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(54) **PACE CONTROL DEVICE**

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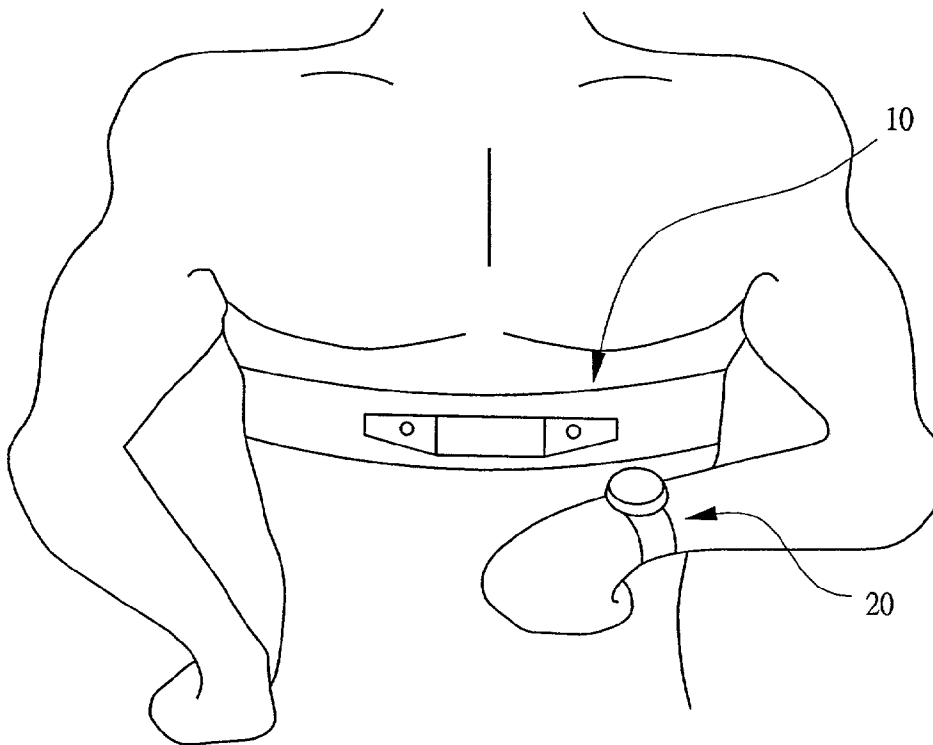
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(57) **ABSTRACT**

The present invention provides a pace control device comprising a chest belt sensor device and a data receiver. When the chest belt sensor device is attached to the chest of the user, the acceleration sensor measures the workout paces, and the heart rate sensor circuit measures the heart rate. These measures are sent to the microprocessor to be encoded by an ID coded protocol and then transmitted by the wireless transmitter circuit to the data receiver. The data receiver comprises a wireless receiver circuit, a monitor, and a microprocessor with the same ID coded protocol as in the chest belt sensor device. The data receiver obtains the data on the heart rate and the workout paces and displays the information on the monitor so that the user can adjust their working at an optimum level.



