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(54) **BANDS FOR MEASURING BIOMETRIC INFORMATION**

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A61B 5/0205	(2006.01)
A61B 5/02	(2006.01)
A61B 5/00	(2006.01)

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CPC ***A61B 5/0205*** (2013.01); ***A61B 5/02*** (2013.01); ***A61B 5/6813*** (2013.01)

USPC **340/539.1**; 340/539.12; 340/10.1; 455/41.2; 455/466; 600/301

(58) **Field of Classification Search**

CPC A61B 5/0002; A61B 5/02; A61B 5/0245; A61B 5/1118; A61B 5/681

USPC 340/539.12, 539.1, 573.1, 5.82, 10.1; 600/500, 300, 301; 455/4.9, 420, 466, 455/41.2, 41.3

See application file for complete search history.

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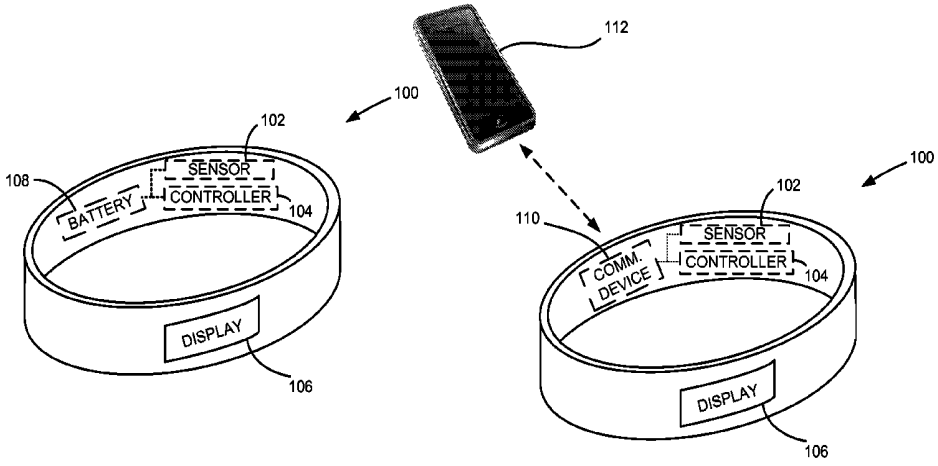
(57) **ABSTRACT**

In some aspects, a system is provided that includes (1) a wrist band having one or more sensors that measure biometric data of a user wearing the band; and (2) a display on the band that displays a message based on biometric data measured by the band. The message indicates a heart rate zone of the user. Numerous other aspects are provided.

22 Claims, 5 Drawing Sheets



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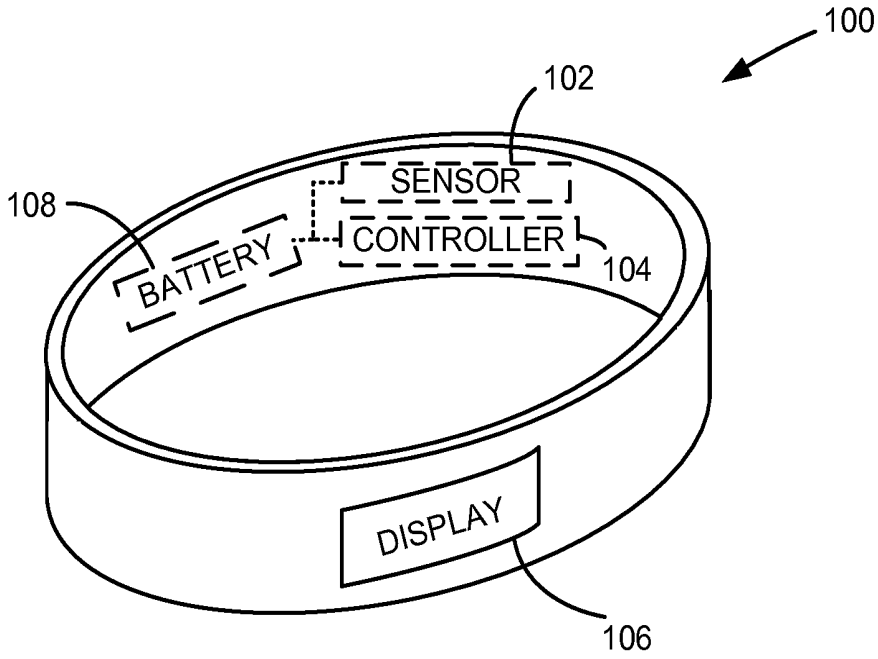

