

METHOD AND APPARATUS FOR INPUTTING IDEOGRAPHIC
CHARACTERS INTO HANDHELD DEVICES

FIELD OF THE INVENTION

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The present invention relates to handheld devices, and in particular to a method and apparatus for inputting ideographic characters into handheld devices.

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BACKGROUND OF THE INVENTION

Developers of handheld devices have struggled with designing user interfaces for data entry of ideographic characters. Ideographic characters are commonly used for
15 Asian languages, such as Chinese and Japanese.

A conventional device for inputting data into handheld devices is a keypad typically having only 12 to 24 keys of which 10 keys are used for entering numbers 1 through 9 and 0. The keypad is typically used on telephones,
20 mobile phones and similar handheld devices.

In order to input ideographic characters into a handheld device via a keypad, the phonetic letters (e.g., pinyin or zhuyin letters for Chinese characters) or the strokes of the ideographic characters are first mapped by
25 the manufacturer of the handheld device onto the 10 keys of the keypad, which are used for entering numbers. Then, for inputting an ideographic character into the handheld device via the keypad, a user may, in one input mode, enter

the phonetic letters of the ideographic character by pressing the numeric keys of the keypad, and select one of the ideographic characters that will be displayed by the handheld device based on the entered phonetic letters.

5 Alternatively the user may, in another input mode, enter the strokes of the ideographic character by pressing the numeric keys of the keypad, and select one of the ideographic characters that will be displayed by the handheld device based on the entered strokes.

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SUMMARY OF THE INVENTION

The objective of the present invention is to provide a novel and convenient method and apparatus for inputting ideographic characters into handheld devices. The method and apparatus of the present invention are completely different from those in the prior art.

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In order to achieve the above objective, the present invention provides an apparatus for inputting ideographic characters into a handheld device, characterized by comprising:

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a display including a first window for displaying ideographic characters and a second window for displaying symbols;

25 a scrolling device for scrolling a cursor displayed either in said first window or in said second window;

a first part that can be pressed, for switching, when said first part is pressed, said cursor from said second

window into said first window;

a second part that can be pressed, for selecting, when said second part is pressed, a symbol or an ideographic character where said cursor is displayed; and

5 an ideographic character engine, for displaying in said second window symbols to be selected by said second part, displaying in said first window ideographic characters that are associated with a symbol string composed of all symbols that have been selected by said
10 second part, and inputting into said handheld device an ideographic character that has been selected by said second part.

The present invention further provides a method of inputting ideographic characters into a handheld device,
15 characterized by comprising steps of:

predicting a plurality of symbols, and displaying said plurality of symbols in a window;

scrolling a cursor from one symbol to another if a scrolling device is rotated by a user for selecting
20 symbols;

inputting symbols selected by said user;

predicting a plurality of ideographic characters associated with inputted symbols, and displaying said plurality of ideographic characters in another window;

25 switching said cursor from said window into said another window;

scrolling said cursor from one ideographic character to another if said scrolling device is rotated by said user

for selecting ideographic characters;

inputting ideographic characters selected by said user into said handheld device.

The apparatus of the present invention is a substitute
5 for the keypad in handheld devices. By selecting symbols displayed by the apparatus of the present invention, a user may easily and conveniently input desired ideographic characters into the handheld device.

With the apparatus and method of the present invention,
10 a user may input Chinese characters in pinyin input method, in zhuyin input method, or in stroke input method. The present invention improves conventional pinyin input method, conventional zhuyin input method and conventional stroke input method such that input speed is greatly
15 enhanced.

Other features and advantages of the present invention should be apparent from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings, which
20 illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

25 Fig. 1 is a schematic block diagram of the apparatus for inputting ideographic characters according to the present invention;

Figs. 2A and 2B show two modified examples of the

apparatus for inputting ideographic characters shown in Fig. 1;

Figs. 3A to 3G show one process of inputting a Chinese character;

5 Figs. 4A to 4E show another process of inputting the same Chinese character as that in Figs. 3A to 3G;

Fig. 5A to 5F show one process of inputting another Chinese character; and

Fig. 6 is the flow chart of the method of inputting ideographic characters into a handheld device according to the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

15 The embodiments of the present invention will be described in detail.

Fig. 1 is a schematic block diagram of the apparatus for inputting ideographic characters according to the present invention. In Fig. 1, reference numeral 100 denotes a display, 101 the first window, 102 the second window, 107 the third window, 106 a cursor, 103 a scrolling device, 104 the first part, 105 the second part, 108 the third part.

