(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
4 December 2014 (04.12.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/190827 A1

(51) International Patent Classification:
H04M 1/725 (2006.01)

(21) International Application Number:
PCT/CN2014/076000

(22) International Filing Date:
23 April 2014 (23.04.2014)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201310206302.X 29 May 2013 (29.05.2013) CN

(71) Applicant: **TENCENT TECHNOLOGY (SHENZHEN) COMPANY LIMITED** [CN/CN]; Room 403, East Block 2, SEG Park, Zhenxing Road, Futian District, Shenzhen City, Guangdong 518000 (CN).

(72) Inventors: **GUO, Yongzhi**; Room 403, East Block 2, SEG Park, Zhenxing Road, Futian District, Shenzhen city, Guangdong 518044 (CN). **YI, Wei**; Room 403, East Block 2, SEG Park, Zhenxing Road, Futian District, Shenzhen city, Guangdong 518044 (CN). **HE, Jing**; Room 403, East Block 2, SEG Park, Zhenxing Road, Futian District, Shenzhen city, Guangdong 518044 (CN). **LI, Bin**; Room 403, East Block 2, SEG Park, Zhenxing Road, Futian District, Shenzhen city, Guangdong 518044 (CN).

(74) Agent: **DEQI INTELLECTUAL PROPERTY LAW CORPORATION**; 7/F, Xueyuan International Tower, NO.1 Zhichun Road, Haidian District, Beijing 100083 (CN).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

(54) Title: METHOD AND APPARATUS FOR CONTROLLING PORTABLE SMART TERMINAL

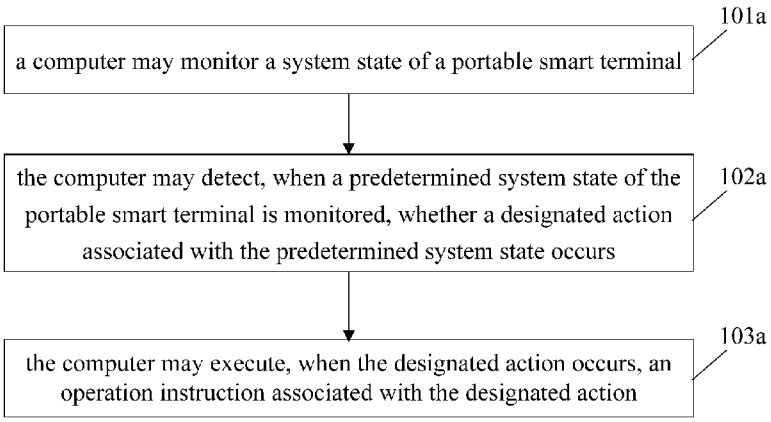

FIG. 1a

(57) Abstract: According to an example, a computer monitors a system state of a portable smart terminal. When a predetermined system state of the portable smart terminal is monitored, the computer detects whether a designated action associated with the predetermined system state occurs. When the designated action occurs, the computer executes an operation instruction associated with the designated action.

WO 2014/190827 A1

METHOD AND APPARATUS FOR CONTROLLING PORTABLE SMART TERMINAL

PRIORITY STATEMENT

[0001] This application claims the benefit and priority of Chinese Patent Application No. 201310206302X, filed May 29, 2013, the disclosure of which is incorporated herein in its entirety by reference.

FIELD

[0002] Various examples of the present disclosure relate to processing technology of portable smart terminals, and more particularly, to a method and apparatus for controlling a portable smart terminal.

BACKGROUND

[0003] Currently, portable smart terminals with a data processing capability, such as computers, mobile phones, personal digital assistants (PDAs), tablet personal computers (PCs), pocket PCs, smart TV, and etc., have been widely used. The portable smart terminal has become an indispensable tool carried by people.

[0004] With enhancement of the data processing capability of the portable smart terminal and development of information technology, more and more applications can run on the portable smart terminal. For example, a smart phone can not only make and/or answer a call and send and/or receive a short message, but also can install other feature applications, which are based on an operating system (OS) of the smart phone, to achieve a variety of functions.

SUMMARY

[0005] According to various examples of the present disclosure, a method for controlling a portable smart terminal is provided. The method includes:

monitoring, by a computer, a system state of a portable smart terminal;

detecting, by the computer when a predetermined system state of the portable smart terminal is monitored, whether a designated action associated with the predetermined system state occurs; and

executing, by the computer when the designated action occurs, an operation instruction associated with the designated action.

[0006] According to various examples of the present disclosure, an apparatus for controlling a portable smart terminal is provided. The apparatus includes:

a system state monitoring module, to monitor a system state of a portable smart terminal;

an action detecting module, to detect, when a predetermined system state of the portable smart terminal is monitored by the system state monitoring module, whether a designated action associated with the predetermined system state occurs; and

an instruction executing module, to execute an operation instruction associated with the designated action when the action detecting module detects that the designated action occurs,

[0007] According to various examples of the present disclosure, a non-transitory computer-readable storage medium encoded with a plurality of instructions is provided. When the instructions are executed by one or more computers, the one or more computers are caused to perform operations including:

monitoring a system state of a portable smart terminal;

detecting, when a predetermined system state of the portable smart terminal is monitored, whether a designated action associated with the predetermined system state occurs; and

executing, when the designated action occurs, an operation instruction associated with the designated action.

[0008] As may be seen from the above descriptions that, according to various examples of the present disclosure, a computer may monitor a system state of a portable smart terminal. When a predetermined system state of the portable smart terminal is monitored, the computer may detect whether a designated action associated with the predetermined system state occurs. When the designated action occurs, the computer may execute an operation instruction associated with the designated action. By this manner, in the examples of the present disclosure, the portable smart terminal may be controlled through recognizing a designated action of the portable smart terminal when the portable smart terminal is in a predetermined system state and executing an operation instruction associated with the designated action. As such, eye attentions of a user and the number of times of finger operations when the user uses the portable smart terminal may be reduced, the occupied user time may be reduced, and the operation efficiency may be improved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Features of the present disclosure are illustrated by way of example and not limited in the following figures, in which like numerals indicate like elements, in which:

[0010] FIG. 1a is a flowchart illustrating a method for controlling a portable smart terminal, according to an example of the present disclosure.

[0011] FIG. 1b is a flowchart illustrating a method for controlling a

portable smart terminal, according to an example of the present disclosure.

[0012] FIG. 2a is a flowchart illustrating a method for detecting whether an action of picking up a portable smart terminal and placing the portable smart terminal close to an ear occurs, according to an example of the present disclosure.

[0013] FIG. 2b is a flowchart illustrating a method for detecting whether an action of flipping a portable smart terminal occurs, according to an example of the present disclosure.

[0014] FIG. 2c is a flowchart illustrating a method for detecting whether an action of shaking a portable smart terminal occurs, according to an example of the present disclosure.

[0015] FIG. 3 is a schematic diagram illustrating a structure of an apparatus for controlling a portable smart terminal, according to an example of the present disclosure.

[0016] FIG. 4a is a schematic diagram illustrating a structure of an action detecting module in a portable smart terminal, according to an example of the present disclosure.

[0017] FIG. 4b is a schematic diagram illustrating a structure of an action detecting module in a portable smart terminal, according to another example of the present disclosure.

[0018] FIG. 4c is a schematic diagram illustrating a structure of an action detecting module in a portable smart terminal, according to an example of the present disclosure.

[0019] FIG. 5 is a schematic diagram illustrating a structure of an apparatus for controlling a portable smart terminal, according to another example of the present disclosure.

[0020] FIG. 6a is a schematic diagram illustrating a hardware structure of an apparatus for controlling a portable smart terminal, according to an example of the present disclosure.

[0021] FIG. 6b is a schematic diagram illustrating a hardware structure of an apparatus for controlling a portable smart terminal, according to another example of the present disclosure.

DETAILED DESCRIPTION

[0022] Hereinafter, the present disclosure will be described in further detail with reference to the accompanying drawings and examples.

[0023] For simplicity and illustrative purposes, the present disclosure is described by referring to examples. In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present disclosure. It will be readily apparent however, that the present disclosure may be practiced without limitation to these specific details. In other instances, some methods and structures have not been described in detail so as not to unnecessarily obscure the present disclosure. As used herein, the term "includes" means includes but not limited to, the term "including" means including but not limited to. The term "based on" means based at least in part on. In addition, the terms "a" and "an" are intended to denote at least one of a particular element.

[0024] Usually, a screen of a portable smart terminal is small, and functions of an operating system of the portable smart terminal and applications subsequently installed on the terminal by a user are numerous. As such, in order to search for a designated function on the terminal and initiate an operation instruction associated with the designated function, the user needs to perform human-computer interactions many times. Therefore, too much time, too many eye attentions, and too many finger operations of the user may be taken up, and thus operation efficiency may be reduced.

[0025] For example, according to the conventional solution, when a user is driving a car and if there is an incoming call for a smart phone of the user, the user may perform the following operations. The user may pick up

the phone, pay attention to a screen of the phone with eyes of the user, check a position of an answer button, trigger the answer button with a finger, and place the phone close to an ear of the user to answer the call.

[0026] In this case, when triggering the answer button with the finger, if the smart phone is in a screen-locking state, some types of the smart phone need to perform an unlocking operation to answer the call.

[0027] In the circumstance as described above, too much time, too many eye attentions, and too many finger operations of the user may be taken up, and thus the operation efficiency may be reduced. In addition, the eye attentions require excessive finger operations, and the finger operations further require the eye attentions. As such, attention of the user and an implementation ability of a hand may be distracted, and therefore the danger may be increased when the user is driving.

[0028] According to various examples of the present disclosure, a portable smart terminal may refer to a portable smart terminal with data processing and calculating functions, which may include but may not be limited to smart phones, PDAs, tablet PCs, and the like. These portable smart terminals may have operating systems installed on them, which may include but may not be limited to Android OS™, Symbian OS™, Windows mobile OS™, iPhone OS™, and etc. In examples of the present disclosure, the portable smart terminal may also be called a terminal for short.

[0029] Although some types of the portable smart terminal and types of the operating system are listed above, one skilled in the art may understand that examples of the present disclosure may not be limited to the types listed above. Examples of the present disclosure may also be applied to any other type of the portable smart terminal and any other type of the operating system.

[0030] According to various examples of the present disclosure, a computer may execute a method and an apparatus described later. The

computer may be a computing device capable of executing the method and the apparatus provided by examples of the present disclosure. The computer may include one or more non-transitory processor-readable storage media and one or more processors in communication with the non-transitory processor-readable storage media. For example, the non-transitory processor-readable storage media may be a RAM memory, a flash memory, a ROM memory, or any other form of the non-transitory storage medium known in the art. The one or more non-transitory processor-readable storage media may store sets of instructions, or units and/or modules that include the sets of instructions, for conducting operations described in the present disclosure. The one or more processors may be configured to execute the sets of instructions and perform the operations in the examples of the present disclosure.

[0031] FIG. 1a is a flowchart illustrating a method for controlling a portable smart terminal, according to an example of the present disclosure. As shown in FIG. 1a, the method may include the following operations.

[0032] In block 101a, a computer may monitor a system state of a portable smart terminal.

[0033] In block 102a, the computer may detect, when a predetermined system state of the portable smart terminal is monitored, whether a designated action associated with the predetermined system state occurs.

[0034] In block 103a, the computer may execute, when the designated action occurs, an operation instruction associated with the designated action.

[0035] FIG. 1b is a flowchart illustrating a method for controlling a portable smart terminal, according to an example of the present disclosure. As shown in FIG. 1b, the method may include the following operations.

[0036] In block 101, a system state of a portable smart terminal may be monitored, and operations in block 102 may be performed when it is

monitored that the portable smart terminal is in a predetermined system state.

[0037] In block 102, it may be detected whether a designated action associated with the monitored predetermined system state occurs, and operations in block 103 may be performed if the designated action occurs.

