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(54) **SYSTEM AND METHOD FOR GENERATING  
CUSTOMIZABLE AUDIBLE BEEP TONES  
AND ALARMS**

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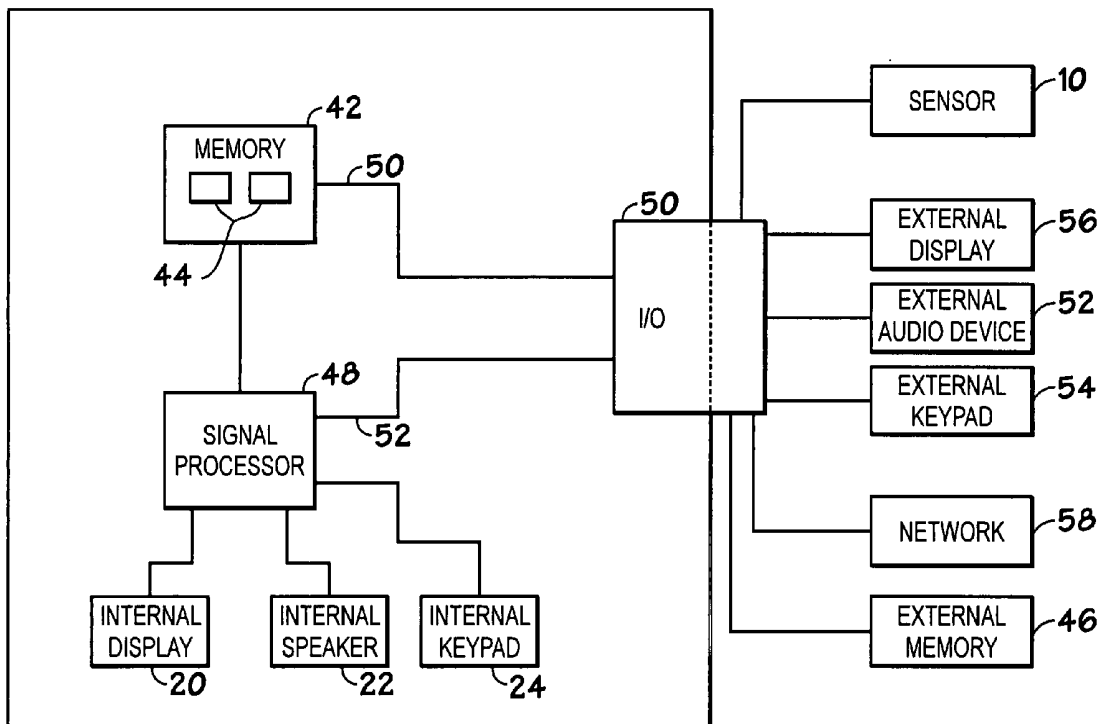
(57) **ABSTRACT**

A pulse oximetry system adapted to obtain physiological data. The pulse oximetry system is adapted to store one or more digital audio files on one or more memory media in communication with a patient monitoring system. The pulse oximetry system is adapted to process the one or more digital audio files and to generate an audio signal in response to the physiological data.

