US009636056B2

(12) **United States Patent**　　(10) **Patent No.:**　　**US 9,636,056 B2**
Al-Ali　　(45) **Date of Patent:**　　*May 2, 2017

(54) **PHYSIOLOGICAL TREND MONITOR**

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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 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **14/683,666**

(22) Filed: **Apr. 10, 2015**

(65) **Prior Publication Data**

US 2015/0208966 A1　　Jul. 30, 2015

Related U.S. Application Data

(63) Continuation of application No. 14/065,339, filed on Oct. 28, 2013, now Pat. No. 9,131,883, which is a (Continued)

(51) **Int. Cl.**
　　A61B 5/00　　　　(2006.01)
　　A61B 5/1455　　　(2006.01)
　　(Continued)

(52) **U.S. Cl.**
　　CPC .... *A61B 5/14551* (2013.01); *A61B 5/021* (2013.01); *A61B 5/0402* (2013.01); (Continued)

(58) **Field of Classification Search**
　　CPC A61B 5/14551; A61B 5/746; A61B 5/021; A61B 5/04018
　　(Continued)

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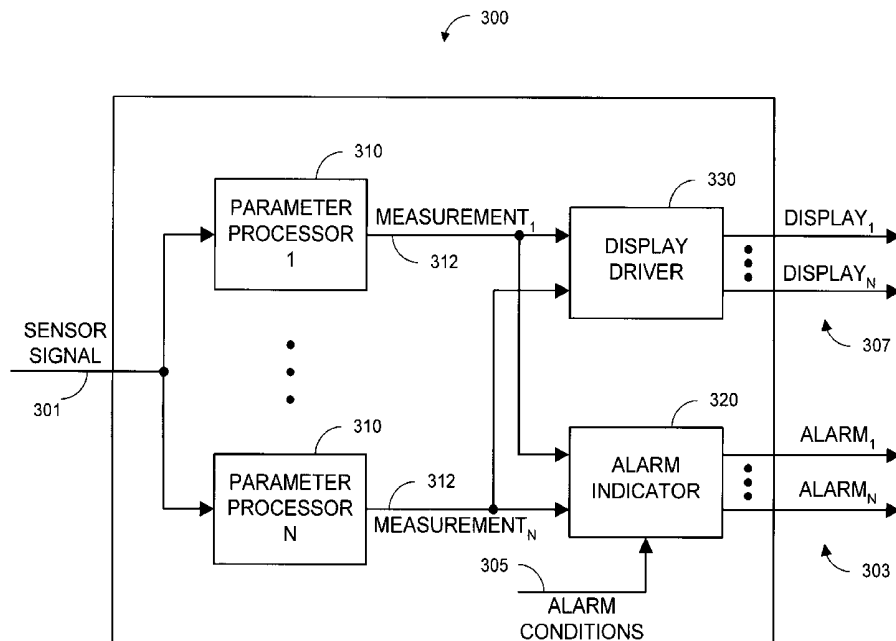(Continued)

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(57)　　　　**ABSTRACT**

A physiological trend monitor has a sensor signal responsive to multiple wavelengths of light transmitted into a tissue site. The transmitted light is detected after attenuation by pulsatile blood flow within the tissue site. A processor has an input responsive to the sensor signal and a physiological parameter output. Features are extracted from the physiological parameter output. Criteria are applied to the features. An alarm output is generated when the criteria are satisfied.

9 Claims, 9 Drawing Sheets

Related U.S. Application Data

continuation of application No. 13/557,107, filed on Jul. 24, 2012, now Pat. No. 8,570,167, which is a continuation of application No. 13/018,334, filed on Jan. 31, 2011, now Pat. No. 8,228,181, which is a continuation of application No. 12/070,061, filed on Feb. 12, 2008, now Pat. No. 7,880,606, which is a continuation of application No. 11/717,591, filed on Mar. 13, 2007, now Pat. No. 7,355,512, which is a continuation of application No. 11/405,815, filed on Apr. 18, 2006, now Pat. No. 7,190,261, which is a continuation of application No. 10/975,860, filed on Oct. 28, 2004, now Pat. No. 7,030,749, which is a continuation of application No. 10/351,735, filed on Jan. 24, 2003, now Pat. No. 6,822,564.

(60) Provisional application No. 60/351,510, filed on Jan. 24, 2002.

(51) **Int. Cl.**

A61B 5/021	(2006.01)
A61B 5/0402	(2006.01)
A61B 5/08	(2006.01)
A61B 5/145	(2006.01)
A61B 5/04	(2006.01)

(52) **U.S. Cl.**
CPC *A61B 5/0816* (2013.01); *A61B 5/14532* (2013.01); *A61B 5/14546* (2013.01); *A61B 5/746* (2013.01); *A61B 5/04018* (2013.01)

(58) **Field of Classification Search**
USPC 600/316, 322, 323; 340/511, 539.12, 340/573.1
See application file for complete search history.

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U.S. Appl. No. 90/012,568, filed Sep. 14, 2012, requesting ex parte reexamination of U.S. Pat. No. 8,128,572, including accompanying Reexam Request, claim charts, and other documentation filed under 37 C.F.R. § 1.510 and 35 U.S.C. § 302.

U.S. Appl. No. 90/012,699, filed Oct. 4, 2012, requesting ex parte reexamination of U.S. Pat. No. 6,002,952, including accompanying Reexam Request, claim charts, and other documentation filed under 37 C.F.R. § 1.510 and 35 U.S.C. § 302.

U.S. Appl. No. 90/012,555, filed Sep. 13, 2012, requesting ex parte reexamination of U.S. Pat. No. 7,440,787, including accompanying Reexam Request, claim charts, and other documentation filed under 37 C.F.R. § 1.510 and 35 U.S.C. § 302.

U.S. Appl. No. 95/002,183, filed Sep. 12, 2012, requesting inter partes reexamination of U.S. Pat. No. 7,530,955, including accompanying Reexam Request, claim charts, and other documentation filed under 37 C.F.R. § 1.913 and 35 U.S.C. § 311.

V. Ya. Volkov, "Enhancing the Reliability and Accuracy of Pulse Oximetry with a Built-In Expert System," Biomedical Engineering, vol. 27, No. 3 (May-Jun. 1993) (translated from Russian).

V. Ya. Volkov, "Principles and Algroiths for Determining Blood Oxygenation Level by Pulse Oximetry," Biomedical Engineering, vol. 27, No. 1 (Jan.-Feb. 1993) (translated from Russian).

Wukitsch, et al., "Knowing Your Monitoring Equipment," Journal of Clinical Monitoring, vol. 4, No. 4 (Oct. 1998).