FIG. 1A

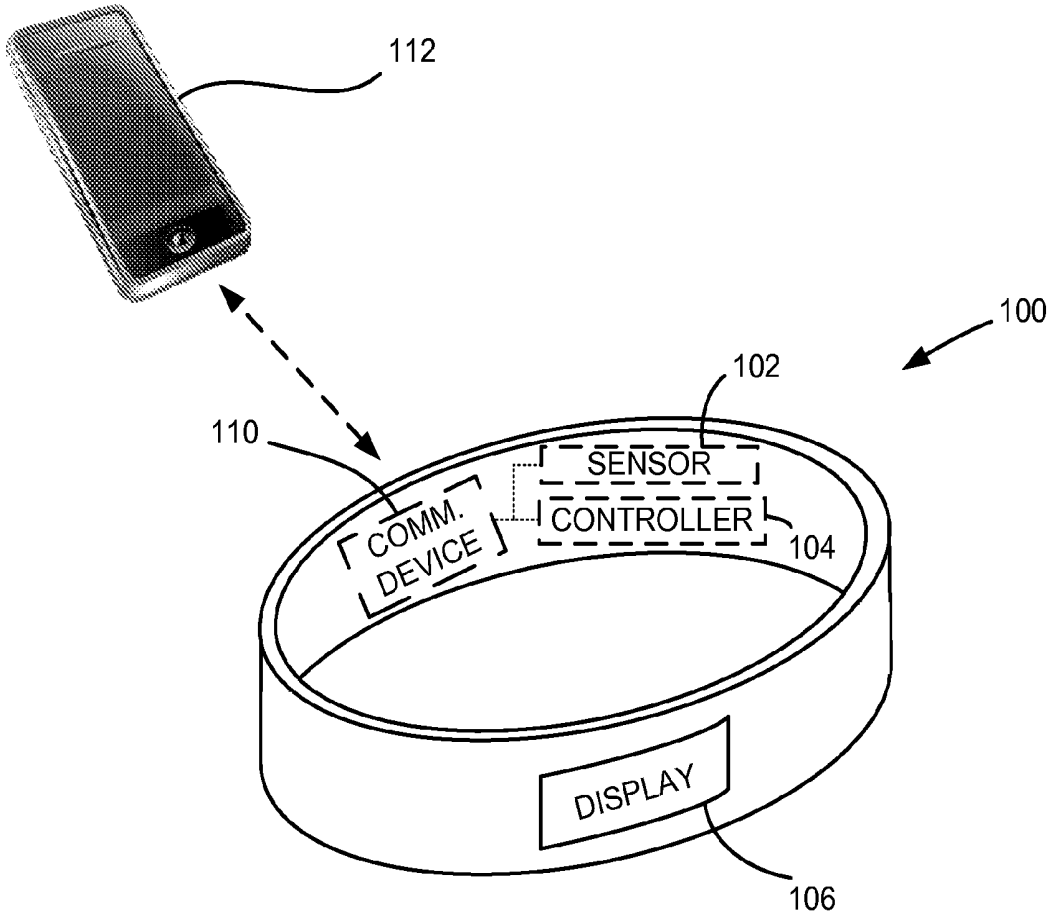
112
100
102
110
SENSOR
COMM. DEVICE
CONTROLLER
104
DISPLAY
106