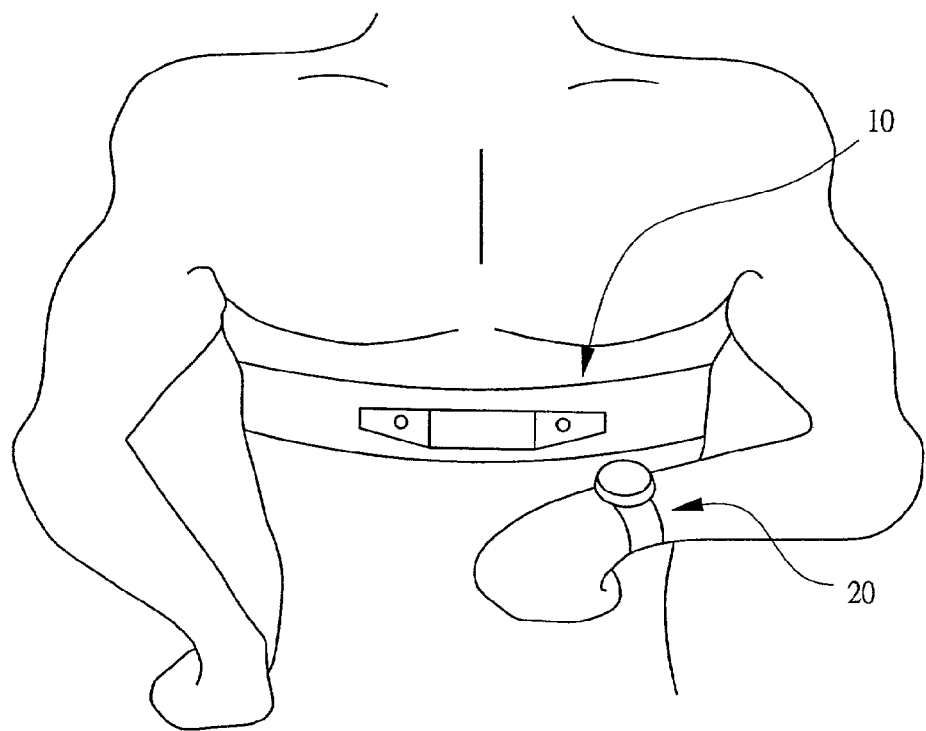


FIG.1

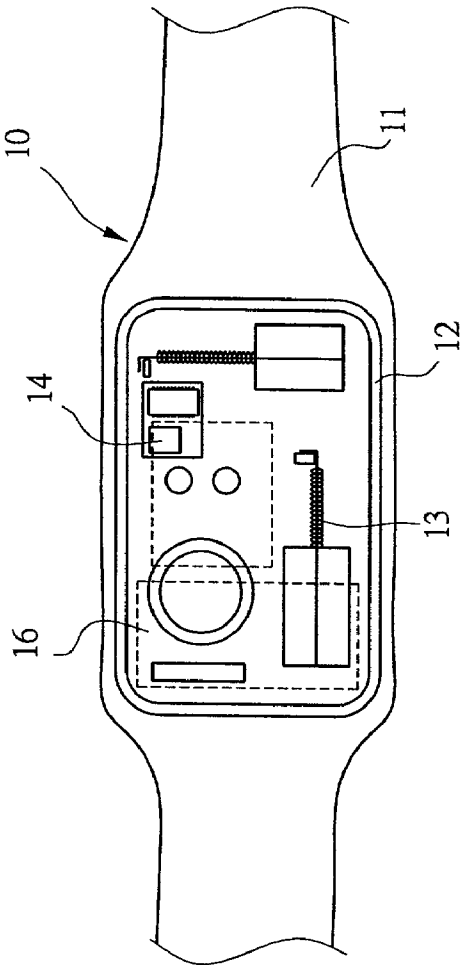


FIG.2

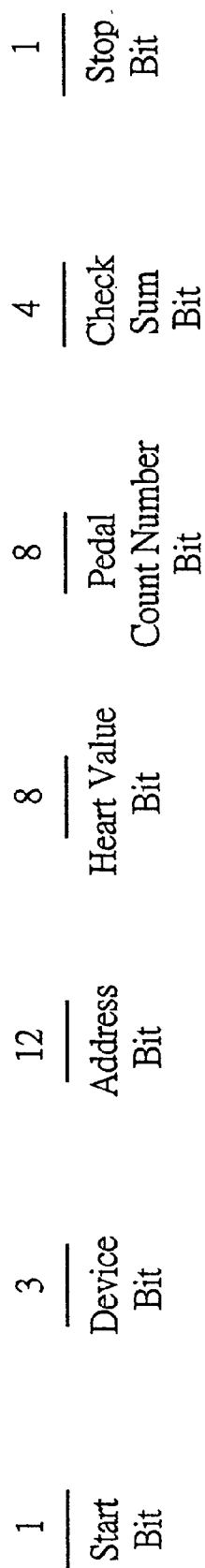


FIG.3

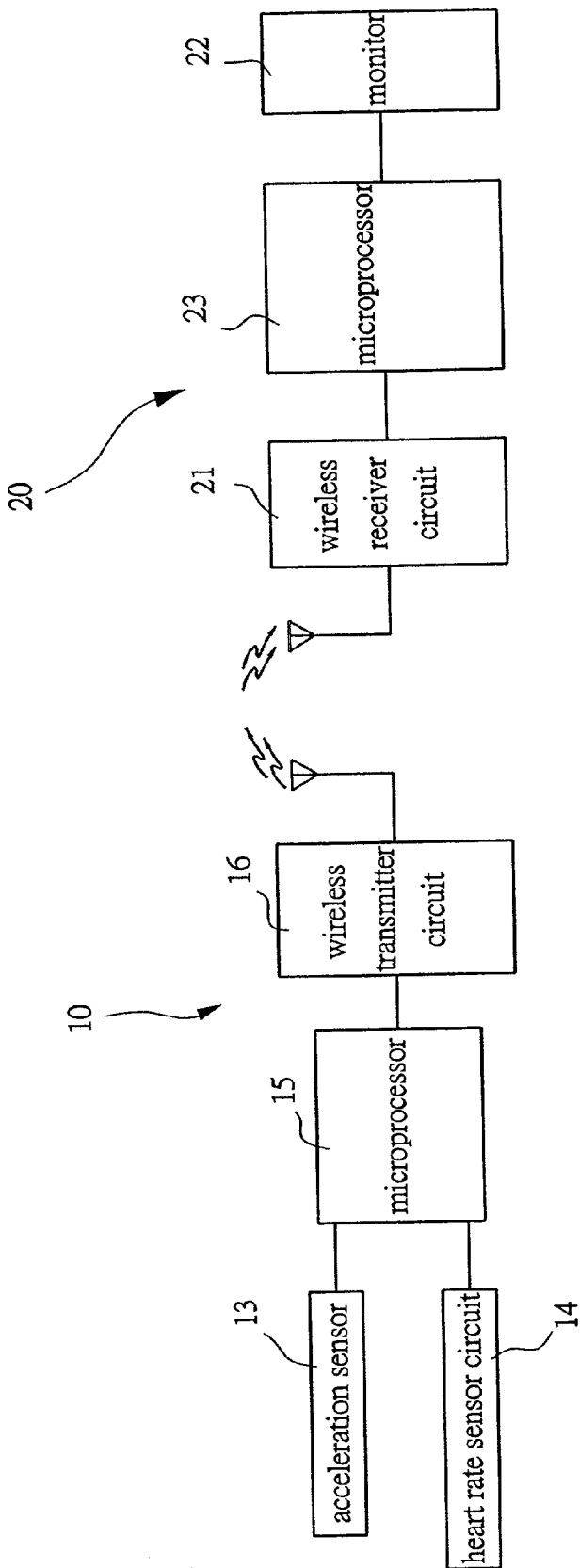


FIG.4

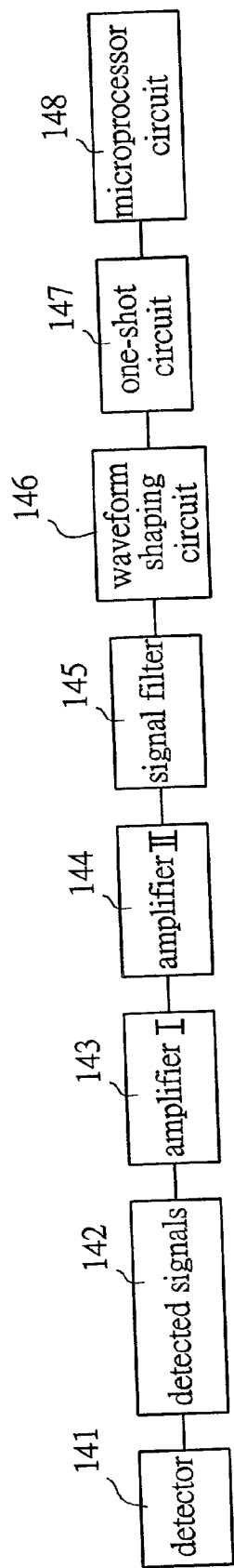


FIG.5

PACE CONTROL DEVICE

BACKGROUND OF THE INVENTION

[0001] I. Field of the Invention

[0002] This invention relates generally to a pace control device and, more specifically, to a pace control device which is to be attached to the chest when the user is doing exercise and can offer immediate measurements on the workout paces and the heart rate information to the user. The heart rate increases when the workout paces go up, and the heart rate decreases when the workout paces go down. The present invention detects and measures the workout paces and the heart rate and gives immediate feedback so that the user can track the aerobic exercise level and make necessary adjustment to achieve the desired heart rate target zone.

[0003] II. Description of the Prior Art

[0004] Heretofore, it is known to construct a heart rate monitor having a telemetry transmitter and a wireless receiver watch, as shown in **FIG. 4**. A heart rate monitor of such construction is to be attached to the chest of the user, with an EKG device measuring the heart rate and the telemetry transmitter transferring the data to the wireless receiver watch. The user can read the heart rate information from the monitor of the wireless receiver watch (U.S. Pat. No. 5,486,818).

