédé selon la revendication 8, comprenant en outre :

la prédiction, par le dispositif portable, sur base des données d'utilisateur historique, d'une activité future de l'utilisateur ; et
la configuration, par le dispositif portable, sur base de l'activité future de l'utilisateur, du dispositif portable pour fournir un du premier ensemble de fonctions, du deuxième ensemble de fonctions ou du troisième ensemble de fonctions.

10. Dispositif (400) comprenant des moyens pour exécuter les procédés selon l'une quelconque des revendications 1-9.

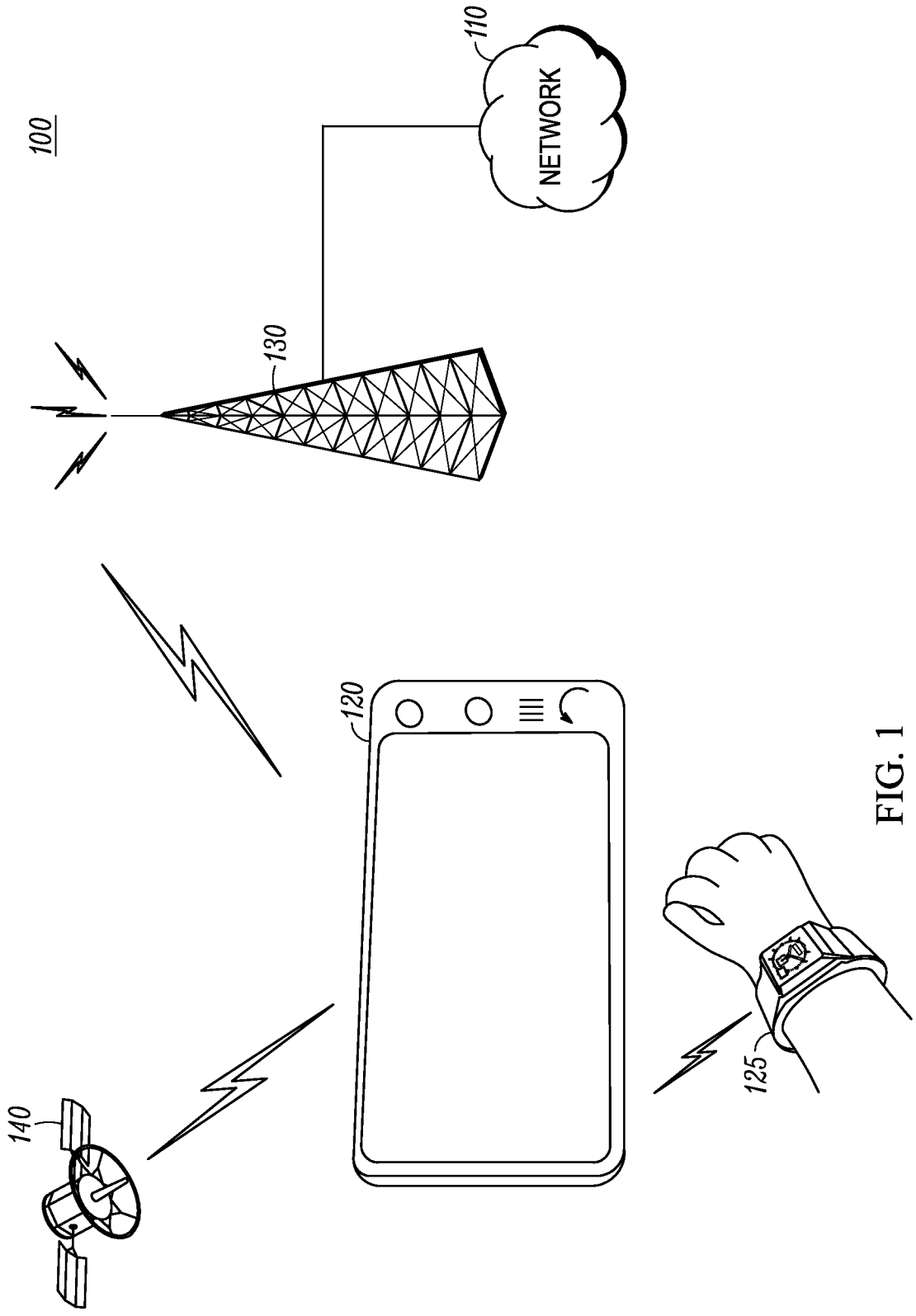


FIG. 1