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12 →



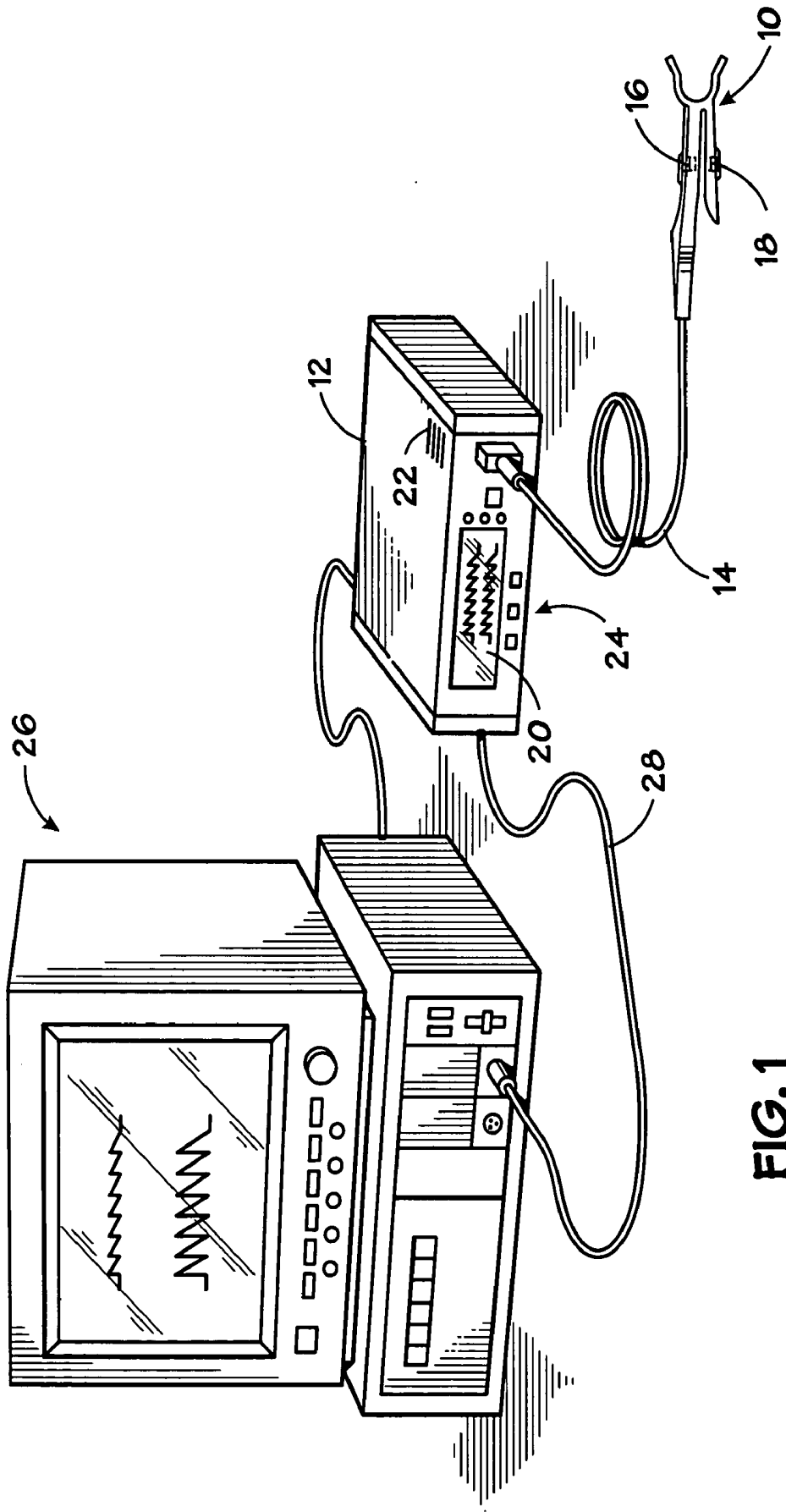


FIG. 1

12 →

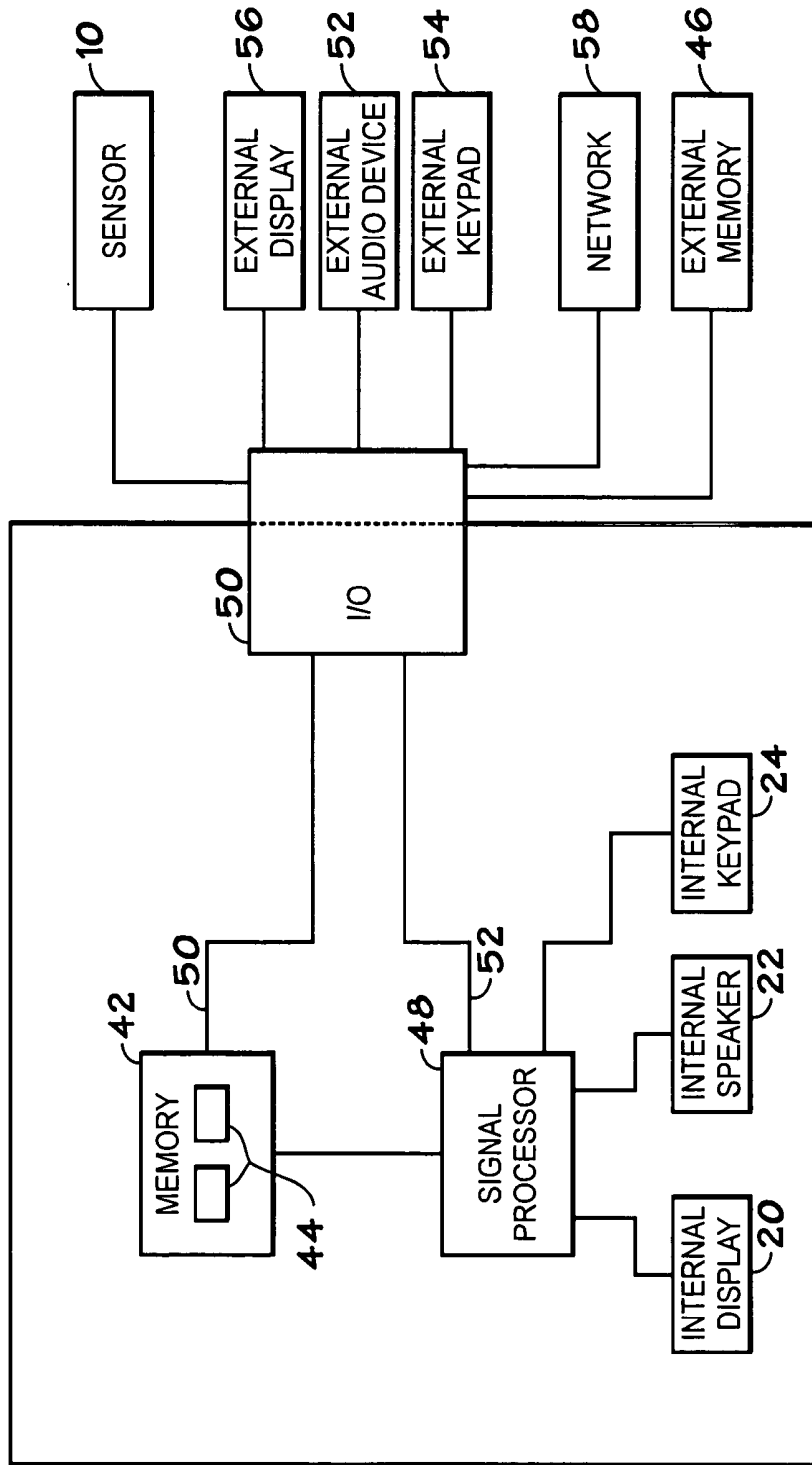


FIG. 2

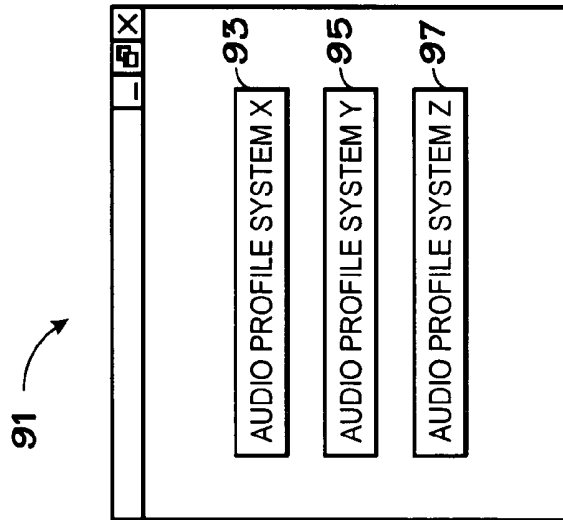
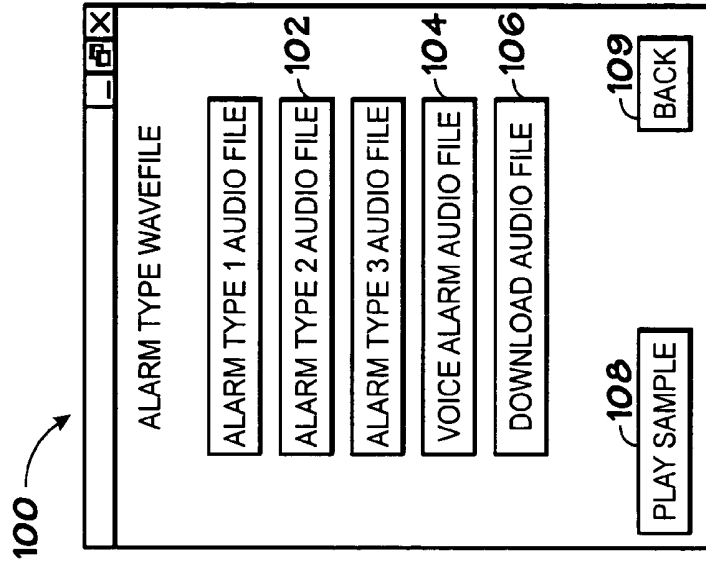