25 Display 100 has the first window 101, the second window 102, the third window 107 and other windows. The first window 101 is used for displaying ideographic characters. The second window 102 is used for displaying symbols.

Scrolling device 103, manipulated by a user, is used

for scrolling cursor 106. Cursor 106 is displayed either in the first window 101 or in the second window 102. The switching of cursor 106 between the second window 102 and the first window 101 is described later in the present specification.

Scrolling device 103 may be a touch pad that senses leftward movement or rightward movement of a user's finger on the surface of the touch pad. Scrolling device 103 may be a touch pad that senses clockwise movement or counterclockwise movement of a user's finger on the surface of the touch pad. Scrolling device 103 may also be a rotator that can be rotated clockwise or counterclockwise.

Different types of scrolling device 103 constitute no restriction to the present invention.

The first part 104 can be pressed. When the first part 104 is pressed, it is used for switching cursor 106 from the second window 102 into the first window 101. The first part 104 may also be used for switching cursor 106 from the first window 101 into the second window 102.

The first part 104 may be one or two micro switches or any other equivalent devices (See Fig. 2A). The first part 104 may be a soft key such as "Convert" displayed on display 100 (See Fig. 2B), or soft arrows displayed on display 100 (not shown), or specific portions of scrolling device 103. In the pinyin input methods described later in the present specification, the switching of cursor 106 from the second window 102 into the first window 101 may be performed when a space or tone mark is selected in the

second window 102 which implies the pinyin letter string is complete.

Different types of the first part 104 constitute no restrictions to the present invention.

5 The second part 105 can be pressed. When the second part 105 is pressed, it is used for selecting a symbol or an ideographic character where cursor 106 is displayed. That is, when cursor 106 is displayed in the second window 102 and the second part 105 is pressed, the symbol where
10 cursor 106 is displayed is selected. When cursor 106 is displayed in the first window 101 and the second part 105 is pressed, the ideographic character where cursor 106 is displayed is selected.

 The second part 105 may be a micro switch or any other
15 equivalent device (See Fig. 2A). The second part 105 may be a soft key such as "Confirm" displayed on display 100 (See Fig. 2B).

Different types of the second part 105 constitute no restriction to the present invention.

20 The first part 104 or the second part 105 may be integrated with the scrolling device 103. The first part 104 may be at the upper or lower edges of the scrolling device 103. The second part 105 may be at the center of the scrolling device 103. The first part 104 may be
25 adjacent to the second part 105 and close to the center of the scrolling device 103 (See Fig. 2A).

Different positions of the first part 104 and different positions of the second part 105 constitute no

restriction to the present invention.

The apparatus for inputting ideographic characters shown in Fig. 1 also includes an ideographic character engine. The ideographic character engine is not shown in Fig. 1, and is usually built inside the handheld device.

The first function of the ideographic character engine is to predict and display symbols in the second window 102. In order to select a symbol displayed in the second window 102, the user need to first scroll cursor 106 onto the desired symbol and then press the second part 105.

The second function of the ideographic character engine is to display ideographic characters in the first window 101. Each of the ideographic characters displayed in the first window 101 is associated with the same symbol string. This symbol string is composed of all symbols that have been selected by means of the second part 105 for inputting a desired ideographic character. In the example shown in Fig. 1, the user has selected symbol "z" and the symbol string is "z". Thus, ideographic characters associated with symbol string "z", such as "在", "增", "最", "做", "怎", "中", are displayed in the first window 101.

There would be other ideographic characters that may be shown in other pages of the first window 101. As described later in the present specification, in order to select an ideographic character displayed in the first window 101,

the user may switch cursor 106 into the first window 101, scroll the first window 101 page by page until to find the desired ideographic character in one page, scroll cursor 106 onto the desired ideographic character in this page,
5 and then press the second part 105.

The third function of the ideographic character engine is to input an ideographic character that has been selected by the second part 105 into the handheld device. Due to the second function of the ideographic character
10 engine, a plurality of ideographic characters may be displayed in the first window 101. The user may first scroll cursor 106 onto the desired ideographic character and then press the second part 105 such that desired ideographic character is inputted into the handheld
15 device.

In order to input a desired ideographic character, after one symbol is selected by means of the second part 105 and thus the present symbol string is updated (and may be shown in the third window 107 as described later in the
20 present specification), or at the very beginning when no symbol is selected and the present symbol string is null, the ideographic character engine predicts probable symbols based on the present symbol string and displays only the probable symbols in the second window 102.

