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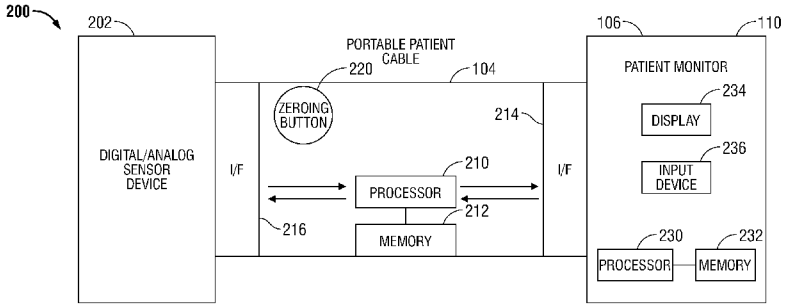

FIG. 2

(57) Abstract: A portable patient cable is provided for connecting a medical sensor to a patient monitoring device. The patient cable includes a memory configured to store information related to the patient and the patient' s condition, so that information can travel with the patient as the patient is moved and be made available to a medical monitor located at a new location. The memory may be configured to store a unique identifier specific to that patient. The memory may be configured to store entered or measured physiological data for that individual patient. The memory may be configured to store information related to a first use or age of the cable.

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PORTABLE PATIENT CABLE TO TRANSFER PATIENT DATA

DETAILED DESCRIPTION

[0001] Embodiments of the invention generally relate to a system, patient monitoring devices, and a portable patient cable that allow for patient physiological data measured by a physiological sensor in a medical environment to be stored by the portable patient cable and transferred to different monitoring devices.

[0002] As an example, with reference to FIG. 1, an example of a medical environment in which embodiments of the invention may be practiced is hereinafter described. In particular, FIG. 1 shows a system for transporting patient physiological data of a patient measured by a physiological sensor. As can be seen in FIG. 1, a patient 100 may enter an emergency room (e.g., emergence of patient as shown in FIG. 1). A portable patient cable 104 having a processor and memory may be coupled to a physiological sensor (e.g., shown in this example as a cardiac sensor). Medical personnel 102 may couple the portable patient cable 104 to a first patient monitor device 106. In this way, the portable patient cable 104 may transmit patient physiological data measured by the physiological sensor of the patient to the first patient monitor device 106.

[0003] Upon a first use or emergence of the patient 100 (e.g., to the Emergency Room (ER)), the first patient monitor device 106 may command the storage of a unique patient identifier (ID) (e.g., a unique hospital code for the patient, a patient name, or other type of unique identifier, etc.) for the patient 100. Further, the first patient monitor device 106 may command the storage of measured physiological data from the physiological sensor

for the patient 100 to the memory of the portable patient cable 104. As an example, a patient 100 may enter the Emergency Room, have a medical operation performed (e.g., stitching of wounds), and during that time the portable patient cable 104 may transmit patient physiological data (e.g., cardiac data, such as heart rate, etc.) measured by the physiological sensor (e.g., a cardiac sensor) of the patient to the first patient monitor device 106 and the first patient monitor device 106 may command the storage of the measured physiological data from the physiological sensor for the patient to the memory of the portable patient cable 104.

[0004] After the Emergency Room, the patient 100 and the portable patient cable 104 may be transported to the Intensive Care Unit (ICU) or another medical unit (e.g., ICU merely being utilized as an example). At the ICU, medical personnel 112 may reconnect the portable patient cable 104 to a second patient monitor device 110. The physiological sensor may be the same physiological sensor or a different physiological sensor. When the portable patient cable 104 is moved and coupled to the second patient monitor device 110, the second patient monitor device 110 reads the stored patient ID for the patient 100 and the stored measured physiological data of the patient 100 from the memory of the portable patient cable 104. In this way, the second patient monitor device 110 can read the stored physiological data of the patient from the portable patient cable 104 that was collected by the first patient monitor device 106 and transported to the second patient monitor device 110. This read physiological data can then be displayed by the second patient monitor device 110 to the new medical personnel 112 and/or this read physiological data can be used by the second patient monitor device 110 for other purposes, as will be described.

[0005] It should be appreciated that, in one embodiment, measured physiological data of the patient 100 stored to the memory of the portable patient cable 104 by the first patient monitor device 106 includes monitored parameter data that was displayed on the first patient monitor device 106. As an example, monitored parameter data may relate to data displayed by the patient monitoring device to medical personnel for their observation. This data may relate to a variety of numeric or quantifiable values indicating particular types of physiological conditions or states of the patient.

[0006] As another example for illustrative purposes, at the emergence of the patient 100 in an Emergency Room, medical personnel 102 may couple the portable patient cable 104 to the physiological sensor and the first patient monitor device 106. Again, in this example the physiological sensor may be a cardiac sensor. The portable patient cable 104 may transmit patient physiological data measured by the cardiac sensor of the patient to the first patient monitor device 106. The first patient monitor device 106 may display on a display device the monitored cardiac data and command the storage of the monitored cardiac data to the memory of the portable patient cable 104. After the Emergency Room, the patient 100 and the portable patient cable 104 may be transported to the Intensive Care Unit (ICU) or another medical unit. At the ICU, medical personnel 112 may reconnect the portable patient cable 104 to a second patient monitor device 110. The second patient monitor device 110, like the first patient monitor device 106, may display on a display device the monitored cardiac data and command the storage of monitored cardiac data to the memory of the portable patient cable 104.

[0007] Further, when the portable patient cable 104 is moved and coupled to the second patient monitor device 110, the second patient monitor device 110 reads the stored patient ID for the patient 100 and the stored monitored cardiac data of the patient 100 from the memory of the portable patient cable 104. In this way, the second patient monitor device 110 can read the stored cardiac data of the patient from the portable patient cable 104 that was collected and displayed by the first patient monitor device 106 and transported to the second patient monitor device 110. This read cardiac data may be displayed by the second patient monitor device 110 to the new medical personnel 112 and/or this read cardiac data can be used by the second patient monitor device 110 for other purposes (e.g., for comparative purposes). For example, the read cardiac data from the portable patient cable 104 may be used for comparative purposes against future monitored cardiac data and displayed by the second patient monitor device 110. As an example, another cardiac monitor may coupled via the portable patient cable 104 to the second patient monitor device 110 and subsequent cardiac data measured at the second patient monitor device may be compared to the previous cardiac data measured by the first patient monitor device 106.

[0008] With additional reference to FIG. 2, a more detailed example of the portable patient cable 104 and a system for its use, according to one embodiment of the invention, will hereinafter be described. In one embodiment, portable patient cable 104 may include a processor 210, a memory 212, an interface 214 to a patient monitor device 106, and an interface 216 to a physiological sensor device (digital or analog) 202. Interface 214 may be a suitable interface for connection to a patient monitor device (e.g., first and second

patient monitor devices 106, 110). Similarly, interface 216 may be a suitable interface for connection to a sensor device 202.

[0009] The sensor device 202 may be an analog or a digital medical sensor device that may be invasive or non-invasive. Examples of medical sensor devices 202 may include pressure sensors, temperature sensors, image sensors, light sensors, electric sensors, magnetic sensors, flow sensors, biosensors, accelerometer sensors, etc., that may be used to measure patient physiological data such as: cardiac measurements, blood measurements, chemical measurements, hemodynamic measurements, breathing measurements, electric measurements, intracranial pressure measurements, etc. It should be appreciated that sensor device 202 may be any type of medical sensor device.

