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[Continued on nextpage]

(54) Title: A METHOD OF ENABLING A LOCK BUTTON OF A MOBILE DEVICE WITH AN IOS OPERATING SYSTEM TO BE USED BY A USER TO EFFECT AN ACTION

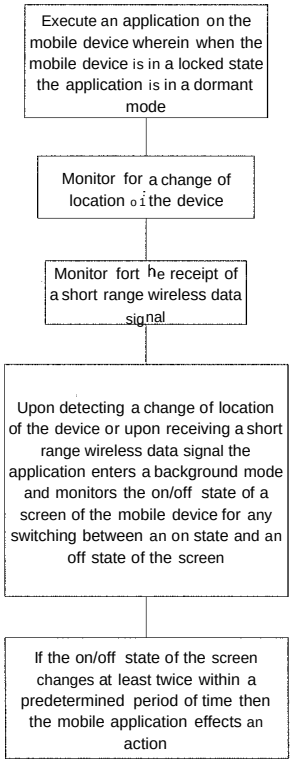

FIGURE 2

(57) Abstract: A method of enabling a lock button of a mobile device with an iOS operating system to be used by a user to effect an action when the mobile device is in the locked state is provided. The method includes executing an application on the mobile device wherein when the mobile device is in a locked state the application is in a dormant mode. Monitoring by the operating system of the mobile device for a change of location of the device and/or for the receipt of a short range wireless data signal. Upon detecting a change of location of the device or upon receiving a short range wireless data signal the operating system communicates this to the application which in response enters a background mode and monitors the on/off state of a screen of the mobile device for any switching between an on state and an off state of the screen. If the on/off state of the screen changes at least twice within a predetermined period of time then the mobile application effects an action. In one example, the action is to transmit a panic message to an external server.

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Declarations under Rule 4.17:

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A METHOD OF ENABLING A LOCK BUTTON OF A MOBILE DEVICE WITH AN IOS OPERATING SYSTEM TO BE USED BY A USER TO EFFECT AN ACTION

BACKGROUND OF THE INVENTION

The present invention relates to a method of enabling a lock button of a mobile device with an iOS™ operating system to be used by a user to effect an action when the mobile device is in the locked state.

The iOS operating system for mobile devices is created and developed by Apple Inc. and distributed exclusively for Apple hardware.

A mobile device with the operating system typically has a so-called locked state where the screen of the device is off and some of the applications may be executing in the background. However, in this locked state with the screen off, the user would first need to wake up the device by pressing a so-called "home" button which would switch on the screen and allow the user to then unlock the device to obtain access to the full functionality of the mobile device and access the relevant applications or features.

In the locked state, pressing a power on/off button will also switch on the screen. Holding the power on/off button down for an extended period of time will switch off the device. Pressing the power on/off button twice in quick succession will have no further effect.

Because access to the iOS operating system is not provided to application developers in a "locked out state", there is currently no method of enabling a double press of the power on/off button to be used by an application developer to execute an action.

The present invention seeks to address this without access to the iOS operating system.

SUMMARY

According to an example embodiment there is provided a method of enabling a lock button of a mobile device with an iOS operating system to be used by a user to effect an action when the mobile device is in the locked state, the method including:

executing an application on the mobile device wherein when the mobile device is in a locked state the application is in a dormant mode;

monitoring by the operating system of the mobile device for a change of location of the device;

monitoring by the operating system of the mobile device for the receipt of a short range wireless data signal;

upon detecting a change of location of the device or upon receiving a short range wireless data signal the operating system communicates this to the application which in response enters a background mode and monitors the on/off state of a screen of the mobile device for any switching between an on state and an off state of the screen; and

if the on/off state of the screen changes at least twice within a predetermined period of time then the mobile application effects an action.

The short range wireless data signal is preferably a Bluetooth Low Energy signal.

The mobile device is typically a mobile telephone.

The action in one example is to transmit a panic data message to an external server, which panic message may include a location of the mobile device.

