

## METHOD AND APPARATUS FOR ACCELERATED SCROLLING

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of priority from U.S. Provisional Patent Application No. 60/346,237, filed Oct. 22, 2001, and entitled "METHOD AND SYSTEM FOR LIST SCROLLING," which is hereby incorporated by reference herein. Further, this application claims benefit of priority from U.S. Provisional Patent Application No. 60/387,692, filed Jun. 10, 2002, and entitled "METHOD AND APPARATUS FOR USE OF ROTATIONAL USER INPUTS," which is hereby incorporated by reference herein. Still further, this application claims benefit of priority from U.S. Provisional Patent Application No. 60/359,551, filed Feb. 25, 2002, and entitled "TOUCH PAD FOR HANDHELD DEVICE," which is hereby incorporated by reference herein.

[0002] This application is related to U.S. patent application Ser. No. 10/072,765, filed Feb. 7, 2002, and entitled "MOUSE HAVING A ROTARY DIAL," which is hereby incorporated by reference herein. This application is also related to U.S. patent application Ser. No. 10/188,182, filed Jul. 1, 2002, and entitled "TOUCH PAD FOR HANDHELD DEVICE," which is incorporated by reference herein.

### BACKGROUND OF THE INVENTION

[0003] 1. Field of the Invention

[0004] The present invention relates generally to a computing device and, more particularly, to a handheld computing device having a rotational input unit.

[0005] 2. Description of the Related Art

[0006] There exist today many styles of input devices for performing operations with respect to a consumer electronic device. The operations generally correspond to moving a cursor and making selections on a display screen. By way of example, the input devices may include buttons, switches, keyboards, mice, trackballs, touch pads, joy sticks, touch screens and the like. Each of these devices has advantages and disadvantages that are taken into consideration when designing the consumer electronic device. In handheld computing devices, the input devices are typically buttons and switches. Buttons and switches are generally mechanical in nature and provide limited control with regard to the movement of a cursor (or other selector) and the making of selections. For example, they are generally dedicated to moving the cursor in a specific direction (e.g., arrow keys) or to making specific selections (e.g., enter, delete, number, etc.). In the case of handheld personal digital assistants (PDAs), the input devices tend to utilize touch-sensitive display screens. When using a touch screen, a user makes a selection on the display screen by pointing directly to objects on the screen using a stylus or finger.

[0007] In portable computing devices such as laptop computers, the input devices are commonly touch pads. With a touch pad, the movement of an input pointer (i.e., cursor) corresponds to the relative movements of the user's finger (or stylus) as the finger is moved along a surface of the touch pad. Touch pads can also make a selection on the display screen when one or more taps are detected on the surface of

the touch pad. In some cases, any portion of the touch pad may be tapped, and in other cases, a dedicated portion of the touch pad may be tapped. In stationary devices such as desktop computers, the input devices are generally selected from keyboards, mice and trackballs. With a mouse, the movement of the input pointer corresponds to the relative movements of the mouse as the user moves the mouse along a surface. With a trackball, the movement of the input pointer corresponds to the relative movements of a ball as the user rotates the ball within a housing. Both mice and trackball devices generally include one or more buttons for making selections on the display screen.

[0008] In addition to allowing input pointer movements and selections with respect to a Graphical User Interface (GUI) presented on a display screen, the input devices may also allow a user to scroll across the display screen in the horizontal or vertical directions. For example, a mouse may include a scroll wheel that allows a user to simply roll the scroll wheel forward or backward to perform a scrolling action. In addition, touch pads may provide dedicated active areas that implement scrolling when the user passes his or her finger linearly across the active area in the x and y directions. Both devices may also implement scrolling via horizontal and vertical scroll bars that are displayed as part of the GUI. Using this technique, scrolling is implemented by positioning the input pointer over the desired scroll bar, selecting the desired scroll bar, and moving the scroll bar by moving the mouse or finger in the y direction (forwards and backwards) for vertical scrolling or in the x direction (left and right) for horizontal scrolling.

[0009] Further, consumer electronic products other than computers, such as cordless telephones, stereo receivers and compact-disc (CD) players, have used dials to enable users to select a phone number, a radio frequency and a specific CD, respectively. Here, typically, a limited-resolution display is used together with the dial. The display, at best, displays only a single item (number, frequency or label) in a low resolution manner using a character generator LCD. In other words, these devices have used single line, low resolution LCD readouts.

[0010] Thus, there is always a need for improved user input devices that facilitate greater ease of use of computing devices.

### SUMMARY OF THE INVENTION

[0011] The present invention relates to improved approaches for users of computing devices to interact with graphical user interfaces. A rotational user action supplied by a user via a user input device can provide accelerated scrolling. The accelerated nature of the scrolling enables users to scroll or traverse a lengthy data set (e.g., list of items) faster and with greater ease. The amount of acceleration provided can be performed in successive stages, and/or performed based on the speed of the rotational user action. In one embodiment, the rotational user action is transformed into linear action with respect to a graphical user interface. The resulting acceleration effect causes the linear action to be enhanced such that a lengthy data set is able to be rapidly traversed. Other aspects and features of the invention will become apparent below. Although the type of computing device can vary, the invention is particularly well-suited for use with a media player.