[0010] The portable patient cable 104 may operate under the control of processor 210 to interface with physiological sensor device 202 through interface 216 and to transmit patient physiological data measured by the physiological sensor device 202 to a patient monitor device (106, 110, etc.) through interface 214. Processor 210 may operate under the control of a program, routine, or the execution of instructions to execute methods or processes in accordance with embodiments of the invention, previously and hereinafter described. As previously described, portable patient cable 204 may be coupled to a plurality of different patient monitors to transfer patient physiological data previously stored in memory 212. Memory 212 may include volatile memory for operational purposes and non-volatile memory (e.g. EEPROM) such that stored data can be transferred from one patient monitor device to another patient monitor device (without

power) so that data stored is not erased and is kept (without power) as it is being transported.

[0011] For example, portable patient cable 104 may store a unique patient identifier (ID) for a patient and measured physiological data of the patient to the memory 212 based upon a command from the patient monitor device 106. As will be described in more detail hereinafter, memory 212 may also store other data, such as: a first use date, a maximum age, patient demographic data, notes, etc.

[0012] Also, in one embodiment, the portable patient cable 104 may include a zeroing button 220 to implement an auto-zeroing command. Pressure zeroing is a function that some monitoring devices have to zero the pressure signal from a pressure sensor device to the atmospheric pressure. Zeroing is typically performed prior to pressure measurement and is commonly repeated when the position of the pressure sensor device is changed. In one embodiment, under the control of processor 210, the portable patient cable 104, based on the pressing of the zeroing button 220, may implement the pressure zeroing function. For example, the zeroing button 220 may be configured for pressing by medical personnel to implement the auto-zeroing command.

[0013] Further, an example patient monitor device (e.g., first patent monitor device 106, second patient monitor device 110, etc.) may include a processor 230, a memory 232, a display device 234, and an input device 236. Processor 230 may operate under the control of a program, routine, or the execution of instructions to execute methods or processes in accordance with embodiments of the invention, previously and hereinafter described. Display device 234 may be a common display monitor to display information to

medical personnel. Input device 236 may be a keyboard or keypad to accept input from medical personnel. It should be appreciated that a patient monitor device (first 106, second 110, or any subsequent patient monitor device) may be a desktop computer, a laptop computer, a wireless computing device, a smart phone, a tablet, a specialized medical computing device, or any type of computing device. It should be appreciated that the patient monitor device may have both wired and wireless connectivity to other computing devices and networks.

[0014] With brief additional reference to FIG. 3, particular data elements that may be stored in a non-volatile portion 300 of memory 212 will be briefly described. Non-volatile memory portion 300 of memory 212 may store the following data elements: a first use date 306 of the portable patient cable 104; a maximum age 304 of the portable patient cable 104; a unique patient ID 320; patient demographic data 322; patient physiological data 324; notes 326; a transport flag 328; and various other data. It should be noted that the maximum age 304 and the first use date 306 may be write-once only such that they are not changeable. The maximum age 304 may be set by the manufacturer or vendor of the portable patient cable 104 and the first use date 306 may be set permanently on the first use of the portable patient cable 104. The other elements denoted by memory set 340: unique patient ID 320; patient demographic data 322; patient physiological data 324; notes 326; and a transport flag 328; may be changeable as commanded by patient monitor devices, as will be hereinafter described.

[0015] With additional reference again to FIGs. 1 and 2, an example of the use of a portable patient cable 104 will be hereinafter described. As a particular example, upon the

emergence of a patient 100 (e.g., to the Emergency Room (ER)), the portable patient cable 104 including a processor 210 and memory 212 may be coupled to a physiological sensor 202 (e.g., a cardiac sensor) and to a first patient monitor device 106. Portable patient cable 104 under the control of processor 210 may transmit patient physiological data measured by the physiological sensor 202 of the patient to the first patient monitor device 106. The first patient monitor device 106 may display monitored parameter data from the measured physiological data on the display device 234. This data may relate to a variety of numeric or quantifiable values indicating particular types of physiological conditions or states of the patient. Further, the first patient monitor device 106, under the control of processor 230, may command the storage of a unique patient identifier (ID) 320 (e.g., a unique hospital code for the patient, a patient name, or other type of unique identifier, etc.) for the patient 100 to the memory 212 of the portable patient cable 104. It should be appreciated that medical personnel may input such a unique patient ID through an input device 236 of the first patient monitor device. Additionally, the first patient monitor device 106, under the control of processor 230, may command the storage of measured patient physiological data 324 from the physiological sensor 202 to the memory 212 of the portable patient cable 104. For example, the physiological data 324 stored in memory may be the monitored parameter data that is displayed on the display device 234. This may be referred to as monitored patient physiological data 324.

[0016] Continuing with this example, a patient 100 may enter the Emergency Room, have a medical operation performed (e.g., stitching of wounds), and during that time the portable patient cable 104 may transmit patient physiological data (e.g., cardiac data, such

as heart rate, etc.) measured by the physiological sensor 202 (e.g., a cardiac sensor) of the patient 100 to the first patient monitor device 106 and the first patient monitor device 106 may command the storage of the monitored patient physiological data 324 (e.g., cardiac data) measured by physiological sensor 202 to the memory 212 of the portable patient cable 104. Additional data may also be stored to the memory 212 of the portable patient cable 104. Examples of this additional data will be hereinafter described.

[0017] In one example, the first patient monitor device 106 determines if the portable patient cable 104 is undergoing a first use (e.g., the first use date 306 is not set), and if so, the first patient monitor device 106 commands that the portable patient cable 104 store the first use date 306 to memory 212. The first use date 306 may be representative of the first use (e.g., time, day, month, year, etc.) of the portable patient cable 104. The first patient monitor device 106 may automatically perform this function or request, via the display device 234, that medical personnel via input device 236 enter the first use date and then command the portable patient cable 104 to store first use date 306 to memory 212. As be will described later, this may be useful in determining recommendations for replacement of the portable patient cable 104.

[0018] In one example, the first patient monitor device 106 commands the storage of patient demographic data 322 to the memory 212 of the portable patient cable 104. As an example, when a new patient is being attended to by medical personnel, the medical personnel may enter via the input device 236 patient demographic information such as: height, weight, sex, age, etc. This patient demographic information 322 may then be stored to the memory 212 of the portable patient cable 104. Afterwards, when the portable patient

cable 104 is moved and coupled to a second patient monitor device 111, the second patient monitor device may read the stored demographic information 322 for the patient from the memory 212 of the portable patient cable 104.

[0019] Also, as an additional example, the first patient monitor device 106 may command the storage of notes 326 for the patient to the memory 212 of the portable patient cable 104. For example, medical personnel may enter notes regarding the patient and their medical condition via the input device 236 of the first patient monitor device 106. Then, after the portable patient cable 104 is moved and coupled to a second patient monitor device 110, the second patient monitor device 110 may read the stored notes 326 for the patient from the memory 212 of the portable patient cable 104 and display them on the display device 234. This may be useful in transferring information about a patient's medical condition between different medical personnel at different parts of the hospital (e.g., ER vs. ICU, etc.)