25 The prediction of probable symbols based on a symbol string should meet such a requirement that the symbol string and each of the probable symbols should be able to constitute a valid symbol string that is associated with

at least one ideographic character.

The probable symbols may be displayed in the second window 102 in different orders, such as alphabetic order, ascending/descending order of the length of the symbols, 5 or the descending order of the usage frequency of the symbols. Displaying the predicted probable symbols in a specific order facilitates the selection of symbols by the user. However, different orders of displaying symbols constitute no restriction to the present invention.

10 The prediction of probable symbols is explained in detail with the example shown in Fig. 1. At the very beginning of inputting a desired ideographic character, the symbol string is null. Fig. 1 shows that the user has selected a symbol "z". Then, the symbol string becomes 15 "z". The probable symbols are "a", "e", "i", "h", "o", "u" (in the current page) and other symbols (in other pages not shown in Fig. 1). The symbol string and each of the probable symbols may constitute a plurality of valid symbol strings, which are "za", "ze", "zi", "zh", "zo", "zu", etc. 20 Each valid symbol string is associated with one or more ideographic characters. For example, valid symbol string "ze" is associated with ideographic characters "增", "怎", etc.; valid symbol string "zu" is associated with ideographic characters "最", "做", etc.

25 All of these ideographic characters ("在", "增", "最",

“做”, “怎”, “中” (in the current page), and other associated ideographic characters (in other pages not shown in Fig. 1) are displayed in the first window 101. Though these ideographic characters are associated with a number of different valid symbol strings, they are associated with the same symbol string (which essentially is a common substring of these different valid strings), for instance “z”, as stated above.

At any time, the ideographic character engine may predict and display a wildcard symbol such as “?” in the second window 102. The ideographic character interprets a wildcard symbol as any valid symbol and functions accordingly.

The ideographic character engine predicts not only probable symbols but also ideographic characters. Once an ideographic character has been selected and inputted due to the third function of the ideographic character engine, the ideographic character engine predicts probable ideographic characters based on the previously inputted ideographic characters, and displays the probable ideographic characters in the first window 101.

The prediction of probable ideographic characters based on the previously inputted ideographic characters should meet such a requirement that the previously inputted ideographic characters and each of the probable ideographic characters should be a traditional phrase in the language of the ideographic characters. For instance,

if Chinese character "中" has been inputted, the ideographic character engine may predict probable Chinese characters "国", "文", "共", "央", "心", "华", etc and display them in the first window 101 (See Fig. 5F).

5 Display 100 may further include the third window 107 for displaying the symbol string composed of all symbols that have been selected by means of the second part 105 for inputting a desired ideographic character. In Fig. 1, the symbol string is "z". If the user further selects
10 symbol "a" in the second window 102, the symbol string becomes "za".

 The third part 108 can be pressed. When being pressed, the third part 108 is used for scrolling, page by page, symbols displayed in the second window 102 or ideographic
15 characters displayed in the first window 101. The third part 108 may be integrated with scrolling device 103. The third part 108 may be at the left or right edges of scrolling device 103 (See Fig. 1). The third part 108 may be adjacent to the second part 105 (See Fig. 2A).

20 The third part 108 may be one or two micro switches or any other equivalent devices (See Fig. 2A). The third part 108 may be soft arrows displayed on display 100 (not shown), or specific portions of scrolling device 103.

 Different types and different positions of the third
25 part 108 constitute no restrictions to the present invention.

The following description is based on the assumption that the ideographic characters are Chinese characters. However, such an assumption does not constitute any restriction to the present invention.

5 If Chinese characters are inputted by pinyin method, the symbols displayed in the second window 102 include pinyin letters for Chinese characters. For examples, pinyin letters are "b", "p", "m", "f", etc.

 The following is the process of inputting a Chinese
10 character by pinyin letters using the apparatus for inputting ideographic characters shown in Fig. 1. Many pinyin letters are initially displayed in the second window 102. The user scrolls cursor 106 onto a desired pinyin letter and presses the second part 105 so as to select the
15 desired pinyin letter. Then, the ideographic character engine displays in the first window 101 all Chinese characters associated with the pinyin letter string that has been inputted so far for inputting the desired Chinese character, predicts next pinyin letters and displays the
20 predicted pinyin letters in the second window 102.

 On one hand, the user may press the first part 104, with cursor 106 being switched into the first window 101, scroll cursor 106 onto the desired Chinese character, and press the second part 105, so as to input the Chinese
25 character into the handheld device.