[0038] In block 103, an operation instruction associated with the designated action may be executed, in which the designated action is associated with the monitored predetermined system state.

[0039] According to various examples of the present disclosure, there may be at least one predetermined system state. Each predetermined system state may be associated with at least one designated action. Each designated action may be associated with one operation instruction.

[0040] According to an example of the present disclosure, the predetermined system state may be shown as in Table 1.

<table>
<tr><th>Predetermined system state</th><th>Designated action associated with the predetermined system state</th><th>Operation instruction associated with the designated action that is associated with the predetermined system state</th></tr>
<tr><td rowspan="2">incoming call + screen-locking,
or
incoming call + desktop</td><td>pick up the portable smart terminal and place the portable smart terminal close to the ear</td><td>answer a call</td></tr>
<tr><td>flip or shake the portable smart terminal</td><td>reject a call</td></tr>
<tr><td>screen-brightening + screen-locking,
or
screen-brightening + desktop</td><td>pick up the portable smart terminal and place the portable smart terminal in front of the face</td><td>trigger a function of voice dialing</td></tr>
</table>

incoming call	pick up the portable smart terminal and place the portable smart terminal close to the ear	answer a call
	flip or shake the portable smart terminal	reject a call
screen-brightening	pick up the portable smart terminal and place the portable smart terminal in front of the face	trigger a function of voice dialing

Table 1

[0041] In examples of the present disclosure, based on configurations of the predetermined system state, the designated action associated with the predetermined system state, and the operation instruction associated with the designated action, the portable smart terminal may be controlled through recognizing a designated action of the portable smart terminal when the portable smart terminal is in a predetermined system state and executing an operation instruction associated with the designated action. As such, the eye attentions of the user and the number of times of the finger operations when the user uses the portable smart terminal may be reduced, the occupied user time may be reduced, and the operation efficiency may be improved.

[0042] According to an example of the present disclosure, as shown in Table 1, the predetermined system state may include the incoming call state, or the incoming call state plus the screen-locking state, or the incoming call state plus the desktop state.

[0043] According to an example of the present disclosure, when any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is

monitored, the operation of detecting, as described in block 102, whether the designated action associated with the monitored predetermined system state occurs and performing the operations in block 103 if the designated action occurs may be implemented as follows. It may be detected whether a first action or a second action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state occurs. When the first action or the second action is detected, the operations in block 103 may be performed.

[0044] According to an example of the present disclosure, as shown Table 1, the first action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state may include an action of picking up the portable smart terminal and placing the portable smart terminal close to an ear of the user. The second action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state may include an action of flipping or shaking the portable smart terminal.

[0045] According to an example of the present disclosure, the operation of executing, as described in block 103, the operation instruction associated with the detected designated action may be implemented as follows. If the first action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is detected, an operation instruction of answering an incoming call may be executed. If the second action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is detected, an operation instruction of rejecting the incoming call may be executed.

[0046] According to an example of the present disclosure, the incoming call state may be defined to mean a state in which there is an incoming call but the incoming call is not answered or rejected.

[0047] According to an example of the present disclosure, the operation of detecting the designated action may be triggered as long as the incoming call state is monitored. This example may be applied to incoming call states under various situations, including a situation in which the user may not pay attention to a screen of the portable smart terminal, e.g., the user is driving a car, or a situation in which the user may pay attention to the screen of the portable smart terminal, e.g., the user is playing a game on the smart terminal. When the user pays attention to the screen of the portable smart terminal, the eyes of the user may focus on the portable smart terminal. As such, the operation of answering the incoming call or rejecting the incoming call may be implemented through finger operations.

[0048] According to another example of the present disclosure, the operation of detecting the designated action may be triggered when the incoming call state is monitored and the portable smart terminal is in the screen-locking state or in the desktop state. The screen-locking state or the desktop state may indicate that currently the user may not pay attention to the screen of the portable smart terminal. In this case, the screen-locking state may indicate that the user may not pay attention to the screen of the portable smart terminal for a long time, e.g., the user is driving the car. In this example, the operation of detecting the designated action may be triggered when the incoming call state is monitored and the portable smart terminal is in the screen-locking state or in the desktop state. As such, using time of related sensors may be reduced and power of the portable smart terminal may be saved.

[0049] According to various examples of the present disclosure, in order to detect the designated action, related sensors may be installed in the

portable smart terminal, such as an acceleration sensor, a gravity sensor, a light-sensitive sensor, and etc. According to various examples of the present disclosure, interfaces on the portable smart terminal and associated with the sensors may be used to call the sensors to detect corresponding signals. The interfaces may also receive the signals detected by the sensors to determine a specific action.

[0050] According to an example of the present disclosure, as shown in FIG. 2a, the operation of detecting, as described in block 102, whether the first action occurs may be implemented as follows. In this case, the first action may be the action of picking up the portable smart terminal and placing the portable smart terminal close to the ear of the user.

[0051] In block 121, an acceleration sensor of the potable smart terminal may be called. And, it may be determined, based on acceleration data transmitted from the acceleration sensor, whether an action of picking up the portable smart terminal and an action of placing the portable smart terminal at a side of a user face occur.

[0052] In block 122, a gravity sensor of the portable smart terminal may be called. And, it may be determined, based on a gravity parameter transmitted from the gravity sensor, whether an action of picking up the portable smart terminal with a head of the terminal upwards occurs.

[0053] In block 123, a light-sensitive sensor of the portable smart terminal may be called. And, it may be determined, based on a light intensity transmitted from the light-sensitive sensor, whether an action of placing the portable smart terminal close to the ear occurs.

[0054] In block 124, in response to a determination that the action of picking up the portable smart terminal, the action of placing the portable smart terminal at the side of the user face, the action of picking up the portable smart terminal with the head of the terminal upwards, and the action of placing the portable smart terminal close to the ear have occurred,

it may be determined that the action of picking up the portable smart terminal and placing the portable smart terminal close to the ear occurs.

[0055] Hereinafter, the operations described above will be explained in further detail.

[0056] Firstly, the acceleration sensor of the portable smart terminal may detect three dimensionalities, including an x-axis, a y-axis, and a z-axis. According to various examples of the present disclosure, a direction of the x-axis may be from left to right along a horizontal direction of the screen of the portable smart terminal, in which if a shape of the portable smart terminal is not a square, a shorter edge of the portable smart terminal may be placed horizontally and a longer edge of the portable smart terminal may be placed vertically. A direction of the y-axis may begin from a lower-left corner of the screen and point to the top of the screen along a vertical direction of the screen. When the portable smart terminal is placed on a table horizontally, a direction of the z-axis may begin from the screen of the portable smart terminal and point to the sky vertically. When the user places the portable smart terminal close to the ear, usually the portable smart terminal may be held sideways in a hand of the user. At this time, it may be determined that there are accelerations at the x-axis and the y-axis but there is not the acceleration at the z-axis. By this manner, it may be determined, through the acceleration sensor, whether the portable smart terminal is held sideways in the hand. And, it may also be determined, based on the acceleration at the y-axis, whether there is the action of picking up the portable smart terminal upwards.

[0057] As such, according to an example of the present disclosure, the determining operation in block 121 may include a process A and a process B described as follows.

[0058] In process A, it may be determined whether the action of picking up the terminal occurs, which may be implemented as follows. The

acceleration sensor of the portable smart terminal may be called. Acceleration data at the three axes may be received, in which the acceleration data at the three axes may be periodically transmitted from the acceleration sensor of the portable smart terminal. It may be determined whether a difference between an acceleration at the x-axis currently received and an acceleration at the x-axis last received is greater than a specified value, or a difference between an acceleration at the y-axis currently received and an acceleration at the y-axis last received is greater than the specified value, or a difference between an acceleration at the z-axis currently received and an acceleration at the z-axis last received is greater than the specified value. According to an example of the present disclosure, the specified value may be configured as a value which is greater than 1. If any one of the acceleration differences at the x-axis, the y-axis, and the z-axis is greater than the specified value, it may be determined that the action of picking up the terminal occurs, and a next process may be performed. Otherwise, it may be determined that the action of picking up the terminal does not occur.

[0059] In process B, it may be determined whether the action of placing the portable smart terminal at the side of the face occurs. According to various examples of the present disclosure, there may be two positions when the user picks up the portable smart terminal, in which a first one is to place the terminal in front of the face and a second one is to place the terminal at the side of the face and closed to the ear. As such, changes of the accelerations at the three axes may be detected, which may be implemented as follows. The acceleration data at the three axes may be received continuously, in which the acceleration data at the three axes may be periodically transmitted from the acceleration sensor of the portable smart terminal. Changes of the accelerations at the x-axis and the z-axis received each time may be determined, respectively. If fluctuation of the

acceleration at the z-axis is within a predetermined range (e.g., the acceleration difference at the z-axis may be less than 1 and an absolute value of the acceleration at the z-axis currently received may be less than 2) and the acceleration at the x-axis is gradually increased to a specified range (e.g., the acceleration at the x-axis may be gradually increased to be greater than 2), it may be determined that the action of placing the portable smart terminal at the side of the face occurs. If the acceleration at the z-axis is gradually increased to the specified range (e.g., the acceleration at the z-axis may be gradually increased to be greater than 2) and fluctuation of the acceleration at the x-axis is within the predetermined range (e.g., the acceleration difference at the x-axis may be less than 1 and an absolute value of the acceleration at the x-axis currently received may be less than 2), it may be determined that an action of placing the terminal in front of the face occurs.

[0060] Secondly, in addition to the operation of determining whether the action of picking up the terminal occurs and the operation of determining whether the action of placing the terminal at the side of the face occurs, it may further be recognized whether the portable smart terminal is placed with the head of the terminal upwards when the terminal is held in the hand of the user. In this case, when the portable smart terminal is placed with the head of the terminal downwards, an action of swing the terminal upwards that is generated by the user may not be recognized. In this case, a gravity coefficient of the gravity sensor of the portable smart terminal may be used. According to various experimental results, when the portable smart terminal is placed horizontally, a gravity coefficient of the y-axis is 0. When the portable smart terminal is picked up with the head of the terminal upwards, the gravity coefficient of the y-axis is greater than 0 and is increased with increasing of an angle that is formed by the y-axis and a horizontal plane. When the portable smart terminal is

perpendicular to the horizontal plane with the head of the terminal upwards, the gravity coefficient of the y-axis is 9.8. When the portable smart terminal is placed with the head of the terminal downwards, the gravity coefficient of the y-axis is less than 0 and is decreased with the increasing of the angle that is formed by the y-axis and the horizontal plane. When the portable smart terminal is perpendicular to the horizontal plane with the head of the terminal downwards, the gravity coefficient of the y-axis is -9.8. Based on the above objective law, according to an example of the present disclosure, the operation of determining, as described in block 122, whether the action of picking up the portable smart terminal with the head of the terminal upwards occurs may be implemented as follows. The gravity sensor of the portable smart terminal may be called. Gravity coefficients of the three axes may be received, in which the gravity coefficients of the three axes may be periodically transmitted from the gravity sensor. It may be determined whether the gravity coefficient of the y-axis is increased continually. If the gravity coefficient of the y-axis is increased continually, it may be determined that the action of picking up the portable smart terminal with the head of the terminal upwards occurs.

[0061] Finally, it may be detected whether the portable smart terminal is placed closed to the ear, in which the light-sensitive sensor of the portable smart terminal may be used. The light-sensitive sensor on the portable smart terminal may recognize current light intensity. When the user places the portable smart terminal close to the ear, the light intensity recognized by the light-sensitive sensor may become weak because the portable smart terminal is shaded by the head of the user. As such, according to an example of the present disclosure, the operation of determining, as described in bock 123, whether the action of placing the portable smart terminal close to the ear occurs may be implemented as follows. The light-sensitive sensor of the portable smart terminal may be

called. The light intensity periodically transmitted from the light-sensitive sensor may be received. It may be determined whether the light intensity becomes weak. If the light intensity becomes weak, it may be determined that the action of placing the portable smart terminal close to the ear occurs.