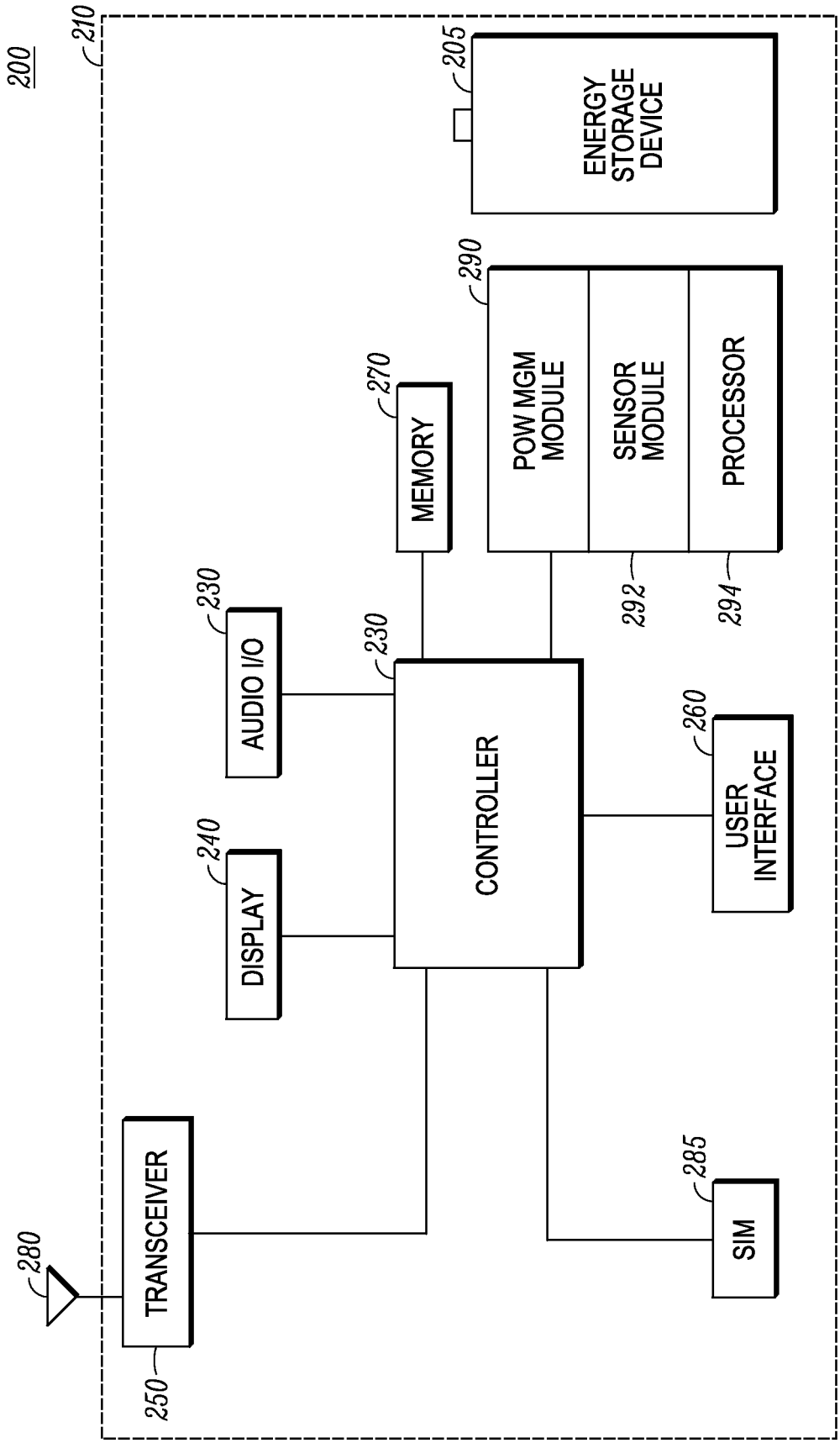

200
210
205
ENERGY STORAGE DEVICE
290
POW MGM MODULE
SENSOR MODULE
PROCESSOR
292
294
270
MEMORY
230
AUDIO I/O
230
CONTROLLER
260
USER INTERFACE
240
DISPLAY
285
SIM
280
TRANSCEIVER
250

FIG. 2

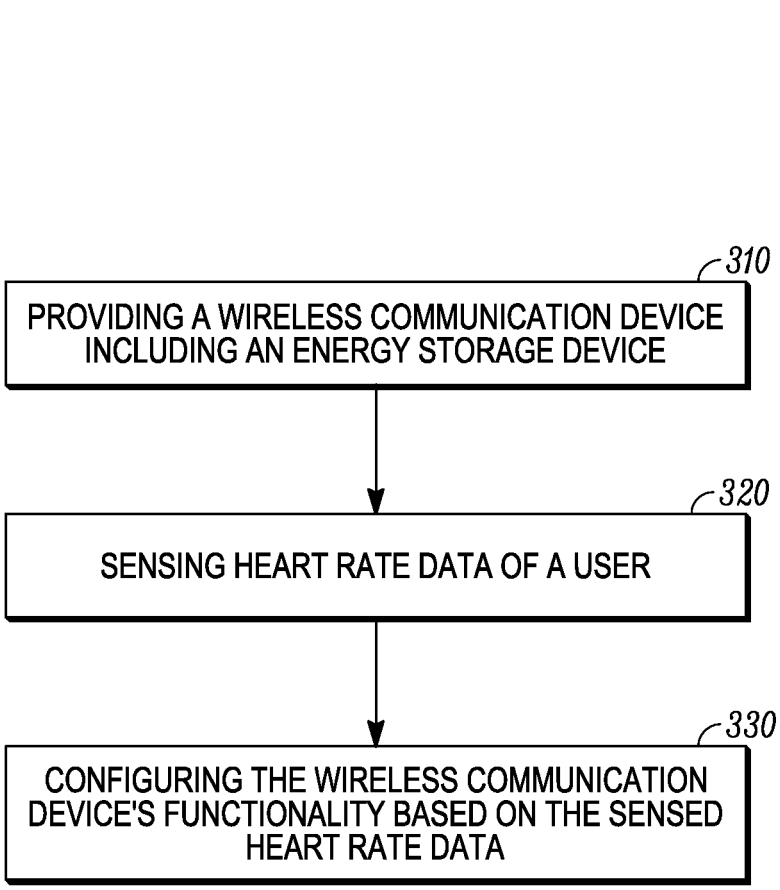
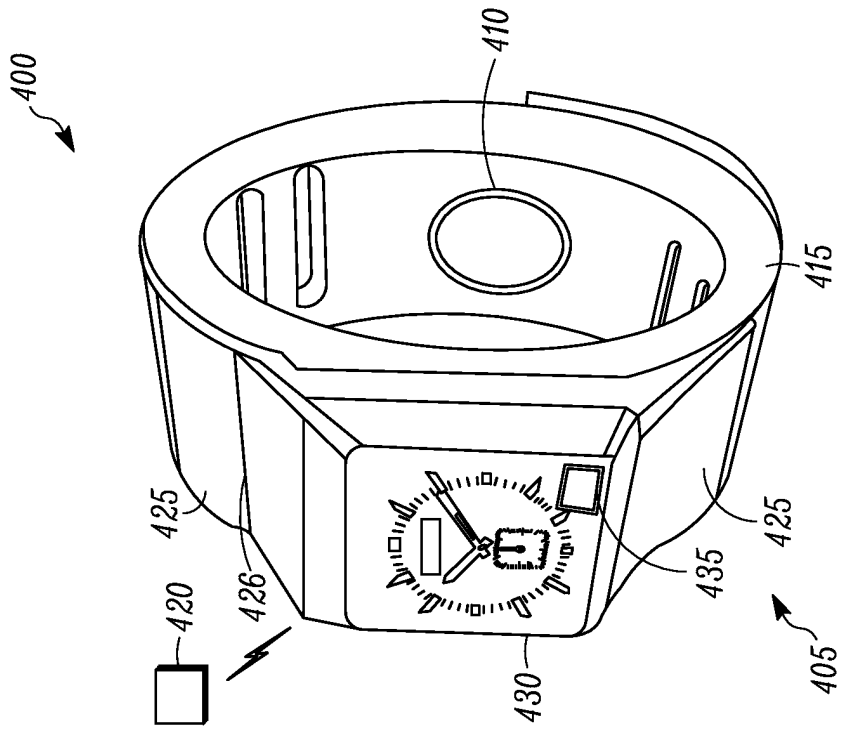

