Title: IMPROVED MOBILE COMMUNICATION TERMINAL AND METHOD THEREFORE

Abstract: An input method for a mobile communication apparatus, and such a communication apparatus, which comprises a processor and a touch sensitive display, is disclosed. The invention particularly comprises displaying a touch keypad comprising a set of keys, detecting an object over one key of said set of keys, and displaying, upon detection of said object, a first sub-set of keys adjacent to said one key, wherein said sub-set of keys is associated with a first set of sub-functions of said one key.
Technical field

The present invention relates to a mobile communication apparatus with an improved user interface, and an input method for a mobile communication apparatus.

Background of the invention

A problem with mobile communication apparatuses, which nowadays comprise a huge number of functions, is that a large number of functions are to be controlled with a very limited number of input means, i.e. keys, rotating input means, joystick, etc. This is normally coped with by using a menu system, where functions are accessed by navigating a menu system, normally hierarchical. However, for functions that are used often, and especially when a plurality of functions is to be operated in sequence, the menu approach is not satisfactory for the user. An example of this is text input. In this case, multitap or predicting functions have been used, but still, there is a need for improvements, since the existing solutions are error prone. This may be solved, as in US 2005/0140659 A1, with a keypad comprising a number of ordinary keys and a number of extra keys, wherein the extra keys will get an adaptive function depending on actuation of the ordinary keys. This is used for text input, such that when e.g. the ordinary key for "2" is pressed, wherein the key for "2" also comprises alphanumeric symbols "a", "b", and "c", the extra keys will get the function of "a", "b", and "c", respectively. In this way, the user can easily select what alphanumeric symbol to be input. However, this approach is still not satisfactory for a number of reasons, e.g. the extra keys will take up precious space on the keypad when they are not used, the user has to
move between the ordinary key set and the extra key set for each input, etc.

Therefore, there is a need for an improved way of input and activation of functions.

Summary of the invention

In view of the above, an objective of the invention is to solve or at least reduce the problems discussed above. In particular, an objective is to provide an intuitive and efficient user interface and input approach for mobile communication apparatus.

According to a first aspect of the present invention, there is provided a mobile communication apparatus comprising a processor and a touch sensitive display, wherein said touch sensitive display is arranged to, under control of said processor, display a touch keypad, comprising a set of keys, detect an object over one key of said set of keys, and display, upon detection of said object over said one key, a first sub-set of keys associated with a first set of sub-functions of said one key, wherein said sub-set of keys is arranged adjacent to said one key.

An advantage of this is that the sub-set of keys are arranged in direct vicinity to the first actuated key, and therefore the user can actuate the key associated with the sub-function both quickly and intuitively.

The touch sensitive display may further be arranged to, under control of said processor, detect an object over one key of said first sub-set of keys, and display, upon detection of said object over said one key of said first sub-set of keys, a second sub-set of keys associated with a second set of sub-functions of said one key of said first sub-set of keys, wherein said second sub-set of keys is arranged adjacent to said one key of said first sub-set of keys.

This way, the user is able to select among a larger number of functions in a structured way, which maintains the intuitivity of the handling of the mobile
communications apparatus, although the large number of functions.

The second set of sub-functions may relate hierarchically to one sub-function of said first set of sub-functions.

This improves the user's experience of the intuitive handling.

The first set of sub-functions may relate to a first application of said mobile communication apparatus and said second set of sub-functions may relate to a second application of said mobile communication apparatus.

This way, the user is able to select what application that is to be accessed directly from the keypad, without the need of first choosing this from a menu system.

The first set of sub-functions may be application dependent. The second set of sub-functions may also be application dependent. The first sub-set of keys associated with a first set of sub-functions of said one key may comprise a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application. Also, the second sub-set of keys associated with a second set of sub-functions of said one key of said first sub-set of keys may comprise a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application.

This enables a more specific presentation of sub-functions depending on the actual use of the mobile communication apparatus.