FIG. 1B

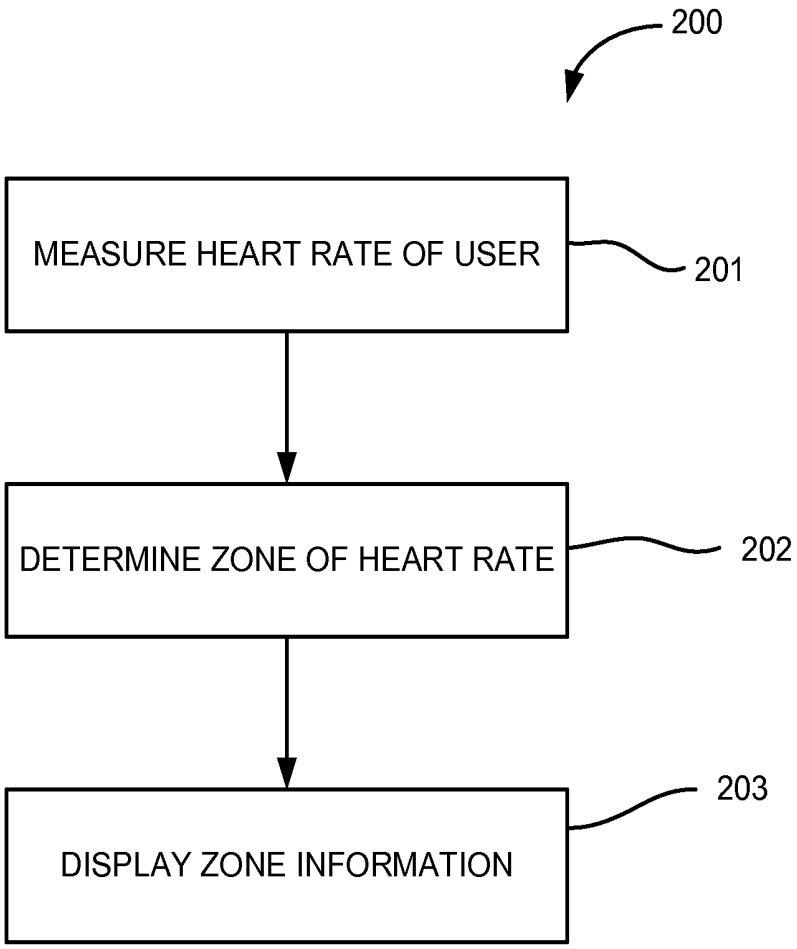
200
MEASURE HEART RATE OF USER
201
DETERMINE ZONE OF HEART RATE
202
DISPLAY ZONE INFORMATION
203

FIG. 2

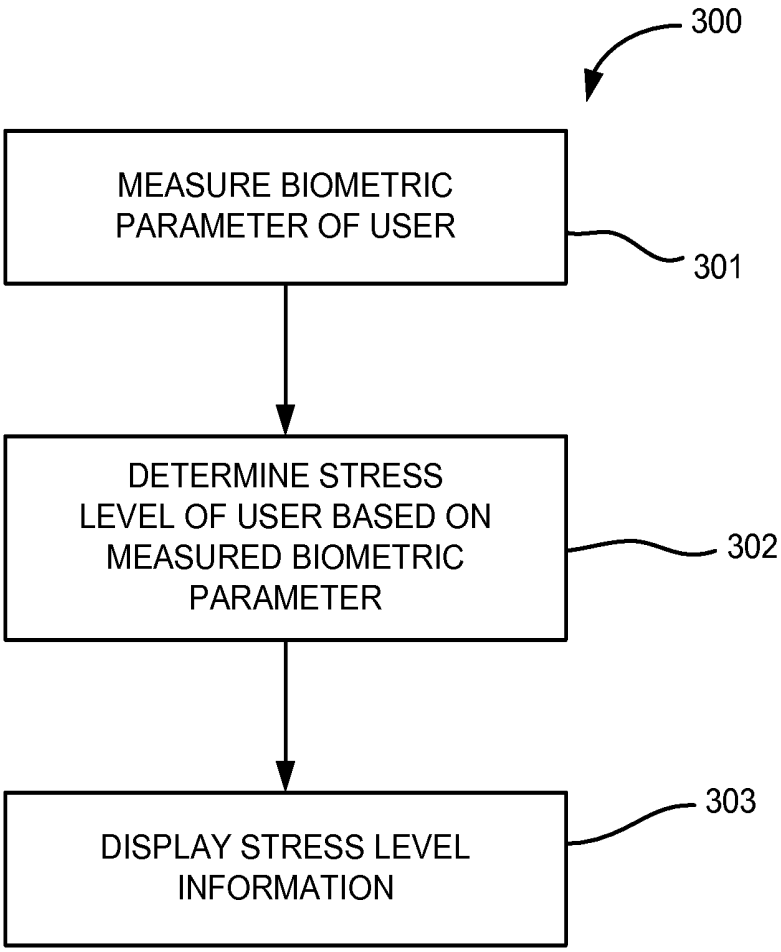
300
MEASURE BIOMETRIC PARAMETER OF USER
301
DETERMINE STRESS LEVEL OF USER BASED ON MEASURED BIOMETRIC PARAMETER
302
DISPLAY STRESS LEVEL INFORMATION
303

