

DESCRIPTION

DETECTION KIT FOR INTERACTIVE TERMINAL

Technical field

5 [0001] The present invention relates to a detection kit for an interactive terminal, an interactive terminal equipped with a detection kit and a method for modifying an interactive terminal.

Prior art

10 [0002] It is known practice to use interactive terminals offering users self-service operations, such as a ticket machine, a travel pass recharging terminal, a public transit stop request button, a border identification terminal etc. These interactive terminals generally comprise a casing fixed to the ground, a touchscreen housed in the casing, a central processing unit and various peripherals (printer, card reader etc.). The user interacts with the touchscreen through a series of finger presses. As these touchscreens may be used by a large number of people, they are a source of
15 the spread of viruses, such as the COVID-19 virus.

[0003] There is therefore a need to propose a solution which makes it possible to meet the challenges of a public health crisis while at the same time making it possible to continue to operate current interactive terminals with complete confidence.

Disclosure of the invention

20 [0004] The present invention aims to remedy this need at least in part.

[0005] More particularly, the objective of the present invention is to transform current interactive terminals with a touchscreen into interactive terminals for which physical contact with users is limited.

25 [0006] For this purpose a first subject of the invention relates to a detection kit intended to limit physical contact between a user and a touchscreen of an interactive terminal. The detection kit comprises a contactless detection frame which can be positioned around the touchscreen. The detection kit also comprises an electric power supply module which can supply power to the detection frame from the interactive terminal. The detection kit also comprises a data transmission module

which can make it possible to exchange data between this detection frame and the interactive terminal.

[0007] The kit thus makes it possible to transform, in a simple and practical way, the interactive terminal with a touchscreen into an interactive terminal with limited physical contact. The detection frame overlaps the touchscreen without hiding it. Thus, useful information may always be read on the touchscreen for the user. To make their selection, the user will bring their fingers close to the touchscreen inside the detection frame. This frame then detects the position of the fingers with respect to the touchscreen and to the information which is present on this screen. The frame will thus deduce the control intention of the user without the user needing to touch the touchscreen directly.

[0008] In one particular embodiment, the detection frame comprises means for adapting the size of the detection screen to the touchscreen.

[0009] Thus, the detection frame adapts to various dimensions of the touchscreen. This makes it easier to transform interactive terminals having different screen sizes from the same detection kit. These adaptation means may be in the form of a first frame portion sliding on a second, central portion of this frame. These adaptation means make it possible to adjust the length and/or the width of the detection frame. The adaptation means may also comprise locking elements, such as pins, for locking the frame portions together and stabilizing this frame within suitable dimensions.

[0010] In one particular embodiment, the detection frame comprises means for fixing said frame to the interactive terminal.

[0011] This ensures that the detection frame is indeed securely installed on the interactive terminal. These fixing means are, for example, adhesive means such as an epoxy adhesive or adhesive tapes. As a variant, the fixing means are screwing means such as rivets.

[0012] In one particular embodiment, the detection frame comprises at least two sensors, each sensor being able to detect movements of the user in an associated virtual plane.

[0013] In one particular embodiment, the virtual planes associated with the sensors are at a distance from one another and parallel to the touchscreen.

[0014] In one particular embodiment, the two sensors are selected from a list of sensors comprising at least:

- an infrared sensor;
- an ultrasound sensor;

5 - a depth camera.

[0015] In one particular embodiment, the detection kit comprises a plurality of light-emitting diodes extending over the detection frame, said light-emitting diodes being adapted to be activated depending on the interactions of the user with at least one of said virtual planes.

10 [0016] In one particular embodiment, the detection kit comprises a device for projecting a holographic numeric keyboard.

[0017] In one particular embodiment, the detection kit comprises a holographic projection device which can replace the touchscreen.

15 [0018] Another subject of the invention relates to an interactive terminal intended to be used by a user, this interactive terminal comprising a detection kit according to the preceding subject.

[0019] Another subject of the invention relates to a method for transforming an interactive terminal in order to limit contact between a user and a touchscreen of said interactive terminal, said method comprising:

- 20 - a step of installing a detection kit according to one of the preceding subjects;
- a step of calibrating sensors of said detection kit.