 On the other hand, the user may scroll cursor 106 in the second window 102 onto the second pinyin letter of the desired Chinese character, and press the second part 105

so as to select the second pinyin letter of the desired Chinese character. The ideographic character engine updates the pinyin letter string, displays in the first window 101 all Chinese characters associated with the updated pinyin letter string, predicts next pinyin letters and displays the predicted pinyin letters in the second window 102. The above process may continue until the desired Chinese character is displayed in the first page of the first window 101. As the above process progresses, the Chinese characters displayed in the first window 101 become limited.

As with the traditional pinyin input method, the symbols initially displayed in the second window 102 may be the complete set of pinyin letters, i.e., from "a" to "z".

Figs. 3A to 3G show one process of inputting a desired Chinese character "这" whose pinyin letter string is "zhe".

Fig. 3A shows that the complete set of pinyin letters are initially displayed in the second window 102. The user scrolls the cursor 106 onto the desired pinyin letter "z".

Fig. 3B shows that the user has selected pinyin letter "z", the inputted pinyin letter string "z" is displayed in the third window 107, a plurality of Chinese characters associated with "z" including "在", "增", "最", "做", "怎", "中", are displayed in the first window 101, and a plurality

of pinyin letters including "a", "e", "i", "h", "o", "u" are predicted and displayed in the second window 102.

Fig. 3C shows the user scrolls cursor 106 onto the desired pinyin letter "h".

5 Fig. 3D shows that the user has selected pinyin letter "h", the inputted pinyin letter string "zh" is displayed in the third window 107, a plurality of Chinese characters associated with "zh" including "摘", "着", "真", "正", "只", "中", are displayed in the first window 101, a plurality
10 of pinyin letters including "a", "e", "i", "o", "u" are predicted and displayed in the second window 102. Additionally, "_" (an optional soft key representing space, used for cursor switching) may also be displayed in the second window 102. The user has scrolled cursor 106 onto
15 pinyin letter "e".

Fig. 3E shows that the user has selected pinyin letter "e", the inputted pinyin letter string "zhe" is displayed in the third window 107, a plurality of Chinese characters associated with "zhe" including "着", "这", "者", "折", "遮",
20 "哲", are displayed in the first window 101, a plurality of pinyin letters including "i", "n" are predicted and displayed in the second window 102. Additionally, "_" (an optional soft key representing space, used for cursor switching) may also be displayed in the second window 102.

At this step, the desired Chinese character “这” appears in the first window 101.

Fig. 3F shows the user switches cursor 106 from the second window 102 into the first window 101.

5 Fig. 3G shows the user scrolls cursor 106 onto “这”.

If the user presses the second part 105, the desired Chinese character “这” is inputted into the handheld device.

More preferably, the symbols initially displayed in the second window 102 are consonants for pinyin method.
10 The consonants for pinyin method are “b”, “p”, “m”, “f”, “d”, “t”, “n”, “l”, “g”, “k”, “h”, “j”, “q”, “x”, “zh”, “ch”, “sh”, “r”, “z”, “c”, “s”, “y” and “w”. In so doing, the number of scrolling the second window 102 page by page in order to find a desired pinyin letter is greatly reduced
15 compared with the traditional pinyin input method.

After a consonant has been selected, the ideographic character engine displays vowels for pinyin method in the second window 102. The vowels for pinyin method are “a”, “o”, “e”, “i”, “u”, “ü”, “ua”, “uo”, “ui”, “ia”, “ie”, “iu”,
20 “ue”, “ai”, “ei”, “ao”, “ou”, “an”, “en”, “in”, “un”, “er”, “ang”, “eng”, “ong”, “ing”, “uai”, “iao”, “ian”, “uan”, “iang”, “iong”, “uang”. In so doing, the number of scrolling the second window 102 page by page in order to find a desired pinyin letter is further greatly reduced
25 compared with the traditional pinyin input method.

Figs. 4A to 4E show another process of inputting the same Chinese character "哲" whose pinyin letter string is "zhe".

Fig. 4A shows the consonants for pinyin method are initially displayed in the second window 102. The user scrolls the cursor 106 onto the desired consonant "zh".

Fig. 4B shows that the user has selected consonant "zh", the inputted pinyin letter string "zh" is displayed in the third window 107, a plurality of Chinese characters associated with "zh" including "摘", "着", "真", "正", "只", "中", are displayed in the first window 101, and a plurality of vowels including "a", "e", "i", "ai", "ao" are predicted and displayed in the second window 102.