FIG. 3B

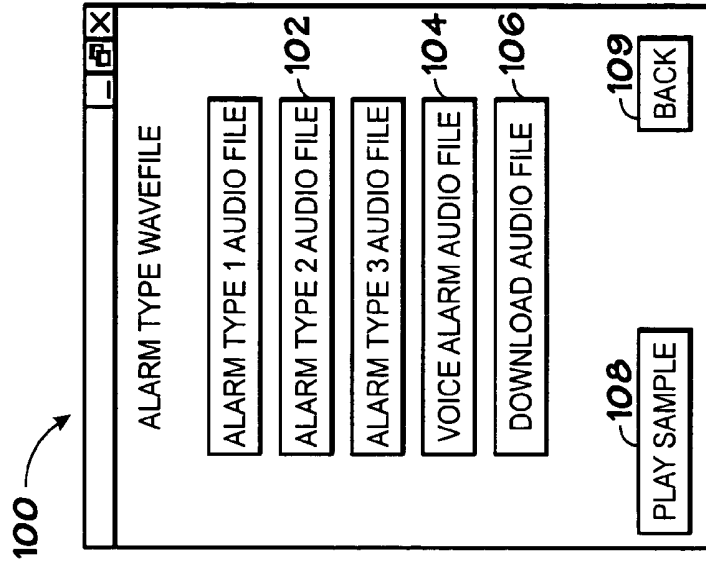


FIG. 3C

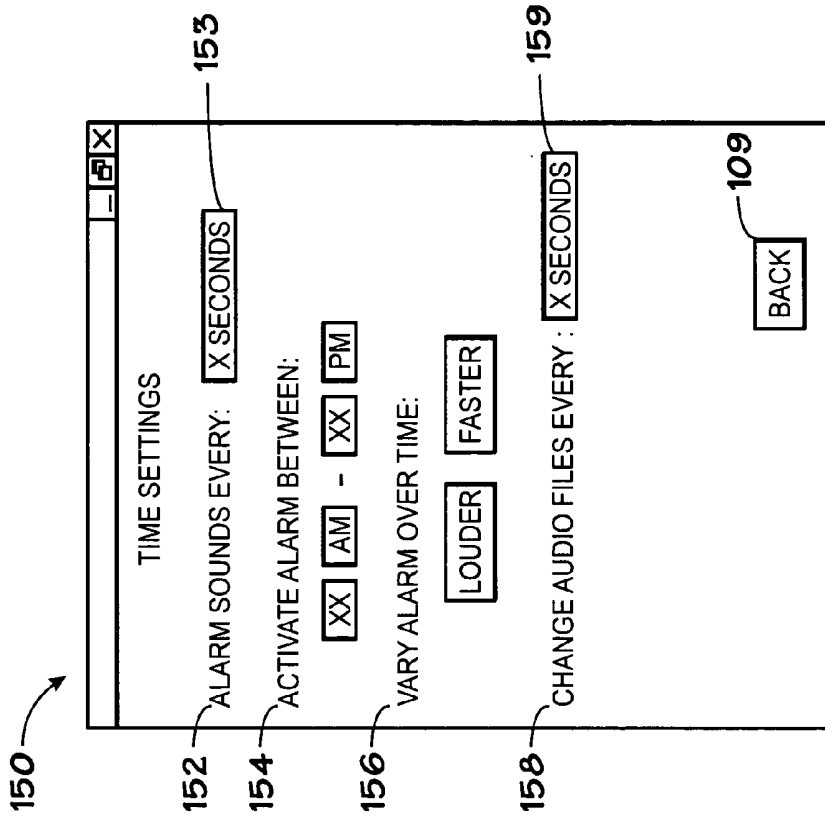


FIG. 3E

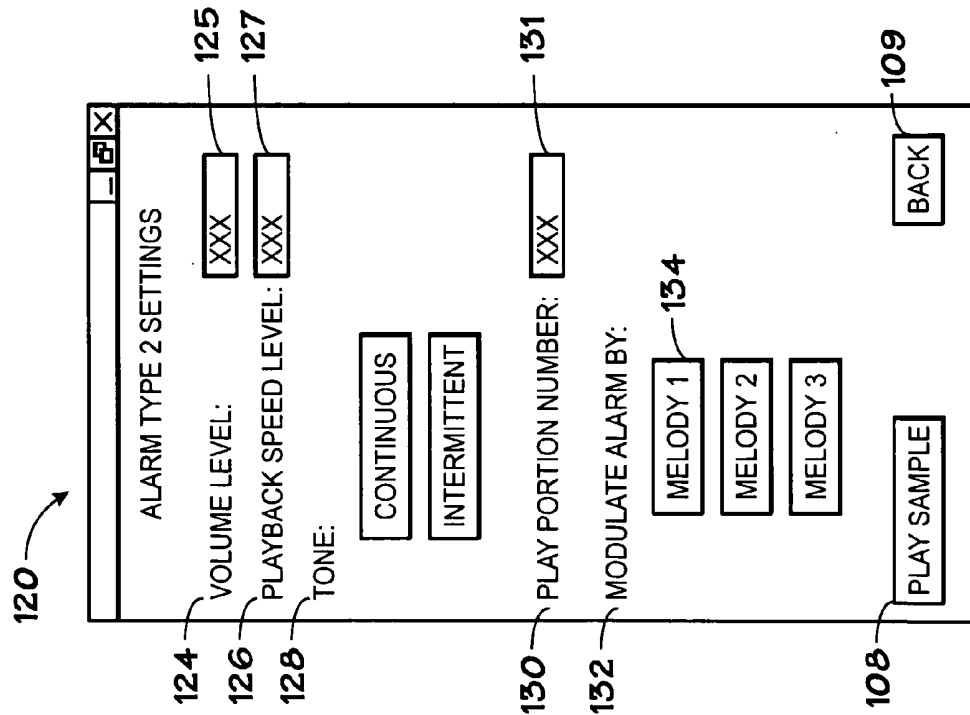


FIG. 3D

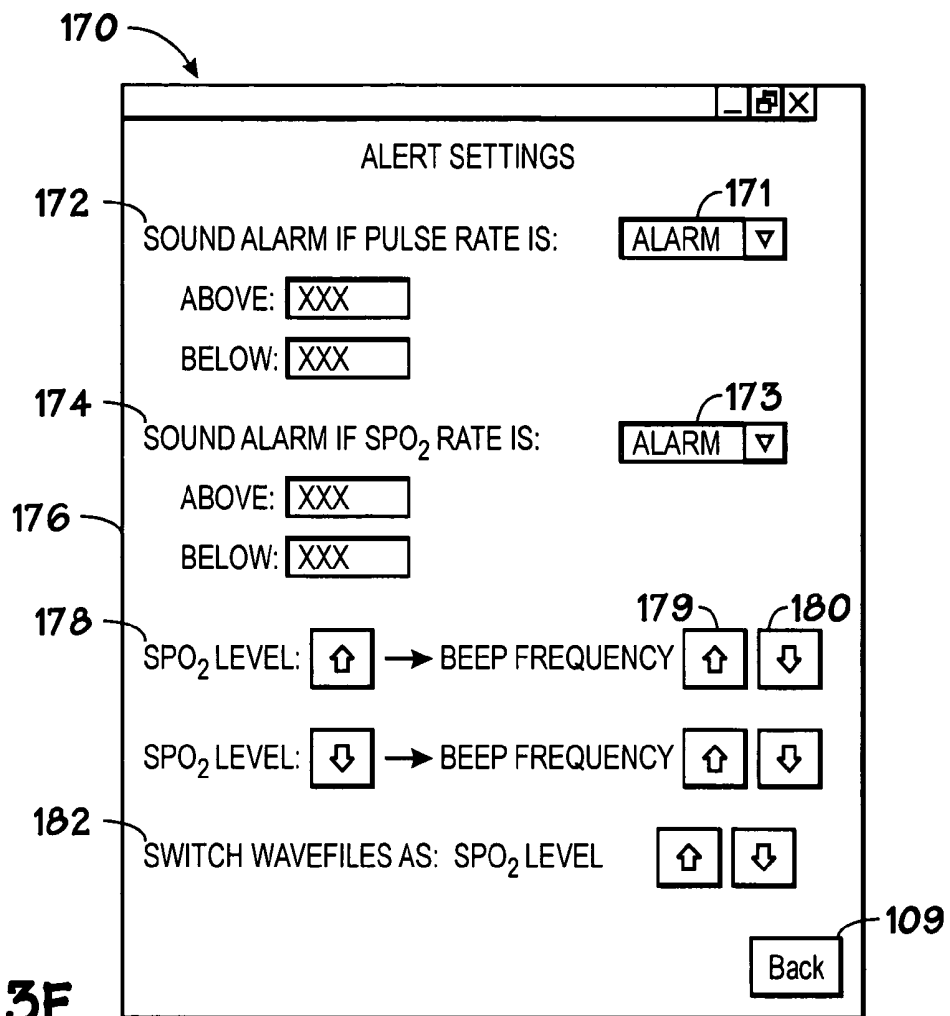


FIG. 3F

## SYSTEM AND METHOD FOR GENERATING CUSTOMIZABLE AUDIBLE BEEP TONES AND ALARMS

### BACKGROUND OF THE INVENTION

#### [0001] 1. Field of The Invention

[0002] The present invention relates generally to pulse oximetry, and more particularly to tones and alarms generated by pulse oximetry systems.

#### [0003] 2. Description Of The Related Art

[0004] This section is intended to introduce the reader to various aspects of art that may be related to various aspects of the present invention, 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 present invention. Accordingly, it should be understood that these statements are to be read in this light, and not as admissions of prior art.

[0005] 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 physiological characteristics of a patient. Such devices 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.

[0006] One technique for monitoring certain physiological characteristics of a patient is commonly referred to as pulse oximetry, and the devices built based upon pulse 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 ( $SpO_2$ ) 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.

[0007] Pulse oximeters typically utilize a non-invasive sensor that transmits light through a patient's tissue and that photoelectrically senses the absorption and/or scattering of the transmitted light in such tissue. Data of light absorbance and/or scatter in a patient's tissue is processed by the pulse oximetry system to derive meaningful and conveyable physiological data of the patient for use by clinicians. Accordingly, pulse oximeters typically employ means to convey a patient's physiological parameters that are monitored by the pulse oximetry system. Correspondingly, changes in status of such parameters may invoke an appropriate action by a clinician to address such changes. As such, pulse oximetry systems normally employ audible alarms or beep tones, possibly comprising various frequencies, pitches, and/or volume amplitudes to convey physiologically monitored information, changes in such information or the absence of change in such information. Furthermore, in a clinical setting, such as an operating room, a patient may be monitored for numerous physiological parameters in addition to those associated with pulse oximetry. Hence, monitoring additional parameters may encompass additional audible systems, each having its own set of beeps and

alarms. In such a setting, there exists a potential for confusion due to the number of audible monitoring tones and their potential similarity.