[0020] Continuing with this example, after the Emergency Room, the patient 100 and the portable patient cable 104 may be transported to the Intensive Care Unit (ICU) or another medical unit (e.g., ICU merely being utilized as an example). At the ICU, medical personnel 112 may reconnect the portable patient cable 104 to a second patient monitor device 110. The physiological sensor 202 may be the same physiological sensor or a different physiological sensor.

[0021] When the portable patient cable 104 is moved and coupled to the second patient monitor device 110, the second patient monitor device 110 reads the stored unique patient ID 320 for the patient 100 from the memory 212 of the portable patient cable 104.

Further, the second patient monitor device 110 may read the patient demographic data 322 and the notes 326 for the patient 100 from the memory 212 of the portable patient cable 104. These may be displayed on the display device 234 and/or used for monitoring operations by the second patient monitor device 110.

[0022] Further, the second patient monitor device 110 may read measured physiological sensor data (e.g., cardiac data) from the cardiac sensor 202 of the patient 100 that is transmitted by the portable patient cable 104. The second patient monitor 110 may display monitored parameter data from the measured physiological data on the display device 234.

[0023] Additionally, the stored monitored patient physiological data 324 may be read by the second patient monitor device 110 from the memory 212 of the portable patient cable 104. In this way, the second patient monitor device 110 can read the stored monitored physiological data 324 of the patient from the portable patient cable 104 that was collected by the first patient monitor device 106 and transported to the second patient monitor device 110. This read monitored physiological data 324 can then be displayed on the display device 234 of the second patient monitor device 110 to the new medical personnel 112 and/or this read physiological data can be used by the second patient monitor device 110 for other purposes (e.g., for comparative purposes). For example, the read monitored patient physiological data may be used for comparative purposes against future measured physiological data.

[0024] As an example, another cardiac sensor device 202 may be coupled via the portable patient cable 104 to the second patient monitor device 110 and the cardiac data

measured by the second patient monitor device 110 may be compared to the previous measured cardiac data by the first patient monitor device 110 that was stored by the portable patient cable 104. In this way, the second patient monitor device 110 may display on the display device 234 the currently measured cardiac data, as well as, a comparison, to the previously measured cardiac data.

[0025] It should be appreciated that although an example of a cardiac sensor device has been described, that embodiments of the invention relate any type of medical sensor device, such as: pressure sensors, temperature sensors, image sensors, light sensors, electric sensors, magnetic sensors, flow sensors, biosensors, accelerometer sensors, etc., that may be used to measure any type of patient physiological data such as: cardiac measurements, blood measurements, chemical measurements, hemodynamic measurements, breathing measurements, electric measurements, intracranial pressure measurements, etc.

[0026] Also, it should be appreciated that although examples have been given of transporting the portable patient cable 104 from a first patient monitor device 106 to a second patient monitor device 110, that portable patient cable 104 may be used to transfer data among a plurality of different patient monitor devices throughout various different types of medical settings. For example, after the portable patient cable 104 is moved and coupled to the second patient monitor device 110, in which the second patient monitor device 110 receives physiological data of the patient measured by the physiological sensor 202, the second patient monitor device commands the storage of monitored patient physiological data 324 to the memory 212 of the portable patient cable 104. Thereafter,

the portable patient cable 104 may be moved and coupled to another patient monitor device (e.g., a third patient monitor device), and the third patient monitor device reads the stored monitored patient physiological data 324 of the patient from the memory 212 of the portable patient cable 104, and begins the similar process over again. Thus, the portable patient cable 104 may be moved to a plurality of different patient monitoring devices (third, fourth, fifth….etc.) to transfer monitored patient physiological data 324, maximum age 304, first use date 306, unique patient ID 320, patient demographic data 322, notes 326, etc., among any number of different patient monitoring devices at different medical settings.

[0027] With additional reference to FIG. 4, a process 400 to determine if the portable patient cable 104 has reached its maximum age, according to one embodiment, is described. At block 402, medical personnel connects the portable patient cable 104 to a patient monitoring device (e.g., 106, 110, etc.). The patient monitoring device then determines if the portable patient cable 104 is undergoing a first use (decision block 404). For example, if the first use date 306 of memory 212 of the portable patient cable 104 is not set, then this may indicate that this is the first use of the portable patient cable 104. If so, the patient monitoring device commands that the portable patient cable 104 store the first use date 306 to memory 212 of the portable patient cable 104 (block 406). The first use date 306 may be representative of the first use date (e.g., time, day, month, year, etc.) of the portable patient cable 104. The patient monitor device may automatically perform this function or request via the display device 234 that medical personnel, via input device 236, enter the first use date and then command the portable patient cable 104 to store the

first use date 306 to memory 212. After this, the patient monitor device may proceed to its normal monitoring functions (block 408).

[0028] If the patient monitoring device determines that this is not the first use of the portable patient cable 104, then the patient monitoring device determines if the maximum age of the portable patient cable 104 has been exceeded. To accomplish this, the patient monitoring device reads the first use date 306 from the memory 212 of the portable patient cable 104 (block 410). Next, the patient monitoring device calculates the difference between the current date and the first use date to determine a current cable age of the portable patient cable 104 (block 412). Then, at decision block 420, the patient monitoring device determines if the current cable age is greater than the maximum age 304 stored in the memory 212 of the portable patient cable 104. As previously described, the maximum age 304 may be set by the manufacturer or vendor of the portable patient cable 104. The maximum cable age may be any suitable age for the predefined quality performance of the portable patient cable (e.g., 6 month, 1 year, 2 year, 3 year, etc.). If the cable age is not greater than the maximum age, then the patient monitor device may proceed to its normal monitoring functions (block 422).

[0029] On the other hand, if the current age is greater than the maximum age, than the patient monitor may post a notification that the portable patient cable 104 should be expired and replaced (block 430). For example, the patient monitor device may command a display on the display device 234 that the portable patient cable 104 has exceeded its maximum age and should be expired and replaced. As another example, the patient monitor device may command the transmission (e.g., wirelessly or via a wired connection

(e.g., via the Internet)) to a vendor/manufacturer of the portable patient cable 104 such that the vendor/manufacturer can contact the medical department that the portable patient cable 104 should be replaced. Nonetheless, after the notification, the patient monitor device may proceed to its normal monitoring functions (block 432).

[0030] With additional reference to FIG. 5, a process 500 to assign a new patient to a portable patient cable, according to one embodiment, is described. At block 502, medical personnel connects the portable patient cable 104 to a patient monitoring device. The patient monitoring device then determines that the patient is a new patient based upon either the medical personnel entering via user input 236 that this is a new patient and/or by reading that the transport flag 328 of memory 212 of the portable patient cable 104 is set to OFF (block 504). Next, at block 506, the patient monitor device assigns a unique patient ID to the patient. In particular, the patient monitor device may command the storage of the unique patient ID 320 to memory 212 of the portable patient cable 104 (block 508). The unique patient ID may be a unique hospital code for the patient, a patient name, or another type of unique identifier for the patient. The unique patient ID may be manually entered by the input device 236 of the patient monitor device by medical personnel, it may be scanned, or it may inputted by other methods. Next, at block 510, the patient monitor device may assign patient demographic data (e.g., age, height, weight, etc.). In particular, the patient monitor may command the storage of the patient demographic data 322 to memory 212 of the portable patient cable 104 (block 512). As an example, when a new patient is being attended to by medical personnel, the medical personnel may enter via the input device 236 patient demographic information such as: height, weight, sex, age, etc.

