Title: METHOD, APPARATUS AND COMPUTER PROGRAM PRODUCT FOR FACILITATING DATA ENTRY VIA A TOUCHSCREEN

(57) Abstract: A method, apparatus and computer program product are provided for facilitating data entry into an electronic device via a touchscreen. As a user places his or her finger on the touchscreen, a cursor may be displayed at a location relative to other items displayed on the touchscreen that is proximate the physical location where the user touched the touchscreen. Because the cursor is likely now obscured by the user's finger, the items displayed on the touchscreen, including the cursor, may then be shifted or scrolled so that the cursor is offset from the physical location where the user touched the touchscreen. At the same time, the items displayed on the touchscreen may be magnified in order to further facilitate data entry. At this point, the user may shift or tilt the cursor in order to achieve the desired cursor placement.

FIG. 2
Published:
— with international search report
METHOD, APPARATUS AND COMPUTER PROGRAM PRODUCT FOR
FACILITATING DATA ENTRY VIA A TOUCHSCREEN

FIELD

Exemplary embodiments of the invention relate, generally, to electronic
device touchscreens and, in particular, to a technique for facilitating the input of
data into the electronic device via the touchscreen.

BACKGROUND

As technology improves, electronic devices, such as cellular telephones,
personal digital assistants (PDAs), pagers, and the like, appear to get smaller and
smaller. With this decrease in size almost necessarily comes a decrease in the size
of the display screens of those devices. At the same time, another advance in
technology has been the use of these display screens as input devices for their
corresponding electronic device. The display screens of many electronic devices
are touch sensitive input devices, or touchscreens. However, because the display
screens appear to be getting smaller over time, use of the display screen as a touch
sensitive input device has become somewhat difficult. This is particularly true
where it is intended that an individual use his or her finger to select a selectable
item displayed on the touchscreen. As a user places his or her finger on a small
item displayed on the touchscreen, the finger will likely occlude the item
completely, as well as overlap some of the adjacent items displayed. Consequently, it is difficult if not impossible for the user to be certain which item
he or she is selecting.

Several solutions have been proposed for facilitating data entry into
relatively small touch sensitive input devices, or touchscreens. Each of these
solutions, however, has at least one drawback. One solution is to dynamically
magnify a selectable item on the touchscreen when the cursor, or other means of
selecting the item, is within a certain proximity to the selectable item. According
to this solution, a window displaying a magnified version of a selectable item
opens directly on top of the selectable item when the cursor comes within
proximity to the selectable item. As the cursor moves closer to the selectable item,
the window size and magnification of the selectable item increase until the cursor
reaches the magnified window. One drawback of this solution is that it may be
difficult to implement where selectable items were scattered throughout a
touchscreen, rather than in a single row or column. In particular, where the item
the user wishes to select is surrounded by other selectable items, as the cursor
moves closer to the intended item, one of the surrounding items would likely
become magnified, thereby potentially making it difficult, if not impossible, to see
and select the intended item.

Another solution, which may solve the above drawback to the first solution,
is to only open the window displaying the magnified version of the selectable item
when the user actuates a button. This solution, however, requires additional steps
and may further make operating the electronic device to input data a two-handed
operation, which is less than ideal. A third solution that has been proposed is to
continuously display a window including a magnified view of what is under the
window. In this solution, the window has edges that may not be well defined,
wherein the magnification decreases smoothly at the margins of the window.
According to this solution, however, the magnified window moves with the cursor
and may cause the magnified view to appear unstable, restless and wobbly. This
solution, therefore, would not facilitate data entry into the touchscreen.

In addition to the foregoing, each of the above solutions may have a further
drawback in that the window displaying a magnified version of the selectable item
appears directly on top of the selectable item. Where, for example, an individual is
using his or her finger, and most commonly his or her thumb (e.g., where the
individual is operating the electronic device with one hand) to select the item on
the touchscreen, the magnification, and consequently the window, would have to
be fairly large in order to make the selected item viewable from under the
individual’s finger. Given the above-referenced limited size of the display screen,
having a large magnification window may be undesirable and may in fact be
unfeasible in some circumstances. In addition, even if the magnification window
is large enough to be viewable underneath the individual’s finger, at least part of
the selectable item may still be occluded at all times.

Further proposed solutions for facilitating data entry into relatively small
touch sensitive input devices, or touchscreens that address the above drawback are
to offset a magnified or unmagnified window above, below, to the left or to the
right of the selectable item. Where magnified, this solution, as well as the above
solutions, may have the additional drawback that magnifying parts of a graphical
user interface generally requires vector graphics, which are not always available on
electronic devices, such as cellular telephones; thus potentially causing these solutions to not be possible in some instances.

In addition, if the contents of the original view are magnified in the window, the amplitude of finger movements, including tremor, may be magnified as well. For example, if the contents of the window are magnified to twice their size (i.e., 2x magnification), any finger movement may cause the window contents to move with twice the speed. This may make the view in the window appear restless and hard to control. This problem could be solved by retaining the “gain” of movement (i.e., window content movement / finger movement) as a one-to-one ratio even if the view magnification is two-to-one. Unfortunately, this may create a new problem when the user needs to select (i.e., “paint”) a string of characters. In particular, in this situation, by the time the finger reaches the end of the string, the window and the pointer may only be halfway along the string. In other words, the finger and the pointer may no longer be pointing at the same item.