[0008] Furthermore, prolonged usage of specific monitoring equipment having distinctive alarms and beep tones may, over time, condition the clinician to respond to specific sounds generated by the monitoring system. Being conditioned to specific alarms which correspond to particular physiological parameters, a clinician can respond directly to a patient's needs without having to first physically access the monitoring system. Consequently, replacement of monitoring equipment having different alarm types may necessitate a clinician to recondition his/hers reaction to correspond to the new alarm and/or tone. Therefore, it may be time consuming and inconvenient for a clinician to get adapted to new alarm types in instances where monitoring equipment is replaced. Further, this may lead to clinician error in misinterpreting alarms and/or tones, potentially causing the clinician to improperly respond to a medical condition.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Advantages of the invention may become apparent upon reading the following detailed description and upon reference to the drawings in which:

[0010] FIG. 1 illustrates a patient monitoring system coupled to a single or a multi-parameter patient monitor and a sensor, in accordance with aspects of one embodiment of the present technique;

[0011] FIG. 2 is a block diagram illustrating the hardware component of the single or the multi-parameter patient monitor, in accordance with aspects of one embodiment of the present technique;

[0012] FIGS. 3A-3F illustrate user configurable audio file settings, in accordance with aspects of one embodiment of the present technique.

### DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

[0013] One or more specific embodiments of the present invention will be described below. In an effort to provide a concise description of these embodiments, not all 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. 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.

[0014] The object of the present technique is to provide a system and method for generating customizable beep tones and alarms in pulse oximetry. Thus, for example, in order to distinguish one pulse oximeter from another a clinician can configure one or more pulse oximeters such that the clinician can distinguish between the beeps and alarms emitted by each oximeter. Additionally, pulse oximeters with customizable alarms and beep tones may be configurable to generate alarms and beep tones associated with other pulse oximeter types and models. Accordingly, such flexibility is advanta-

geous, especially when one pulse oximetry model is replaced by another. Hence, a clinician can configure the monitoring equipment's alarms and beep tones to be similar or identical to previously used equipment.

[0015] Referring now to FIG. 1, a patient monitoring system includes a sensor 10 which according to the present invention may be used in conjunction with a patient monitor 12. In the depicted embodiment, a cable 14 connects the sensor 10 to the patient monitor 12. As will be appreciated by those of ordinary skill in the art, the sensor 10 and/or the cable 14 may include or incorporate one or more integrated circuit devices or electrical devices, such as a memory, processor chip, or resistor, that may facilitate or enhance communication between the sensor 10 and the patient monitor 12. Likewise the cable 14 may be an adaptor cable, with or without an integrated circuit or electrical device, for facilitating communication between the sensor 10 and various types of monitors, including older or newer versions of the patient monitor 12 or other physiological monitors. In other embodiments, the sensor 10 and the patient monitor 12 may communicate via wireless means, such as using radio, infrared, or optical signals. In such embodiments, a transmission device (not shown) may be connected to the sensor 10 to facilitate wireless transmission between the sensor 10 and the patient monitor 12. As will be appreciated by those of ordinary skill in the art, the cable 14 (or corresponding wireless transmissions) are typically used to transmit control or timing signals from the monitor 12 to the sensor 10 and/or to transmit acquired data from the sensor 10 to the monitor 12. In some embodiments, however, the cable 14 may be an optical fiber that allows optical signals to be conducted between the monitor 12 and the sensor 10.

[0016] The sensor 10, in the example depicted in FIG. 1, includes an emitter 16 and a detector 18 which may be of any suitable type. For example, the emitter 16 may be one or more light emitting diodes adapted to transmit one or more wavelengths of light, such as in the red to infrared range, and the detector 18 may be a photodetector, such as a silicon photodiode package, selected to receive light in the range emitted from the emitter 16. In the depicted embodiment, the sensor 10 is coupled to a cable 14 that is responsible for transmitting electrical and/or optical signals to and from the emitter 16 and/or detector 18 of the sensor 10. The cable 14 may be permanently coupled to the sensor 10, or it may be removably coupled to the sensor 10—the latter alternative being more useful and cost efficient in situations where the sensor 10 is disposable.

[0017] The patient monitor 12 comprises display 20, a speaker 22 (such as a high-fidelity speaker), and a keypad 24. These components are adapted to configure and play digital and/or analog audio files stored within or accessed by the patient monitor 12. The patient monitor 12 may further be connected to a computer 26, via cable 28. The computer 26 may be used to couple the patient monitor 12 to a network, such as internet.

[0018] Referring now to FIG. 2, a block diagram represents an exemplary embodiment of the monitor 12 having internal and external hardware components. The components depicted by the diagram are adapted to facilitate use of digital and analog audio files in conjunction with pulse oximetry. In one embodiment, memory 42 (such as magnetic, solid-state, and/or optical memory components) is adapted to store digital audio files 44 in respective memory regions. As will be appreciated to those of ordinary skill in

the art, audio files may also be stored in external memory devices 46, such as a compact flash card or a USB memory stick or other suitable connectable memory medium, via a suitable external memory interface. Accordingly, the digital audio files can be used to generate various audible beeps and alarms in accordance with one or more physiological parameters monitored by the patient monitor 12.

[0019] Digital audio files 44 stored in memory 42 or memory device 46 may include file formats such as ".wav", ".mp3", ".aif", ".aiff", ".au", ".wma", ".qt", ".ra", ".ram", ".mp4", AAC (AIFF, AIFC), and other formats by which audio is saved digitally. The patient monitor 12 may further save or play audio files generated by source code executed by a signal processor. In one exemplary embodiment, the digital audio files may be stored in memory 42 and accessed by a user during patient monitoring. The digital audio files may further be pre-installed and stored during manufacture and assembly of the patient monitor or, alternatively, they can be downloaded from a computer, a server, and/or a network. Similarly, the digital audio files may be downloaded or accessed from a consumer electronic device, such as a portable music player, cellular telephone, etc. via a suitable interface, such as a USB and/or a serial interface of the patient monitor 12. Similarly, a suitable interface can be implemented as a wireless communication device (not shown) coupled to the patient monitor 12 and the computer 26 of FIG. 1, such that the digital audio files may be downloaded wirelessly. In one embodiment, the patient monitor 12 may have the capability to digitally record and store audible signals for retrieval and playing upon demand.

