

which they are inserted or formed. Such imperfect fit can invite entry of liquids, dirt, and the like, undesirably causing yet another disadvantage.

[0016] Thus, the need exists for commercially feasible device display systems with improved aesthetics that unobtrusively furnish information as appropriate, but otherwise do not distract or detract from the user's experience or the device's performance. Preferably, selected elements of such display systems would additionally become invisible in their off states.

[0017] In view of ever-increasing commercial competitive pressures, increasing consumer expectations, and diminishing opportunities for meaningful product differentiation in the marketplace, it is increasingly critical that answers be found to these challenges. Moreover, the ever-increasing need to save costs, improve efficiencies, improve performance, and meet such competitive pressures adds even greater urgency to the critical necessity that answers be found.

BRIEF SUMMARY OF THE INVENTION

[0018] The invention relates in one embodiment an electronic device having an invisible input. The device has a frame having a top face with invisible holes formed therein. A capacitor reference is on an inner surface of the top face in the area of the invisible holes. An interior wall is separated from the top face and forms an interior space having a dielectric medium disposed therein. A capacitor plate is disposed on a surface of the interior wall opposite the first capacitor plate. A light source is disposed in the interior space and is configured to shine through the invisible holes. A capacitor sensor is electrically connected to the capacitive reference and the capacitor plate. When an object is placed on the frame in the area of the invisible holes and pressure is applied, the frame deforms. This deformation causes a change in capacitance between the capacitive reference and the capacitor plate. The capacitor sensor detects this change and converts it to an electrical signal.

[0019] The invention relates in another embodiment to an invisible input. The invisible input has a frame having a top face with invisible holes formed therein. A capacitor reference is on an inner surface of the top face in the area of the invisible holes. An interior wall is separated from the top face and forms an interior space having a dielectric medium disposed therein. A capacitor plate is disposed on a surface of the interior wall opposite the first capacitor plate. A light source is disposed in the interior space and is configured to shine through the invisible holes. A capacitor sensor is electrically connected to the capacitive reference and the capacitor plate. When an object is placed on the frame in the area of the invisible holes and pressure is applied, the frame deforms. This deformation causes a change in capacitance between the capacitive reference and the capacitor plate. The capacitor sensor detects this change and converts it to an electrical signal.

BRIEF DESCRIPTION OF THE DRAWINGS/FIGURES

[0020] Certain embodiments of the invention have other aspects in addition to or in place of those mentioned above. The aspects will become apparent to those skilled in the art from a reading of the following detailed description when taken with reference to the accompanying drawings. The present invention is illustrated by way of example, and not by

way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

[0021] FIG. 1 is a perspective view of an electronic device according to the present invention;

[0022] FIG. 2 is a cross sectional view of the electronic device of FIG. 1, taken along line 2-2 in FIG. 1 in a first position;

[0023] FIG. 3 is another cross sectional view of the electronic device of FIG. 1, taken along line 2-2 in FIG. 1 in a second position;

[0024] FIG. 4 is a cross sectional view of an alternate embodiment of the electronic device of FIG. 1;

[0025] FIG. 5A is a perspective view of an embodiment of the electronic device of FIG. 4;

[0026] FIG. 5B is a magnified view of a portion of the electronic device of FIG. 5A;

[0027] FIG. 6 is a perspective view of another electronic device according to the present invention;

[0028] FIG. 7 is a cross sectional view of the electronic device of FIG. 6, taken along line 7-7 in FIG. 6 in a first position;

[0029] FIG. 8 is another cross sectional view of the electronic device of FIG. 6, taken along line 7-7 in FIG. 6 in a second position;

[0030] FIG. 9 is another cross sectional view of the electronic device of FIG. 6, taken along line 7-7 in FIG. 6 in a third position;

[0031] FIG. 10 is a cross sectional view of an alternate embodiment of the electronic device of FIG. 6;

[0032] FIG. 11 is a perspective view of an alternate embodiment of the electronic device of FIG. 6;

[0033] FIG. 12 is a schematic of a conventional track pad;

[0034] FIG. 13 is a perspective view of an electronic device according to the present invention;

[0035] FIG. 14 is a schematic plan view of internal portions of the electronic device of FIG. 13;

[0036] FIG. 15 is a cross sectional view of the electronic device of FIG. 13, taken along line 15-15 in FIG. 13;

[0037] FIG. 16 is a schematic plan view of internal portions of the electronic device of FIG. 13;

[0038] FIG. 17 is a perspective view of an alternate embodiment of the electronic device of FIG. 13;

[0039] FIG. 18 is a cross sectional view of another electronic device according to the present invention;

[0040] FIG. 19 is a cross sectional view of another electronic device according to the present invention;

[0041] FIG. 20 is a cross sectional view of another electronic device according to the present invention;

[0042] FIG. 21 is a cross sectional view of another electronic device according to the present invention;

[0043] FIG. 22 is a cross sectional view of another electronic device according to the present invention;

[0044] FIG. 23 is a cross sectional view of another electronic device according to the present invention;

[0045] FIG. 24 is perspective view of a laptop computer according to the present invention;

[0046] FIG. 25 is a front view of a laptop computer according to the present invention; and

[0047] FIG. 26 is a front view of a laptop computer according to the present invention.