In addition, use of an offset window may have further drawbacks, whether the contents are magnified or not. In particular, as noted above, the size of the touchscreen may be rather small. As a result, there may not be sufficient room on the touchscreen to display an additional window in which items are displayed large enough to provide an improvement over the original display. In addition, the contents of the original touchscreen display are not obscured not only by the user’s finger, but also the offset window. As you increase the size of the offset window to further facilitate data entry, the more you obscure the original touchscreen display.

Yet another solution proposed has been to provide a set of crosshairs just above the position where the user places his or her finger, which the user can use to aim. Several drawbacks may exist for this solution as well. In particular, one drawback may be that it forces the user to guess to some extent where to place his or her finger in order to select a certain item on the touchscreen, since he or she can no longer simply touch the screen at the location of that item. In addition, it may be very difficult to place a cursor or select an item at a location near one of the edges of the touchscreen.

A need, therefore, exists for a technique for facilitating data entry into a relatively small touch sensitive input device or touchscreen that overcomes at least the above-described drawbacks.
BRIEF SUMMARY

In general, exemplary embodiments of the present invention provide an improvement by, among other things, providing a method for facilitating data entry into an electronic device via a touch sensitive input device or touchscreen, wherein the items displayed on the touchscreen are automatically shifted or scrolled when the user touches the touchscreen, so that the user can more easily view the exact position where he or she is placing a cursor on the touchscreen. In particular, according to one exemplary embodiment a user touches the touchscreen at a physical location on the touchscreen. Upon detection of this input or contact, a cursor may be displayed on the touchscreen at a location relative to items displayed on the touchscreen (e.g., icons, text, etc.) that is proximate the physical location where the user touched the touchscreen. In other words, where the user uses his or her finger to touch the touchscreen, the cursor may be displayed directly underneath the user's finger. Because the cursor, as well as various items displayed on the touchscreen, are likely now obscured by the user's finger, according to one exemplary embodiment, the items displayed on the touchscreen, including the cursor, may then be automatically shifted or scrolled so that the cursor is now offset from the physical location where the user touched the touchscreen. For example, in one exemplary embodiment all of the items displayed on the touchscreen may be shifted or scrolled upwards. Alternatively, where, for example, the user touches the touchscreen near the top of the screen, the items displayed may be shifted downward and/or to the left or right. At the same time, in one exemplary embodiment, the items displayed on the touchscreen may be magnified in order to further facilitate data entry.

In accordance with one aspect, a method is provided of facilitating data entry via a touch sensitive input device. In one exemplary embodiment, the method may include: (1) detecting a tactile input from a user at a physical location on a touch sensitive input device; (2) displaying a cursor at a relative location on the touch sensitive input device proximate the physical location; and (3) translating, without further user interaction, one or more items displayed on the touch sensitive input device such that the relative location of the cursor is offset from the physical location of the detected tactile input.

In one exemplary embodiment the method may further include determining a distance between the one or more items displayed on the touch sensitive input
device. In this exemplary embodiment, the items displayed on the touch sensitive input device may only be translated when the distance is less than a predetermined threshold (e.g., a predefined portion of the width of an average fingertip).

In another exemplary embodiment, the method may further include determining in which vertical half (e.g., top or bottom), horizontal half (e.g., left or right), or quadrant (e.g., top left, top right, bottom left or bottom right) of the touch sensitive input device the physical location falls. In these exemplary embodiments, translating the items displayed on the touch sensitive input device may involve shifting the items upward, downward, left, right, or a combination thereof, depending upon the half or quadrant the physical location falls.

According to another aspect, an apparatus is provided for facilitating data entry via a touch sensitive input device. In one exemplary embodiment, the apparatus includes a processor configured to: (1) detect a tactile input from a user at a physical location on a touch sensitive input device; (2) display a cursor at a relative location on the touch sensitive input device proximate the physical location; and (3) translate, without further user interaction, one or more items displayed on the touch sensitive input device such that the relative location of the cursor is offset from the physical location of the detected tactile input.

In accordance with yet another aspect, a computer program product is provided for facilitating data entry via a touch sensitive input device. The computer program product contains at least one computer-readable storage medium having computer-readable program code portions stored therein. The computer-readable program code portions of one exemplary embodiment include: (1) a first executable portion for detecting a tactile input from a user at a physical location on a touch sensitive input device; (2) a second executable portion for displaying a cursor at a relative location on the touch sensitive input device proximate the physical location; and (3) a third executable portion for translating, without further user interaction, one or more items displayed on the touch sensitive input device such that the relative location of the cursor is offset from the physical location of the detected tactile input.

According to another aspect, apparatus is provided for facilitating data entry via a touch sensitive input device. In one exemplary embodiment the apparatus includes: (1) means for detecting a tactile input from a user at a physical location on a touch sensitive input device; (2) means for displaying a cursor at a
relative location on the touch sensitive input device proximate the physical location; and (3) means for translating, without further user interaction, one or more items displayed on the touch sensitive input device such that the relative location of the cursor is offset from the physical location of the detected tactile input.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

Having thus described exemplary embodiments of the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

Figure 1 is a schematic block diagram of a mobile station capable of operating in accordance with an exemplary embodiment of the present invention;

Figure 2 is a flow chart illustrating the operations which may be taken in order to facilitate data entry into an electronic device via a touch sensitive input device in accordance with exemplary embodiments of the present invention;