[0020] Internal memory 42 and/or external memory 46 are coupled to a signal processor 48. The signal processor 48 is configured to process the digital audio files by converting these files to signals which may be audibilized when played on an attached speaker. Thus, the signal processor 48 may further comprise components, such as analog to digital converters and amplifiers adapted to generate the audio signals and may be configured to execute corresponding software routines. The software routines may include suitable algorithms adapted to output audio signals in accordance with the physiological data or changes thereof.

[0021] In one embodiment, the signal processor 48 is coupled to the internal speaker 22 (such as a high-fidelity speaker), the internal display 20, the internal keypad 24, and/or to an Input/Output (I/O) interface 50. The internal speaker 22 facilitates conversion of the signal generated by signal processor 48 into sound. The internal display 20 and the internal keypad 24 facilitate user configuration of alarms and beep tones generated by the digital audio files and associations of such settings with specific physiological events. In an exemplary embodiment, the display itself may include a touchable keypad for configuration of the patient monitor 12.

[0022] Further, the memory 42 and/or the signal processor 48 may be coupled to external devices via the I/O 50. For example, pulse oximetry data, such as oxygen saturation, is transferred via I/O 50 from the sensor 10 to the signal processor 48 for processing and/or to the memory 42 for storage. Accordingly, the signal processor 48 may generate audio signals which correspond to or otherwise relate to physiological information obtained by the sensor 10. The generated signals may be transmitted to the internal speaker 22 and/or to an external audio device 52 (such as a high-fidelity speaker, an ear piece etc.). In one exemplary embodi-

ment, the external audio device **52** may comprise a back-up audible system, operable only in the event speaker **22** is not. In other exemplary embodiments, speakers **22** and **52** can be simultaneously operable or they can each be configured to sound different beeps and/or alarms.

[0023] Additionally, in one embodiment, an external keypad **54** and an external display **56** are connected via I/O ports **50**. These devices may enable, for example, users to remotely configure the patient monitor **12**. Furthermore, network connection **58** (such as an Internet connection) may be accomplished via a network port on the monitor **12** or via a network connection or an intermediate device, such as computer **26**, connected via cable **28** (FIG. 1) to the I/O **50**. Accordingly, audio files can be downloaded to the patient monitor **12**, stored in memory **42** and/or processed by the signal processor **48** to generate customizable audible beep tones and/or alarms. It should be emphasized that, in some embodiments, the external devices **10**, **46**, **52**, **54**, **56** and other devices may wirelessly communicate with the patient monitor **12** via the I/O **50** or via a device specific interface.

[0024] In accordance with the present technique, a user, such as a clinician, can configure the patient monitor **12** to sound specific audible tones, saved as audio files as described above, corresponding to monitored states of physiological parameters. In an exemplary embodiment, a clinician may configure the patient monitor **12** via the display **20**, **56**, and via the keypad **24**, **54**. In accordance with the present technique, FIGS. 3A-3F illustrate exemplary screens for the configuration of settings related to generating beep tones and alarms using audio files, as discussed further below.

[0025] Referring to FIG. 3A, an embodiment including exemplary screen **80** labeled, OXIMETER SETTINGS MENU enables the user to initiate the configuration of the patient monitor **12**. The screen **80** includes settings, such as PROFILE setting **82**, ALARM/AUDIO FILE setting **84** and ALERT setting **86** discussed further below with reference to sequentially configuring alarm settings of the patient monitor **12**. Screen **80** further comprises VOLUME setting **88**, and DISPLAY setting **90**. Accordingly, the VOLUME setting **88** sets a default volume level of the speaker **22** and/or the external audio device **54**, while the DISPLAY setting **90** may control brightness, color, and textural features of the displays **20**, **56**.

[0026] The PROFILE setting **82** may configure the profile/theme of the patient monitor **12** to be distinct from or identical to a different model of patient monitor. For example, a clinician may desire to have the patient monitor **12** generate sounds that are identical to a patient monitor that is no longer in use, but whose alarm sounds are familiar to the clinician. Thereby, upon replacement or upgrading of a patient monitoring system, the clinician may not have to retrain his/hers reactions to new alarm sounds. Alternatively, it may be preferable for the clinician to distinguish the alarm sounds of one patient monitor from alarm sounds of other patient monitors operating in a vicinity of the patient monitor. In such a situation, the clinician may configure one or more monitors **12** to sound different from other nearby monitors.

[0027] Hence, in an exemplary embodiment, selection of profile option **82** leads the user to screen **91** (FIG. 3B) for further configuration of the patient monitor **12**. Accordingly, the screen **91** lists respective options **93**, **95**, and **97** adapted to configure the profile/theme of the patient monitor **12** to be

identical to particular patient monitoring systems. Thus, choosing option button **93** may, for example, configure the profile/theme of the patient monitoring **12** to that of a different model of a patient monitoring system. In so doing, the patient monitor **12** may emulate the other model's alarm and alert sounds, settings and characteristics. The options **95** and **97** may further configure the patient monitor **12** to emulate the alarm and alert settings of other patient monitoring systems. Advantageously, screen **91** enables a clinician to configure the patient monitor **12** as a different patient monitoring system with a stroke of a key.

[0028] Referring once again to screen **80**, the ALARM/AUDIO FILE setting **84** controls features of alarms generated using audio files stored in respective memory regions of memory **42**. These alarms may be activated when, for example, a patient's oxygen saturation level drops below a certain value, which prompts the clinician to react accordingly. The ALERT setting **86** controls beep tones generated using the stored audio files such that the beep tones may correspond to a continuous monitoring of physiological parameters and/or changes of such parameters thereof over time.

[0029] In this example, user selection of setting **84** ALARM/AUDIO FILE in screen **80** of FIG. 3A prompts the user to screen **100**, depicted by an exemplary screen shown in FIG. 3C. Accordingly, the screen **100** includes a selectable option of, ALARM TYPE AUDIO FILE, and a list of audio files at the user's disposal. In an exemplary embodiment, a user may choose option **102** labeled ALARM TYPE 2 AUDIO FILE. In so doing, the user may choose an audio file having the desired audio characteristics, such as having a desired fixed audible frequency with a fixed time interval between each beep. Alternatively, ALARM TYPE 2 may comprise a song, a melody, a chime, or any other audio format storable as an audio file. The list **100** may further comprise option **104** representing VOICE ALARM WAVE FILE adapted to use an audio file of a voice or oral message as the configured alarm. Accordingly, in choosing option **104**, the patient monitor **12** is configured to voice a verbalized alarm stating, for example, "oxygen saturation level is below 80%."

