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(54) **MODULAR PHYSIOLOGICAL SENSORS**

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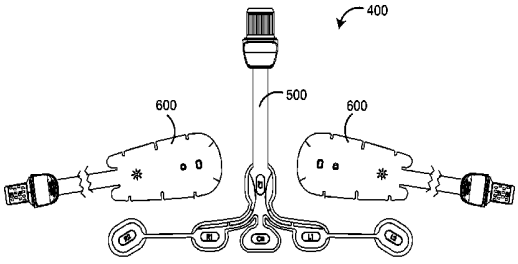
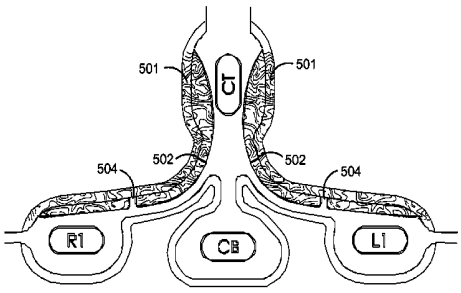
(57) **ABSTRACT**

Modular physiological sensors that are physically and/or electrically configured to share a measurement site for the comfort of the patient and/or to ensure proper operation of the sensors without interference from the other sensors. The modular aspect is realized by providing outer housing shapes that generally conform to other physiological sensors; mounting areas for attachment of one sensor to another sensor; providing release liners on the overlapping sensor attachment areas; and/or providing notches, tabs or other mechanical features that provide for the proper placement and interaction of the sensors.

22 Claims, 7 Drawing Sheets





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See application file for complete search history.

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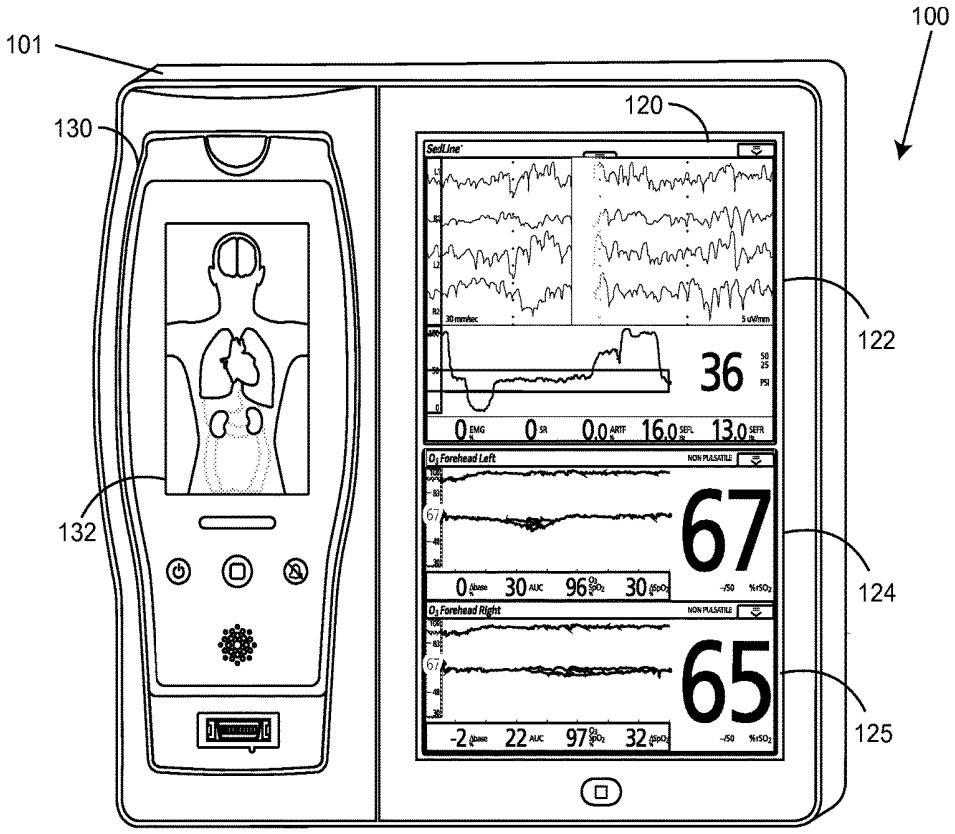
100
101
120
130
122
132
124
125
SedLine
36
67
65
O2 Forehead Left
O2 Forehead Right
NON PULSATILE