[0020] The present invention will be better understood on reading the detailed description of embodiments which are given by way of non-limiting examples and illustrated by the appended drawings, in which:

- 25 - figure 1 illustrates, seen from the front, an interactive terminal comprising a detection kit according to the invention;
- figure 2 illustrates the interactive terminal of figure 1, seen from the side;
- figure 3 is an enlargement of the detection frame of the detection kit according to the invention positioned around a touchscreen of the interactive terminal of
- 30 figures 1 and 2;

- figure 4 illustrates, in a perspective cross-sectional view, a portion of the detection frame of figure 3;
- figure 5 illustrates, in a perspective view, a device for projecting a holographic numeric keyboard belonging to the detection kit of the invention;
- 5 - figure 6 illustrates the projection device of figure 4, in a cross section A-A;
- figure 7 illustrates the operation of a software architecture of an interactive terminal according to the prior art;
- figure 8 illustrates the operation of a software architecture of an interactive terminal comprising the detection kit of the invention;
- 10 - figure 9 illustrates the various steps of a transformation method for obtaining the interactive terminal of figures 1 and 2 modified by the detection kit.

[0021] The invention is not limited to the embodiments and variants presented and other embodiments and variants will be clearly apparent to a person skilled in the art.

[0022] Figure 1 and figure 2 illustrate an interactive terminal 10 comprising a
15 detection kit 20 according to the invention.

[0023] The interactive terminal 10 comprises:

- a chassis 100;
- a touchscreen 101.

[0024] By way of non-limiting example, the interactive terminal 10 also comprises, in
20 the embodiment of figure 1:

- a camera 102;
- a contactless fingerprint sensor 103.

[0025] The chassis 100 is adapted to make the interactive terminal 10 rest on the ground and/or against a wall. This chassis is composed here of two portions 100A,
25 100B.

[0026] A first chassis portion 100A has a parallelepipedal shape elongated in the height direction. This height corresponds substantially to the maximum height of an average user. This first portion 100A is adapted to house the touchscreen 101 and the camera 102.

[0027] A second chassis portion 100B also has a parallelepipedal shape. This second portion 100B is positioned in front of the first portion 100A. It is smaller in height than the first portion 100A. The height of the second portion 100B is here substantially equal to half the height of the first portion 100A. This second portion 100B is adapted to house the contactless fingerprint sensor 103.

[0028] The touchscreen 101 constitutes an interface with the user. This screen 101 is thus adapted to display information. By way of example, the touchscreen 101 is a 17-inch screen of Elo Open Frame type from Elo Touch Solutions. The user may select the desired service options with their fingers through direct physical contact with the screen 101.

[0029] The camera 102 is adapted to record video sequences and/or photos of the user. Using the camera 102 is, for example, appropriate for processing a request to renew an identity card. The camera 102 is positioned above the touchscreen 101. More particularly, the camera 102 is housed in an upper region of the first portion 100A of the chassis 100 at a height which makes it possible for it to record the face of an average user.

[0030] The contactless fingerprint sensor 103 is adapted to read the fingerprints of the user without the latter needing to make physical contact with their hand. Using such a fingerprint sensor 103 is, for example, appropriate for processing a request to renew an identity card. The fingerprint sensor 103 is housed in the second portion 100B of the chassis 100 at a height which makes it possible for it to accommodate the hand of the user.

[0031] The detection kit 20 comprises:

- a contactless detection frame 201;
- an electric power supply module 202;
- a data transmission module 203;
- a software module 204;
- a device 205 for projecting a holographic numeric keyboard.

[0032] The contactless detection frame 201 makes it possible for a user to interact with the interactive terminal 10 by limiting as far as possible, or even by completely eliminating, the need for physical contact with the touchscreen 101. In practice, the

contactless detection frame 201 detects the movements of the finger of the user a few centimeters from the touchscreen 101. The movements of the user are used to simulate the motion of a virtual “mouse”, the information from which is transmitted to the host system via a USB HID (human interface device) of absolute mouse type.

- 5 The detection frame 201 is adapted to be positioned around the touchscreen 101. The operating temperature of the touchscreen 101 is here between -20°C and +60°C. Preferably, the touchscreen 101 complies with the IP54 and IK07 protection standards.