Figures 3A-3C provide screen shots of an electronic device touchscreen illustrating the technique for facilitating data entry by scrolling the touchscreen upwards in response to a detected tactile input by a user in accordance with one exemplary embodiment of the present invention;

Figures 4A-4C provide additional screen shots of an electronic device touchscreen illustrating the technique for repositioning placement of a cursor on the touchscreen in accordance with another exemplary embodiment of the present invention;

Figures 5A and 5B provide screen shots of an electronic device touchscreen illustrating the technique for facilitating data entry by scrolling the touchscreen to the left in response to a detected tactile input by a user in accordance with one exemplary embodiment of the present invention; and

Figures 6A and 6B provide screen shots of an electronic device touchscreen illustrating the technique for facilitating data entry by scrolling the touchscreen upwards and magnifying the items displayed on the touchscreen in response to a detected tactile input by a user in accordance with yet another exemplary embodiment of the present invention.
DETAILED DESCRIPTION

Exemplary embodiments of the present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the inventions are shown. Indeed, exemplary embodiments of the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

Overview:

In general, exemplary embodiments of the present invention provide a method, apparatus and computer program product for facilitating data entry into an electronic device via a touch sensitive input device. As noted above, according to one exemplary embodiment, as a user places his or her finger on the touchscreen, a cursor may be displayed on the touchscreen at a location that is relative to other items displayed on the touchscreen and is proximate the physical location where the user touched the touchscreen. Where the items displayed on the touchscreen are close together, the cursor and the item(s) on or within which the cursor is placed are likely now obscured by the user's finger. As a result, according to one exemplary embodiment, the items displayed on the touchscreen, including the cursor, may then be shifted or scrolled in one or more directions so that the cursor, while maintaining its position relative to the other items displayed on the touchscreen, is now offset from the physical location where the user touched the touchscreen.

For example, in one exemplary embodiment all of the items displayed on the touchscreen may be shifted or scrolled upwards. Alternatively, where, for example, the user touches the touchscreen near the top right corner of the touchscreen, the items displayed may be shifted downward and/or to the left. In one exemplary embodiment, the items displayed on the touchscreen may also be magnified in order to further facilitate data entry. At this point, if the user sees that the cursor has not been placed at the location he or she intended, according to one exemplary embodiment, the user may shift his or her finger slightly (e.g., tilt it left,
right, up or down) in order reposition the cursor with respect to the other items displayed on the touchscreen.

Electronic Device:

Reference is not made to Figure 1, which illustrates one type of electronic device that would benefit from embodiments of the present invention. As shown, the electronic device may be a mobile station 10, and, in particular, a cellular telephone. It should be understood, however, that the mobile station illustrated and hereinafter described is merely illustrative of one type of electronic device that would benefit from the present invention and, therefore, should not be taken to limit the scope of the present invention. While several embodiments of the mobile station 10 are illustrated and will be hereinafter described for purposes of example, other types of mobile stations, such as personal digital assistants (PDAs), pagers, laptop computers, as well as other types of electronic systems including both mobile, wireless devices and fixed, wireline devices, can readily employ embodiments of the present invention.

The mobile station includes various means for performing one or more functions in accordance with exemplary embodiments of the present invention, including those more particularly shown and described herein, such as a suitably programmed processor. It should be understood, however, that one or more of the entities may include alternative means for performing one or more like functions, without departing from the spirit and scope of the present invention. More particularly, for example, as shown in Figure 2, in addition to an antenna 302, the mobile station 10 includes a transmitter 304, a receiver 306, and means, such as a processing device 308, e.g., a processor, controller or the like, that provides signals to and receives signals from the transmitter 304 and receiver 306, respectively. These signals include signaling information in accordance with the air interface standard of the applicable cellular system and also user speech and/or user generated data. In this regard, the mobile station can be capable of operating with one or more air interface standards, communication protocols, modulation types, and access types. More particularly, the mobile station can be capable of operating in accordance with any of a number of second-generation (2G), 2.5G and/or third-generation (3G) communication protocols or the like. Further, for example, the mobile station can be capable of operating in accordance with any of a number of
different wireless networking techniques, including Bluetooth, IEEE 802.11 WLAN (or Wi-Fi®), IEEE 802.16 WiMAX, ultra wideband (UWB), and the like.

It is understood that the processing device 308, such as a processor, controller or other computing device, includes the circuitry required for implementing the video, audio, and logic functions of the mobile station and is capable of executing application programs for implementing the functionality discussed herein. For example, the processing device may be comprised of various means including a digital signal processor device, a microprocessor device, and various analog to digital converters, digital to analog converters, and other support circuits. The control and signal processing functions of the mobile device are allocated between these devices according to their respective capabilities. The processing device 308 thus also includes the functionality to convolutionally encode and interleave message and data prior to modulation and transmission. The processing device can additionally include an internal voice coder (VC) 308A, and may include an internal data modem (DM) 308B. Further, the processing device 308 may include the functionality to operate one or more software applications, which may be stored in memory. For example, the controller may be capable of operating a connectivity program, such as a conventional Web browser. The connectivity program may then allow the mobile station to transmit and receive Web content, such as according to HTTP and/or the Wireless Application Protocol (WAP), for example.