According to another example embodiment there is provided a mobile device with an iOS operating system, the device including:

a memory for storing data therein;

a long range communication module for communication over a cellular communication network;

a short range communications module for receiving short range signals;

a location determination module to determine the location of the mobile device;

a user interface for receiving inputs from the user;

a screen for displaying information to the user; and

a processor for executing an operating system and an application thereon, the processor:

monitoring by the operating system for a change of location of the device as detected by the location determination module;

monitoring by the operating system for the receipt of a short range wireless data signal via the short range communications module;

upon detecting a change of location of the device or upon receiving a short range wireless data signal the operating system communicates this to the application which in response enters a background mode and monitors the on/off state of the screen of the mobile device for any switching between an on state and an off state of the screen;

if the on/off state of the screen changes a predetermined number of times within a predetermined period of time then effecting an action.

The mobile device is typically a mobile telephone.

The short range wireless data signal is a Bluetooth Low Energy signal.

The action in one example is to transmit a panic data message to an external server, which panic message may include a location of the mobile device.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram illustrating an example mobile device for executing an application thereon to implement the methodologies described herein; and

Figure 2 is a block diagram illustrating an example embodiment method.

DESCRIPTION OF EMBODIMENTS

The present invention relates to a method of enabling a lock button of a mobile device with an iOS operating system to be used by a user to effect an action when the mobile device is in the locked state.

Referring to Figure 1, a mobile device 10 is illustrated including a number of components.

The mobile device 10 is typically a mobile telephone.

A processor 12 and associated memory 14 is used for controlling the operation of the device.

The processor 12 executes an iOS operating system for mobile devices created and developed by Apple Inc. and distributed exclusively for Apple hardware.

The processor 12 is also able to execute applications which are executable software code often written by third parties for the mobile device 10.

The device also includes a display 16 typically in the form of a screen.

A user interface 18 allows a user to input commands to the mobile device 10.

The user interface 18 may include a touchscreen integrated with the display 16 as well as some other buttons which will be described in more detail below.

The device also includes a location module 20, a long range communications module 22 and a short range communications module 24 which will be described in more detail below.

The mobile device 10 has a so-called locked state where the screen 16 of the device is off and some of the applications may be executing in the

background. In this state, the operating system limits what the applications can and cannot do.

In this locked state with the screen 16 off, the user would first need to wake up the device by pressing a so-called "home" button which would switch on the screen and allow the user to then unlock the device to obtain access to the full functionality of the mobile device.

In the locked state, pressing a power on/off button will also switch on the screen. Holding the power on/off button down for an extended period of time will switch off the device. Pressing the power on/off button twice in quick succession will toggle the screen on and off but will have no further effect.

The present invention addresses this in the following inventive method which does not require altering the operating system of the mobile device 10 but operates within the current setup of the operating system.

To achieve this, an application is executed on the processor 12 so that when the mobile device 10 is in a locked state the application is in dormant mode.

Even in the dormant state, the operating system executing on the mobile device 10 does monitor for certain events.

How this works is that the operating system monitors for these changes such as "significant location change" or picking up a BLE tag and when the operating system picks this up, the application is "subscribed" to those services and the operating system communicates an instruction to the application that this has occurred and thereby "wakes" up the application which enters into a background mode.

In any event, particularly, what is being monitored for are:

i. a change of location of the device; and

ii. the receipt of a short range wireless data signal via the short range communications module 24.

Regarding a change of location of the device, this is detected by the location module 20 which typically uses the GPS location of the mobile device 10.

The change of location that is being referred to is a significant change of location such as 1km and not a small change of location.

The operating system starts the Significant-Change Location Service which provides accuracy that is good enough for most apps and represents a power-saving alternative to the standard location service. The service uses Wi-Fi to determine the user's location and report changes in that location, allowing the system to manage power usage much more aggressively than it could otherwise. The significant-change location service can also wake up an iOS app that is currently suspended or not running in order to deliver new location data.

Regarding the receipt of a short range wireless data signal, in one example embodiment this refers to a Bluetooth low energy signal that is received from another device that is periodically transmitting such signals.

Upon detecting either a change of location of the device or upon receiving a short range wireless data signal the operating system communicates an instruction to application that this has occurred in response to which the application enters a background mode and monitors the on/off state of the screen 16 of the mobile device 10 for any switching between an on state and an off state of the screen 16.

If the on/off state of the screen 16 changes at least twice within a short predetermined period of time then the mobile application effects an action.

