USER INTERFACE ENHANCEMENT SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/223,004, filed on 3 Jul. 2009 and entitled "User Interface System", which is incorporated in its entirety by this reference.

[0002] This application is related to U.S. application Ser. No. 11/969,848 filed on 4 Jan. 2008 and entitled "System and Method for Raised Touch Screens", and U.S. application Ser. No. 12/319,334 filed on 5 Jan. 2009 and entitled "User Interface System", which are both incorporated in their entirety by this reference.

TECHNICAL FIELD

[0003] This invention relates generally to touch sensitive user interfaces, and more specifically to a new and useful mountable systems and methods for selectively raising portions of touch sensitive displays.

BACKGROUND

[0004] Touch sensitive displays, e.g., touch screens, are able to provide a dynamic user input interface and are useful in applications where the user interface is applied to a variety of uses, for example, in a universal remote control where the user interface may change to adapt to the device that is being controlled by the user or in a cellular phone with multiple functionalities. However, unlike a static user input interface with a dedicated input device, such as a keypad with discrete well-defined keys, most touch sensitive displays are generally flat. As a result, touch sensitive displays do not provide many of the tactile guidance that may be seen and/or felt in static user interfaces. The importance of tactile guidance is readily apparent in the competition between Apple's iPhone and RIM's Blackberry products. Without tactile guidance, several disadvantages exist; for example, the user may have difficulty distinguishing one input selection from another without keeping their eye on the display or have difficulty determining where to place their finger when entering an input. Many electronic devices such as smartphones, remote controls, personal navigation devices, cellular phones, and portable gaming devices are increasing in functionality, and it is becoming increasingly more difficult for manufacturers to provide a static user interface that can adapt to the various functions of each device. In an attempt to provide a better user experience, many electronic devices are increasingly using touch sensitive displays to provide a dynamic user interface that can adapt to the various functions of each device, thus there are a significant number of commonly available electronic devices that rely on a touch sensitive display as the main user input receiving device and lack the tactile guidance of a mechanical keypad. This invention provides a new and useful user interface that may be appended to such a device to provide tactile guidance.

BRIEF DESCRIPTION OF THE FIGURES

[0005] FIGS. **1***a* and **1***b* are a top view of the user interface system of the preferred embodiments and a cross-sectional view illustrating the operation of a button array in accordance to the preferred embodiments, respectively.

[0006] FIGS. **2***a* and **2***b* are schematic views of the user interface system of the preferred embodiments coupled to a device.

[0007] FIGS. **3***a*, **3***b*, and **3***c* are cross-sectional views of the retracted, expanded, and user input modes of the preferred embodiments, respectively.

[0008] FIGS. **4***a* and **4***b* are cross-sectional views of a second variation of the sheet with a combination of a channel and a cavity and a third variation of the sheet with a split layer portion and a substrate portion.

[0009] FIGS. **5** and **6** are schematic views of variations of the attachment component of the preferred embodiments.

[0010] FIGS. **7***a* and **7***b* are cross-sectional views of the sheet, the cavity, and a displacement device of the first preferred embodiment that modifies the existing fluid in the cavity, with the cavity in a retracted volume setting and an expanded volume setting, respectively.

[0011] FIG. **8** is a schematic view of the sheet, the cavity, and a displacement device of a first example of the first preferred embodiment that displaces additional fluid into the cavity.

[0012] FIG. **9** is a schematic view of the sheet, the cavity, and a displacement device of a second example of the first preferred embodiment that displaces additional fluid into the cavity.

[0013] FIGS. **10***a* and **10***b* are schematic views of the sheet, the cavity, and a displacement device of a third example of the first preferred embodiment that displaces additional fluid into and out of the cavity, with the cavity in a retracted volume setting and an expanded volume setting, respectively.

[0014] FIGS. **11***a*, **11***b*, **12***a*, and **12***b* are schematic views of the displacement device of a first and second example of a first variation of the second preferred embodiment.

[0015] FIGS. **13***a* and **13***b* are schematic views of the displacement device of a second variation of the second preferred embodiment.

[0016] FIGS. **14**, **15** are schematic views of the displacement device of a first version of a first example of the third variation of the second preferred embodiment.

[0017] FIG. **16** is a schematic view of the displacement device of a second version of the first example of the third variation of the second preferred embodiment.

[0018] FIGS. **17***a*, **17***b*, **18***a*, and **18***b* are schematic views of the displacement device of a third version of the first example of the third variation of the second preferred embodiment.

[0019] FIGS. **19***a*, **19***b*, **20***a*, and **20***b*, are schematic views of the locking mechanism of a first and second example in the disengaged and engaged states, respectively.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0020] The following description of the preferred embodiments of the invention is not intended to limit the invention to these preferred embodiments, but rather to enable any person skilled in the art to make and use this invention.

[0021] As shown in FIGS. **1** and **2**, the user interface enhancement system **100** of the preferred embodiments is preferably used to enhance the user interface of a touch interface device **10**, as shown in FIG. **2**. The user interface enhancement system **100** of the preferred embodiments preferably includes a sheet **102** that defines a surface **115** and at least partially defines a fluid vessel **127**; a volume of fluid **112** contained within the fluid vessel **127** that cooperates with the sheet **102** to transmit an image through the sheet **102** without