The mobile station may also comprise means such as a user interface including, for example, a conventional earphone or speaker 310, a ringer 312, a microphone 314, a display 316, all of which are coupled to the controller 308. The user input interface, which allows the mobile device to receive data, can comprise any of a number of devices allowing the mobile device to receive data, such as a keypad 318, a microphone 314, a touch sensitive display or touchscreen 326, or other input device. In embodiments including a keypad, the keypad can include the conventional numeric (0-9) and related keys (#, *), and other keys used for operating the mobile station and may include a full set of alphanumeric keys or set of keys that may be activated to provide a full set of alphanumeric keys. Although not shown, the mobile station may include a battery, such as a vibrating battery pack, for powering the various circuits that are required to operate the mobile station, as well as optionally providing mechanical vibration as a detectable output.
The mobile station can also include means, such as memory including, for example, a subscriber identity module (SIM) 320, a removable user identity module (R-UIM) (not shown), or the like, which typically stores information elements related to a mobile subscriber. In addition to the SIM, the mobile device can include other memory. In this regard, the mobile station can include volatile memory 322, as well as other non-volatile memory 324, which can be embedded and/or may be removable. For example, the other non-volatile memory may be embedded or removable multimedia memory cards (MMCs), secure digital (SD) memory cards, Memory Sticks, EEPROM, flash memory, hard disk, or the like. The memory can store any of a number of pieces or amount of information and data used by the mobile device to implement the functions of the mobile station. For example, the memory can store an identifier, such as an international mobile equipment identification (IMEI) code, international mobile subscriber identification (IMSI) code, mobile device integrated services digital network (MSISDN) code, or the like, capable of uniquely identifying the mobile device. The memory can also store content. The memory may, for example, store computer program code for an application and other computer programs. For example, as discussed in more detail below, in one embodiment, the memory may store computer program code for detecting a tactile input from a user at a physical location on the touchscreen 326 of the mobile station 10 (e.g., when a user places his or her finger on the touchscreen 326), displaying a cursor at a relative location on the touchscreen 326 proximate the physical location, and translating, without user interaction, one or more items displayed on the touchscreen 326 such that the relative location of the cursor is offset from the physical location of the detected tactile input.

The method, apparatus and computer program product of exemplary embodiments of the present invention are primarily described in conjunction with mobile communications applications. It should be understood, however, that the method, apparatus and computer program product of embodiments of the present invention can be utilized in conjunction with a variety of other applications, both in the mobile communications industries and outside of the mobile communications industries. For example, the method, apparatus and computer program product of exemplary embodiments of the present invention can be utilized in conjunction with wireline and/or wireless network (e.g., Internet) applications.
Method of Facilitating Data Entry via a Touchscreen

Referring now to Figure 2, which illustrates the operations which may be taken in accordance with exemplary embodiments of the present invention in order to facilitate data entry into an electronic device via a touch sensitive input device, or touchscreen. As shown, the process may begin when the electronic device and, more typically software executed by a processor of the electronic device, detects a tactile input on the electronic device touchscreen, for example, when a user places his or her finger on the touchscreen (Block 201), and determines the physical location of the tactile input (Block 202). The electronic device may detect the tactile input and determine its location via any number of techniques that are known to those of ordinary skill in the art. For example, the touchscreen may comprise two layers that are held apart by spacers and have an electrical current running therebetween. When a user touches the touchscreen, the two layers may make contact causing a change in the electrical current at the point of contact. The electronic device may note the change of the electrical current (i.e., in order to perform Block 201), as well as the coordinates of the point of contact (i.e., in order to perform Block 202). Alternatively, wherein the touchscreen uses a capacitive, as opposed to a resistive, system to detect tactile input, the touchscreen may comprise a layer storing electrical charge. When a user touches the touchscreen, some of the charge from that layer is transferred to the user causing the charge on the capacitive layer to decrease. Circuits may be located at each corner of the touchscreen that measure the decrease in charge, such that the exact location of the tactile input can be calculated based on the relative differences in charge measured at each corner. Embodiments of the present invention can employ other types of touchscreens, such as a touchscreen that is configured to enable touch recognition by any of resistive, capacitive, infrared, strain gauge, surface wave, optical imaging, dispersive signal technology, acoustic pulse recognition or other techniques, and to then provide signals indicative of the location of the touch.

In one exemplary embodiment determining the physical location of the tactile input may involve not only determining the precise location of the input (e.g., the coordinates of the location), but also determining in which half and/or quadrant of the touchscreen the physical location falls. More specifically, the touchscreen may be divided into verticals halves including a top and a bottom half, horizontal halves including a left and a right half, and/or quadrants including a top
left, top right, bottom left and bottom right quadrant, and the physical location of
the tactile input may fall within one of these halves and/or quadrants. In one
exemplary embodiment, a default position may be held where the user touches the
touchscreen directly in between two halves or quadrants. For example, if the
touchscreen is divided into vertical halves (i.e., top and bottom halves), the default
may be to treat an input detected directly in between the two halves as occurring
within the bottom half. Similarly, if the touchscreen is divided into horizontal
halves (i.e., left and right), the default may be to treat any input detected directly in
between the two halves as occurring within the right half.

Returning to Figure 2, once the tactile input has been detected and its
physical location determined, the electronic device and, more typically software
executed by a processor of the electronic device may then display, in Block 203, a
cursor on the touchscreen at a location relative to one or more items displayed on
the touchscreen (i.e., a “relative location”) that is proximate the physical location
determined at Block 202. In other words, a cursor may be displayed on the
touchscreen at the spot where the user touched the screen. Where, for example, the
touchscreen is displaying a text document or message, the cursor will be placed
relative to the letters displayed in the text document or message at the spot where
the user touched the screen.