[0062] As may be seen from the above descriptions, through the acceleration sensor, the gravity sensor, and the light-sensitive sensor of the portable smart terminal, examples of the present disclosure may detect whether the action of picking up the portable smart terminal and placing the portable smart terminal close to the ear occurs. As such, when the user needs to answer a call under a circumstance that the user may not pay too many eye attentions and perform too many figure operations to the portable smart terminal (e.g., a mobile phone), such as the user is driving a car, the user may pick up the mobile phone and place the mobile phone close to the ear to answer the call. By this manner, the user may answer the call without staring at a screen of the mobile phone and performing excessive figure operations to the mobile phone. Therefore, the safety of answering a call under the circumstance in which the user may not pay too many eye attentions and perform too many figure operations to the mobile phone may be improved.

[0063] According to an example of the present disclosure, the operation of detecting, as described in block 102, whether the second action occurs may be implemented as follows. In this case, the second action may be the action of flipping or shaking the portable smart terminal.

[0064] As shown in FIG. 2b, a method for detecting whether the action of flipping the portable smart terminal occurs may be illustrated, according to an example of the present disclosure. The method may include the following operations.

[0065] In block 125, the acceleration sensor of the portable smart

terminal may be called.

[0066] In block 126, it may be determined, based on the acceleration data transmitted from the acceleration sensor, whether the acceleration at the z-axis is changed with a designated angle.

[0067] In block 127, in response to a determination that the acceleration at the z-axis is changed with the designated angle, it may be determined that the action of flipping the portable smart terminal occurs.

[0068] According to an example of the present disclosure, a value of the designated angle may be predetermined based on requirements. In an example, the designated angle may be defined as any value from 90 degrees to 180 degrees.

[0069] As may be seen from the above description, when there is an incoming call for the portable smart terminal and the user is inconvenient to answer the call for some reasons, such as the user is driving a car, the call may be rejected as long as the portable smart terminal is flipped immediately, no matter which side of the portable smart terminal is placed upwards. As such, the eye attentions and finger operations of the user may not be excessively taken up. Therefore, the operation efficiency may be improved, and the safety of driving may be improved, as well.

[0070] As shown in FIG. 2c, a method for detecting whether the action of shaking the portable smart terminal occurs may be illustrated, according to an example of the present disclosure. The method may include the following operations.

[0071] In block 128, the acceleration sensor of the portable smart terminal may be called.

[0072] In block 129, it may be determined, based on the acceleration data transmitted from the acceleration sensor, whether periodic angle-swing occurs at the acceleration of the x-axis within a determined period (e.g., 3 seconds).

[0073] In block 130, in response to a determination that the periodic angle-swing occurs at the acceleration of the x-axis within the determined period, it may be determined that the action of shaking the portable smart terminal occurs.

[0074] According to an example of the present disclosure, as shown in Table 1, the predetermined system state may include the screen-brightening state, or the screen-brightening state plus the screen-locking state, or the screen-brightening state plus the desktop state. In an example, the screen-brightening state may be defined to mean a state in which the screen of the portable smart terminal may be brightened through an clicking or touching operation, such as clicking the screen of the terminal, clicking a keyboard of the terminal, clicking other auxiliary keys of the terminal (e.g., a HOME button, a start-up button on the side of the portable smart terminal), and etc. When the portable smart terminal is in the screen-brightening state, the user may perform operations described later to the terminal.

[0075] According to an example of the present disclosure, when any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state is monitored, the operation of detecting, as described in block 102, whether the designated action associated with the monitored predetermined system state occurs and performing the operations in block 103 if the designated action occurs may be implemented as follows. It may be detected whether a third action associated with any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state occurs. When the third action is detected, the operations in block 103 may be performed.

[0076] According to an example of the present disclosure, as shown in Table 1, the third action associate with any one of the screen-brightening

state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state may include an action of picking up the portable smart terminal and placing the terminal in front of the face of the user.

[0077] According to an example of the present disclosure, the operation of executing, as described in block 103, the operation instruction associated with the detected designated action may be implemented as follows. If the third action associated with any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state is detected, an operation instruction of triggering a voice dialing may be executed.

[0078] According to an example of the present disclosure, after the operation instruction of triggering the voice dialing is executed, the method may further include the following operations. An inputted voice may be detected. Semantic recognition may be performed to the inputted voice. After the semantic is recognized, a name of a contact associated with the semantic may be searched from a contact list of the portable smart terminal. And, after the name of the contact associated with the semantic is searched out, a voice dialing to the contact may be triggered.

[0079] According to another example of the present disclosure, after the operation instruction of triggering the voice dialing is executed, the method may further include the following operations. An inputted voice may be detected. Numeral semantic recognition may be performed to the inputted voice. And, after the numeral semantic is recognized, dialing of a call number associated with the numeral semantic may be triggered, so as to make a voice dialing to the call number.

[0080] According to an example of the present disclosure, the operation of detecting, as described in block 102, whether the third action

occurs may be implemented as follows. In this case, the third action may be the action of picking up the portable smart terminal and placing the terminal in front of the face of the user. The acceleration sensor of the portable smart terminal may be called. Acceleration data at the three axes may be received, in which the acceleration data at the three axes may be periodically transmitted from the acceleration sensor of the portable smart terminal. It may be determined whether a difference between an acceleration at the x-axis currently received and an acceleration at the x-axis last received is greater than a specified value, or a difference between an acceleration at the y-axis currently received and an acceleration at the y-axis last received is greater than the specified value, or a difference between an acceleration at the z-axis currently received and an acceleration at the z-axis last received is greater than the specified value. According to an example of the present disclosure, the specified value may be configured as a value which is greater than 1. If any one of the acceleration differences at the x-axis, the y-axis, and the z-axis is greater than the specified value, it may be determined that the action of picking up the terminal occurs. In addition, changes of the accelerations at the x-axis and the z-axis received each time may be determined, respectively. If fluctuation of the acceleration at the x-axis is within the predetermined range (e.g., the acceleration difference at the x-axis may be less than 1 and an absolute value of the acceleration at the x-axis currently received may be less than 2) and the acceleration at the z-axis is gradually increased to the specified range (e.g., the acceleration at the z-axis may be gradually increased to be greater than 2), it may be determined that the action of placing the terminal in front of the face occurs.

[0081] As may be seen from the above description, when the user needs to make a call under a circumstance that the user may not pay too many eye attentions and perform too many figure operations to the

portable smart terminal (e.g., a mobile phone), such as the user is driving a car, the user may click or touch the mobile phone to brighten a screen of the mobile phone, and place the mobile phone in front of the face of the user. The user may speak out, towards the mobile phone, a name of a contact in a contact list of the mobile phone to dial a call number of the contact. By this manner, the user may make the call without staring at the screen and performing excessive figure operations to the mobile phone. Therefore, the safety of making a call under the circumstance in which the user may not pay too many eye attentions and perform too many figure operations to the mobile phone may be improved.

[0082] According to an example of the present disclosure, the method may further include the following operations. When monitoring that the portable smart terminal is not in the predetermined system state, the detecting of the designated action associated with the predetermined system state may be stopped. As such, power consumption of the portable smart terminal may be reduced.

[0083] Corresponding to the above method examples, various examples of the present disclosure also disclose an apparatus for controlling a portable smart terminal. FIG. 3 is a schematic diagram illustrating a structure of the apparatus for controlling the portable smart terminal, according to an example of the present disclosure. The apparatus may be configured inside the portable smart terminal and may control the portable smart terminal. As shown in FIG. 3, the apparatus 300 may include a system state monitoring module 301, an action detecting module 302, and an instruction executing module 303.

[0084] According to an example of the present disclosure, the system state monitoring module 301 may monitor a system state of a portable smart terminal. The action detecting module 302 may detect, when a predetermined system state of the portable smart terminal is monitored by

the system state monitoring module 301, whether a designated action associated with the predetermined system state occurs. The instruction executing module 303 may execute an operation instruction associated with the designated action when the action detecting module 302 detects that the designated action occurs.

[0085] According to an example of the present disclosure, the system state monitoring module 301 may monitor a system state of the portable smart terminal and trigger the action detecting module 302 when the system state monitoring module 301 monitors that the portable smart terminal is in a predetermined system state. The action detecting module 302 may detect whether a designated action associated with the monitored predetermined system state occurs and trigger the instruction executing module 303 if the designated action occurs. The instruction executing module 303 may execute an operation instruction associated with the designated action detected by the action detecting module 302, in which the designated action is associated with the predetermined system state monitored by the system state monitoring module 301.

[0086] According to various examples of the present disclosure, there may be at least one predetermined system state. Each predetermined system state may be associated with at least one designated action. Each designated action may be associated with one operation instruction. According to an example of the present disclosure, the predetermined system state may be shown as in Table 1, which may not be repeated herein.

[0087] According to an example of the present disclosure, as shown in Table 1, the predetermined system state may include the incoming call state, or the incoming call state plus the screen-locking state, or the incoming call state plus the desktop state.

[0088] According to an example of the present disclosure, the system

state monitoring module 301 may monitor any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state. And, the system state monitoring module 301 may trigger the action detecting module 302 when any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is monitored.

[0089] According to an example of the present disclosure, the action detecting module 302 may detect whether a first action or a second action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state occurs. And, the action detecting module 302 may trigger the instruction executing module 303 when the first action or the second action is detected.

[0090] According to an example of the present disclosure, as shown Table 1, the first action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state may include an action of picking up the portable smart terminal and placing the portable smart terminal close to an ear of the user. The second action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state may include an action of flipping or shaking the portable smart terminal.

[0091] According to an example of the present disclosure, when the action detecting module 302 detects the first action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state, the instruction executing module 303 may execute an operation instruction of answering an incoming call. When the action detecting module 302 detects the second action associated with any one of the incoming call state, the incoming call

state plus the screen-locking state, and the incoming call state plus the desktop state, the instruction executing module 303 may execute an operation instruction of rejecting the incoming call.

[0092] According to an example of the present disclosure, as shown in FIG. 4a, the action detecting module 302 may include a first action detecting sub-module 321 and/or a second action detecting sub-module 322. In which the first action detecting sub-module 321 may detect the first action and the second action detecting sub-module 322 may detect the second action.

[0093] According to an example of the present disclosure, as shown in FIG. 4b, the first action detecting sub-module 321 may include a first detecting unit 401, a second detecting unit 402, a third detecting unit 403, and a determining unit 404.

[0094] According to an example of the present disclosure, the first detecting unit 401 may call an acceleration sensor of the potable smart terminal. The first detecting unit 401 may determine, based on acceleration data transmitted from the acceleration sensor, whether an action of picking up the portable smart terminal and an action of placing the portable smart terminal at a side of a user face occur.

[0095] According to an example of the present disclosure, the second detecting unit 402 may call a gravity sensor of the portable smart terminal. The second detecting unit 402 may determine, based on a gravity parameter transmitted from the gravity sensor, whether an action of picking up the portable smart terminal with a head of the terminal upwards occurs.

[0096] According to an example of the present disclosure, the third detecting unit 403 may call a light-sensitive sensor of the portable smart terminal. The third detecting unit 403 may determine, based on a light intensity transmitted from the light-sensitive sensor, whether an action of

placing the portable smart terminal close to the ear occurs.

[0097] According to an example of the present disclosure, when the first detecting unit 401 determines that the action of picking up the portable smart terminal and the action of placing the portable smart terminal at the side of the face occur, the second detecting unit 402 determines that the action of picking up the portable smart terminal with the head of the terminal upwards occurs, and the third detecting unit 403 determines that the action of placing the portable smart terminal close to the ear occurs, the determining unit 404 may determine that the first action is detected, in which the first action may be the action of picking up the portable smart terminal and placing the portable smart terminal close to the ear.

