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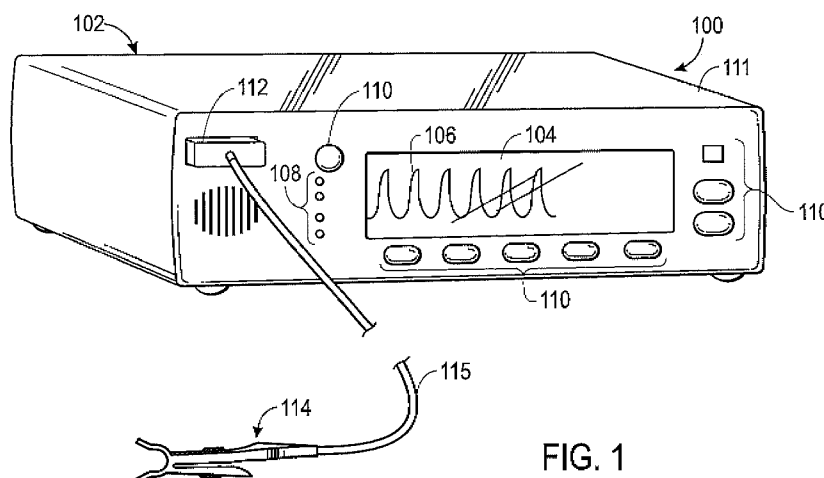


FIG. 1

(57) Abstract: A system and method for determining physiological parameters of a patient based on light transmitted through the patient. The light may be transmitted via a broadband light source and received by a detector. The light may also be optically filtered by an optical filter of either the light source or the detector. Based on the filter, specific wavelengths of light are received by the detector for use in monitoring the physiological parameters of the patient.

METHOD AND APPARATUS FOR OPTICAL FILTERING OF A BROADBAND FILTER IN A MEDICAL SENSOR

BACKGROUND

The present disclosure relates generally to medical devices and, more
5 particularly, to sensors used for sensing physiological parameters of a patient.

This section is intended to introduce the reader to various aspects of art that may
be related to various aspects of the present disclosure, which are described and/or
claimed below. This discussion is believed to be helpful in providing the reader with
background information to facilitate a better understanding of the various aspects of the
10 present disclosure. Accordingly, it should be understood that these statements are to be
read in this light, and not as admissions of prior art.

In the field of medicine, doctors often desire to monitor certain physiological
characteristics of their patients. Accordingly, a wide variety of devices have been
developed for monitoring many such physiological characteristics. Such devices
15 provide doctors and other healthcare personnel with the information they need to
provide the best possible healthcare for their patients. As a result, such monitoring
devices have become an indispensable part of modern medicine.

One technique for monitoring certain physiological characteristics of a patient is
commonly referred to as pulse oximetry, and the devices built based upon pulse
20 oximetry techniques are commonly referred to as pulse oximeters. Pulse oximetry may
be used to measure various blood flow characteristics, such as the blood-oxygen

saturation of hemoglobin in arterial blood, the volume of individual blood pulsations supplying the tissue, and/or the rate of blood pulsations corresponding to each heartbeat of a patient. In fact, the “pulse” in pulse oximetry refers to the time varying amount of arterial blood in the tissue during each cardiac cycle.

5 Pulse oximeters typically utilize a non-invasive sensor that transmits light through a patient’s tissue and that photoelectrically detects the absorption and/or scattering of the transmitted light in such tissue. One or more of the above physiological characteristics may then be calculated based upon the amount of light absorbed or scattered. More specifically, the light passed through the tissue is typically
10 selected to be of one or more wavelengths that may be absorbed or scattered by the blood in an amount correlative to the amount of the blood constituent present in the blood. The amount of light absorbed and/or scattered may then be used to estimate the amount of blood constituent in the tissue using various algorithms.

 The light sources utilized in pulse oximeters typically must be selected based on
15 their ability to transmit light at specific wavelengths so that the absorption and/or scattering of the transmitted light in a patient’s tissue may be properly determined. This may preclude the use of a multitude of readily available, and typically less costly, light sources that transmit light at various wavelengths.

20 **BRIEF DESCRIPTION OF THE DRAWINGS**

Advantages of the disclosure may become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. 1 illustrates a perspective view of a pulse oximeter in accordance with an embodiment;

FIG. 2 illustrates a simplified block diagram of a pulse oximeter in **FIG. 1**, according to an embodiment;

5 **FIG. 3** illustrates a simplified block diagram of a pulse oximeter in **FIG. 1**, according to a second embodiment;

FIG. 4 illustrates a simplified block diagram of a pulse oximeter in **FIG. 1**, according to a third embodiment; and

FIG. 5 illustrates a simplified block diagram of a pulse oximeter in **FIG. 1**,
10 according to a fourth embodiment.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

One or more specific embodiments of the present disclosure will be described below. In an effort to provide a concise description of these embodiments, not all
15 features of an actual implementation are described in the specification. It should be appreciated that in the development of any such actual implementation, as in any engineering or design project, numerous implementation-specific decisions must be made to achieve the developers' specific goals, such as compliance with system-related and business-related constraints, which may vary from one implementation to another.
20 Moreover, it should be appreciated that such a development effort might be complex and time consuming, but would nevertheless be a routine undertaking of design,

fabrication, and manufacture for those of ordinary skill having the benefit of this disclosure.