[0031] It should be appreciated that as the new patient is having their ID and demographic data entered that the patient monitor device may be monitoring and displaying on the display device 234 physiological data of the patient based upon sensor data received from the sensor device 202 through the portable patient cable 104 (block 516) and may command the storage of the patient physiological data 324 to the memory 212 of the portable patient cable 104 (block 518). Further, the medical personnel may enter notes regarding the patient and their medical condition via the input device 236 and the patient monitor device may assign the patient notes (block 520) and command the storage of the patient notes 326 for the patient to the memory 212 of the portable patient cable 104. When the patient is ready to be transferred with the portable patient cable 104 to another patient monitor device, medical personnel may enter via the user interface 236, a transport patient command (block 530), and the patient monitor device may command the storage of the transport flag 328 ON in the memory 212 of the portable patient cable 104 (block 531) and the patient may then be transported to another patient monitor device (block 532).

[0032] With additional reference to FIG. 6, a process 600 to receive a portable patient cable at a subsequent patient monitoring device, according to one embodiment, is described. At block 602, medical personnel connects the portable patient cable 104 to a patient monitoring device. The patient monitoring device then determines that the patient is a previous patient having stored information in the portable patient cable 104 based upon either the patient monitoring device reading that the transport flag 328 of memory 212 of the portable patient cable 104 is set to ON and/or the medical personnel entering,

via user input 236, that this is a previous patient with a transported portable patient cable 104 (block 602). At block 606, the patient monitor device then reads the stored unique patient ID 320 for the patient from the memory 212 of the portable patient cable 104 and may display this on the display device 234. Next, at block 608, the patient monitor device may read stored patient demographic data 322 (e.g., age, height, weight, etc.) from the memory 212 of the portable patient cable 104 and may display the patient demographic data on the display device 234. Further, at block 609, the patient monitor device may read the notes 326 for the patient from the memory 212 of the portable patient cable 104 and may display notes on the display device 234. It should be appreciated that further demographic data and notes may be entered by medical personnel at subsequent patient monitor devices.

[0033] Continuing with the process 600, at block 610, the patient monitor device may read stored monitored patient physiological data 324 from the memory 212 of the portable patient cable 104. The previously monitored patient physiological data may be displayed on the display device 234 and/or used for comparative purposes with newly read physiological data, as previously described. Further, at block 620, the patient monitor device may read measured physiological sensor data from the sensor 202 for the patient that is transmitted by the portable patient cable 104 and may display this monitored parameter physiological data from the measured physiological data on the display device 234. Additionally, the patient monitor device may command the storage of the new monitored parameter physiological data 324 to memory 212 of the portable patient cable 104 (block 622) such that this new stored monitored parameter physiological data may be

used by subsequent patient monitors to which the portable patient cable 104 and the patient are transferred to. At block 630, medical personnel may enter notes about the patient, such that the patient monitor device may command the storage of the notes 326 to memory 212 of the portable patient cable 104, which may read at subsequent patient monitor devices. After monitoring at the patient monitor device, the patient and the portable patient cable 104 may be transported to another patient monitor device (block 642).

[0034] It should be appreciated that aspects of the invention previously described may be implemented in conjunction with the execution of instructions by processors of the devices, such as the portable patient cable and patient monitor devices, previously described. Processors may operate under the control of a program, routine, or the execution of instructions to execute methods or processes in accordance with embodiments of the invention. For example, such a program may be implemented in firmware or software (e.g. stored in memory and/or other locations) and may be implemented by processors and/or other circuitry of the devices previously described. Further, it should be appreciated that the terms processor, microprocessor, circuitry, controller, etc., refer to any type of logic or circuitry capable of executing logic, commands, instructions, software, firmware, functionality, etc

[0035] The various illustrative logical blocks, modules, and circuits described in connection with the embodiments disclosed herein may be implemented or performed with a general purpose processor, a microcontroller, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or

other programmable logic device, discrete gate or transistor logic, discrete hardware components, or any combination thereof designed to perform the functions described herein. A processor may be a microprocessor or any conventional processor, controller, microcontroller, or state machine. A processor may also be implemented as a combination of computing devices, e.g., a combination of a DSP and a microprocessor, a plurality of microprocessors, one or more microprocessors in conjunction with a DSP core, or any other such configuration.

[0036] The steps of a method or algorithm described in connection with the embodiments disclosed herein may be embodied directly in hardware, in a software/firmware module executed by a processor, or in a combination of the two. Memory to store data and modules may include RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary storage medium is coupled to the processor such the processor can read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor.

[0037] The previous description of the disclosed embodiments is provided to enable any person skilled in the art to make or use the present invention. Various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without departing from the spirit or scope of the invention. Thus, the present invention is not intended to be limited to

the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.

WHAT IS CLAIMED IS:

1. A system for transporting patient physiological data of a patient measured by a physiological sensor comprising:

a first and a second patient monitor device; and

a portable patient cable including a memory, the portable patient cable to couple the physiological sensor to the first patient monitor device and to transmit patient physiological data measured by the physiological sensor of the patient to the first patient monitor device;

wherein the first patient monitor device commands the storage of a patient identifier (ID) for the patient and measured physiological data of the patient to the memory of the portable patient cable; and

wherein, when the portable patient cable is moved and coupled to the second patient monitor device, the second patient monitor device reads the stored patient ID for the patient and the measured physiological data of the patient from the memory of the portable patient cable.

2. The system of claim 1, wherein the memory of the portable patient cable is a non-volatile memory.

3. The system of claim 1, wherein the measured physiological data of the patient stored to the memory of the portable patient cable by the first patient monitor device

comprises monitored parameter data that is displayed by the first patient monitor device.

4. The system of claim 1, wherein the first patient monitor device commands the storage of demographic information for the patient to the memory of the portable patient cable, and, wherein, when the portable patient cable is moved and coupled to the second patient monitor device, the second patient monitor device reads the stored demographic information for the patient from the memory of the portable patient cable.

5. The system of claim 1, wherein the first patient monitor device commands the storage of notes for the patient to the memory of the portable patient cable, and, wherein, when the portable patient cable is moved and coupled to the second patient monitor device, the second patient monitor device reads the stored notes for the patient from the memory of the portable patient cable.

6. The system of claim 1, wherein, when the portable patient cable is moved and coupled to the second patient monitor device and coupled to a physiological sensor, the second patient monitor device receives measured physiological data of the patent measured by the physiological sensor of the patient and commands the storage of measured physiological data to the memory of the portable patient cable, and, wherein, when the portable patient cable is moved and coupled to a third patient

monitor device, the third patient monitor device reads the stored measured physiological data of the patient from the memory of the portable patient cable.

7. The system of claim 1, wherein, the portable patient cable includes a zeroing button.

8. The system of claim 1, wherein, the portable patient cable includes a maximum age stored in memory.

9. The system of claim 8, wherein, the first patient monitor device determines if the portable patient cable is undergoing a first use, and if so, the first patient monitor device commands the storage of a first use date to the memory of the portable patient cable.

10. The system of claim 9, wherein, if the first patient monitor device determines that the portable patient cable is not undergoing a first use, the first patient monitor device:

reads the first use date from the memory of the portable patient cable;

calculates the difference between the current date and the first use date to determine a current age; and

determines if the current age is greater than the maximum age, and if the current age is greater than the maximum age, commands the display of a notification.