The touch sensitive display may further be arranged to, under control of said processor, move at least one neighbouring key to said one key of said set of keys on said touch sensitive display to make room for said first sub-set of keys. The touch sensitive display may further
be arranged to, under control of said processor, move at
least one neighbouring key to said one key of said first
sub-set of keys on said touch sensitive display to make
room for said second sub-set of keys. The touch sensitive
display may further be arranged to, under control of said
processor to scale down at least one neighbouring key to
said one key of said set of keys on said touch sensitive
display to make room for said first sub-set of keys. The
touch sensitive display may further be arranged under
control of said processor to scale down at least one
neighbouring key to said one key of said first sub-set of
keys on said touch sensitive display to make room for
said second sub-set of keys.

An advantage of this is that the mobile
communication apparatus automatically makes room for the
extra keys, such that they can be in direct vicinity of
the first actuated key. This is enabled due to the
adaptiveness of the nature of the touch keypad provided
by the touch sensitive display.

The touch sensitive display may be arranged to delay
display of said first sub-set of keys until after a
predetermined time of said detection.

This enables that unintentional actuation of keys
does not render in annoying pop-ups of extra key sets.
The predetermined time may be set by the user, pre-set,
or adapted according to determined user interaction speed
history.

The touch sensitive display may be arranged to
display said first sub-set of keys for a predetermined
time after said detection ceases.

This enables a user to determine and actuate a
desired key of the sub-set of keys for a time, or, if the
user do not want to activate any of the functions, the
sub-set of keys disappears again. This improves the user-
friendliness. The predetermined time may be set by the
user, pre-set, or adapted according to determined user
interaction speed history.
The sub-functions may comprise alphanumeric input, mediaplayer input, short-cuts to applications, functions or contacts, or browser input, or any combination thereof.

The functions of the keys of the first set of keys, the first sub-set of keys, and the second sub-set of keys, respectively, are activated upon pressing a key. The object may be a finger, a stylus, or a digitizer pen.

According to a second aspect of the present invention, there is provided an input method for a mobile communication apparatus comprising a processor and a touch sensitive display, comprising the steps of:
- displaying a touch keypad comprising a set of keys,
- detecting an object over one key of said set of keys, and
- displaying, upon detection of said object, a first sub-set of keys adjacent to said one key, wherein said sub-set of keys is associated with a first set of sub-functions of said one key.

The method may further comprise the steps of:
- detecting an object over one key of said first sub-set of keys, and
- displaying, upon detection of said object, a second sub-set of keys adjacent to said one key of said first sub-set of keys, wherein said second sub-set of keys is associated with a second set of sub-functions of said one key of said first sub-set of keys.

The method may further comprise the step of moving at least one neighbouring key to said one key of said set of keys on said touch sensitive display to make room for said first sub-set of keys.

The method may further comprise the step of moving at least one neighbouring key to said one key of said first sub-set of keys on said touch sensitive display to make room for said second sub-set of keys.

The method may further comprise the step of scaling down at least one neighbouring key to said one key of
said set of keys on said touch sensitive display to make room for said first sub-set of keys.

The method may further comprise the step of scaling down at least one neighbouring key to said one key of said first sub-set of keys on said touch sensitive display to make room for said second sub-set of keys.

The step of detecting said object comprises detecting said object for a predetermined time before displaying said first sub-set of keys.

The method may further comprise the step of continuing displaying said first sub-set of keys for a predetermined time after detection of said finger ceases.

Activating of the functions of the keys of the first set of keys, the first sub-set of keys, and the second sub-set of keys, respectively, is performed when pressing a key.

In general, the second set of sub-functions may relate hierarchically to one sub-function of said first set of sub-functions. The first set of sub-functions may relate to a first application of said mobile communication apparatus and said second set of sub-functions may relate to a second application of said mobile communication apparatus. The first set of sub-functions may be application dependent. The first sub-set of keys associated with a first set of sub-functions of said one key may comprise a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application. The second set of sub-functions may be application dependent. The second sub-set of keys associated with a second set of sub-functions of said one key of said first sub-set of keys may comprise a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application. The sub-functions may comprise alphanumeric input, mediaplayer input, short-
cuts to applications, functions or contacts, or browser input, or any combination thereof.