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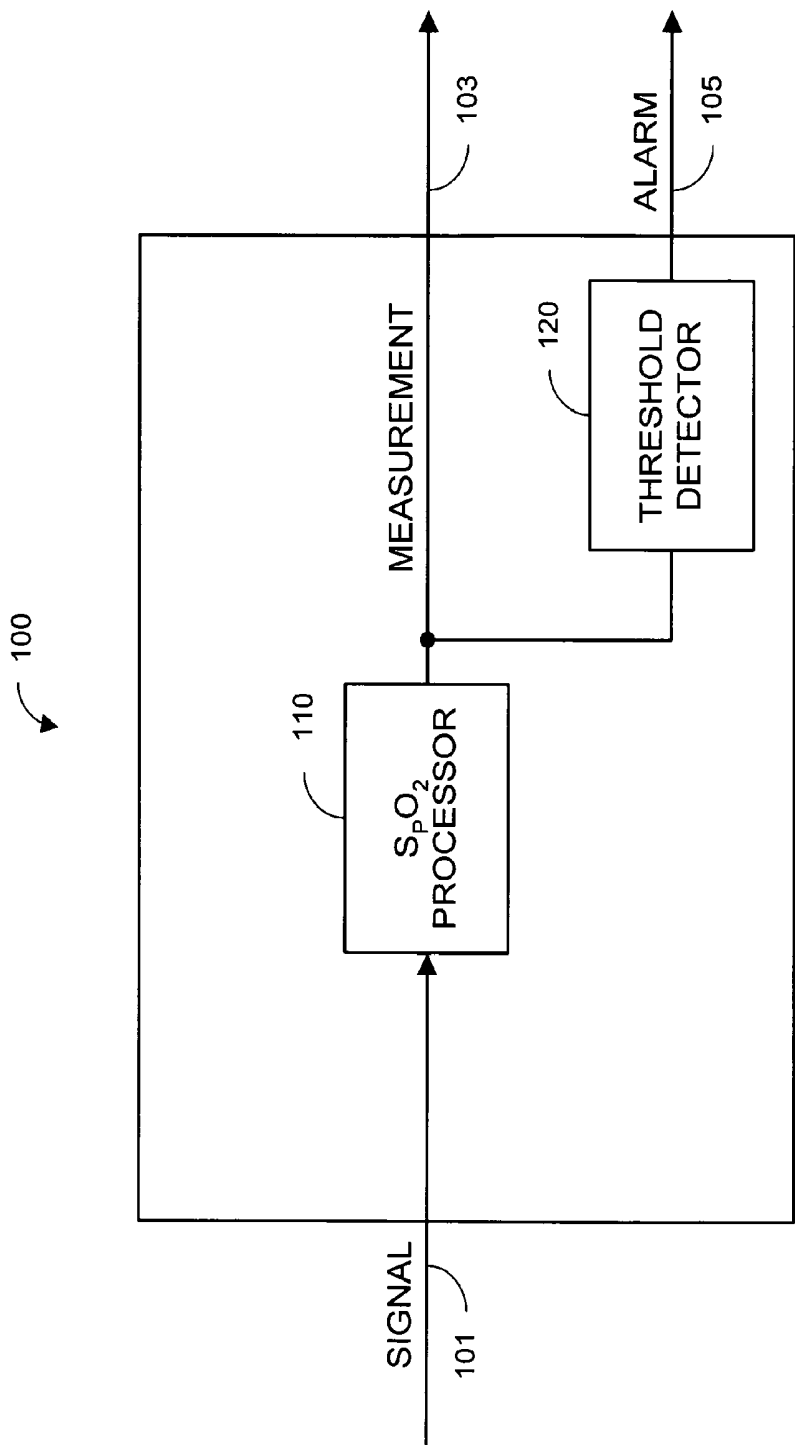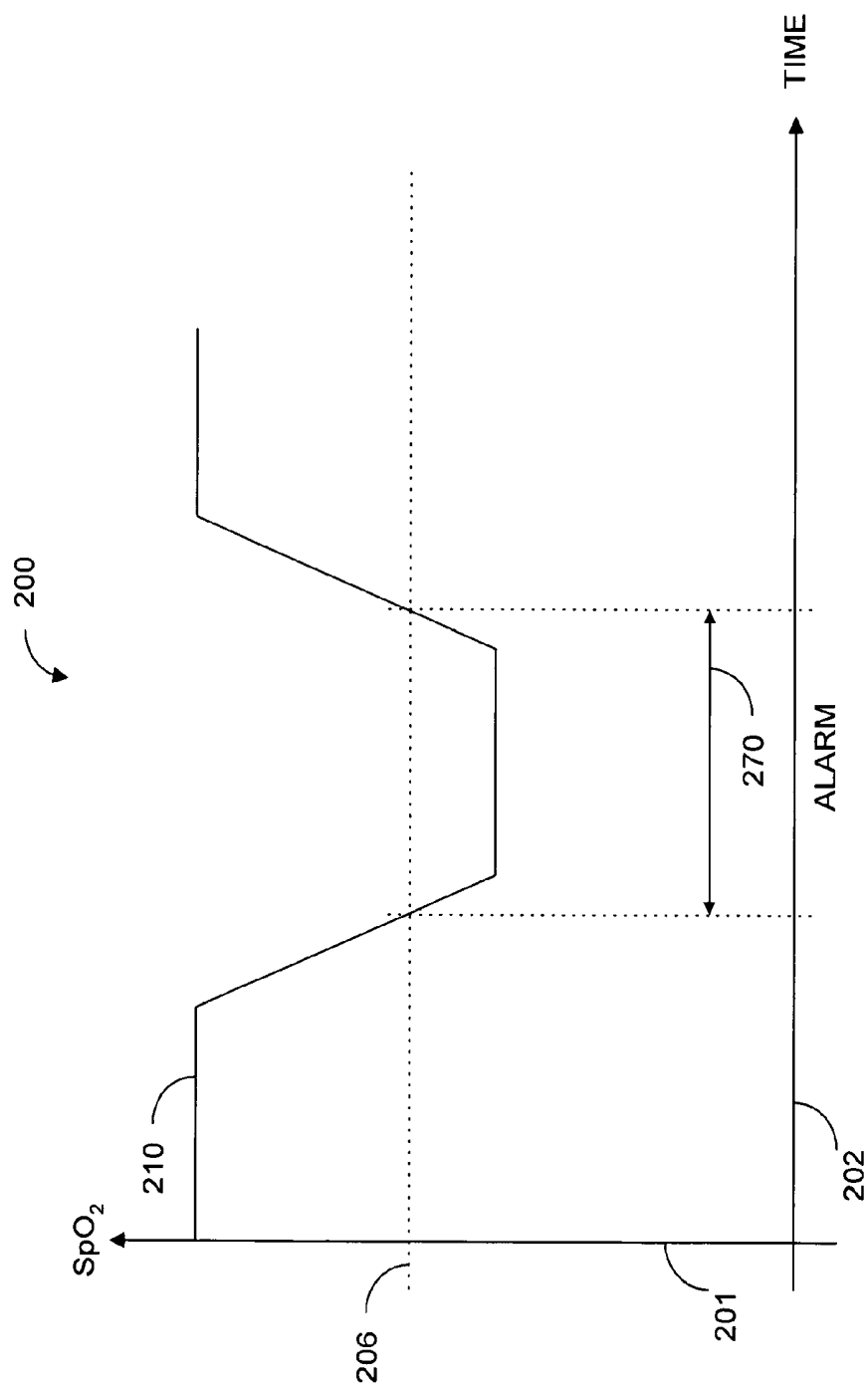