



US010204081B2

(12) **United States Patent**
Vann et al.

(10) **Patent No.:** **US 10,204,081 B2**
(45) **Date of Patent:** ***Feb. 12, 2019**

(54) **COMBINED EPISODIC AND CONTINUOUS
PARAMETER MONITORING**

(58) **Field of Classification Search**
None
See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 498 days.

This patent is subject to a terminal dis-
claimer.

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(21) Appl. No.: **14/955,172**

Primary Examiner — Yu Chen

(22) Filed: **Dec. 1, 2015**

(74) *Attorney, Agent, or Firm* — Merchant & Gould P.C.

(65) **Prior Publication Data**

US 2016/0085942 A1 Mar. 24, 2016

(57) **ABSTRACT**

A method for displaying physiological data on a medical
display device includes receiving one or more first units of
physiological data from a first monitoring device. At least
one of the first units of physiological data is received on a
continuous basis. Each first unit of physiological data cor-
responds to a medical parameter being monitored by the first
monitoring device. One or more second units of physiologi-
cal data are received from a second monitoring device. At
least one of the second units of physiological data is received
on a non-continuous basis. Each second unit of physiologi-
cal data corresponds to a medical parameter being monitored
by the second monitoring device. The first and second units
of physiological data are displayed on a single display
screen of the medical display device.

Related U.S. Application Data

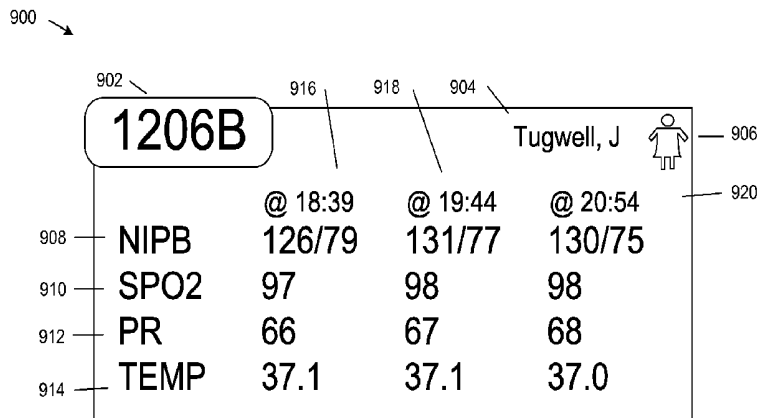
(63) Continuation of application No. 13/440,318, filed on
Apr. 5, 2012, now Pat. No. 9,235,682.

(51) **Int. Cl.**
G09G 5/00 (2006.01)
G06F 17/21 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **G06F 17/212** (2013.01); **G06F 3/0484**
(2013.01); **G06F 19/00** (2013.01);
(Continued)

17 Claims, 14 Drawing Sheets



(51)	<p>Int. Cl. G06F 3/0484 (2013.01) G16H 40/63 (2018.01) G16H 15/00 (2018.01) G06F 19/00 (2018.01) A61B 5/00 (2006.01)</p>	<p>8,020,558 B2 9/2011 Christopher et al. D646,689 S 10/2011 Ulliot 8,028,701 B2 10/2011 Al-Ali et al. 8,038,593 B2 10/2011 Friedman et al. 8,046,705 B2 10/2011 Hunleth et al. 8,055,514 B2 11/2011 Elsholz 8,078,983 B2 12/2011 Davis et al. D652,051 S 1/2012 Judy et al. D656,153 S 3/2012 Imamura et al. D656,157 S 3/2012 Khan et al. D656,946 S 4/2012 Judy et al. D657,368 S 4/2012 Magee et al. D658,196 S 4/2012 Wood et al. D658,667 S 5/2012 Cho et al. D662,106 S 6/2012 Mori et al. D664,971 S 8/2012 Lee et al. D664,984 S 8/2012 Lee et al. D666,625 S 9/2012 Gilmore et al. D667,837 S 9/2012 Magee et al. D667,838 S 9/2012 Magee et al. D674,401 S 1/2013 Trumble et al. D675,218 S 1/2013 Arnold et al. D676,863 S 2/2013 Ho Kushner et al. D676,864 S 2/2013 Velasco et al. D682,292 S 5/2013 Mori et al. D688,685 S 8/2013 Rhee et al. D689,899 S 9/2013 Lee et al. D695,781 S 12/2013 Edwards et al. 8,732,604 B2 5/2014 Okamoto et al. D708,210 S 7/2014 Capua et al. 8,782,076 B2 7/2014 Rothman et al. D710,879 S 8/2014 Elston et al. D711,895 S 8/2014 Inose et al. D711,903 S 8/2014 Mishra et al. 8,806,366 B2 8/2014 Kim et al. D712,420 S 9/2014 Song et al. D714,822 S 10/2014 Capua et al. D718,775 S 12/2014 Kim et al. D720,772 S 1/2015 Cranfill et al. D726,205 S 4/2015 Angelides D726,206 S 4/2015 Angelides D726,207 S 4/2015 Angelides D726,751 S 4/2015 Angelides D726,756 S 4/2015 Angelides D726,757 S 4/2015 Angelides D727,353 S 4/2015 Yokota et al. D727,930 S 4/2015 Kim et al. D730,376 S 5/2015 Ranz et al. D730,927 S 6/2015 Lee et al. D732,562 S 6/2015 Yan et al. 9,053,583 B1* 6/2015 Gross G06F 19/3418 9,055,870 B2 6/2015 Meador et al. D733,723 S 7/2015 Brinda et al. D737,831 S 9/2015 Lee et al. 9,131,904 B2 9/2015 Qualey et al. D740,313 S 10/2015 Seo et al. 9,173,998 B2 11/2015 Rosinko et al. 9,180,243 B2 11/2015 Michaud 9,223,771 B2 12/2015 Lehrian et al. 9,235,682 B2* 1/2016 Vann G16H 15/00 9,254,104 B2 2/2016 Judy et al. 9,259,526 B2 2/2016 Barron et al. 9,265,429 B2 2/2016 St. Pierre et al. 9,377,927 B2 6/2016 Sciammarella et al. D772,252 S 11/2016 Myers et al. 2002/0054141 A1 5/2002 Yen et al. 2002/0078097 A1 6/2002 Chen et al. 2002/0126137 A1 9/2002 Kaestner, Jr. 2002/0177758 A1 11/2002 Schoenberg et al. 2003/0060727 A1 3/2003 Kline 2003/0135087 A1 7/2003 Hickle et al. 2004/0002874 A1 1/2004 Shaffer et al. 2004/0088199 A1 5/2004 Childress et al. 2004/0111045 A1 6/2004 Sullivan et al. 2005/0114374 A1 5/2005 Juskiewicz et al. 2005/0229110 A1 10/2005 Gegner et al. 2005/0288571 A1 12/2005 Perkins 2006/0149597 A1 7/2006 Powell et al. 2006/0200009 A1 9/2006 Wekell et al.</p>
(52)	<p>U.S. Cl. CPC G16H 15/00 (2018.01); G16H 40/63 (2018.01); A61B 5/7445 (2013.01); A61B 2505/03 (2013.01); G09G 2380/08 (2013.01)</p>	
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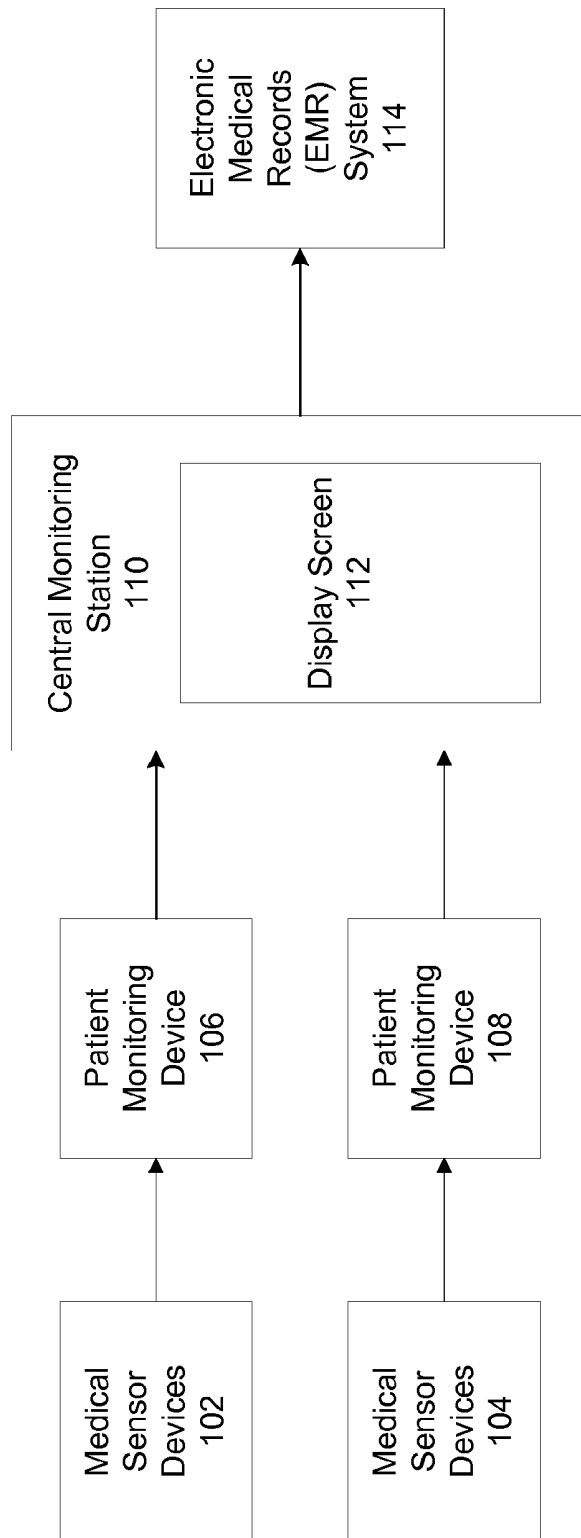
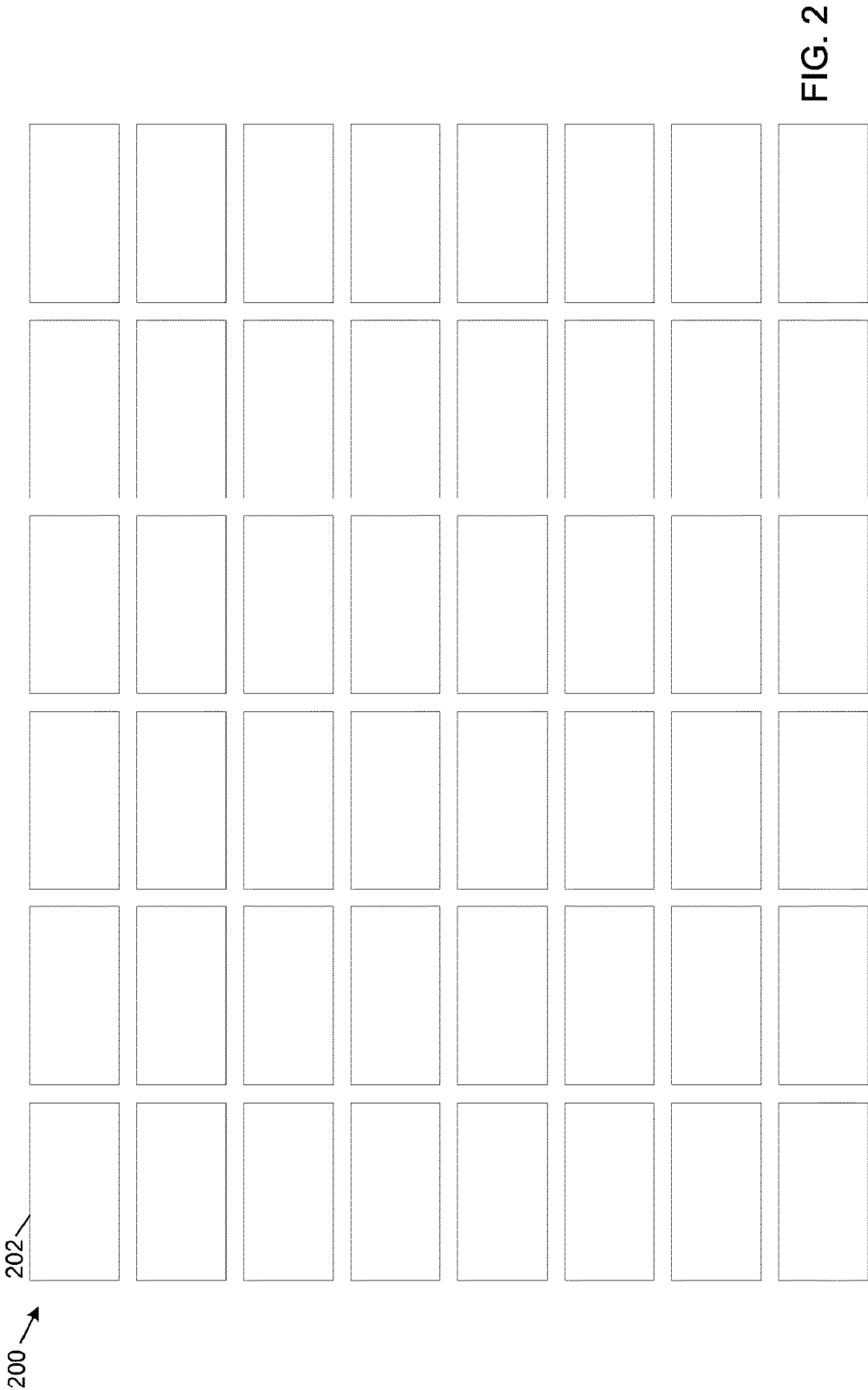


