

displacement device **130** to expand the second cavity **125b**. For example, the button may be a slider with a first slider position to signal no expansion, a second position to signal expansion of the cavity **125**, a third position to signal expansion of the second cavity **125b**, and/or a fourth position to signal expansion of both the cavities **125** and **125b**. The slider may alternatively include a first slider position to signal no expansion, a second position to signal a first degree of expansion of the cavity **125**, and a third position to signal a second degree of expansion of the cavity **125**. The slider of this variation may be used to indicate the range of degrees of expansion available with the displacement device **130**. Alternatively, the user interface enhancement system **100** may include a second button that functions to signal to the displacement device **130** to expand the second cavity **125b**. However, any other suitable user interface may be used to allow the user to selectively expand the cavity **125** and/or the second cavity **125b** electrically.

[0053] The user preferably actuates the expansion of the cavity **125** when he or she desires tactile guidance, for example, the user may be performing an activity where it is difficult or undesirable to keep their eye on the device **10** (for example, while typing at substantially high-speeds or while driving). In another example, the device **10** may be low on portable power and the display may be dimmed to conserve power, resulting in the lack of visual cues and the need for the alternative of tactile guidance. In such situations, the user actuates the expansion of the cavity **125** to obtain tactile guidance that allows them to use the device **10** without visual guidance. The user may also configure the level of expansion of the cavity **125**. The user may also configure the user interface enhancement system **100** to expand the cavity **125** upon activation of the device **10** or they may configure the cavity **125** to remain expanded whether the device **10** is on or off. In the variation wherein the user interface enhancement system **100** includes a second cavity **125b**, the user also selects whether to actuate the expansion of the cavity **125** or the second cavity **125b**, or both. However, any other suitable usage scenario may be applicable.

[0054] As a person skilled in the art will recognize from the previous detailed description and from the figures and claims, modifications and changes can be made to the preferred embodiments of the invention without departing from the scope of this invention defined in the following claims.

We claim:

1. A user interface enhancement system, for a touch interface device, comprising:

a substrate comprising an attachment face and a support member continuous with the attachment face, the substrate defining a fluid channel configured to communicate fluid through the support member;

a tactile layer comprising an outer tactile surface and a back surface opposite the tactile surface, the back surface coupled to the attachment face at an undeformable region of the tactile layer, the back surface adjacent to and disconnected from the support member at a deformable region of the tactile layer, wherein the deformable region is of a thickness at least as great as a width dimension of the fluid channel, and wherein the support member limits inward deformation of the deformable region due to a force applied to the tactile surface;

a displacement device configured to displace fluid through the fluid channel and toward the back surface of the deformable region to transition the deformable region

from a retracted setting to an expanded setting, wherein the expanded setting is tactilely distinguishable from the retracted setting at the tactile surface; and

an attachment component configured to removably couple the substrate adjacent to the touch interface device.

2. The user interface enhancement system of claim **1**, wherein the attachment component is configured to substantially encase a portion of the touch interface device.

3. The user interface enhancement system of claim **1**, wherein the attachment component is configured to couple the substrate over a touch-sensitive display of the touch interface device.

4. The user interface enhancement system of claim **3**, wherein the attachment component is configured to transiently mount the substrate over a portion of the touch-sensitive display.

5. The user interface enhancement system of claim **1**, wherein the attachment component comprises a substantially transparent adhesive configured to couple the substrate to the touch interface device.

6. The user interface enhancement system of claim **1**, wherein the attachment component is configured to couple the substrate to touch interface device selected from the group consisting of: an automotive console, a desktop computer, a laptop computer, a tablet computer, a television, a radio, a desk phone, a mobile phone, a PDA, a personal navigation device, a personal media player, a camera, and a watch.

7. The user interface enhancement system of claim **1**, wherein, in the retracted setting, the tactile surface of the deformable region is flush with the tactile surface of the undeformable region.

8. The user interface enhancement system of claim **7**, wherein, in the expanded setting, the tactile surface of the deformable region is elevated above a portion of the tactile surface of the undeformable region.

9. The user interface enhancement system of claim **1**, wherein, in the retracted setting, the back surface of the deformable region is in contact with the support member.

10. The user interface enhancement system of claim **1**, wherein the displacement device comprises a pump.

11. The user interface enhancement system of claim **1**, wherein the displacement device is configured to be powered manually.

12. The user interface enhancement system of claim **11**, further comprising an accumulator configured to store a manual input, provided by a user, as potential energy, wherein the accumulator is further configured to release the stored potential energy to power the displacement device.

13. The user interface enhancement system of claim **1**, wherein the displacement device is coupled to a first portion of the touch interface device, and wherein the displacement device is powered by relative motion between the first portion and a second portion of the touch interface device.

14. The user interface enhancement system of claim **13**, wherein the displacement device is coupled to the first portion that is a base of the touch interface device and the second portion that is a flip cover of the touch interface device.

15. The user interface enhancement system of claim **1**, further comprising a reservoir configured retain fluid and to displace fluid toward the back surface of the deformable region when compressed.

16. The user interface enhancement system of claim **1**, wherein the displacement device is further configured to displace fluid away from the back surface of the deformable