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(54) Title: METHOD FOR IDENTIFYING ACTION ON TOUCH DEVICE AND ACTION IDENTIFYING DEVICE

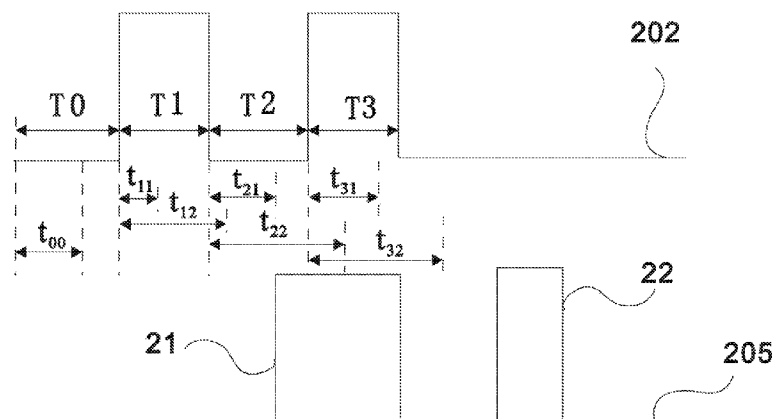


FIG. 6

(57) Abstract: A method for identifying action on a touch device is provided, comprising the steps of: detecting a first land of an object on a touch device; and generating a single click signal if a first time duration of the first land of the object on the touch screen is no less than a first reference time and no more than a second reference time and no second land of the object is detected in a fourth reference time after the first leave of the object from the touch device. Further, an action identifying device for a touch device is also provided.

METHOD FOR IDENTIFYING ACTION ON TOUCH DEVICE AND ACTION IDENTIFYING DEVICE

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority and benefits of Chinese Patent Application Serial No. 200910190704.9, filed with the State Intellectual Property Office of the P. R. China on September 23, 2009, the entire contents of which are incorporated herein by reference.

FIELD

The present disclosure relates to a touch device, and more particularly to a method for identifying action on a touch device and an identification device for a touch device.

BACKGROUND

Presently, software is normally displayed on a computer in Graphical User Interface (GUI). A pointing tool such as mouse or trackball may be used to move on a computer screen and then some actions such as selecting will be displayed in a window. Because the method is practiced in a human visual conforming manner, it is widely applied to electronic devices installed with window software.

In the following, a pointing tool such as mouse will be used for description. When the mouse is moved, the cursor will be moved accordingly, and a command such as single click, double click or drag etc will be executed by pressing a button such as the left button of the mouse in a position of the window where the command has to be executed. Besides the mouse or the trackball a touch device is normally adopted for executing a desired command for simplicity, handiness and low cost thereof. Currently, the touch devices are widely adopted in the electronic devices.

Figs. 1 to 3 show sequence diagrams for single click, double click and drag action on a touch device in prior art respectively. The numerals 101, 102 and 103 represent respectively a single click, double click and a drag action. The method for identifying the signal click action comprising the steps of: detecting a first land of a object on the touch device; comparing a first time duration t_1 of the first land of the object with a first reference time; generating a first signal 11 if the first time duration t_1 of the first land of the object is smaller than the first reference time; terminating the first signal 11 and generating a single click signal if no second land is detected in a second reference time; maintaining the first signal if a second land is detected and the time span t_2 between the first land and the second land is larger than the second reference time; comparing the second time duration t_3 of the second land of the object with a third reference time; terminating the first signal 11, generating a second signal 12 and generating a double click signal if the second

time duration t_3 of the second land of the object is smaller than a third reference time; maintaining the land signal 11 if the second time duration t_3 of the second land of the object is larger than the third reference time; terminating the first signal 11 and generating a drag signal when the second land of the object is terminated.

In the method as described hereinabove, the times t_1 , t_2 and t_3 are compared with a reference time respectively. However, due to individual differences, the operating time thereof may differ. Thus, erroneous judgment may occur therefrom. Furthermore, during the usage of the touch device, the touch device may be mistakenly touched or interfered by noises generated by the touch device, an erroneous operation may follow accordingly.

SUMMARY

In viewing thereof, the present disclosure is directed to solve at least one of the problems existing in the prior art. Accordingly, a method for identifying action on a touch device is needed to avoid an error operation. Further, an action identifying device for a touch device may also

According to an aspect of the present disclosure, a method for identifying action on a touch device may be provided, comprising the steps of: detecting a first land of an object on a touch device; and generating a single click signal if a first time duration of the first land of the object on the touch screen is no less than a first reference time and no more than a second reference time and no second land of the object is detected in a fourth reference time after the first leave of the object from the touch device.

According to another aspect of the present disclosure, action identifying device for a touch device may be provided, comprising: a detecting unit for detecting a land or a leave of an object on the touch device; a counter for measuring the time; and a processing unit for recording the time of the counter, comparing the recorded time with a reference time and outputting a single click signal, a double click signal or a drag click signal.