Sensors for pulse oximetry or other applications utilizing spectrophotometry are provided therein that include the use of broadband emitters that emit light at in a range of wavelengths. This transmitted light may be filtered by optical filters that may be located either adjacent the broadband emitter or adjacent the detector. In one embodiment, multiple detectors may be utilized for reception of light from a single emitter. The multiple detectors may each be able to generate signals based on the light received from the broadband emitter, and transmit the generated signals across independent channel lines associated with each of the multiple detectors. A monitor in the pulse oximeter system may receive the signals and calculate physiological parameters of a patient based on the signals without having to demodulate the received signals first.

Turning to **FIG. 1**, a perspective view of a medical device is illustrated in accordance with an embodiment. The medical device may be a pulse oximeter **100**. The pulse oximeter **100** may include a monitor **102**, such as those available from Nellcor Puritan Bennett LLC. The monitor **102** may be configured to display calculated parameters on a display **104**. As illustrated in **FIG. 1**, the display **104** may be integrated into the monitor **102**. However, the monitor **102** may be configured to provide data via a port to a display (not shown) that is not integrated with the monitor **102**. The display **104** may be configured to display computed physiological data including, for example, an oxygen saturation percentage, a pulse rate, and/or a plethysmographic waveform **106**. As is known in the art, the oxygen saturation percentage may be a functional arterial hemoglobin oxygen saturation measurement in

units of percentage SpO₂, while the pulse rate may indicate a patient's pulse rate in beats per minute. The monitor **102** may also display information related to alarms, monitor settings, and/or signal quality via indicator lights **108**.

To facilitate user input, the monitor **102** may include a plurality of control inputs **110**. The control inputs **110** may include fixed function keys, programmable function keys, and soft keys. Specifically, the control inputs **110** may correspond to soft key icons in the display **104**. Pressing control inputs **110** associated with, or adjacent to, an icon in the display may select a corresponding option. The monitor **102** may also include a casing **111**. The casing **111** may aid in the protection of the internal elements of the monitor **102** from damage.

The monitor **102** may further include a sensor port **112**. The sensor port **112** may allow for connection to an external sensor **114**, via a cable **115** which connects to the sensor port **112**. The sensor **114** may be of a disposable or a non-disposable type. Furthermore, the sensor **114** may obtain readings from a patient, which can be used by the monitor to calculate certain physiological characteristics such as the blood-oxygen saturation of hemoglobin in arterial blood, the volume of individual blood pulsations supplying the tissue, and/or the rate of blood pulsations corresponding to each heartbeat of a patient.

Turning to **FIG. 2**, a simplified block diagram of a pulse oximeter **100** is illustrated in accordance with an embodiment. Specifically, certain components of the sensor **114** and the monitor **102** are illustrated in **FIG. 2**. The sensor **114** may include an emitter **116**, a detector **118**, and an encoder **120**. It should be noted that the emitter **116** may be capable of emitting at least two wavelengths of light, e.g., RED and

infrared (IR) light, into the tissue of a patient **117** to calculate the patient's **117** physiological characteristics, where the RED wavelength may be between about 600 nanometers (nm) and about 700 nm, and the IR wavelength may be between about 800 nm and about 1000 nm. A single broadband light source may be used as the
5 emitter **116**, whereby the broadband light source may transmitting light at various wavelengths, including the RED and IR wavelengths, for use in measuring, for example, water fractions, hematocrit, or other physiologic parameters of the patient **117**. It should be understood that, as used herein, the term "light" may refer to one or more of ultrasound, radio, microwave, millimeter wave, infrared, visible, ultraviolet,
10 gamma ray or X-ray electromagnetic radiation, and may also include any wavelength within the radio, microwave, infrared, visible, ultraviolet, or X-ray spectra, and that any suitable wavelength of light may be appropriate for use with the present disclosure.

In one embodiment, the detector **118** may be capable of detecting light at various intensities and wavelengths. In operation, light enters the detector **118** after
15 passing through the tissue of the patient **117**. The detector **118** may convert the light at a given intensity, which may be directly related to the absorbance and/or reflectance of light in the tissue of the patient **117**, into an electrical signal. That is, when more light at a certain wavelength is absorbed or reflected, less light of that wavelength is typically received from the tissue by the detector **118**. After converting the received light to an
20 electrical signal, the detector **118** may send the signal to the monitor **102**, where physiological characteristics may be calculated based at least in part on the absorption of light in the tissue of the patient **117**.

Additionally the sensor **114** may include an encoder **120**, which may contain information about the sensor **114**, such as what type of sensor it is (e.g., whether the

sensor is intended for placement on a forehead or digit) and the wavelengths of light emitted by the emitter **116**. This information may allow the monitor **102** to select appropriate algorithms and/or calibration coefficients for calculating the patient's physiological characteristics. The encoder **120** may, for instance, be a memory on
5 which one or more of the following information may be stored for communication to the monitor **102**: the type of the sensor **114**; the wavelengths of light emitted by the emitter **116**; and the proper calibration coefficients and/or algorithms to be used for calculating the patient's **117** physiological characteristics.

In another embodiment, the encoder **120** may be removed from the sensor **114**.
10 For example, if a broadband emitter **116** is utilized with an optical filter that allows only light of a certain wavelength to pass to the detector **118**, then there may be no need for the transmission of information related to wavelengths of light emitted by the emitter **116** and the proper calibration coefficients and/or algorithms to be used for calculating the patient's **117** physiological characteristics. Instead, the actual
15 wavelengths of light received will correspond to the wavelengths passed by the optical filter, and no calibration coefficients and/or algorithms will be utilized to calculate the patient's **117** physiological characteristics. Accordingly, the encoder **120** may be removed from the sensor **114**.

