

of a plurality of segments representing a specific character. In this example the area covered by each segment is approximately $\frac{1}{40}$ th of the circumferential arc, or about 36 degrees, thereby representing a character selection area of $\pi/10$, less the region for the "SP" segment (space character). It should be understood that this approach offers the user a selection area that is notably larger than the traditional graphic QWERTY keyboard representation on portable devices, while occupying the same or preferably a smaller area of the display screen.

[0069] Having described the general operation of the present invention, attention is now turned to **FIGS. 5A and 5B**, where flowcharts depict the programmatic steps completed by a device in carrying out the character selection process described above. Respectively, the flowcharts depict a character selection process and a keyboard display process. Various methods employed within an embodiment of the present invention are described and taught, for example, in Chapter 13 of "Programming with Microsoft Windows® CE" by Douglas Boling, published by Microsoft Press, 1998, the relevant portions of which are hereby incorporated by reference for their teachings.

[0070] Each of these flowcharts run concurrently. In an alternative embodiment, it will be appreciated that the steps set forth in the flowcharts may be combined and/or reordered so as to provide similar functionality. Referring briefly to **FIG. 5A**, the character selection process is initiated at Step 450, and at Steps 452-460 the default or desired character group is displayed in the selection window in accordance with the process depicted in **FIG. 5B**. Once the desired character group is displayed, Step 462 continues where a character is selected by the user in accordance with one of a number of well-known selection methods.

[0071] Subsequently, a space key selection may be detected and entered at steps 464 and 470. It will be understood that each of the character and/or space selection steps represented herein results in a further output or signaling of such selection to the system or application in which the present application is running, thereby enabling the character selection to be recognized by the application and inserted or added therein.

[0072] As depicted at the bottom of **FIG. 5A**, the character entry process is completed by an affirmative response to step 472, where it terminates in Step 478. Otherwise, the process continues looping at Step 454 to enable the selection and output of additional character and/or space selections by the user in accordance with the process depicted in **FIG. 5B**.

[0073] More specifically, one character display process of **FIG. 5B** is started at step 502, in response to a user selecting a "Murphy Keyboard" or similar icon (not shown) from the device screen depicting various software applications. Once started, the application program operates to show a character display consisting of a group of character selection segments corresponding to one of the groups set forth in **FIG. 2**, or other alternatives as discussed herein, as represented at step 504. The alternate action key display functions are also depicted at steps 506 and 508. Although shown as in **FIG. 1** as touch-sensitive action keys 60, it is also possible that such functionality is not touch-sensitive but coded in association with a "hard" button 16, in which case the steps of showing the text punctuation and math symbol and punctuation action keys would not be required.

[0074] Once the display window is built and displayed at step 510 (including steps 504-508), the keyboard progresses through a sequence of Boolean decision steps (530-538), checking for the selection of any of the action keys. In the event that none are selected, the default display group, Group 1, is displayed in display segments 100₁-100₁₀, as shown in step 540. More specifically, the program builds the representations of the characters for the current group, by default Group 1 from **FIG. 2**, so as to display the selectable segments in the display window 40. Subsequently, the application enters another decision step, step 590, to determine if the keyboard application has been closed. In the event that it has, progression through the flowchart stops, shown by step 598. If it has not, the final decision making step in the progression, step 592, is entered, which determines if the application has timed out. If the pre-set period of time without activity has expired, step 598 is executed. If it has not, the flowchart returns to the head of the decision making sequence, step 530.

[0075] The described progression takes place at a fast pace determined only by the speed of the processor performing the steps, continuously checking for the selection of one of the action keys, steps 530-538, closure of the program, step 590, or time out of the program, step 592. In the event that none of these takes place, the effect is that Display Group 1 is continuously displayed in display window 40 by the re-execution of step 540.

[0076] Obviously deviations from this routine are possible in the event that the answer to any one of the decision-making steps 530-538 is Yes. As represented by Step 530, one test conducted during this sequence is whether a text punctuation action key has been selected or pressed. In response to detection of a user's selection of the text punctuation action key, the application replaces the characters displayed in segments 100₁-100₁₀ by the characters of Group 5, as represented by step 552. Similarly, in the event that a math symbol action key selection is detected at step 532, the application would replace the characters displayed in segments 100₁-100₁₀ by the characters of Group 6, as represented by step 554.

[0077] Subsequent to step 552 or 554, the application would enter a second decision-making step, step 556. In this step, the question is asked whether a character has been selected from the group displayed in the display window. If one has, the selection is entered as input in steps 560 and 562, and action returns to the decision-making sequence step 530. If no selection from the display window was made yet, then decision step 558 is reached, asking whether the timeout period has expired. If it has not, action is looped back to step 556 again. This repeats quickly until either a character is selected from the display window, or until the timeout period elapses. In the event that the timeout period elapses, action returns to step 530 without a character having been selected from the display window. In steps 560 and 562, the selection is indicated by highlighting or otherwise depicting the selection on the character segment of the display. In addition to indicating the selection, the associated character(s) is output from the application—either directly into another application (e.g., a note, meeting entry in a date book, etc.) or to a character data buffer associated with the device for retrieval by another application.