METHOD AND APPARATUS FOR PROVIDING COMMUNICATONS WITH HAPTIC CUES

FIELD

[0001] The exemplary embodiment(s) of the present invention relates to the field of electronic communications. More specifically, the exemplary embodiment(s) of present invention relates to communications using haptic feedbacks.

BACKGROUND

[0002] As computer-based systems, such as monitoring systems, training systems, game consoles, appliances, personal computers ("PCs"), servers, personal digital assistants ("PDAs"), cellular phones, become more prevalent in recent years, intuitive human-machine communications have become increasingly important. Human-machine communications generally can be categorized into user interface device and machine interface device, wherein user interface device provides a mechanism for a user to talk to a machine while machine interface device is a mechanism for a machine to talk to a user. Many conventional user interface devices have been well developed over the years, such as keyboard, voice recognition, touch panel, joystick, and the like. Machine interface, however, is typically limited to audible cues and visual cues.

[0003] An audible cue typically is a sound or voice initiated by a machine or a computer to notify or to respond to a user's request(s). For example, audible cues may be a beep, a voice, a ring, etc. and it is used to remind, acknowledge, and/or warn the user(s). Audible cues have been effectively used by the machines to communicate with the user(s). For example, a machine initiates a beep when a user tries to choose a menu item that is currently not available.

[0004] A visual cue typically includes a graphical cue or a textual cue enabling a machine to communicate to a user. Visual cues typically allow users to see the results of their interaction with the machine or computer immediately. For example, when a user clicks to open a file, the computer responds to user's click by providing context of the file in a text format on the display. Graphical cues typically assist and/or indicate user actions. For example, a cursor on a screen is a graphical cue to indicate or assist user action.

[0005] A problem associated with machine interface is that audible cues are not effective in certain scenarios while visual cues may not be available in some occasions. For example, a marathon runner may have a difficult time noticing visual cues via a display. Also, the runner may not be able to notice audible cues in a noisy environment.

SUMMARY

[0006] A haptic system capable of generating haptic cues in accordance with one or more detected events is disclosed. After sensing a predefined event or events via a component such as a sensor, a process of the haptic system generates an input in accordance with the sensed event. The component, for example, may include a sensor, multiple sensors, or a combination of sensors and haptic actuators. Upon receipt of the input from the component, the process retrieves a haptic signal from a tactile library in response to the input. If the sensor is a separate unit from the haptic system, a wireless network is used to transfer the information. A haptic feedback as a haptic cue in accordance with the haptic signal is generated.

[0007] Additional features and benefits of the exemplary embodiment(s) of the present invention will become apparent from the detailed description, figures and claims set forth below.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The exemplary embodiment(s) of the present invention will be understood more fully from the detailed description given below and from the accompanying drawings of various embodiments of the invention, which, however, should not be taken to limit the invention to the specific embodiments, but are for explanation and understanding only.

[0009] FIG. **1** is a diagram illustrating a runner wearing a haptic pacing system in accordance with one embodiment of the present invention;

[0010] FIG. **2** is a diagram illustrating a person wearing a haptic device in accordance with one embodiment of the present invention;

[0011] FIG. **3** illustrates a diagram showing a haptic shoe capable of correcting strides relating to abnormalities in accordance with one embodiment of the present invention;

[0012] FIG. **4** is a diagram illustrating a person wearing a haptic ambient warning device capable of detecting moving object in accordance with one embodiment of the present invention; and

[0013] FIG. **5** is a flowchart illustrating a process of providing haptic cues in response to one or more events in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION

[0014] Embodiments of the present invention are described herein in the context of a method, system and apparatus for providing haptic cues in response to one or more events using an attachable haptic device.

[0015] Those of ordinary skilled in the art will realize that the following detailed description of the present invention is illustrative only and is not intended to be in any way limiting. Other embodiments of the present invention will readily suggest themselves to such skilled persons having the benefit of this disclosure. Reference will now be made in detail to implementations of the exemplary embodiments of the present invention as illustrated in the accompanying drawings. The same reference indicators (or numbers) will be used throughout the drawings and the following detailed description to refer to the same or like parts.

[0016] In the interest of clarity, not all of the standard hardware and routine features of the implementations described herein are shown and described. It will, of course, be appreciated that in the development of any such actual implementation, numerous implementation-specific decisions must be made in order to achieve the developer's specific goals, such as compliance with application- and business-related constraints, and that these specific goals will vary from one implementation to another and from one developer to another. Moreover, it will be appreciated that such a development effort might be complex and time-consuming, but would nevertheless be a routine undertaking of engineering for those of ordinary skilled in the art having the benefit of this disclosure.