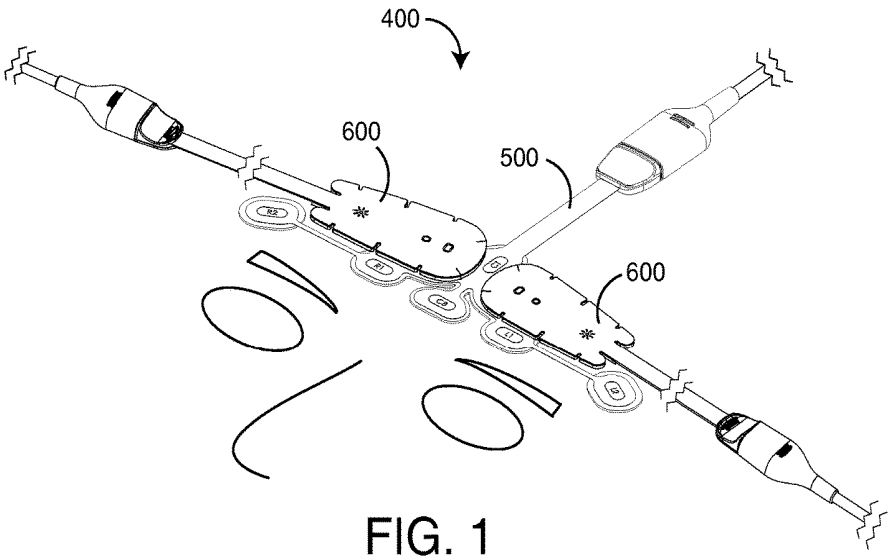
400
600
500
600

FIG. 1

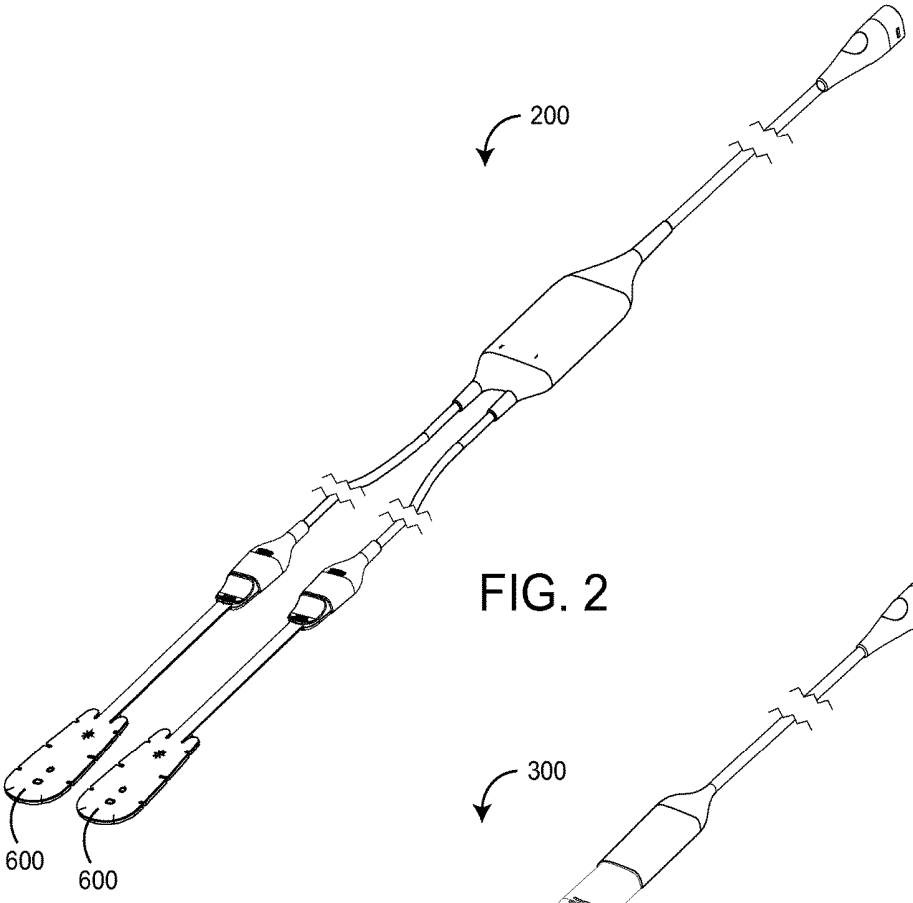

FIG. 2

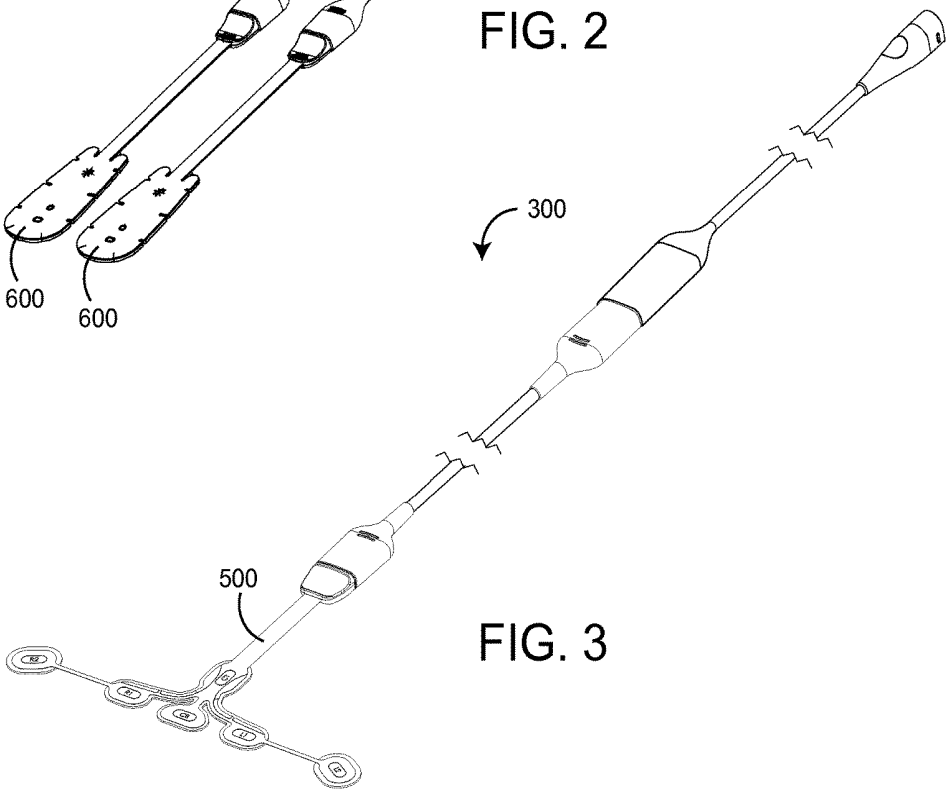

FIG. 3

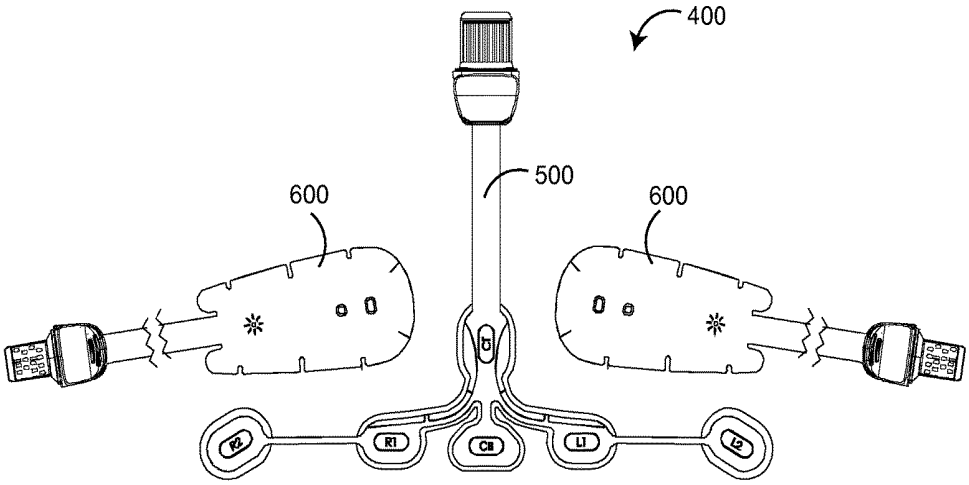

FIG. 4A

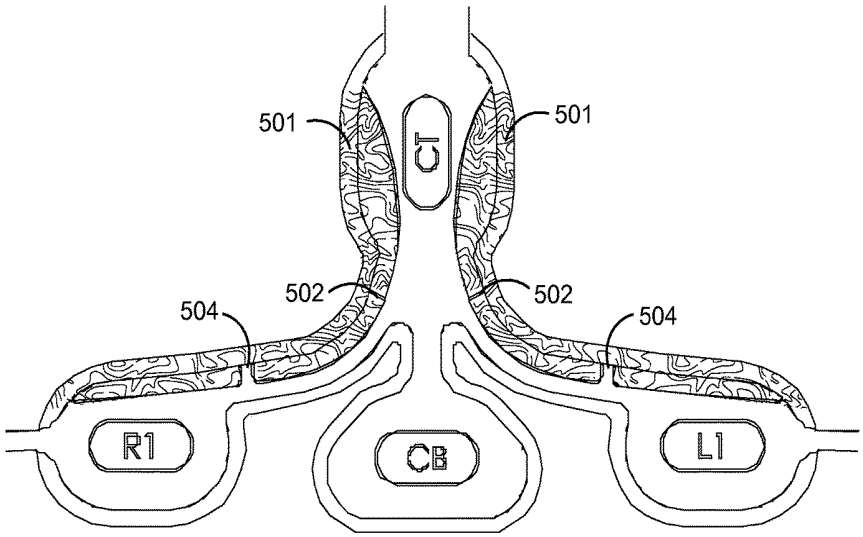

FIG. 4B

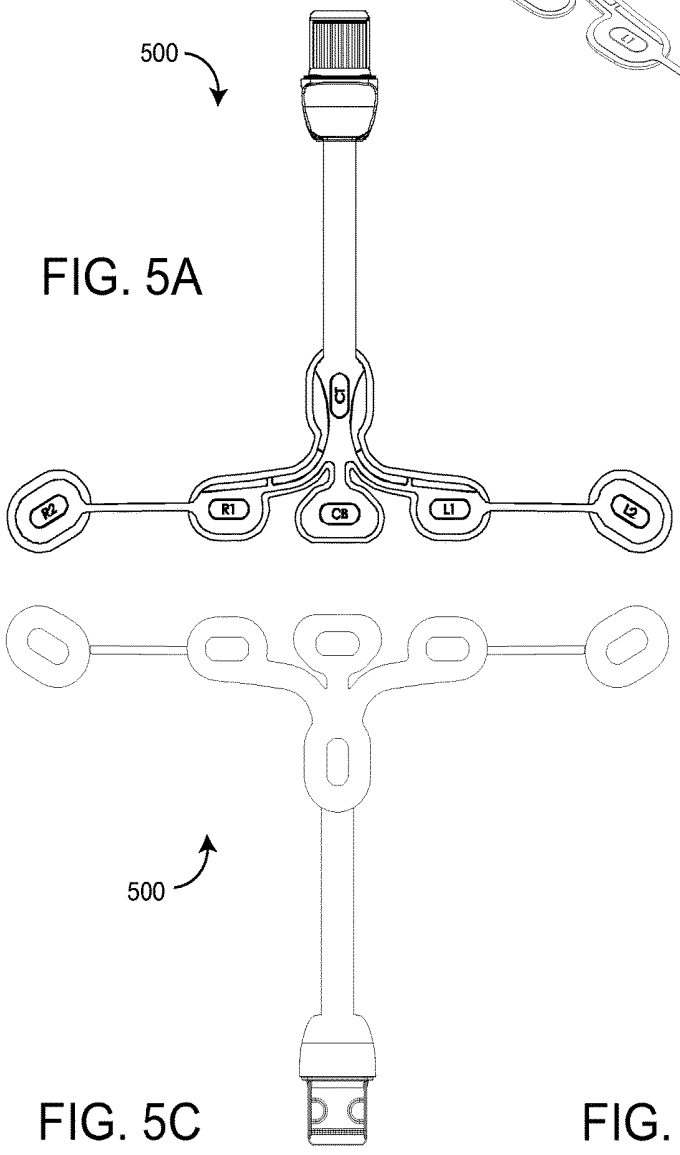

FIG. 5A

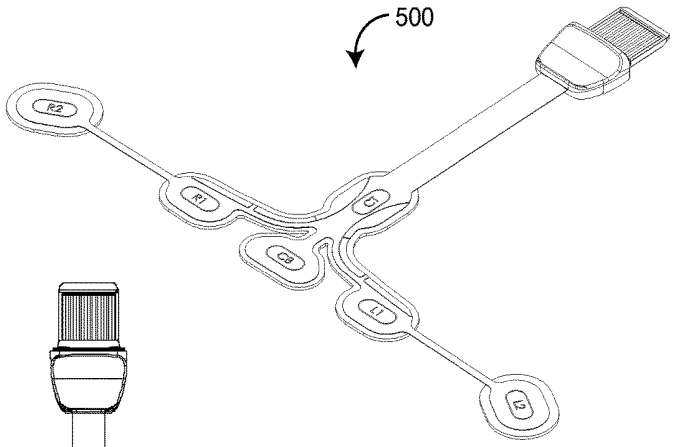

FIG. 5B

FIG. 5C

FIG. 5D

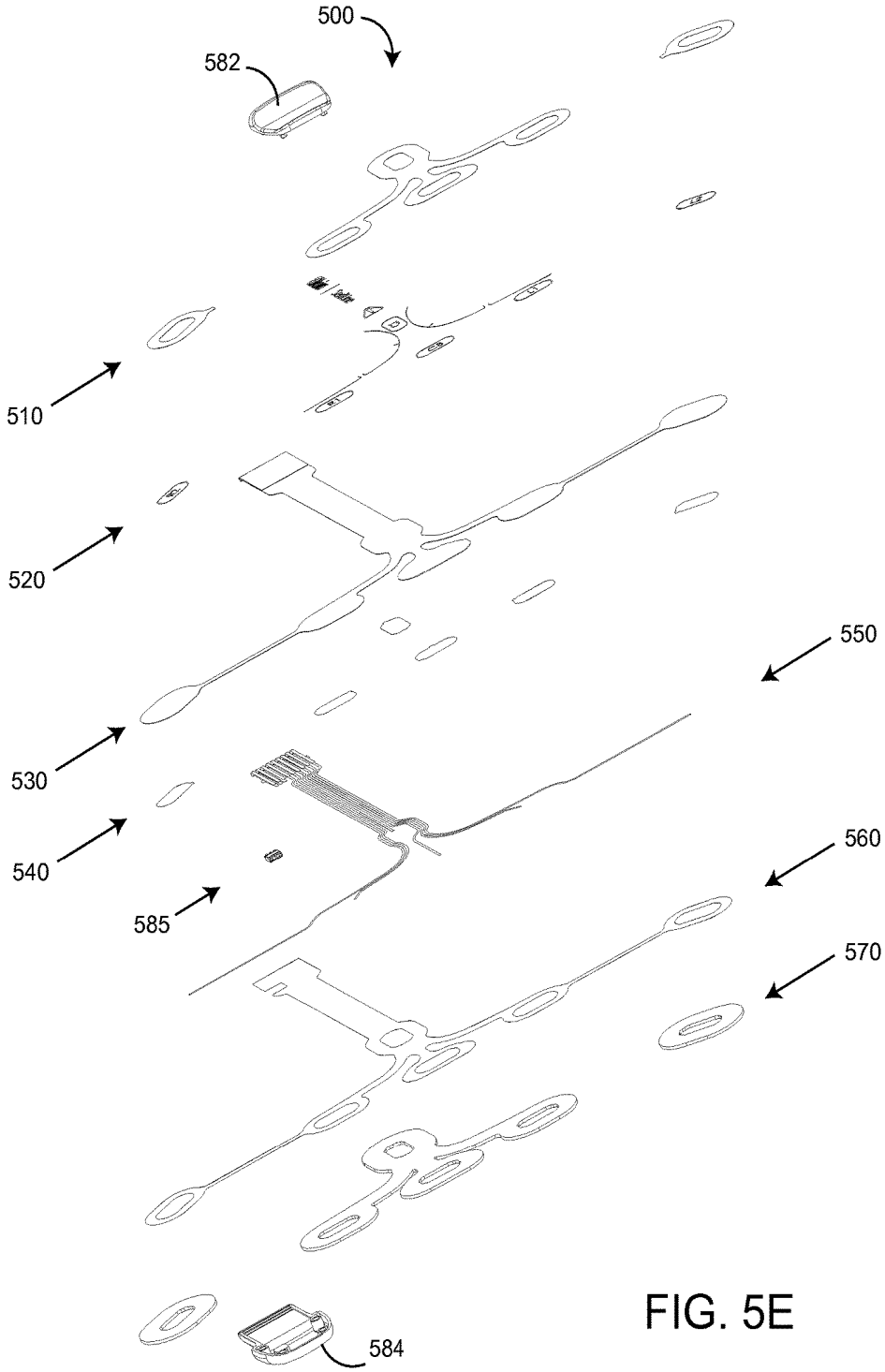

FIG. 5E

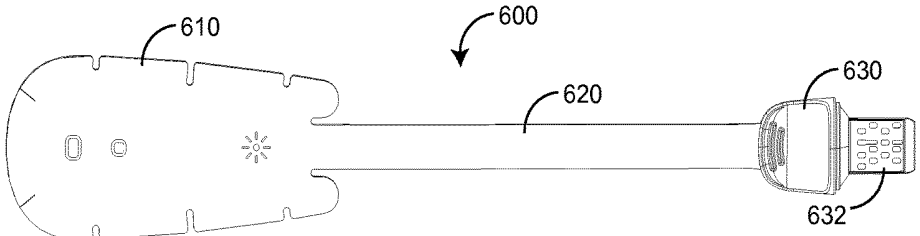

FIG. 6A

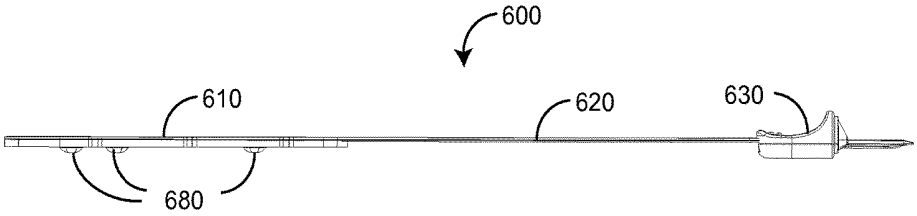

FIG. 6B

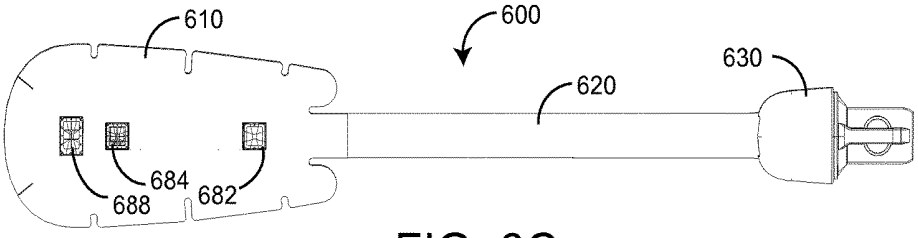

FIG. 6C

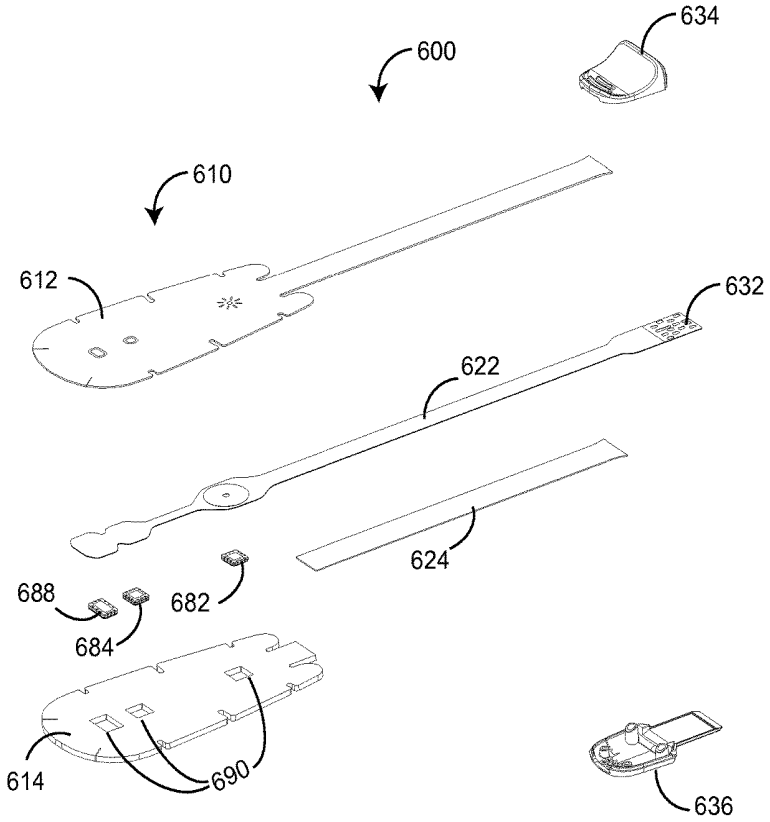

FIG. 6D

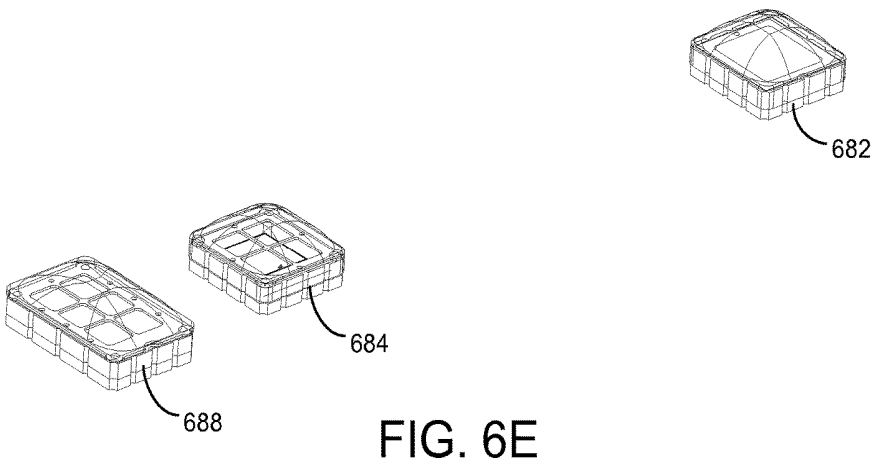

FIG. 6E

MODULAR PHYSIOLOGICAL SENSORS

INCORPORATION BY REFERENCE TO ANY PRIORITY APPLICATIONS

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

The present application claims priority benefit under 35 U.S.C. § 119(e) to U.S. Provisional Patent Application Ser. No. 62/061,132 filed Oct. 7, 2014, titled Regional Oximetry-EEG Sensor. The above-cited provisional patent application is hereby incorporated in its entirety by reference herein.

FIELD OF THE DISCLOSURE

The present disclosure relates to physiological sensors. More specifically, the present disclosure relates to configurations for modular physiological sensors.

BACKGROUND

Pulse oximetry is a widely accepted noninvasive procedure for measuring the oxygen saturation level of arterial blood, an indicator of a person's oxygen supply. A typical pulse oximetry system utilizes an optical sensor attached to a fingertip to measure the relative volume of oxygenated hemoglobin in pulsatile arterial blood flowing within the fingertip. Oxygen saturation (SpO2), pulse rate and a plethysmograph waveform, which is a visualization of pulsatile blood flow over time, are displayed on a monitor accordingly.