Signals from the detector **118** and the encoder **116** (if utilized) may be
20 transmitted to the monitor **102**. The monitor **102** may include one or more processors **122** coupled to an internal bus **124**. Also connected to the bus may be a RAM memory **126** and a display **104**. A time processing unit (TPU) **128** may provide timing control signals to light drive circuitry **130**, which controls when the emitter **116** is activated,

and if multiple light sources are used, the multiplexed timing for the different light sources. TPU 128 may also control the gating-in of signals from detector 118 through an amplifier 132 and a switching circuit 134. These signals are sampled at the proper time, depending at least in part upon which of multiple light sources is activated, if
5 multiple light sources are used. The received signal from the detector 118 may be passed through an amplifier 136, a low pass filter 138, and an analog-to-digital converter 140 for amplifying, filtering, and digitizing the electrical signals the from the sensor 114. The digital data may then be stored in a queued serial module (QSM) 142, for later downloading to RAM 126 as QSM 142 fills up. In an embodiment, there may
10 be multiple parallel paths of separate amplifier, filter, and A/D converters for multiple light wavelengths or spectra received.

In an embodiment, based at least in part upon the received signals corresponding to the light received by detector 118, processor 122 may calculate the oxygen saturation using various algorithms. These algorithms may require coefficients,
15 which may be empirically determined, and may correspond to the wavelengths of light used. The algorithms may be stored in a ROM 144 and accessed and operated according to processor 122 instructions.

FIG. 3 illustrates an embodiment that may include two broadband emitters 146A and 146B and one detector 118 in sensor 114. Unlike a typical sensor that may
20 include a first emitter that may transmit light in a visible frequency, such as 660 nm as well as a second emitter that may transmit light in an infrared (IR) range such as approximately 900 nm, the sensor assembly 114 of FIG. 3 may include two broadband emitters 146A and 146B that may transmit light across multiple wavelengths. For example, the broadband emitters 146A and 146B may be light emitting diodes (LEDs)

that transmit light at wavelengths between, for example, 380 nm and 2500 nm. As such, the broadband emitters **146A** and **146B** may transmit light of wavelengths for across both visible and infrared wavelengths. Accordingly, processes such as binning, which may be defined as the process of selecting LEDs that may transmit at specific frequencies, such as 660 nm and 900 nm, may be avoided. Because the LEDs do not have to be binned to perform at a certain wavelength, more LEDs may be available for use in the system illustrated in **FIG. 3**. That is, broadband emitters, such as LEDs, are no longer excluded from use because of an inability to transmit light at a peak wavelength ranges used by the monitor **102**.

10 Instead, a visible light optical filter **148** that may, for example, allow only a single wavelength or a range of red light (between the total range of red light from about 600-700 nm) to pass through the optical filter **148**, may be used with one of the broadband emitters, for example, **146A**. Similarly, an infrared (IR) filter **150** that may, for example, allow only a single wavelength or a range of IR light (between a range of IR light from about 700 nm to 1400 nm), may be used with another broadband emitter, 15 for example, **146B**. Through use of the optical filters **148** and **150**, the light from the broadband emitters **146A** and **146B** may be filtered so that only a single wavelength, or a specified range of light, for each emitter **146A** and **146B** is transmitted to the patient **117**.

20 The optical filters **148** and **150** may, for example, be integrated into the die package of the respective broadband emitters **146A** and **146B**. For example, each optical filter **148** and **150** may be applied via, for example, thin film deposition over the emitters **146A** and **146B**. Alternatively, the optical filters **148** and **150** may be disposed adjacent the broadband emitters **146A** and **146B**, such that the filters **148** and **150** may

be separate from the die packages of the broadband emitters **146A** and **146B**. In this embodiment, the optical filters **148** and **150** may be applied to glass, for example, to generate filter glass that may lie adjacent to the broadband emitters **146A** and **146B**. In this manner, the filter glass may be disposed between the broadband emitters **146A** and **146B** and the detector **118**.

The broadband emitters **146A** and **146B** may receive input signals from monitor **102**. These input signals may be used to activate the broadband emitters **146A** and **146B** so that light may be generated via the emitters **146A** and **146B**. For example, emitter **146A** may be activated while emitter **146B** receives no input signal, thus remaining deactivated. This period of activation of the emitter **146A** may be followed by a period of no input signals being delivered to the emitters **146A** and **146B**, i.e. a dark interval. Subsequently, an activation signal may be transmitted to emitter **146B** while emitter **146A** receives no input signal, thus remaining deactivated. In this manner, the emitter **146A** and the emitter **146B** may be alternately activated to each generate light during an independent period of time.

As the light is generated from the respective emitters **146A** and **146B**, the light passes through the respective red filter **148** and IR filter **150** corresponding to each broadband emitter **146A** and **146B**. For example, the red filter **148** may allow visible light in the optical range of about 660 nm to pass into the patient. Additionally, for example, the IR filter **150**, may allow light at approximately 900 nm to pass into the patient **117**. Accordingly, the emitters **146A** and **146B** may alternately transmit filtered light through the patient **117** for detection by the detector **118**.

This received light may be scattered and/or absorbed by the patient **117**, and may subsequently exit the patient **117**. Upon exiting the patient **117**, the light may be detected by the detector **118**. The detector **118** may detect the light, which may include both visible and IR wavelength light, and may generate electrical signals corresponding to the detected light. To aid in the interpretation of these signals, a demodulator may be utilized. The demodulator may interpret the various received signals as, for example, corresponding to light in either the red or infrared spectrum. This demodulation may, for example, take place in the monitor **102**. That is, the received signals at detector **118** may be transmitted via cable **115** to the monitor **102** for processing, which may include demodulation of the signals transmitted from the detector **118**. Based on these demodulated signals, the oxygenation of the blood of the patient **117** may be determined in accordance with known techniques.

