ment shown in FIG. **15** uses different temporal variations of the intensity of the electro-sensory stimulus, wherein the different temporal variations provide the user with a tactile feedback indicating the significance of the touch-sensitive areas.

[0087] The operation of the embodiment shown in FIG. **15** differs from the one described in connection with FIG. **14** in that the controller, here denoted by reference numeral **1506**, applies different temporal variations to the intensity of the signal to the electrode **1404**. In this example, the first touch-sensitive area A_1 is processed similarly to the preceding embodiment, or in other words, the intensity of the electro-sensory stimulus depends only on the presence of the finger **120** in close proximity to the area A_1. But in close proximity to areas A_2 and A_3, the controller **1506** also applies temporal variations to the intensity of the electro-sensory stimulus. For example the significance (coarsely analogous with a displayed legend) of area A_2 is indicated by a pulsed electro-sensory stimulus at a first (low) repetition rate, while the significance of area A_3 is indicated by a pulsed electro-sensory stimulus at a second (higher) repetition rate. In an illustrative example, the three touch-sensitive areas A_1, A_2 and A_3 can invoke the three functions in a yes/no/cancel -type user interface, wherein the user can sense the positions of the user interface keys (here: the three touch-sensitive areas) and the indication of an accepted input only via tactile feedback. In other words, the user needs no visual or aural information on the positions of the touch-sensitive areas or on the selected function. The embodiment described in connection with FIG. **15** is particularly attractive in car navigators or the like, which should not require visual attention from their users.

[0088] In the embodiments shown in FIGS. **14** and **15**, when the user's finger **120** has selected the function assigned to area A_3 and the controller CTRL **1406**, **1506** generates the high-intensity electro-sensory stimulus via the electrode **1404**, the high-intensity stimulus is sensed via any of the areas A_1, A_2 and A_3. In other words, if one finger of the user presses the area A_3, other finger(s) in close proximity to the other areas A_2 and/or A_3 will also sense the high-intensity stimulus. In cases where this is not desirable, the embodiments shown in FIGS. **14** and **15** can be combined with the multi-electrode embodiment disclosed in connection with FIG. **9**, such that the signal to each of several electrodes (shown in FIG. **9** as items **910***a* through **910***i*) is controlled individually.

[0089] In the scenarios shown in FIGS. **14** and **15**, the variation of the electrosensory stimulus on the finger **120** was synchronized on the basis of the finger's movement over the areas A_1, A_2 and A_3. But unlike some prior art technologies, such as the one disclosed in reference document 1, the present invention does not require finger movement to create the electrosensory stimulus or the user's sensation. In other words, the illusion of a textured surface is based on the finger's position (and the stimulus intensity applied by the controller at the various positions) but not on finger movement.

[0090] FIG. **16**A shows an embodiment of the invention in which the electrode(s) for the tactile output section are positioned between the touch input section and the display layer. The present embodiment, generally denoted by reference numeral **1600**A, comprises a bus **1602** providing inter-element connections between a microprocessor **1604**, memory **1606**, processor support circuitry **1608**, display controller **1620** and touch input controller **1640**. The display controller **1620** control a display **1622**, such as a liquid-crystal display via an array of connecting wires **1624**. In a similar manner, the touch input controller **1640** control a touch-sensitive layer **1642** via an array of connecting wires **1644**.

[0091] The embodiment **1600**A also comprises a tactile output section, which is comprised of a tactile output controller **1660** and an insulated electrode layer **1662**, interconnected by an interconnection wire **1664**. In FIG. **16**A, the emphasis on integration of the tactile output section **1660-1662** with a substantially known touch-sensitive display, including the elements **1602** through **1644**. For details of the tactile output controller **1660** and the insulated electrode layer **1662**, a reference is made to the previously described embodiments.

[0092] As shown in FIG. **16**A, the display layer shows information, generally denoted by reference numeral **1626**, which is seen by the user via the touch-sensitive layer **1642** and the insulated electrode layer **1662**. The touch-sensitive layer **1642** is scanned by the touch input controller **1640**, such that the microprocessor **1604**, under control of software stored in and executed from the memory **1606**, is aware of the presence or absence of the user's finger **120** on top of a predefined area **1646**. The surface of the touch-sensitive layer **1642** may be completely homogenous, and the predefined areas, one of which is indicated by reference numeral **1646**, are created dynamically by the microprocessor, under control of the software, such that the X and Y coordinates of the user's finger, as it touches the touch-sensitive layer **1642**, are compared with predefined borders of the predefined area **1646**. Reference numeral **1648** denotes a presence-detection logic within the memory **1606**. Execution of the presence-detection logic **1648** by the microprocessor **1604** causes the detection of the presence or absence of the user's finger **120** at the predefined area **1646**. A visual cue, such as a name of the function or activity associated with the predefined area, is typically displayed on the display **1622**, as part of the displayed information **1626**, so as to help the user find the desired area **1646**.

[0093] Reference numeral **1668** denotes a stimulus-variation logic within the memory **1606**. Input information to the stimulus-variation logic **1668** includes information on the presence or absence of the user's finger **120** at the predefined area **1646**. Based on this presence information, the stimulus-variation logic **1668** has the effect that the microprocessor **1604** instructs the tactile output controller **1660** to vary the electrical input to the electrode layer **1662**, thus varying the electrosensory stimulus caused to the body member **120**. Thus it is possible for the user to detect the presence or absence of the body member **120** at the predefined area **1646**, as well as a feedback caused by activation of a function associated with the predefined area **1646**, merely via tactile information, that is, without requiring the visual clues.

[0094] FIG. **16**B shows an embodiment of the invention in which the electrode(s) for the tactile output section are positioned on top of a touch input section, which in turn is positioned on top of a display layer. As used in the present context, "X is on top of Y" means that X is closer to the user's eyes than Y, when the apparatus is in normal operation position. In most respects, the present embodiment, generally denoted by reference numeral **1600**B is very similar to the embodiment **1600**A shown in FIG. **16**A, and only the differences are described. A first difference is simply a reversed mutual order of the insulated electrode layer **1662** and the touch-sensitive layer **1642**. A second difference is that because the insulated electrode layer **1662** resides on top of the touch-sensitive