FIG. 3

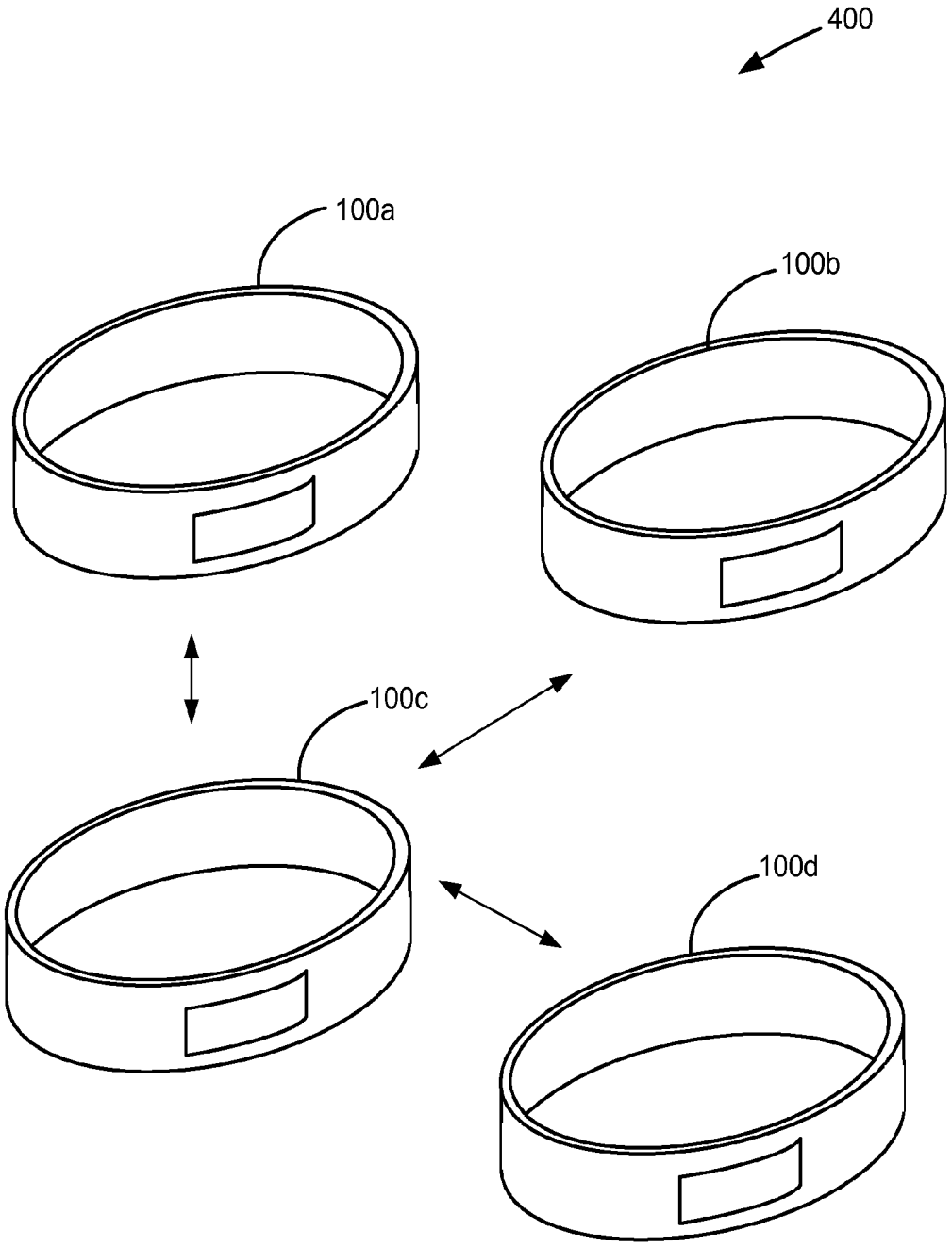

FIG. 4

BANDS FOR MEASURING BIOMETRIC INFORMATION

The present application claims priority from U.S. Provisional Patent Application Ser. No. 61/493,313, filed Jun. 3, 2011 and titled "BANDS FOR MEASURING BIOMETRICS", which is hereby incorporated by reference herein in its entirety for all purposes.