[0098] According to an example of the present disclosure, the first detecting unit 401 may call the acceleration sensor of the portable smart terminal and receive acceleration data at three axes including an x-axis, a y-axis, and a z-axis, in which the acceleration data at the three axes may be periodically transmitted from the acceleration sensor of the portable smart terminal. The first detecting unit 401 may determine whether a difference between an acceleration at the x-axis currently received and an acceleration at the x-axis last received is greater than a specified value, or a difference between an acceleration at the y-axis currently received and an acceleration at the y-axis last received is greater than the specified value, or a difference between an acceleration at the z-axis currently received and an acceleration at the z-axis last received is greater than the specified value. According to an example of the present disclosure, the specified value may be configured as a value which is greater than 1. If any one of the acceleration differences at the x-axis, the y-axis, and the z-axis is greater than the specified value, the first detecting unit 401 may determine that the action of picking up the terminal occurs. The first detecting unit 401 may determine changes of the accelerations at the x-axis and the z-axis received

each time, respectively. If fluctuation of the acceleration at the z-axis is within a predetermined range (e.g., the acceleration difference at the z-axis may be less than 1 and an absolute value of the acceleration at the z-axis currently received may be less than 2) and the acceleration at the x-axis is gradually increased to a specified range (e.g., the acceleration at the x-axis may be gradually increased to be greater than 2), the first detecting unit 401 may determine that the action of placing the portable smart terminal at the side of the face occurs.

[0099] According to an example of the present disclosure, the second detecting unit 402 may call the gravity sensor of the portable smart terminal and receive gravity coefficients of the three axes, in which the gravity coefficients of the three axes may be periodically transmitted from the gravity sensor. The second detecting unit 402 may determine whether the gravity coefficient of the y-axis is increased continually. If the gravity coefficient of the y-axis is increased continually, the second detecting unit 402 may determine that the action of picking up the portable smart terminal with the head of the terminal upwards occurs.

[0100] According to an example of the present disclosure, the third detecting unit 403 may call the light-sensitive sensor of the portable smart terminal and receive the light intensity periodically transmitted from the light-sensitive sensor. The third detecting unit 403 may determine whether the light intensity becomes weak. If the light intensity becomes weak, the third detecting unit 403 may determine that the action of placing the portable smart terminal close to the ear occurs.

[0101] According to an example of the present disclosure, as shown in FIG. 4b, the second action detecting sub-module 322 may include a fourth detecting unit 405 or a fifth detecting unit 406.

[0102] According to an example of the present disclosure, the fourth detecting unit 405 may call the acceleration sensor of the portable smart

terminal. The fourth detecting unit 405 may determine, based on the acceleration data transmitted from the acceleration sensor, whether the acceleration at the z-axis is changed with a designated angle. In response to a determination that the acceleration at the z-axis is changed with the designated angle, the fourth detecting unit 405 may determine that the action of flipping the portable smart terminal is detected.

[0103] According to an example of the present disclosure, a value of the designated angle may be predetermined based on requirements. In an example, the designated angle may be defined as any value from 90 degrees to 180 degrees.

[0104] According to an example of the present disclosure, the fifth detecting unit 406 may call the acceleration sensor of the portable smart terminal. The fifth detecting unit 406 may determine, based on the acceleration data transmitted from the acceleration sensor, whether periodic angle-swing occurs at the acceleration of the x-axis within a determined period (e.g., 3 seconds). In response to a determination that the periodic angle-swing occurs at the acceleration of the x-axis within the determined period, the fifth detecting unit 406 may determine that the action of shaking the portable smart terminal is detected.

[0105] As may be seen from the above description, when there is an incoming call for the portable smart terminal and the user is inconvenient to answer the call for some reasons, such as the user is driving a car, the call may be rejected as long as the portable smart terminal is flipped immediately, no matter which side of the portable smart terminal is placed upwards. As such, the eye attentions and finger operations of the user may not be excessively taken up. Therefore, the operation efficiency may be improved, and the safety of driving may be improved, as well.

[0106] According to an example of the present disclosure, as shown in Table 1, the predetermined system state may include the

screen-brightening state, or the screen-brightening state plus the screen-locking state, or the screen-brightening state plus the desktop state.

[0107] According to an example of the present disclosure, the system state monitoring module 301 may monitor any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state. And, the system state monitoring module 301 may trigger the action detecting module 302 when any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state is monitored.

[0108] According to an example of the present disclosure, the action detecting module 302 may detect whether a third action associated with any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state occurs. And, the action detecting module 302 may trigger the instruction executing module 303 when the third action is detected.

[0109] According to an example of the present disclosure, as shown in Table 1, the third action associate with any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state may include an action of picking up the portable smart terminal and placing the terminal in front of the face of the user.

[0110] According to an example of the present disclosure, when the action detecting module 302 detects the third action, the instruction executing module 303 may execute an operation instruction of triggering a voice dialing.

[0111] According to an example of the present disclosure, as shown in FIG. 4c, the action detecting module 302 may include a third action detecting sub-module 323, which may detect the third action.

[0112] According to an example of the present disclosure, the third action detecting sub-module 323 may call the acceleration sensor of the portable smart terminal and receive acceleration data at the three axes, in which the acceleration data at the three axes may be periodically transmitted from the acceleration sensor of the portable smart terminal. The third action detecting sub-module 323 may determine whether a difference between an acceleration at the x-axis currently received and an acceleration at the x-axis last received is greater than a specified value, or a difference between an acceleration at the y-axis currently received and an acceleration at the y-axis last received is greater than the specified value, or a difference between an acceleration at the z-axis currently received and an acceleration at the z-axis last received is greater than the specified value. According to an example of the present disclosure, the specified value may be configured as a value which is greater than 1. If any one of the acceleration differences at the x-axis, the y-axis, and the z-axis is greater than the specified value, the third action detecting sub-module 323 may determine that the action of picking up the terminal occurs. The third action detecting sub-module 323 may determine changes of the accelerations at the x-axis and the z-axis received each time. If fluctuation of the acceleration at the x-axis is within the predetermined range (e.g., the acceleration difference at the x-axis may be less than 1 and an absolute value of the acceleration at the x-axis currently received may be less than 2) and the acceleration at the z-axis is gradually increased to the specified range (e.g., the acceleration at the z-axis may be gradually increased to be greater than 2), the third action detecting sub-module 323 may determine that the action of placing the terminal in front of the face occurs.

[0113] According to an example of the present disclosure, the apparatus 300 may further include a first voice dialing module 304 and/or a second voice dialing module 305, as shown in FIG. 5.

[0114] According to an example of the present disclosure, after the instruction executing module 303 executes the operation instruction of triggering the voice dialing, the first voice dialing module 304 may detect an inputted voice and perform semantic recognition to the inputted voice. After the semantic is recognized, the first voice dialing module 304 may search a name of a contact associated with the semantic from a contact list of the portable smart terminal. And, after the name of the contact associated with the semantic is searched out, the first voice dialing module 304 may trigger a voice dialing to the contact.

[0115] According to an example of the present disclosure, after the instruction executing module 303 executes the operation instruction of triggering the voice dialing, the second voice dialing module 305 may detect an inputted voice and perform numeral semantic recognition to the inputted voice. And, after the numeral semantic is recognized, the second voice dialing module 305 may trigger the dialing of a call number associated with the numeral semantic, so as to make a voice dialing to the call number.

[0116] As may be seen from the above description, when the user needs to make a call under a circumstance that the user may not pay too many eye attentions and perform too many figure operations to the portable smart terminal (e.g., a mobile phone), such as the user is driving a car, the user may click or touch the mobile phone to brighten a screen of the mobile phone, and place the mobile phone in front of the face of the user. The user may speak out, towards the mobile phone, a name of a contact in a contact list of the mobile phone to dial a call number of the contact. By this manner, the user may make the call without staring at the screen and performing excessive figure operations to the mobile phone. Therefore, the safety of making a call under the circumstance in which the user may not pay too many eye attentions and perform too many figure operations to the

mobile phone may be improved.

[0117] According to an example of the present disclosure, when monitoring that the portable smart terminal is not in the predetermined system state, the system state monitoring module 301 may notify the action detecting module 302 to stop detecting the designated action associated with the predetermined system state. As such, power consumption of the portable smart terminal may be reduced.

[0118] The above-mentioned modules, sub-modules, or units may be software (e.g., machine readable instructions stored in a computer readable medium and executable by a processor), hardware (e.g., the processor of an application specific integrated circuit (ASIC)), or a combination thereof.

[0119] The above-mentioned modules, sub-modules, or units in the examples of the present disclosure may be deployed either in a centralized or a distributed configuration, and may be either merged into a single module, or further split into a plurality of sub-modules.

[0120] FIG. 6a is a schematic diagram illustrating a hardware structure of the apparatus for controlling a portable smart terminal, according to an example of the present disclosure. As shown in FIG. 6a, the apparatus 300 may include ports 31, a processor 32, a storage 33, and a data processing unit 34. The data processing unit 34 may transmit data information received via the ports 31 to the processor 32 for processing, and may transmit data information from the processor 32 to the ports 31 for transmitting. The storage 33 may store machine-readable instruction modules to be executed by the processor 32, in which the machine-readable instruction modules may include a system state monitoring module 301, an action detecting module 302, and an instruction executing module 303, in which:

the system state monitoring module 301 may monitor a system state of a portable smart terminal;

the action detecting module 302 may detect, when a predetermined system state of the portable smart terminal is monitored by the system state monitoring module 301, whether a designated action associated with the predetermined system state occurs; and

the instruction executing module 303 may execute an operation instruction associated with the designated action when the action detecting module 302 detects that the designated action occurs.

[0121] According to an example of the present disclosure, the processor 32 can execute the machine-readable instruction modules stored in the storage 33 to perform all or part of the procedures described in the aforementioned method and apparatus examples, which are not repeated herein.

[0122] As such, when the machine-readable instruction modules stored in the storage 33 are executed by the processor 32, functions of the aforementioned system state monitoring module 301, the action detecting module 302, the instruction executing module 303, the first action detecting sub-module 321, the second action detecting sub-module 322, the first detecting unit 401, the second detecting unit 402, the third detecting unit 403, the determining unit 404, the fourth detecting unit 405, the fifth detecting unit 406, the third action detecting sub-module 323, the first voice dialing module 304, and the second voice dialing module 305 may be achieved. Therefore, an example of the hardware structure of the apparatus for controlling a portable smart terminal is shown in FIG. 6b.

[0123] According to an example of the present disclosure, a machine-readable storage medium is also provided, which is to store machine-readable instructions to cause a machine to execute the technical scheme as disclosed herein. Specifically, a system or apparatus having a storage medium which stores machine-readable instructions for implementing functions of any of the above examples and which may

make the system or the apparatus (or CPU or MPU) read and execute the machine-readable instructions stored in the storage medium. In this situation, the machine-readable instructions read from the storage medium may implement any one of the above examples, thus the machine-readable instructions and the storage medium storing the machine-readable instructions are part of the technical scheme.

[0124] The storage medium for providing the machine-readable instructions may include floppy disk, hard disk, magneto-optical disk, compact disk (such as CD-ROM), magnetic tape drive, flash memory, and so on. Optionally, the machine-readable instructions may be downloaded from a server computer via a communication network.

[0125] The above examples may be implemented by hardware, software or firmware, or a combination thereof. For example, the various methods, processes and functional modules described herein may be implemented by a processor (the term processor is to be interpreted broadly to include a CPU, processing unit, ASIC, logic unit, or programmable gate array, etc.). The processes, methods, and functional modules disclosed herein may all be performed by a single processor or split between several processors. In addition, reference in this disclosure or the claims to a 'processor' should thus be interpreted to mean 'one or more processors'. The processes, methods and functional modules disclosed herein may be implemented as machine readable instructions executable by one or more processors, hardware logic circuitry of the one or more processors or a combination thereof. Further the examples disclosed herein may be implemented in the form of a computer software product. The computer software product may be stored in a non-transitory storage medium and may include a plurality of instructions for making a computer apparatus (which may be a personal computer, a server or a network apparatus such as a router, switch, access point, etc.) implement the

method recited in the examples of the present disclosure.