Conventional pulse oximetry assumes that arterial blood is the only pulsatile blood flow in the measurement site. During patient motion, venous blood also moves, which causes errors in conventional pulse oximetry. Advanced pulse oximetry processes the venous blood signal so as to report true arterial oxygen saturation and pulse rate under conditions of patient movement. Advanced pulse oximetry also functions under conditions of low perfusion (small signal amplitude), intense ambient light (artificial or sunlight) and electrosurgical instrument interference, which are scenarios where conventional pulse oximetry tends to fail.

Advanced pulse oximetry is described in at least U.S. Pat. Nos. 6,770,028; 6,658,276; 6,157,850; 6,002,952; 5,769,785 and 5,758,644, which are assigned to Masimo Corporation ("Masimo") of Irvine, Calif. and are incorporated in their entireties by reference herein. Corresponding low noise optical sensors are disclosed in at least U.S. Pat. Nos. 6,985,764; 6,813,511; 6,792,300; 6,256,523; 6,088,607; 5,782,757 and 5,638,818, which are also assigned to Masimo and are also incorporated in their entireties by reference herein. Advanced pulse oximetry systems including Masimo SET® low noise optical sensors and read through motion pulse oximetry monitors for measuring SpO2, pulse rate (PR) and perfusion index (PI) are available from Masimo. Optical sensors include any of Masimo LNOP®, LNCS®, SofTouch™ and Blue™ adhesive or reusable sensors. Pulse oximetry monitors include any of Masimo Rad 8®, Rad 5®, Rad®-5v or SatShare® monitors.

