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(71) Applicant (for all designated States except US): **SONY ERICSSON MOBILE COMMUNICATIONS AB** [SE/SE]; S-221 88 Lund (SE).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **BENGTSSON, Henrik** [SE/SE]; Qvantenborgsvägen 33, S-227 38 Lund (SE).

(74) Agent: **DAHNÉR, Christer**; Valea AB, P.O. Box 7086, S-103 87 Stockholm (SE).

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Declaration under Rule 4.17:

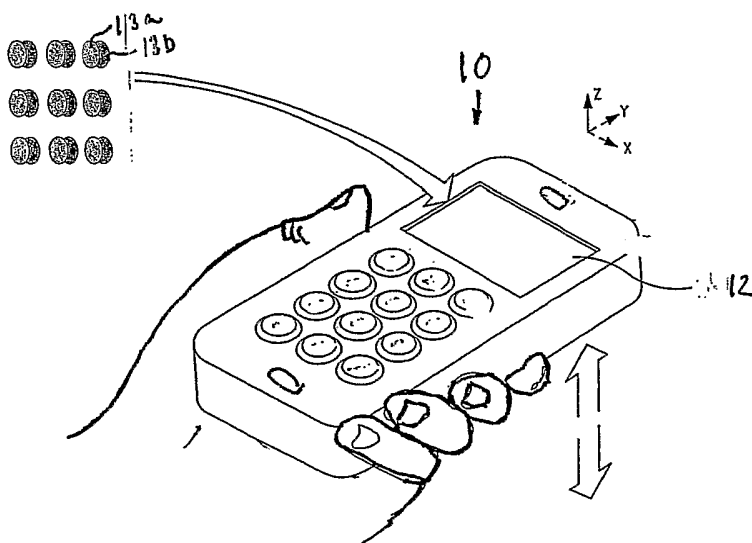
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PORTABLE COMMUNICATION DEVICE WITH THREE DIMENSIONAL DISPLAY



(57) Abstract: The present invention relates to a portable communication device (10) comprising: a display unit (12) for displaying a multi-dimensional image (13) having at least three dimensions; a multi-dimensional image control unit (15) controlling and providing said image (13) to be displayed in more than one plane (13a, b) depending on a selection of a user; a detector element (16) for detecting a selection of the user.

PORTABLE COMMUNICATION DEVICE WITH THREE
DIMENSIONAL DISPLAY

TECHNICAL FIELD OF THE INVENTION

- 5 The present invention relates to the field of portable communication devices and more particularly to a portable communication device having a multi-dimensional, at least a dimensional (3D) MMI (man-machine-interface) such as a 3D display.

DESCRIPTION OF RELATED ART

- 10 Portable communication devices like cellular phones can provide a stereoscopic MMI , for instance a stereoscopic display, typically a 3D display. This is for instance described in EP-A1-1 379 063, which describes a mobile device for capturing, generating and displaying three-dimensional images using a single camera.
- 15 In a few years, 3D displays will probably be common in cellular phones such that a user can see images in three dimensions, which will then probably add features to the phone, in particular as regards improved reality of images. However, there is yet a demand to further benefit from the coming 3D displays, for instance as regards seen from a MMI view.

20

SUMMARY OF THE INVENTION

The present invention is directed towards solving the problem of providing future portable communication device having 3D displays with new functionality that can benefit from using more dimensions than today's 2D devices.

25

One object of the present invention is to provide a portable communication device having improved features for the MMI compared to today's possibilities.

Herein, the term "MMI" relates to any man-machine-interface for a portable

- 30 communication device, and is not necessary limited to a display.

According to a first aspect of the present invention, this object is achieved by a portable communication device comprising:

a display unit for displaying a multi-dimensional image having at least three

35 dimensions;

a multi-dimensional image control unit controlling and providing said image to be displayed in more than one plane depending on a selection of a user;

a detector element for detecting a selection of the user.

A second aspect of the present invention is directed towards a portable communication device including the features of the first aspect, wherein said detector
5 element is a device sensing movements or its position relative an other object.

A third aspect of the present invention is directed towards a portable communication device including the features of the second aspect, wherein said detector element is an accelerometer or a gyro.

10

A fourth aspect of the present invention is directed towards a portable communication device including the features of the second aspect, wherein said detector element comprises a camera sensing movements by means of movement within a coordination system related thereto.