FIG. 1



202 →

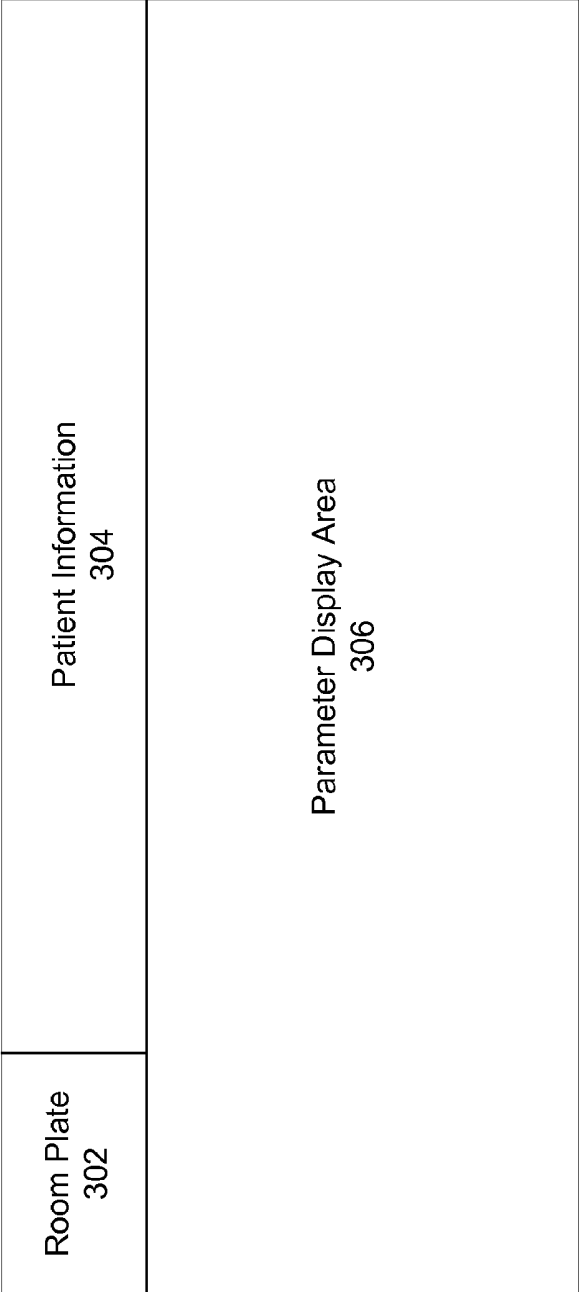


FIG. 3

306 →

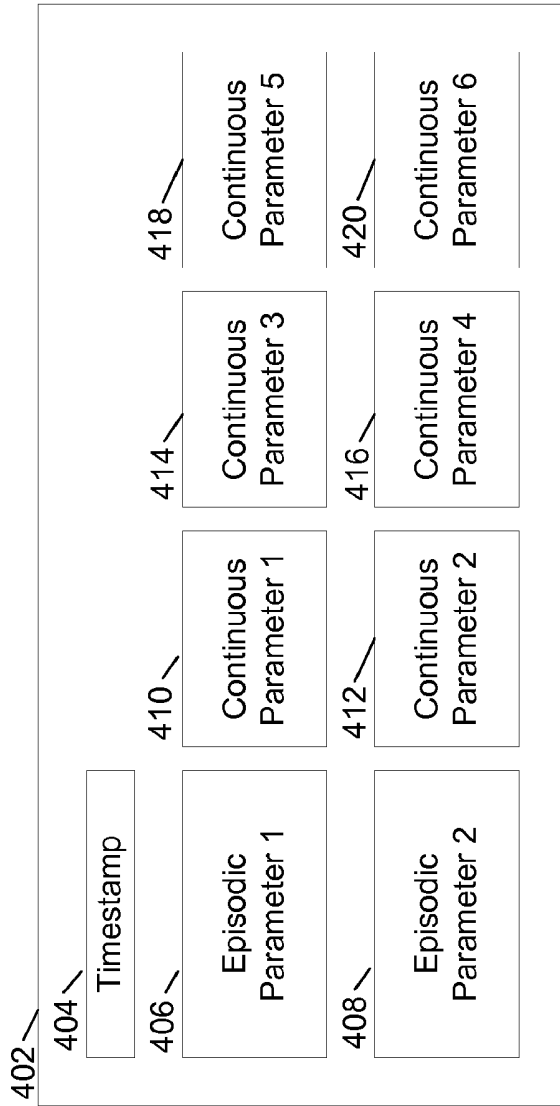


FIG. 4

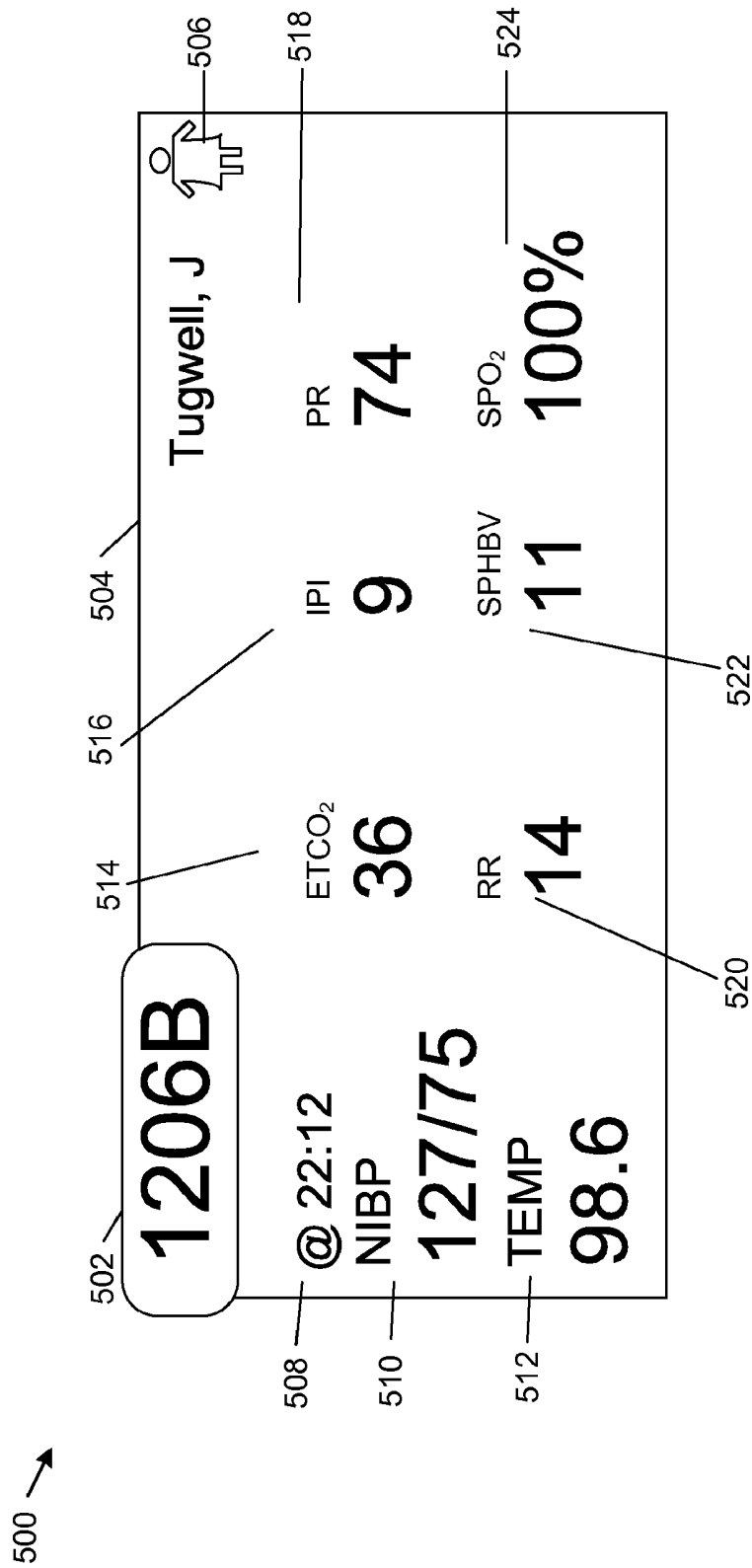


FIG. 5

306 →

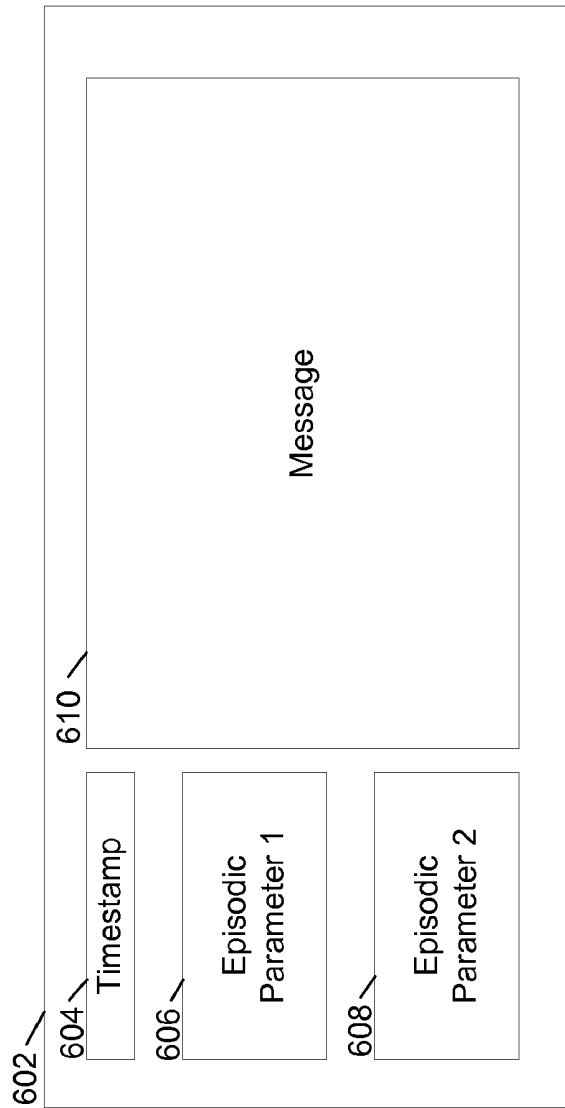


FIG. 6

306 →

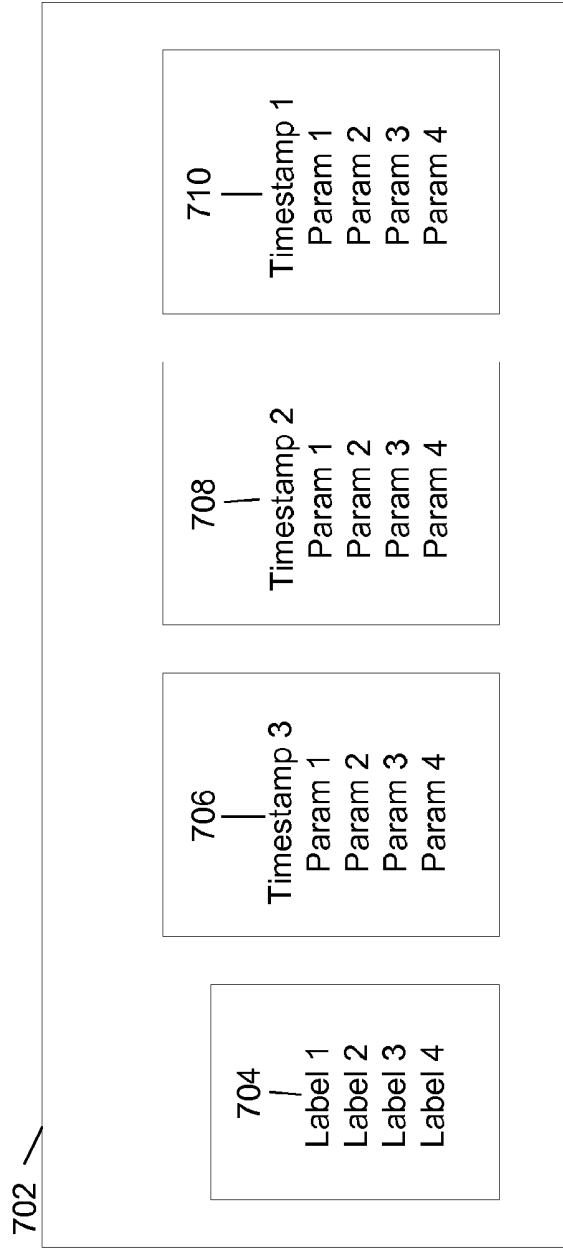


FIG. 7

306 →

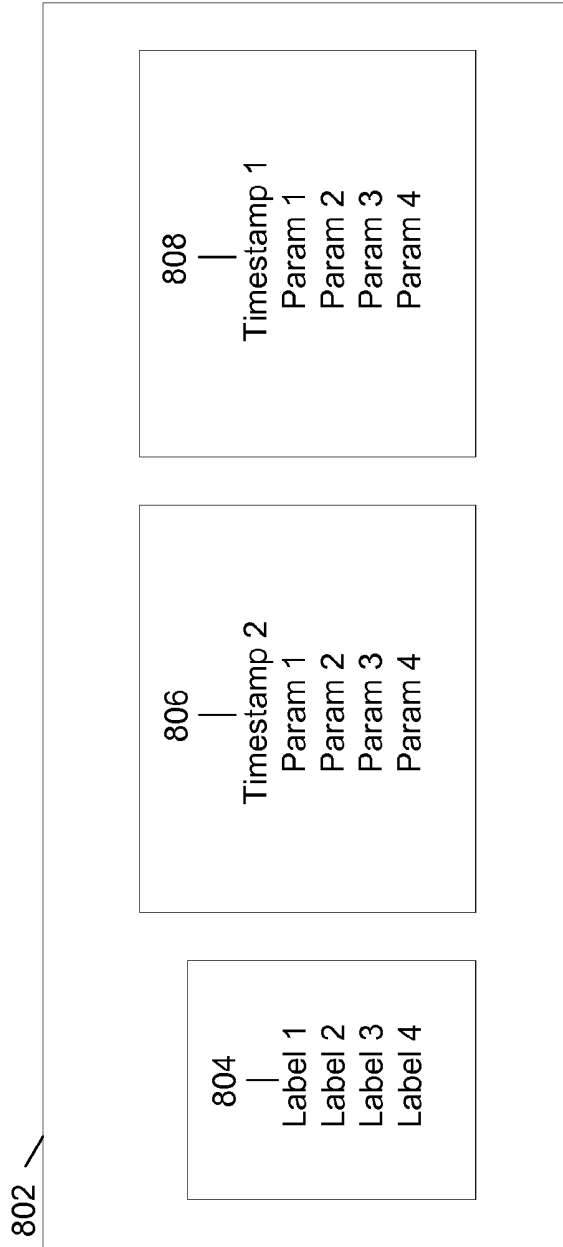


FIG. 8

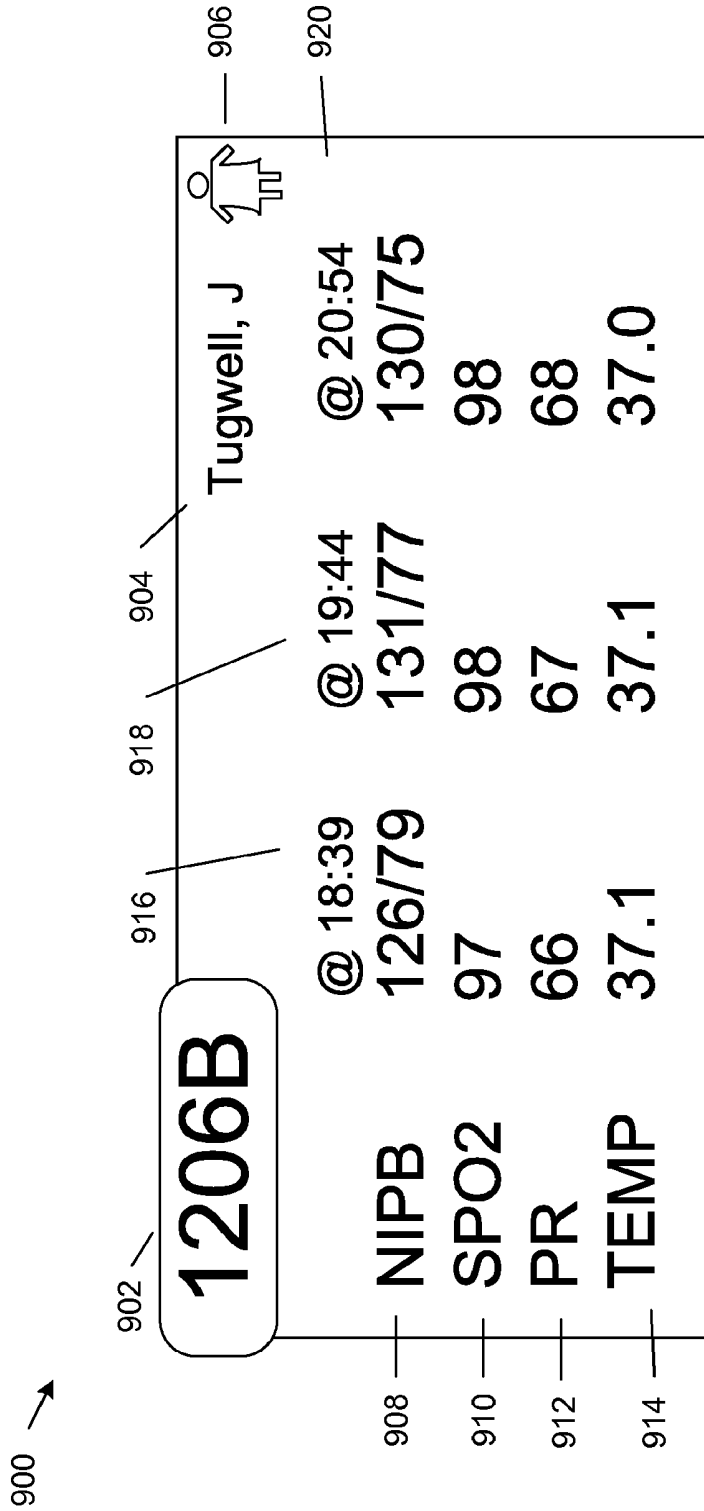


FIG. 9

306 →