The distance between each of the items displayed on the touchscreen may
then be calculated or otherwise determined, in Block 204, by the electronic device
and, more typically software executed by a processor on the electronic device. The
distances may then be compared by the electronic device and, more typically
software executed by a processor of the electronic device, to a predetermined
threshold that is used to determine whether it is necessary or otherwise desired to
shift the contents of the touchscreen so that the user can more easily see where
exactly he or she is attempting to place the cursor within the document, or other
item(s), displayed on the touchscreen. (Block 205). In particular, if the items are
well spaced apart (e.g., spaced more than a predetermined percent, such as ½, the
width of an average person’s finger, or a predefined amount, such as 2 cm), then it
may be obvious to the user where he or she is placing the cursor relative to the
items displayed. In contrast, where the items are not well spaced apart (e.g.,
spaced less than ½ the width of an average person’s finger, or 2 cm), then several
items (e.g., words and/or letters of a word) may be occluded by the user’s finger
making it difficult to know where, with respect to those items, the user is placing a cursor. Thus, in Block 205, the electronic device and, more typically software executed by a processor of the electronic device determines whether any of the distances calculated in Block 204 is less than the predetermined threshold (e.g., $\frac{1}{2}$ the width of an average person’s finger, or 2 cm). If not, the process may return to Block 201 where a subsequent tactile input, or placement of the user’s finger on the touchscreen, may be detected by the touchscreen.

If, on the other hand, at least one of the calculated distances between the various items displayed on the touchscreen is less than the threshold, indicating that several items may be occluded by the user’s finger when he or she touches the touchscreen, the process continues to Block 206, wherein the electronic device and, in particular, software executed by the processor operating on the electronic device, shifts the items displayed on the touchscreen (e.g., icons, words of a document, etc.) so that the cursor is visible, at the original location relative to the other items displayed on the touchscreen but offset from the physical location where the user touched the touchscreen. In this way, the cursor may be visible while the user’s finger is still placed on the touchscreen.

In exemplary embodiments, shifting the items displayed on the touchscreen may involve scrolling the screen upward, downward, to the left, to the right, or a combination thereof, depending upon the half and/or quadrant the physical location of the detected tactile input falls (as determined at Block 202). For example, if the user’s input is detected in the bottom half of the touchscreen, the entire touchscreen may “scroll upwards” – i.e., all of the items displayed on the touchscreen may be displaced upwards. Alternatively, where the input is detected in the top left corner of the touchscreen, such that displaying the items upward would not result in the cursor being displayed, the items displayed may be shifted downward and/or to the right. In one exemplary embodiment, a default setting may be established in order to define what should happen when the tactile input is detected directly in the middle of two halves and/or quadrant being measured. For example, as mentioned above, the default may be to interpret placement of the user’s finger directly in between the vertical halves as placement in the bottom half and, therefore, to shift the contents of the touchscreen upwards. In yet another exemplary embodiment, the default may be to always scroll or shift the touchscreen upwards unless the user places his or her finger at the extreme top.
edge of the touchscreen, in which case the contents of the touchscreen may
scrolled or shifted downward and/or to the left or right. As one of ordinary skill
with recognize, any number of methods of determining in which direction the
contents of the touchscreen should be shifted may be used without departing from
the spirit and scope of exemplary embodiments of the present invention.

By way of example, Figures 3A – 3C provides screen shots of a
touchscreen of an electronic device illustrating placement of a cursor in a text
document in accordance with one exemplary embodiment of the present invention.
In particular, Figure 3A illustrates a touchscreen displaying a text document
including the misspelled word “aspetcs,” which the user in this exemplary
embodiment would like to correct. In order to do so, the user may place his or her
finger on the touchscreen, as shown in Figure 3B, overtop of the position where the
misspelled word is displayed. As shown, when the user does so, he or she is no
longer able to see the word “aspetcs,” or many of the surrounding words, and,
therefore, cannot tell whether he or she has placed the cursor on that word, let
alone in the right place within that word (e.g., between the “c” and the “i”). In
order to facilitate the user’s placement of the cursor in the right position, according
to one exemplary embodiment shown in Figure 3C, the entire text document may
automatically (i.e., without further user interaction) scroll or shift upwards so that
the cursor is no longer obscured by the user’s finger. The user is now able to see
that he or she has placed a cursor between the “c” and the “s” of the word
“aspetcs.”

If, at this point, the user is unhappy with the placement of the cursor, for
example because he or she would preferred to have had the cursor placed between
the “c” and the “i” of the word “aspetcs,” according to one exemplary embodiment,
the user is able to reposition the cursor as shown in Figures 4A-4C. Figure 4A,
which is the same as previous Figure 3C, again illustrates placement of the cursor
in a position relative to the items displayed on the touchscreen (i.e., the words and
letters of the text document) that is offset slightly above the physical location
where the user touched the touchscreen so that the use can see the placement of the
cursor from underneath his or her finger. In order to then move the cursor to the
desired position, as shown in Figure 4B, the user may simply shift or tilt his or
finger up, down, right or, as in this example, left, causing the cursor to move in that
direction. Once the cursor has been placed at the desired location, the user may
then lift his or her finger from the touchscreen, as shown in Figure 4C, and the
cursor will remain at that location relative to the items displayed on the
touchscreen, while all of the items displayed (e.g., the text document including the
cursor) may return to their original position on the touchscreen (e.g., scroll back
down).