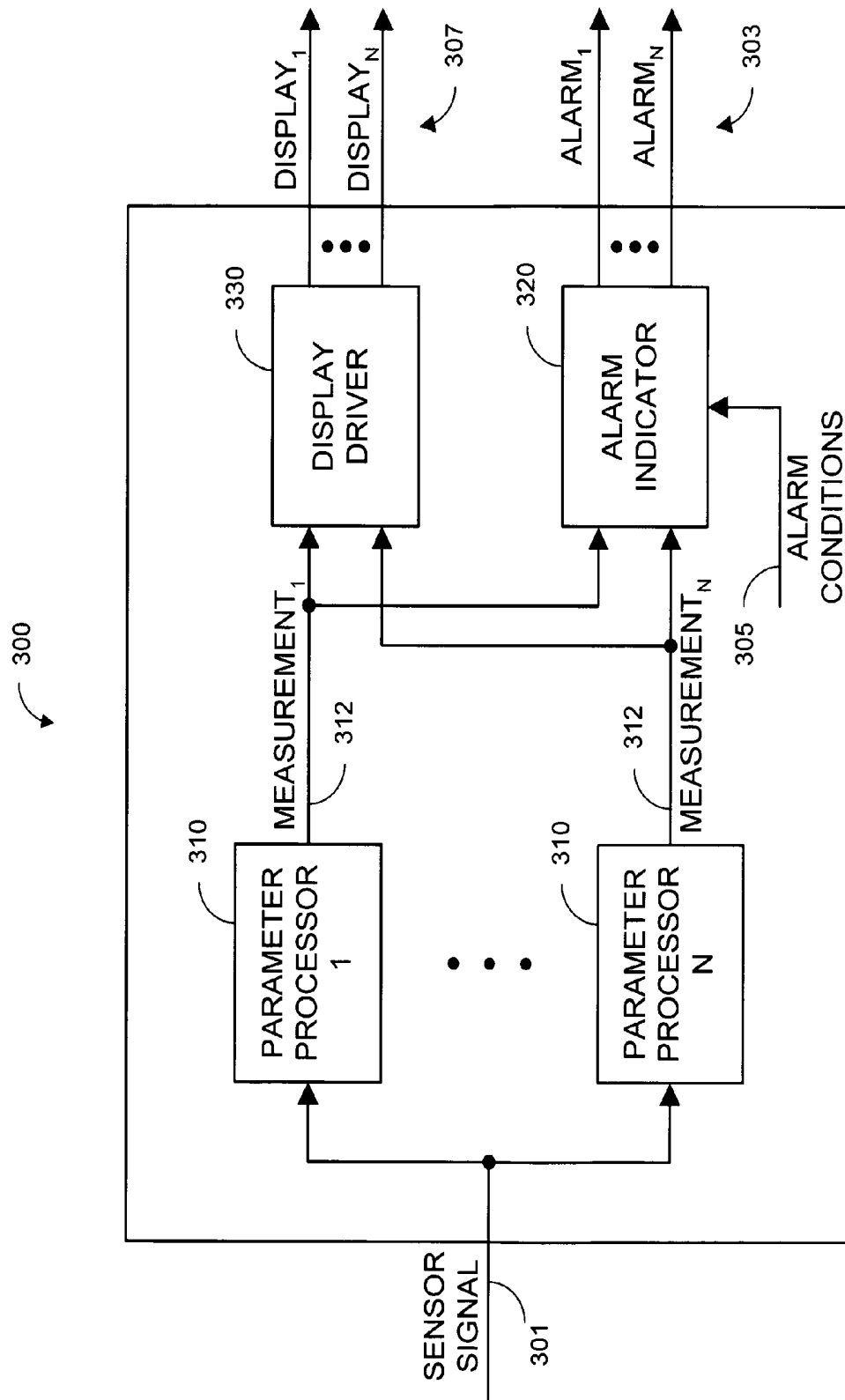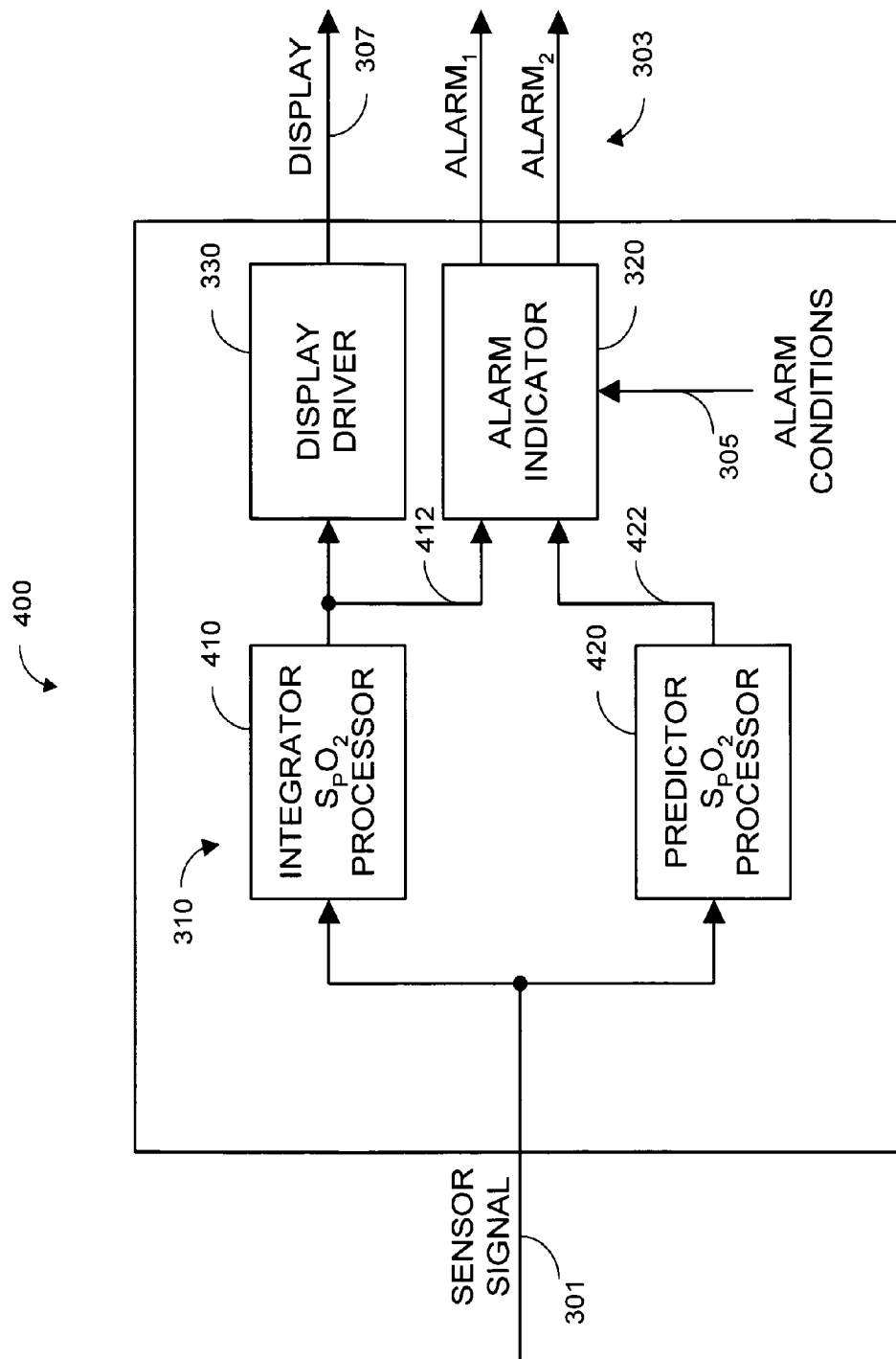
* cited by examiner