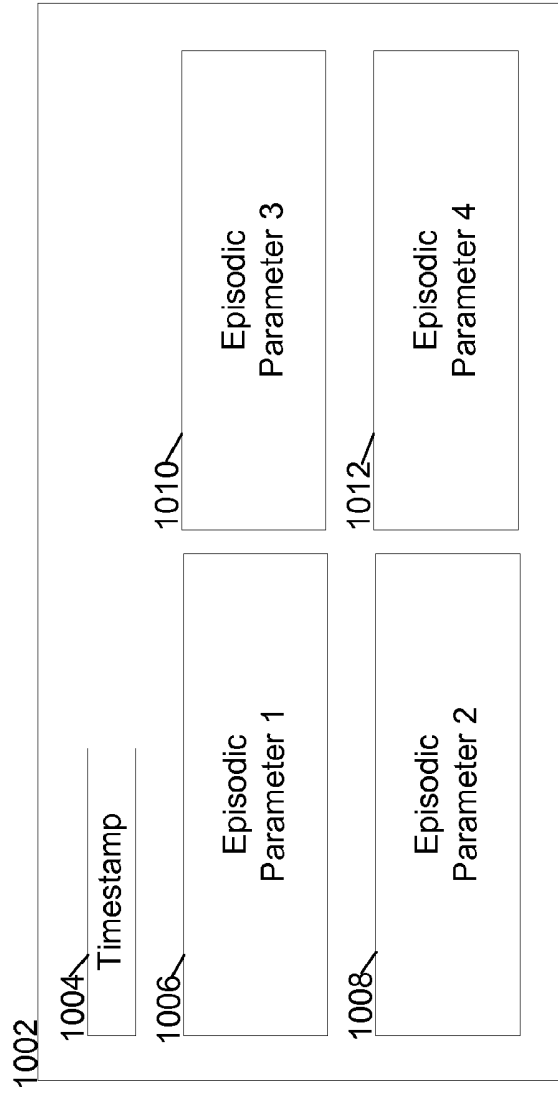


FIG. 10

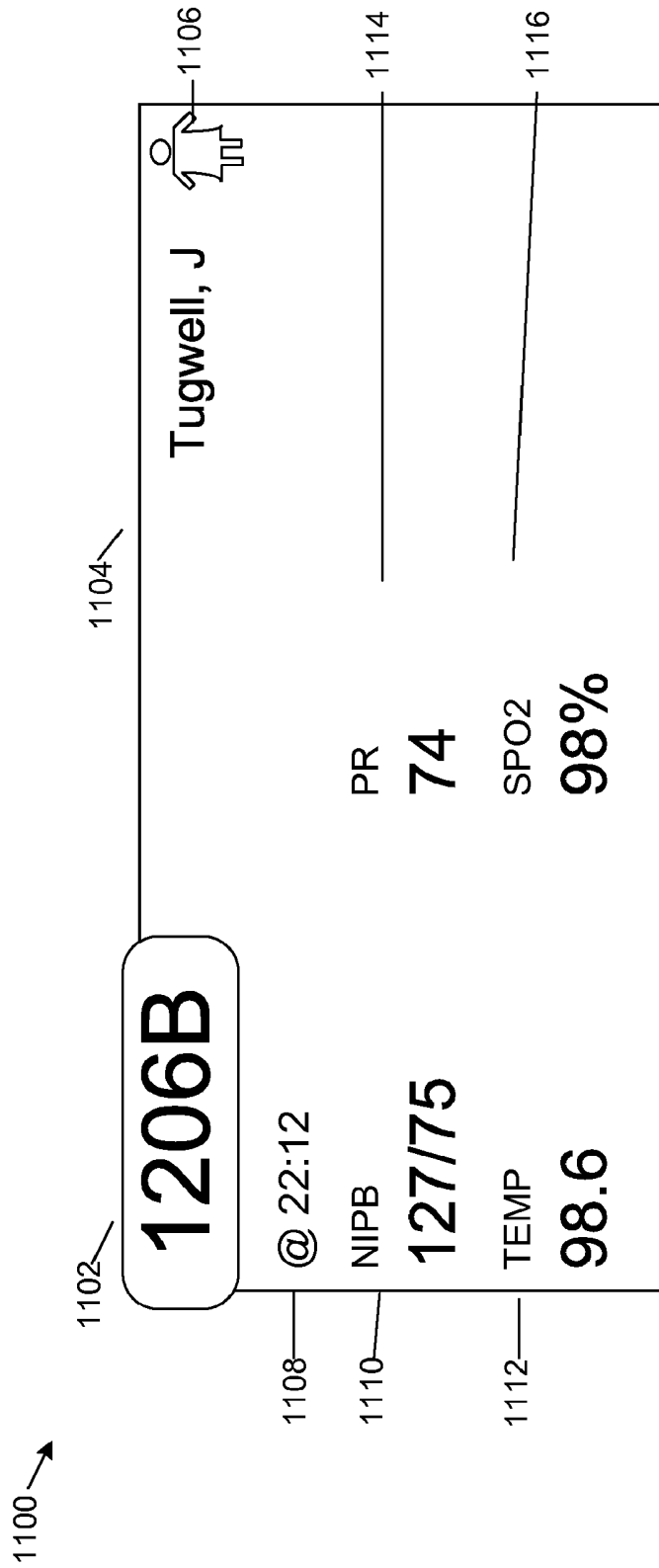


FIG. 11

1200 →

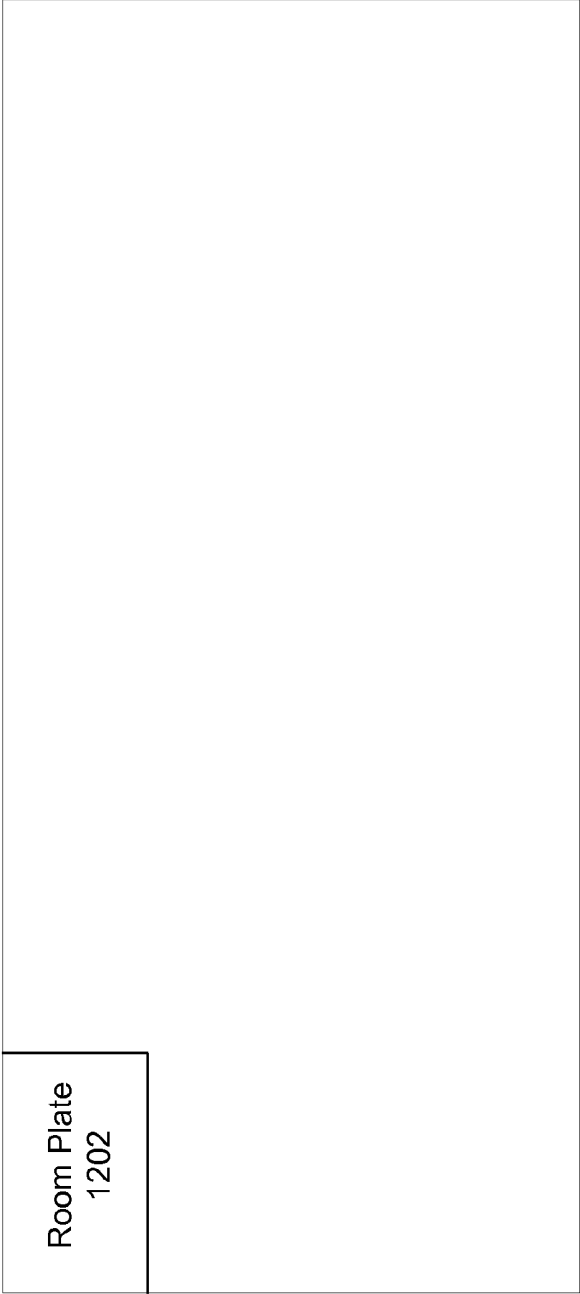


FIG. 12

1300 →

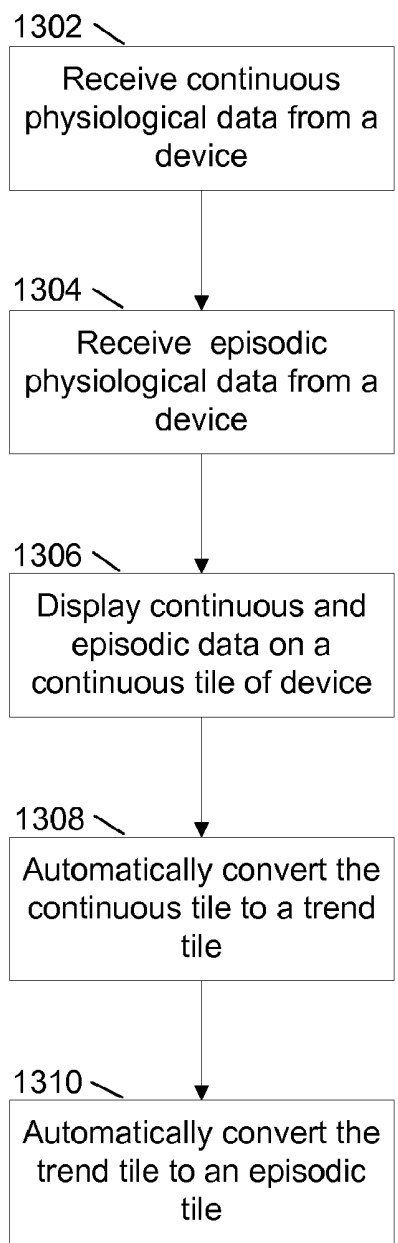


FIG. 13

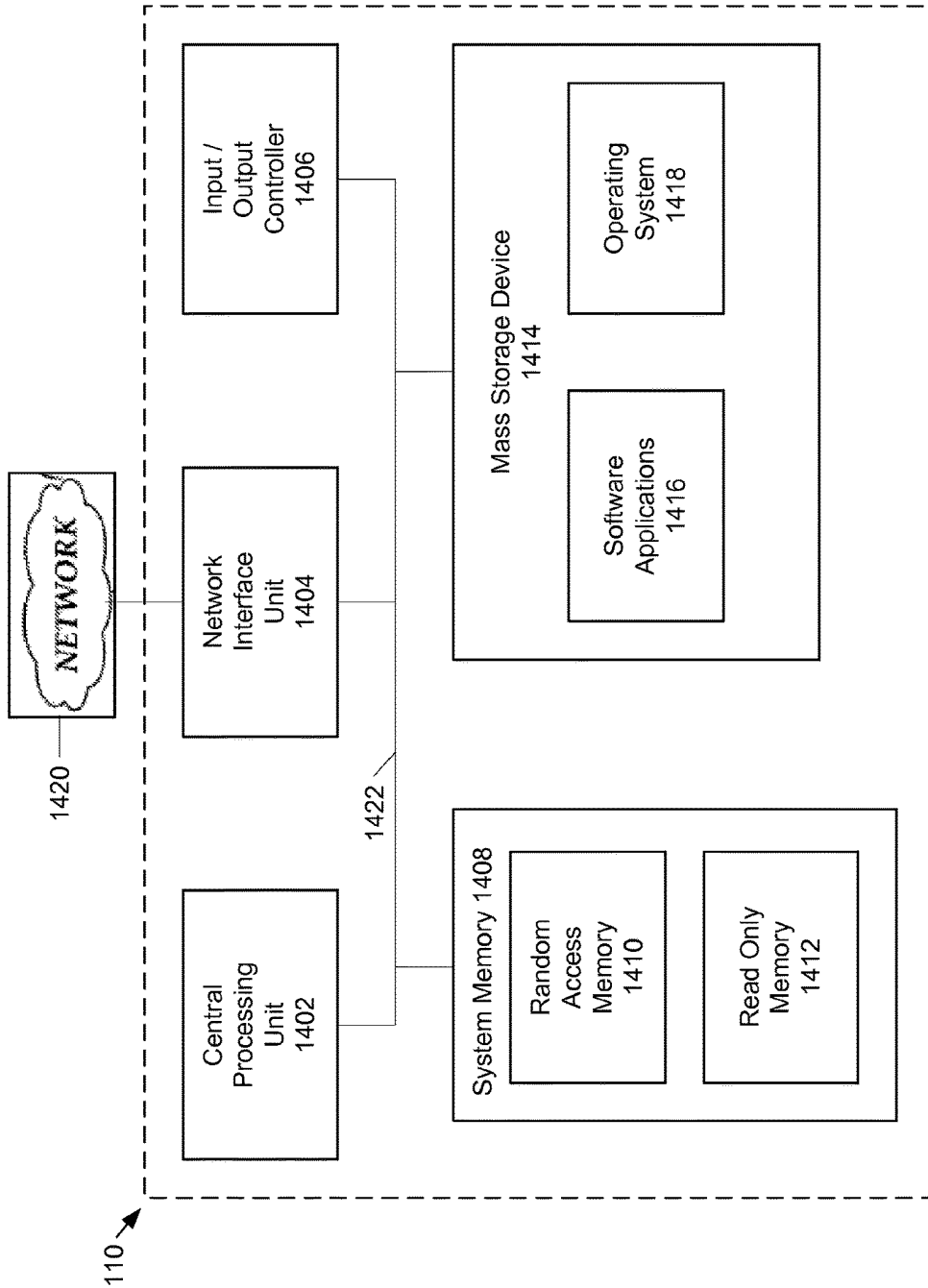


FIG. 14

COMBINED EPISODIC AND CONTINUOUS PARAMETER MONITORING

BACKGROUND

In a medical setting, different monitoring devices may be used to monitor different types of patients. Surgical patients and post-surgical patients in intensive care are typically connected to monitoring devices that continuously receive physiological data from these patients. Less acute patients may be monitored less frequently using vital signs devices, for example when a clinician periodically takes vital signs for the patients.

Physiological and other data obtained from these patients are often stored and displayed in different places. For example, systems that continuously monitor patients typically display patient data and also send the data to an electronics medical records (EMR) system where the data is stored. For less acute patients, monitoring devices, for example vital signs devices, may be portable and data from these devices may be obtained manually, written on a chart and put outside a patient's room.

