HAPTIC COMPUTER INTERFACE

BACKGROUND INFORMATION

[0001] Touch screens have become an increasingly popular interface for a variety of devices. The ability of the touch screen to display indicia corresponding to a variety of interfaces accommodates multiple user interfaces through a single compact device. This allows different interfaces to be displayed for compact mobile devices such as cell phones, personal digital assistants (PDAs), digital audio players and other devices. These devices are designed to be mobile and are frequently used in transit such as while a user is driving, walking, running and under other challenging conditions. The use of a touch screen generally provides a flat surface with no tactile feedback to a user. The touch screen thus requires a user to look at the display of the touch screen in order to determine the positioning of displayed keys, buttons and other controls. The required viewing of the touch screen controls can be especially demanding if a user is attempting to control a device while a user is driving, running, working out or engaged in other activities which require the user's attention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0002] In order to facilitate a fuller understanding of the exemplary embodiments, reference is now made to the appended drawings. These drawings should not be construed as limiting, but are intended to be exemplary only.

[0003] FIG. **1** is a haptic computer interface, according to an exemplary embodiment.

[0004] FIG. **2** is a haptic computer interface, according to an exemplary embodiment.

[0005] FIG. **3** is a flowchart depicting a method for providing haptic computer interface, according to an exemplary embodiment.

[0006] FIG. **4** is a haptic computer interface, according to an exemplary embodiment.

[0007] FIG. **5** is a haptic computer interface, according to an exemplary embodiment.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0008] An exemplary embodiment provides a haptic computer interface which provides tactile feedback allowing a user of the interface to sense by touch one or more interface input controls. The haptic computer interface may enable a user of a touch screen interface to identify and distinguish one or more controls of the interface without visual confirmation by the user.

[0009] FIG. **1** is an haptic computer interface, according to an exemplary embodiment. Display **110** may represent an organic light emitting diode display such as a polymer light emitting diode or another display capable of being constructed on a flexible substrate. Display **110** may also contain touch screen functionality such as a resistive touch screen panel, a capacitive touch screen panel or other touch screen technologies to accept input from a user. Alternatively display **110** may function simply as a display without detecting user input.

[0010] Tactile panel **120** may contain one or more buttons **130**. In one or more embodiments, tactile panel **120** may be composed of a flexible material or membrane which may contain portions raised by one or more actuators to create one or more buttons **130**. Tactile panel **120** may be composed of a material such as rubber, plastic or other materials containing one or more portions preformed to create one or more buttons **130**. When combined with display **110**, buttons **130** of tactile panel **120** may cause display **110** to contain one or more raised portions. The resulting one or more raised portions may correspond to controls in the display. The number, shape, functionality, behavior and other attributes of the raised portions may vary according to the desired controls of the interface. In one or more embodiments, a device using the haptic computer interface may vary the number and/or the position of raised portions dynamically using actuators to raise or lower one or more buttons **130**. For example, a device may present 12 or more buttons for a standard telephone interface, or may present 6 buttons for a media player interface.

[0011] In other embodiments, tactile panel **120** may be composed of a rigid material with one or more openings. When combined with display **110**, tactile panel **120** may cause display **110** to contain one or more depressions in the surface of the display which may indicate the positioning of controls.

[0012] One or more buttons **130** may depress when force is applied to them by a user and may provide tactile feedback to the user that a button has been successfully pressed. In one or more embodiments, buttons **130** may not depress and may serve only as a positioning guide for a user to determine the position of controls on display **110** without using visual confirmation. In one or more embodiments, buttons **130** may be depressions in the surface of display **110**. Buttons **130** may be rounded dome shaped buttons, oval buttons, rectangular buttons, or other shapes providing tactile feedback to the user of the interface.

[0013] The controls of the haptic computer interface may be contained in a touch screen which may be resistive touch screen panel, a capacitive touch screen panel or other touch screen technology built into display **110**. In some embodiments, buttons **130** may be present for tactile feedback only and user input may be accepted by touch screen functionality of display **110**. In one or more embodiments, one or more buttons **130** may activate a corresponding switch and the display **110** may not contain touch screen technology. In other embodiments, buttons **130** may accept input when pressed and display **110** may also contain touch screen technology. In such embodiments, a user may press lightly on a button and the touch screen may signal one input. Pressing harder on the button may depress the button and cause a second input. The two inputs may correspond to different functionalities. For example, a light touch on a button which may only register on a touch screen may signal a click on an object in the display. A harder touch may depress the button and may signal a double click on an object in the display.

[0014] Buttons, raised surfaces, or indentations may be caused by the raising or lowering of one or more surfaces in a tactile feedback layer. The one or more surfaces may be raised or lowered in response to a command from a controller which may signal a servomechanism or servo to raise or lower one or more surfaces. For example a servo may use a motor and one or more actuators to raise or lower one or more surfaces.

[0015] The various components as shown in FIG. **1** may be further duplicated, combined and/or integrated to support various applications and platforms. Additional elements may also be implemented in the systems described above to support various applications.