While a pulse oximeter **100** utilizing a demodulator was described above with respect to **FIG. 3**, alternate configurations of the pulse oximeter **100** may be implemented without the use of a demodulator. **FIG. 4** illustrates one such configuration of a pulse oximeter **100** that may operate without a demodulator. The pulse oximeter **100** of **FIG. 4** may include a sensor **114** with a single broadband emitter **146** as well as two detectors **118A** and **118B** connected to the monitor **102** via a cable **115**. The broadband emitter **146** may transmit light across a given range of wavelengths that may include, for example, both visible and IR light. This light may pass into patient **117**, and may pass from patient **117** to each of the detectors **118A** and **118B** through, for example, an optical filter **148** and **150**. As discussed below, the optical filters **148** and **150** allow the detectors **118A** and **118B** to each receive separate wavelengths of light, and thus, generate separate signals corresponding to the received

light. Accordingly, a demodulator is not required because the signals corresponding to, for example, visible and IR light, are already separated from each other via the independent detectors **118A** and **118B**.

Accordingly, the first detector **118A** may be associated with an optical filter **148**, which may allow light of a given wavelength, such as light in the red spectrum around 660 nm, or a given range of wavelengths to pass to the detector **118A**. Similarly, the second detector **118B** may be associated with to an optical filter **150**, which may allow light of a given wavelength, such as light in the infrared spectrum around 900 nm, or a given range of wavelengths to pass to the detector **118B**. The optical filters **148** and **150** may, for example, be integrated into the respective die package of the detectors **118A** and **118B**. Alternatively, the optical filters **148** and **150** may be positioned adjacent the detectors **118A** and **118B**, such that the filters **148** and **150** may be separate from the die packages of the detectors **118A** and **118B** as, for example, filter glass.

In operation, the pulse oximeter **100** of FIG. 4 may include a broadband emitter **146** that may receive electrical signals from the monitor **102** via the cable **115**. These electrical signals may cause the broadband emitter **146** to transmit light in a given range of wavelengths, such as 380 nm to approximately 2500 nm. This light may be transmitted to the patient **117**, and may pass through the patient **117** to the filters **148** and **150** of detectors **118A** and **118B**. The detector **118A**, associated with the optical filter **148**, may receive light in the visible light range, such as the red frequency range of light and may generate signals corresponding to the received light. These signals may be transmitted via an independent channel line, i.e. a signal path, to monitor **102** across

cable **115**. Similarly, the detector **118B**, associated with the optical filter **150**, may receive light in the infrared light range and may generate signals corresponding to the received light. These signals may be transmitted via a second independent channel line, i.e. a signal path, to monitor **102** across cable **115**. Thus, the monitor **102** may receive
5 two sets of signals indicative of light transmitted through the patient **117** across separate channels. As such, because the received signals may be on different channels, the signal transmitted from the detectors **118A** and **118B** to the monitor **102** may not need to be demodulated. Accordingly, this may reduce the cost and complexity of the monitor **102**.

10 In an embodiment, detectors **118A** and **118B** may include UV enhanced silicon photodiodes. UV enhanced photodiodes may be designed for low noise detection in the UV region of electromagnetic spectrum. Inversion layer structure UV enhanced photodiodes may exhibit 100% internal quantum efficiency and may be well suited for low intensity light measurements. They may have high shunt resistance, low noise and
15 high breakdown voltages.

As discussed above with respect to **FIG. 4**, utilizing multiple detectors, such as detectors **118A** and **118B**, may be beneficial in that the multiple detectors may each utilize an independent signal path to transmit signals corresponding to received light, eliminating demodulation of the signals. Use of multiple detectors may also be
20 beneficial when multiple physiological parameters of the patient **117** are to be monitored simultaneously. **FIG. 5** illustrates an embodiment whereby multiple physiological parameters of the patient **117** may be simultaneously monitored via a detector array.

FIG. 5 illustrates a pulse oximeter **100** that utilizes a detector array for simultaneous monitoring of multiple physiological parameters of a patient **117**, as set forth above. The pulse oximeter **100** includes a single broadband emitter **146** with four detectors **118A**, **118B**, **118C**, and **118D**. The single broadband emitter **146** of **FIG. 5** may operate in a substantially similar manner to the emitter **146** illustrated and described above with respect to **FIG. 4**. Furthermore, the detectors **118A-D** may each be coupled to a respective optical filter **148**, **150**, **152**, and **154**. The first detector **118A** may be associated with an optical filter **148**, which may allow light of a given wavelength, such as light in the red spectrum around 660 nm, or a given range of wavelengths to pass to the detector **118A**. Similarly, the second detector **118B** may be associated with to an optical filter **150**, which may allow light of a given wavelength, such as light in the infrared spectrum around 900 nm, or a given range of wavelengths to pass to the detector **118B**. Additionally, a glucose filter **152**, which may be associated with detector **118C**, may allow light of a given wavelength, such as light at a wavelength of approximately 1000 nm, or a given range of wavelengths to pass to the detector **118C**. Furthermore, a hematocrit optical filter **154**, which may be associated with detector **118D**, may allow light of a given wavelength, such as light at a wavelength of approximately 550 nm, or a given range of wavelengths to pass to the detector **118D**.