The advantages of the second aspect of the present invention are essentially the same as of the first aspect of the present invention.

Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of said element, device, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

Other objectives, features and advantages of the present invention will appear from the following detailed disclosure, from the attached dependent claims as well as from the drawings.

**Brief description of the drawings**

The above, as well as additional objects, features and advantages of the present invention, will be better understood through the following illustrative and non-limiting detailed description of preferred embodiments of the present invention, with reference to the appended drawings, where the same reference numerals will be used for similar elements, wherein:

Fig. 1 is a schematic view of functional blocks of the present invention;

Figs 2-8 illustrate examples according to different embodiments of the present invention;

Fig. 9 is a flow chart illustrating the process according to an embodiment of the method according to the present invention; and

Figs 10 and 11 are flow charts illustrating sub-processes according to embodiments of the present invention.
Detailed description of preferred embodiments

Fig. 1 schematically shows a mobile communication apparatus 100 according to an embodiment of the present invention. It should be noted that parts not contributing to the core of the invention are left out not to obscure the features of the present invention. The mobile communication apparatus comprises a processor 102, a user interface (UI) 104, and a memory 106. The memory 106 holds, among other things, program code for operation of applications of the mobile communication apparatus. The memory 106 also holds data used by the applications. Here, the memory 106 is depicted as a single unit. However, the memory can be two or more units, and/or divided in partitions. The processor 102 is arranged to control functions of the mobile communication apparatus 100 via connections between elements 104, 106, and 108 the control of the elements, which connections also depict signal transfer and information exchange. The mobile communication apparatus 100 can further comprise a transceiver (not shown) connected to the processor 102 which is arranged to receive and transmit radio signals through an antenna (not shown). The mobile communication apparatus can further comprise a rotating dial, a microphone, a speaker, and a buzzer. These elements are not shown in Fig. 1 not to obscure the core of the present invention. Further miscellaneous electronics, such as means for infrared data association, Bluetooth, wireless local area network, etc. can also be comprised. In particular, the present invention relates to the special features of the UI 104, which comprises a touch sensitive display 108 which is arranged to display information which is controlled and provided by the processor 102, and to detect and provide input information to the processor 102. The touch sensitive display 108 is arranged to detect both if a part of the display 108 is pressed, e.g. by a user's finger, and if an object, e.g. said finger, is held over a part of the
display 108. The detection of the state where the object is held over a part of the display can be performed in one or more ways, e.g. capacitively detecting the object close to, i.e. hoovering over, the display, light touch of the screen, which can be performed by determining the force from the object against the display, etc. The detection of pressing the part of the display is performed as conventional for touch sensitive displays.

The display 108 is arranged to display a touch keypad, i.e. a displayed image of a keypad where the areas of the display 108 where the keys of the displayed image of the keypad is mapped to, with aid of the ability of the touch sensitive display 108 to detect actuation by touching and/or pressing of the display 108, which is used to operate the mobile communication apparatus 100.

The features and function of the UI 104 are illustrated by a number of examples and embodiments with reference to Figs 2 to 8. However, it should be noted that, due to the large number of possible use cases within the scope of the present invention, that alternatives to and combinations of the presented examples and embodiments are equally possible.

Fig. 2a illustrates a mobile communication apparatus 200 comprising a speaker 202, a microphone 204, and a touch sensitive display 206. The mobile communication apparatus 200 can also comprise a large number of elements that are commonly used in mobile communication apparatuses, as discussed with reference to Fig. 1, but these are not depicted in Fig. 2a, as well as in the below discussed figures, not to obscure the essence of the present invention. The touch sensitive display 206 displays an image of a keypad 208 comprising a set of keys 210. When the touch sensitive display 206 detects an object, which can be a finger, a stylus, or a digitizer pen, over e.g. key 212 having the main function of input of the digit "5", which normally also comprise the letters "j", "k", and "l", or other symbols or strokes
for languages not using latin characters, a sub-set of keys 214 are displayed, as depicted in Fig. 2b, adjacent to the key 212. In this example, the input functions of the letters "j", "k", and "l" can be associated with the keys 215, 216, 217, respectively, of the sub-set of keys 214. Alternatively, the keys can comprise symbols related to functions of other applications, e.g. "≪", "≫", "|«" and "»" for "fast reverse", "play", "pause", and "fast forward", respectively, for a media player. Other examples, such as "←", "→", and "śni" for "back", "forward", and "home" for a browser application, "El", "X", "H", and "&" for "send", "delete", "save", and "map" for a messaging application, etc. are possible. The user can then press the one of the keys 215, 216, 217 to activate the desired function.