In the method and device of the present disclosure, the first and second lands of the object on the touch device and the time interval therebetween are compared with reference times corresponding thereto, and the reference times are time spans rather than a fixed value adopted in prior art respectively, the easily rendered error action determination or operation may be obviated.

Additional aspects and advantages of the embodiments of present disclosure will be given in part in the following descriptions, become apparent in part from the following descriptions, or be learned from the practice of the embodiments present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects, features and advantages of the present disclosure will become

apparent from the detailed description of the embodiment of the present disclosure set forth below, taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a sequence diagram indicating a single click action in prior art;

Fig. 2 is a sequence diagram indicating a double click action in prior art;

5 Fig. 3 is a sequence diagram indicating a drag action in prior art;

Fig. 4A is a flow chart showing a method for identifying action on a touch device according to an embodiment of the present disclosure;

Fig. 4B is a flow chart showing a method for identifying action on a touch device according to an embodiment of the present disclosure;

10 Fig. 5 is a schematic sequence diagram of a first signal according to an embodiment of the present disclosure;

Fig. 6 is a schematic sequence diagram of a second signal according to an embodiment of the present disclosure;

15 Fig. 7 is a schematic sequence diagram of a third signal according to an embodiment of the present disclosure; and

Fig. 8 is a block diagram of an identification device for identifying action on a touch device according to an embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

20 Reference will be made in detail to embodiments of the present disclosure. The embodiments described herein with reference to drawings are explanatory, illustrative, and used to generally understand the present disclosure. The embodiments shall not be construed to limit the present disclosure. The same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the descriptions.

25 According to an embodiment of the present disclosure, a method for identifying action on a touch device is provided. The method may comprise the following steps: detecting a first land of an object on a touch device; generating a first signal at a third reference time if a first time duration of the first land of the object on the touch screen is no less than a first reference time and no more than a second reference time; and generating a first signal, such as a single click signal, if a first
30 time duration of the first land of the object on the touch screen is no less than a first reference time and no more than a second reference time and no second land of the object is detected in a fourth reference time after the first leave of the object from the touch device.

Referring to Figs. 4A-7, T0 is a first time span between a counter is reset and restarted and a time of a first land of an object on the touch device. T1 is a first time duration of the first land of
35 the object. T2 is second time span between the first land and the second land of the object. T3 is a second time duration of the second land of the object on the touch device. t_{00} is a lead reference

time. t_{11} is a first reference time, t_{12} is a second reference time, t_{21} is a third reference time; t_{22} is a fourth reference time; t_{31} is a fifth reference time; and t_{32} is a sixth reference time.

According to an embodiment of the present disclosure, before the step of detecting first leave of the object from the touch device, further comprising the step of comparing a first time span between the time when the counter is reset and restarted and the time of the first land of the object on the touch device with the lead reference time, if the first time span is no less than the lead reference time, then the method goes to the step of detecting a first leave of the object from the touch device (Step 303). In some embodiment of the present disclosure, the first signal may be a signal click signal.

In some embodiments of the present disclosure, the method for identifying action on a touch device, comprising the steps of: detecting a first land of an object on a touch device; detecting a first leave of the object from the touch device; detecting a second land of the object on the touch device if a first time duration of the first land of the object is no less than a first reference time and no more than a second reference time; detecting a second leave of the object from the touch device if the second land of the object is detected in a fourth reference time after the first leave of the object; and generating a second signal if a second time span between the first land and the second land of the object is no less than a third reference time and no more than a fourth reference time and a second time duration of the second land of the object is no less than a fifth reference time and no more than a sixth reference time. In some embodiment of the present disclosure, the second signal is a double click signal.

In some embodiments of the present disclosure, the method for identifying action on a touch device, comprising the steps of: detecting a first land of an object on a touch device; detecting a first leave of the object from the touch device; detecting a second land of the object on the touch device if a first time duration of the first land of the object is no less than a first reference time and no more than a second reference time; detecting a second leave of the object from the touch device if the second land of the object is detected in a fourth reference time after the first leave of the object; and generating a third signal if a second time span between the first land and the second land of the object is no less than a third reference time and no more than a fourth reference time and a second time duration of the second land of the object is larger than a sixth reference time. In some embodiment of the present disclosure, the third signal is a drag signal.

In some embodiments of the present disclosure, the counter may be reset and restarted when a land of the object is detected or a leave of the object is detected.