FIG. 1 (Prior Art)

FIG. 2

FIG. 3

FIG. 4

FIG. 5

600

SpO₂

610

620

630

606

640

601

602

SUPPRESSED
ALARM

TIME

FIG. 6A

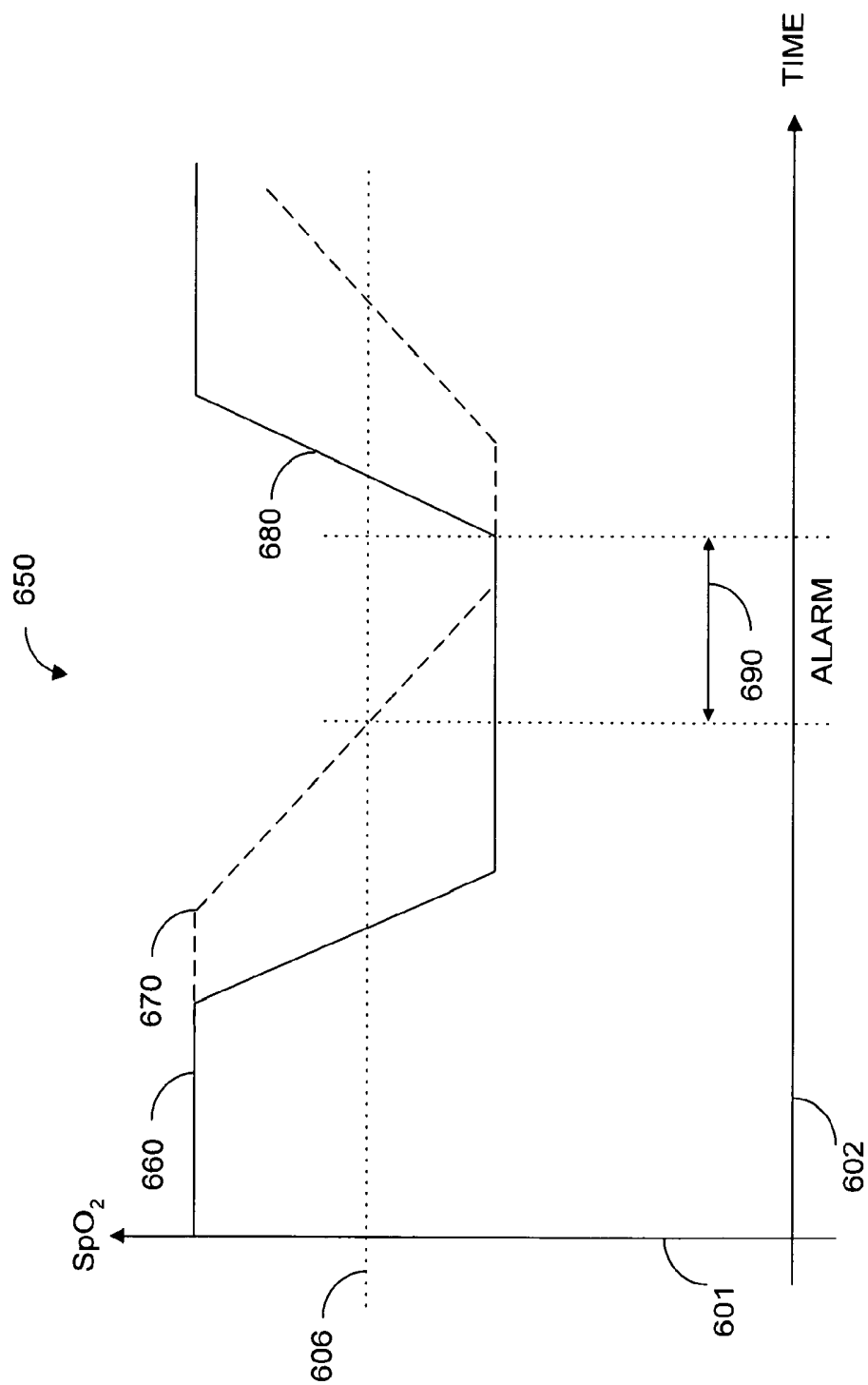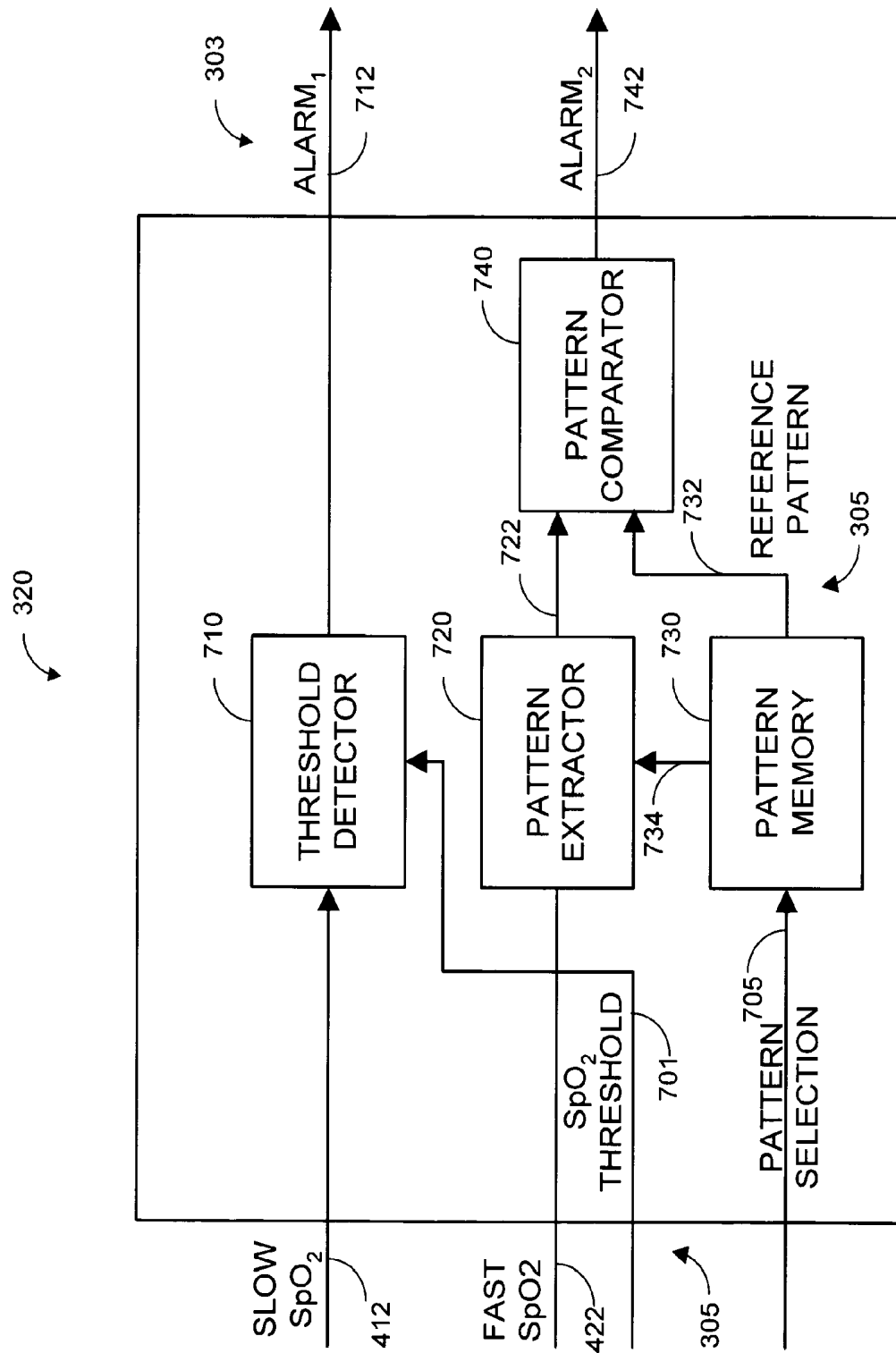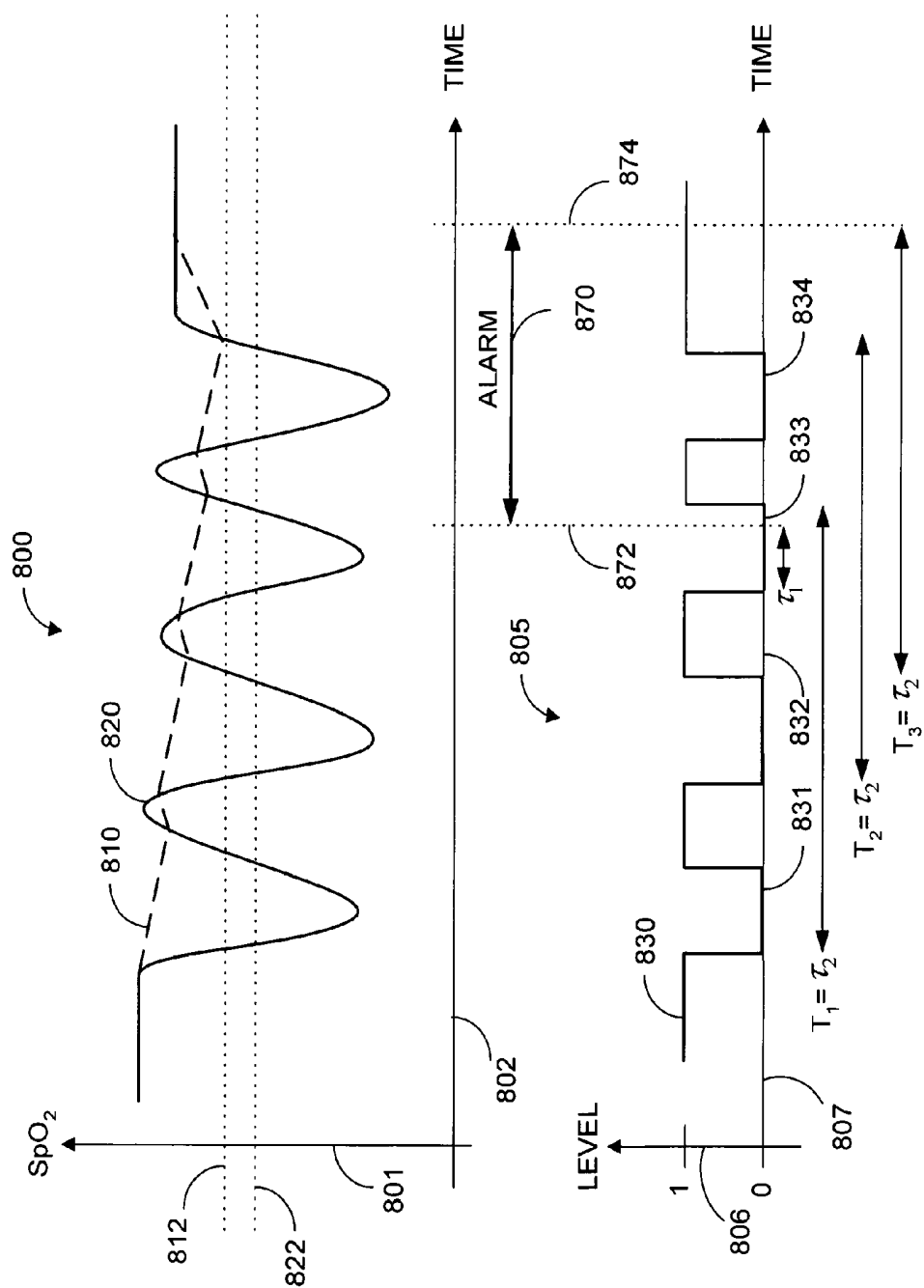FIG. 6B