Fig. 3a illustrates a mobile communication apparatus 300 where an object, e.g. a finger, a stylus, or a digitizer pen, has been detected over a key 302, whereby a sub-set of keys 304 has been displayed adjacent to the key 302. The keys 306 of the sub-set of keys 304 can, as illustrated by the symbols "≪", "≫", and "»" which commonly on at least consumer products mean "backward", "forward", and "fast forward", respectively, be associated with a media player, an FM radio, a browser, or any other application where forward and backward navigation are provided, e.g. controlling listening to a voice mail. These applications can sometimes provide more features than only "backward", "forward", and "fast forward", e.g. search functions, step to next or previous track/album/frequency band/etc. Therefore, as depicted in the example of Fig. 3b, by detecting the object over key 308 of the sub-set of keys 304, a second sub-set of keys 310 is displayed adjacent to the key 308 of the first sub-set of keys 304, comprising keys 312 with, as illustrated by the symbols "|≪", and "<", which can mean "search/step backward", and "(play) backward", respectively.
In the examples discussed herein, one or two levels of sub-sets of keys and associated sets of sub-functions have been illustrated. However, the number of levels according to the present invention is not limited. On the other hand, the number of levels are in practice limited, since the user interface and its display, and the need for a large number of levels are limited, and the usability of the mobile communication apparatus has to be considered.

To cope with limited space on the display of the mobile communication apparatus, neighbouring keys to the actual key, i.e. the key over which the object has been detected, can be moved and/or resized to make room for the additional sub-sets of keys. This is possible, since the keypad is an image provided on the touch sensitive display, and thus can a new image of an adapted keypad be provided, and the mapping of the positions of the keys on the display and the areas related to the touch sensitive function of the display are re-mapped to the new image.

Examples of this are depicted in Figs 4 to 8.

In Fig. 4, an object, e.g. a finger, a stylus, or a digitizer pen, has been detected over a key 400, whereby a sub-set of keys 402 has been displayed adjacent to the key 400. To make room for the sub-set of keys 402, a neighbouring key 404 has been scaled down in size.

In Fig. 5, an object, e.g. a finger, a stylus, or a digitizer pen, has been detected over a key 500, whereby a sub-set of keys 502 has been displayed adjacent to the key 500. To make room for the sub-set of keys 502, a neighbouring key 504 has been moved. In this case the neighbouring key 504 has been moved upwards, away from the sub-set of keys 502. In a preferred embodiment, the actual key, i.e. the key over which the object has been detected, always remain in the same position, such that the user experience the position of the object as the static point around which the surroundings change. This is to avoid that the key under the object, e.g. the
finger, moves away, which would degrade usability. Thus, the actual key remains the same, while neighbouring keys can change positions and sizes. It is also possible to entirely remove one or more neighbouring keys, if that is considered to improve the user interface.

In Fig. 6a, an object, e.g. a finger, a stylus, or a digitizer pen, has been detected over a key 600, whereby a sub-set of keys 602 has been displayed adjacent to the key 600. To make room for the sub-set of keys 602, a neighbouring key 604 has been both scaled down in size and moved. In this example, the sub-functions of the sub-set of keys 602 are associated to contacts, e.g. in a phone book. Here, the three first names in the phone book for each of the letters "j", "k", and "l", present on the key 600 are presented as keys 604 of the sub-set of keys. In this context, "first names" could be construed to be either in alphabetical order, in a user defined order, or an order based on statistics, i.e. calling history. Here, the user can either press one of the keys 604 to access the contact, e.g. call or send a message to the contact, or hold the object over one key 606 of the keys 604 to get a second sub-set of keys 608, as depicted in Fig. 6b. In Fig. 6b, we can also note that the keys 604 of the first sub-set of keys 602 except the key 606 also are included in the "neighbouring keys" discussed with reference to Figs 4, 5, and 6a above. We can also note that a plurality of keys 610-614 has been moved and/or scaled down in size.