[0126] Those skilled in the art may understand that all or part of the procedures of the methods of the above examples may be implemented by hardware modules following machine readable instructions. The machine readable instructions may be stored in a computer readable storage medium. When running, the machine readable instructions may provide the procedures of the method examples. The storage medium may be diskette, CD, ROM (Read-Only Memory) or RAM (Random Access Memory), and etc.

[0127] The figures are only illustrations of examples, in which the modules or procedures shown in the figures may not be necessarily essential for implementing the present disclosure. Certain procedures or modules may be omitted according to the needs. The order of the procedures is not fixed, and can be adjusted according to the needs. Those skilled in the art can understand the modules in the apparatus of examples of the present disclosure may be located in the apparatus as described in the examples, or may be located in one or more apparatuses of the examples of the present disclosure when modified accordingly. The modules in the aforesaid examples may be combined into one module or further divided into a plurality of sub-modules.

[0128] What has been described and illustrated herein is an example of the disclosure along with some of its variations. The terms, descriptions and figures used herein are set forth by way of illustration only and are not meant as limitations. Many variations are possible within the spirit and scope of the disclosure, which is intended to be defined by the following claims and their equivalents in which all terms are meant in their broadest reasonable sense unless otherwise indicated.

CLAIMS

What is claimed is:

1. A method for controlling a portable smart terminal, comprising:

monitoring, by a computer, a system state of a portable smart terminal;

detecting, by the computer when a predetermined system state of the portable smart terminal is monitored, whether a designated action associated with the predetermined system state occurs; and

executing, by the computer when the designated action occurs, an operation instruction associated with the designated action.

2. The method of claim 1, wherein the predetermined system state comprises any one of an incoming call state, the incoming call state plus a screen-locking state, and the incoming call state plus a desktop state;

the operation of detecting, when the predetermined system state is monitored, whether the designated action associated with the predetermined system state occurs comprises:

when any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is monitored, detecting whether a first action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state occurs;

the operation of executing, when the designated action occurs, the operation instruction associated with the designated action comprises:

executing an operation instruction of answering an incoming call when the first action occurs.

3. The method of claim 2, wherein the first action comprises an action of picking up the portable smart terminal and placing the portable smart terminal close to an ear of a user.

4. The method of claim 3, wherein the operation of detecting whether the first action occurs comprises:

calling an acceleration sensor of the potable smart terminal, and determining, based on acceleration data transmitted from the acceleration sensor, whether an action of picking up the portable smart terminal and an action of placing the portable smart terminal at a side of a user face occur;

calling a gravity sensor of the portable smart terminal, and determining, based on a gravity parameter transmitted from the gravity sensor, whether an action of picking up the portable smart terminal with a head of the portable smart terminal upwards occurs;

calling a light-sensitive sensor of the portable smart terminal, and determining, based on a light intensity transmitted from the light-sensitive sensor, whether an action of placing the portable smart terminal close to the ear occurs; and

in response to a determination that the action of picking up the portable smart terminal, the action of placing the portable smart terminal at the side of the user face, the action of picking up the portable smart terminal with the head of the portable smart terminal upwards, and the action of placing the portable smart terminal close to the ear occur, determining that the first action occurs.

5. The method of claim 1, wherein the predetermined system state comprises any one of an incoming call state, the incoming call state plus a screen-locking state, and the incoming call state plus a desktop state;

the operation of detecting, when the predetermined system state is monitored, whether the designated action associated with the predetermined system state occurs comprises:

when any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is monitored, detecting whether a second action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state occurs;

the operation of executing, when the designated action occurs, the operation instruction associated with the designated action comprises:

executing an operation instruction of rejecting an incoming call when the second action occurs.

6. The method of claim 5, wherein the second action comprises an action of flipping the portable smart terminal or an action of shaking the portable smart terminal.

7. The method of claim 6, wherein the second action is the action of flipping the portable smart terminal;

the operation of detecting whether the second action occurs comprises:

calling an acceleration sensor of the portable smart terminal;

determining, based on acceleration data transmitted from the acceleration sensor, whether an acceleration at a z-axis is

changed with a designated angle; and

in response to a determination that the acceleration at the z-axis is changed with the designated angle, determining that the action of flipping the portable smart terminal occurs.

8. The method of claim 6, wherein the second action is the action of shaking the portable smart terminal;

the operation of detecting whether the second action occurs comprises:

calling an acceleration sensor of the portable smart terminal;

determining, based on acceleration data transmitted from the acceleration sensor, whether periodic angle-swing occurs at an acceleration of an x-axis within a determined period; and

in response to a determination that the periodic angle-swing occurs at the acceleration of the x-axis within the determined period, determining that the action of shaking the portable smart terminal occurs.

9. The method of claim 1, wherein the predetermined system state comprises any one of a screen-brightening state, the screen-brightening state plus a screen-locking state, and the screen-brightening state plus a desktop state;

the operation of detecting, when the predetermined system state is monitored, whether the designated action associated with the predetermined system state occurs comprises:

when any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state is monitored, detecting whether a third action associated with any one of

the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state occurs;

the operation of executing, when the designated action occurs, the operation instruction associated with the designated action comprises:

executing an operation instruction of triggering a voice dialing when the third action occurs.

10. The method of claim 9, wherein the third action comprises an action of picking up the portable smart terminal and placing the terminal in front of a user face.

11. The method of claim 10, wherein the operation of detecting whether the third action occurs comprises:

calling an acceleration sensor of the portable smart terminal;

receiving accelerations at three axes comprising an x-axis, a y-axis, and a z-axis; wherein the accelerations at the three axes are periodically transmitted from the acceleration sensor;

determining whether a difference between an acceleration at the x-axis currently received and an acceleration at the x-axis last received is greater than a specified value, or a difference between an acceleration at the y-axis currently received and an acceleration at the y-axis last received is greater than the specified value, or a difference between an acceleration at the z-axis currently received and an acceleration at the z-axis last received is greater than the specified value;

in response to a determination that any one of the acceleration differences at the x-axis, the y-axis, and the z-axis is greater than the specified value, determining that an action of

picking up the portable smart terminal occurs;

determining changes of accelerations at the x-axis and the z-axis received each time; and

when fluctuation of the acceleration at the x-axis is within a predetermined range and the acceleration at the z-axis is gradually increased to a specified range, determining that an action of placing the portable smart terminal in front of the user face occurs.

12. An apparatus for controlling a portable smart terminal, comprising:

a system state monitoring module, to monitor a system state of a portable smart terminal;

an action detecting module, to detect, when a predetermined system state of the portable smart terminal is monitored by the system state monitoring module, whether a designated action associated with the predetermined system state occurs; and

an instruction executing module, to execute an operation instruction associated with the designated action when the action detecting module detects that the designated action occurs,

13. The apparatus of claim 12, wherein the predetermined system state comprises any one of an incoming call state, the incoming call state plus a screen-locking state, and the incoming call state plus a desktop state;

the system state monitoring module is to

monitor any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state, and

trigger the action detecting module when any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is monitored;

the action detecting module is to

detect whether a first action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state occurs, and

trigger the instruction executing module when the first action occurs;

the instruction executing module is to

execute an operation instruction of answering an incoming call when the action detecting module detects that the first action occurs;

wherein the first action comprises an action of picking up the portable smart terminal and placing the portable smart terminal close to an ear of a user.

14. The apparatus of claim 13, wherein the action detecting module comprises a first action detecting sub-module, wherein the first action detecting sub-module is to detect the first action and comprises:

a first detecting unit, to

call an acceleration sensor of the potable smart terminal, and

determine, based on acceleration data transmitted from the acceleration sensor, whether an action of picking up the portable smart terminal and an action of

placing the portable smart terminal at a side of a user face occur;

a second detecting unit, to

call a gravity sensor of the portable smart terminal, and

determine, based on a gravity parameter transmitted from the gravity sensor, whether an action of picking up the portable smart terminal with a head of the portable smart terminal upwards occurs;

a third detecting unit, to

call a light-sensitive sensor of the portable smart terminal, and

determine, based on a light intensity transmitted from the light-sensitive sensor, whether an action of placing the portable smart terminal close to the ear occurs; and

a determining unit, to

determine that the first action occurs when the first detecting unit determines that the action of picking up the portable smart terminal and the action of placing the portable smart terminal at the side of the user face occur, the second detecting unit determines that the action of picking up the portable smart terminal with the head of the portable smart terminal upwards occurs, and the third detecting unit determines that the action of placing the portable smart terminal close to the ear occurs.

15. The apparatus of claim 12, wherein the predetermined system state comprises any one of an incoming call state, the incoming call state plus a screen-locking state, and the incoming call state plus a desktop state;

the system state monitoring module is to

monitor any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state, and

trigger the action detecting module when any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state is monitored;

the action detecting module is to

detect whether a second action associated with any one of the incoming call state, the incoming call state plus the screen-locking state, and the incoming call state plus the desktop state occurs, and

trigger the instruction executing module when the second action occurs;

the instruction executing module is to

execute an operation instruction of rejecting an incoming call when the action detecting module detects that the second action occurs;

wherein the second action comprises an action of flipping the portable smart terminal or an action of shaking the portable smart terminal.

16. The apparatus of claim 15, wherein the second action is the action of flipping the portable smart terminal;

the action detecting module comprises a second action detecting

sub-module, wherein the second action detecting sub-module is to detect the action of flipping the portable smart terminal and comprises:

a fourth detecting unit, to

call an acceleration sensor of the portable smart terminal;

determine, based on acceleration data transmitted from the acceleration sensor, whether an acceleration at a z-axis is changed with a designated angle; and

in response to a determination that the acceleration at the z-axis is changed with the designated angle, determine that the action of flipping the portable smart terminal occurs.

17. The apparatus of claim 15, wherein the second action is the action of shaking the portable smart terminal;

the action detecting module comprises a second action detecting sub-module, wherein the second action detecting sub-module is to detect the action of shaking the portable smart terminal and comprises:

a fifth detecting unit, to

call an acceleration sensor of the portable smart terminal;

determine, based on acceleration data transmitted from the acceleration sensor, whether periodic angle-swing occurs at an acceleration of an x-axis within a determined period;

in response to a determination that the periodic angle-swing occurs at the acceleration of the x-axis within the determined period, determine that the action of shaking the portable smart terminal occurs.

18. The apparatus of claim 12, wherein the predetermined system state

comprises any one of a screen-brightening state, the screen-brightening state plus a screen-locking state, and the screen-brightening state plus a desktop state;

the system state monitoring module is to

monitor any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state, and

trigger the action detecting module when any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state is monitored;

the action detecting module is to

detect whether a third action associated with any one of the screen-brightening state, the screen-brightening state plus the screen-locking state, and the screen-brightening state plus the desktop state occurs, and

trigger the instruction executing module when the third action occurs;

the instruction executing module is to

execute an operation instruction of triggering a voice dialing when the action detecting module detects that the third action occurs;

wherein the third action comprises an action of picking up the portable smart terminal and placing the terminal in front of a user face.

