the underside of the touch screen **82** to provide haptic feedback such as pulses, vibrations, and textures; for example, an actuator **86** can be positioned near each corner of the screen **82**, as shown in FIG. **8***a*. Other configurations of actuators can also be used. The user can experience the haptic feedback through a finger or a held object such as a stylus **87** that is contacting the screen **82**.

[**0075**] As shown in FIG. **8***b*, the touch screen **82** is preferably coupled to the housing **88** of the device **80** by one or more spring or compliant elements **90**, such as helical springs, leaf springs, flexures, or compliant material (foam, rubber, etc.) The compliant element allows the touch screen **82** to move approximately along the z-axis, thereby providing haptic feedback similarly to the touchpad embodiments described above. Actuators **86** can be piezo-electric actuators, voice coil actuators, or any of the other types of actuators described above for the touchpad embodiments. As shown in FIG. **8***b*, the actuators **86** are directly coupled to the touch screen **82** similarly to the touchpad embodiment of FIG. **3**; alternatively, an inertial mass can be moved to provide inertial feedback in the z-axis of the touch screen, similarly to the touchpad embodiment of FIG. **6**. Other features described above for the touchpad are equally applicable to the touch screen embodiment **80**.

[**0076**] In the embodiments of touch input devices (touchpad and touch screen) described herein, it is also advantageous that contact of the user is detected by the touch input device. Since haptic feedback need only be output when the user is contacting the touch device, this detection allows haptic feedback to be stopped (actuators "turned off") when no objects are contacting the touch input device. This feature can conserve battery power for portable devices. If a local touch device microprocessor (or similar circuitry) is being used in the computer, such a microprocessor can turn off actuator output when no user contact is sensed, thus alleviating the host processor of additional computational burden.

[**0077**] While the subject matter has been described in terms of several preferred embodiments, it is contemplated that alterations, permutations, and equivalents thereof will become apparent to those skilled in the art upon a reading of the specification and study of the drawings. For example, many different types of actuators can be used to output tactile sensations to the user. Furthermore, many of the features described in one embodiment can be used interchangeably with other embodiments. Furthermore, certain terminology has been used for the purposes of descriptive clarity, and not to be limiting.

What is claimed is:

1. A method of outputting localized haptic effects comprising:

selecting a housing having a touch screen coupled thereto;

coupling a plurality of actuators to the housing; and

outputting an activating signal to two or more of the actuators to produce a haptic effect of a desired magnitude, wherein the two activated actuators each output respective haptic effects of different magnitudes.

2. A haptic feedback device comprising:

a user interface device configured to display a graphical object to a user via a touch screen, wherein the graphical object is programmed to have a first state or a second state; and

an actuator coupled to the touch screen and configured to impart a haptic effect to the haptic feedback device when a user's input on the touch screen selects the graphical object only when in the first state.

3. The haptic feedback device of claim 2 wherein the first state is an active state.

4. A haptic feedback device comprising:

a housing;

one or more portions separately movable relative to the housing; and

an actuator configured to impart a first haptic force to one of the separately movable portions and a second haptic force to another of the separately movable portions, or to the housing.

5. A handheld communication device comprising:

a housing having a button thereon;

a first sensor coupled to the button, wherein the first sensor outputs a first sensor signal upon the button being depressed;

a touch screen coupled to the housing;

a second sensor coupled to the touch screen, wherein the second sensor outputs a second sensor upon the user providing an input to the touch screen;

a processor coupled to the first and second sensors, wherein the processor outputs a predetermined signal to perform a specific task by the communication device upon receiving the first and second signals.

6. A method of scrolling on an electronic device, the method comprising:

selecting a touch screen configured to display a graphical interface having a plurality of graphical objects;

sensing a user's input with the touch screen, wherein the user's input imparts a scrolling action among the plurality of graphical objects in the graphical interface;

outputting a first haptic effect upon sensing the user's input at an edge of a scrolling control region of the touch screen; and

outputting a second haptic effect upon sensing the user's input at another location on the scrolling control region.

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