[0030] The screen **100** may further include selectable option **106**, corresponding to a selection labeled DOWNLOAD AUDIO FILE. Accordingly, selecting this option configures the patient monitor **12** to download audio files from a connected network, computer or electronic device. Further, the screen **100** includes an option **108** denoted PLAY SAMPLE, enabling the user to hear a sample of one of an available audio file. Lastly, screen **100** includes an option **109** denoted BACK, enabling the user to return to a previous screen.

[0031] In an exemplary embodiment in which option **102** ALARM TYPE 2 AUDIO FILE has been chosen, the user is sequentially prompted to screen **120** shown in FIG. 3D. The screen **120** is labeled ALARM TYPE 2 SETTINGS. Accordingly, the screen **120** lists selectable options, enabling the clinician to further tailor the chosen alarm **102**. For example, screen **120** includes a VOLUME LEVEL setting **124** which overrides the default VOLUME setting **88** for alarm **102**. Accordingly, using the keypad **20** the user can enter an alpha numeric key to set the desired volume level. Further, screen **120** includes option **126** which reads PLAYBACK SPEED LEVEL, enabling the user to set the playing speed of the alarm by entering an alphanumeric key in box **127**. The

screen **120** further includes a TONE option **128**, comprising selectable options settings CONTINUOUS and INTERMITTENT modes of the alarm. For example, in the INTERMITTENT mode, the alarm **102** may comprise beep tone trains comprising a series of beeps and silent intervals between consecutive trains. Alternately, a CONTINUOUS mode would configure the alarm **102** to have no silent interval between each beep train.

**[0032]** In another exemplary embodiment, alarm **102** may include an audio file of a song or melody. Accordingly, configurable setting **130**, labeled PLAY PORTION NUMBER, enables the user to select a portion of the song or the melody when the alarm is sounded. As such, the portion number of the song or melody can be entered as an alpha numeric key in box **131**, which configures the patient monitor **12** to play the portion of the song corresponding to the alpha numeric key entered.

**[0033]** Referring again to the exemplary embodiment in which the alarm **102** comprises a series of beeps, screen **120** may further include selectable option **134** denoted as MODULATE ALARM BY with corresponding audio file options: MELODY 1, MELODY 2, MELODY 3 . . . etc. Accordingly option **134** modulates the beeps of alarm **102** with a certain melody chosen by the user. Thus, for example, in a children's hospital it may be preferable to have alarm **102** be modulated by a children's song or nursery rhyme, such that every other note of the song is accentuated by a beep of the alarm **102**. Accordingly, embodiment **102** comprises a PLAY SAMPLE option **108** permitting the clinician to listen to any configuration chosen from list **120**.

**[0034]** Upon choosing the ALARM/AUDIO FILE option **84** in screen **80**, the user may further be prompted to an exemplary screen **150** shown in FIG. 3E. In an exemplary embodiment, the user is prompted to screen **150** after completing screen **120**. Screen **150**, labeled TIME SETTINGS, comprises alarm duration settings, alarm activation setting, etc. For example, a user option **152** labeled ALARMS SOUNDS EVERY, enables the user to choose the time interval between each sounding of alarm **102** by entering an alpha numeric key in box **153**. This option is analogous to the INTERMITTENT mode of option **128**; however option **152** is more flexible in that it enables variable intermittency settings of the alarm **102**.

**[0035]** Further, screen **150** includes user option **154** denoted ACTIVATE ALARM BETWEEN. Hence, a user can set a time of day or period of time during which the alarm may be active. For example, during hours in which a patient may rest or sleep it may be desirable to silence the alarm. Additionally, screen **150** includes an option **156** labeled VARY ALARM OVER TIME. Accordingly, in an exemplary embodiment the user can choose the alarm to become louder and/or faster over time. Further, the screen **150** includes user option **158** labeled CHANGE AUDIO FILES EVERY, which according to the present technique configures an alarm to switch between different AUDIO FILES having different tones and/or melodies during the course of the monitoring period.

**[0036]** Referring again to FIG. 3A, in an exemplary embodiment that assumes user selection of the ALERT option **86** from menu **80**, a clinician is prompted to screen **170** shown in FIG. 3F. The screen **170** is denoted by title, ALERT SETTINGS. Accordingly, the menu **170** comprises audio file alarm and beep settings configured to alert the clinician about occurring changes of physiologically moni-

tored parameters. As such, a clinician may become aware of changes taking place in physiologically monitored parameters without having to visually inspect the monitor. Thus, the configurable alert settings are advantageous, for example, during treatment of the patient the clinician can multi-task and be attentive to the monitoring of physiological parameters, acquired during pulse oximetry.

**[0037]** Accordingly, screen **170** comprises user option **172** labeled SOUND ALARM IF PULSE RATE IS which prompts the user to enter an upper or lower threshold value for the pulse rate. Thus, in an exemplary embodiment, a pulse rate rising above the user entered threshold sounds an alarm generated by a designated audio file that alerts the clinician on the status of the pulse rate. Block **171** includes a pull down menu for choosing an audio file associated with the pulse. Similarly, user option **174** labeled SOUND ALARM IF SpO<sub>2</sub> LEVEL IS prompts the user to enter an upper or lower threshold value for oxygen saturation. Accordingly, upon reaching the user entered oxygen saturation threshold an alarm generated by a designated audio file alerts the clinician on the status of the oxygen saturation. Block **173** includes a pull down menu for choosing an audio file associated with the SpO<sub>2</sub> level. Thus, by utilizing pull down menus **171** and **173** the user may configure the patient monitor **12** to sound similar or different audio files for monitoring the pulse rate and SpO<sub>2</sub> levels. Further, the pull down menus **171** and **173** may support features, such as sounding an audio file whenever a loss of pulse is detected or whenever the sensor **10** is disconnected from the patient monitor or is not properly attached to a patient's body.