19. The apparatus of claim 18, wherein the action detecting module comprises a third action detecting sub-module, wherein the third action detecting sub-module is to:

call an acceleration sensor of the portable smart terminal;

receive accelerations at three axes comprising an x-axis, a y-axis, and a z-axis; wherein the accelerations at the three axes are periodically transmitted from the acceleration sensor;

determine whether a difference between an acceleration at the x-axis currently received and an acceleration at the x-axis last received is greater than a specified value, or a difference between an acceleration at the y-axis currently received and an acceleration at the y-axis last received is greater than the specified value, or a difference between an acceleration at the z-axis currently received and an acceleration at the z-axis last received is greater than the specified value;

in response to a determination that any one of the acceleration differences at the x-axis, the y-axis, and the z-axis is greater than the specified value, determine that an action of picking up the portable smart terminal occurs;

determine changes of accelerations at the x-axis and the z-axis received each time; and

when fluctuation of the acceleration at the x-axis is within a predetermined range and the acceleration at the z-axis is gradually increased to a specified range, determine that an action of placing the portable smart terminal in front of the user face occurs.

20. A non-transitory computer-readable storage medium encoded with

a plurality of instructions that when executed by one or more computers cause the one or more computers to perform operations comprising:

monitoring a system state of a portable smart terminal;

detecting, when a predetermined system state of the portable smart terminal is monitored, whether a designated action associated with the predetermined system state occurs; and

executing, when the designated action occurs, an operation instruction associated with the designated action.

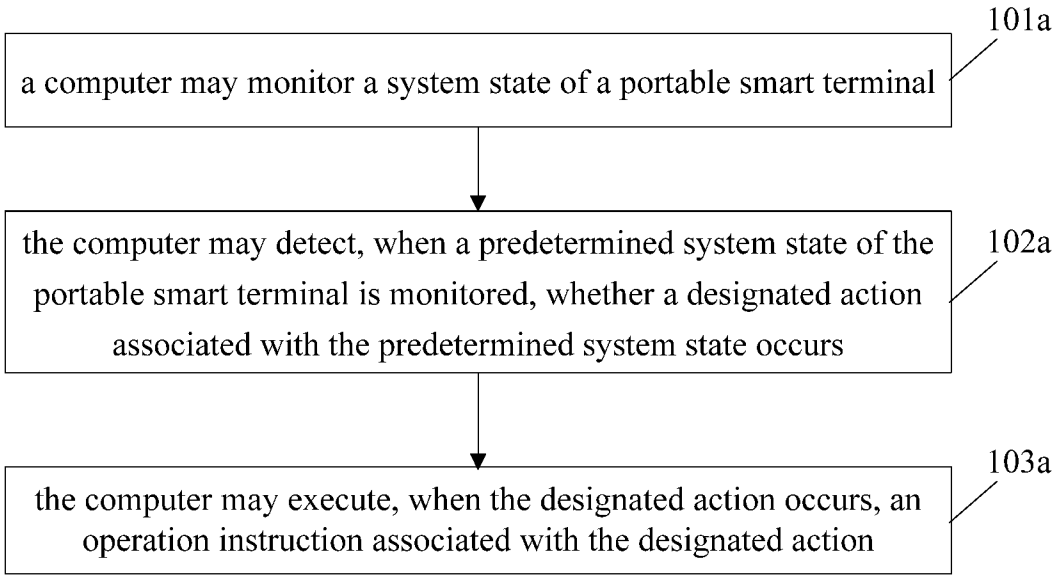
a computer may monitor a system state of a portable smart terminal
101a
the computer may detect, when a predetermined system state of the portable smart terminal is monitored, whether a designated action associated with the predetermined system state occurs
102a
the computer may execute, when the designated action occurs, an operation instruction associated with the designated action
103a

FIG. 1a

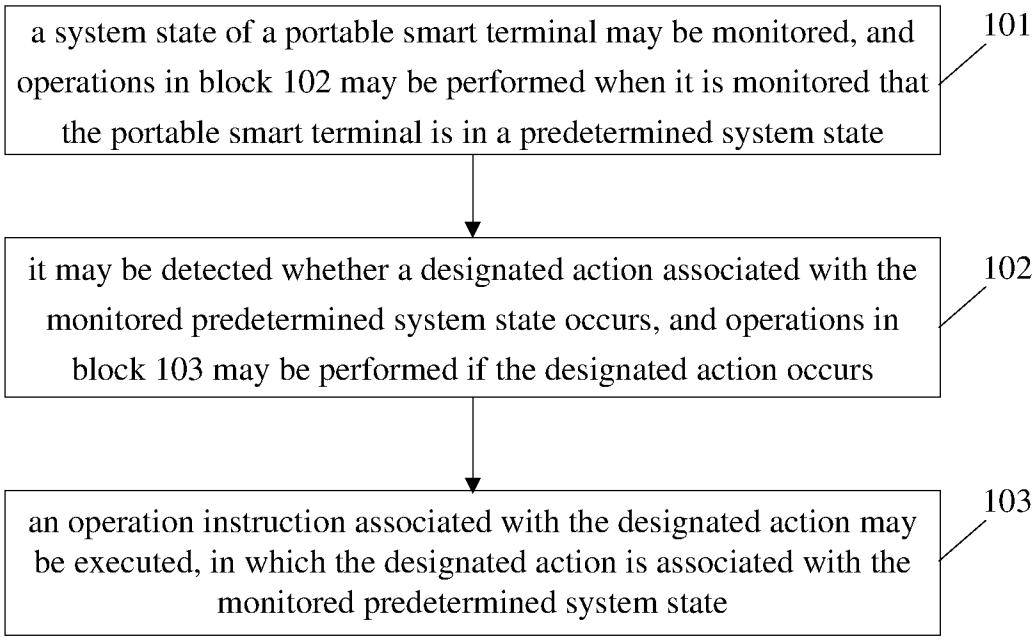
a system state of a portable smart terminal may be monitored, and operations in block 102 may be performed when it is monitored that the portable smart terminal is in a predetermined system state
101
it may be detected whether a designated action associated with the monitored predetermined system state occurs, and operations in block 103 may be performed if the designated action occurs
102
an operation instruction associated with the designated action may be executed, in which the designated action is associated with the monitored predetermined system state
103

FIG. 1b

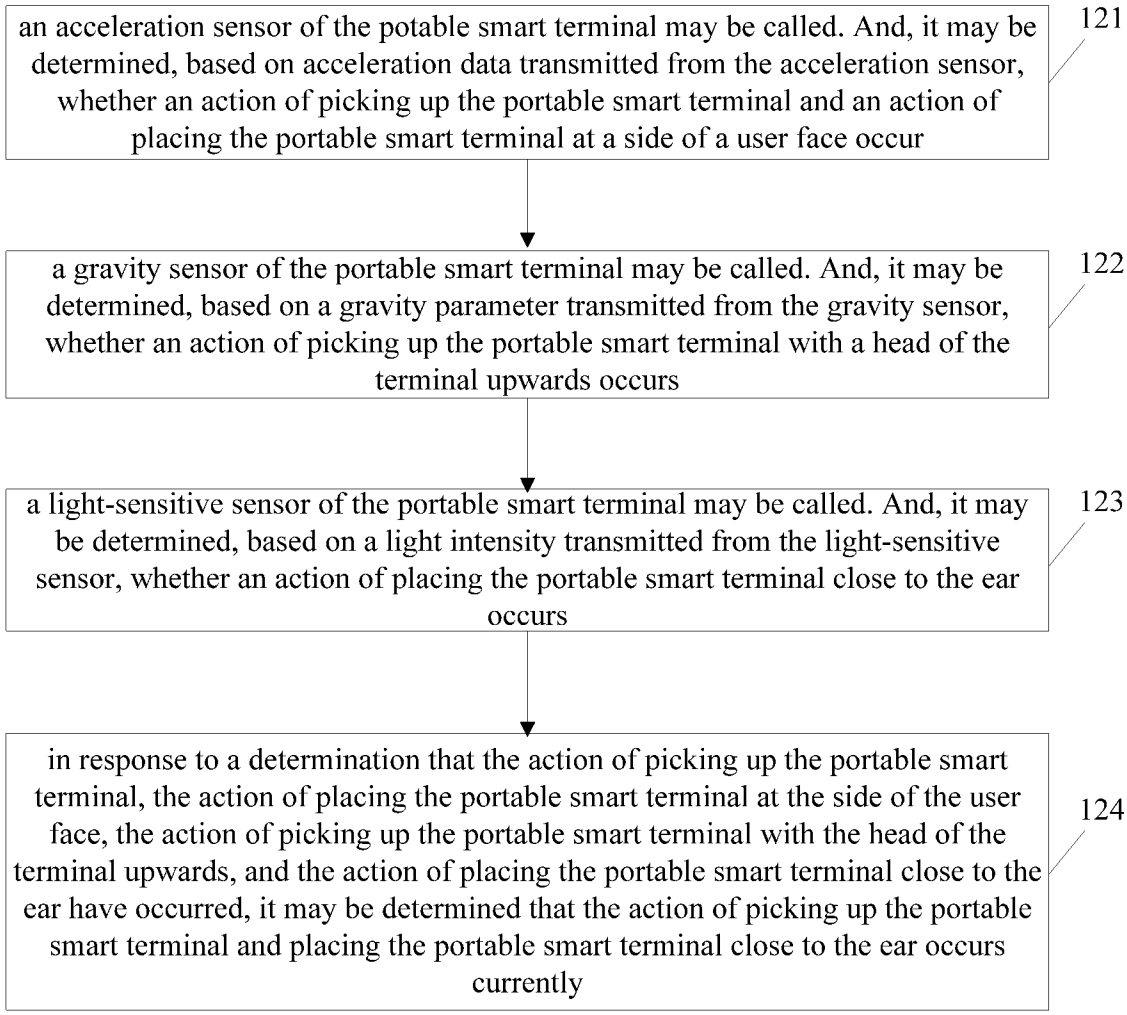
an acceleration sensor of the potable smart terminal may be called. And, it may be determined, based on acceleration data transmitted from the acceleration sensor, whether an action of picking up the portable smart terminal and an action of placing the portable smart terminal at a side of a user face occur
121
a gravity sensor of the portable smart terminal may be called. And, it may be determined, based on a gravity parameter transmitted from the gravity sensor, whether an action of picking up the portable smart terminal with a head of the terminal upwards occurs
122
a light-sensitive sensor of the portable smart terminal may be called. And, it may be determined, based on a light intensity transmitted from the light-sensitive sensor, whether an action of placing the portable smart terminal close to the ear occurs
123
in response to a determination that the action of picking up the portable smart terminal, the action of placing the portable smart terminal at the side of the user face, the action of picking up the portable smart terminal with the head of the terminal upwards, and the action of placing the portable smart terminal close to the ear have occurred, it may be determined that the action of picking up the portable smart terminal and placing the portable smart terminal close to the ear occurs currently
124

FIG. 2a

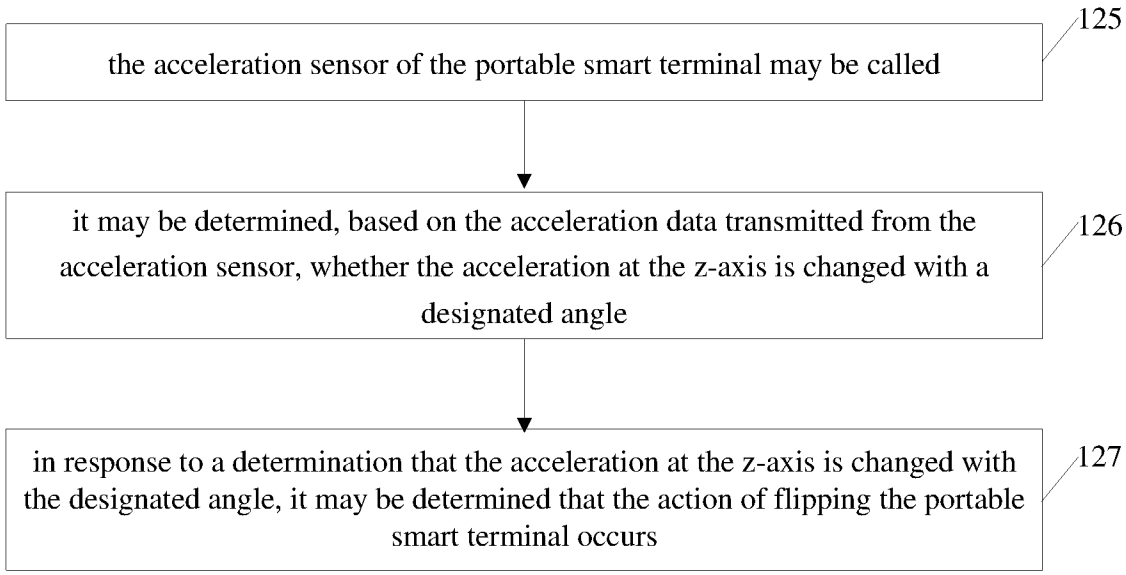
the acceleration sensor of the portable smart terminal may be called
125
it may be determined, based on the acceleration data transmitted from the acceleration sensor, whether the acceleration at the z-axis is changed with a designated angle
126
in response to a determination that the acceleration at the z-axis is changed with the designated angle, it may be determined that the action of flipping the portable smart terminal occurs
127

