USER INTERFACE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of US Provisional Application number 61/405,140, filed 20 Oct. 2010, 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", U.S. application Ser. No. 12/319,334 filed on 5 Jan. 2009 and entitled "User Interface System", and U.S. application Ser. No. 12/497,622 filed on 3 Jul. 2009 and entitled "User Interface System", which are all incorporated in their entirety by this reference.

TECHNICAL FIELD

[0003] This invention relates generally to the user interface field, and more specifically to a new and useful user interface in the touch-based interface field.

BACKGROUND

[0004] Touch-sensitive displays (e.g., touch screens) allow users to input commands and data directly into a display, which may be particularly useful in a variety of applications. Common applications for touch screens include consumer products such as cellular telephones and user interfaces for industrial process control. Depending on the specific application, these touch-sensitive displays are commonly used in devices ranging from small handheld PDAs, to medium sized tablet computers, to large industrial implements. It is often convenient for a user to input and read data on the same display. Unlike 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 screens do not provide significant tactile guidance for one or more control "buttons". Instead, touch-sensitive displays rely on visual cues (e.g., displayed images) to guide user input.

[0005] Hence a serious drawback of touch-sensitive displays is the inherent difficulty a user faces when attempting to input data accurately because adjacent buttons are not distinguishable by feel. Improper keystrokes are common, which typically forces the user to focus both on the keypad (to properly input the next keystroke) and on the text input line (to check for errors); generally, the user is forced to keep his or her eyes on the display. The importance of tactile guidance is readily apparent in the competition between the Apple's iPhone and RIM's BlackBerry 8800. Touch-sensitive displays and physical hard buttons each have benefits and drawbacks, and digital devices generally incorporate one such component or the other.

[0006] Thus, there is a need in the touch-based interface field to create a new and useful interface, for a digital display, that incorporates tactile guidance for one or more control buttons.

BRIEF DESCRIPTION OF THE FIGURES

[0007] FIG. **1** is a schematic representation of a preferred embodiment of the user interface system with a proximal reservoir;

[0008] FIG. **2** is a schematic representation of an embodiment of the user interface system with in an expanded state;

[0009] FIG. **3** is a schematic representation of an embodiment of the user interface system with a permeable layer defining a support surface with a concave contour proximal to the second region;

[0010] FIGS. **4**A and **4**B are schematic representations of an embodiment of the user interface system with a porous permeable layer and without and with a reservoir, respectively;

[0011] FIG. **5** is a schematic representation of an embodiment of the user interface system with a with a proximal reservoir and a remote reservoir;

[0012] FIG. **6** is a schematic representation of an embodiment of the user interface system with a proximal reservoir and a displacement device that is an electrical pump;

[0013] FIG. **7** includes schematic representations of various operable states of the preferred embodiment of the user interface system;

[0014] FIG. **8** is a perspective view of the preferred embodiment, incorporated into an electronic device with a digital display, and a flowchart of the operation of the preferred embodiment therein; and

[0015] FIG. **9** is a perspective view of the preferred embodiment and a flowchart of the operation of the preferred embodiment therein.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0016] 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.

[0017] As shown in FIG. **1**, the user interface system **100** of the preferred embodiment includes: a volume of fluid **110**; a tactile layer **120**; a retaining wall **130**; a permeable layer **140**; a displacement device **150**; and a touch sensor **160**. The tactile layer **120** defines an outer tactile surface **124** touchable by a user and a back surface **125** opposite the tactile surface **124**; the tactile layer **120** further includes a first region **121** and a second region **122**, wherein the second region **122** is operable between: a retracted state, wherein the second region **122** is substantially flush with the first region **121**; and an expanded state, wherein the second region **122** is substantially proud of the first region **121**. The retaining wall **130** is substantially impermeable to the fluid **110**. The permeable layer **140**, interposed between the tactile layer **120** and the retaining wall **130**, is joined to the back surface **125** of the first region **121** and defines a support surface **142** below the second region **122**; the permeable layer **140** further includes a plurality of fluid ports **144** that communicate a portion of the fluid **110** through the permeable layer **140** to the back surface **125** of the second region **122**. The displacement device **150** cooperates with the retaining wall **130** to direct a portion of the fluid **110** through the fluid ports **144** to the back surface **125** to transition the second region **122** from the retracted state to the expanded state. The touch sensor **160** is coupled to the retaining wall **130** and detects a user touch on the tactile surface **124**. The user interface system **100** may further comprise: a reservoir **170** that contains a portion of the volume of fluid **110**; a digital display **190** that transmits an image to the user; an attachment point **180** that joins the tactile layer **120** to the permeable layer **140**; and/or a pressure sensor that detects ambient air pressure proximal to the user interface system **100**.