

stood from the following description of specific embodiments when read in connection with the accompanying drawings.

**[0028]** The embodiments of the invention presented in this document are not to be interpreted to pose limitations to the applicability of the appended claims. The verb “to comprise” is used in this document as an open limitation that does not exclude the existence of also unrecited features. The features recited in depending claims are mutually freely combinable unless otherwise explicitly stated.

#### BRIEF DESCRIPTION OF THE FIGURES

**[0029]** The embodiments of the invention that are presented in the sense of examples and their advantages are explained in greater detail below with reference to the accompanying drawings, in which:

**[0030]** FIGS. 1*a* and 1*b* show an electronic device comprising a user interface according to an embodiment of the invention,

**[0031]** FIGS. 2*a* and 2*b* show an electronic device comprising a user interface according to an embodiment of the invention,

**[0032]** FIGS. 3*a* and 3*b* show an electronic device according to an embodiment of the invention,

**[0033]** FIG. 4 is a flow chart of a method according to an embodiment of the invention, and

**[0034]** FIG. 5 shows an interface module according to an embodiment of the invention.

#### DESCRIPTION OF THE EMBODIMENTS

**[0035]** A user interface according to an embodiment of the invention comprises: (i) means for forming a location indicator that indicates a location of a spot of a sensor surface that is closest to an external object, (ii) means for forming a force indicator that indicates strength of a force directed to the sensor surface, and (iii) means for controlling an electronic device on the basis of said location indicator and said force indicator.

**[0036]** FIG. 1*a* shows an electronic device 100 comprising a user interface according to an embodiment of the invention. FIG. 1*b* shows the A-A section view of the electronic device. The user interface of the electronic device comprises a sensor element 101 that has a sensor surface 102. The sensor element is arranged to form a location indicator that is adapted to indicate a location of a spot 121 of the sensor surface 102 that is closest to an external object. The location indicator is an output signal of the sensor element 101. The location indicator can express, for example, x- and y-coordinates of the spot 121. In the exemplifying situation shown in FIGS. 1*a* and 1*b* the external object is a finger 120 of a user of the electronic device 100. The user interface comprises a force sensor equipment arranged to form a force indicator that is adapted to indicate strength of a force directed to the sensor surface 102. The force sensor equipment comprises a force sensor 103 that is arranged to detect a pressing force F1 in the z-direction. The force sensor 103 can be arranged to detect also a magnitude of a sheer force F2, -F2 that is in the xy-plane. The force sensor 103 can be arranged to detect also a direction of the sheer force in the xy-plane. The force indicator is an output signal of the force sensor 103. The sensor element 101 can be mechanically supported to the casing of the electronic device for example with the aid of the force sensor 103 and flexible support elements 109. The user interface comprises a processor unit 105 that is capable of

controlling the electronic device on the basis of the location indicator and the force indicator. The user interface can comprise a vibration generator 107 responsive to the force indicator and/or to the location indicator. Mechanical vibration generated with the vibration generator can be used e.g. for indicating that the electronic device has received a control action from the user.

**[0037]** In the electronic device shown in FIGS. 1*a* and 1*b*, the sensor surface 102 is also a display screen with the aid of which visual information can be shown. It is also possible that a display screen is only a part of the sensor surface 102 or the sensor surface 102 is only a part of a display screen. The user interface of the electronic device can comprise also a keyboard 110 and/or other means for exchanging information between the electronic device and the user.

**[0038]** In a user interface according to an embodiment of the invention the sensor surface 102 is a touch sensitive sensor surface that is arranged to form the location indicator as a response to a situation in which the external object 120 touches the sensor surface.

**[0039]** In a user interface according to an embodiment of the invention the sensor surface 102 is a capacitive sensor surface that is arranged to form the location indicator as a response to a situation in which the distance d between the sensor surface and the external object 120 is less than a pre-determined limit value.

**[0040]** In a user interface according to an embodiment of the invention the sensor surface 102 is a combined touch sensitive and capacitive sensor surface.

**[0041]** In a user interface according to an embodiment of the invention the force sensor 103 is arranged to detect the magnitude of the sheer force F2, -F2. A magnitude of a twisting effect caused by a force Fa directed to the sensor surface 102 and by a force Fb directed to another surface 108 of the electronic device than the sensor surface is indicated by the magnitude of the sheer force F2, -F2. The processor unit 105 is capable of controlling the electronic device on the basis of the magnitude of the twisting effect.

**[0042]** In a user interface according to an embodiment of the invention the force sensor 103 is arranged to detect the direction of the sheer force F2, -F2 in the xy-plane. A direction of the twisting effect caused by the forces Fa and Fb is indicated by the direction of the sheer force F2, -F2 in the xy-plane. The processor unit 105 is capable of controlling the electronic device on the basis of the direction of the twisting effect.

**[0043]** In a user interface according to an embodiment of the invention the processor unit 105 is capable of controlling the electronic device on the basis of both the direction and the magnitude of the twisting effect.

**[0044]** In a user interface according to an embodiment of the invention the processor unit 105 is arranged to highlight a symbol displayed on the sensor surface as a response to a situation in which the distance d between the external object 120 and the symbol is less than a pre-determined limit value. The symbol can be, for example, an icon 111, a piece of text 112, or some other kind of piece of visual information shown on the sensor surface.

**[0045]** In a user interface according to an embodiment of the invention the processor unit 105 is arranged to select the symbol 111 and to modify visual information displayed on the sensor surface 102 around the symbol as a response to a