Advanced blood parameter measurement systems are described in at least U.S. Pat. No. 7,647,083, filed Mar. 1, 2006, titled Multiple Wavelength Sensor Equalization; U.S. Pat. No. 7,729,733, filed Mar. 1, 2006, titled Configurable Physiological Measurement System; U.S. Pat. Pub. No. 2006/0211925, filed Mar. 1, 2006, titled Physiological Parameter Confidence Measure and U.S. Pat. Pub. No. 2006/0238358, filed Mar. 1, 2006, titled Noninvasive Multi-Parameter Patient Monitor, all assigned to Cercacor Laboratories, Inc., Irvine, Calif. (Cercacor) and all incorporated in their entireties by reference herein. Advanced blood parameter measurement systems include Masimo Rainbow® SET, which provides measurements in addition to SpO2, such as total hemoglobin (SpHb™), oxygen content (SpOC™), methemoglobin (SpMet®), carboxyhemoglobin (SpCO®) and PVI®. Advanced blood parameter sensors include Masimo Rainbow® adhesive, ReSposable™ and reusable sensors. Advanced blood parameter monitors include Masimo Radical-7™, Rad-87™ and Rad-57™ monitors, all available from Masimo. Such advanced pulse oximeters, low noise sensors and advanced blood parameter systems have gained rapid acceptance in a wide variety of medical applications, including surgical wards, intensive care and neonatal units, general wards, home care, physical training, and virtually all types of monitoring scenarios.

SUMMARY

The present disclosure relates to modular physiological sensors. In some situations in the clinical environment, it is necessary to use multiple physiological sensors in the same general measurement site of a patient. For example, the forehead, arm, hand, ear, and noes are all common areas where multiple physiological sensors may be used at the same time. The present disclosure provides for modular physiological sensors that are physically and/or electrically configured to share the measurement site for the comfort of the patient