FIG. 7

FIG. 8
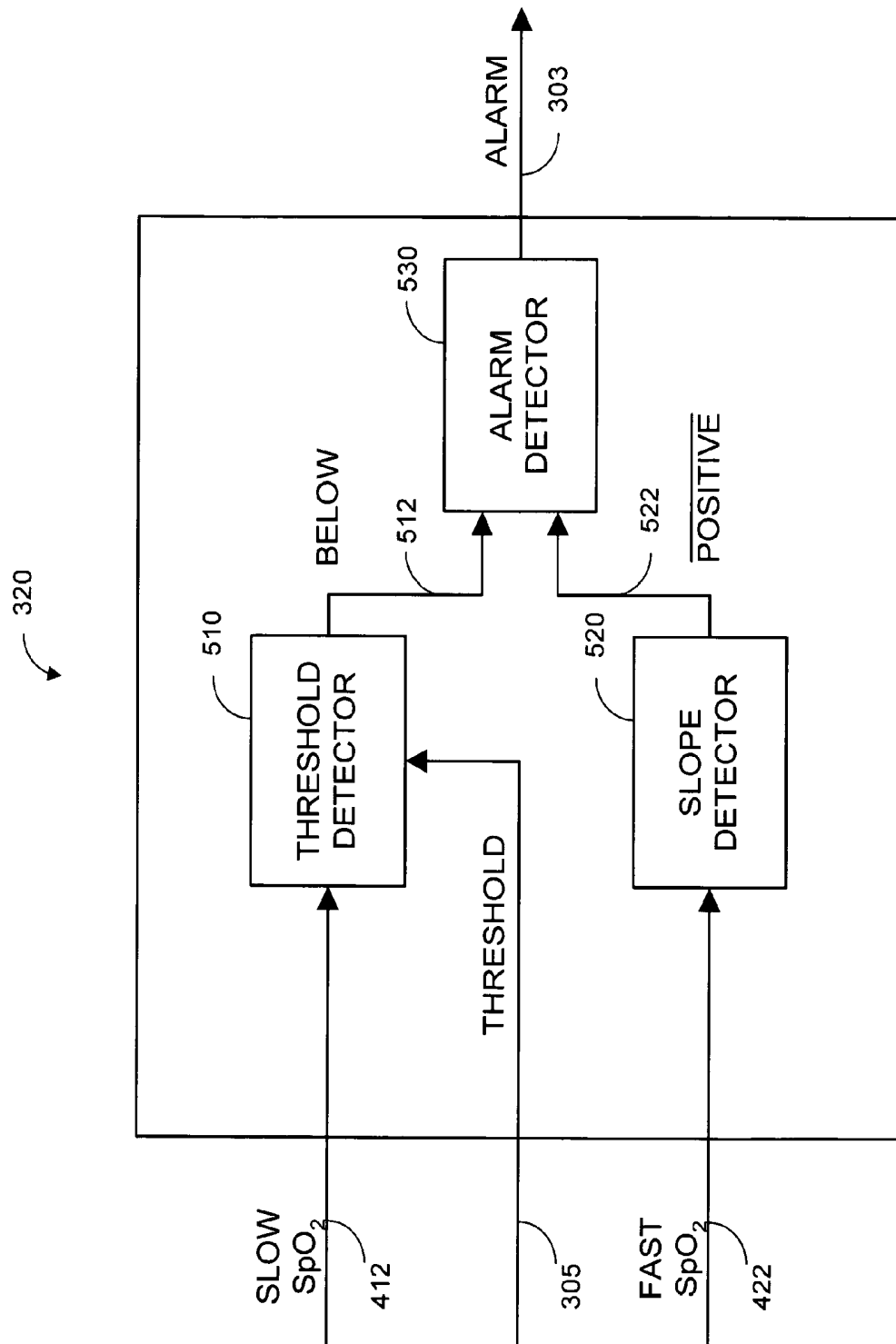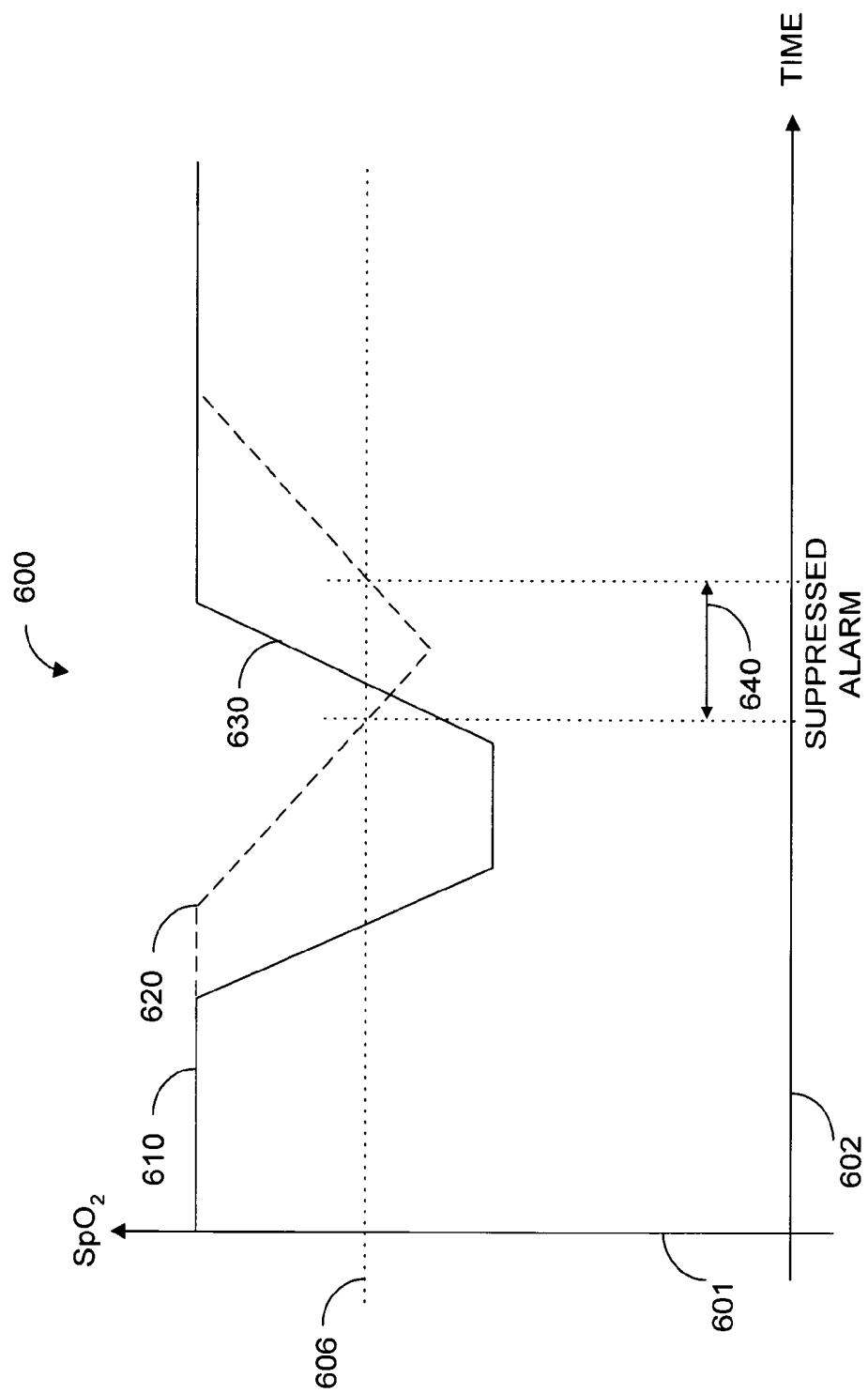
PHYSIOLOGICAL TREND MONITOR