15

A fifth aspect of the present invention is directed towards a portable communication device including the features of any one of the previous aspects, wherein said control unit provides said image to be displayed such that the user can see what 's behind a first plane in a second plane when said device is tilted.

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A sixth aspect of the present invention is directed towards a portable communication device including the features of the fifth aspect, wherein said planes comprise a number of items such as icons, to be displayed stacked onto each other seen from a user 's point of view.

25

A seventh aspect of the present invention is directed towards a portable communication device including the features of the first aspect, wherein said control unit is arranged to be controlled by further enabling elements for avoiding unnecessary activation of the control unit.

30

An eighth aspect of the present invention is directed towards a portable communication device including the features of the first aspect, wherein it is a cellular phone.

35 The invention has many advantages. For instance, the device according to the invention will benefit from future 3D MMI:s and in particular 3D displays. A user can see what is behind a first plane of items. For instance icons typically related to user

selectable items can be shown not just in one plane of items but in several typically user selectable planes of items.

It should be emphasized that the term "comprises/comprising" when used in this specification is taken to specify the presence of stated features, integers, steps or components, but does not preclude the presence or addition of one or more other features, integers, steps, components or groups thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

10 The present invention will now be described in more detail in relation to the enclosed drawings, in which:

Fig. 1 schematically shows a front view of a portable communication device in the form a cellular phone, having a 3D display, according to an embodiment of the
15 invention,

Fig. 2 schematically shows a simplified block schematic of relevant parts of the phone illustrated in Fig. 1,

Fig. 3a shows the display of the portable communication device shown in Fig. 1 in more detail, wherein one plane of icons is shown as a 3D image,

20 Fig. 3b shows the same display as in Fig. 2a but when a user has tilted the cellular phone to the right, wherein a second plane of icons starts to appear,

Fig. 3c shows the same display as in Fig. 2a and b, but even more tilted to the right, wherein the second plane appears clearly, and

Fig 4 shows the phone illustrated in Fig. 1 held in a user's hand.

25

DETAILED DESCRIPTION OF EMBODIMENTS

A portable communication device according to the present invention will now be described in relation to a cellular phone, which is a preferred variation of the invention. The phone is furthermore described in relation to a so-called stick-type
30 phone, but it can be other types of phones like clamshell phones. The portable communication device can also be another type of device, like a cordless phone, a communication module, a PDA or a lap top computer or any other type of portable device communicating with radio waves.

35 Fig. 1 schematically shows a front perspective view of a phone 10 according to an embodiment of the present invention. The phone 10 includes a 3D display 12, and a number of keys on a keypad 14 provided below the display 12. In this figure, the 3D

display can be any suitable 3D display including enhanced stereoscopic 2D displays having 3D functionality providing a sense of depth in the image shown. Thus, also a 2D display including polarization glasses or the like to provide a 3D functionality is possible without departing from the scope of the invention. Since such technology and other 3D image conversion techniques are well known for a person skilled in the art, a more detailed description thereof will not be given herein.

Now is referred to Fig. 2 which schematically shows a simplified block schematic of the interior of the phone illustrated in Fig. 1. Fig. 2 schematically shows a view of the parts of the interior of the phone that are relevant to the present invention according to the present embodiment. Thus, conventional parts such as signal processing parts and the like not directly related to the invention have been omitted in the drawings figures for a better understanding of the invention, since these parts and the function thereof are considered to be well-known for a person skilled in the art of portable communication devices such as cellular phones.

In this embodiment, the phone 10 includes a display unit 12 for displaying a multi-dimensional image 13 having at least three dimensions. The display unit 12 typically is a liquid crystal 3D display known per se. See for instance EP-A1-1 379 063.

Furthermore, the phone 10 includes a 3D image control unit 15 controlling and providing the image 13, or more precisely planes 13a-b comprising items, of which only a first plane 13a containing items such as icons are shown, to be displayed in more than one plane stacked onto each other seen from a user's point of view, depending on a selection of a user of the phone 10, and a detector element 16 for detecting the selection of the user. By means of the detector element 16 (or any other user selection element such as conventional user operated keys), the user can select the image (or more precisely, the planes 13a-b containing the items, i. e. the icons) to be displayed such that also the second plane of items 13b also can be displayed, for instance by tilting (i. e. the movement or the position of the phone is sensed) the phone to a certain degree or select also the second plane 13b to be displayed located behind the first plane 13a.