FIELD OF THE INVENTION

The present invention relates to biometric measurements, and more particularly to wearable bands that may be employed to measure biometric information.

BACKGROUND

Biofeedback devices such as portable heart rate monitoring (HRM) devices are commonly used in fitness related activities for weight loss, goal heart rate (HR) training, and general HR monitoring. Such devices may sometimes be employed by healthcare professionals for chronic and/or acute heart condition monitoring and/or diagnosis.

Portable HRMs and other monitoring devices typically are expensive, and in some cases are cost prohibitive for many consumers. A need exists for inexpensive and/or simplified monitoring systems.

SUMMARY

In some aspects, a system is provided that includes (1) a wrist band having one or more sensors that measure biometric data of a user wearing the band; and (2) a display on the band that displays a message based on biometric data measured by the band. The message indicates a heart rate zone of the user.

In some aspects, a system is provided that includes (1) a wrist band having one or more sensors that measure biometric data of a user wearing the band; and (2) a display on the band that displays a message based on biometric data measured by the band. The message indicates a stress level the user.

In some aspects, a system is provided that includes a wrist band having one or more sensors that measure biometric data of a user wearing the band. The wrist band adapted to (1) detect at least one of a handshake, a first bump and a high five of the user; and (2) share information with another user in response to the detection.

Numerous other aspects are provided, as are various methods, apparatus and computer program products for carrying out these and other aspects of the invention. Each computer program product may be carried by a medium readable by a computer (e.g., a carrier wave signal, a floppy disc, a hard drive, a random access memory, etc.).

Other features and aspects of the present invention will become more fully apparent from the following detailed description, the appended claims, and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1**A is a schematic diagram of a band provided in accordance with the present invention.

FIG. **1**B illustrates an embodiment of the band of FIG. **1**A that includes a communications device in accordance with the present invention.

FIG. **2** is a flowchart of an example method of employing the band of FIGS. **1**A and/or **1**B for zone training in accordance with the present invention.

FIG. **3** is a flowchart of an example method of employing the band of FIG. **1**A and/or **1**B for monitoring stress level in accordance with the present invention.

FIG. **4** illustrates a group that may be formed by a plurality of users employing bands in accordance with the present invention.

DETAILED DESCRIPTION

In one or more embodiments of the invention, a wearable wrist band or "bracelet" (collectively referred to as a band herein) is provided that includes a sensor for measuring heart rate, pulse, temperature, or the like and displaying an indication of the measured data such as (1) a color; and/or (2) a message, which may depend on the value of the measured data. Examples include, for example:

(1) a stress level band having a color and/or message based on a measured stress level of a person wearing the band (e.g., as determined by measuring and/or monitoring heart rate, pulse rate, body temperature, perspiration, or the like); and/or

(2) a zone band having a color and/or message based on a determined heart rate zone of a person wearing the band (e.g., recovery, fat burning, target heart rate, anaerobic zone, maximum, etc.).

In some embodiments, the bands may be flexible and/or waterproof. Such bands are simple to use and inexpensive. Example embodiments are these and other bands are described below.

FIG. **1**A is a schematic diagram of a band **100** provided in accordance with the present invention. The band **100** may include a biometric sensor **102** coupled to a controller **104**, and display **106** coupled to the controller **104**. The band **100** may be fabricated from any suitable material. In some embodiments, the band **100** may be formed from a flexible and/or waterproof material such as silicone; and the sensor **102** and/or controller **104** may be embedded therein.

The sensor **102** may include any suitable biometric sensor configured to measure one or more of but is not limited to, heart rate, pulse rate, temperature, respiration, acceleration, skin resistivity, etc. More than one sensor **102** may be provided.

The controller **104** may include a programmable logic controller, microprocessor, application specific integrated circuit, or the like having suitable programming code for performing the methods described herein. More than one controller **104** may be used.

The display **106** may be any suitable display such as a liquid crystal display, electronic paper display, organic light-emitting diode display, or the like.