300
310
PROVIDING A WIRELESS COMMUNICATION DEVICE INCLUDING AN ENERGY STORAGE DEVICE
320
SENSING HEART RATE DATA OF A USER
330
CONFIGURING THE WIRELESS COMMUNICATION DEVICE'S FUNCTIONALITY BASED ON THE SENSED HEART RATE DATA

FIG. 3


400
410
415
425
426
420
435
425
430
405

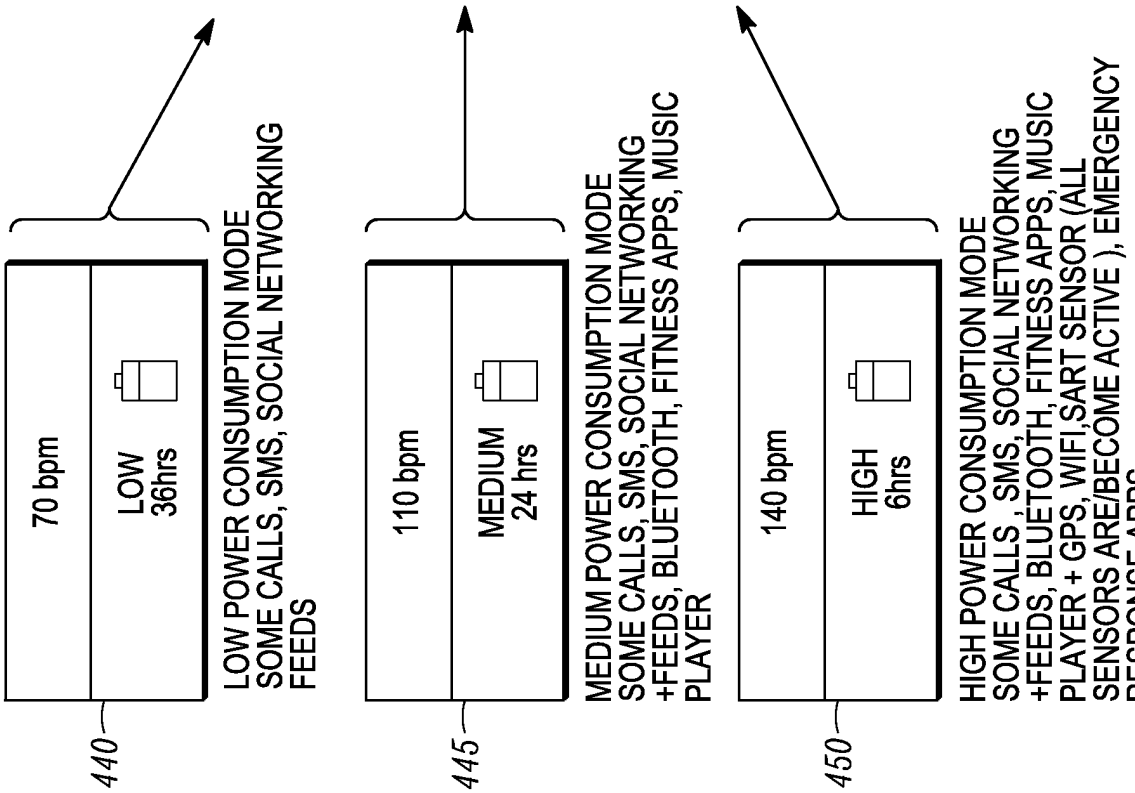

70 bpm
LOW
36hrs
LOW POWER CONSUMPTION MODE
SOME CALLS, SMS, SOCIAL NETWORKING
FEEDS
440
110 bpm
MEDIUM
24 hrs
MEDIUM POWER CONSUMPTION MODE
SOME CALLS, SMS, SOCIAL NETWORKING
+FEEDS, BLUETOOTH, FITNESS APPS, MUSIC
PLAYER
445
140 bpm
HIGH
6hrs
HIGH POWER CONSUMPTION MODE
SOME CALLS , SMS, SOCIAL NETWORKING
+FEEDS, BLUETOOTH, FITNESS APPS, MUSIC
PLAYER + GPS, WIFI,SART SENSOR (ALL
SENSORS ARE/BECOME ACTIVE), EMERGENCY
RESPONSE APPS
450