FIG. 2b

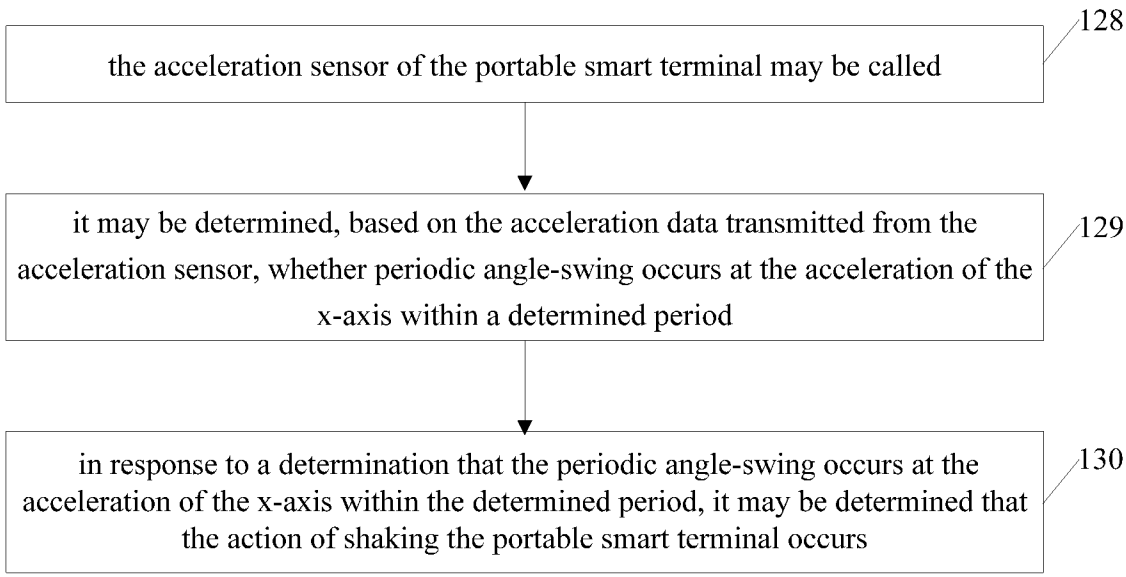
the acceleration sensor of the portable smart terminal may be called
128
it may be determined, based on the acceleration data transmitted from the acceleration sensor, whether periodic angle-swing occurs at the acceleration of the x-axis within a determined period
129
in response to a determination that the periodic angle-swing occurs at the acceleration of the x-axis within the determined period, it may be determined that the action of shaking the portable smart terminal occurs
130

FIG. 2c

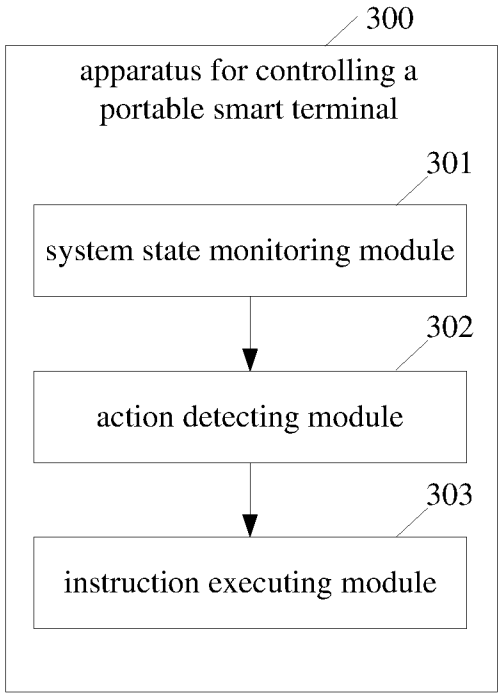
300
apparatus for controlling a portable smart terminal
301
system state monitoring module
302
action detecting module
303
instruction executing module

FIG. 3

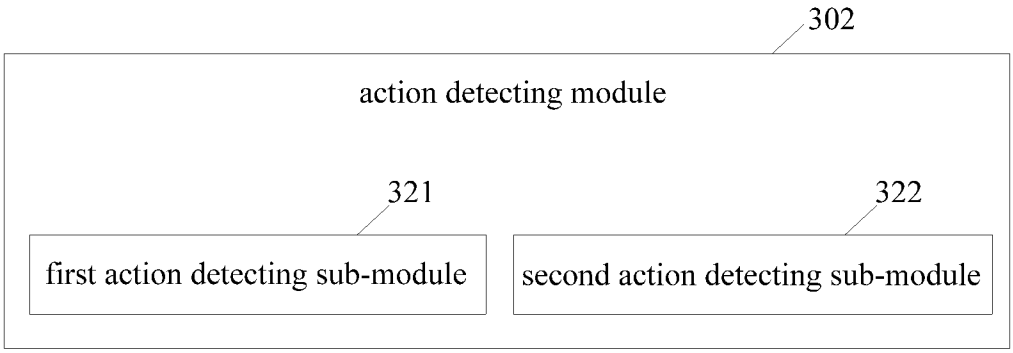
302
action detecting module
321
first action detecting sub-module
322
second action detecting sub-module

FIG. 4a

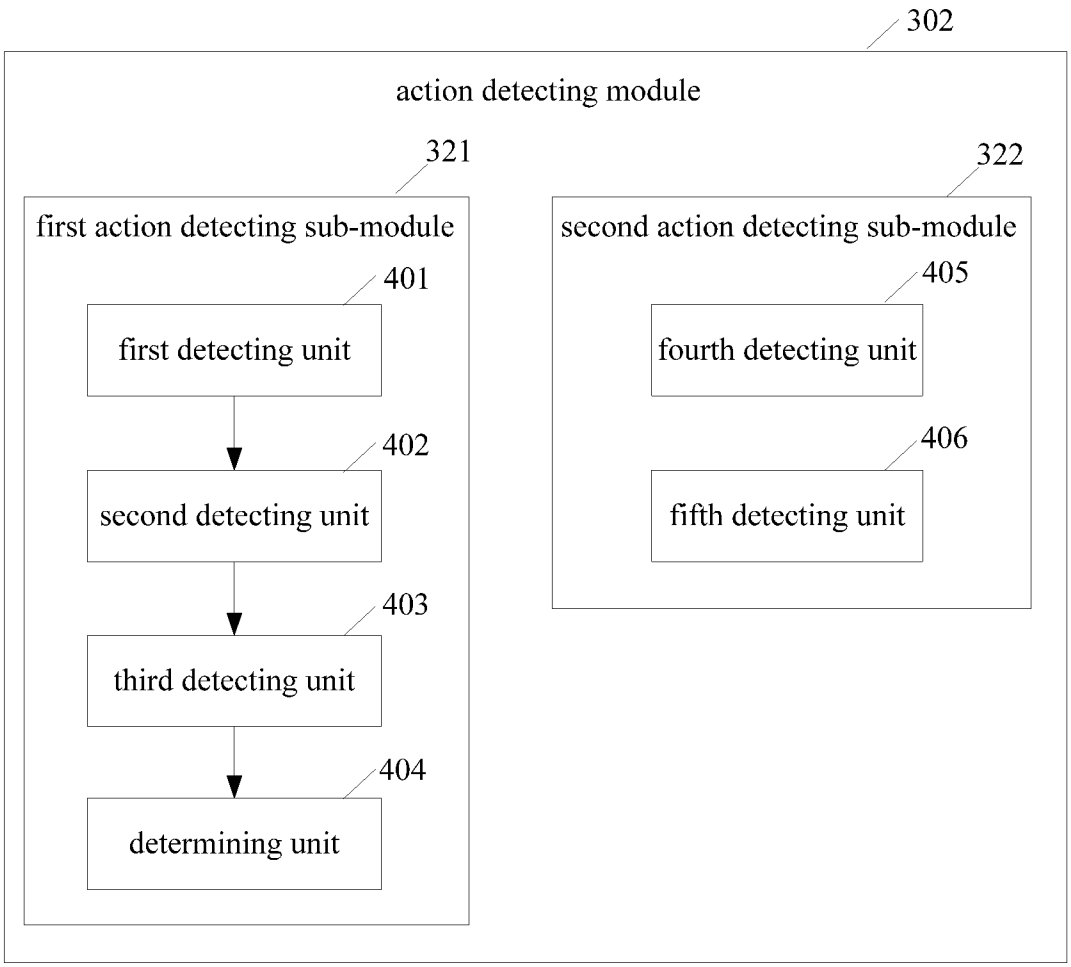
302
action detecting module
321
first action detecting sub-module
401
first detecting unit
402
second detecting unit
403
third detecting unit
404
determining unit
322
second action detecting sub-module
405
fourth detecting unit
406
fifth detecting unit

FIG. 4b

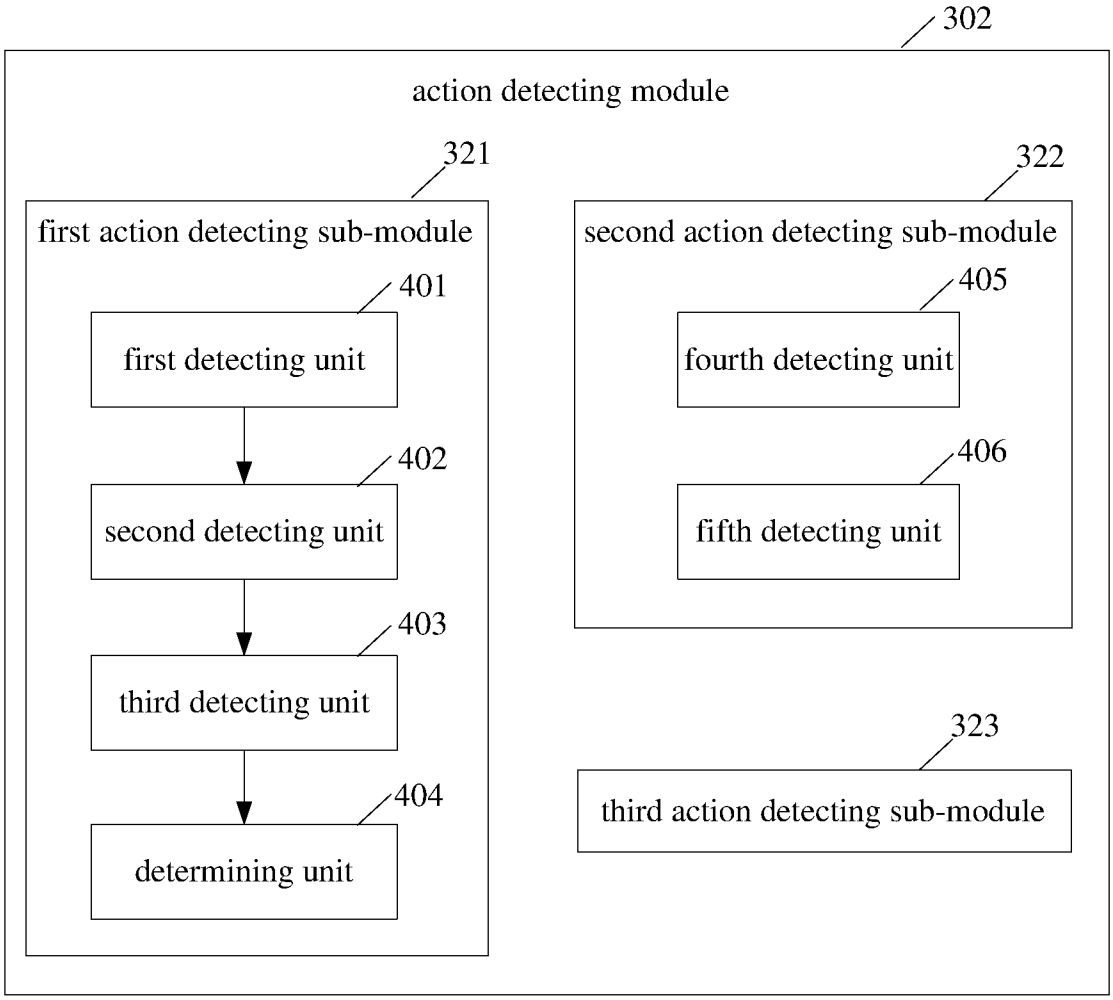
302
action detecting module
321
first action detecting sub-module
401
first detecting unit
402
second detecting unit
403
third detecting unit
404
determining unit
322
second action detecting sub-module
405
fourth detecting unit
406
fifth detecting unit
323
third action detecting sub-module