Fig. 4C shows the user scrolls cursor 106 onto the desired vowel "e".

Fig. 4D shows that the user has selected vowel "e", the inputted pinyin letter string "zhe" is displayed in the third window 107, a plurality of Chinese characters associated with "zhe" including "着", "这", "者", "折", "遮", "哲", are displayed in the first window 101. Since the

pinyin letter string "zhe" is complete, no pinyin letter is predicted and cursor 106 is automatically switched from the second window 102 into the first window 101. (In another embodiment described later in the present specification, further pinyin letters may be predicted and displayed in

the second window 102 and cursor 106 is not automatically switched into the first window 101 until no pinyin letter can be predicted.)

Fig. 4E shows the user scrolls cursor 106 onto "这".

- 5 If the user presses the second part 105, the desired Chinese character "这" is inputted into the handheld device.

Once a pinyin letter string constitutes a complete pinyin letter string, cursor 106 may be automatically switched from the second window 102 into the first window
10 101. It is more preferable to design the ideographic character engine in such a way that cursor 106 is automatically switched into the first window 101 only when no pinyin letter can be predicted. This is explained as follows.

- 15 Pinyin letter string "zhe" is a complete pinyin letter string for "这", "着", etc. ⁽³⁾

Pinyin letter string "zhen" is a complete pinyin letter string for "阵", "振", etc.

- Pinyin letter string "zheng" is a complete pinyin
20 letter string for "正", "症", etc.

After pinyin letter string "zhe" is inputted, the ideographic character engine does not automatically switch cursor 106 into the first window 101, although "zhe"

is a complete pinyin letter string, but predicts and displays "n", "ng" in the second window 102.

After pinyin letter string "zhen" is inputted, the ideographic character engine does not automatically switch cursor 106 into the first window 101, although
5 "zhen" is a complete pinyin letter string, but predicts and displays "g" in the second window 102.

After pinyin letter string "zheng" is inputted, the ideographic character engine automatically switches
10 cursor 106 into the first window 101, since no pinyin letter can be predicted.

Thus, the way of inputting a desired Chinese character is very flexible.

The following is an even more preferable way of
15 inputting Chinese characters.

Due to the nature of pinyin method, the length of a pinyin letter string associated with a Chinese character is not longer than 7. Thus, after one or more pinyin letters have been selected, it is realistic to predict and
20 display all remaining probable pinyin letters that may form valid pinyin letter strings together with the pinyin letters that have been selected.

As stated above in the previous example of inputting Chinese character "中", a user may select "z", "h", "o",
25 "n", "g" successively in the second window 102, or select "zh", "ong" successively in the second window 102. Since the ideographic character engine may predict and display all remaining probable pinyin letters that may form valid

pinyin letter strings together with the pinyin letters that have been selected, if the user has select "zh" and "o", all remaining probable pinyin letters may be displayed in the second window 102, such as "u", "n", "ng". The user
5 may simply select "ng" to complete the pinyin letter string associated with "中".

Fig. 5A to 5F show one process of inputting Chinese character "中" whose pinyin letter string is "zhong".

Fig. 5A shows that the complete set of pinyin letters
10 are initially displayed in the second window 102. The user scrolls the cursor 106 onto the desired pinyin letter "z".

Fig. 5B shows that the user has selected pinyin letter "z", the inputted pinyin letter string "z" is displayed in the third window 107, a plurality of Chinese characters
15 associated with "z" including "在", "增", "最", "做", "怎",

"中", are displayed in the first window 101, a plurality of pinyin letters including "a", "e", "i", "h", "o", "u" are predicted and displayed in the second window 102, and the user scrolls onto the desired pinyin letter "h".

20 Fig. 5C shows the user has selected pinyin letter "h", the inputted pinyin letter string "zh" is displayed in the third window 107, a plurality of Chinese characters associated with "zh" including "摘", "着", "真", "正", "只",

“中”, are displayed in the first window 101, a plurality of pinyin letters including “a”, “e”, “i”, “o”, “u”, “_” (space) are predicted and displayed in the second window 102, and the user scrolls cursor 106 onto pinyin letter
5 “o”.

Fig. 5D shows that the user has selected pinyin letter “o”, the inputted pinyin letter string “zho” is displayed in the third window 107, a plurality of Chinese characters associated with “zho” including “中”, “周”, “州”, “重”, “种”,
10 “粥”, are displayed in the first window 101, a plurality of pinyin letters including “n”, “u”, “_” (space), “ng”, “-” (tone mark) are predicted and displayed in the second window 102, and the user scrolls cursor 106 onto the pinyin letter “ng”. (Note: the desired Chinese character “中” has
15 appeared in the first window 101. The user may simply switch cursor 106 into the first window 101 and select the desired Chinese character “中”.)