In some embodiments of the present disclosure, the method for identifying action on a touch device, comprising the steps of: detecting a first land of an object on a touch device; detecting a first leave of the object from the touch device; detecting a second land of the object on the touch device if a first time duration of the first land of the object is no less than a first reference time and

no more than a second reference time; generating a first signal if no second land of the object is detected in a fourth reference time after the first leave of the object; detecting a second leave of the object from the touch device if the second land of the object is detected in a fourth reference time after the first leave of the object; generating a second signal if a second time span between the first land and the second land of the object is no less than a third reference time and no more than a fourth reference time and a second time duration of the second land of the object is no less than a fifth reference time and no more than a sixth reference time; and generating a third signal if a second time span between the first land and the second land of the object is no less than a third reference time and no more than a fourth reference time and a second time duration of the second land of the object is larger than a sixth reference time. In some embodiment of the present disclosure, the first signal is a signal click signal, the second signal is a double click signal and the third signal is a drag signal.

According to an embodiment of the invention, as shown in Fig. 4A, the touch device comprises a counter, when the touch device starts to work, the counter is reset and restarted to time from zero to maximum and maintain the maximum value if no land of an object is detected on the touch device. If a land of the object is detected on the touch device or a leave of the object from the touch device is detected, the counter may be reset and time from zero again. Referring to Figs. 4 and 5, in step 300, timing is started from zero. In step 301, a first land of an object on a touch device is detected. In step 302, a first time span T_0 between the time the counter is reset and restarted and the start of the first land of an object on the touch device is compared with a lead reference time t_{00} , if the first time span is less than the lead reference time t_{00} , it is jumped to step 300, otherwise to step 303 in which a first leave of the object from the touch device is detected. In step 304, the first time duration T_1 of the first land of the object on the touch device is compared with a first reference time, if T_1 is smaller than t_{11} , it is jumped to step 300, otherwise to step 305. The first time duration T_1 of the first land of the object is compared with a second reference time, if T_1 is larger than t_{12} , it is followed to step 308 for further determination of the action, if T_1 is no more than t_{12} , it is followed to step 307 to detected a second land of the object in the fourth reference time t_{22} . Meanwhile if the counter reaches the third reference time t_{21} , a first middle signal 21 is generated. In step 307, if no second land of the object is detected in the fourth reference time t_{22} after the first leave of the object from the touch device, it follows to step 309, the first middle signal 21 is terminated at t_{22} and a single click signal 204 is generated.

Referring Figs. 4 and 5, if the second land of the object is detected in the fourth reference time t_{22} after the first leave of the object from the touch device, that is a second time span T_2 between the first land and the second land of the object on the touch device is no more than the fourth reference time, it is followed to step 310, a second time span T_2 between the first land and the second land of the object on the touch device is compared with a third reference time t_{21} . If T_2

is smaller than t_{21} , it is followed to step 308, otherwise to step 312 to detect a second leave of the object, and the first middle signal is terminated when a second leave of the object is detected. In step 313, a second time duration T_3 is compared with a fifth reference time t_{31} , if T_3 is less than t_{31} , it is jumped to step 308, if T_3 is no less than t_{31} , step 314 is followed where the second time duration T_3 is compared with a sixth reference time t_{32} from the second land of the object on the touch device, if T_3 is no more than t_{32} , step 315 is followed where the first middle signal 21 is terminated when the second leave of the object from the touch device and a second middle signal 22 and a double signal 205 are generated, otherwise to step 316 as shown in Fig. 4 and Fig. 7, and then the first signal 21 is terminated when the second leave of the object from the touch device is detected, resulting a drag signal 206.

According to an embodiment of the invention, as shown in Fig. 4B, the steps before step 310 are similar to the method as mentioned in Fig. 4A. Therefore, the detailed description thereof is hereby omitted for clarity purpose. In the following, only the differences between Fig. 4A and Fig. 4B will be described.

As shown in Fig. 4B, if the second time span T_2 is greater than or equal to the third reference t_{21} and less than or equal to the fourth reference t_{22} , the method detects a second leave of the object at step 3121. The counter counts until the second leave of the object is detected. If the second leave of the object on the touch device is detected in the sixth reference time t_{32} , a second time duration T_3 is recorded, the method may compare a second time duration T_3 to a fifth reference t_{31} at step 313. If the second time duration T_3 compared at step 313 is less than the fifth reference t_{31} , the method goes the step 308. If the second time duration T_3 is greater than or equal to the fifth reference t_{31} , that is, the second time duration T_3 is greater than or equal to the fifth reference t_{31} and less than or equal to the sixth reference t_{32} , the first middle signal is terminated, and a second middle signal is generated. A double-click signal is then output at step 315. If a second leave of the object is not detected in the sixth reference time t_{32} , a drag signal is output at step 316. Then a second leave of the object is detected at step 318. And when the second leave of the object from the touch screen is detected, the drag signal is terminated at step 320.

In the following, an action identifying device for a touch device may be described in detail with reference to Figs. 5 and 8.

