USER INTERFACE SYSTEM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 61/313,054, filed on 11 Mar. 2010, and U.S. Provisional Application No. 61/313,064, filed 11 Mar. 2010, which are incorporated in their 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", U.S. application Ser. No. 12/652,708 entitled "User Interface System" filed on 5 Jan. 2010, and U.S. application Ser. No. 12/652,704 entitled "User Interface System" filed on 5 Jan. 2010, which are all incorporated in their entirety by this reference.

BRIEF DESCRIPTION OF THE FIGURES

[0003] FIG. **1** is a schematic representation of the system of the preferred embodiments as applied to a device.

[0004] FIGS. **2**, **3***a*, **3***b*, and **4** are schematic representations of variations of the first and second deformable layers of the user interface system.

[0005] FIG. **5** is a schematic representation of a variation of the arrangement of the first and second deformable layers of the user interface system.

[0006] FIGS. **6**, **7**, **8***a*, **8***b*, **9***a*, **9***b*, and **10** are schematic representations of variations of the deformation of the second deformable layer when applied to a device.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0007] 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.

The System of the Preferred Embodiments

[0008] As shown in FIGS. **1** and **2**, the user interface system **100** of the preferred embodiments comprises a first deformable layer **200** that includes a first sheet **202** that defines a first surface **215**, a first fluid vessel **227** arranged underneath the first surface, and a first volume of fluid **212** contained within the first fluid vessel **227** that is manipulated to deform a first particular region **213** of the first surface **215** to receive a user input; a second deformable layer **300** that includes a second sheet **302** that defines a second surface **315**, and a second volume of fluid **312** contained within the second fluid vessel **327** that is manipulated to deform a second particular region **313** of the second surface **315** to change the shape of the device; and a displacement device **130** coupled to at least one of the first and second fluid vessels **227** and **327** and configured to manipulate at least one of the first and second volumes of fluid **212** and **312**, thereby deforming at least one of the first and second particular regions **213** and **313**.

[0009] The user interface system **100** is preferably applied to a device **10** (as shown in FIGS. **1** and **5**-**10**). The first deformable layer **200** preferably functions as the touch interface system that is applied to the device **10** where tactile guidance is to be provided to the user, such as a touch sensitive display, any other type of sensor or display, or any other suitable device as described in 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," and the second deformable layer **300** preferably functions as an accessory interface system that provides any other suitable tactile experience related to the device **10**. For example, the second deformable layer **300** may function to provide information to the user such as a tactile communication to the user to indicate the occurrence of an event or a tactile locator for a feature of the device (such as the speaker or the volume button as shown in FIG. **6**); to provide protection for the device (such as a bumper to protect the device or "feet" that support the device when placed on a surface, as shown in FIGS. **7** and **8**); to change the orientation of the device (such as when the device is placed on an unlevel surface, as shown in FIG. **9**); to provide a visual aesthetic (such as to provide a decoration on the device **10** or to provide an aesthetic enhancement to the logo of the company manufacturing and/or designing the device **10**, as shown in FIG. **10**); or any other suitable tactile experience related to the device **10**. The device **10** is preferably an electronic device such as a cellular phone, a media player, a laptop, a computer, a camera, television, automated teller machine, or any other suitable device. Alternatively, the device **10** may be an interface component of a larger device, for example, the steering wheel of a vehicle or the center control console of a vehicle. However, the device **10** may be any other suitable device.

[0010] The first and second deformable layers may be arranged in any suitable arrangement along the surfaces of the device **10**. For example, the first deformable layer **200** may be arranged on the main touch interface surface of the device **10** while the second deformable layer **300** is arranged on a side face of the device **10** and/or on a face opposite the main touch interface surface where a volume button, camera button, an on/off button, a ringer on/off switch, or any other suitable feature may be located, as shown in FIGS. **1** and **7**. Alternatively, the second deformable layer may be located on the same face as the first deformable layer, for example, the second deformable layer may be located along the perimeter of the first deformable layer as shown in FIGS. **5** and **8** or exterior to one edge of the first deformable layer, as shown in FIGS. **6** and **10**, or in any other suitable arrangement. Alternatively, the first and second deformable layers **200** and **300** may both be of the touch interface system as described in 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," The first and second deformable layers **200** and **300** may be applied to the same display and/or touch sensitive display, but may also be applied to devices **10** that include two displays and/or touch sensitive displays (for example, dual screen laptops, or handheld game consoles). However, the first and second deformable layers **200** and **300** may be any other suitable type of system.

[0011] The first and second deformable layers are preferably structurally similar. In particular, the first and second sheets **202** and **302** are preferably substantially identical. Each of the first and second sheets **202** and **302** may include a first and second layer portion **210** and **310**, respectively, that are substantially similar, and a first and second substrate portion **220** and **320**, respectively, that are substantially similar. The first and second layer portions **210** and **310** preferably