In this manner, a single broadband emitter **146** may be utilized to transmit light to a plurality of detectors **118A-D**, each with an optical filter **148**, **150**, **152**, and **154** that specifically allows certain wavelengths of light to pass to the detectors **118A-D**. By calibrating each of the filters **148**, **150**, **152**, and **154** to pass a respective wavelength or range of wavelengths, the detectors **118A-D** may each be able to receive light that

may be utilized in detecting specific physiological parameters according to the light received.

Moreover, by utilizing multiple detectors **118**, each with its own respective channel line to the monitor **102**, the monitor **102** may receive electrical signals

5 corresponding to specific values of the patient **117** that may be utilized in calculation of specific physiological parameters of the patient **117** simultaneously. That is, the detectors **118A** may comprise a four-channel detector array that allows for determination of the oxygen saturation of a patient, the hematocrit levels of a patient, the blood/glucose levels of a patient, and/or other physiological readings of the patient,

10 simultaneously. Accordingly, each channel line may transmit electrical signals corresponding to each of the above-referenced values for calculation by the monitor **102**. Additionally, more or fewer detectors than illustrated detectors **118A-D** may be utilized as part of the detector array to receive the light from the broadband emitter **146** and to transmit the electrical signals corresponding to the light in specific wavelengths

15 to the monitor **102** for calculation of variety of physiological parameters.

While the disclosure may be susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and have been described in detail herein. However, it should be understood that the embodiments provided herein are not intended to be limited to the particular

20 forms disclosed. Indeed, the disclosed embodiments may not only be applied to measurements of blood oxygen saturation, but these techniques may also be utilized for the measurement and/or analysis of other blood constituents. For example, using the same, different, or additional wavelengths, the present techniques may be utilized for the measurement and/or analysis of carboxyhemoglobin, met-hemoglobin, total

hemoglobin, fractional hemoglobin, intravascular dyes, and/or water content. Rather, the various embodiments may cover all modifications, equivalents, and alternatives falling within the spirit and scope of the disclosure as defined by the following appended claims.

CLAIMS

What is claimed is:

1. A physiological sensor comprising:
a broadband light emitter adapted to transmit light across a range of
5 wavelengths;
an optical filter associated with the broadband emitter, wherein the optical filter
is adapted to substantially pass light transmitted from the broadband
light emitter at a specific wavelength or at a subset of the range of
wavelengths through the optical filter and to substantially block light at
10 all other wavelengths from passing through the optical filter; and
a light detector adapted to receive the light passed through the optical filter.
2. The physiological sensor, as set forth in claim 1, comprising:
a second broadband light emitter adapted to transmit light across a range of
15 wavelengths; and
a second optical filter associated with the second broadband emitter, wherein the
second optical filter is adapted to substantially pass light transmitted from the
broadband light emitter at a second specific wavelength or at a second subset of the
range of wavelengths through the second optical filter and to substantially block light at
20 all wavelengths from passing through the second optical filter.
3. The physiological sensor, as set forth in claim 2, wherein the specific
wavelength or subset is in a red range suitable for pulse oximetry measurements.

4. The physiological sensor, as set forth in claim 2, wherein the second wavelength or second subset is in an infrared range suitable for pulse oximetry measurements.

5. The physiological sensor, as set forth in claim 1, wherein the optical filter comprises filter glass, deposited on to the broadband emitter.

6. The physiological sensor, as set forth in claim 1, wherein the optical filter is disposed adjacent the broadband emitter and wherein the optical filter and the broadband emitter comprise separate discrete components.

7. A pulse oximetry system comprising:
a pulse oximetry monitor; and
a sensor assembly configured to be coupled to the monitor, the sensor assembly comprising:

a broadband light emitter adapted to transmit light across a range of wavelengths;

a plurality of light detectors adapted to receive the light from the broadband emitter; and

a plurality of optical filters, wherein each of the plurality of optical filters is associated with a single one of the plurality of light detectors, and wherein each of the plurality of optical filters is adapted to substantially pass light transmitted from the broadband light emitter at a specific wavelength or at a subset

of the range of wavelengths to the associated single one of the plurality of light detectors and to substantially block light at all other wavelengths from the associated single one of the plurality of light detectors.

5

8. The pulse oximetry system, as set forth in claim 7, comprising a first channel line configured to couple a first light detector of the plurality of light detectors to the monitor.

10

9. The pulse oximetry system, as set forth in claim 7, comprising a second channel line configured to couple a second light detector of the plurality of light detectors to the monitor, wherein the second channel line is independent from the first channel line.

15

10. The pulse oximetry system, as set forth in claim 7, wherein the specific wavelength or subset of the range of wavelengths differs for each of the plurality of optical filters.

20

11. The pulse oximetry system, as set forth in claim 7, wherein the specific wavelength or subset is in a red range suitable for pulse oximetry measurements.

12. The pulse oximetry system, as set forth in claim 7, wherein the second wavelength or second subset is in an infrared range suitable for pulse oximetry measurements.

13. A method comprising:

transmitting light with a plurality of wavelengths via a broadband light emitter;

filtering the transmitted light via an optical filter adapted to pass light at a

specific wavelength or at a subset of the range of wavelengths and to

5 substantially block light at all other wavelengths from passing through

the optical filter to generate filtered light;

receiving the filtered light at a light detector; and

calculating physiological parameters based on the filtered light.

10 14. The method of claim 13, comprising displaying indications of the
physiological parameters on a pulse oximeter.

15 15. The method of claim 13, wherein the filtering is performed at the
broadband emitter.