According to an embodiment of the present disclosure, an action identifying device for a touch device may be provided, which is shown in Fig. 8 where the action identifying device is schematically shown comprising a detecting unit 110, a counter 130 and a processing unit 120 connected with the detecting unit 110 and the counter 130 respectively. The detecting unit 110 is configured to detect a land or a leave of an object on the touch device, the counter is configured to measure the time; and the processing unit is configured to record the time of the counter, compare the recorded time with a reference time and output a single click signal, a double click signal or a

drag click signal.

As shown in Figs. 5 and 8, when the touch device starts working, the counter 130 starts to time from zero to maximum and maintain the maximum value if no land of an object is detected on the touch device. The detecting unit 110 detects a first land of the object on the touch device.

5 T0 is a first time span between the time the counter 130 is reset and restarted and a time of the first land of the object on the touch device. The first time span T0 is recorded by the processing unit 120. If the first time span T0 is no less than the first reference time t_{11} and no more than the second reference time t_{12} , the first middle signal 21 is generated at the third reference time t_{21} . If no second land of the object on the touch device is detected in the fourth reference time t_{22} , the first
10 middle signal 21 is terminated, and a single click signal is generated accordingly.

As shown in Figs 6 and 8, if a second land of the object on the touch device is detected by the detecting unit 110 in the fourth reference time t_{22} , and the second time span T2 between the first land and the second land of the object is larger than a third reference time t_{21} and smaller than the fourth reference time t_{22} , the first middle signal 21 is maintained, and the leave of the object from the
15 touch device is detected by the detecting unit 110. T3 is a second time duration from the second land of the object on the touch device. If T3 is larger than the fifth reference time t_{31} and no more than the sixth reference time t_{32} , then the first signal 21 is terminated when a second land of the object leaves the touch device, a second signal 22 is generated and a double click signal 205 is generated by the processing unit 130.

20 As shown in Figs. 7 and 8, if T3 is larger than the sixth reference time t_{32} , the first middle signal 21 is maintained, and the first signal 21 is terminated after the second leave of the object from the touch device, and a drag signal 206 is generated by the processing unit 130 accordingly.

In some embodiments, referring to FIG. 7, if a second leave of the object is not detected in the sixth reference time t_{32} , a drag signal is output after the counter reaches the sixth reference time t_{32} .
25 And then when the second leave of the object is detected, the drag signal is terminated.

As described above, due to the first time duration, second time span and second time duration compared with more than one reference time respectively, in other words, the first time duration, second time span and second time duration are compared with a period of time rather than a fixed value, so that an error operation or erroneous determination of the action may be avoided.

30 While the present disclosure has been described in conjunction with the embodiment thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and scope thereof as set forth in the appended claims.

WHAT IS CLAIMED IS:

1. A method for identifying action on a touch device, comprising the steps of:
detecting a first land of an object on a touch device; and
generating a first signal if a first time duration of the first land of the object on the touch
5 screen is no less than a first reference time and no more than a second reference time and no
second land of the object is detected in a fourth reference time after the first leave of the object
from the touch device.

2. The method according to claim 1, wherein the first signal is a signal click signal.

3. The method according to claim 1, wherein if a second land of the object on the touch
device is no less than a fifth reference time and no larger than a sixth reference time, a second
signal is generated.

4. The method according to claim 3, wherein the second signal is a double click signal.

5. The method according to claim 4, wherein if the second land of the object on the touch
device is larger than the sixth reference time, a third signal is generated after a second leave of
the object from the touch device.

6. The method according to claim 5, wherein the third signal is a drag signal.

7. The method according to claim 4, wherein if the second land of the object on the touch
device is larger than the sixth reference time, a drag signal is generated after the time duration of
the second land of the object reaches the sixth reference time and the drag signal is terminated
after a second leave of the object from the touch device.

8. The method according to claim 1, wherein a first time span between a time when the touch
device is started and a time of a first land of the object on the touch device is no less than a lead
reference time, otherwise it is determined that it is an error touch.

9. The method according to claim 1, wherein if a first time duration of the first land of the
object on the touch device is less than the first reference time, the first land of the object is
determined again.

10. An action identifying device for a touch device, comprising:

a detecting unit for detecting a land or a leave of an object on the touch device;

a counter for measuring the time; and

a processing unit for recording the time of the counter, comparing the recorded time with a reference time and outputting a single click signal, a double click signal or a drag click signal.

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11. The device according to claim 10, wherein a first time duration of an object on a touch device is measured by the counter.

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12. The device according to claim 11, wherein a single click signal is generated by the processing unit if the first time duration is no less than a first reference time and no more than a second reference time and no second land of the object is detected in a fourth reference time after the first leave of the object from the touch device.

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13. The device according to claim 12, wherein a second land of the object on the touch device is detected by the detecting unit in a time no less than a third reference time and no more than the fourth reference time, a double click signal is generated by the processing unit if a second time duration of the second land of the object is no less than a fifth reference time and no more than a sixth reference time after the second leave of the object from the touch device.