11. A system for transporting patient physiological data of a patient measured by a physiological sensor comprising:

a first and a second patient monitor device; and

a portable patient cable including a memory, the portable patient cable to couple the physiological sensor to the first patient monitor device and to transmit patient physiological data measured by the physiological sensor of the patient to the first patient monitor device, wherein the first patient monitor device commands the storage of measured physiological data of the patient to the memory of the portable patient cable, and, when the portable patient cable is moved and coupled to the second patient monitor device, the second patient monitor device reads the measured physiological data of the patient from the memory of the portable patient cable; and

wherein, the first patient monitor device determines if the portable patient cable is undergoing a first use, and if so, the first patient monitor device commands the storage of a first use date to the memory of the portable patient cable

12. The system of claim 11, wherein, the portable patient cable includes a maximum age stored in memory.

13. The system of claim 12, wherein, if the first patient monitor device determines that the portable patient cable is not undergoing a first use, the first patient monitor device:

reads the first use date from the memory of the portable patient cable;

calculates the difference between the current date and the first use date to determine a current age; and

determines if the current age is greater than the maximum age.

14. The system of claim 13, wherein, if the current age is greater than the maximum age, the first patient monitor device commands the display of a notification of exceeding the maximum age on a display device.

15. The system of claim 14, wherein, if the current age is greater than the maximum age, the first patient monitor device commands the transmission of a notification of exceeding the maximum age to a vendor of the portable patent cable.

16. The system of claim 12, wherein the memory of the portable patient cable is a non-volatile memory.

17. The system of claim 16, wherein the memory of the portable patient to store the first use data and the maximum age is permanent non-volatile memory.

18. The system of claim 11, wherein the measured physiological data of the patient stored to the memory of the portable patient cable by the first patient monitor

device comprises monitored parameter data that is displayed by the first patient monitor device.

19. The system of claim 11, wherein the first patient monitor device commands the storage of demographic information for the patient to the memory of the portable patient cable, and, wherein, when the portable patient cable is moved and coupled to the second patient monitor device, the second patient monitor device reads the stored demographic information for the patient from the memory of the portable patient cable.

20. The system of claim 11, wherein the first patient monitor device commands the storage of notes for the patient to the memory of the portable patient cable, and, wherein, when the portable patient cable is moved and coupled to the second patient monitor device, the second patient monitor device reads the stored notes for the patient from the memory of the portable patient cable.

21. The system of claim 11, wherein, when the portable patient cable is moved and coupled to the second patient monitor device and coupled to a physiological sensor, the second patient monitor device receives measured physiological data of the patent measured by the physiological sensor of the patient and commands the storage of measured physiological data of the patient to the memory of the portable patient cable, and, wherein, when the portable patient cable is moved and coupled to a third

patient monitor device, the third patient monitor device reads the stored measured physiological data of the patient from the memory of the portable patient cable.

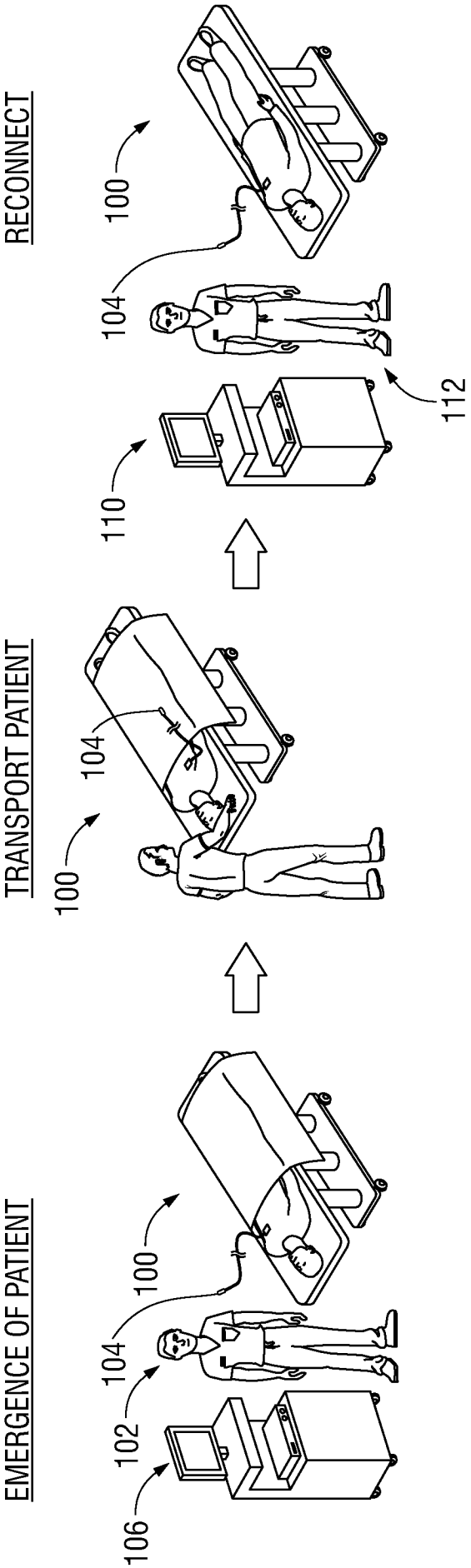
EMERGENCE OF PATIENT
TRANSPORT PATIENT
RECONNECT
100
102
104
106
110
112

FIG. 1

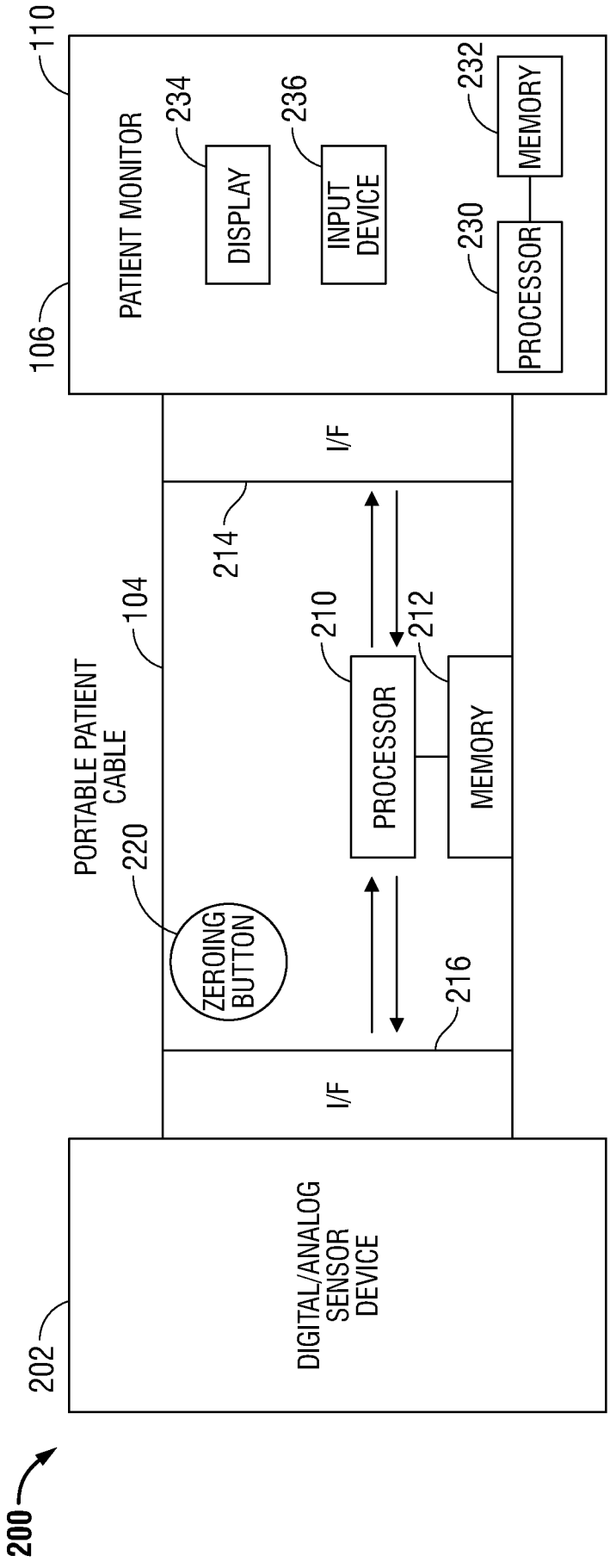
200
202
DIGITAL/ANALOG SENSOR DEVICE
I/F
216
ZEROING BUTTON
220
PORTABLE PATIENT CABLE
104
PROCESSOR
210
MEMORY
212
214
I/F
106
PATIENT MONITOR
110
DISPLAY
234
INPUT DEVICE
236
PROCESSOR
230
MEMORY
232