FIG. 4c

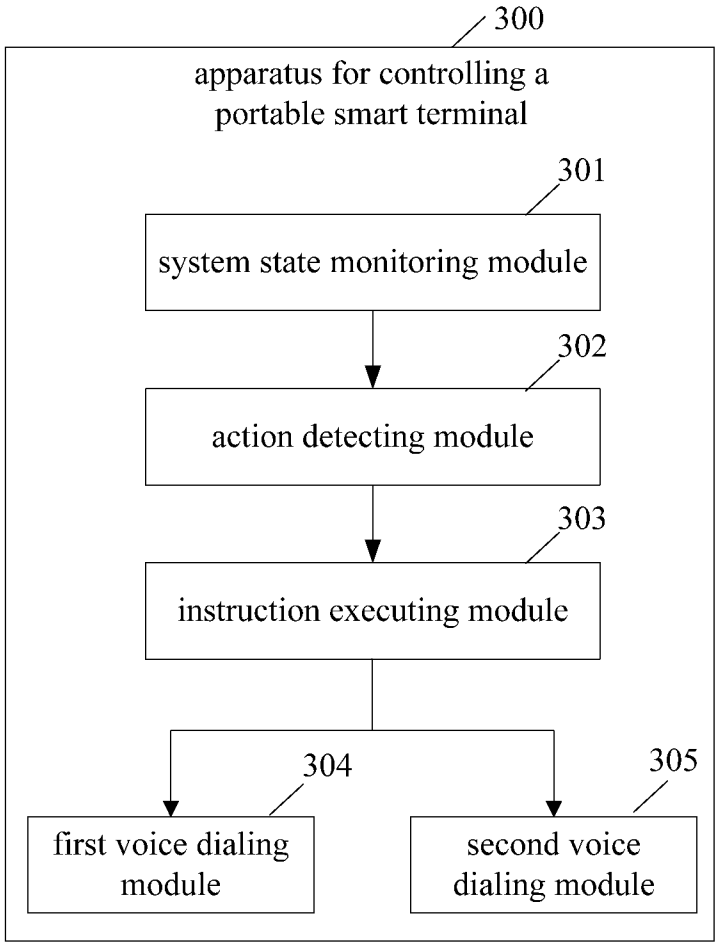
300
apparatus for controlling a portable smart terminal
301
system state monitoring module
302
action detecting module
303
instruction executing module
304
first voice dialing module
305
second voice dialing module

FIG. 5

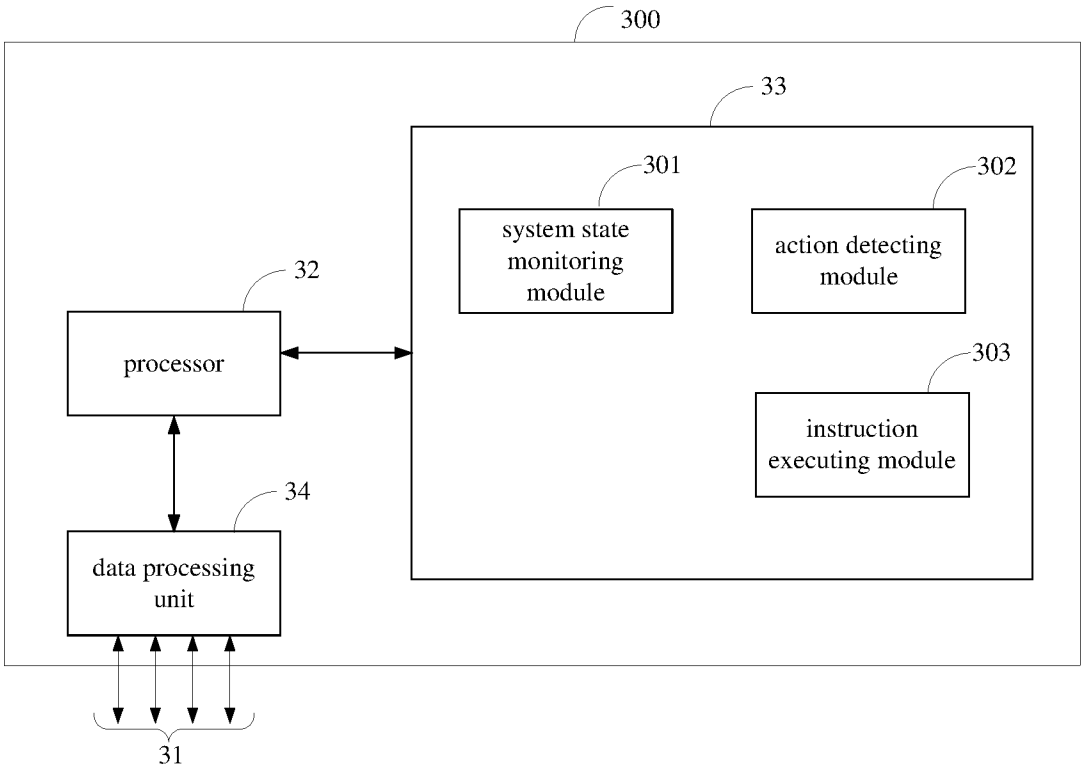
300
33
301
system state monitoring module
302
action detecting module
32
processor
303
instruction executing module
34
data processing unit
31

FIG. 6a

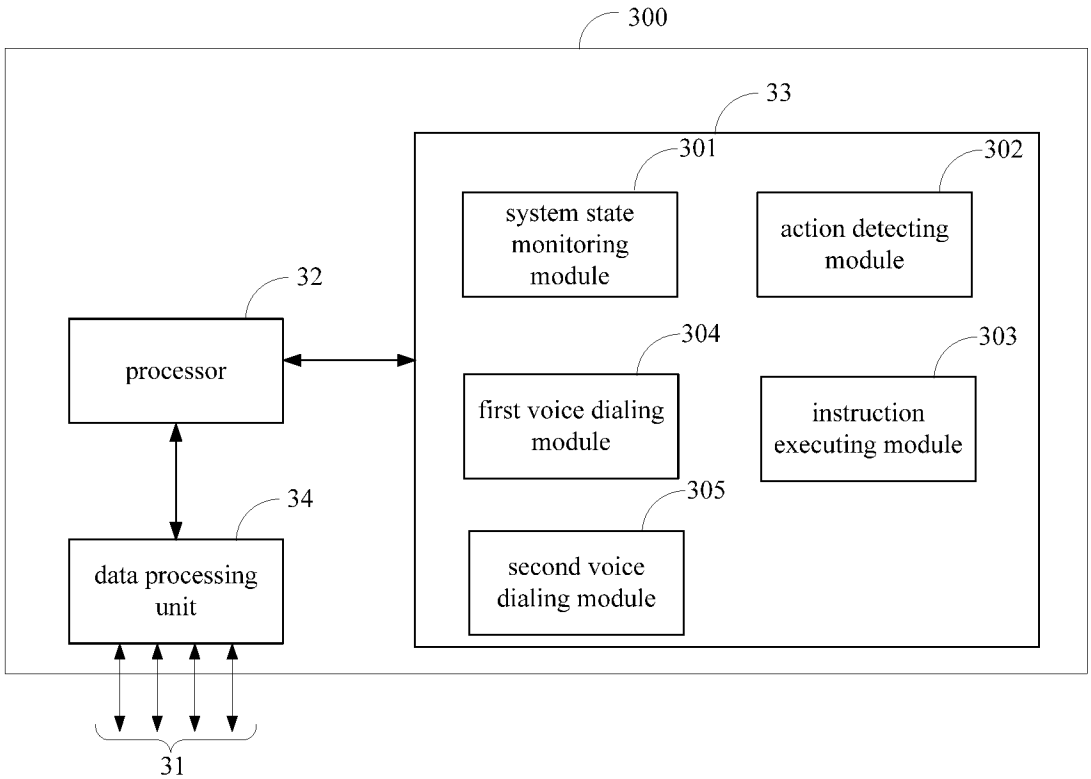
300
33
301
system state monitoring module
302
action detecting module
32
processor
304
first voice dialing module
303
instruction executing module
305
second voice dialing module
34
data processing unit
31

FIG. 6b

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/076000

A. CLASSIFICATION OF SUBJECT MATTER

H04M 1/725 (2006.01)i

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; G06F

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)

CNPAT, CNKI, EPODOC, WPI: incoming call, automatic, answer, reject, trigger, dial, sensor, acceleration, gravity

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 102833414 A (HUIZHOU TCL MOBILE COMMUNICATION CO., LTD.) 19 December 2012 (2012-12-19) description, paragraphs [0023]-[0025]	1-4, 12-14, 20
Y	CN 102833414 A (HUIZHOU TCL MOBILE COMMUNICATION CO., LTD.) 19 December 2012 (2012-12-19) description, paragraphs [0023]-[0025]	5-11, 15-19
Y	CN 103118202 A (SHANGHAI FEIXUN COMMUNICATION CO., LTD.) 22 May 2013 (2013-05-22) description, paragraphs [0038], [0049], [0050]	5-8, 15-17
Y	CN 102984392 A (HUIZHOU TCL MOBILE COMMUNICATION CO., LTD.) 20 March 2013 (2013-03-20) description, paragraphs [0021]-[0024]	9-11, 18, 19
A	EP 1783591 A1 (VODAFONE K.K.) 09 May 2007 (2007-05-09) the whole document	1-20

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

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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

"P" document published prior to the international filing date but later than the priority date claimed

"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

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
17 July 2014	**29 July 2014**
Name and mailing address of the ISA/ **STATE INTELLECTUAL PROPERTY OFFICE OF THE P.R.CHINA(ISA/CN)** **6,Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088 China** Facsimile No. **(86-10)62019451**	Authorized officer **TIAN,Tao** Telephone No. **(86-10)62413319**

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/076000

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 102833414 A	19 December 2012	None	
CN 103118202 A	22 May 2013	None	
CN 102984392 A	20 March 2013	None	
EP 1783591 A1	09 May 2007	JP 2006031307 A	02 February 2006
		WO 2006/008946 A1	26 January 2006
		US 2008/0254821 A1	16 October 2008