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14. The device according to claim 13, wherein if the second land of the object on the touch device is more than a sixth reference time, a drag signal is generated by the processing unit.

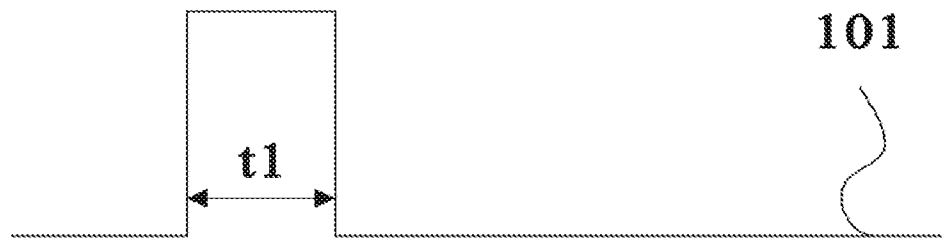


FIG. 1

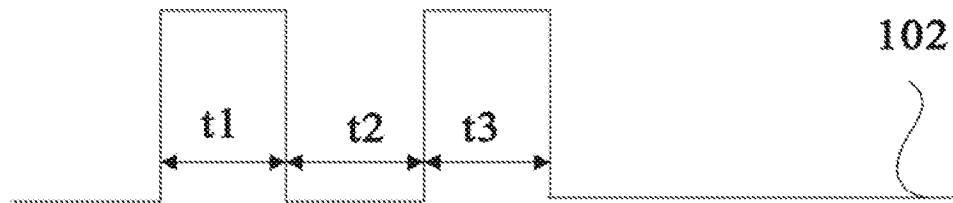


FIG. 2

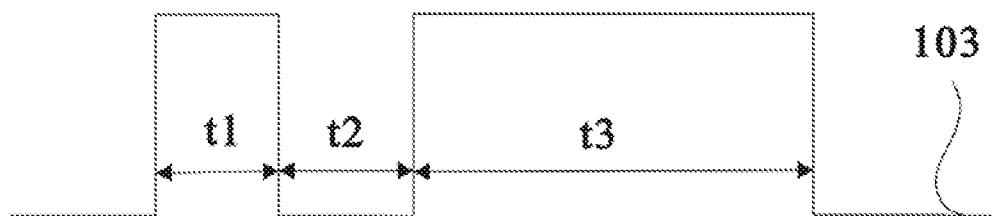


FIG. 3

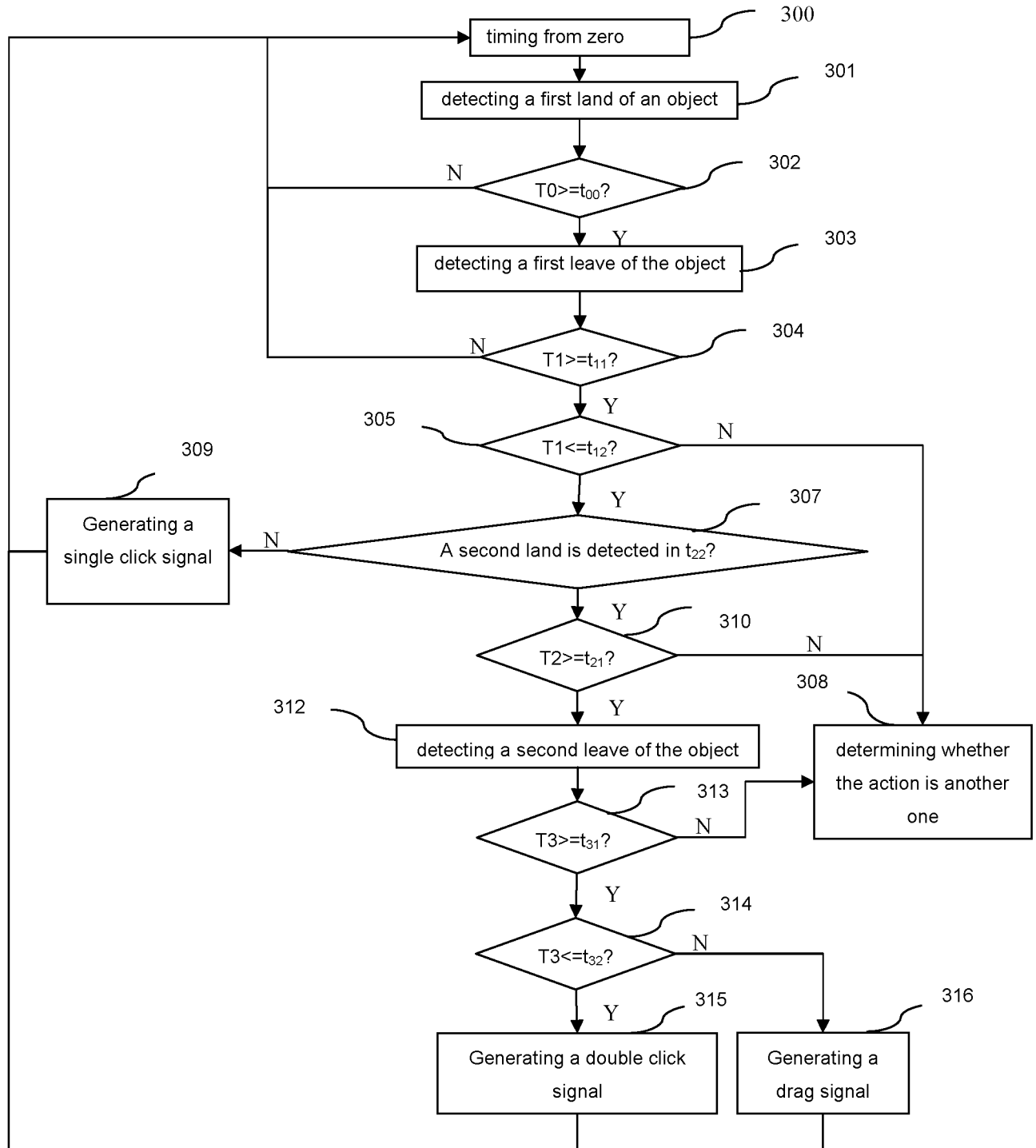


FIG. 4A

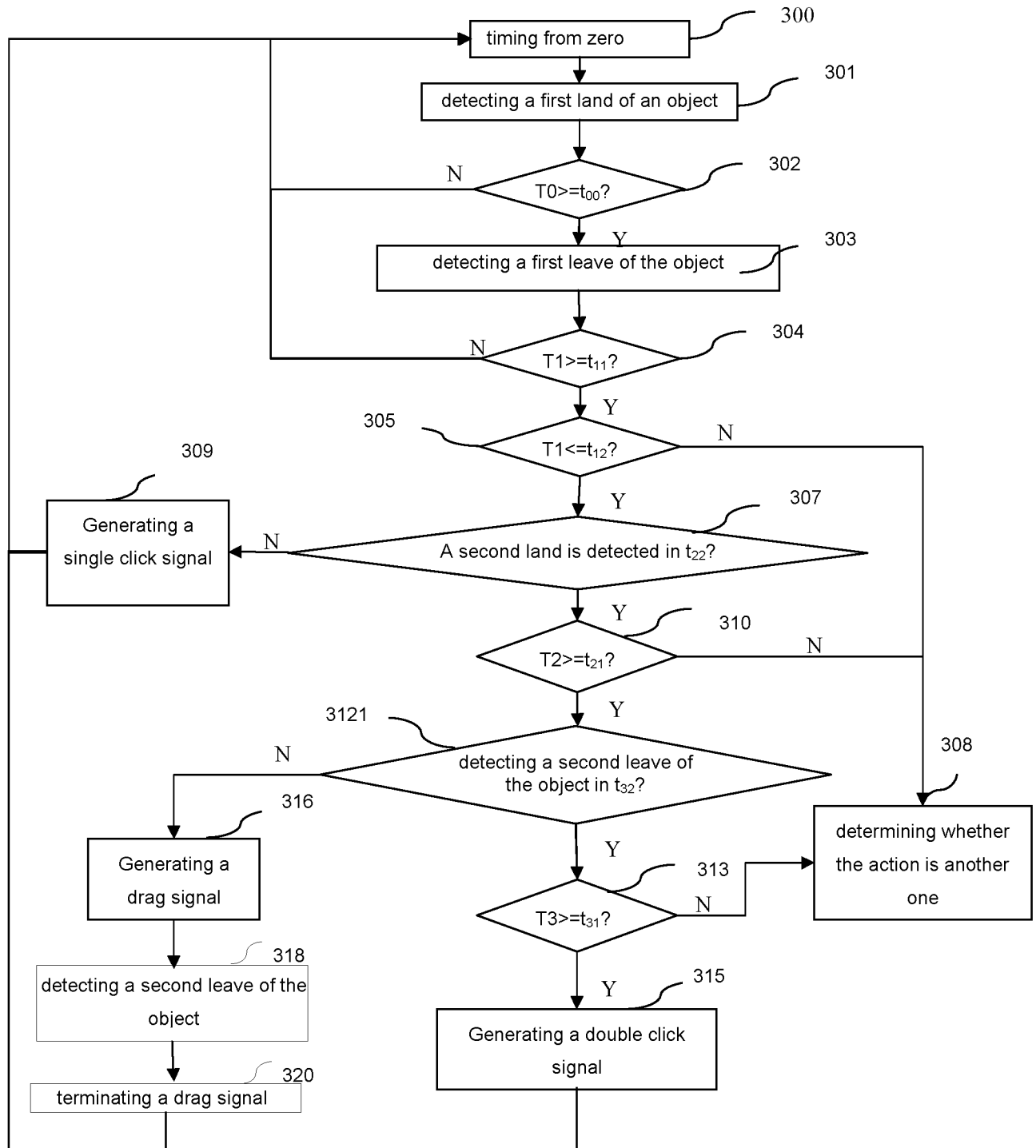


FIG. 4B