FIG. 2

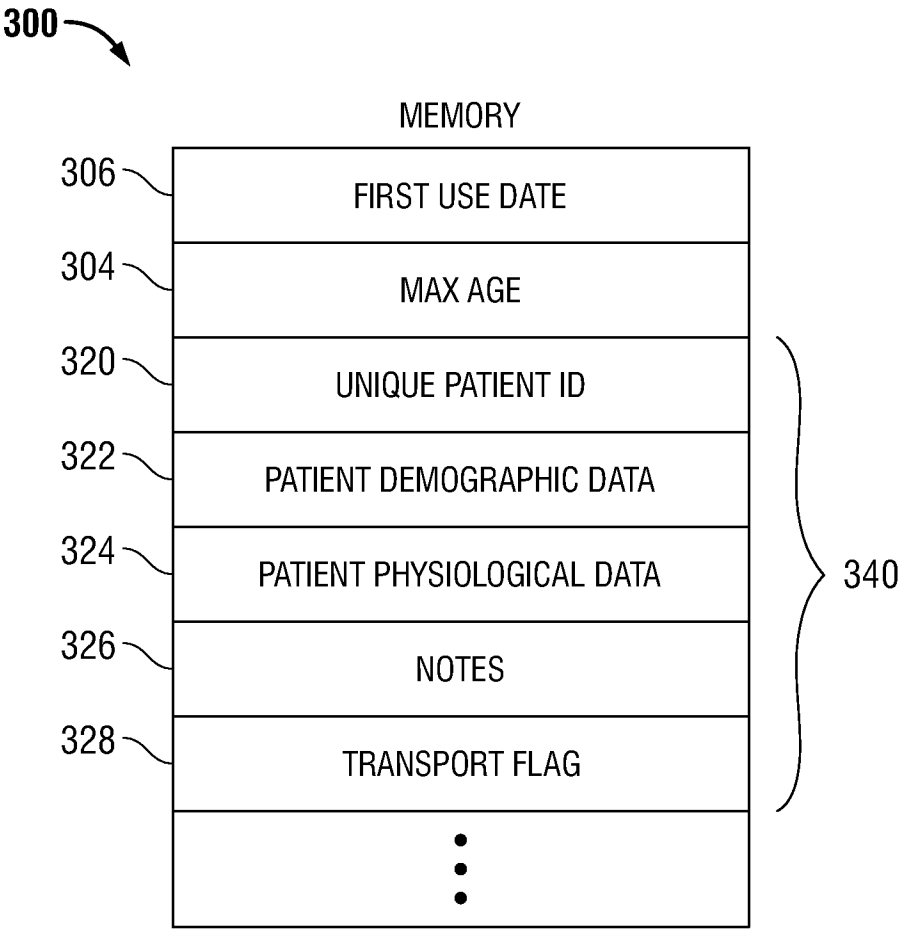
300
MEMORY
306
FIRST USE DATE
304
MAX AGE
320
UNIQUE PATIENT ID
322
PATIENT DEMOGRAPHIC DATA
324
PATIENT PHYSIOLOGICAL DATA
326
NOTES
328
TRANSPORT FLAG
340

FIG. 3

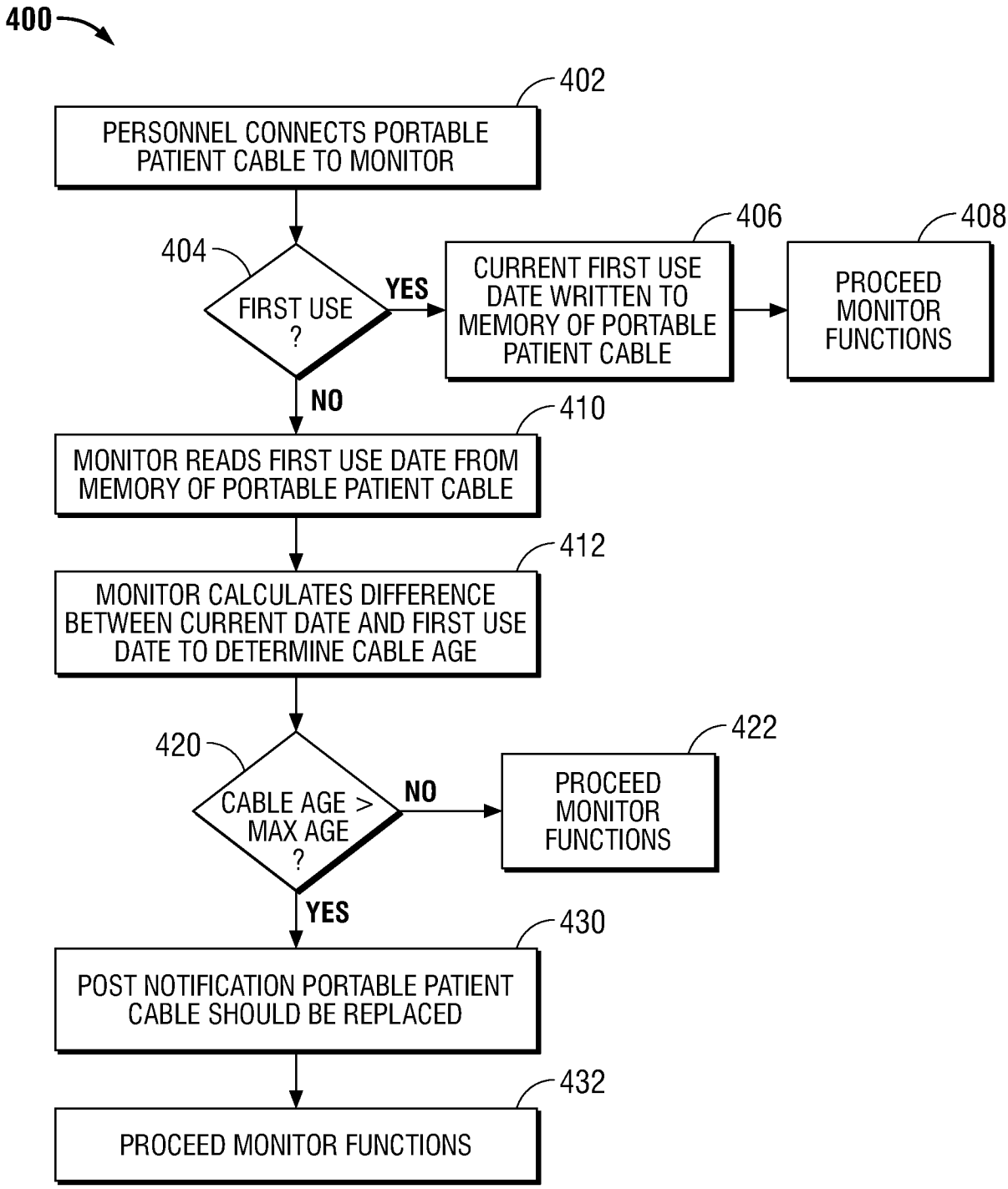
400
402
PERSONNEL CONNECTS PORTABLE PATIENT CABLE TO MONITOR
404
FIRST USE ?
YES
406
CURRENT FIRST USE DATE WRITTEN TO MEMORY OF PORTABLE PATIENT CABLE
408
PROCEED MONITOR FUNCTIONS
NO
410
MONITOR READS FIRST USE DATE FROM MEMORY OF PORTABLE PATIENT CABLE
412
MONITOR CALCULATES DIFFERENCE BETWEEN CURRENT DATE AND FIRST USE DATE TO DETERMINE CABLE AGE
420
CABLE AGE > MAX AGE ?
NO
422
PROCEED MONITOR FUNCTIONS
YES
430
POST NOTIFICATION PORTABLE PATIENT CABLE SHOULD BE REPLACED
432
PROCEED MONITOR FUNCTIONS