A battery **108** may be provided for powering sensor **102**, controller **104** and/or display **106**. In some embodiments, battery **108** may be rechargeable and/or replaceable. In one particular embodiment, the battery may be recharged via a USB connection (not shown) that allows information to be transferred from band **100** to another device such as a computer (not shown).

In some embodiments, the band **100** may configured to communicate wirelessly with other devices such as a mobile telephone, tablet computer, laptop computer, desktop computer or the like. For example, FIG. **1**B illustrates an embodiment of the band **100** in which the band **100** includes communications device **110** such as a transmitter/receiver chip that allows the controller **104** to communicate with a mobile device **112**. In some embodiments, the controller **104** may

send information to and/or receive information from mobile device **112** using a wireless protocol such as WiFi, Bluetooth, or the like.

FIG. **2** is a flowchart of an example method **200** of employing the band **100** for zone training. With reference to FIGS. **1A-2**, an exerciser (not shown) may wear the band **100** on his/her wrist. In step **201**, sensor **102** of band **100** detects and measures the heart rate, pulse or another biometric parameter of the exerciser and provides this information to controller **104**.

Based on the measured heart (or other information), in step **202**, the controller **104** may determine an exercise zone for the exerciser. Generally, recommended exercise zones may depend on such factors as age and/or weight. In some embodiments, band **100** may be pre-programmed with particular definitions of the target heart rates for multiple zones. Any number of zones may be used (e.g., 1, 2, 3, 4, 5, 6, 7, etc.). For instance, bands may be pre-programmed with suitable heart rate zones for exercisers based on age and/or weight. In other embodiments, an exerciser may specify his/her age and/or weight and controller **104** may determine appropriate heart rate zones for the exerciser. For example, a mobile device **112** may include an application that prompts an exerciser for his/her age and/or weight, and then communicates this information (or zone information calculated by the mobile device) to the controller **104** via communications device **110**.

In step **203**, the band **100** displays heart rate zone information. For example, the controller **104** may cause display **106** to display a different color for each heart rate zone. In some embodiments, text information may be provided such as heart rate, zone, encouraging messages and/or warnings, or the like. Table 1 below provides exemplary colors for heart rate zones. Other colors may be employed.

TABLE 1

HEART RATE RANGE (BEATS PER MINUTE)	COLOR
70-95	GREEN
95-105	BLUE
105-120	PURPLE
120-135	YELLOW
135-150	PINK
150+	RED

In at least one embodiment, the controller **104** may include exercise routines that specify which heart rate zones an exerciser should be in and/or move between during an exercise routine. Band **100** may display an up arrow or down arrow (or other indicators) to indicate that an exerciser should increase or decrease his/her heart rate so as to move to another zone. A zone band may have a color and/or message based on what zone a user's heart rate is in (e.g., recovery, fat burning, target heart rate, or anaerobic zone). A different color can correspond to each zone, and/or the band **100** may display the current zone as a message.

FIG. **3** is a flowchart of an example method **300** of employing the band **100** for monitoring stress level in accordance with the present invention. With reference to FIGS. **1A-1B** and FIG. **3**, a user (not shown) may wear the band **100** on his/her wrist. In step **301**, sensor **102** of band **100** detects and measures the heart rate, pulse or other biometric parameter of the user and provides this information to controller **104**.

Based on the measured heart rate (or other parameter such as temperature), in step **302**, the controller **104** may determine a stress level of the user. In general, heart rate increases as stress level increases. As such, controller **104** may determine when the heart rate of the user rises above a pre-determined heart rate level (e.g., such as a steady state heart rate for the user, or a heart rate measured when the user is relaxed). Zones of stress may be determined for the user such as low stress, moderate stress, high stress and extreme stress based on various heart rate ranges of the user. Temperature of the user may be similarly employed (e.g., as temperature may decrease with stress). Such stress ranges may be pre-programmed, determined by the controller **104**, determined by mobile device **112** and communicated to controller **104** or the like. For example, a mobile device **112** may include an application that prompts the user to meditate, breath deep or otherwise relax when determining a low stress level for the user. The mobile application may then communicates this information (or zone information calculated by the mobile device) to the controller **104** via communications device **110**.