**[0038]** Further, screen **170** may include audio file beep settings corresponding to changes in SpO<sub>2</sub> levels. User option **178** activates a change in frequency of the alarm beep tones upon detecting changes in the level of oxygen saturation. For example, choosing boxes **179** and/or **180** respectively configure the alert of the patient monitor to increase or decrease the frequency of each beep of the audio file, corresponding to an increase in oxygen saturation. Accordingly, a linear or nonlinear function may map the changes of oxygen saturation onto changes in each beep's frequency. Alternatively, the pitch of the alarm beep may change according to the changes in SpO<sub>2</sub> levels.

**[0039]** Additionally, in analogy to option **158** of screen **150**, screen **170** further comprises an alert setting **182** which enables the user to configure the pulse oximetry system **12** to change audio file alarms in correspondence to changes in levels of oxygen saturation. In an exemplary embodiment, upon detecting a change in oxygen saturation, the pulse oximetry system **12** may sound an audio file randomly selected from a collection of audio files stored in the system's memory.

**[0040]** While only certain features of the invention have been illustrated and described herein, many modifications and changes will occur to those skilled in the art. It is, therefore, to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit of the invention.

What is claimed is:

1. A pulse oximetry system, comprising:
  - a pulse oximetry monitor, comprising:
    - a memory;
    - at least one audio file stored in the memory;
    - a signal processor configured to generate an audio signal using the at least one audio file; and

- a speaker configured to receive the audio signal from the signal processor.
2. The system, as set forth by claim 1, wherein the audio file is a digital audio file.
3. The system, as set forth by claim 1, wherein the audio file is an analog audio file.
4. The system, as set forth by claim 1, comprising a pulse oximetry sensor configured to transmit data to at least one of the memory or the signal processor.
5. The system, as set forth by claim 1, wherein the audio signal corresponds to a corresponding signal associated with a different pulse oximeter model.
6. The system, as set forth by claim 1, comprising one or more external memory devices adapted to store digital audio files.
7. The system, as set forth by claim 1, comprising programmable source code for generating the audio signal.
8. A method for monitoring physiological parameters, comprising the acts of:  
obtaining physiological data; and  
generating an audible signal using a digital audio file in response to the physiological data.
9. The method, as set forth by claim 6, wherein obtaining physiological data comprises obtaining pulse oximetry data.
10. The method, as set forth by claim 6, comprising the act of: administering a medical treatment based on the audible signal.
11. The method, as set forth by claim 6, comprising the act of: utilizing one or both of an internal and an external speaker to play the audible signal.
12. The method, as set forth by claim 6, wherein the audible signal comprises a beep train, a musical selection, or an oral communication.
13. A tangible machine readable medium comprising:  
code for generating an audible signal using a digital audio file in response to a set of physiological data.
14. The tangible machine readable medium, as set forth by claim 11, wherein the set of physiological data comprises pulse oximetry data.
15. The tangible machine readable medium, as set forth by claim 11, comprising code for configuring one or more parameters of the digital audio file.
16. The tangible machine readable medium, as set forth by claim 11, comprising code for downloading the digital audio file via a network connection.
17. The tangible machine readable medium, as set forth by claim 11, wherein the audible signal comprises a beep train, a musical selection, or an oral communication.
18. A method for configuring an alarm, comprising the acts of:  
selecting an audio file to be played on a medical monitoring system; and  
configuring the medical monitoring system to play the audio file based on monitored values of one or more measured physiological characteristics.
19. The method, as set forth by claim 16, comprising configuring one or more playback characteristics of the audio file.
20. The method, as set forth by claim 17, wherein the one or more playback characteristics comprise speed, frequency, volume, pitch, tone, or timing of an audible signals derived from the audio file.
21. The method, as set forth by claim 16, wherein the audio file comprises a beep train, a musical selection, or an oral communication.
22. The method, as set forth by claim 16, wherein configuring the medical monitoring system comprises configuring a different audio file to be played for different respective oxygen saturation levels.
23. The method, as set forth by claim 16, comprising utilizing linear or non-linear functions configured to map states of the physiological parameters on to different audible signals derived from the audio file.
24. The method, as set forth by claim 16, comprising the act of: downloading the digital audio file via a network connection.
25. A tangible machine readable medium comprising:  
code for selecting an audio file to be played on a medical monitoring system; and  
code for configuring the medical monitoring system to play the audio file based on monitored values of one or more measured physiological characteristics.
26. The tangible machine readable medium, as set forth by claim 23, comprising code for configuring one or more playback characteristics of the audio file.
27. The tangible machine readable medium, as set forth by claim 24,  
wherein the one or more playback characteristics comprise speed, frequency, volume,  
pitch, tone, or timing of an audible signal derived from the audio file.
28. The tangible machine readable medium, as set forth by claim 23, wherein the audio file comprises a beep train, a musical selection, or an oral communication.
29. The tangible machine readable medium, as set forth by claim 23, comprising code for configuring the medical monitoring system to play different audio files for different oxygen saturation levels.
30. The tangible machine readable medium, as set forth by claim 23, comprising code for utilizing linear or non-linear functions configured to map states of the physiological parameters on to different audible signals derived from the audio file.
31. A method of configuring a patient monitoring system, comprising:  
storing one or more digital audio files on one or more memory media in communication with a patient monitoring system.
32. The method, as set forth by claim 29, wherein the memory media is on the patient monitoring system.
33. The method, as set forth by claim 29, wherein the memory media is in communication with the patient monitoring system over a network.

|                |   |         |            |
|----------------|---|---------|------------|
| 专利名称(译)        | 用于产生可定制的可听到的嘟嘟声和警报的系统和方法  |         |            |
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| 其他公开文献         | US8380271   |         |            |
| 外部链接           | <a href="#">Espacenet</a> <a href="#">USPTO</a>                     |         |            |

摘要(译)

一种适于获得生理数据的脉搏血氧测量系统。脉搏血氧测定系统适于将一个或多个数字音频文件存储在患者监测系统通信的一个或多个存储介质上。脉搏血氧测定系统适于处理一个或多个数字音频文件并响应于生理数据产生音频信号。