This is because the mobile device 10 includes a power on/off button which is used to switch the device on and off. However, when the device 10 is in the locked state, pressing the on/off button rapidly simply toggles the screen from on to off or from off to on as the case may be.

Thus if the on/off state of the screen 16 changes at least twice within a short predetermined period of time, this indicates that the power on/off button has been pressed twice in relatively quick succession, typically within milli seconds.

Once the application determines this it executes an action even whilst in the background mode.

This is due to the fact that within the restraints of the current iOS operating system, it is possible for an application executing in background mode to monitor if the screen has been switched on or off but it is not possible for an application to otherwise determine if the power on/off button has been depressed.

It will be appreciated that by monitoring the status of the screen, the application can cleverly ascertain if the power on/off button has been depressed.

Regarding the action that is executed by the application, it will be appreciated that this could be any suitable action.

One example implementation is in the use of the vehicle tracking technology where an application executing on the mobile device 10 is used to track the location of the mobile device 10 either alone or in conjunction with an external tag to which the mobile device 10 communicates, typically via Bluetooth. This would occur in a scenario such as is described in the

applicant's co-pending PCT application PCT/IB2014/065736, the contents of which are incorporated herein by reference.

In this example, the power on/off button can be used as a panic button for the user, for example if they are being car jacked.

In this scenario, the user would press the power on/off button twice and the action implemented by the application would be to send a panic message via the long range communications module 22 to an external server.

The panic message will typically include a location of the mobile device 10 as obtained from the location module 20 at the time of the panic.

In any event, it will be appreciated that the methodology described above effectively allows the power on/off button of a mobile device with an iOS operating system to be used to effect an action, even when the device is in a locked state.

CLAIMS:

1. A method of enabling a lock button of a mobile device with an iOS operating system to be used by a user to effect an action when the mobile device is in the locked state, the method including:

executing an application on the mobile device wherein when the mobile device is in a locked state the application is in a dormant mode;

monitoring by the operating system of the mobile device for a change of location of the device;

monitoring by the operating system of the mobile device for the receipt of a short range wireless data signal;

upon detecting a change of location of the device or upon receiving a short range wireless data signal the operating system communicates this to the application which in response enters a background mode and monitors the on/off state of a screen of the mobile device for any switching between an on state and an off state of the screen; and

if the on/off state of the screen changes at least twice within a predetermined period of time then the mobile application effects an action.

2. A method according to claim 1 wherein the short range wireless data signal is a Bluetooth Low Energy signal.

3. A method according to claim 1 or claim 2 wherein the mobile device is typically a mobile telephone.

4. A method according to any preceding claim wherein the action is to transmit a panic data message to an external server.

5. A method according to claim 4 wherein the panic message includes a location of the mobile device.

6. A mobile device with an iOS operating system, the device including:

a memory for storing data therein;

a long range communication module for communication over a cellular communication network;

a short range communications module for receiving short range signals;

a location determination module to determine the location of the mobile device;

a user interface for receiving inputs from the user;

a screen for displaying information to the user; and

a processor for executing an operating system and an application thereon, the processor:

monitoring by the operating system for a change of location of the device as detected by the location determination module;

monitoring by the operating system for the receipt of a short range wireless data signal via the short range communications module;

upon detecting a change of location of the device or upon receiving a short range wireless data signal the operating system communicates this to the application which in response enters a background mode and monitors the on/off state of the screen of the mobile device for any switching between an on state and an off state of the screen;

if the on/off state of the screen changes a predetermined number of times within a predetermined period of time then effecting an action.

7. A system according to claim 6 wherein the short range wireless data signal is a Bluetooth Low Energy signal.

8. A system according to claim 6 or claim 7 wherein the mobile device is typically a mobile telephone.

9. A system according to any one of claims 6 to 8 wherein the action is to transmit a panic data message to an external server.