SUMMARY

Embodiments of the disclosure are directed to systems and methods for displaying physiological data on a medical display device. On the medical display device, one or more first units of physiological data are received from a first monitoring device. At least one of the first units of physiological data is received on a continuous basis. Each first unit of physiological data corresponds to a medical parameter being monitored by the first monitoring device. One or more second units of physiological data are received from a second monitoring device. At least one of the second units of physiological data is received on a non-continuous basis. Each second unit of physiological data corresponds to a medical parameter being monitored by the second monitoring device. The first and second units of physiological data are displayed on a single display screen of the medical display device.

The details of one or more techniques are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of these techniques will be apparent from the description, drawings, and claims.

DESCRIPTION OF THE DRAWINGS

FIG. 1 shows an example patient monitoring system that supports a central monitoring station for displaying both continuous and episodic physiological data from a patient.

FIG. 2 shows an example user interface of the central monitoring station of FIG. 1.

FIG. 3 shows an example standard layout for a display tile of the user interface of FIG. 2.

FIG. 4 shows an example display screen for a continuous tile.

FIG. 5 shows an example screenshot of a continuous tile.

FIG. 6 shows an example display screen for a continuous tile with continuous data temporarily stopped.

FIGS. 7-8 show example display screens for trend tiles.

FIG. 9 shows an example screenshot of a trend tile.

FIG. 10 shows an example display screen for an episodic tile.

FIG. 11 shows an example screenshot for a trend tile.

FIG. 12 shows an example display screen for an empty room tile.

FIG. 13 shows an example flowchart of a method for displaying continuous and episodic physiological data for a patient on a single display device.

FIG. 14 shows example physical components of the central monitoring station of FIG. 1.

DETAILED DESCRIPTION

The present disclosure is directed to a central monitoring station that displays both continuous and episodic data for a plurality of patients. Continuous data refers to patient data that is continuously obtained at short intervals, for example on a millisecond or second basis. Episodic data refers to patient data that is obtained as needed, for example at intervals that may range from minutes to hours. The central monitoring station is typically located at a central nurse's station so that the plurality of patients may be monitored from a central location.

Continuous data is typically obtained for acute patients, for example from surgical patients or from post-surgical patients in an intensive care unit. Typically these patients are connected to a monitoring device that continually receives physiological data from these patients. Examples of continuous physiological data include blood pressure, temperature, pulse rate, oxygen saturation level (SPO2), end tidal carbon dioxide (ETCO2) and respiratory rate. Other types of physiological data are possible. The physiological data is typically displayed on the monitoring device, typically located near the patient, and sent to an EMR system where the data is stored.

Episodic data is typically obtained for less acute patients, for example a patient recovering from surgery but out of intensive care. For these patients, physiological data may be obtained via a vital signs device that may be manually operated by a clinician. In this disclosure, episodic data refers to data obtained on a non-continuous basis. Examples of episodic data obtained from the vital signs device include blood pressure, temperature, pulse rate and SPO2. Other examples of episodic data are possible. Episodic data such as blood pressure, temperature, pulse rate and SPO2 may also be obtained on a continuous basis. However, when this data is obtained at random intervals, for example when a nurse manually takes a patient's blood pressure and temperature, the data is designated as episodic data. A nurse may manually obtain an oxygen saturation reading by manually clipping an SPO2 sensor to the patient and monitoring the SPO2 via a vital signs device.

FIG. 1 shows an example system 100 that supports a central monitoring station for displaying both continuous and episodic physiological data from a patient. The example system 100 includes medical sensor devices 102 and 104, patient monitoring devices 106 and 108, central monitoring station 110 and EMR system 114. More or fewer medical sensor devices and patient monitoring devices may be used.

In the example system 100, medical sensor devices 102 are attached to a patient requiring continuous monitoring, for example a surgical patient or a post-surgical patient in an intensive care unit. The example patient monitor device 106 is a continuous monitoring device, receiving continuous physiological data from medical sensor devices 102. In this example, continuous physiological data refers to physiological data obtained at short intervals. Certain physiological data, for example SPO2 and pulse rate, may be obtained in millisecond intervals. Other physiological data, for example non-invasive blood pressure (NIBP) may be obtained at longer intervals, for example every few minutes. An

example continuous monitoring device is the Welch Allyn 1500 Patient Monitor from Welch Allyn, Inc. of Skaneateles Falls, N.Y.

In the example system 100, medical sensor devices 104 are attached to a patient receiving non-continuous episodic monitoring. For example, a patient monitor device 108 may include some or all of the medical sensor devices 104, for example a thermometer, a blood pressure cuff and an SPO2 sensor. The patient monitor device 108 may be a portable vital signs device administered by a clinician on an as needs basis. An example vital signs device is the Connex® Vital Signs Monitor from Welch Allyn, Inc. of Skaneateles Falls, N.Y.

The example central monitoring station 110 receives physiological data from patient monitor device 106 and from patient monitor device 108 and displays the physiological data on example display screen 112. In addition, the central monitoring station 110 sends physiological data received from patient monitoring devices 106 and 108 to EMR system 114.

FIG. 2 shows an example user interface 200 of display screen 112. The example user interface 200 includes a rendering of 48 display tiles. Each display tile provides information about an individual patient. Each display tile identifies the person, provides a location for the patient, for example a hospital room number, and displays physiological data for the patient. Different types of tiles are possible, including a continuous tile, an episodic tile, a trend tile, an empty room tile and a waiting area tile. The example user interface 200 shows six rows of tiles with eight tiles per row. Other tile organizations are possible and more or fewer than 48 tiles may be displayed. For example, an alternative tile organization is to render 36 display tiles, organized into six rows of six tiles per row. Each tile has a standard layout, as explained later herein.

In examples, the position of each tile on the user interface 200 may be configured via one or several modes. In an example automatic mode, the tiles are positioned by room number. In this mode, a tile with the lowest numerical room number is positioned at the upper left portion of the user interface 200 and a tile with the highest numerical room number is position in the lower right portion of the user interface 200. In an example batch mode, certain positions on the user interface 200 are reserved for certain room numbers. Then, when a patient is assigned a room number, the tile takes a reserved position on the user interface 200. In an example manual mode, tiles can be manually positioned anywhere on the user interface 200.

FIG. 3 shows an example standard layout of display tile 202. The standard layout for display tile 202 includes a room plate area 302, a patient information area 304 and a parameter display area 306. The room plate area 302 typically displays a room number for a patient. In examples the room plate area 302 may also include a hospital unit number and a bed number. The patient information area 304 includes identification information for the patient including the patient's name and sex. Other information may be included in the patient information area 304. The parameter display area 306 displays physiological parameter data for the different types of tiles, as explained herein.

FIG. 4 shows an example display screen 402 for a continuous tile that is displayed in parameter display area 306. A continuous tile is a tile that is associated with a medical device that continuously monitors physiological data for a patient. However, a continuous tile may display both continuous and episodic parameter data. The display screen 402 shows a layout having two episodic parameters

and six continuous parameters. The continuous tile shown in display screen 402 includes a timestamp 404, episodic parameters 406 and 408 and six continuous parameters 410, 412, 414, 416, 418 and 420. Each parameter represents a specific type of physiological data for the patient. More or fewer episodic and continuous parameters may be displayed in parameter display area 306 for a continuous tile.

FIG. 5 shows an example screen shot for a continuous tile 500 with two episodic parameters and six continuous parameters. The continuous tile 500 includes room plate designator 502, patient information including the name 504 of the patient, in this example Tugwell, J. and the sex of the patient, in this case an icon 506 indicating that the patient is a woman. The continuous tile 500 includes timestamp 508. The two episodic parameters include parameters for non-invasive blood pressure (NIBP) 510 and temperature 512. The six continuous parameters include parameters for end tidal carbon dioxide (ETCO2) 514, IPI (integrated pulmonary index) 516, pulse rate (PR) 518, respiratory rate (RR) 520, venous calibrated total hemoglobin (SPHBV) 522 and oxygen saturation (SPO2) 524.

FIG. 6 shows an example display screen 602 for a continuous tile that is displayed in parameter display area 306. For the example display screen 602, continuous data has been temporarily stopped. The display screen 602 shows that when continuous data is stopped, instead of displaying continuous tiles, a message 610 is displayed in the area of parameter display area 306 reserved for the display of continuous tiles. The message indicates that that continuous data has been stopped temporarily. For example, a patient may be temporarily disconnected from a monitoring device to go the bathroom, get an x-ray, etc. The message may also indicate a reason why the continuous data has been stopped and may indicate an expected time when continuous data may resume. The display screen 602 still shows a timestamp 604 and two episodic parameters 606 and 608.

FIG. 7 shows an example display screen for a trend tile 702 with three columns of data that is displayed in parameter display area 306. A trend tile is displayed when a patient steps down from being continuously monitored, but still needs monitoring at relatively short intervals, for example every 15 minutes. The trend tile shows on one screen trends in the parameters being monitored. For example, trend tile 702 includes a column 704 that provides labels for four parameters being monitored. In addition, trend tile 702 includes three columns 706, 708 and 710 of data. Column 706 includes timestamp 3, representing the latest data obtained. Column 710 includes timestamp 1, representing the earliest data being displayed. Column 708 shows parameter data corresponding to a timestamp between the latest and earliest. By viewing trend tile 702, a clinician may be able to see a trend in the values of parameters being monitored.

FIG. 8 shows an example display screen for a trend tile 802 with two columns of data that is displayed in parameter display area 306. Trend tiles with more than three columns of data are possible.