FIG. 4

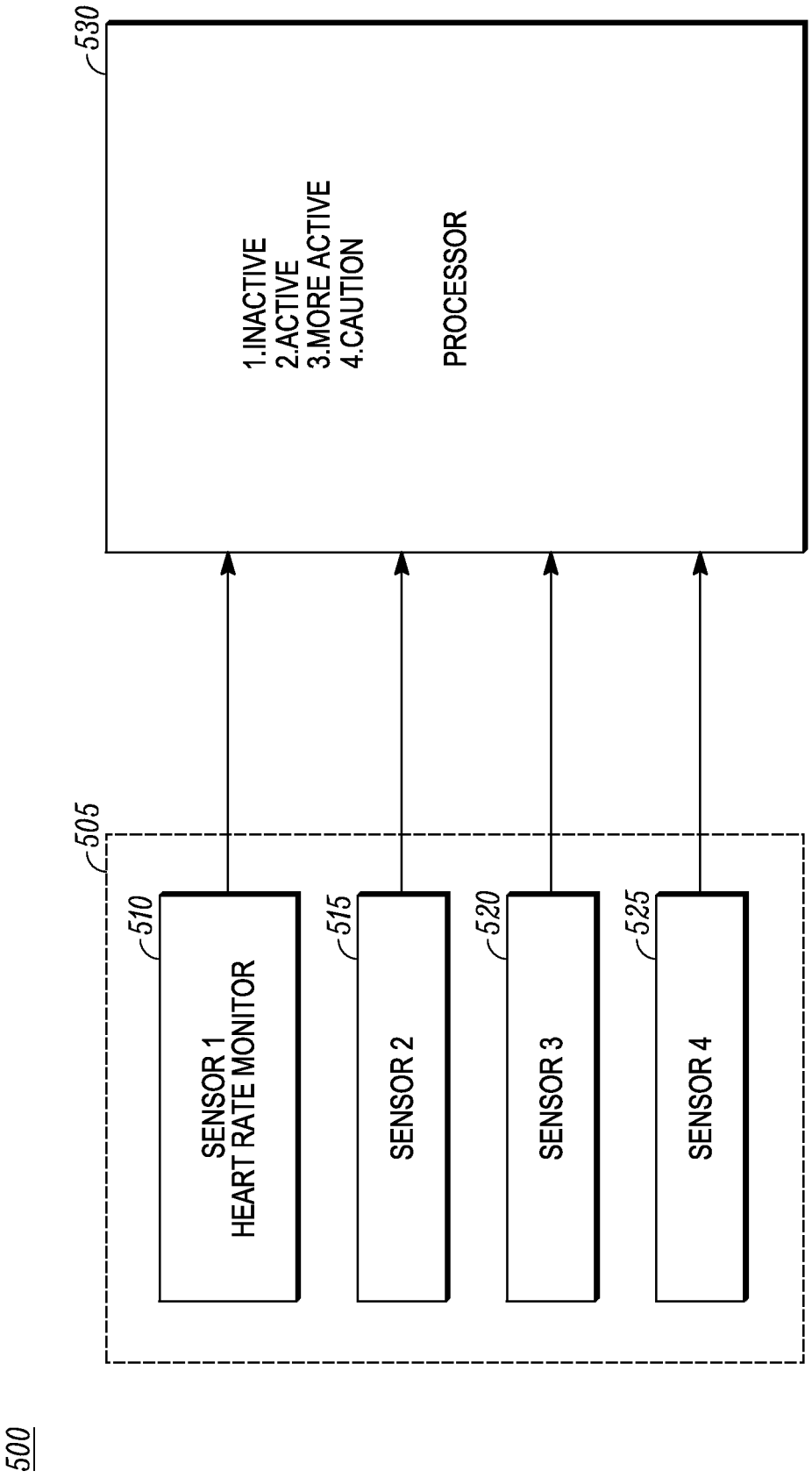

500
505
510
SENSOR 1
HEART RATE MONITOR
515
SENSOR 2
520
SENSOR 3
525
SENSOR 4
530
PROCESSOR
1.INACTIVE
2.ACTIVE
3.MORE ACTIVE
4.CAUTION

FIG. 5

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2006320735 A **[0005]**
- US 20090247883 A1 **[0005]**

专利名称(译)	具有自适应电源管理的过程和设备		
公开(公告)号	EP2814384B1	公开(公告)日	2020-04-22
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申请(专利权)人(译)	MOTOROLA MOBILITY LLC		