- 10 [0033] The electric power supply module 202 is adapted to supply power to the contactless detection frame 201 from a power supply (which is not shown in figures 1 and 2) of the interactive terminal 10. The module 202 can, for example, supply the detection frame 201 at 12 V or at 24 V with a direct current. Preferably, the power consumed by the contactless detection frame 201 is less than 10 W. The electrical connection between the electric power supply module 202 and the power supply of
15 the interactive terminal 10 is made using bare wires. As a variant, the electrical connection is made using a suitable connector.

[0034] The data transmission module 203 is adapted to make it possible to exchange data between the contactless detection frame 201 and the interactive terminal 10. This module comprises the suitable connector technology for such a data exchange.

- 20 [0035] The software module 204 comprises a set of blocks making it possible to produce the software interface between an existing operating system of the interactive terminal 10 and elements of the kit 20 such as the contactless detection frame 201 and/or the device 205 for projecting a holographic numeric keyboard. Such a software module 204 is described in more detail in figure 8.

- 25 [0036] The device 205 for projecting a holographic numeric keyboard is a virtual numeric keyboard system equipped with a contactless interface. This device makes it possible to enter a certain number of digits confidentially. It also makes it possible to perform standard functions of “edit”, “delete” and “confirm” type. The projection device 205 is compatible with any system which supports the USB protocol. It is
30 supplied with power directly by the interactive terminal 10 via a wired USB output and it must be able to switch on and off on demand. The interactions of the user with the

projection device 205 are reported via a USB HID acting as a numeric keypad. Such a projection device 205 is described in more detail in figures 5 and 6.

[0037] In an embodiment which is not shown, the detection kit further comprises an additional holographic projection device. This projection device is fitted in the contactless detection frame 201 and it can replace the touchscreen 101.

[0038] Figure 3 is an enlargement of the interactive terminal 10 at the touchscreen 101. In this figure 3, the contactless detection frame 201 is detailed. Thus, this detection frame 201 comprises:

- a first sensor 2014;
- a second sensor 2015;
- a plurality of light-emitting diodes 2016.

[0039] The first sensor 2014 is adapted to detect movements of the user in a first virtual plane. The second sensor 2015 is adapted to detect movements of the user in a second virtual plane. The first virtual plane and the second virtual plane are at a distance from one another and parallel to the touchscreen 101. For example, the first virtual plane is closer to the touchscreen and it simulates the “click/selection”. Preferably, this first virtual plane is at a distance of about 2 cm from the touchscreen 101. The second virtual plane is further from the touchscreen and it simulates a motion of the “mouse”. Preferably, the second virtual plane is at a distance of about 4 cm from the touchscreen 101. The first sensor 2014 and the second sensor 2015 are selected from a list of sensors comprising at least:

- an infrared sensor;
- an ultrasound sensor;
- a depth camera.

[0040] The first sensor 2014 and the second sensor 2015 are sensors of the same type in this list of sensors. As a variant, the first sensor 2014 and the second sensor 2015 are of different types.

[0041] The information supplied by the first sensor 2014 and the second sensor 2015 is transmitted to the interactive terminal 10 by the data transmission module 203.

[0042] The contactless detection frame 201 also comprises a plurality of light-emitting diodes 2016. These light-emitting diodes 2016 are regularly distributed over the frame 201. These diodes generate various luminous ambiances depending on the interactions of the user with the frame 201. For example, when the user interacts with the second virtual plane, the light-emitting diodes turn green. The luminous intensity of the diodes depends on the position of the finger of the user. When the user interacts with the first virtual plane and a click is detected, the light-emitting diodes emit a green flash. When no interaction is detected, the light-emitting diodes have a low-intensity green color. As a variant, the light-emitting diodes are orange when no interaction is detected.

[0043] The light-emitting diodes 2016 are connected to the data transmission module 203, for example, via a USB connection.

[0044] It will be noted that, in the example of figures 1 to 3, the contactless detection frame 201 completely frames the touchscreen 101. As a variant, the detection frame may frame this touchscreen 101 only partially. For example, the detection frame may comprise only two uprights. These uprights are parallel to one another and extend vertically or horizontally on either side of the touchscreen 101.

[0045] Figure 4 is a perspective cross-sectional view of a portion of the contactless detection frame 201 of figure 3. Figure 4 details means for adapting the size of the detection frame 201. These adaptation means comprise:

- a slide 201A;
- a core 201B;
- locking elements 2011, 2012.