FIG. 9 shows an example screen shot for a trend tile 900 for four episodic parameters with three columns of parameter data. The trend tile 900 includes room plate designator 902, patient information including the name 904 of the patient, in this example Tugwell, J. and the sex of the patient, in this case an icon 906 indicating that the patient is a woman. The trend tile 900 displays data for four episodic parameters including non-invasive blood pressure (NIBP) 908, oxygen saturation (SPO2) 910, pulse rate (PR) 912 and temperature (TEMP) 914. The trend tile 910 includes values

of these four episodic parameters for three different timestamps **916**, **918** and **920**. For the example trend tile **900**, the timestamp **916** corresponds to the earliest parameter data displayed and timestamp **920** corresponds to the latest parameter data displayed. For example, timestamp **916** corresponds to readings taken for the four parameters **908-914** at a time of 18:39, timestamp **918** corresponds to readings taken for the four parameters **908-914** at a time of 19:44 and timestamp **920** corresponds to readings taken for the four parameters **908-914** at a time of 20:54.

FIG. **10** shows an example display screen for an episodic tile **1002** that is displayed in parameter display area **306**. The episodic tile **1002** includes four episodic parameters **1006**, **1008**, **1010** and **1012**. The episodic tile **1002** is displayed when the central monitoring station **110** does not receive parameter data for a predetermined period of time, for example for 90 minutes. In a typical hospital scenario, continuous tiles are displayed for surgical and post-surgical patients. When patients step-down from being continuously monitored to being monitored at longer intervals, for example every 15 minutes, trend tiles are typically displayed. When the condition of a patient is less acute, the patient is typically monitored at still longer intervals, for example once per nursing shift. When physiological data for a patient is not received by the central monitoring station within the still longer time interval, for example 90 minutes, an episodic tile is typically displayed for that particular patient.

FIG. **11** shows an example screen shot for an episodic tile **1100** with four episodic parameters. The episodic tile **1100** includes room plate designator **1102**, patient information including the name **1104** of the patient, in this example Tugwell, J., and the sex of the patient, in this case an icon **1106** indicating that the patient is a woman. The episodic tile **1100** includes timestamp **1108**. The four episodic parameters include parameters for non-invasive blood pressure (NIBP) **1110**, temperature **1112**, pulse rate **1114** and SPO2 **1116**.

FIG. **12** shows an example display screen for empty room tile **1200**. The example empty room tile **1200** is a tile for a patient that has been admitted to a hospital and has been assigned a room number, but physiological data has not been taken and entered into the central monitoring station for the patient yet. When one or more medical devices are associated with the patient and physiological data is taken for the patient, the empty room tile **1200** becomes a standard tile—for example a continuous time, a trend tile or an episodic tile.

FIG. **13** shows an example flowchart for a method **1300** for displaying continuous and episodic physiological data for a patient on a single display device. At operation **1302**, continuous physiological data is received from a first monitoring device. The first monitoring device is a patient monitoring device that is connected to one or more physiological sensors attached to a patient. The patient monitoring device is typically used for acute patients, typically patients in surgery or in an intensive care unit. The physiological sensors continuously monitor physiological data for the patient. Examples of physiological data that is continuously monitored for such acute patients include temperature, blood pressure, pulse rate, oxygen saturation, respiratory rate and end tidal carbon dioxide. Other continuous physiological data is possible. The patient monitoring device is located near the patient and includes a display screen on which the physiological data can be observed by clinicians.

At operation **1304**, episodic physiological data for the patient is obtained from a second patient monitoring device. As discussed, episodic physiological data refers to patient

data that is obtained as needed, for example taken manually by a clinician at random time intervals. The second patient monitoring device is typically a vital signs device, for example the Connex® Vital Signs Monitor from Welch Allyn, Inc. of Skaneateles Falls, N.Y. Examples of episodic data include blood pressure, temperature, pulse rate and oxygen saturation. Other episodic physiological data is possible.

At operation **1306**, the continuous physiological data and the episodic physiological data are displayed on a continuous tile of a centrally located medical display device. The central located medical display device, for example central monitoring station **110**, is typically located at a nurse's station, whereby clinicians can view the status of a plurality of patients. The central monitoring station **110** can display a plurality of display tiles, each tile corresponding to one patient. The continuous tile, an example screenshot of which is shown in FIG. **5**, displays both continuous parameters and episodic parameters for a patient on a single tile.

A continuous tile is displayed for a patient when continuous physiological data continues to be received for the patient. At operation **1308**, when the central monitoring station **110** does not receive continuous physiological data within a first predetermined time interval, for example 15 minutes, the continuous tile is automatically converted to a trend tile. The trend tile, an example screenshot of which is shown in FIG. **9**, displays multiple columns of episodic data, each column of episodic data representing a snap shot of the episodic data at a specific time. By viewing the trend tile, a clinician may be able to detect changes in episodic data over time.

When a patient no longer needs acute monitoring, for example, when the patient is out of intensive care and moved to a standard hospital room, the patient is typically monitored at less frequent intervals. For example, the patient's vital signs may be taken during changes of nursing shifts or at random intervals during a nurse's shift. At operation **1310**, when the central monitoring station **110** does not receive any new physiological data from the patient within a second predetermined time interval, for example 90 minutes, the trend tile is automatically converted to an episodic tile. The episodic tile, an example screenshot of which is shown in FIG. **11**, displays the most recently received episodic data.

FIG. **14** illustrates example physical components of the central monitoring station **110**. As illustrated in the example of FIG. **14**, the central monitoring station **110** includes at least one central processing unit ("CPU") **1402**, a system memory **1408**, and a system bus **1422** that couples the system memory **1408** to the CPU **1402**. The system memory **1408** includes a random access memory ("RAM") **1410** and a read-only memory ("ROM") **1412**. A basic input/output system contains the basic routines that help to transfer information between elements within the central monitoring station **110**, such as during startup, is stored in the ROM **1412**. The central monitoring station **110** further includes a mass storage device **1414**. The mass storage device **1414** is able to store software instructions and data.

The mass storage device **1414** is connected to the CPU **1402** through a mass storage controller (not shown) connected to the bus **1422**. The mass storage device **1414** and its associated computer-readable data storage media provide non-volatile, non-transitory storage for the central monitoring station **110**. Although the description of computer-readable data storage media contained herein refers to a mass storage device, such as a hard disk or CD-ROM drive, it should be appreciated by those skilled in the art that computer-readable data storage media can be any available

non-transitory, physical device or article of manufacture from which the central monitoring station can read data and/or instructions.

Computer-readable data storage media include volatile and non-volatile, removable and non-removable media implemented in any method or technology for storage of information such as computer-readable software instructions, data structures, program modules or other data. Example types of computer-readable data storage media include, but are not limited to, RAM, ROM, EPROM, EEPROM, flash memory or other solid state memory technology, CD-ROMs, digital versatile discs (“DVDs”), other optical storage media, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which can be used to store the desired information and which can be accessed by the central monitoring station **110**.

According to various embodiments of the invention, the central monitoring station **110** may operate in a networked environment using logical connections to remote network devices through the network **1420**, such as a local network, the Internet, or another type of network. The central monitoring station may connect to the network **1420** through a network interface unit **1404** connected to the bus **1422**. It should be appreciated that the network interface unit **1404** may also be utilized to connect to other types of networks and remote computing systems. The central monitoring station **110** also includes an input/output controller **1406** for receiving and processing input from a number of other devices, including a keyboard, a mouse, a touch user interface display screen, or another type of input device. Similarly, the input/output controller **1406** may provide output to a touch user interface display screen, a printer, or other type of output device.

As mentioned briefly above, the mass storage device **1414** and the RAM **1410** of the central monitoring station **110** can store software instructions and data. The software instructions include an operating system **1418** suitable for controlling the operation of the central monitoring station **110**. The mass storage device **1414** and/or the RAM **1410** also store software instructions, that when executed by the CPU **1402**, cause the central monitoring station **110** to provide the functionality of the central monitoring station **110** discussed in this document. For example, the mass storage device **1414** and/or the RAM **1410** can store software instructions that, when executed by the CPU **1402**, cause the central monitoring station **110** to display the user interface **200** screen and other screens.

The description of the example physical components used on the central monitoring station **110** as shown in FIG. **14** also applies to example physical components used in the EMR system **114**. Thus, each of the one or more computing devices in the EMR system **114** includes at least one central processing unit (“CPU”), a system memory, and a system bus that couples the system memory to the CPU. The system memory also includes a random access memory (“RAM”), a read-only memory (“ROM”) and a mass storage device that is able to store software instructions and data. In addition, the mass storage device and its associated computer-readable data storage media provide non-volatile, non-transitory storage for each of the one or more computing devices in the EMR system **114**.

The various embodiments described above are provided by way of illustration only and should not be construed to limiting. Various modifications and changes that may be made to the embodiments described above without departing from the true spirit and scope of the disclosure.