In Fig. 7, an object, e.g. a finger, a stylus, or a digitizer pen, has been detected over a key 700, whereby a sub-set of keys 702 has been displayed adjacent to the key 700. To make room for the sub-set of keys 702, a neighbouring key 704 has been scaled down in size. The sub-set of keys 702 comprises two groups 706, 708 of keys, each group 706, 708 being associated to separate types of inputs, where the first group 706, as illustrated by the symbols "<", ">", and " » " which
commonly on at least consumer products mean "backward", "forward", and "fast forward", respectively, is associated with a media player, an FM radio, a browser, or any other application where forward and backward navigation are provided, e.g. controlling listening to a voice mail, and the second group 708 is associated with the letters "j", "k", and "l", which could be any other symbols or strokes for languages not using latin characters, and functions and applications related to them, as discussed above with reference to Figs 2 and 6. By providing multiple groups 706, 708, with different associations, within a sub-set on a level of sub-sets, the user can directly access a larger number of functions and/or applications.

Fig. 9 is a flow chart illustrating the method according to an embodiment of the present invention. Some steps can be performed in a different order than depicted, and some steps can be performed in parallel, as is common in real time systems. It should be noted that the features of the illustrated method is not essential for the invention unless explicitly stated. The depicted method should be considered as a most refined improvement from the essence of the invention. However, a touch keypad have to be displayed in a touch keypad displaying step 900, a finger have to be detected over a key of the touch keypad in a detection step 902, and upon detection, a first sub-set of keys has to be displayed in a first sub-set of keys displaying step 904. The touch keypad displaying step 900 comprises displaying a touch keypad, i.e. a displayed image of a keypad where the areas of the display where the keys of the displayed image of the keypad is mapped to, with aid of the ability of the touch sensitive display to detect actuation by touching and/or pressing of the display, which is used to operate the mobile communication apparatus. The detection step 902 comprises detecting an object, which can be a finger, a stylus, or a digitizer pen, over a key of a set of keys.
provided on the displayed touch keypad. The first sub-set of keys displaying step 904 comprises displaying a first sub-set of keys on the touch sensitive display, adjacent to the key in question in the detection step 902.

As discussed above with reference to the examples depicted in Figs 2 to 8, there can be provided multiple levels of sub-steps. Therefore, the method can comprise at least one step 906 for detecting the object over one of the keys of the sub-set, wherein, upon detection, a further sub-set of keys is displayed adjacent to the key in question in step 906 in a display step 908. Similar steps (not shown) are provided for each level of sub-set of keys.

The present invention radically improves usability of a mobile communication apparatus, and the usability is further improved by requiring that the object is detected during a predetermined time to avoid annoying and unintentional keys to show up. This is performed in a waiting step 903, where the sub-set does not show up until the object is detected for the predetermined time. Otherwise, the method returns to the detection step 902. The similar applies to the detection of the object over the keys of the sub-set of keys in step 906, where a similar waiting step 907 is inserted before the displaying step 908.

Similarly, it is preferable that the keys of the sub sets of keys are displayed for a certain time, not too short, not too long, before the keys are removed from the display if they are not pressed. Therefore, the displaying steps 904, 908 for the sub-sets of keys can be adapted to only show the sub-sets of keys for predetermined times, respectively.