and to ensure proper operation of the sensors without interference from other sensors. The modular aspect is realized by providing outer housing shapes that generally conform to other physiological sensors; mounting areas for attachment of one sensor to another sensor; providing release liners on the overlapping sensor attachment areas; and/or providing notches, tabs or other mechanical features that provide for the proper placement and interaction of the sensors.

For example, regional oximetry (rO2), also referred to as tissue oximetry and cerebral oximetry, enables the continuous assessment of tissue oxygenation beneath a regional oximetry optical sensor. Regional oximetry helps clinicians detect regional hypoxemia that pulse oximetry alone can miss. In addition, the pulse oximetry capability in regional oximetry sensors can automate a differential analysis of regional to central oxygen saturation. Regional oximetry monitoring is as simple as applying regional oximetry sensors to any of various body sites including the forehead, forearms, chest, upper thigh, upper calf or calf, to name a few. Up to four sensors are connected to a conventional patient monitor via one or two regional oximetry pods. The pods advantageously drive the sensor optics, receive the detected optical signals, perform signal processing on the detected signals to derive regional oximetry parameters and communicate those parameters to a conventional patient monitor through, for example, standard USB ports. Although much of the present disclosure is explained by way of example with respect to EEG and rO2 sensors, it is to be understood that the modular configurations of the sensors can be applied to other types of physiological sensors and are not limited to EEG and rO2 sensors.