INCORPORATION BY REFERENCE TO ANY PRIORITY APPLICATIONS

Any and all applications, if any, for which a foreign or domestic priority claim is identified in the Application Data Sheet of the present application are hereby incorporated by reference under 37 CFR 1.57.

BACKGROUND

Physiological measurement instruments employed in healthcare environments often feature visual and audible alarm mechanisms that alert a caregiver when a patient's vital signs are outside of predetermined limits. One example is a pulse oximeter, which measures the oxygen saturation level of arterial blood, an indicator of oxygen supply. A typical pulse oximeter displays a numerical readout of the patient's oxygen saturation, a numerical readout of pulse rate, and a plethysmograph, which is indicative of a patient's pulse. In addition, a pulse oximeter provides an alarm that warns of a potential desaturation event.

FIG. 1 illustrates a prior art pulse oximeter portion **100** having a signal input **101** and generating an oxygen saturation measurement output **103** and an alarm output **105**. The pulse oximeter portion **100** has an oxygen saturation (SPO.sub.2) processor **110** and an associated threshold detector **120**. The SPO.sub.2 processor **110** derives an oxygen saturation measurement from the signal input **101**. The signal input **101** is typically an amplified, filtered, digitized and demodulated sensor signal. A sensor emits both red and infrared (IR) wavelength light, which is transmitted through a patient's tissue, detected and input to the pulse oximeter. The pulse oximeter calculates a normalized ratio (AC/DC) of the detected red and infrared intensities, and an arterial oxygen saturation value is empirically determined based on a ratio of these normalized ratios, as is well-known in the art. The oxygen saturation measurement output **103** is typically a digital signal that is then communicated to a display.

FIG. 2 illustrates the operation of a conventional threshold detector **120** (FIG. 1) utilizing a graph **200** of oxygen saturation **201** versus time **202**. The graph **200** displays a particular oxygen saturation measurement **210** corresponding to the measurement output **103** (FIG. 1) and a predetermined alarm threshold **206**. During an alarm time period **270** when the measured oxygen saturation **210** is below the threshold **206**, an alarm output **105** (FIG. 1) is generated, which triggers a caregiver alert. Adjusting the threshold **206** to a lower value of oxygen saturation **201** reduces the probability of an alarm, i.e. reduces the probability of a false alarm and increases the probability of a missed event. Likewise, adjusting the threshold **206** to a higher value of oxygen saturation **201** increases the probability of an alarm, i.e. increases the probability of a false alarm and decreases the probability of a missed event.

SUMMARY

One aspect of a physiological trend monitor comprises transmitting light into a patient tissue site, generating a sensor signal, detecting a blood parameter trend according to the sensor signal and generating an alarm according to the blood parameter trend. The transmitted light has multiple wavelengths. The sensor signal is responsive to the light after attenuation by pulsatile arterial blood flow within the tissue site. In various embodiments, the detecting comprises deriving a curve-fitting blood parameter measurement. A blood parameter slope is calculated from the blood parameter measurement. The alarm is responsive to a negative value of the blood parameter slope. A smoothed blood parameter measurement is derived. A threshold value is set for the smoothed blood parameter measurement. The alarm is responsive to the smoothed blood parameter measurement crossing the threshold value.

Another aspect of a physiological trend monitor comprises a sensor signal responsive to multiple wavelengths of light transmitted into a tissue site and detected after attenuation by pulsatile blood flow within the tissue site. A processor has an input responsive to the sensor signal and a physiological parameter output. Features are extracted from the physiological parameter output. Criteria are applied to the features. An alarm output is generated when the criteria are satisfied. In various embodiments a pattern memory stores feature values and a comparator compares the features with the stored feature values. The criteria determine a match between the features and the stored feature values so as to trigger the alarm output. At least one of the features relate to the number of threshold crossings over a specified time period. At least one of the features relate to a duration of a threshold crossing by the physiological parameter output. At least one of the features relate to a trend in the physiological parameter and a slope of that trend over a specified time period.

A further aspect of a physiological trend monitor comprises a detector responsive to multiple wavelengths of light transmitted into a tissue site after attenuation by pulsatile blood flow within the tissue site so as to generate a sensor signal. A processor means calculates a physiological measurement in response to the sensor signal. A pattern extractor means identifies features of the physiological measurement. A pattern memory means stores a reference pattern. A pattern comparator means triggers an alarm if the identified features match the reference pattern. In various embodiments, a threshold is input to the pattern extractor. The identified features comprise at least the number of times the physiological measurement crosses the threshold within a predetermined time period. The identified features comprise at least the duration of each time the physiological measurement crosses the threshold. The physiological measurement comprises a predictive oxygen saturation measurement. A second processor means calculates an integrator oxygen saturation measurement.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of a prior art pulse oximeter portion;

FIG. **2** is a graph of oxygen saturation versus time illustrating a conventional threshold detector alarm;

FIG. **3** is a block diagram of an alarm processor utilizing parallel measurements of a physiological parameter;

FIG. **4** is a block diagram of a pulse oximeter processor utilizing dual oxygen saturation measurements;

FIG. **5** is a block diagram of a predictive alarm indicator utilizing a threshold detector with a slow oxygen saturation measurement input and a slope detector with a fast oxygen saturation measurement input;

FIGS. **6A-B** are graphs of oxygen saturation versus time illustrating operation of the alarm indicator according to FIG. **5**;

FIG. **7** is a block diagram of a pattern recognition alarm indicator utilizing a threshold detector with a slow oxygen

3

saturation measurement input and a pattern extractor with a fast oxygen saturation measurement input; and

FIG. 8 is a graph of oxygen saturation versus time illustrating the pattern recognition alarm indicator according to FIG. 7.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 3 illustrates a parallel measurement alarm processor 300. The alarm processor 300 has a sensor signal input 301 responsive to a physiological parameter and provides one or more alarm outputs 303 to indicate that the physiological parameter may have exceeded particular limits. The alarm processor 300 also has multiple parameter processors 310, which do not necessarily have the same or similar internal configurations. The multiple parameter processors 310 input the sensor signal 301 and provide parallel measurements 312 of the physiological parameter, each measurement having differing characteristics, such as response time or bandwidth to name a few. The alarm processor 300 further has an alarm indicator 320 that inputs the parallel parameter measurements 312 and generates the alarm outputs 303 based upon alarm conditions 305. The alarm outputs 303 change state to indicate that the parameter may have exceed one or more limits and to trigger an alarm accordingly. The alarm conditions 305 define particular limits with respect to one or more of the measurements 312. The alarm conditions 305 may be predefined, such as by user input, or determined by a separate process, such as a measurement of sensor signal quality or data confidence as described in U.S. patent application Ser. No. 09/858,114 entitled "Pulse Oximetry Data Confidence Indicator," assigned to Masimo Corporation, Irvine, Calif. and incorporated by reference herein. The alarm processor 300 may also have a display driver 330 that processes one or more of the parameter measurements 312 and provides one or more display outputs 307.