Fig. 10 is a flow chart of a sub-process, preferably running in parallel to the process described with reference to Fig. 9, which copes with the available and many times limited display space. In general, the process checks if there is need for more space as the touch
keypad is extended by sub-sets of keys. Therefore, the process can comprise a step for checking need for scaling the size of neighbouring keys to the key in question, as in the detection steps 902, 906 discussed above with reference to Fig. 9, as depicted by scaling check step 1000. If scaling is determined to be needed, this is performed in a neighbouring key scaling step 1002, where one or more neighbouring keys are scaled down in size. The process can also/alternatively comprise a step for checking need for moving neighbouring keys to the key in question. This is performed in a moving check step 1004, and if moving of neighbouring keys is needed, this is performed in a neighbouring key moving step 1006. The scaling an positions of the keys are preferably restored when there is no longer a need.

Fig. 11 is a flow chart illustrating the process of checking if any key is pressed and if it is, activating an associated function. This is performed in a conventional way and comprises a step of checking if and what key is pressed in a key press checking step 1100, and an associated function activating step 1102, and needs no further explanation.

Fig. 8 illustrates a mobile communication apparatus 800 where all of the features discussed with reference to Figs 2-7 are combined, and particularly that multiple of groups is used on one sub-set level, from which next level of sub-set, here associated with the key 802 with "j", being a number of contacts with names starting with the letter "J". On the other hand, Fig. 8 could also illustrate the mobile communication apparatus 800, but where the next sub-set level associated with "j", and the names "Jane", "Jens", "John", and "Juha" are names on artists, albums, songs, images, or any other media content, and thereby illustrating a further improved input method for these types of applications, where the "two groups" of keys of the first sub-set of keys just are different inputs to the same application. This may
seem unclear, but what is clear is that the approach presented by the present invention can be combined in a multitude of ways, of which most we do not have room for in this concise description. Thus, the invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended patent claims.
1. A mobile communication apparatus comprising a processor and a touch sensitive display, wherein said touch sensitive display is arranged under control of said processor to display a touch keypad, comprising a set of keys, to detect an object over one key of said set of keys, and to display, upon detection of said object over said one key, a first sub-set of keys associated with a first set of sub-functions of said one key, wherein said sub-set of keys is arranged adjacent to said one key.

2. The mobile communication apparatus according to claim 1, wherein said touch sensitive display is further arranged under control of said processor to detect an object over one key of said first sub-set of keys, and to display, upon detection of said object over said one key of said first sub-set of keys, a second sub-set of keys associated with a second set of sub-functions of said one key of said first sub-set of keys, wherein said second sub-set of keys is arranged adjacent to said one key of said first sub-set of keys.

3. The mobile communication apparatus according to claim 2, wherein said second set of sub-functions relates hierarchically to one sub-function of said first set of sub-functions.

4. The mobile communication apparatus according to claim 2, wherein said first set of sub-functions relates to a first application of said mobile communication apparatus and said second set of sub-functions relates to a second application of said mobile communication apparatus.

5. The mobile communication apparatus according to any of claims 2 to 4, wherein said second set of sub-functions is application dependent.
6. The mobile communication apparatus according to any of claims 2 to 5, wherein said second sub-set of keys associated with a second set of sub-functions of said one key of said first sub-set of keys comprises a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application.

7. The mobile communication apparatus according to any of claims 2 to 6, wherein said touch sensitive display is further arranged under control of said processor to move at least one neighbouring key to said one key of said first sub-set of keys on said touch sensitive display to make room for said second sub-set of keys.

8. The mobile communication apparatus according to any of claims 2 to 7, wherein said touch sensitive display is further arranged under control of said processor to scale down at least one neighbouring key to said one key of said first sub-set of keys on said touch sensitive display to make room for said second sub-set of keys.

9. The mobile communication apparatus according to any of claims 1 to 8, wherein said first set of sub-functions is application dependent.

10. The mobile communication apparatus according to any of claims 1 to 9, wherein said first sub-set of keys associated with a first set of sub-functions of said one key comprises a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application.

11. The mobile communication apparatus according to any of claims 1 to 10, wherein said touch sensitive display is further arranged under control of said processor to move at least one neighbouring key to said one key of said set of keys on said touch sensitive display to make room for said first sub-set of keys.
12. The mobile communication apparatus according to any of claims 1 to 11, wherein said touch sensitive display is further arranged under control of said processor to scale down at least one neighbouring key to said one key of said set of keys on said touch sensitive display to make room for said first sub-set of keys.