[0005] Nonetheless, a heart rate monitor of this kind typically provides only heart rate information and does not give the feedback on the workout paces. Without the information on workout paces, the user would have difficulty tracking the aerobic exercise level and thus may not be able to keep the working in a safe zone and at the same time achieve the target zone.

[0006] It is also known to construct a heart rate monitor in terms of a pedometer, which measures workout paces and transmits these data to a data receiver watch through a wireless transmitting device. The user can read the data right from the monitor on the data receiver watch (refer to U.S. Pat. No. 6,160,480). Nonetheless, a heart rate monitor of this kind typically provides only feedback on the workout paces and does not give the heart rate information. In order to provide information on both workout paces and heart rate, two separate devices have to be combined so that the user would not have to carry both devices to obtain the desired information.

SUMMARY OF THE INVENTION

[0007] It is therefore a primary object of the invention to provide a pace control device measuring both the heart rate and the workout paces and transferring these data to a data receiver in a wireless manner. These data are to be displayed on the screen of the data receiver, based on which the user can adjust the working level to achieve competitive performance.

[0008] The present invention improves on the heretofore known heart rate monitor by providing a chest belt sensor device comprising an acceleration sensor, a heart rate sensor circuit (with the technique of EKG), a microprocessor and a wireless transmitter circuit. The chest belt sensor device is to be attached to the chest when the user is doing exercise. The acceleration sensor detects and measures the workout paces,

and the heart rate sensor circuit measures the heart rate, with both signals sent to the microprocessor to be encoded by the ID coded protocol. The encoded data are then transmitted by the wireless transmitter circuit to the data receiver. The data receiver comprises a wireless receiver circuit, a monitor, and a microprocessor with the ID coded protocol same as the one in the microprocessor of the chest belt sensor device. Once receiving data from the microprocessor of the chest belt sensor device, the data receiver displays the information on heart rate and workout paces on the monitor.

[0009] With the acceleration sensor measuring the workout paces and the heart rate sensor circuit measuring the heart rate, the information can be processed and passed wirelessly to the data receiver, where the user can read the information from the monitor, according to which the user can make adjustment on the working level to achieve the target zone.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] An embodiment of the invention will now be described by way of example only, with reference to the accompanying drawing, in which:

[0011] **FIG. 1** is a schematic drawing of an embodiment of the present invention;

[0012] **FIG. 2** is a schematic drawing of an acceleration sensor according to the present invention;

[0013] **FIG. 3** is a schematic drawing of ID coded protocol of the present invention;

[0014] **FIG. 4** is a circuit diagram showing the complete circuit according to the present invention.