10. A system according to claim 9 wherein the panic message includes a location of the mobile device.

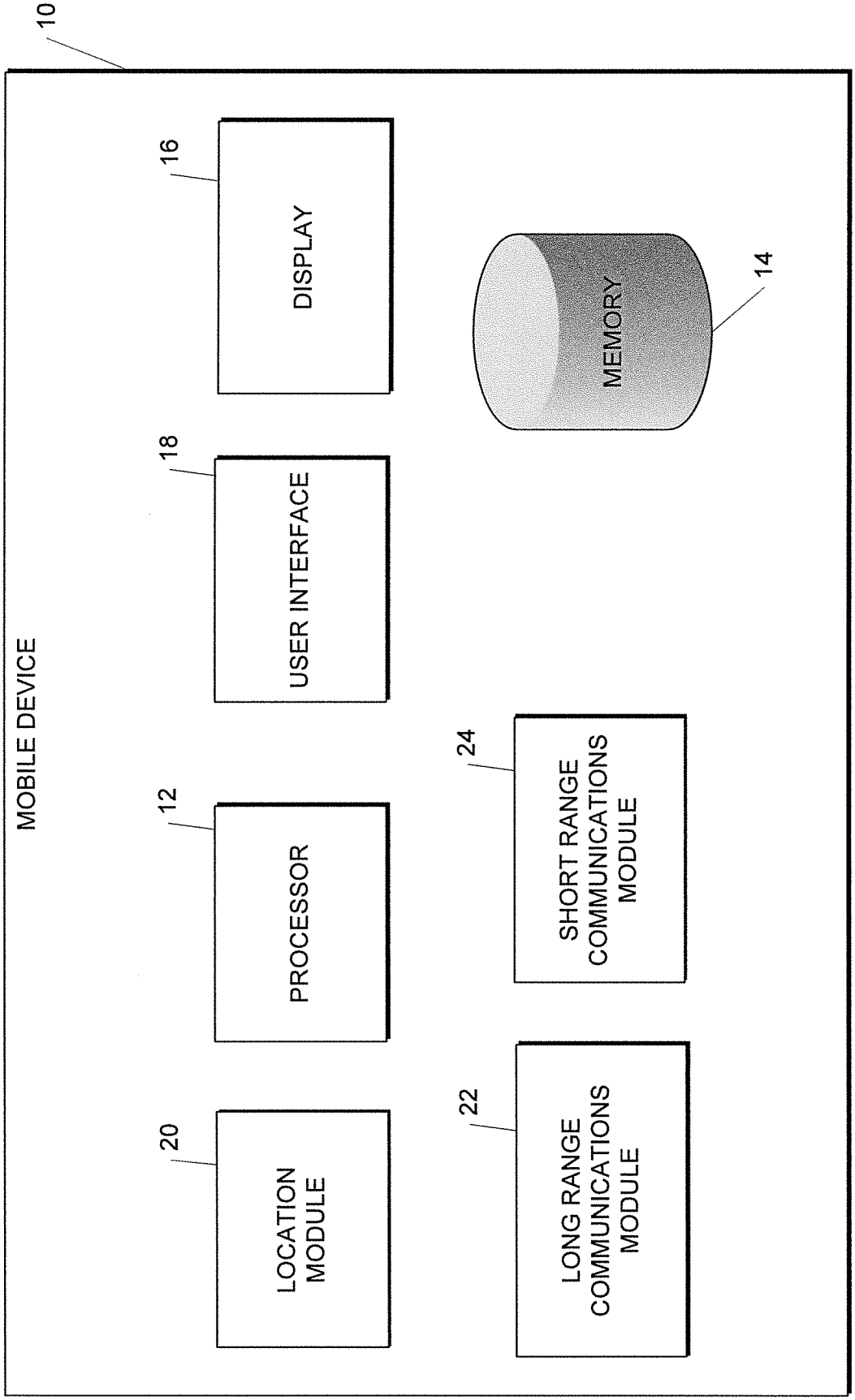
10
MOBILE DEVICE
16
DISPLAY
14
MEMORY
18
USER INTERFACE
12
PROCESSOR
24
SHORT RANGE COMMUNICATIONS MODULE
20
LOCATION MODULE
22
LONG RANGE COMMUNICATIONS MODULE