While a default setting may be to scroll the contents of the touchscreen
upwards to display the cursor, as discussed above, in some instances this may not
be possible or ideal because of the placement of the user’s finger with respect to
the touchscreen. In particular, the touchscreen may be divided into vertical halves
(i.e., top and bottom), horizontal halves (i.e., left and right) and/or quadrants (i.e.,
top left, top right, bottom left and bottom right), and depending upon the half
and/or quadrant on which the user places his or her finger, the touchscreen may
scroll or shift accordingly. To illustrate, Figures 5A and 5B show an example
where the user desires to place a cursor within a word that is displayed at the top
right corner of the touchscreen (i.e., “Commerce”). In this instance it would not
be possible to shift the contents of the touchscreen upward. As a result, as shown
in Figure 5B, the contents of the touchscreen may, instead, be shifted or scrolled to
the left causing the cursor and its position with respect to the other words and
letters displayed on the touchscreen to now be visible to the left side of the user’s
finger. A similar scenario may be shown where the user desires to place a cursor
on an item displayed on the top left, bottom left or bottom right of the touchscreen.

In another exemplary embodiment, illustrated in Figures 6A and 6B, in
addition to shifting the items displayed on the touchscreen so that the relative
location of the cursor with respect to the items displayed on the touchscreen is
offset from the physical location at which the user touched the touchscreen, the
contents of the touchscreen may be magnified in order to further facilitate data
data entry.

Based on the foregoing, exemplary embodiments of the present invention
provide a technique for facilitating data entry into an electronic device via a touch
sensitive input device, wherein the contents of the touchscreen are shifted or
scrolled such that the placement of a cursor with respect to items displayed on the
touchscreen is not obscured by the user’s finger during placement.
Conclusion:

As described above and as will be appreciated by one skilled in the art, embodiments of the present invention may be configured as a method and apparatus. Accordingly, embodiments of the present invention may be comprised of various means including entirely of hardware, entirely of software, or any combination of software and hardware. Furthermore, embodiments of the present invention may take the form of a computer program product on a computer-readable storage medium having computer-readable program instructions (e.g., computer software) embodied in the storage medium. Any suitable computer-readable storage medium may be utilized including hard disks, CD-ROMs, optical storage devices, or magnetic storage devices.

Exemplary embodiments of the present invention have been described above with reference to block diagrams and flowchart illustrations of methods, apparatuses (i.e., systems) and computer program products. It will be understood that each block of the block diagrams and flowchart illustrations, and combinations of blocks in the block diagrams and flowchart illustrations, respectively, can be implemented by various means including computer program instructions. These computer program instructions may be loaded onto a general purpose computer, special purpose computer, or other programmable data processing apparatus to produce a machine, such that the instructions which execute on the computer or other programmable data processing apparatus create a means for implementing the functions specified in the flowchart block or blocks.

These computer program instructions may also be stored in a computer-readable memory that can direct a computer or other programmable data processing apparatus to function in a particular manner, such that the instructions stored in the computer-readable memory produce an article of manufacture including computer-readable instructions for implementing the function specified in the flowchart block or blocks. The computer program instructions may also be loaded onto a computer or other programmable data processing apparatus to cause a series of operational steps to be performed on the computer or other programmable apparatus to produce a computer-implemented process such that the instructions that execute on the computer or other programmable apparatus provide steps for implementing the functions specified in the flowchart block or blocks.
Accordingly, blocks of the block diagrams and flowchart illustrations support combinations of means for performing the specified functions, combinations of steps for performing the specified functions and program instruction means for performing the specified functions. It will also be understood that each block of the block diagrams and flowchart illustrations, and combinations of blocks in the block diagrams and flowchart illustrations, can be implemented by special purpose hardware-based computer systems that perform the specified functions or steps, or combinations of special purpose hardware and computer instructions.

Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these exemplary embodiments of the invention pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. For example, while the various embodiments have been described in conjunction with the use of a user’s finger to select an item, other selection devices, such as a stylus, a pencil or the like, may be similarly employed. Therefore, it is to be understood that the embodiments of the invention are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.
THAT WHICH IS CLAIMED:

1. A method comprising:
   detecting a tactile input from a user at a physical location on a touch
   sensitive input device;
   displaying a cursor at a relative location on the touch sensitive input device
   proximate the physical location; and
   translating, without further user interaction, one or more items displayed on
   the touch sensitive input device such that the relative location of the cursor is offset
   from the physical location of the detected tactile input.

2. The method of Claim 1 further comprising:
   determining a distance between the one or more items displayed on the
   touch sensitive input device, wherein the items are only translated if at least one
   distance is less than a predetermined threshold.

3. The method of Claim 2, wherein the predetermined threshold comprises a
   predefined portion of the width of an average fingertip.

4. The method of Claim 1 further comprising:
   determining in which vertical half of the touch sensitive input device the
   physical location falls, wherein translating the one or more items displayed
   comprises shifting the one or more items upward or downward depending upon the
   determined vertical half.

5. The method of Claim 1 further comprising:
   determining in which horizontal half of the touch sensitive input device the
   physical location falls, wherein translating the one or more items displayed
   comprises shifting the one or more items left or right depending upon the
   determined horizontal half.
6. The method of Claim 1 further comprising:
determining in which quadrant of the touch sensitive input device the
physical location falls, wherein translating the one or more items displayed
comprises shifting the one or more items upward or downward and left or right
depending upon the determined quadrant.