当前申请(专利权)人(译)	Google技术控股有限责任公司		
[标]发明人	MA JEONG J		
发明人	MA, JEONG J.,		
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优先权	13/398099 2012-02-16 US		
其他公开文献	EP2814384A1		
外部链接	Espacenet		

摘要(译)

无线通信设备（200）和方法（300）可定制的功率管理。 方法（300）可以包括：提供（310）包括能量存储设备的无线通信设备； 感测（320）用户的心率数据； 以及基于感测到的心率数据来配置（330）无线通信设备的功能。 有利地，设备（200）和方法（300）可以提供用户的实时属性，该实时属性可以用于配置设备的功能并节省功率。

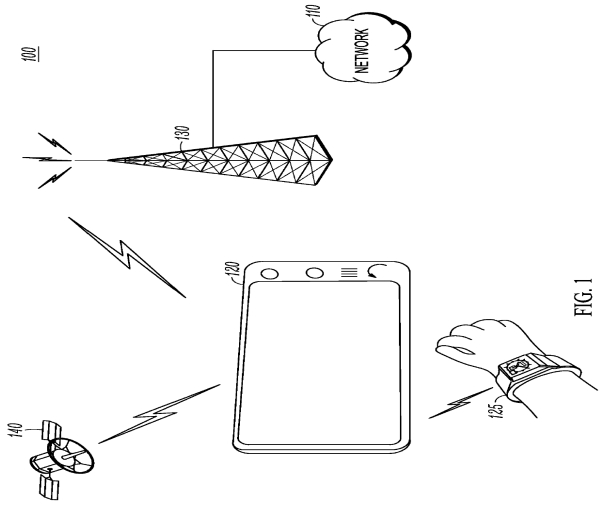

FIG. 1