The image control unit 15 typically comprises a processor 15a executing a program to control the image 13, and a memory 15b referenced by the processor 15a. The processor can be a special processor, or a processor such as a microprocessor that is used for other purposes in the phone. Preferably, the processor performs time

integration of the acceleration measurements to obtain velocity measurements of the phone, and also time integration of the velocity measurements to obtain measurements of the position of the phone at any desired time. These integration functions can alternatively be performed by a dedicated processor connected to the accelerometer rather than the processor 15a. The detector element 16 preferably is an accelerometer, but any other device suitable for sensing movements (tilting) of the phone 10 can be provided. For instance, a camera (typically a conventional digital camera module with suitable software provided in the phone) can be employed as detector element 16 using a co-ordinate system without departing from the invention. As such it is not necessary to provide an additional camera but the camera used in a conventional phone can be used. This is not described in more detail since it is well-known for a person skilled in the art to implement.

It is also possible that the detector element is substituted by the keyboard 14, wherein the image control unit 15 receives an input from the user by means of the keyboard in a way known per se, possibly also including input by means of a image rotating-key or any other suitable key or cursor arranged to operate the image control unit 15 according to the user's preference.

Moreover, the control unit 15 can be arranged to be controlled by further enabling elements for avoiding unnecessary activation of the control unit 15 (not shown).

Now is referred to Fig. 3a-c, which show the display of the portable communication device shown in Fig. 1 in more detail, wherein one plane of icons is shown as a 3D image,

Fig. 3b shows the same display as in Fig. 3a but when a user has tilted the cellular phone to the right, wherein a second plane of icons starts to appear,

Fig. 3c shows the same display as in Fig. 3a and b, but even more tilted to the right, wherein the second plane appears clearly.

30

In Fig. 3a, a user (not shown) that looks at the display 12 sees a first plane 13a containing first items 13a' such as icons arranged in the first plane. The items 13a' can for instance represent messages, media player, video call, settings etc and are shown as 3D images. In this mode, from the user's point of view seen at essentially , the user cannot see what is hidden behind this first plane of icons.

In Fig. 3b the user (or any other person of course) has tilted the phone to the right, which is detected by the detector 16, herein an accelerometer. A different view of the MMI then appears such that the user can see what is behind the first plane 13a (shown in Fig. 3a). In Fig. 3b it is evident that new icons 13b 'start to appear.

5

In Fig. 3c the user has tilted the phone even more to the right and the second plane 13b of icons gets more and more visible.

In Fig. 4 it is further illustrated in even more detail how movement of a phone 10 is used to control the above described functions of the phone. Fig. 4 clearly shows how a user's hand can be tilted (illustrated by means of two arrows) to practice the invention. Fig. 4 shows a slightly tilted position to the right of the display 14 wherein the two planes 13a and 13b appears clearly distinguished (corresponding to the situation illustrated in Fig 3c).

15

According to the described embodiment of the invention, by having some detector device that can sense movements the user will be able to tilt the phone to see from the side, and also see behind the first plane 13a, which will provide good use of a 3D display.

20

In this way much information can easily be provided in a small display area by means of showing information according to a user's preference. Contrary to a more conventional way of simply using selectable information by means of a menu system more information can be displayed at the same time also on a small area. This is often the case since at least in today's and near future phones, the display area is often small compared to other portable or stationary devices such as lap tops and PCs. Thus, the invention finds particularly application in phones or other devices having small display area.

Moreover, the invention solves the problem with space required for locating multiple keys, and the use of multiple keys that may be confusing and difficult to practice by means of the inventive convenient control of the MMI.

The portable communication device according to the present invention can be varied in a number of ways apart from what has been disclosed above.