In some embodiments, an EEG sensor is advantageously shaped and marked on either side of a connector stem so as to allow regional oximetry (rO2) sensors to be placed in close proximity to the EEG sensor and so as to guide the

proper placement of one or more rO2 sensors compactly next to the EEG sensor. The proper placement assistance and joint operation of the sensors provides for improved patient comfort and improved monitoring by ensuring the sensors do not interfere with each other. In some embodiments, the body shape of the EEG sensor is designed to the egg-shaped contours of the rO2 sensor heads. Further, markings on EEG contours correspond to notches on the rO2 sensor heads. These notches allow the rO2 sensor heads to conform to the curvature of a person's forehead. This integrated rO2-EEG sensor combination allows for measuring cerebral regional oximetry in conjunction with EEG parameters, such as depth of consciousness. The EEG sensor is applied first, as the EEG sensor electrodes have particular placement criteria. The EEG sensor markings, as described above, guide placement of the rO2 sensors, as these too require a particular placement for cerebral regional oximetry measurements. The EEG sensor skin-side is advantageously colored black so as to prevent the EEG sensor from reflecting the rO2 sensor-emitted light into the sensor detectors, which would degrade rO2 sensor performance.

In some embodiments, the rO2 sensors connect with a single rO2 pod and cable and the EEG sensor connects with a separate EEG pod and cable. In various other embodiments, a combination rO2-EEG sensor pod houses a single rO2 analog/digital signal processing board and a single EEG signal processing board and the rO2-EEG sensors each connect to the single rO2-EEG sensor pod.

One aspect of a brain analysis sensor is an EEG sensor having a stem, a left branch and a right branch. The left branch and the right branch extend generally perpendicularly from the stem so as to form a branch intersection. A plurality of right and left active electrodes are disposed along the left branch and the right branch. A ground electrode and reference electrode are disposed proximate the branch intersection. A mounting zone is disposed proximate the branch intersection for removable attachment of at least one regional oximetry (rO2) sensor.

In various embodiments, the mounting zone accommodates a regional oximetry sensor head having light emitting and light detecting elements. The mounting zone is marked with a curved line generally indicating a shape of the regional oximetry sensor head. The mounting zone comprises a release layer so that the regional oximetry sensor head removably attaches to the mounting zone. The regional oximetry sensor head has notches that accommodate a curved surface and the mounting zone has notch markings that generally align with the sensor head notches so as to aid regional oximetry sensor placement. The mounting zone is configured to removably attach two regional oximetry sensor heads. A first regional oximetry sensor head is mounted proximate a EEG sensor left branch and a second regional oximetry sensor head is mounted proximate a EEG sensor right branch.

Another aspect of a brain analysis sensor is a sensor method comprising mounting an EEG sensor on a forehead tissue site, mounting a first regional oximetry sensor on the forehead tissue site so as to at least partially overlap a first portion of the EEG sensor and mounting a second regional oximetry sensor on the forehead tissue site so as to at least partially overlap a second portion of the EEG sensor.

In various embodiments, the first portion and the second portion of the EEG sensor are marked for placement of the first and second regional oximetry sensors. A release liner is disposed on the first portion and the second portion for aiding removal of the regional oximetry sensors. The shape of the marked portions conform to shape of the regional oximetry sensors. The marked portions also designate the location of notches on head portions of the regional oximetry sensors.

A further aspect of a brain analysis sensor is an electrical sensor means for passively measuring an EEG signal, an optical sensor means for detecting an oxygen saturation and a placement means for at least partial overlapping the electrical sensor means and the optical sensor means on a tissue site. In an embodiment, the placement means comprises a marking means for designating the partial overlapping. In an embodiment, the marking means comprises at least a partial duplication of the optical sensor means shape on the electrical sensor means.

Regional oximetry sensors and pods are disclosed in U.S. patent application Ser. No. 14/507,620, titled Regional Oximetry Sensor, filed Oct. 6, 2014 by Masimo Corporation, Irvine, Calif. and incorporated in its entirety by reference herein. An EEG sensor and monitor are disclosed in U.S. patent application Ser. No. 14/470,819, titled Depth of Consciousness Monitor, filed Aug. 27, 2014 by Masimo Corporation, Irvine, Calif. and incorporated in its entirety by reference herein.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a brain analysis system having an advantageous modular brain analysis sensor applied to a forehead site and in communications with a physiological monitor for generating simultaneous electroencephalogram (EEG) and left and right forehead regional oximetry (rO2) parameter values and waveforms;

FIGS. **2-3** are perspective views, respectively, of a regional oximetry (rO2) sensor and cable assembly and an EEG sensor and cable assembly;

FIGS. **4**A-B are an exploded plan view (FIG. **4**A) and a detailed plan view (FIG. **4**B), respectively, of a modular brain analysis sensor having an advantageous keyed mounting zone (shaded) for precise, overlaid placement of dual rO2 sensors on an rO2-configured EEG sensor;

FIGS. **5**A-E are top, perspective, bottom, side and exploded perspective views, respectively, of an rO2-configured EEG sensor; and

FIGS. **6**A-E are top, side, bottom and exploded top perspective views, respectively, of a rO2 sensor and an enlarged perspective view of rO2 sensor optical elements.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. **1** illustrates a brain analysis system **100** having an advantageous modular brain analysis sensor **400** applied to a forehead tissue site in communications with a physiological monitor **101** for measuring and generating simultaneous electroencephalogram (EEG) and left and right forehead regional oximetry (rO2) parameter values and waveforms. The modular brain analysis sensor **400** can be advantageously assembled and placed within a limited-area forehead site. Also, the rO2 components **600** and EEG component **500** can be advantageously purchased, stocked and used separately and individually, saving hospital and medical care center costs over other, more specialized brain analysis sensors not having separately useable regional oximetry and EEG sensor functions. The same cost savings is realized by modular designs for any and all types of physiological monitoring sensors.

As shown in FIG. **1**, the brain analysis sensor **400** has an EEG sensor (FIGS. **4-5**) that co-mounts dual regional oxi-

metry (rO2) sensors. Each of these sensor functions are in communications with a physiological monitor **101** having a main display **120** and a (removable) handheld monitor **130** having a handheld display **132**. The main display **120** provides EEG waveforms and parameter values **122** in addition to forehead left **124** and forehead right **125** regional oximeter waveforms and parameters. The handheld display **132** provides a 3-D man graphic displaying green, yellow and red organ symbols (brain, lung and kidneys) corresponding to EEG and/or rO2 parameter values. Similar displays can be provided for other physiological parameters as well.

Also shown in FIG. **1**, a modular brain analysis sensor **400** advantageously has dual rO2 sensors **600** that overlap right- and left-side portions of a specially-configured and marked (rO2-configured) EEG sensor **500** so as to compactly fit these modular sensors **500**, **600** within a limited-space forehead site, as described in detail with respect to FIGS. **2-4**, below. An rO2-configured EEG sensor **500** is described in detail with respect to FIGS. **5**A-E, below. An regional oximetry sensor **600** is described in detail with respect to FIGS. **6**A-E, below.