FIGURE 1

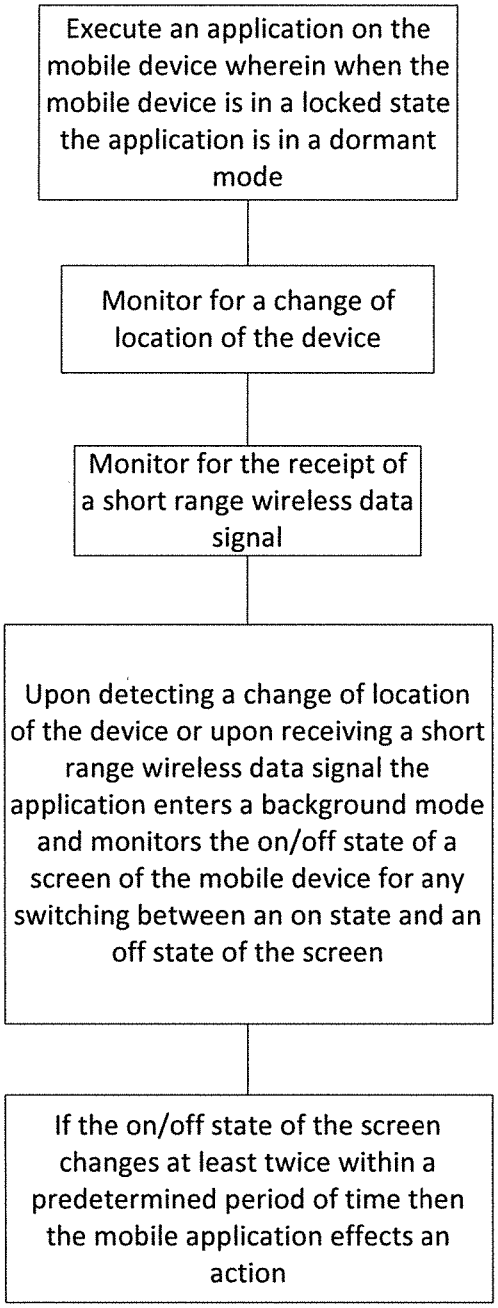
Execute an application on the mobile device wherein when the mobile device is in a locked state the application is in a dormant mode
Monitor for a change of location of the device
Monitor for the receipt of a short range wireless data signal
Upon detecting a change of location of the device or upon receiving a short range wireless data signal the application enters a background mode and monitors the on/off state of a screen of the mobile device for any switching between an on state and an off state of the screen
If the on/off state of the screen changes at least twice within a predetermined period of time then the mobile application effects an action

FIGURE 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/055606

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04M1/725
ADD.

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)
H04M H04W G08B

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 practicable, search terms used)
EPO-Internal , WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2013/062475 A1 (XH MOBILE SOLUTIONS AB [SE] ; HANSSON GUSTAF [SE] ; BALIC MIJO [SE] ; WES) 2 May 2013 (2013-05-02) page 6, line 9 - page 23, line 26; figures 1-7	1-10
A	US 2014/349603 A1 (WATERHOUSE VALÉRIE [FR]) 27 November 2014 (2014-11-27) paragraphs [0017] , [0027] - [0049]	1-10
A	US 2011/230161 A1 (NEWMAN FREDRIC MARK [US]) 22 September 2011 (2011-09-22) paragraphs [0052] - [0164] ; figures 1-34	1-10
A	US 2010/237991 A1 (PRABHU KRISHNANAND [IN] ET AL) 23 September 2010 (2010-09-23) paragraph [0040]	1-10

-/--

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

[X] See patent family annex.

* Special categories of cited documents :

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

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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 November 2016	24/11/2016

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/055606

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2014/215496 A1 (SEXTON ROBERT J [US] ET AL) 31 July 2014 (2014-07-31) paragraphs [0071] - [0073]; figure 4A	1-10
A	US 2012/225635 A1 (ESBENSEN DANIEL [US]) 6 September 2012 (2012-09-06) abstract	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2016/055606

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013062475 A1	02-05-2013	US 2014292526 A1	02-10-2014
		WO 2013062475 A1	02-05-2013
US 2014349603 A1	27-11-2014	EP 2789154 A1	15-10-2014
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		US 2010237991 A1	23-09-2010
		WO 2010107827 A1	23-09-2010
US 2014215496 A1	31-07-2014	NONE	
US 2012225635 A1	06-09-2012	NONE	