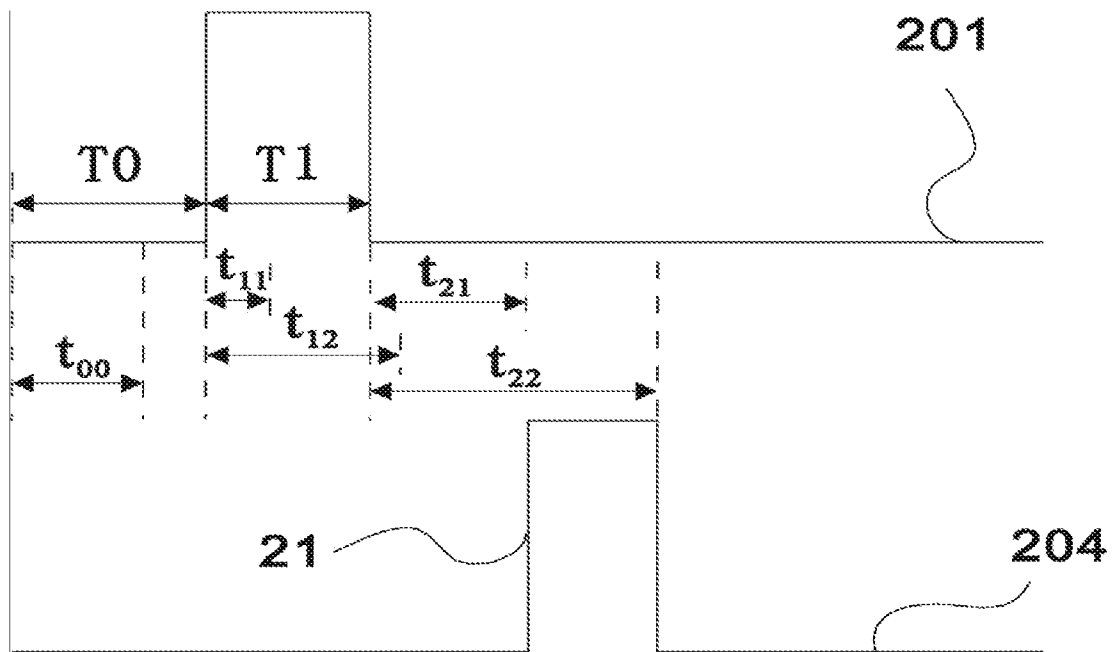


FIG. 5

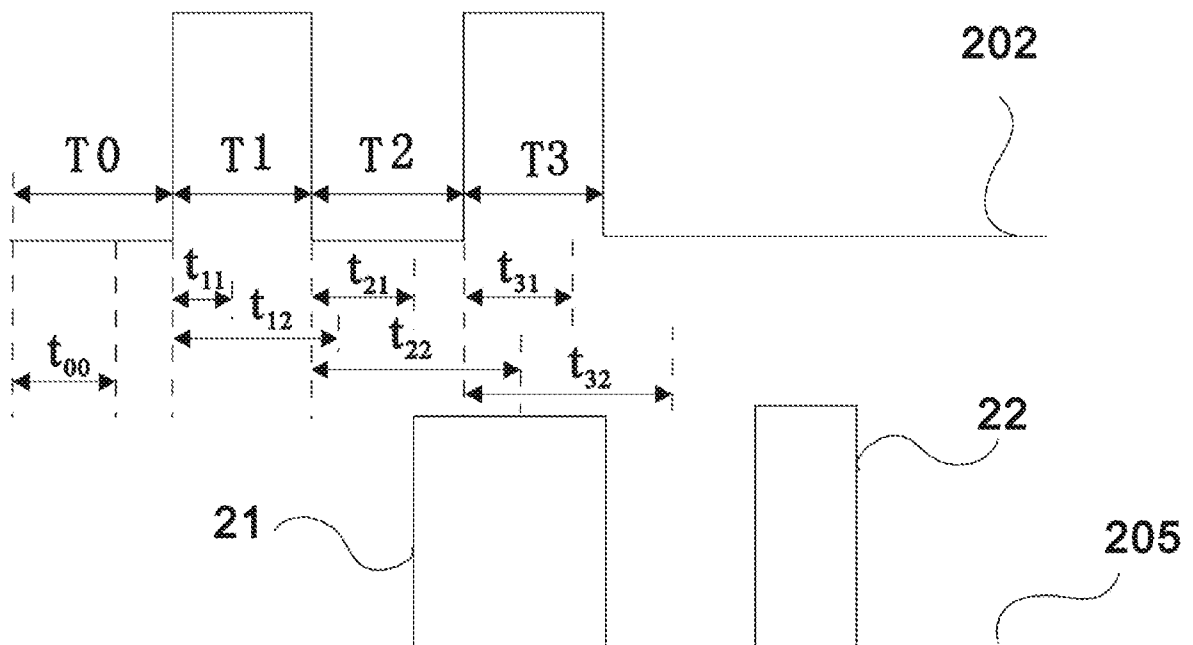


FIG. 6

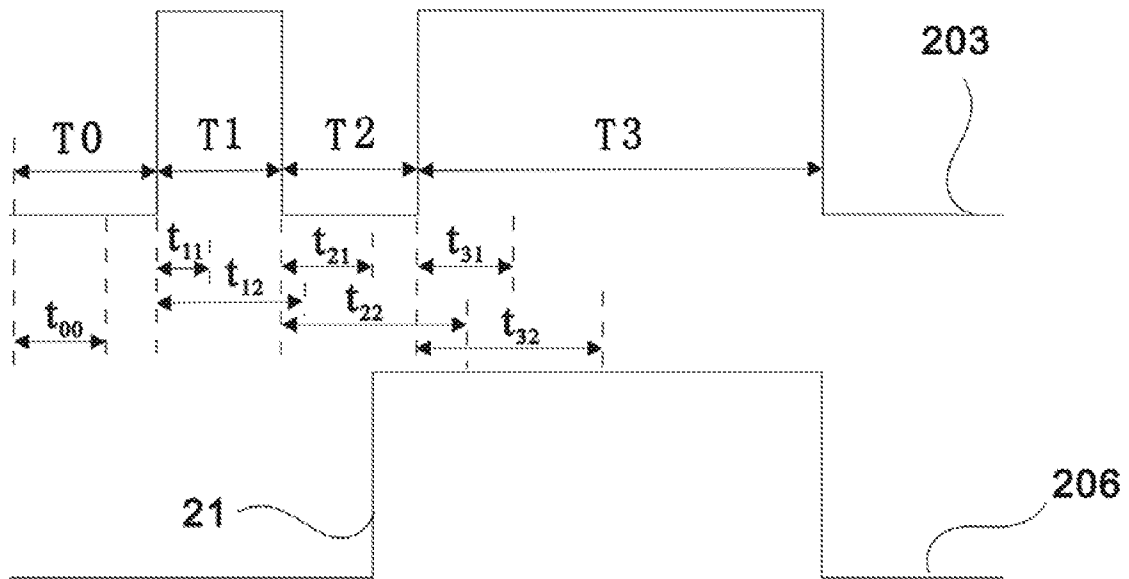


FIG. 7

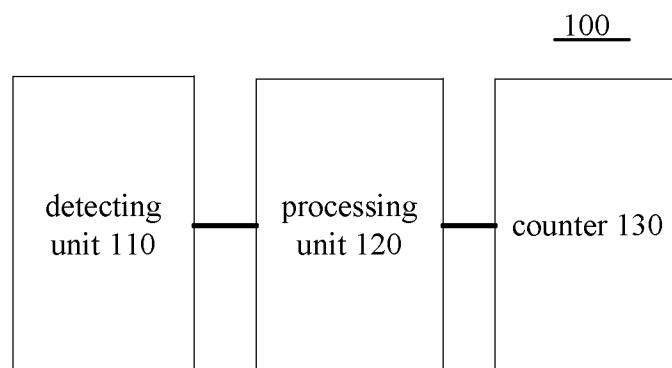


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2010/077238

A. CLASSIFICATION OF SUBJECT MATTER

G06F 3/041(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)

IPC: 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, WPI, EPODOC: touch; click; time; single; double; drag

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN1627244A (SHENGDA TECH CO., LTD.) 15 Jun. 2005 (15.06.2005) description page 3 line 12 to page 6 line 7	1-2, 9
Y		3-7, 10-14
A		8
Y	CN1624632A (SHENGDA TECH CO., LTD.) 08 Jun. 2005 (08.06.2005) description page 6 line 15 to page 7 line 20	3-7, 10-14
Y	CN1624631A (SHENGDA TECH CO., LTD.) 08 Jun. 2005 (08.06.2005) description page 5 line 1 to page 8 line 17	5-7, 10-14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:	“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
“A” document defining the general state of the art which is not considered to be of particular relevance	“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
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Date of the actual completion of the international search
10 Dec. 2010 (10.12.2010)Date of mailing of the international search report
06 Jan. 2011 (06.01.2011)Name and mailing address of the ISA/CN
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International application No.
PCT/CN2010/077238

Form PCT/ISA /210 (patent family annex) (July 2009)