What is claimed is:

1. A method for displaying physiological data on a medical display device, the method comprising:
 - receiving physiological data of a first patient from a first monitoring device, wherein the physiological data of the first patient is received at a first frequency;
 - on the medical display device, displaying the physiological data of the first patient on a first tile, wherein the first tile has a first data presentation format;
 - determining, after a first time period expires without receiving the physiological data of the first patient at the first frequency, that the physiological data of the first patient has changed from the first frequency to a second frequency;
 - based on determining that the physiological data of the first patient has changed from the first frequency to the second frequency, converting the first data presentation format to a second data presentation format, wherein the second data presentation format includes at least some of the physiological data of the first patient received at the first frequency;
 - determining, after a second time period, that the physiological data of the first patient has changed from the second frequency to a third frequency;
 - based on determining that the physiological data of the first patient has changed from the second frequency to the third frequency, converting the second data presentation format to a third data presentation format, wherein the second data presentation format includes at least some of the received physiological data of the first patient;
 - receiving physiological data of a second patient from a second monitoring device, wherein the physiological data of the first patient is received at the first frequency;
 - on the medical display device, displaying the physiological data of the second patient on a second tile, wherein the second tile has the first data presentation format;
 - determining, after the first time period expires without receiving the physiological data of the second patient at the first frequency, that the physiological data of the second patient has changed from the first frequency to the second frequency; and
 - based on determining that the physiological data of the second patient has changed from the first frequency to the second frequency, converting the first data presentation format to the second data presentation format, wherein the second data presentation format includes at least some of the received physiological data of the second patient.
 2. The method of claim 1, wherein the first data presentation format is a continuous tile;
 - wherein the second data presentation format is a trend tile;
 - and
 - wherein the third data presentation format is an episodic tile.
 3. The method of claim 2, wherein the medical display device displays the physiological data of the first and second patients in a series of display tiles on the medical display device.
 4. The method of claim 3, wherein the series of display tiles include continuous tiles, episodic tiles and trend tiles.
 5. The method of claim 4, wherein the continuous tiles include a display of physiological data received continuously and physiological data received non-continuously.

6. The method of claim 5, wherein the episodic tiles include a display of physiological data received non-continuously and do not include a display of physiological data monitored continuously.

7. The method of claim 6, wherein the trend tiles include displays of two or more groups of physiological data having the second frequency, the two or more groups of physiological data corresponding to physiological data received non-continuously, each group of physiological data having the second frequency being identified by a timestamp.

8. The method of claim 7, wherein the physiological data having the first frequency include blood pressure, temperature, pulse rate, end tidal carbon dioxide, respiratory rate, hemoglobin, oxygen saturation and an index related to pulmonary health for a patient.

9. The method of claim 8, wherein the first time period is 15 minutes; and wherein the second time period is 90 minutes.

10. The method of claim 9, wherein a message is displayed on the continuous tiles when the patient is temporarily disconnected from the first monitoring device.

11. The method of claim 10, wherein the series of display tiles are organized by rows and columns.

12. An electronic computing device comprising:
a processing unit; and

system memory, the system memory including instructions that, when executed by the processing unit, cause the electronic computing device to:

receive physiological data of a first patient from a first monitoring device, wherein the physiological data of the first patient is received at a first frequency;

on the electronic computing device, display the physiological data of the first patient on a first tile, wherein the first tile has a first data presentation format;

determine, after a first time period expires without receiving the physiological data of the first patient at the first frequency, that the physiological data of the first patient has changed from the first frequency to a second frequency;

based on determining that the physiological data of the first patient has changed from the first frequency to the second frequency, convert the first data presentation format to a second data presentation format, wherein the second data presentation format includes at least some of the physiological data of the first patient received at the first frequency;

determine, after a second time period, that the physiological data of the first patient has changed from the second frequency to a third frequency;

based on determining that the physiological data of the first patient has changed from the second frequency to the third frequency, convert the second data presentation format to a third data presentation format, wherein the second data presentation format includes at least some of the received physiological data of the first patient;

receive physiological data of a second patient from a second monitoring device, wherein the physiological data of the first patient is received at the first frequency;

on the electronic computing device, display the physiological data of the second patient on a second tile, wherein the second tile has the first data presentation format;

determine, after the first time period expires without receiving the physiological data of the second patient at the first frequency, that the physiological data of

the second patient has changed from the first frequency to the second frequency; and

based on determining that the physiological data of the second patient has changed from the first frequency to the second frequency, convert the first data presentation format to the second data presentation format, wherein the second data presentation format includes at least some of the received physiological data of the second patient.

13. The electronic computing device of claim 12, wherein the first data presentation format is a continuous tile;

wherein the second data presentation format is a trend tile; wherein the third data presentation format is an episodic tile;

wherein the electronic computing device displays the physiological data of the first and second patients in a series of display tiles on the electronic computing device;

wherein the series of display tiles include continuous tiles, episodic tiles and trend tiles;

wherein the continuous tiles include a display of physiological data received continuously and physiological data received non-continuously; and

wherein the episodic tiles include a display of physiological data received non-continuously and do not include a display of physiological data monitored continuously.

14. The electronic computing device of claim 13, wherein the trend tiles include displays of two or more groups of physiological data having the second frequency, the two or more groups of physiological data corresponding to physiological data received non-continuously, each group of physiological data having the second frequency being identified by a timestamp;

wherein the first time period is 15 minutes; and

wherein the second time period is 90 minutes.

15. A medical device, comprising:

a processing unit; and

system memory, the system memory including instructions that, when executed by the processing unit, cause the medical device to:

receive physiological data of a first patient from a first monitoring device, wherein the physiological data of the first patient is received at a first frequency;

on the medical device, display the physiological data of the first patient on a first tile, wherein the first tile has a first data presentation format;

determine, after a first time period expires without receiving the physiological data of the first patient at the first frequency, that the physiological data of the first patient has changed from the first frequency to a second frequency;

based on determining that the physiological data of the first patient has changed from the first frequency to the second frequency, convert the first data presentation format to a second data presentation format, wherein the second data presentation format includes at least some of the physiological data of the first patient received at the first frequency;

determine, after a second time period, that the physiological data of the first patient has changed from the second frequency to a third frequency;

based on determining that the physiological data of the first patient has changed from the second frequency to the third frequency, convert the second data presentation format to a third data presentation format,

11

wherein the second data presentation format includes at least some of the received physiological data of the first patient;
 receive physiological data of a second patient from a second monitoring device, wherein the physiological data of the first patient is received at the first frequency;
 on the medical device, display the physiological data of the second patient on a second tile, wherein the second tile has the first data presentation format;
 determine, after the first time period expires without receiving the physiological data of the second patient at the first frequency, that the physiological data of the second patient has changed from the first frequency to the second frequency; and
 based on determining that the physiological data of the second patient has changed from the first frequency to the second frequency, convert the first data presentation format to the second data presentation format, wherein the second data presentation format includes at least some of the received physiological data of the second patient.

16. The medical device of claim 15, wherein the first data presentation format is a continuous tile;
 wherein the second data presentation format is a trend tile;
 wherein the third data presentation format is an episodic tile;

12

wherein the medical device displays the physiological data of the first and second patients in a series of display tiles on the medical device;
 wherein the series of display tiles include continuous tiles, episodic tiles and trend tiles;
 wherein the continuous tiles include a display of physiological data received continuously and physiological data received non-continuously; and
 wherein the episodic tiles include a display of physiological data received non-continuously and do not include a display of physiological data monitored continuously.

17. The medical device of claim 16, wherein the trend tiles include displays of two or more groups of physiological data having the second frequency, the two or more groups of physiological data corresponding to physiological data received non-continuously, each group of physiological data having the second frequency being identified by a timestamp;
 wherein the first time period is 15 minutes;
 wherein the second time period is 90 minutes;
 wherein a message is displayed on the continuous tiles when a patient is temporarily disconnected from the first monitoring device; and
 wherein the series of display tiles is organized by rows and columns.

* * * * *

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|----------------|--|---------|------------|
| 专利名称(译) | 结合间歇和连续参数监测 | | |
| 公开(公告)号 | US10204081 | 公开(公告)日 | 2019-02-12 |
| 申请号 | US14/955172 | 申请日 | 2015-12-01 |
| [标]申请(专利权)人(译) | 伟伦公司 | | |
| 申请(专利权)人(译) | 伟伦, INC. | | |
| 当前申请(专利权)人(译) | 伟伦, INC. | | |
| [标]发明人 | VANN JOHN RAYMOND
WILMINGTON ROBERT PAUL
MYERS THOMAS A
VASSALLO GREGORY P
IMBODEN EDWARD | | |
| 发明人 | VANN, JOHN RAYMOND
WILMINGTON, ROBERT PAUL
MYERS, THOMAS A.
VASSALLO, GREGORY P.
IMBODEN, EDWARD | | |
| IPC分类号 | G09G5/00 G06F3/0484 G06F17/21 G16H15/00 G16H40/63 A61B5/00 G16H10/60 | | |
| CPC分类号 | G06F17/212 G06F3/0484 G16H15/00 G16H40/63 G09G2380/08 A61B5/7445 A61B2505/03 G06F40/106 | | |
| 代理机构(译) | 商户德律P.C. | | |
| 审查员(译) | 陈, 俞 | | |
| 其他公开文献 | US20160085942A1 | | |
| 外部链接 | Espacenet | | |

摘要(译)

一种用于在医疗显示设备上显示生理数据的方法，包括从第一监测设备接收一个或多个第一生理数据单元。至少一个第一生理数据单元是连续接收的。每个第一生理数据单元对应于由第一监测设备监测的医学参数。从第二监测设备接收一个或多个第二生理数据单元。在非连续的基础上接收至少一个第二生理数据单元。每个第二生理数据单元对应于由第二监视设备监视的医学参数。第一和第二生理数据单元显示在医疗显示设备的单个显示屏上。