35

CLAIMS

1. Portable communication device (10) comprising:
a display unit (12) for displaying images (13) in a first and a second plane,
5 where each image comprises a number of items such as icons, where the
items (13a) of the first plane are stacked onto the items (13b) of the
second plane;
a control unit (15) controlling and providing said images (13) to be
displayed in said first and second plane (13a, b) such that the user can see
10 the items (13b) of the second plane behind the items (13a) of the first
plane when said device (10) is tilted,
a detector element (16) for detecting the tilting of the device.
2. Portable communication device according to claim 1, wherein said detector
15 element (16) is a device sensing movements or its position relative another
object.
3. Portable communication device according to claim 2, wherein said detector
20 element (16) is an accelerometer or a gyro.
4. Portable communication device according to claim 2, wherein said detector
element (16) comprises a camera sensing movements by means of
movement within a co-ordination system related thereto.
- 25 5. Portable communication device according to any previous claim, wherein
said control unit is arranged to be controlled by further enabling elements
for avoiding unnecessary activation of the control unit (15).
- 30 6. Portable communication device according to any previous claim, wherein it
is a mobile phone.

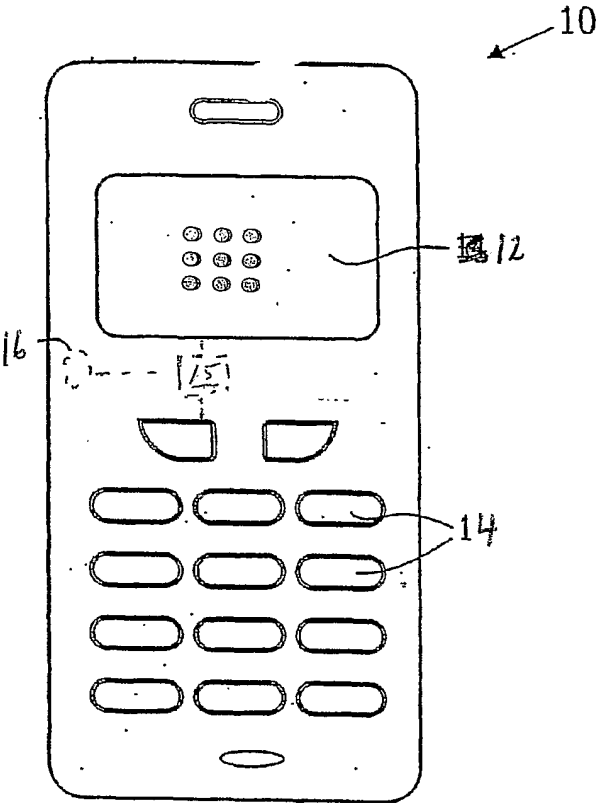


Fig. 1

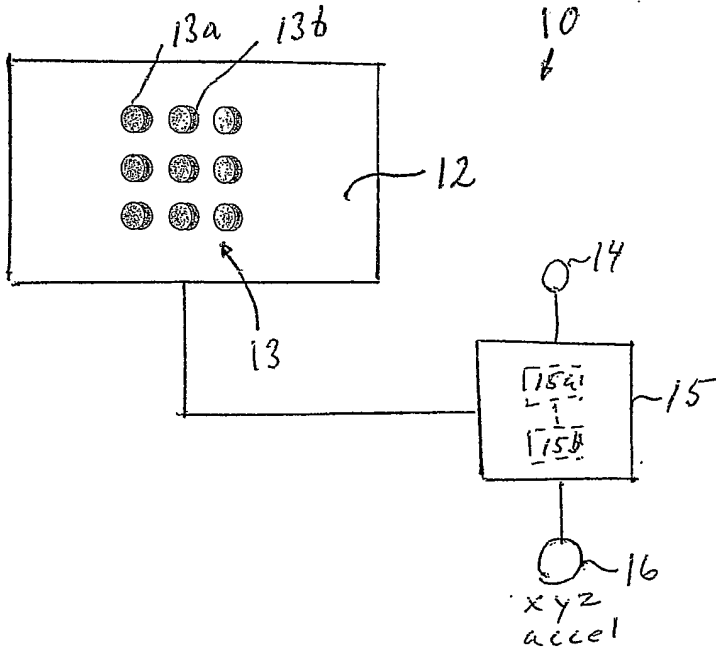


Fig. 2

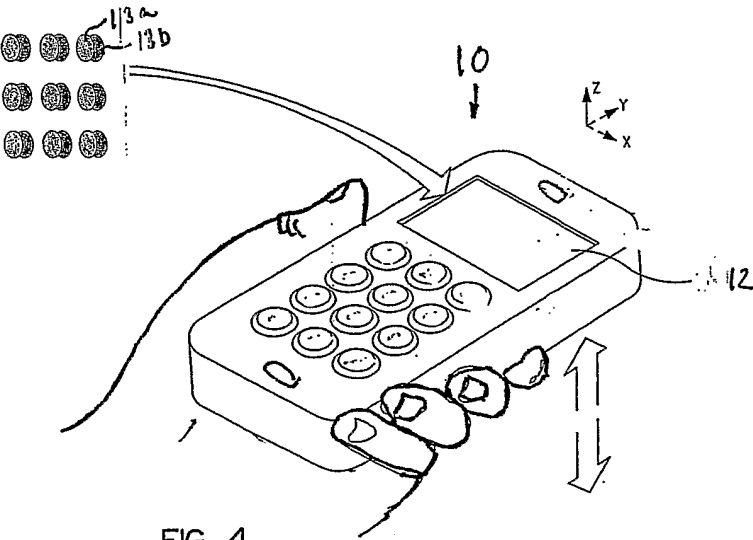