In step **303**, the band **100** displays stress level information for the user. For example, the controller **104** may cause display **106** to display a different color for each stress level zone of the user. In some embodiments, text information may be included such as heart rate, stress level zone, encouraging messages and/or warnings, or the like. Table 2 below provides example colors for stress level zones. Other colors may be employed.

TABLE 2

STRESS LEVEL	COLOR
LOW	GREEN
MEDIUM	BLUE
HIGH	PURPLE
EXTREME	RED

In at least one embodiment, the controller **104** may cause messages to be displayed on the display **106** such as "relax", "breathe", "getting agitated", "step away from the situation", or the like based on the level of stress of the user. In some embodiments, a stress level band may have a color and/or message based on stress level (e.g., as determined by heart rate, pulse, temperature, etc.). A user may use mind control to adjust your heart rate and change the message (e.g., via breathing techniques). Any suitable message may displayed such as be calm, back off, getting agitated, etc.

In some embodiments, the band **100** may be a "mood" band. For example, sensor **102** may measure temperature of a user and provide the temperature information to the controller **104**. In response to this information, the controller **102** may cause display **106** to display a color representative of the user's mood. Example colors are provided below in Table 3. Other colors may be employed.

TABLE 3

MOOD	COLOR
HAPPY/PASSIONATE	DARK BLUE
CALM	BLUE
SLIGHTLY CALM	BLUE GREEN
NORMAL	GREEN
SLIGHTLY NERVOUS	AMBER
ANXIOUS	GRAY
STRESSED	BLACK

The temperature ranges used for each mood/color may be pre-selected based on statistical averages for men, women, boys, girls, etc., or in some embodiments, may be determined by the controller **104** by monitoring the steady state or normal temperature of a user and/or the temperature of the user

during known times of stress. For example, mobile device **112** may include an application that asks a user his/her mood. Based on this information, the mobile device **112** may direct the controller **102** to store relevant temperature ranges which correlate to moods of the user. Of course, if desired, a mood band may be formed using thermotropic liquid crystals calibrated to a nominal temperature of about 82° F. as in a conventional mood ring in place of or in addition to the above described controller embodiment.

In some embodiments, the band **100** may be configured to detect the presence of like bands. For example, a band **100***a* may be assigned to a group **400** of bands **100***a-d* as shown in FIG. **4**. Fewer or more bands may be in the group **400**. Each band **100***a* in the group **400** may be configured to communicate with other bands in the group **400** (e.g., via communications device **110** and/or mobile device **112**) so as to identify members of the group, such as to beep, vibrate, change colors and/or display a message when other people/members of group **400** are near (e.g., other people from your college, people with similar interest or status, people within a frequent flyer program or points level, etc.), or the like. For instance, each band **100***a-d* may periodically broadcast identifying information so that any band in the group **400** may detect and identify the band(s).

In some embodiments, bands **100** may "exchange" information with other bands in a group or any other band. For instance, the sensor **102** may include an accelerometer (not separately shown) that may recognize a handshake by a user of the band (e.g., by detecting the rapid up/down motion which occurs when two people shake hands). This may trigger the controller **104** in the band **100** of each person to share contact information for the user (e.g., email addresses, cellular telephone numbers, generate a Facebook friend request, or the like). Likewise, bands may be "bumped" together to share information. Any such information may be communicated to mobile devices **112** if desired. As an example, person A wearing band **100***a* may shake hands, high five, bump fists, etc., with person B wearing band **100***b*. Each band **100***a*, **100***b* may include a sensor **102** such as an accelerometer, strain gauge or the like which detects an acceleration and/or an acceleration pattern along one or more axis that is identifiable by controller **104** of each band **100***a*, **100***b* as a request to share information. In response thereto, controller **104** of each band **100***a*, **100***b* may cause information to be shared. For instance, bands **100***a*, **100***b* may directly broadcast information between one another; and/or bands **100***a*, **100***b* may direct mobile devices **112** of each user to share contact or other information.

In other embodiments, a wearable band may include a built in flash drive in place of or in addition to one or more the above. For example, monitored/collected data may be stored on the flash drive.

In one or more embodiments, a band may be used to motivate people to take the stairs. Most staircases in buildings are stark and depressing. A hotel chain may spruce of their staircases and even provide incentives for people to use them (to promote healthy living, save electricity by not using elevators, etc.). One or more of the above bands may be used as part of such a promotions.

