other types of sensors can be used. Additionally or alternatively, the alterable portions can include a display element. The display element can for example be a display panel. Examples of display elements can include LCD, OLED, electronic ink, and the like. The individual alterable portions can include additional elements including for example covers, labels, skins and the like.

[0115] In one example, the change in the alterable portions **102** can be driven by shape changeable actuators that form the shape changeable nodes **108**.

[0116] FIG. **14** illustrates an exemplary electromechanical device that can be used as a shape changeable actuator for changing topography of a user interface according to embodiments of the invention. In the example of FIG. **14**, actuator **140** (or electromechanical device) can have housing **144** having outer surface **141**, movable piston **145** within the housing, and solenoid **143** surrounding the piston that can be electrically stimulated to actuate the piston. In an unactuated state, the piston **145** can be partially or fully seated within the housing **144**. Whereas in an actuated state, the piston **145** can move out of the housing **144** to push against the corresponding alterable portion **102** of the node **108** of FIG. **10**. Conversely, in an unactuated state, the piston **145** can be partially or fully moved out of the housing **144**. Whereas in an actuated state, the piston **145** can move into the housing **144** to pull away from the corresponding alterable portion **102** of the node **108** of FIG. **10**. Alternatively, in an unactuated state, the piston **145** can be seated midway within the housing **144**. Whereas, in an actuated state, the piston **145** can move further out of the housing **144** to push against the corresponding alterable portion **102** of the node **108** of FIG. **10** and can move further into the housing to pull away from the corresponding alterable portion of the node. The amount that the piston **145** moves into and out of the housing **144** can be controlled by the amount of stimulus, e.g., electrical current, applied to the solenoid **143**, according to the user interface state.

[0117] Referring again to FIG. **10**, the shape changeable actuators **140** of FIG. **14** can be disposed on a back side opposite the front side of the alterable portions **102**. In some cases, the alterable portions **102** can be disposed adjacent to the back side of the surface **101**, where each actuator **140** can be proximate to a particular alterable portion **102** of the surface. In some embodiments, the actuators **140** can be electromechanical devices (symbolically illustrated by the rectangles in FIG. **10** and described in FIG. **14**), such as micro actuators, microelectromechanical (MEM) devices, piezoelectronics, and other suitable such miniature devices and can have various gears, cams, and other electromechanical devices to help actuate the alterable portions **102**.

[0118] In one example, the actuators **140** can have a housing, a movable piston within the housing, and a solenoid surrounding the piston. When an electrical current passes through the solenoid, the solenoid can produce a magnetic field that moves the piston in and out of the housing. The movement of the piston can for example be used to affect a change of the alterable portion **102**.

[0119] In some embodiments, each alterable portion **102** can raise above the initial surface **101** when the corresponding actuator **140** changes to push against the back side of the portion and can lower below the initial surface when the actuator changes to pull away from the back side of the portion. In some embodiments, where the actuators **140** have "push against" change, each alterable surface portion **102** can raise above the initial surface **101** when the corresponding actuator **140** pushes against the back side of the portion and otherwise remain unaltered in the initial surface. In some embodiments, where the actuators **140** have "pull away" change, each alterable surface portion **102** can lower below the initial surface **101** when the corresponding actuator **140** pulls away from the back side of the portion and otherwise remain unaltered in the initial surface.

[0120] In some embodiments (as shown), the alterable portions **102** of the surface **101** can be configured to form a matrix of rows and columns. It is to be understood, however, that the surface configuration is not so limited, but can include other suitable configurations. Similarly, in some embodiments (as shown), the actuators **140** can be configured to form a matrix of rows and columns corresponding to the matrix rows and columns of the surface's alterable portions **102**. It is to be understood, however, that the changeable nodes' configuration is not so limited, but can include other suitable configurations, including other resolutions.

[0121] In some embodiments, the actuators **140** can additionally carry input signals between the surface **101** and other components of the user interface **100**. For example, the actuators **140** can carry touch signals from the surface **101** to the device processor to be processed and can carry display signals from the processor to the surface for display.

[0122] The outer side of the alterable portions can be widely varied. They can be rigid or flexible and in some cases even deformable. They can also be angled, flat or have a curved shape. In general, the outer sides of each alterable portion can cooperate with the other alterable portions to form a continuous outer side. This continuous outer side can be angled, flat or curved.

[0123] FIG. **11** illustrates an exemplary user interface that can change topography using electromechanical devices to raise portions of the user interface surface according to embodiments of the invention. In the example of FIG. **11**, user interface **110** can include dynamic shape changeable surface **111** having individual shape changeable nodes **118**. In some embodiments, the dynamic surface **111**, and more particularly each of the nodes **118** can be made up of individual selectable, alterable portions **112** that can receive a touch on a front side. The individual alterable portions **112** can be configured to change their position or their physical configuration in order to affect a topography change at the dynamic surface **111**. In one example, the change in the alterable portions **112** can be driven by shape changeable actuators that form the shape changeable nodes **118**. Shape changeable actuators **140** (which can be electromechanical devices) of FIG. **14** can be capable of moving the alterable portions **112** between an unactuated state and an actuated state. The actuated state can for example include raising and lowering of the alterable portion **112**. The motion can be analog or binary. In analog, varying heights can be achieved. In binary, the motion can be simply up or down a predetermined distance.

[0124] FIG. **12** illustrates an exemplary user interface that can change topography using electromechanical devices to lower portions of the user interface surface according to embodiments of the invention. In the example of FIG. **12**, user interface **120** can include dynamic shape changeable surface **121** having individual shape changeable nodes **128**. In some embodiments, the dynamic surface **121**, and more particularly each of the nodes **128** can be made up of individual selectable, alterable portions **122** that can receive a touch on a front side. The individual alterable portions **122** can be configured to change their position or their physical configu-