FIG. 4 illustrates a pulse oximeter embodiment 400 of the alarm processor 300 (FIG. 3) described above. A pulse oximeter sensor (not shown) provides a signal input 301 that is responsive to arterial oxygen saturation, as described with respect to FIG. 1, above. The alarm processor 400 has dual oxygen saturation processors 310. An integrator oxygen saturation (SpO.sub.2) processor 410 outputs a slow SpO.sub.2 measurement 412, i.e. a measurement having a slow response time to changes in the SpO.sub.2 parameter. A predictor SpO.sub.2 processor 420 outputs a fast SPO.sub.2 measurement 422, i.e. a measurement having a fast response time that tracks changes in the SpO.sub.2 parameter. The slow SpO.sub.2 measurement 412 is input to a display driver 330, which provides an oxygen saturation display output 307. For example, the display output 307 may be input to a digital display that provides a numerical readout of oxygen saturation to a caregiver. Both the slow SpO.sub.2 measurement 412 and the fast SpO.sub.2 measurement 422 are input to an alarm indicator 320 that generates at least one alarm output 303 based upon alarm conditions 305, as described in further detail with respect to FIGS. 5-8, below.

The integrator SpO.sub.2 processor 410, advantageously, provides a smoothed measurement of oxygen saturation suitable for threshold detection. The predictor SPO.sub.2 processor 420, advantageously, provides a curve-fitting or a predictive measurement of oxygen saturation that detects trends in oxygen saturation, as described in further detail with respect to FIG. 5 and FIGS. 6A-B, below. Further, the predictor SpO.sub.2 processor 420 advantageously tracks oxygen saturation details that may signal a critical physi-

4

ological event, as described in further detail with respect to FIGS. 7-8, below. The integrator SpO.sub.2 processor 410 and predictor SpO.sub.2 processor 420 may be a pulse oximeter as described in U.S. patent application Ser. No. 09/586,845 entitled "Variable Mode Averager," assigned to Masimo Corporation, Irvine, Calif. and incorporated by reference herein.

FIG. 5 illustrates a trend embodiment of an alarm indicator 320, which has a threshold detector 510, a slope detector 520 and alarm detector 530. The threshold detector 510 has a slow SpO.sub.2 measurement 412 and a threshold alarm condition 305 as inputs and a logic output BELOW 512. The slope detector 520 has a fast SpO.sub.2 measurement 422 input and a logic output POSITIVE/522. The alarm detector 530 has BELOW 512 and POSITIVE/522 logic inputs and generates an alarm output 303. The threshold detector 510 is a comparator that asserts BELOW 512 while the slow SpO.sub.2 measurement 412 is less in value than the value of the threshold 305. The slope detector 520 is a differentiator and comparator that asserts POSITIVE/522 while the slope of the fast SpO.sub.2 measurement 422 is non-positive, i.e. while the derivative of the fast SpO.sub.2 measurement 422 is zero or less than zero. The alarm detector 530 performs a logical AND function, asserts the alarm output 303 and indicates an alarm when BELOW 512 and POSITIVE/522 are both asserted. In this manner, an alarm output 303 only changes state when the slow SpO.sub.2 measurement 412 is below a threshold 305 and the fast SpO.sub.2 measurement 422 has not begun to increase in value. Advantageously, the trend recognition alarm indicator 320 reduces false alarms by suppressing a threshold-based alarm on the slow SpO.sub.2 measurement 412 when the fast SpO.sub.2 measurement 422 determines that a patient's oxygen saturation is in recovery, as described in further detail with respect to FIGS. 6A-B, below.

FIGS. 6A-B illustrate operation of the trend recognition alarm indicator 320 (FIG. 5). In FIG. 6A, a graph 600 has an SpO.sub.2 axis 601 and a time axis 602. Shown along the SPO.sub.2 axis 601 is a constant SPO.sub.2 value 606 corresponding to a threshold 305 (FIG. 5). The graph 600 shows a first plot of SPO.sub.2 versus time 610 corresponding to a fast SPO.sub.2 measurement 422 (FIG. 5). The graph 600 also shows a second plot of SpO.sub.2 versus time 620 corresponding to a slow SpO.sub.2 measurement 412 (FIG. 5). A suppressed alarm interval 640 along the time axis 602 corresponds to an alarm that would be indicated by the threshold detector 510 (FIG. 5) but is suppressed as occurring during a positive slope portion 630 of a fast SPO.sub.2 measurement 610. The alarm detector 530 (FIG. 5) would not assert an alarm output 303 (FIG. 5) during this interval.

In FIG. 6B, a graph 650 shows a first plot of SpO.sub.2 versus time 660 corresponding to a fast SpO.sub.2 measurement 422 (FIG. 5). The graph 650 also shows a second plot of SpO.sub.2 versus time 670 corresponding to a slow SpO.sub.2 measurement 412 (FIG. 5). An alarm interval 690 along the time axis 602 corresponds to an alarm period triggered by the alarm output 303 (FIG. 5). This alarm interval 640 occurs while a slow SpO.sub.2 measurement 670 is below the threshold 606 and before a positive slope portion 680 of a fast SpO.sub.2 measurement 660.

FIG. 7 illustrates a pattern recognition embodiment of an alarm indicator 320, having a threshold detector 710, a pattern extractor 720, a pattern memory 730 and a pattern comparator 740. Further, the alarm indicator 320 has slow SpO.sub.2 412 and fast SpO.sub.2 422 measurement inputs in addition to threshold 701 and reference pattern 732 alarm condition inputs 305. The threshold detector 710 has a slow

5

SPO.sub.2 measurement **412** and a SpO.sub.2 threshold **701** as inputs and a first alarm output **712**. The threshold detector **710** changes the state of the first alarm output **712** when the value of the slow SpO.sub.2 measurement **412** crosses the SpO.sub.2 threshold **701**. For example, the first alarm output **712** changes state to trigger an alarm when the slow SpO.sub.2 measurement **412** becomes less than the SpO.sub.2 threshold **701**.

As shown in FIG. 7, the pattern extractor **720** has a fast SpO.sub.2 measurement **422** and a pattern threshold **734** as inputs and an extracted pattern output **722**. The pattern extractor **720** identifies features of the fast SpO.sub.2 measurement **422** that may be used for pattern matching. Features may be, for example, the number of times the fast SpO.sub.2 measurement **422** crosses the pattern threshold **734** within a certain time period, or the duration of each time period that the fast SpO.sub.2 measurement **422** is less than the pattern threshold **734**, to name a few. The pattern memory **730** has a pattern selection input **705** and a reference pattern output **732**. The pattern memory **730** stores values for particular features that are identified by the pattern extractor **720**. The reference pattern output **732** transfers these stored values to the pattern comparator **740**. The pattern memory **730** may be nonvolatile and one or more patterns may be stored at the time of manufacture or downloaded subsequently via a data input (not shown). One of multiple patterns may be determined via the pattern selection input **705**, by a user or by a separate process, for example. The pattern threshold **734** may be generated in response to the pattern selection input **705** or in conjunction with a selected reference pattern **732**.