FIG. 4

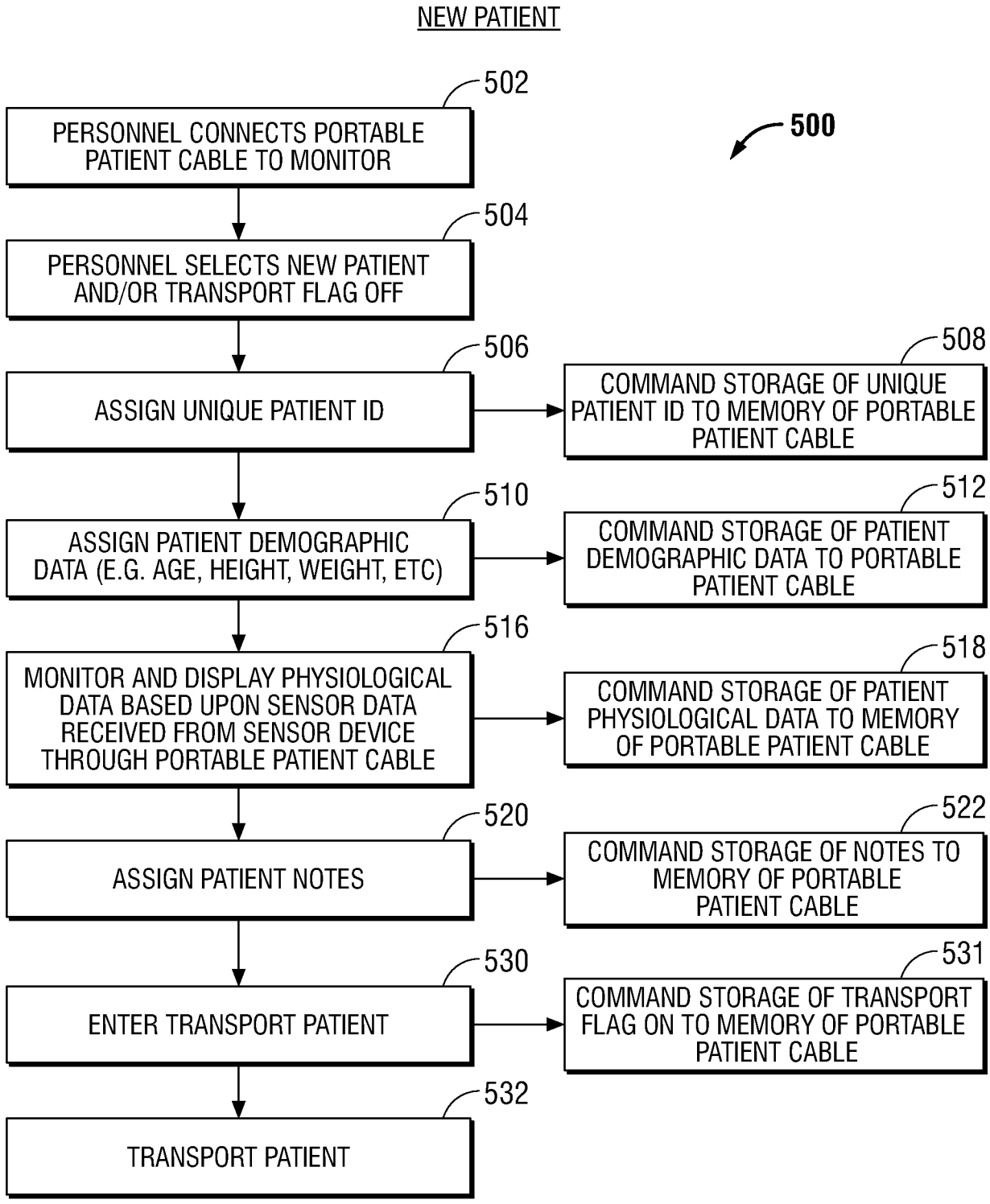
NEW PATIENT
500
502
PERSONNEL CONNECTS PORTABLE PATIENT CABLE TO MONITOR
504
PERSONNEL SELECTS NEW PATIENT AND/OR TRANSPORT FLAG OFF
506
ASSIGN UNIQUE PATIENT ID
508
COMMAND STORAGE OF UNIQUE PATIENT ID TO MEMORY OF PORTABLE PATIENT CABLE
510
ASSIGN PATIENT DEMOGRAPHIC DATA (E.G. AGE, HEIGHT, WEIGHT, ETC)
512
COMMAND STORAGE OF PATIENT DEMOGRAPHIC DATA TO PORTABLE PATIENT CABLE
516
MONITOR AND DISPLAY PHYSIOLOGICAL DATA BASED UPON SENSOR DATA RECEIVED FROM SENSOR DEVICE THROUGH PORTABLE PATIENT CABLE
518
COMMAND STORAGE OF PATIENT PHYSIOLOGICAL DATA TO MEMORY OF PORTABLE PATIENT CABLE
520
ASSIGN PATIENT NOTES
522
COMMAND STORAGE OF NOTES TO MEMORY OF PORTABLE PATIENT CABLE
530
ENTER TRANSPORT PATIENT
531
COMMAND STORAGE OF TRANSPORT FLAG ON TO MEMORY OF PORTABLE PATIENT CABLE
532
TRANSPORT PATIENT