Fig. 5E shows that the user has selected pinyin letter “ng”, the inputted pinyin letter string “zhong” is
20 displayed in the third window 107, a plurality of Chinese characters associated with “zhong” including “中”, “重”, “种”, “忠”, “钟”, “肿”, are displayed in the first window

101, a plurality of pinyin letters including "_" (space),
"ˊ" (the first tone), "ˊ" (the second tone), "ˇ" (the third
tone), "ˋ" (the fourth tone) are predicted and displayed
in the second window 102, and the user switches cursor 106
5 into the first window 101, with cursor 106 displayed on
the desired Chinese character "中".

Fig. 5F shows after the user selects the desired
Chinese character "中", the ideographic character engine
predicts and displays probable Chinese characters
10 including "国", "文", "共", "央", "心", "华", etc.

According to the improved pinyin input method of the
present invention, in order to input Chinese character "中",
the user may input pinyin letters in any one of the
15 following sequences:

- (1) "z", "h", "o", "n", "g";
- (2) "zh", "ong";
- (3) "zh", "o", "n", "g";
- (4) "z", "h", "ong";
- 20 (5) "zh", "o", "ng";
- (6) "z", "h", "o", "ng"; etc.

At any time, in the process of selecting pinyin letters

in the second window 102, the user may press the first part 104 with cursor 106 being switched into the first window 101 and select the desired Chinese character in the first window 101 (maybe in different pages due to different sequences involved).

If Chinese characters are inputted by zhuyin method, the symbols displayed in the second window 102 include zhuyin letters for Chinese characters. For example, in order to input Chinese character "中" by zhuyin method, a string of zhuyin letters "ㄓㄨㄥ" should be inputted, compared with a string of pinyin letters "zhong" if inputted by pinyin method. Zhuyin method resembles pinyin method, and thus the process of inputting a Chinese character by zhuyin method using the apparatus for inputting ideographic characters shown in Fig. 1 resembles the process of inputting a Chinese character by pinyin method which has been described above.

If Chinese characters are inputted by strokes, the symbols displayed in the second window 102 include strokes for Chinese characters. For examples, strokes are "一", "丨", "丿", "㇏", "フ".

The following is the process of inputting a Chinese character by strokes using the apparatus for inputting ideographic characters shown in Fig. 1. Many valid

initial strokes for Chinese characters are displayed in the second window 102. The user scrolls cursor 106 onto the desired stroke and presses the second part 105 so as to select the desired stroke. The ideographic character engine displays in the first window 101 all Chinese characters associated with the stroke string that has been inputted so far for inputting the desired Chinese character, predicts next strokes and displays the predicted strokes in the second window 102.

10 On one hand, the user may press the first part 104, with cursor 106 being switched into the first window 101, scroll cursor 106 onto the desired Chinese character, and press the second part 105, so as to input the desired Chinese character into the handheld device.

15 On the other hand, the user may scroll cursor 106 in the second window 102 onto the second stroke of the desired Chinese character, and press the second part 105 so as to select the second stroke of the desired Chinese character. The ideographic character engine updates the stroke string, displays in the first window 101 all Chinese characters associated with the updated stroke string, predicts next strokes and displays the predicted strokes in the second window 102. The above process may continue until the Chinese character that the user desires to input is displayed in the first page of the first window 101. As the above process progresses, the Chinese characters displayed in the first window 101 become limited.

According to the present invention, the symbols

displayed in the second window 102 may further include radicals for Chinese characters. A radical for Chinese characters is a traditional combination of more than one stroke for Chinese characters, such as "扌", "讠", "兑",
5 etc. The selection of desired radicals in the second window 102 may significantly increase the speed of inputting Chinese characters into a handheld device. For example, in order to input Chinese character "悦", a user may only need to select two radicals "扌" and "兑" in the
10 second window 102, instead of 10 strokes.

Fig. 6 is the flow chart of the method of inputting ideographic characters into a handheld device according to the present invention.

As shown in Fig. 6, the process starts at step 601.
15 At step 602, a plurality of symbols are predicted, and then displayed in a window (e.g., the second window 102 shown in Fig. 1). At step 603, it is decided whether a scrolling device is rotated. If the decision in step 603 is "yes", the process goes to step 604; otherwise, to step 605.