7. The method of Claim 1 further comprising:
magnifying the one or more items displayed on the touch sensitive input
device.

8. The method of Claim 1, wherein translating the one or more items
displayed comprises shifting the one or more items at least one of downward or to
one side, if the physical location of the tactile input is proximate a top edge of the
touch sensitive input device, otherwise translating the one or more items displayed
comprises shifting the one or more items upward.

9. The method of Claim 1, wherein a plurality of items are displayed on the
touch sensitive input device, and wherein translating one or more items displayed
comprises shifting all of the plurality of items at least one of upward, downward,
left or right.

10. An apparatus comprising:
a processor configured to:
detect a tactile input from a user at a physical location on a touch
sensitive input device;
display a cursor at a relative location on the touch sensitive input
device proximate the physical location; and
translate, without further user interaction, one or more items
displayed on the touch sensitive input device such that the relative location of the
cursor is offset from the physical location of the detected tactile input.
11. The apparatus of Claim 10, wherein the processor is further configured to determine a distance between the one or more items displayed on the touch sensitive input device, wherein the one or more items are only translated if at least one distance is less than a predetermined threshold.

12. The apparatus of Claim 11, wherein the predetermined threshold comprises a predefined portion of the width of an average fingertip.

13. The apparatus of Claim 10, wherein the processor is further configured to:
   determine in which vertical half of the touch sensitive input device the physical location falls, wherein translating the one or more items displayed comprises shifting the one or more items upward or downward depending upon the determined vertical half.

14. The apparatus of Claim 10, wherein the processor is further configured to:
   determine in which horizontal half of the touch sensitive input device the physical location falls, wherein translating the one or more items displayed comprises shifting the one or more items left or right depending upon the determined horizontal half.

15. The apparatus of Claim 10, wherein the processor is further configured to:
   determine in which quadrant of the touch sensitive input device the physical location falls, wherein translating the one or more items displayed comprises shifting the one or more items upward or downward and left or right depending upon the determined quadrant.

16. The apparatus of Claim 10, wherein the processor is further configured to:
   magnify the one or more items displayed on the touch sensitive input device.

17. The apparatus of Claim 10, wherein in order to translate the one or more items displayed, the processor is further configured to shift the one or more items at least one of downward or to one side, if the physical location of the tactile input is proximate a top edge of the touch sensitive input device, otherwise in order to
translate the one or more items displayed, the processor is further configured to shift the one or more items upward.

18. The apparatus of Claim 10, wherein a plurality of items are displayed on the touch sensitive input device, and wherein in order to translate one or more items displayed, the processor is further configured to shift all of the plurality of items at least one of upward, downward, left or right.

19. A computer program product comprising at least one computer-readable storage medium having computer-readable program code portions stored therein, the computer-readable program code portions comprising:

   a first executable portion for detecting a tactile input from a user at a physical location on a touch sensitive input device;

   a second executable portion for displaying a cursor at a relative location on the touch sensitive input device proximate the physical location; and

   a third executable portion for translating, without further user interaction, one or more items displayed on the touch sensitive input device such that the relative location of the cursor is offset from the physical location of the detected tactile input.

20. The computer program product of Claim 19, wherein the computer-readable program code portions further comprise:

   a fourth executable portion for determining a distance between the one or more items displayed on the touch sensitive input device, wherein the one or more items are only translated if at least one distance is less than a predetermined threshold.

21. The computer program product of Claim 20, wherein the predetermined threshold comprises a predefined portion of the width of an average fingertip.
22. The computer program product of Claim 19, wherein the computer-readable program portions further comprise:

   a fourth executable portion for determining in which vertical half of the touch sensitive input device the physical location falls, wherein translating the one or more items displayed comprises shifting the one or more items upward or downward depending upon the determined vertical half.

23. The computer program product of Claim 19, wherein the computer-readable program portions further comprise:

   a fourth executable portion for determining in which horizontal half of the touch sensitive input device the physical location falls, wherein translating the one or more items displayed comprises shifting the one or more items left or right depending upon the determined horizontal half.

24. The computer program product of Claim 19, wherein the computer-readable program portions further comprise:

   a fourth executable portion for determining in which quadrant of the touch sensitive input device the physical location falls, wherein translating the one or more items displayed comprises shifting the one or more items upward or downward and left or right depending upon the determined quadrant.

25. The computer program product of Claim 19, wherein the computer-readable program code portions further comprise:

   a fourth executable portion for magnifying the one or more items displayed on the touch sensitive input device.

26. The computer program product of Claim 19, wherein the third executable portions is configured to shift the one or more items at least one of downward or to one side, if the physical location of the tactile input is proximate a top edge of the touch sensitive input device, otherwise the third executable portion is configured to shift the one or more items upward.
27. The computer program product of Claim 19, wherein a plurality of items are displayed on the touch sensitive input device, and wherein the third executable portions if configured to shift all of the plurality of items at least one of upward, downward, left or right.

28. An apparatus comprising:
   means for detecting a tactile input from a user at a physical location on a touch sensitive input device;
   means for displaying a cursor at a relative location on the touch sensitive input device proximate the physical location; and
   means for translating, without further user interaction, one or more items displayed on the touch sensitive input device such that the relative location of the cursor is offset from the physical location of the detected tactile input.