13. The mobile communication apparatus according to any of claims 1 to 12, wherein said touch sensitive display is arranged to delay display of said first sub-set of keys until after a predetermined time of said detection.

14. The mobile communication apparatus according to any of claims 1 to 13, wherein said touch sensitive display is arranged to display said first sub-set of keys for a predetermined time after said detection ceases.

15. The mobile communication apparatus according to any of claims 1 to 14, wherein said sub-functions comprise alphanumeric input, mediaplayer input, shortcuts to applications, functions or contacts, or browser input, or any combination thereof.

16. An input method for a mobile communication apparatus comprising a processor and a touch sensitive display, comprising the steps of:
   displaying a touch keypad comprising a set of keys,
   detecting an object over one key of said set of keys, and
   displaying, upon detection of said object, a first sub-set of keys adjacent to said one key, wherein said sub-set of keys is associated with a first set of sub-functions of said one key.

17. The method according to claim 16, further comprising the steps of:
   detecting an object over one key of said first sub-set of keys, and
   displaying, upon detection of said object, a second sub-set of keys adjacent to said one key of said first sub-set of keys, wherein said second sub-set of keys is
associated with a second set of sub-functions of said one key of said first sub-set of keys.

18. The method according to claim 17, further comprising the step of moving at least one neighbouring key to said one key of said first sub-set of keys on said touch sensitive display to make room for said second sub-set of keys.

19. The method according to claim 17 or 18, wherein said second set of sub-functions relates hierarchically to one sub-function of said first set of sub-functions.

20. The method according to any of claims 17 to 19, wherein said first set of sub-functions relates to a first application of said mobile communication apparatus and said second set of sub-functions relates to a second application of said mobile communication apparatus.

21. The method according to any of claims 17 to 20, further comprising the step of scaling down at least one neighbouring key to said one key of said first sub-set of keys on said touch sensitive display to make room for said second sub-set of keys.

22. The mobile communication apparatus according to any of claims 17 to 21, wherein said second set of sub-functions is application dependent.

23. The mobile communication apparatus according to any of claims 17 to 22, wherein said second sub-set of keys associated with a second set of sub-functions of said one key of said first sub-set of keys comprises a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application.

24. The method according to any of claims 16 to 23, further comprising the step of moving at least one neighbouring key to said one key of said set of keys on said touch sensitive display to make room for said first sub-set of keys.
25. The method according to any of claims 16 to 24, further comprising the step of scaling down at least one neighbouring key to said one key of said set of keys on said touch sensitive display to make room for said first sub-set of keys.

26. The method according to any of claims 16 to 25, wherein said step of detecting said object comprises detecting said object for a predetermined time before displaying said first sub-set of keys.

27. The method according to any of claims 16 to 26, further comprising the step of continuing displaying said first sub-set of keys for a predetermined time after detection of said object ceases.

28. The method according to any of claims 16 to 27, wherein said first set of sub-functions is application dependent.

29. The method according to any of claims 16 to 28, wherein said first sub-set of keys associated with a first set of sub-functions of said one key comprises a first group of keys associated with sub-functions related to a first application, and a second group of keys associated with sub-functions related to a second application.

30. The mobile communication apparatus according to any of claims 16 to 29, wherein said sub-functions comprise alphanumeric input, mediaplayer input, shortcuts to applications, functions or contacts, or browser input, or any combination thereof.
Fig. 10

Fig. 11


## A. CLASSIFICATION OF SUBJECT MATTER

INV. G06F3/023 G06F3/048 H04M1/725 H04M1/02

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 H04M

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

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
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<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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<td>1-6, 9, 10, 13-20, 22, 23, 26-30</td>
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* Special categories of cited documents
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Date of the actual completion of the international search

27 June 2007

Date of mailing of the international search report

05/07/2007

Name and mailing address of the ISA/

European Patent Office, P B 5818 Patentlaan 2
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Bravo, Piero
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