Further shown in FIG. **1**, in an EEG screen portion **122**, the physiological monitor **101** display **120** shows **4** simultaneous EEG channels along with a patient state index (PSI) readout versus time so as to enable continuous assessment of both sides of the brain, such as for improved anesthetic management. In addition, forehead left **124** and forehead right **125** regional oximetry waveforms and readouts enable monitoring of brain tissue oxygen saturation and detect regional hypoxemia.

FIGS. **2-3** illustrate, respectively, a regional oximetry (rO2) sensor and cable assembly and an EEG sensor and cable assembly. As shown in FIG. **2**, the regional oximetry (rO2) cable assembly **200** interconnects dual rO2 sensors **600** to a physiological monitor **101** (FIG. **1**). The rO2 cable assembly has dual sensor connectors at a sensor end, a monitor connector (MOC9) at a monitor end and a rO2 pod mounted between and in communications with the sensor connectors and the monitor connector. Also shown in FIG. **2**, the rO2 pod has regional oximetry analog and digital boards. The analog board communicates with one or more of the regional oximetry sensors **600**. The digital board enables the pod to perform the sensor communications and signal processing functions of a conventional patient monitor. This allows pod-derived regional oximetry parameters to be displayed on a variety of monitors ranging from simple display devices to complex multiple parameter patient monitoring systems.

As shown in FIG. **3**, the EEG cable assembly **300** interconnects an EEG sensor **500** to a physiological monitor **101** (FIG. **1**). The EEG cable assembly **300** has an EEG connector at a sensor end, a monitor connector (MOC9) at a monitor end and a EEG pod mounted between and in communications with the sensor connectors and the monitor connector.

FIGS. **4**A-B illustrate a modular brain analysis sensor **400** having advantageous keyed mounting zones **501** (shaded) for precise, overlaid placement of dual rO2 sensors on an EEG sensor. In particular, the EEG sensor **500** has two mounting zones **501**, one on either side of the interconnected between the EEG electrodes and the EEG sensor connector. Each mounting zone accommodates one of two rO2 sensors (see FIG. **1** and FIG. **4**A). Further, each mounting zone **501** (FIG. **4**B) is shaped and printed to conform to a top and side portion of an rO2 sensor head **610** (FIGS. **6**A-D). Further, each mounting zone has printed notches **502**, **504** corresponding to actual notches in the rO2 sensor heads **610** (FIG. **6**A) that accommodate curved tissue site surfaces. These printed notches **502**, **504** further aid in the alignment of rO2 sensors to the mounting zones **501**.

FIGS. **5**A-E further illustrate an rO2 configured EEG sensor **500** having a generally "T" shape with six electrodes including two right electrodes R**1**, R**2**; two left electrodes L**1**, L**2**; a ground electrode CB and a reference electrode CT. As shown in FIG. **5**A, the R**1**, R**2**, L**1**, L**2** and CB electrodes are disposed across the horizontal top of the "T." The reference electrode CT is disposed on the vertical middle of the "T." The advantageous mounting zone **501** (FIG. **4**B) is disposed on either side of the vertical middle of the "T" proximate the horizontal top of the "T."

As shown in FIG. **5**E, the EEG sensor **500** has multiple layers including a release liner **510** that allows an attached rO2 sensor **600** (FIG. **1**) to be removed and repositioned; artwork **520** including rO2 sensor positioning lines **502** (FIG. **4**B); a polyester substrate **530**; silver pads **540** (electrodes); silver ink traces **550**; a dielectric layer **560** that isolates and protects the traces **550** and a foam pad **570** that contacts a user's skin. The EEG sensor connector includes a top shell **582** and a bottom shell **584**. An information element **585** mechanically and electrically connects to the trace layer **550**.

FIGS. **6**A-E further illustrate a rO2 sensor and its optical elements having a sensor head **610**, a stem **620** and a connector **630**. The sensor head **610** houses an emitter **682**, a near-field detector **684** and a far-field detector **688** within a layered tape having a top side (FIG. **6**A) and an adhesive bottom side (FIG. **6**C) disposed on a release liner. The release liner is removed so as to adhere the bottom side to a skin surface. The emitter **682** and detectors **684**,**688** have lens that protrude from the bottom side (FIG. **6**E) advantageously providing a robust optics-skin interface. The top side has printed emitter/detector indicators so as to aid precise sensor placement on a patient site. A connector **630** terminates the interconnect **620** at the connector contacts **632**.

Also shown in FIG. **6**D, a sensor head assembly **610** has a face tape **612**, a flex circuit **622**, a stem tape **620**, a base tape **624**, a connector top **634** and a connector base **636**. The face tape **612** and base tape **622** encase the flex circuit **622** and corresponding emitter and detectors **682-688**.

A modular physiological sensor 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 this disclosure and the claims herein. One of ordinary skill in art will appreciate many variations and modifications. It should be understood specifically that the present mounting zones, tabs, relative shapes and modular configuration can be applied to other physiological sensors including, for example, ear, nose, hand, harm, and/or chest sensors or any other types of physiological sensors where the sensors are configured to jointly measure the same measurement site of a patient.

What is claimed is:

1. A modular physiological sensor comprising:

an electroencephalogram (EEG) sensor comprising a stem, a left branch and a right branch;

the left branch and the right branch extending generally perpendicularly from the stem so as to form a branch intersection, wherein the branch intersection includes a left corner defined by an intersection of the left branch and the stem of the EEG sensor and a right corner defined by an intersection of the right branch and the stem of the EEG sensor;

a plurality of EEG electrodes disposed along the left branch and the right branch;

a ground electrode and a reference electrode disposed proximate the branch intersection;

a first mounting zone extending outwardly along an edge of the left corner of the branch intersection and configured for removable attachment of a first regional oximetry (rO2) sensor, said first rO2 sensor comprising a first edge including a first outline shape; and

a second mounting zone extending outwardly along an edge of the right corner of the branch intersection and configured for removable attachment of a second rO2 sensor, said second rO2 sensor comprising a second edge including a second outline shape;

wherein the first mounting zone is shaped to match at least a portion of said first outline shape; and

wherein the second mounting zone is shaped to match at least a portion of said second outline shape.

2. The modular physiological sensor according to claim **1**, wherein the first mounting zone accommodates a first rO2 sensor head having a first pair of light emitting and light detecting elements and the second mounting zone accommodates a second rO2 sensor head having a second pair of light emitting and light detecting elements.

3. The modular physiological sensor according to claim **2**, wherein the first mounting zone is marked with a first curved line generally indicating a first shape of the first rO2 sensor head, and wherein the second mounting zone is marked with a second curved line generally indicating a second shape of the second rO2 sensor head.