Also shown in FIG. 7, the pattern comparator **740** has the extracted pattern **722** and the reference pattern **732** as inputs and generates a second alarm output **742**. That is, the pattern comparator **740** matches extracted measurement features provided by the pattern extractor **720** with selected features retrieved from pattern memory **730**, changing the state of the second alarm output **742** accordingly. For example, the second alarm output **742** changes state to trigger an alarm when features of the fast SpO.sub.2 measurement **422** match the reference pattern output **732**. Advantageously, the pattern recognition alarm indicator **320** reduces missed events by supplementing the threshold-based first alarm output **712** responsive to the slow SpO.sub.2 measurement **412** with a pattern-based second alarm output **742** responsive to detail in the fast SpO.sub.2 measurement **422**. In this manner, if a patient's oxygen saturation is, for example, irregular or intermittent, the second alarm output **742** may trigger a caregiver alert when the first alarm output **712** does not, as described in further detail with respect to FIG. 8, below.

FIG. **8** illustrates operation of a pattern recognition alarm indicator **320** (FIG. 7), as described above. A graph **800** has a SpO.sub.2 axis **801** and a time axis **802**. The graph **800** shows a SpO.sub.2 plot versus time **810** corresponding to the slow SPO.sub.2 measurement **412** (FIG. 7). Shown along the time axis **802** is a constant SPO.sub.2 value **812** corresponding to the SPO.sub.2 threshold **701** (FIG. 7). Due to the short duration of irregular and intermittent drops in SpO.sub.2, the slow SpO.sub.2 measurement **810** does not fall below the SpO.sub.2 threshold **812**. Thus, the first alarm output **712** (FIG. 7) does not trigger an alarm in this example.

Also shown in FIG. **8**, the graph **800** shows a SpO.sub.2 plot versus time **820** corresponding to the fast SpO.sub.2 measurement **422** (FIG. 7). Shown along the time axis **802** is a constant SPO.sub.2 value **822** corresponding to the pattern threshold **734** (FIG. 7). A corresponding graph **805**

6

has a logic level axis **806** and a time axis **807**. The graph **805** shows a logic level plot versus time **830** corresponding to the extracted pattern output **722** (FIG. 7). The logic level plot **830** has a "1" level when the fast SpO.sub.2 plot **820** is above the pattern threshold **822** and a "0" level when the fast SpO.sub.2 plot **820** is below the pattern threshold **822**. In this manner, the logic level plot **830** indicates the number and duration of times the fast SpO.sub.2 plot **820** falls below a threshold value **822**.

Further shown in FIG. **8**, an alarm interval **870** along the time axis **802** corresponds to an alarm period indicated by the pattern comparator **740** (FIG. 7). This alarm interval **870** occurs after a reference pattern **732** (FIG. 7) is detected as matching an extracted pattern **722** (FIG. 7) and ends, correspondingly, when there is no longer a match. For example, assume that the reference pattern output **732** (FIG. 7) has the alarm criteria that at least three below threshold periods of minimum duration T.sub.1 must occur during a maximum period T.sub.2, where the value of T.sub.1 and T.sub.2 are illustrated along the time axis **807**. The below threshold time periods **831-834** are each greater in duration than T.sub.2 and a first set of three, below-threshold time periods **831-833** occurs within a time period T.sub.1=T.sub.2, as illustrated. Thus, the alarm interval beginning **872** is triggered by the second alarm output **742** (FIG. 7). A second set of three, below-threshold time periods **832-834** also occurs within a time period T.sub.2=T.sub.2, as illustrated. Thus, the alarm interval **870** continues. There is no third set of three, below-threshold time periods. Thus, after the end of the time interval T.sub.3=T.sub.2, the alarm interval end **874** is triggered. This example illustrates how the pattern recognition alarm indicator **320** (FIG. 7) can trigger an alarm on an event, such as a period of irregular heartbeats, that might be missed by a threshold-based alarm responsive to the slow SpO.sub.2 measurement **412**.

Although some alarm processor embodiments were described above in terms of pulse oximetry and oxygen saturation measurements, one of ordinary skill in the art will recognize that an alarm processor as disclosed herein is also applicable to the measurement and monitoring of other blood constituents, for example blood glucose and total hemoglobin concentration to name a few, and other physiological parameters such as blood pressure, pulse rate, respiration rate, and EKG to name a few.

In an embodiment, multiple pattern processors, each including a pattern extractor, pattern memory and pattern comparator, such as described with respect to FIG. 7, above, have as inputs one or more of fast SpO.sub.2 measurements, a pulse oximeter plethysmograph and pulse rate measurements. An arrhythmia alarm is generated based upon irregular heartbeat patterns being matched or otherwise detected in one or more combinations of SpO.sub.2 measurements, a pulse oximeter plethysmograph and pulse rate measurements.

A physiological trend monitor has been disclosed in detail in connection with various embodiments. These embodiments are disclosed by way of examples only and are not to limit the scope of the claims that follow. One of ordinary skill in the art will appreciate many variations and modifications.

What is claimed is:

1. A system for non-invasively monitoring physiological trends, the system comprising:

a processor configured to:

receive a sensor signal from an optical sensor coupled with a patient, the sensor signal responsive to light attenuated by body tissue of the patient;

calculate a physiological parameter and a physiological parameter trend based on the sensor signal;

output a value of the physiological parameter for presentation on a display; and

output an audible alarm once the physiological parameter reaches a threshold if the physiological parameter trend is not trending upward.

2. The system of claim 1, wherein the processor is further configured to suppress the audible alarm once the smoothed physiological parameter rises above the threshold, even if the physiological parameter trend is flat or trending downward.

3. The system of claim 1, wherein the processor is further configured to suppress the audible alarm once the physiological parameter trend begins to trend upward, even if the physiological parameter is under the threshold.

4. The system of claim 1, wherein the processor is further configured to calculate the physiological parameter by smoothing physiological parameter values.

5. The system of claim 1, wherein the processor is further configured to calculate the physiological parameter by integrating physiological parameter values.

6. The system of claim 1, wherein the processor is further configured to calculate the physiological parameter trend using a curve-fitting technique.

7. The system of claim 1, wherein the processor is further configured to output the audible alarm responsive to the physiological parameter trend being negative.

8. The system of claim 1, wherein the processor is further configured to output the audible alarm responsive to the physiological parameter trend being zero.

9. The system of claim 1, wherein the physiological parameter is selected from the group consisting of oxygen saturation, blood glucose, total hemoglobin concentration, blood pressure, pulse rate, and respiration rate.

* * * * *

专利名称(译)	生理趋势监测		
公开(公告)号	US9636056	公开(公告)日	2017-05-02
申请号	US14/683666	申请日	2015-04-10
[标]申请(专利权)人(译)	梅西莫股份有限公司		
申请(专利权)人(译)	Masimo公司		
当前申请(专利权)人(译)	Masimo公司		
[标]发明人	AL ALI AMMAR		
发明人	AL-ALI, AMMAR		
IPC分类号	A61B5/00 A61B5/0402 A61B5/021 A61B5/08 A61B5/145 A61B5/1455 A61B5/04		
CPC分类号	A61B5/14551 A61B5/021 A61B5/0402 A61B5/0816 A61B5/14532 A61B5/14546 A61B5/746 A61B5/04018		
优先权	13/557107 2013-10-29 US 13/018334 2012-07-24 US 12/070061 2011-02-01 US 11/717591 2008-04-08 US 11/405815 2007-03-13 US 10/975860 2006-04-18 US 10/351735 2004-11-23 US 60/351510 2002-01-24 US		
其他公开文献	US20150208966A1		
外部链接	Espacenet USPTO		

摘要(译)

生理趋势监测器具有响应于传输到组织部位的多个波长的光的传感器信号。在通过组织部位内的脉动血流衰减后检测透射光。处理器具有响应于传感器信号和生理参数输出的输入。从生理参数输出中提取特征。标准适用于特征。满足条件时生成警报输出。