Accordingly, while the present invention has been disclosed in connection with exemplary embodiments thereof, it should be understood that other embodiments may fall within the spirit and scope of the invention, as defined by the following claims.

The invention claimed is:

1. A system comprising:

a first wrist band having one or more sensors that measure biometric data of a first user wearing the first band, the first wrist band adapted to:

detect proximity to a second user wearing a second wrist band;

detect at least one of a handshake, a fist bump and a high five occurring between the first and second users; and

share information between the first and second users in response to the detection of the handshake, fist bump, or high five,

wherein the first wrist band is further adapted to determine if the second user is a member of a group associated with the first user and to display a color indicating the group association;

wherein the first wrist band is adapted to communicate with a mobile device of the first user and the second wrist band is adapted to communicate with a mobile device of the second user, and

wherein the sharing of information between the first and second users in response to the detection of the handshake, fist bump, or high five occurs directly between the mobile devices of the first and second users.

2. The system of claim **1** wherein the first wrist band is flexible.

3. The system of claim **1** wherein the first wrist band includes an acceleration sensor for detecting a handshake, a fist bump or a high five.

4. The system of claim **1** wherein the first wrist band includes an accelerometer.

5. The system of claim **1** wherein the first wrist band is adapted to communicate with the second wrist band to share the information.

6. The system of claim **1** wherein the information shared includes contact information.

7. The system of claim **1** wherein the information shared includes monitored or collected data.

8. The system of claim **1** wherein the first wrist band includes a flash drive.

9. The system of claim **8** wherein the information shared includes data stored on the flash drive.

10. The system of claim **1** wherein the first wrist band is further adapted to emit a sound or vibration or display a message indicating the presence of the second user who is a member of the group associated with the first user.

11. A system comprising:

a mobile device of a first user; and

a first wrist band having one or more sensors configured to measure biometric data of the first user, the first wrist band operative to communicate measured biometric data to the mobile device of the first user, the first wrist band and the mobile device of the first user operative to:

detect proximity to a second user wearing a second wrist band, the second wrist band being adapted to communicate with a mobile device of the second user;

detect at least one of a handshake, a fist bump and a high five occurring between the first and second users based on communication from the first wrist band; and

share information between the first and second users in response to the detection of the handshake, fist bump, or high five; and

wherein the sharing of information between the first and second users in response to the detection of the hand-

shake, fist bump, or high five includes sharing of information between the mobile devices of the first and second users.

12. The system of claim **11** wherein the first wrist band is flexible.

13. The system of claim **11** wherein the first wrist band includes an acceleration sensor for detecting a handshake, a fist bump or a high five.

14. The system of claim **11** wherein the information shared includes contact information.

15. The system of claim **11** wherein the information shared includes monitored or collected data.

16. The system of claim **11** wherein the first wrist band includes a flash drive.

17. The system of claim **16** wherein the information shared includes data stored on the flash drive.

18. The system of claim **11** wherein the first wrist band is further adapted to emit a sound or vibration or display a message indicating the presence of the second user if the second user is a member of a group associated with the first user.

19. The system of claim **11** wherein the first wrist band is adapted to display a color corresponding to a heart rate zone of the first user.

20. The system of claim **11** wherein the first wrist band is adapted to display a color corresponding to a stress level of the user.

21. The system of claim **1** wherein the sharing of information between the first and second users includes generating a social network friend request.

22. The system of claim **11** wherein the sharing of information between the first and second users includes generating a social network friend request.

* * * * *

专利名称(译)	用于测量生物信息的频带		
公开(公告)号	US8947226	公开(公告)日	2015-02-03
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[标]申请(专利权)人(译)	DUGAN BRIAN中号		
申请(专利权)人(译)	DUGAN BRIAN M.		
当前申请(专利权)人(译)	DUGAN，BRIAN M.		
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审查员(译)	LIM，史蒂芬		
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外部链接	Espacenet USPTO		

摘要(译)

在一些方面，提供了一种系统，其包括（1）具有一个或多个传感器的腕带，所述传感器测量佩戴该带的用户的生物识别数据；（2）在频带上显示基于由频带测量的生物特征数据的消息的显示。该消息指示用户的心率区。提供了许多其他方面。