4. The modular physiological sensor according to claim **3**, wherein the first mounting zone comprises a first release layer so that the first rO2 sensor head removably attaches to the first mounting zone, and wherein the second mounting zone comprises a second release layer so that the second rO2 sensor head removably attaches to the second mounting zone.

5. The modular physiological sensor according to claim **4**, wherein:

the first rO2 sensor head has a first plurality of notches that accommodate a first curved surface and the second rO2 sensor head has a second plurality of notches that accommodate a second curved surface;

the first mounting zone has a first plurality of notch markings that generally align with the first plurality of notches so as to aid placement of the first rO2 sensor and the second mounting zone has a second plurality of notch markings that generally align with the second plurality of notches so as to aid placement of the second rO2 sensor.

6. The modular physiological sensor according to claim **2**, wherein a skin-side surface of the EEG sensor is colored black so as to prevent the EEG sensor from reflecting light emitted from the first and second rO2 sensor heads.

7. The modular physiological sensor according to claim **2**, wherein the first and second rO2 sensor heads are egg-shaped.

8. A brain analysis sensing method comprising:

mounting an electroencephalogram (EEG) sensor on a forehead tissue site, the EEG sensor including a stem, a left branch, and a right branch, wherein the left branch and the right branch extend generally perpendicularly from the stem so as to form a branch intersection, the branch intersection including a left corner defined by the intersection of the left branch and the stem of the EEG sensor and a right corner defined by the intersection of the right branch and the stem of the EEG sensor;

mounting a first regional oximetry sensor on the forehead tissue site so as to at least partially overlap a first portion of the EEG sensor, the first portion extending outwardly along an edge of the left corner of the branch intersection, the first regional oximetry sensor comprising a first edge including a first outline shape; and

mounting a second regional oximetry sensor on the forehead tissue site so as to at least partially overlap a second portion of the EEG sensor, the second portion extending outwardly along an edge of the right corner of the branch intersection, the second regional oximetry sensor comprising a second edge including a second outline shape;

wherein the first portion of the EEG sensor is shaped to match at least a portion of said first outline shape; and

wherein the second portion of the EEG sensor is shaped to match at least a portion of said second outline shape.

9. The brain analysis sensing method according to claim **8**, further comprising marking the first portion and the second portion on the EEG sensor for placement of the first and second regional oximetry sensors.

10. The brain analysis sensing method according to claim **9**, further comprising providing a release liner on the first portion and the second portion for aiding removal of the regional oximetry sensors.

11. The brain analysis sensing method according to claim **10**, wherein the first and second regional oximetry sensors are egg-shaped.

12. The brain analysis sensing method according to claim **11**, further comprising indicating on the marked first portion and the marked second portion the location of notches on head portions of the regional oximetry sensors.

13. A brain analysis sensor comprising:

an electrical sensor configured to passively measure an EEG signal, the electrical sensor comprising a generally T shape including a first mounting zone positioned along an edge of a left side of a vertical middle of the T shape and a second mounting zone positioned along an edge of a right side of the vertical middle of the T shape;

an optical sensor configured to detect an oxygen saturation; and

a placement guide configured to aid with the partial overlapping of a first portion of the optical sensor having a first outline shape atop either the first mounting zone or the second mounting zone of the electrical sensor, wherein at least one of the first mounting zone and the second mounting zone is shaped to match at least a portion of said first outline shape; and

wherein a second portion of the optical sensor is configured to attach to a skin surface.

14. The brain analysis sensor according to claim **13**, wherein the placement guide comprises a marking configured to designate the partial overlapping.

15. The brain analysis sensor according to claim **14**, wherein the marking comprises at least a partial duplication of the optical sensor shape on the electrical sensor.

16. The modular physiological sensor according to claim **13**, wherein the optical sensor is egg-shaped.

17. A modular physiological sensor comprising:

a first electronics useful for measuring a first physiological parameter;

a mounting system configured to mount the first electronics to a patient measurement site, wherein the mounting system comprises a stem, a left branch, and a right branch, the left branch and the right branch extending

in opposite directions along a transverse axis generally perpendicular to a longitudinal axis running along a centerline of the stem; and

a first mounting zone on the mounting system located on a left side of the stem of the mounting system, the first mounting zone extending away from an edge of the left branch in a first direction substantially parallel to the longitudinal axis of the stem and extending away from an edge of the stem in a second direction substantially parallel to the transverse axis, wherein the first mounting zone is shaped and physically configured to receive and position a first outline shape of a first physiological sensor; and

a second mounting zone on the mounting system located on a right side of the stem of the mounting system, the second mounting zone extending away from an edge of the right branch in a third direction substantially parallel to the longitudinal axis of the stem and extending away from an edge of the stem in a fourth direction substantially parallel to the transverse axis, wherein the second mounting zone is shaped and physically configured to receive and position a second outline shape of a second physiological sensor.

18. The modular physiological sensor according to claim **17**, wherein the first and second physiological sensors comprise electronics that are different from the first electronics, and wherein the first and second physiological sensors are configured for measuring a physiological parameter different from the first physiological parameter.

19. The modular physiological sensor according to claim **17**, wherein at least one of the first and second mounting zones are marked with a line generally indicating the first outline shape of the first physiological sensor or the second outline shape of the second physiological sensor.

20. The modular physiological sensor according to claim **17**, wherein the first and second mounting zones each comprise a release layer so that the first and second physiological sensors removably attach to the first and second mounting zones.

21. The modular physiological sensor according to claim **17**, wherein:

the first physiological sensor includes a first plurality of notches and the second physiological sensor includes a second plurality of notches; and

the first mounting zone includes a first plurality of notch markings that generally align with the first plurality of notches in order to aid sensor placement, and the second mounting zone includes a second plurality of notch markings that generally align with the second plurality of notch markings in order to aid sensor placement.

22. The modular physiological sensor according to claim **17**, wherein the first and second physiological sensors are egg-shaped.

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专利名称(译)	模块化生理传感器		
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申请号	US14/876307	申请日	2015-10-06
[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 FORREST KEVIN		
发明人	AL-ALI, AMMAR FORREST, KEVIN		
IPC分类号	A61B5/00 A61B5/0478 A61B5/0476 A61B5/1455		
CPC分类号	A61B5/6814 A61B5/0476 A61B5/0478 A61B5/1455 A61B5/14553 A61B5/6833 A61B5/684 A61B2562/16 A61B2560/0443 A61B2562/04 A61B2562/06		
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摘要(译)

模块化生理传感器，其物理地和/或电气地配置成共享测量部位以使患者感到舒适和/或确保传感器的正确操作而不受其他传感器的干扰。通过提供通常与其他生理传感器一致的外壳形状来实现模块化方面;用于将一个传感器连接到另一个传感器的安装区域在重叠的传感器连接区域上提供释放衬垫;和/或提供凹口，突片或其他机械特征，其提供传感器的适当放置和相互作用。