UNITLESS ACTIVITY ASSESSMENT AND ASSOCIATED METHODS

RELATED APPLICATIONS

This application is a continuation of U.S. patent application Ser. No. 15/972,959 filed May 7, 2018 (now U.S. Pat. No. 10,376,015), which is a continuation of U.S. patent application Ser. No. 15/443,392 filed Feb. 27, 2017 (now U.S. Pat. No. 9,968,158), which is a continuation of U.S. patent application Ser. No. 14/298,454 filed Jun. 6, 2014 (now U.S. Pat. No. 9,578,927), which is a continuation of U.S. patent application Ser. No. 13/544,733 filed Jul. 9, 2012 (now U.S. Pat. No. 8,749,380), which is a continuation of U.S. patent application Ser. No. 13/034,311 filed Feb. 24, 2011 (now U.S. Pat. No. 8,217,788), which is a continuation of U.S. patent application Ser. No. 12/083,726 filed Apr. 16, 2008 (now U.S. Pat. No. 7,911,339), which is a 35 U.S.C. 371 National Phase entry of International Patent Application No. PCT/US2006/040970 filed Oct. 18, 2006, which claims priority to US Provisional Patent Application No. 60/728,031 filed Oct. 18, 2005. All of these earlier applications are incorporated herein by reference.

BACKGROUND

Shoes (including sneakers or boots, for example) provide comfort and protection for feet. More importantly, shoes provide physical support for feet to reduce risk of foot injuries. A shoe is often necessary to provide support during intense physical activity, such as running, soccer and American football. As a shoe wears, physical support provided by the shoe decreases, thereby reducing associated protection from injury. When a critical wear level is reached, even if the shoe looks like it is not particularly worn, the shoe may not provide adequate support and may, in fact, cause damage to feet.

SUMMARY

In one embodiment, a shoe wear out sensor includes at least one detector for sensing a physical metric that changes as a shoe wears out, a processor configured to process the physical metric, over time, to determine if the shoe is worn out, and an alarm for informing a user of the shoe when the sole is worn out.

In another embodiment, a system determines the end of a shoe's life. Use of the shoe is sensed by at least one detector. A processor is configured to measure the use of the shoe and to determine if the shoe is worn out. An alarm informs a user of the shoe when the shoe is worn out.

In another embodiment, a body bar sensing system includes a housing with at least one detector for sensing a physical metric that indicates repeated movement of the housing when attached to the body bar, a processor configured to process the physical metric, over time, to determine repetitions thereof, and a display for informing a user of the repetitions.

In another embodiment, a system assesses activity and displaying a unitless activity value and includes a detector for sensing activity of a user of the system, a processor for processing sensed activity data from the detector, a display for displaying the unitless activity value, and an enclosure for housing the detector and the processor. The processor periodically reads the sensed activity data from the detector and processes the data to generate an activity number, the number being used to generate the unitless activity value based upon a maximum number and a display range.

In another embodiment, a method determines a unitless activity value for a desired period of activity. A period accumulator is cleared prior to the start of the activity period. A detector is periodically sampled to obtain data that is processed to determine a number representative of the sampling period. The number is added to the period accumulator. The unitless activity value is then determined based upon the period accumulator, a maximum activity number and a display range. The unitless activity value is then displayed. The sampling, processing and adding are repeated until data is sampled for the desired period of activity.

In another embodiment, a method assesses activity unitlessly by detecting motion of a user, processing the detected motion, over time, to determine an activity value, ratioing the activity value to a maximum activity value, and reporting a scaled unitless activity value to the user based upon the ratio and a scale.

A software product has instructions, stored on computer-readable media, that, when executed by a computer, perform steps for determining a unitless activity value for a desired period of activity, including instructions for: detecting motion of a user, processing detected motion, over time, to determine an activity value, ratioing the activity value to a maximum activity value, and reporting a scaled unitless activity value to the user based upon the ratio and a scale.

BRIEF DESCRIPTION OF THE FIGURES

FIG. **1** shows one exemplary embodiment of a shoe wear-out sensor.

FIG. **2** shows one exemplary embodiment of a shoe with a shoe wear out sensor.

FIG. **3** shows another exemplary embodiment of a shoe with a shoe wear out sensor.

FIG. **4**A shows one exemplary process for determining shoe wear out.

FIG. **4**B shown one exemplary process for determining shoe wear out.

FIG. **4**C shows one exemplary process for determining shoe wear out.

FIG. **4**D shown one exemplary process for determining shoe wear out.

FIG. **5** shows one body bar sensing system embodiment.

FIG. **6** shows one part of an exemplary body bar with a body bar sensing system embodiment attached.

FIG. **7** shows one part of a body bar in an embodiment showing a weight and a body bar sensing system that secures the weight onto the body bar.

FIG. **8** shows one exemplary process for reporting body bar usage.

FIG. **9** shows an embodiment of a sensor that unitlessly assesses activity.

FIG. **10** shows a process for unitlessly determining activity.

DETAILED DESCRIPTION OF THE FIGURES

FIG. **1** shows one shoe-wear out sensor **100**. Sensor **100** includes a processor **102**, a detector **104** and an alarm **106**. A battery **108** may be used to power processor **102**, detector **104** and alarm **106**; alternatively, a magnetic coil generator (not shown) or other mechanical motion-to-electricity conversion device may be employed with sensor **100** to power these elements. Detector **104** is for example an accelerometer and/or a force sensing resistor (FSR). Alarm **106** is for