

mounted on a first polyethylene terephthalate (PET) substrate **23**. Similarly, the second sensing plate **21** comprises a second set of striped ITO electrodes **24** mounted on a second PET substrate **25**. The first and second sets of electrodes **22**, **24** run in orthogonal directions. For example, the first set of electrodes **22** are arranged to run parallel to the x-axis, while the second set of electrodes **24** run parallel to the y-axis. The first and second sensing plates **20**, **21** are bonded together by means of a first optical adhesive layer **26**. A second optical adhesive layer **27** is used to bond the sensor **19** to the keymat **17**. A third optical adhesive layer **28** is used to bond an electroluminescent back light layer **29** to the underside of the sensor **19**. When powered, the electroluminescent layer **29** illuminates the letters and numerals etched into the keys **18**. The electroluminescent layer **29** is mounted to a dome adhesive gasket **30** which is adhered to a flexible substrate **31** on which metal dome switches **32** are mounted. Each dome **32** lies beneath a respective key **18**, for example as shown in **FIGS. 4 and 5**. First and second metal contacts **33a**, **33b** are mounted on the substrate **31** beneath each dome **32**. The second contact **33b** is concentric with the first contact **33a**. Each dome **32** sits upon a respective second metal contact **33b** having the greater radius of the two contacts **33a**, **33b**. Respective nodules **34** on the underside of the dome adhesive gasket are used to help increase the so-called "snap ratio force" of the domes **32** when force is applied to the keys **18**. Thus, this provides better tactile feel when the keys **18** are pressed.

[0025] The keypad **7** may operate as a conventional keypad and, either independently or simultaneously, as a touch sensitive pointing device.

[0026] As a conventional keypad, a user depresses a "hash" key **18a** and force is transmitted through underlying layers **20**, **21**, **26**, **27**, **28**, **29**, **30** to deform a first key dome **32a** lying underneath. Deformation of the first key dome **32a** completes electrical connection between the first and second contacts **33a**, **33b**. This causes a signal to be generated and processed by the key interface **8** and the controller **15** in a well-known manner. This may result in the screen **4** displaying a "#" symbol. In this example, the key interface **8** generates signals which are passed to the controller **15** which runs suitable keypad driver software.

[0027] As a touch-sensitive pointing device, a user lightly touches the keymat **17** without exerting enough force to depress any of the keys **18**. Beneath the user's finger lies an intersection **35** of a first electrode **22a** of the first sensing plate **20** and a second electrode **24a** of the second sensing plate **21**. The user's finger modifies the mutual capacitance between the first and second electrodes **22a**, **24a**, which is detected by sensor interface **9** in a well-known manner so as to determine the co-ordinate of the user's finger, which is fed to the controller **15**. The controller runs suitable touchpad driver software. The user slides their finger over the surface of the keymat **17** and uses it as if it were a conventional touch pad. This is particularly useful when navigating a cursor **36** around a web page **37** displayed on the display **4** in order to select a hypertext link **38** as shown in **FIG. 6**. Hypertext link **38** may be selected by lightly double tapping on the surface of the keymat **17**. In this example, the whole area of the keymat **17** serves as a touch pad and not simply the keys **18**. There are regions of the keymat **17**, for example between the keys **18**, where the user is not able to press a key but is able to control the cursor using capacitive sensor

pointing device. It will be appreciated that the user need not touch the keypad **7** to change the mutual capacitance between the electrodes. For example, the change in mutual capacitance may be sufficient enough to be detected if the user holds their finger less than a millimetre above the surface of the keypad **7**.

[0028] It will be appreciated that many modifications may be made to the embodiment hereinbefore described. For example, a resistive sensor, such as those used in resistive touch sensitive screens, may be used instead of a capacitive sensor. The sensor substrate may be made from other suitable plastics materials such as acrylic or polythene. The electrodes may be made from other conductive materials such as conductive polymers or thin metallic films. The keys need not be proud of the keypad. The keypad may be integrated into the case of the handset. A portion of the area of the keymat may serve as a touch pad.

[0029] It will be appreciated that the invention can be used in relation to any sort of electronic apparatus, be it portable and non-portable. This may include mobile telephone handsets and laptop computers. It may also be used in a remote control unit for electronic apparatus such as television sets, multimedia set-top boxes and audio equipment.

1. A user interface device for electronic apparatus, the device comprising a keypad having a plurality of keys each arranged to actuate a respective switch so as to provide a first type of user input and integrally disposed impedance sensor so as to provide a second type of user input.

2. A device according to claim 1, wherein the keypad includes a region provided with said impedance sensor but without a key.

3. A device according to claim 1, wherein said keys are comprised in a keymat.

4. A device according to claim 3, wherein the impedance sensor is disposed adjacently to the keymat.

5. A device according to claim 3, wherein the keymat and the impedance sensor are coextensive.

6. A device according to claim 1, wherein the keys comprise silicone rubber.

7. A device according to claim 1, wherein the keys include a hard coat.

8. A device according to claim 1, wherein the impedance sensor is arranged to detect the presence of a digit.

9. A device according to claim 1, wherein the impedance sensor comprises first and second sensing plates.

10. A device according to claim 9, wherein the first sensing plate comprises a first set of electrodes.

11. A device according to claim 10, wherein the electrodes are arranged in noncontiguous stripes.

12. A device according to claim 10, wherein the electrodes are transparent.

13. A device according to claim 10, wherein the electrodes are made from indium-tin-oxide.

14. A device according to claim 9, wherein the first sensing plate comprises a substrate.

15. A device according to claim 14, wherein the substrate is substantially transparent.

16. A device according to claim 14, wherein the substrate is made from polyethylene terephthalate.

17. A device according to claim 10, wherein the second sensing plate comprises a second set of electrodes.