16. The method of claim 13, wherein the filtering is performed at the light
detector.

17. The method of claim 13, comprising:

20 filtering the transmitted light via a second optical filter adapted to pass light at a

second specific wavelength or at a second subset of the range of wavelengths and to

substantially block light at all other wavelengths from passing through the second

optical filter to generate second filtered light; and

receiving the second filtered light at a second light detector.

18. The method of claim 17, comprising:
- generating first reception signals at the light detector based on the filtered light;
- generating second reception signals at the second light detector based on the
- 5 second filtered light; and
- transmitting the first reception signals and the second reception signals to a
- monitor on independent channel lines.

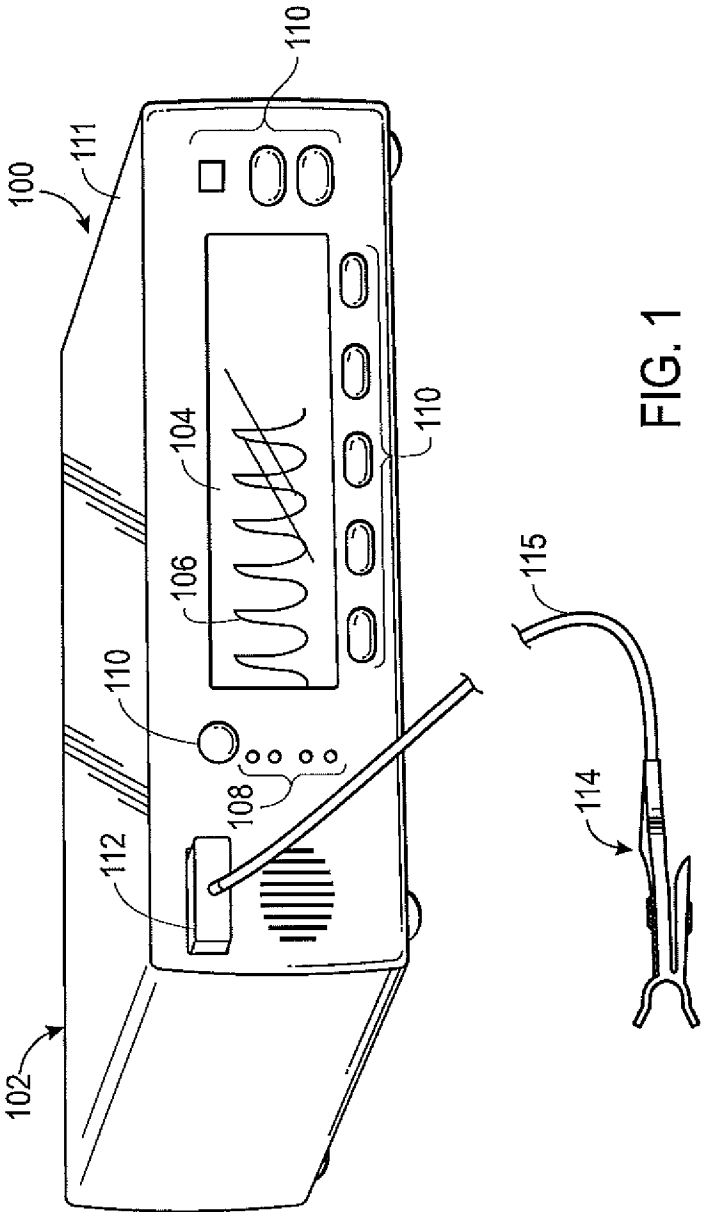


