

electrodes and to compute the position of finger movement based on the capacitance in each of the electrodes. The ASIC may also be configured to report this information to the computing device.

[0011] Referring to FIG. 1, a touch pad 10 will be described in greater detail. The touch pad is generally a small rectangular area that includes a protective shield 12 and a plurality of electrodes 14 disposed underneath the protective shield layer 12. For ease of discussion, a portion of the protective shield layer 12 has been removed to show the electrodes 14. Each of the electrodes 14 represents a different x, y position. In one configuration, as a finger 16 approaches the electrode grid 14, a tiny capacitance forms between the finger 16 and the electrodes 14 proximate the finger 16. The circuit board/sensing electronics measures capacitance and produces an x, y input signal 18 corresponding to the active electrodes 14 is sent to a host device 20 having a display screen 22. The x, y input signal 18 is used to control the movement of a cursor 24 on a display screen 22. As shown, the input pointer moves in a similar x, y direction as the detected x, y finger motion.

SUMMARY OF THE INVENTION

[0012] The present invention relates generally to touch pads capable of detecting an object in close proximity thereto. More particularly, the present invention relates to touch pads capable of moving in order to increase the functionality of the touch pad. For example, the touch pad may be depressible so as to provide additional button functionality.

[0013] The invention relates in one embodiment to an input device. The input device includes a movable touch pad configured to generate a first control signal when the movable touchpad is moved and a second control signal when an object is positioned over the movable touchpad.

[0014] The invention relates in another embodiment to an input device. The input device includes a frame. The input device also includes a rigid touch pad movably restrained to the frame. The rigid touch pad is configured to generate tracking signals when an object is positioned over the rigid touchpad. The input device further includes one or more movement indicators contained within the frame. The movement indicators are configured to generate one or more button signals when the rigid touch pad is moved relative to the frame.

[0015] The invention relates in another embodiment to an input device. The input device includes a touch pad assembly and a housing assembly. The touch pad assembly includes a circuit board having a first side and a second side, an electrode layer positioned on the first side of the circuit board, a cosmetic plate positioned over the electrode layer, one or more switches positioned on the second side of the circuit board, and a stiffener plate positioned on the second side of the circuit board. The housing assembly includes a base plate, a frame and one or more retaining plates that cooperate to movably constrain at least a portion of the touch assembly within a space defined by the base plate, frame and one or more retaining plates.

[0016] The invention relates in another embodiment to a computing system. The computer system includes a computing device capable of receiving, processing and output-

ting data. The computer system also includes an input device configured to send data to the computing device in order to perform an action in the computing device. The input device includes a depressible touch pad configured to generate tracking signals, and one or more movement indicators configured to generate one or more button signals when the touch pad is depressed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] 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:

[0018] FIG. 1 is a simplified diagram of a touch pad and display.

[0019] FIG. 2 is a perspective view of an input device, in accordance with one embodiment of the present invention.

[0020] FIGS. 3A and 3B are simplified side views of an input device having a button touch pad, in accordance with one embodiment of the present invention.

[0021] FIG. 4 is simplified block diagram of an input device connected to a computing device, in accordance with one embodiment of the present invention.

[0022] FIG. 5 is a simplified perspective diagram of an input device, in accordance with one embodiment of the present invention.

[0023] FIG. 6 is a side elevation view of a multi button zone touch pad, in accordance with one embodiment of the present invention.

[0024] FIGS. 7A-7D show the touch pad of FIG. 6 in use, in accordance with one embodiment of the present invention.

[0025] FIG. 8 is a perspective diagram of an input device, in accordance with one embodiment of the present invention.

[0026] FIG. 9 is an exploded perspective diagram of an input device, in accordance with one embodiment of the present invention.

[0027] FIG. 10 is a side elevation, in cross section, of an input device, in accordance with one embodiment of the present invention.

[0028] FIG. 11 is a side elevation, in cross section, of an input device, in accordance with one embodiment of the present invention.

[0029] FIG. 12 is a perspective diagram of a touch pad having switches on its backside, in accordance with one embodiment of the present invention.

[0030] FIG. 13 is a perspective diagram of a media player, in accordance with one embodiment of the present invention.

[0031] FIG. 14 is a perspective diagram of a laptop computer, in accordance with one embodiment of the present invention.

[0032] FIG. 15 is a perspective diagram of a desktop computer with a peripheral input device connected thereto, in accordance with one embodiment of the present invention.