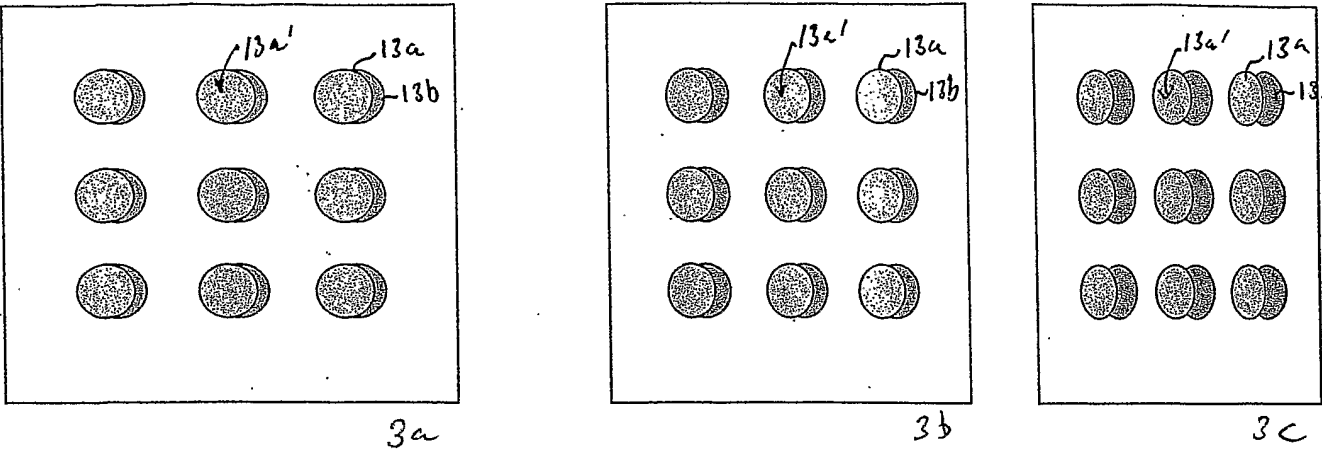


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2005/012899

A. CLASSIFICATION OF SUBJECT MATTER

H04N13/00 H04M1/247 H04N13/00 H04M1/247

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)

H04N 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, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 443 385 A (SONY CORPORATION) 4 August 2004 (2004-08-04)	1-4, 6
A	paragraph '0033!; claims 1,2,7; figures 1,14	5
A	----- US 2001/026249 A1 (BELL DAVID A ET AL) 4 October 2001 (2001-10-04)	1-6
	paragraphs '0010! - '0012!, '0023!, '0024!; figures 1,2	
A	----- EP 1 441 541 A (PIONEER CORPORATION) 28 July 2004 (2004-07-28)	1-6
	paragraphs '0014! - '0017!, '0025!, '0086!; claim 1	
A	----- EP 1 441 548 A (PIONEER CORPORATION) 28 July 2004 (2004-07-28)	1-6
	paragraphs '0065!, '0066!, '0076!	

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

☒ See patent family annex.

* Special categories of cited documents :

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

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T 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.

G document member of the same patent family

Date of the actual completion of the international search

16 February 2006

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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

Montanari, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report		Publication date		Patent family member(s)	Publication date
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