FIG. 1

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2/4

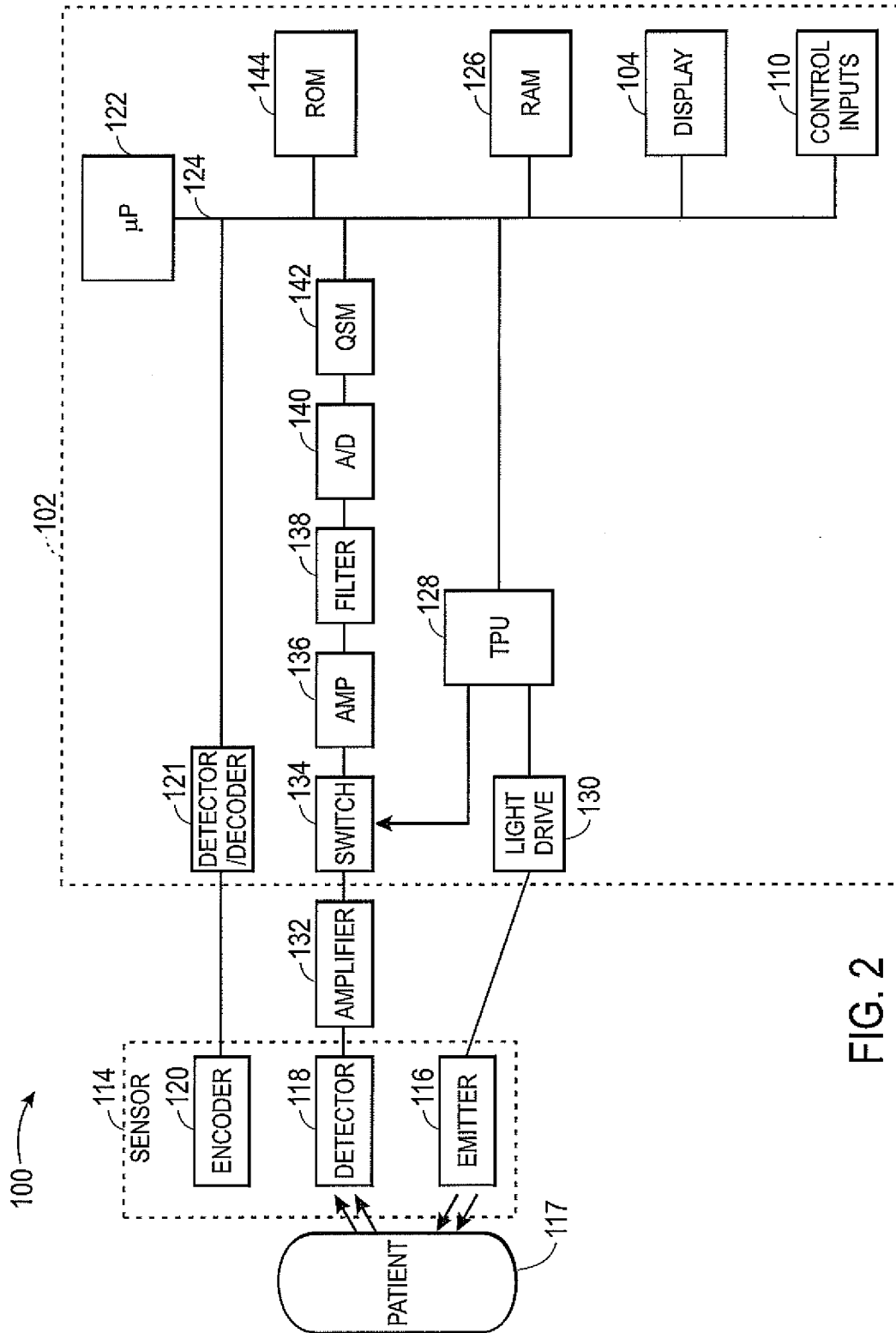


FIG. 2

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3/4

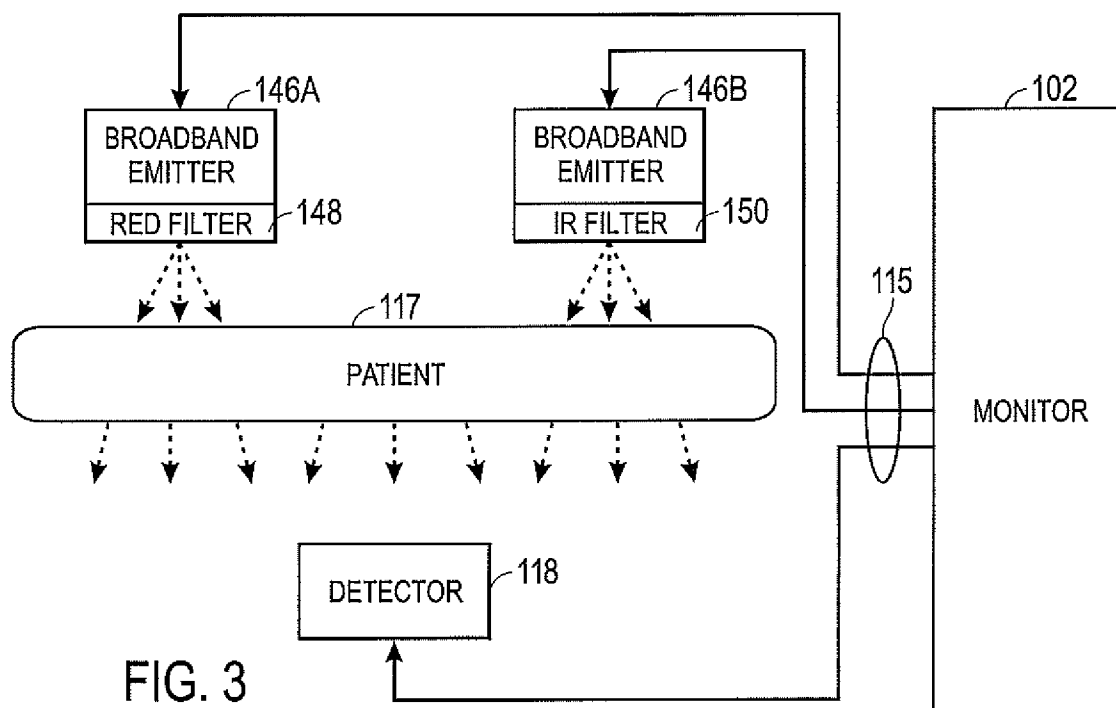


FIG. 3

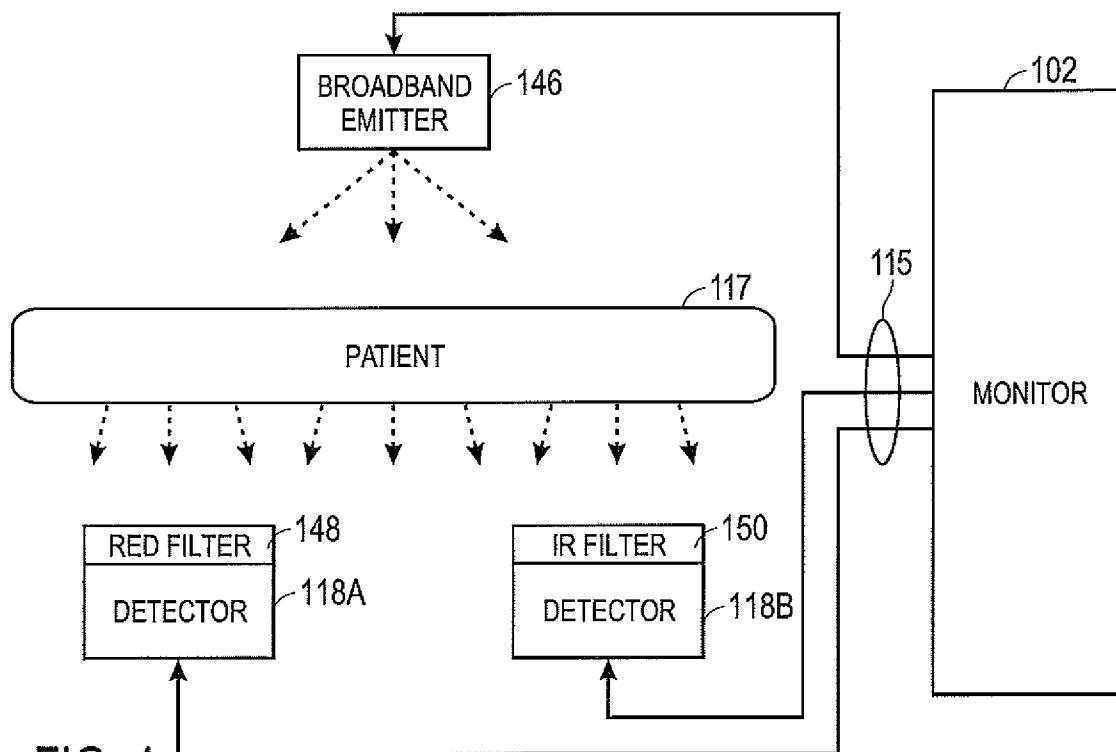


FIG. 4

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4/4

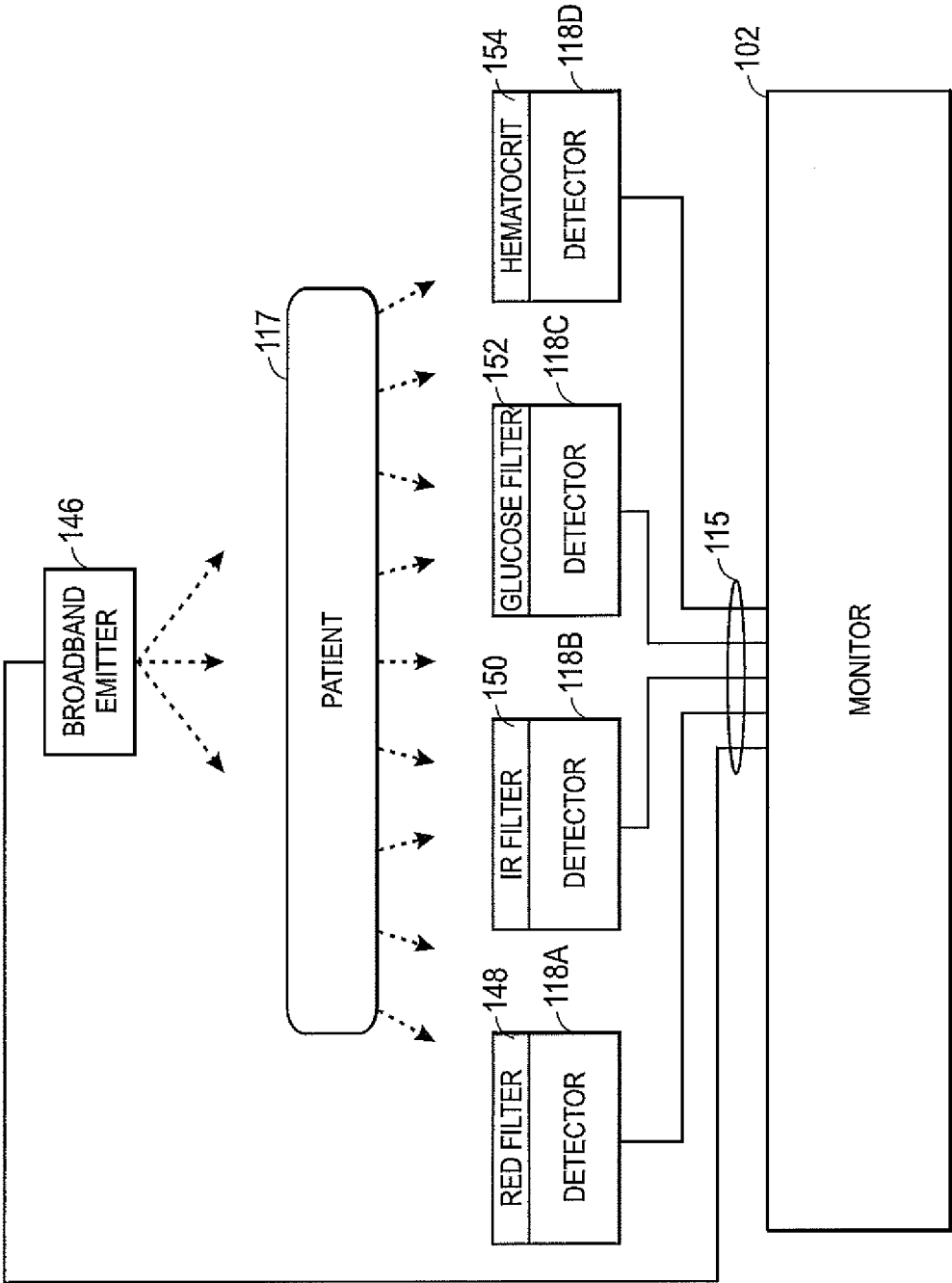


FIG. 5

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