29. The apparatus of Claim 28 further comprising:
   means for determining a distance between the one or more items displayed on the touch sensitive input device, wherein the items are only translated if at least one distance is less than a predetermined threshold.

30. The apparatus of Claim 29, wherein the predetermined threshold comprises a predefined portion of the width of an average fingertip.

31. The apparatus of Claim 28 further comprising:
   means for determining in which vertical half of the touch sensitive input device the physical location falls, wherein the means for translating the one or more items displayed comprises a means for shifting the one or more items upward or downward depending upon the determined vertical half.

32. The apparatus of Claim 28 further comprising:
   means for determining in which horizontal half of the touch sensitive input device the physical location falls, wherein the means for translating the one or more items displayed comprises a means for shifting the one or more items left or right depending upon the determined horizontal half.
33. The apparatus of Claim 28 further comprising:
   means for determining in which quadrant of the touch sensitive input
device the physical location falls, wherein the means for translating the one or
more items displayed comprises a means for shifting the one or more items upward
or downward and left or right depending upon the determined quadrant.

34. The apparatus of Claim 28 further comprising:
   means for magnifying the one or more items displayed on the touch
   sensitive input device.
FIG. 1
FIG. 2

1. Detect placement of user's finger on touchscreen.
2. Determine physical location of user's finger on touchscreen.
3. Display cursor on touchscreen at a relative location proximate the physical location.
4. Determine distance between items displayed on touchscreen.
5. Determine if distance is less than a threshold.
   - NO: Go back to the previous step.
   - YES: Shift items displayed on touchscreen so that cursor is visible while user's finger is still on the touchscreen.
### FIG. 3A

**Document**
The United States Patent and Trademark Office (USPTO or Office) is an agency of the U.S. Department of Commerce. The role of the USPTO is to grant patents for the protection of inventions and to register trademarks. It serves the interest of inventors and businesses with respect to their inventions and corporate products, and service identifiers. It also advises and assists the President of the United States, the Secretary of Commerce, the bureaus and offices of the Department of Commerce and other agencies of the government in matters involving all domestic and global aspects of "intellectual property." Through the preservation, classification, and dissemination of patent information, the Office promotes the industrial and technological progress of the nation and strengthens the economy.

### FIG. 3B

**Document**
The United States Patent and Trademark Office (USPTO or Office) is an agency of the U.S. Department of Commerce. The role of the USPTO is to grant patents for the protection of inventions and to register trademarks. It serves the interest of inventors and businesses with respect to their inventions and corporate products, and service identifiers. It also advises and assists the President of the United States, the Secretary of Commerce, the bureaus and offices of the Department of Commerce and other agencies of the government in matters involving all domestic and global aspects of "intellectual property." Through the preservation, classification, and dissemination of patent information, the Office promotes the industrial and technological progress of the nation and strengthens the economy.

### FIG. 3C

**Document**
and businesses with respect to their inventions and corporate products, and service identifiers. It also advises and assists the President of the United States, the Secretary of Commerce, the bureaus and offices of the Department of Commerce and other agencies of the government in matters involving all domestic and global aspects of "intellectual property." Through the preservation, classification, and dissemination of patent information, the Office promotes the industrial and technological progress of the nation and strengthens the economy.

In discharging its duties, the Patent Office examines applications and grants patents to inventors who are entitled to the protection of their inventions.
The United States Patent and Trademark Office (USPTO or Office) is an agency of the U.S. Department of Commerce. The role of the USPTO is to grant patents for the protection of inventions and to register trademarks. It serves the interest of inventors and businesses with respect to their inventions and corporate products, and service identifications. It also advises and assists the President of the United States, the Secretary of Commerce, the bureaus and offices of the Department of Commerce and other agencies of the government in matters involving all domestic and global aspects of "intellectual property." Through the preservation, classification, and dissemination of patent information, the Office promotes the industrial and technological progress of the nation and strengthens the economy.

FIG. 6A

FIG. 6B
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

INV. G06F3/048

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06f

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, COMPENDEX

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>

X Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

*A* document defining the general state of the art which is not considered to be of particular relevance

*E* earlier document but published on or after the international filing date

*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

*O* document referring to an oral disclosure, use, exhibition or other means

*P* document published prior to the international filing date but later than the priority date claimed

*"* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

*"* document member of the same patent family

Date of the actual completion of the international search 12 September 2008

Date of mailing of the international search report 26/09/2008

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl
Fax: (+31-70) 340-3016

Authorized officer

Legrand, J

Form PCT/ISA/210 (second sheet) (April 2005)
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>column 6, line 25 - column 7, line 63; figures 7-9</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>WO 99/54807 A (KONINKL PHILIPS ELECTRONICS NV [NL]; PHILIPS SVENSKA AB [SE])&lt;br&gt;28 October 1999 (1999-10-28)&lt;br&gt;page 3, line 18 - page 4, line 6; figure 1</td>
<td>7, 16, 25, 34</td>
</tr>
<tr>
<td>Patent document cited in search report</td>
<td>Publication date</td>
<td>Patent family member(s)</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>US 2006244735 A1</td>
<td>02-11-2006</td>
<td>NONE</td>
</tr>
<tr>
<td>WO 9954807 A</td>
<td>28-10-1999</td>
<td>CN 1263616 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 69910710 D1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 69910710 T2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP 2002505783 T</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TW 497063 B</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 6211856 B1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 2002030699 A1</td>
</tr>
</tbody>
</table>