[0015] **FIG. 5** is a circuit block diagram showing the heart rate sensor circuit according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0016] Refer from **FIG. 1** to **FIG. 4**, the present invention includes a chest belt sensor device and a data receiver **20**. The chest belt sensor device **10** consists of a chest belt **11** and a sensor shell **12** in the middle of the chest belt **11**. Inside the sensor shell **12** are an acceleration sensor **13**, a heart rate sensor circuit **14**, a microprocessor **15** and a wireless transmitter circuit **16**.

[0017] When chest belt sensor device **10** is attached to the chest of the user during exercise, the acceleration sensor **13** detects and measures the workout paces, and the heart rate sensor circuit **14** measures the heart rate. Both of the measures are passed to the microprocessor **15** to be encoded by the ID coded protocol (as shown in **FIG. 3**) and transmitted by the wireless transmitter circuit **16** to the data receiver **20**. The data receiver **20** comprises a wireless receiver circuit **21**, a monitor **22** and a microprocessor **23** with the same ID coded protocol as in the microprocessor **15** of the chest belt sensor device **10**. Once receiving the data, the data receiver **20** displays the information of paces and heart rate on the monitor **22** for the reference of users in order to adjust their working at an optimum level.

[0018] The acceleration sensor **13** is designed as having two dimensions (X- and Y-axis) or three dimensions (X-, Y- and Z-axis). As shown in **FIG. 2**, the acceleration sensor **13**

is installed inside the sensor shell **12** of the chest belt sensor device **10** and can accurately measure the workout paces during exercise. The data of workout paces are encoded and transmitted wirelessly to the data receiver **20**, where the user can read this information from the monitor **22** of the data receiver **20**.

[0019] Refer to **FIG. 5**, the heart rate sensor circuit **14** adopts the technique of EKG to measure heart rate, as shown in **FIG. 5**. The detected signals **142** obtained by the detector **141** are amplified by the signal amplifiers **143**, **144**, processed by the signal filter **145** and the waveform shaping circuit **146**, and transmitted out through the one-shot circuit **147** and the microprocessor **148**.

[0020] Also refer to **FIG. 4**, the chest belt sensor device **10** can recode two different signals with the same ID coded protocol and thus transmit the data in a wireless manner. The data receiver **20** can be in the form of a watch, a conventional pedometer or a pager.

[0021] The invention features on that the acceleration sensor **13** measures workout paces, and the heart rate sensor circuit **14** measures heart rate simultaneously. After being encoded by the microprocessor **15**, these measures are transmitted to the data receiver **20** and shown on the monitor **22**. Based on the information on both heart rate and workout paces, the user is able to make necessary adjustment to keep working at an optimum level.

[0022] While only one embodiment of the present invention has been shown and described, it will be understood that various modifications and changes could be made thereunto without departing from the spirit and scope of the invention disclosed.

What is claimed is:

1. A pace control device comprising a chest belt sensor device and a data receiver, said chest belt sensor device having an acceleration sensor, a heart rate sensor circuit, a microprocessor and a wireless transmitter circuit;

said data receiver having a wireless receiver circuit, a monitor and a microprocessor;

wherein said chest belt sensor device is attached to the chest of users, said acceleration sensor detects and measures workout paces of users while said heart rate sensor circuit measures heart rate of users; and both of signals of workout paces and heart rate are passed to said microprocessor of said chest belt sensor device, then being transmitted to the data receiver by said wireless transmitter circuit; once receiving the signal, said data receiver displays the information of workout paces and heart rate on said monitor.

2. A pace control device as claimed in claim 1, wherein said acceleration sensor is designed as having two dimensions (X- and Y-axis) or three dimensions (X-, Y- and Z-axis).

3. A pace control device as claimed in claim 1, wherein said chest belt sensor device and said data receiver having microprocessors with the same ID coded protocol.

4. A pace control device as claimed in claim 1, wherein said data receiver can be in the form of a watch, a pedometer or a pager.

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