FIG. 5

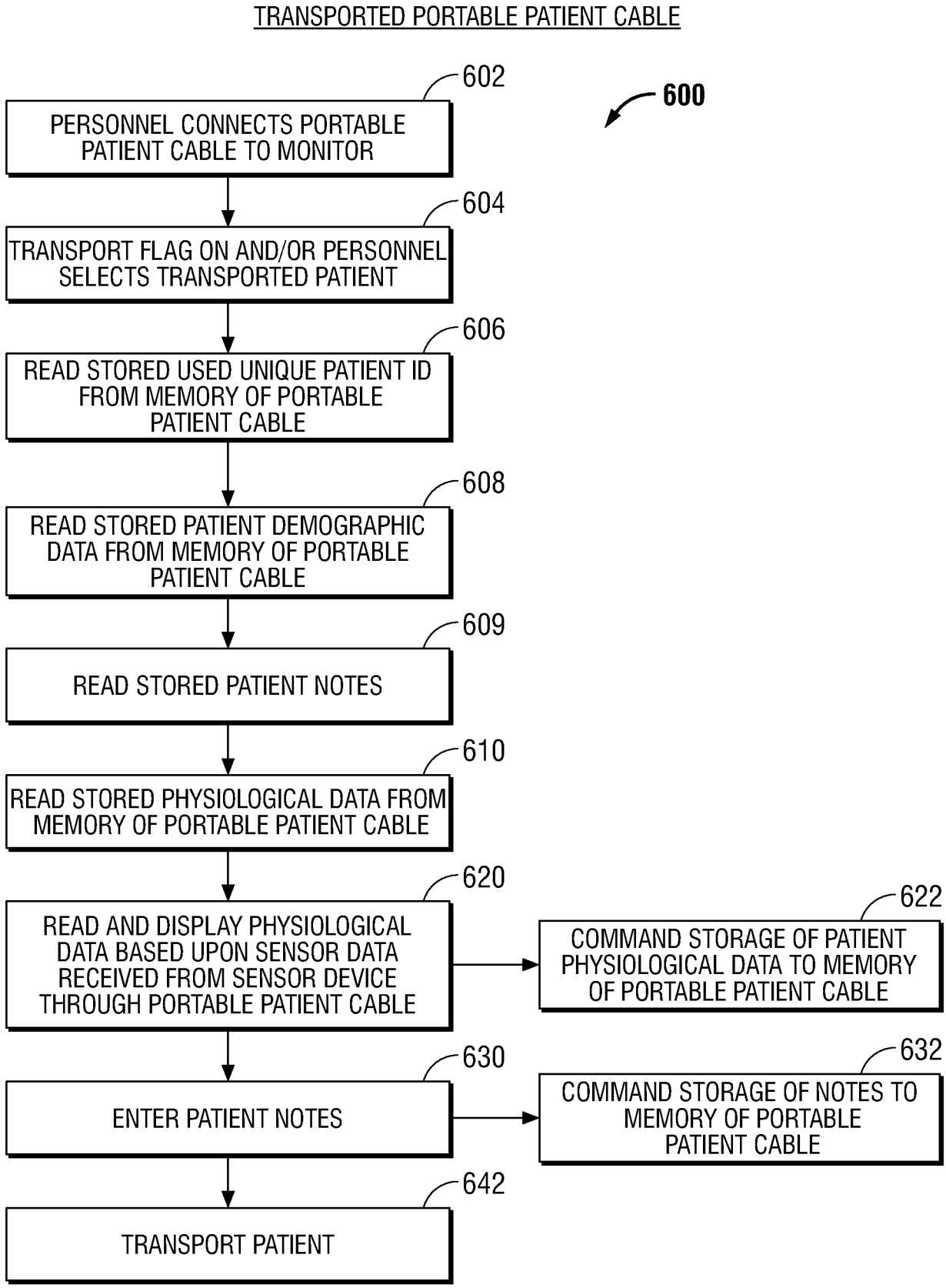
TRANSPORTED PORTABLE PATIENT CABLE
600
602
PERSONNEL CONNECTS PORTABLE PATIENT CABLE TO MONITOR
604
TRANSPORT FLAG ON AND/OR PERSONNEL SELECTS TRANSPORTED PATIENT
606
READ STORED USED UNIQUE PATIENT ID FROM MEMORY OF PORTABLE PATIENT CABLE
608
READ STORED PATIENT DEMOGRAPHIC DATA FROM MEMORY OF PORTABLE PATIENT CABLE
609
READ STORED PATIENT NOTES
610
READ STORED PHYSIOLOGICAL DATA FROM MEMORY OF PORTABLE PATIENT CABLE
620
READ AND DISPLAY PHYSIOLOGICAL DATA BASED UPON SENSOR DATA RECEIVED FROM SENSOR DEVICE THROUGH PORTABLE PATIENT CABLE
622
COMMAND STORAGE OF PATIENT PHYSIOLOGICAL DATA TO MEMORY OF PORTABLE PATIENT CABLE
630
ENTER PATIENT NOTES
632
COMMAND STORAGE OF NOTES TO MEMORY OF PORTABLE PATIENT CABLE
642
TRANSPORT PATIENT

FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2015/033597

A. CLASSIFICATION OF SUBJECT MATTER

A61B 5/00(2006.01)i, G06Q 50/22(2012.01)i, G06Q 50/24(2012.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61B 5/00; A61B 5/04; A61B 5/02; G06Q 50/22; G06Q 50/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & Keywords: cable, sensor, connect, data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005-0113704 A1 (COREY J. LAWSON et al.) 26 May 2005 See abstract, paragraphs [0022]-[0034] and figures 2-5.	1-7
Y		8-21
Y	US 2011-0208013 A1 (LUONG NGOC PHAN et al.) 25 August 2011 See abstract, paragraph [0040] and figure 4.	8-21
A	US 2011-0077473 A1 (DANIEL LISOGURSKI) 31 March 2011 See abstract, paragraphs [0023]-[0040] and figures 1-3.	1-21
A	US 2007-0073116 A1 (MASSI E. KIANI et al.) 29 March 2007 See abstract, paragraphs [0041]-[0047] and figures 5-6B.	1-21
A	US 2011-0004073 A1 (STEVEN CORROY et al.) 06 January 2011 See abstract, paragraphs [0039]-[0042] and figures 2-3c.	1-21

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
26 February 2016 (26.02.2016)	**29 February 2016 (29.02.2016)**

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2015/033597

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		EP 2538843 A2	02/01/2013
		EP 2538843 A4	24/07/2013
		JP 2013-520284 A	06/06/2013
		WO 2011-106318 A2	01/09/2011
		WO 2011-106318 A3	17/11/2011
US 2011-0077473 A1	31/03/2011	US 2013-0237782 A1	12/09/2013
		US 2013-0237783 A1	12/09/2013
		WO 2011-041091 A1	07/04/2011
US 2007-0073116 A1	29/03/2007	None	
US 2011-0004073 A1	06/01/2011	CN 101960746 A	26/01/2011
		EP 2260597 A1	15/12/2010
		JP 2011-512932 A	28/04/2011
		RU 2010139723 A	10/04/2012
		RU 2490799 C2	20/08/2013
		US 8535223 B2	17/09/2013
		WO 2009-107040 A1	03/09/2009