20 At step 604, a cursor is scrolled from one symbol to another in the current window.

At step 605, it is decided whether a symbol is selected. If the decision in step 605 is "yes", the process goes to step 606; otherwise, to step 608.

25 At step 606, the symbol selected by the user is

inputted into the handheld device.

At step 607, a plurality of ideographic characters associated with symbols that have been inputted so far are predicted, and then displayed in another window (e.g. the first window 101 shown in Fig. 1).

At step 608, it is decided whether the cursor is switched to another window. If the decision of step 608 is "yes", the process goes to step 611; otherwise, to step 609.

At step 609, it is decided whether the process of inputting ends. If the decision of step 609 is "yes", the process goes to step 610; otherwise, to step 602.

At step 611, the cursor is switched to another window.

At step 612, it is decided whether the scrolling device is rotated. If the decision of step 612 is "yes", the process goes to step 613; otherwise, to step 614.

At step 613, the cursor is scrolled from one ideographic character to another ideographic character.

At step 614, it is decided whether an ideographic character is selected. If the decision of step 614 is "yes", the process goes to step 615; otherwise, to 617.

At step 615, the ideographic character selected by the user is inputted into the handheld device.

At step 616, a plurality of ideographic characters associated with the ideographic characters that have been inputted so far (or, at least the ideographic character that has just been inputted) are predicted, and then displayed in the another window.

At step 617, it is decided whether the cursor is switched. If the decision of step 617 is "yes", the process goes to step 618; otherwise, to step 612.

At step 618, the cursor is switched from the current
5 window into the previous window. Then, the process goes to step 602.

The flow chart shown in Fig. 6 is just illustrative. For any details of the process of inputting ideographic characters according to the present invention, reference
10 may be made to the descriptions concerning Figs, 1, 2A-2B, 3A-3G, 4A-4E and 5A-5F.

While the foregoing has been with reference to specific embodiments of the invention, it will be appreciated by those skilled in the art that these are
15 illustrations only and that changes in these embodiments can be made without departing from the principles of the invention, the scope of which is defined by the appended claims.

What Is Claimed Is:

1. An apparatus for inputting Ideographic characters into a handheld device, characterized by comprising:
 - 5 a display operable to present a first window for displaying ideographic characters and a second window for displaying symbols;
 - a first switch means for switching, when selected, a cursor from said second window into said first window;
 - a second switch means for selecting, when selected, a symbol or an ideographic character where said cursor is displayed;
 - 10 a scrolling device for scrolling the cursor when displayed in said first window and when displayed in said second window; and
 - an ideographic character engine, operable to control the presentation in said second window of symbols to be selected by said second switch means and operable to control the presentation in said first window of ideographic characters that are associated with a symbol string composed of all symbols that have been selected using said second switch means and operable to input into said handheld device an ideographic character that has been selected using said second switch means.
 - 15
 - 20
2. The apparatus according to claim 1, characterized in that at least one of said first part and said second part is integrated with said scrolling device.
- 25 3. The apparatus according to claim 1, characterized in that said first part is at the upper or lower edges of

said scrolling device.

4. The apparatus according to claim 1, characterized in that said second part is at the center of said scrolling device.

5 5. The apparatus according to claim 4, characterized in that said first part is adjacent to said second part.

6. The apparatus according to claim 1, characterized in that said display further includes a third window for displaying said symbol string.

10 7. The apparatus according to claim 1, characterized in that said scrolling device is a touch pad that senses leftward movement or rightward movement of a user's finger on the surface of said touch pad.

8. The apparatus according to claim 1, characterized
15 in that said scrolling device is a touch pad that senses clockwise movement or counterclockwise movement of a user's finger on the surface of said touch pad.

9. The apparatus according to claim 1, characterized in that said scrolling device is a rotator that can be
20 rotated clockwise or counterclockwise.

10. The apparatus according to claim 1, characterized in that, in order to input an ideographic character, after one symbol is selected by said second part, and said symbol string is updated, said ideographic
25 character engine predicts probable symbols based on said symbol string and displays only said probable symbols in said second window, wherein said symbol string and each of said probable symbols may constitute a valid symbol

string that is associated with at least one ideographic character.

11. The apparatus according to claim 1, characterized in that once an ideographic character has been selected and inputted into said handheld device, said ideographic character engine predicts probable ideographic characters based on said ideographic character that has been selected and inputted, and displays said probable ideographic characters in said first window.

