burden on his or her condition. It should be noted that haptic monitor can be particularly helpful for at-risk people who would like to exercise but need to monitor their health during exertion. It should be noted that some sensors may be implanted under the skin.

[0026] Haptic device **202**, in one embodiment, can include multiple units wherein some of the units may be located in the chest, wrist, foot, and/or the like to generate more realistic warning signals. Haptic device **202** is capable of generating haptic cues or haptic warning signals at different levels of intensities for different levels of exertion rates. For example, haptic device **202** generates a minor haptic cue reminding the user has a slight abnormality while an intensified haptic cue warns the user that his or her physical condition is in a danger zone. Using tactile feedback to indicate the user's physiological conditions is a subtle, discreet, and non-intrusive communication method.

[0027] Haptic device **202**, in another embodiment, is configured to provide subtle tactile cues for various alerts to users who want more discreet and subtle notification(s) than an overt notification(s) such as audible alarm and/or viewable lights. For example, a small haptic device **202**, which can be worn or attached to any part of the user's body, is used to provide subtle haptic information without others perceiving the notification. A diabetic, for instance, may use haptic device **202**, which may be incorporated into the user's watch band, capable of providing subtle vibrations to remind the user to take the insulin. Haptic device **202** can also be useful for elderly persons who may have trouble remembering things but would want to be reminded in a more subtle manner. In an alternative scenario, a parent, who is in a meeting, may receive a subtle notification from haptic device **202** indicating his or her child is home/not home without interrupting the meeting. It should be noted that haptic devices **202** can be incorporated into everyday things such as clothing, glasses, and belts.

[0028] FIG. **3** illustrates a diagram **210** showing a shoe having a haptic device capable of correcting strides related abnormalities in accordance with one embodiment of the present invention. In one embodiment, the shoe includes a front sensor **216**, a back sensor **212**, and a sole sensor **214**. Sensors **212-216** are used to detect strides related abnormalities associated with the user. It should be noted that the underlying concept of the embodiment of the present invention would not change if additional sensors or devices were added to or removed from the shoe.

[0029] Diagram **250** illustrates a sole of the shoe having various sensors **252-256** used for analyzing the user's stride. For example, sensor **252** is used to sense the weight exerted on the back right-hand side of the sole while sensor **256** is used to detect the pressure exerted on the front left-hand side of the sole. From the data collected from sensors **252-256**, haptic device associated with the shoe is capable of identifying the abnormalities associated with the user's strides. In an alternative embodiment, the haptic device associated with the shoe is capable of providing tactile feedback to assist in correcting the abnormalities in real-time. For example, sensor **254**, which is also a haptic actuator, generates a tactile cue when it detects an abnormal amount of exertion on the front right-hand side of the sole.

[0030] A small haptic mechanism incorporated in a pair of running (or training) shoes may be used to provide haptic cues to the user to improve specific elements of running such as strides. To correct stride abnormalities, the haptic device can provide immediate tactile feedback to the user indicating the location of the abnormalities. For example, the shoe could vibrate with greater intensity if the person is putting too much weight on the outside of the shoe or bringing his heel down too forcefully. The exemplary embodiment of the present invention can also be applied to medically disabled patients such as cerebral palsy patients who need assistance to improve their walk.

[0031] It should be noted that sensors and haptic actuators can be the same device. It should be further noted that vibrotactile feedback or haptic feedback may be provided through a piezo materials, shape memory alloy ("SMA"), eccentric rotating mass ("ERM") or linear resonant actuator ("LRA"), or the like. Piezoelectric material, in one embodiment, may be used to construct a sensor and actuator device.

[0032] Some materials such as piezoelectric material have the physical property of sensing as well as providing vibrotactile effect. For example, piezoelectric material discharges a current indicating it detected a pressure when its physical shape deforms due to a pressure. The dimension of piezoelectric material can be reduced to a relatively small size such as 5 millimeters by 5 millimeters. Piezoelectric materials, in one embodiment, include crystals and/or ceramics such as quartz (SiO_2). When a voltage potential applies to the piezoelectric material, it deforms from its original shape to an expanded shape. Piezoelectric material may return to its original state as soon as the voltage potential is removed. Piezoelectric material, however, releases a current when it is being pressed. As a result, piezoelectric material can detect an input when it is being pressed. Similar functions of sensor/actuator may be performed if the piezoelectric material is replaced with other devices such as LRA, ERM, and SMA, wherein SMA, for example, is capable of maintaining its deformed shape for a period of time after the voltage potential is removed. It should be noted that the underlying concept of the embodiments of the present invention does not change if different materials other than piezoelectric actuators are employed.

[0033] FIG. **4** is a block diagram **300** illustrating a woman **302** wearing a haptic ambient warning device **306** capable of detecting moving object(s) in accordance with one embodiment of the present invention. Haptic ambient warning device **306** is configured to selectively generate haptic warning cues when one or more moving objects are detected in the surrounding environment. For example, haptic wearable device **306**, which provides tactile cues to the head, neck or shoulder, generates haptic alert or alerts to user **302** if it detects a vehicle or a person **304** in the ambient environment and approaching quickly to the user.

[0034] In another embodiment, haptic wearable device **306** is capable of emulating a natural human response or natural feelings such as "hair raising on the back of the neck" physiological response to potential danger. Natural human response means a person's natural reaction when he or she senses certain excitements or dangers. The expression of "hair raising on the back of the neck" indicates a natural and curious phenomenon. The movement of hair on the back of the neck is generally involuntary. When you experience something that causes the hair active, which you don't have any control, you just have that feeling that you're in the middle of something exciting. It should be noted that multiple actuators may be used to emulate a natural realistic sensation.

[0035] Haptic device **306** can also be used by a driver to monitor ambient environment for traffic situations. For example, haptic device can provide warning information