

device is illustrated schematically in **FIG. 1** and generally designated **10**. The user input device **10** includes a major face surface **12**. The surface **12** is a touch sensitive surface and is arranged to provide a desired number of pre-defined touch sensitive surface areas **14, 16, 18** wherein each of the touch sensitive surface areas **14, 16, 18** is associated with a corresponding pre-defined functionality. The touch sensitive surface **12** is of an appropriate material and construction arranged to carry out the intended functions and may be of any well known and understood technology for example, resistive, capacitive, inductive, electro-dielectric mechanical film (EMF), optical array such as a CCD or LED, or other suitable components arranged to map the surface area and respond to a touching contact thereon or in proximity thereto. The user input device embodying the present invention is intended to operate with any suitable sensing medium in addition to mediums which sense and detect a touching contact such as for example proximity sensors wherein the close proximity of a finger or pen stylus activates and carries out the associated corresponding pre-defined functionality associated with that pre-defined area of the touch sensitive surface.

[0025] The user input device embodying the present invention may be used with many different devices and controls including but not limited to a mobile device, computer mouse, game controller, touch pad, touch screen, scroll wheel, rotator dial, and is particularly well suited to manipulate on-screen elements in a graphical user interface (GUI). One exemplary embodiment is shown as a schematic perspective view of a portable electronic device such as a mobile cellular telephone generally designated **30** in **FIG. 2**. The mobile cellular telephone **30** is constructed as having a body **32**. The body **32** carries a screen generally designated **34** for displaying text, graphics and other indicia common to mobile cellular telephone devices and well known to users and the general purchasing and user public. The body **32** also includes keys **36, 36** in a desired arrangement defining a keypad **38** to carry out the intended function. Additional keys **40, 42, 44** sometimes referred to as soft keys are provided and are well known and understood to activate the desired associated intended functional operation of the mobile cellular telephone and which functional operations are also well known and understood. The user input device **10** embodying the present invention is conveniently located and carried on the body **32** for ease of use by a user when the mobile cellular telephone **30** is held in the normal manner. As illustrated in **FIG. 2** and as further described below, the user input device **10** is conveniently located and operated by the touching contact of the user's thumb which thumb is shown in phantom and generally designated **46**. The user input device **10** is electrically connected to the appropriate control circuitry carried in the mobile cellular telephone **30** and is responsive to touching contact with the touch sensitive surface to control the movement of a screen element displayed on the screen **34**. The user input device **10** may be located at any convenient portion or area on the electronic device that provides for easy contact and operation with the thumb, finger, stylus or other suitable contact method.

[0026] As illustrated in **FIG. 2**, the screen **34** shows a list or menu generally designated **50** each of which menu items may be associated with a given function of the mobile cellular telephone as activated and selected by one of the keys **40, 42** in a conventional well known manner. Typically,

in the prior art the user navigates through the list **50** upward or downward in a direction as indicated by the direction arrow **52** by repeated operation of the key **44** to index a cursor **54** sequentially through the listing of menu items as indicated by the dash line cursor **56** until the desired menu item is reached after which the item is selected and activated in a well known manner. It can be appreciated that the movement of the cursor in this prior art manner is awkward and requires many repetitive steps by the user. The touch sensitive element arranged as the user input device **10** embodying the present invention as explained above and in further detail below substantially reduces or eliminates repetitive and awkward movements of prior art devices.

[0027] Still referring to **FIGS. 1 and 2**, the user input device **10** is described as it might be used in the scrolling function for the mobile cellular telephone **30**. In this instance, the user desires to scroll the cursor **54** upward and downward through the menu list **50** as indicated by the direction arrow **52**. To move the cursor **54** in the upward direction toward the top of the menu list the user taps the surface **14** with the thumb **46** with each successive touching contact moving the cursor a fixed incremental distance upward as indicated by the dash line cursor **56** until the cursor reaches or is positioned opposite the desired menu item or otherwise highlights the menu item. If the user wishes to move the cursor downward through the menu list **50**, the thumb **46** is tapped against the surface **18** to move the cursor downward each time the cursor is tapped by the thumb to reach and stop at the desired menu item. In this instance, the user input device **10** functions in a similar manner as a key or a rocker switch moving the cursor each time the switch is operated.

[0028] The velocity or speed of the cursor movement in the upward direction through the menu list **50** can be increased by a sliding touching contact of the thumb or finger along the surface **14** in the direction indicated by the direction arrow **60** from one end **62** to the upper end **64** of the surface **14** with the velocity of the cursor movement being the lowest at the end **62** and the maximum at the end **64**. Likewise, the cursor velocity in the downward direction can be controlled by a sliding or touching contact of the thumb or finger along the surface **18** in the direction as indicated by the direction arrow **66** from the end **68** to the end **70** with the lowest velocity being at the end **68** and the maximum velocity being at the end **70**. In this feature, the user input device functions in a similar manner as a slider switch moving the cursor according to the position of the slider along the travel path.

[0029] The user input device may also be configured to provide movement of the cursor without continually tapping the touch sensitive surface areas but rather by imparting momentum to the cursor to move in the desired direction by a sliding touching contact of the thumb or finger along the surface **14** in the direction indicated by the direction arrow **60**. The velocity of the cursor **54** can be slowed by a sliding touching contact of the thumb or finger in the direction indicated by the direction arrow **72** wherein the velocity of the cursor is proportional to the velocity or speed of movement of the thumb **46** along the surface **14**. Likewise, the velocity or speed of the cursor **54** can be increased or decreased in proportion to the sliding touching contact velocity of the thumb **46** along the surface **18** in the direction