10 12. The apparatus according to claim 1, characterized by further comprising:

a third part that can be pressed, for scrolling page by page, when said third part is pressed, symbols displayed in said second window or ideographic characters displayed in said first window.

13. The apparatus according to claim 12, characterized in that said third part is integrated with said scrolling device.

14. The apparatus according to claim 12, characterized in that said third part is at the left or right edges of said scrolling device.

15. The apparatus according to claim 12, characterized in that said second part is at the center of said scrolling device.

16. The apparatus according to claim 15, characterized in that said third part is adjacent to said second part.

17. The apparatus according to any one of claims 1

to 16, characterized in that said ideographic characters are Chinese characters and said symbols displayed in said second window include strokes for Chinese characters.

18. The apparatus according to claim 17,
5 characterized in that said symbols displayed in said second window further include radicals for Chinese characters.

19. The apparatus according to any one of claims 1 to 16, characterized in that said ideographic characters are Chinese characters and said symbols displayed in said
10 second window include pinyin letters for Chinese characters.

20. The apparatus according to claim 19, characterized in that, in order to input a Chinese character, symbols that are initially displayed in said
15 second window include at least one of "b", "p", "m", "f", "d", "t", "n", "l", "g", "k", "h", "j", "q", "x", "zh", "ch", "sh", "r", "z", "c", "s", "y" and "w".

21. The apparatus according to claim 20, characterized in that symbols that are displayed in said
20 second window after a symbol has been selected by said second part include at least one of "a", "o", "e", "i", "u", "ü", "ua", "uo", "ui", "ia", "ie", "iu", "ue", "ai", "ei", "ao", "ou", "an", "en", "in", "un", "er", "ang", "eng", "ong", "ing", "uai", "iao", "ian", "uan", "iang",
25 "iong", "uang".

22. The apparatus according to claim 19, characterized in that once said symbol string constitutes a complete pinyin string, said cursor is automatically

switched from said second window into said first window.

23. The apparatus according to any one of claims 1 to 16, characterized in that said ideographic characters are Chinese characters and said symbols displayed in said second window include zhuyin letters for Chinese characters.

24. A method of inputting ideographic characters into a handheld device, characterized by comprising steps of:

10 predicting a plurality of symbols, and displaying said plurality of symbols in a window;

scrolling a cursor from one symbol to another if a scrolling device is rotated by a user for selecting symbols;

15 inputting symbols selected by said user;

predicting a plurality of ideographic characters associated with inputted symbols, and displaying said plurality of ideographic characters in another window;

20 switching said cursor from said window into said another window;

scrolling said cursor from one ideographic character to another if said scrolling device is rotated by said user for selecting ideographic characters;

25 inputting ideographic characters selected by said user into said handheld device.

25. The method according to claim 24, characterized by further comprising a step of displaying in a third window said inputted symbols.

26. The method according to claim 24, characterized in that in said step of predicting a plurality of symbols, only probable symbols are predicted such that previously inputted symbols and each of said probable symbols may
5 constitute a valid symbol string that is associated with at least one ideographic character.

27. The method according to claim 24, characterized by further comprising a step of predicting probable ideographic characters based on at least one ideographic
10 character that has been inputted, and displaying said probable ideographic characters in said another window.

28. The method according to any one of claims 24 to 27, characterized in that said ideographic characters are Chinese characters and said symbols include strokes for
15 Chinese characters.

29. The method according to claim 28, characterized in that said symbols further include radicals for Chinese characters.

30. The method according to any one of claims 24 to 27, characterized in that said ideographic characters are Chinese characters and said symbols include pinyin letters for Chinese characters.
20

31. The method according to claim 30, characterized in that, in order to input a Chinese character, symbols
25 that are initially predicted include at least one of "b", "p", "m", "f", "d", "t", "n", "l", "g", "k", "h", "j", "q", "x", "zh", "ch", "sh", "r", "z", "c", "s", "y" and "w".

32. The method according to claim 31, characterized

in that symbols that are predicted after a symbol has been inputted include at least one of "a", "o", "e", "i", "u", "ü", "ua", "uo", "ui", "ia", "ie", "iu", "ue", "ai", "ei", "ao", "ou", "an", "en", "in", "un", "er", "ang", "eng",
5 "ong", "ing", "uai", "iao", "ian", "uan", "iang", "iong", "uang".

33. The method according to any one of claims 24 to 27, characterized in that said ideographic characters are Chinese characters and said symbols include zhuyin letters
10 for Chinese characters.