[0046] The slide 201A and the core 201A belong to the detection frame 201. The slide is adapted to slide on the core 201B in order to adjust the dimensions of this frame 201 widthwise or lengthwise. The slide 201A here has a U-shaped cross section. The core 201B is shown as a solid portion. There is a small clearance between the slide 201A and the core 201B with a view to making it easier for these two portions to move relative to another at the moment when the dimensions of the detection frame 201 are adjusted.

[0047] The locking elements comprise a pin 2011 and holes 2012. The pin 2011 is adapted to lock the slide 201A in position with respect to the core 201B. In order to

unlock this slide 201A at the moment when dimensions are adjusted, the pin 2011 is adapted to retract into the core 201B under the effect of vertical pressure. A spring system (which is not shown) housed in the core 201B makes it possible for the pin 2011 to resume a position in one of the holes 2012 corresponding to the desired dimension. It will be noted that the holes 2012 extend vertically in the thickness of the slide 201A.

[0048] As has already been indicated, the detection frame 201 comprises a plurality of light-emitting diodes 2016. These diodes 2016 are borne by a strip 2017 covering the slide 201A. The strip 2017 thus comprises a set of electrical connections making it possible to supply power to the various light-emitting diodes 2016. In addition, the strip 2017 is connected to the data transmission module 203 via a USB connection. It will be noted that the holes 2012 of the locking elements also pass through the thickness of this strip 2017.

[0049] Finally, the contactless detection frame 201 comprises means 2013 for fixing this frame 201 to the chassis 100 of the interactive terminal. These fixing means 2012 are shown, in the exemplary embodiment of figure 4, in the form of an adhesive tape. As a variant, these fixing means 2012 are rivets.

[0050] Figures 5 and 6 illustrate the device 205 for projecting a holographic numeric keyboard belonging to the detection kit 20.

[0051] This projection device 205 comprises:

- a casing 2051;
- a first cavity 2052;
- a second cavity 2053;
- a third cavity 2054.

[0052] The casing 2051 has a generally parallelepipedal shape. Its mechanical dimensions are, for example, 150*150*80 mm. This casing 2051 is adapted to be housed in the second portion 100B of the chassis 100. The operating temperature of the projection device 205 is between -20°C and +60°C. It will also be noted that the projection device 205 complies with the IP54 and IK07 protection standards.

[0053] The first cavity 2052 is adapted to accommodate a holographic display. This holographic display can generate an active hologram 20521 showing a holographic

numeric keyboard. Preferably, the holographic numeric keyboard has a resolution of 480*272 and a display dimension of 4.3 inches. The luminance of the active hologram is 300 cd/m².

5 [0054] The second cavity 2053 is adapted to accommodate a sensor. This sensor can detect the interactions of the user with the active hologram 20521 and transmit them to the operating system of the interactive terminal 10.

[0055] The third cavity 2054 is adapted to accommodate electronic boards which make it possible to display the holographic numeric keyboard.

10 [0056] Preferably, the power consumed by the contactless detection frame 201 is less than 10 W.

[0057] Figure 7 illustrates the operation of a software architecture of an interactive terminal according to the prior art. In this figure 7, the interactive terminal comprises a central processing unit 104. This central processing unit 104 is adapted to organize the data exchanges between the touchscreen 101, the camera 102 and the
15 fingerprint sensor 103. More specifically, the central processing unit 104 comprises:

- a software platform 1041;
- a set of device drivers 1042;
- an operating system 1043.

20 [0058] The software platform 1041 groups together some of the software used by the interactive terminal. More specifically, this software platform 1041 comprises a human-machine interface 10411 and a middleware sub-platform 10412. The human-machine interface 10411 groups together all of the software used to display the data graphically on the touchscreen 101. The middleware sub-platform 10412 groups together all of the software which can create an information network between various
25 computer applications.

[0059] The set of device drivers 1042 comprises the various device drivers which will make it possible for the operating system 1043 to interact with the peripherals 101, 102, 103.

30 [0060] The operating system 1043 is adapted to perform various operations, such as process scheduling operations, managing a main memory, managing the

inputs/outputs, managing the user commands, protecting the central processing unit 104 etc.

[0061] In order to perform a service, for example processing a request to activate a new identity card, the whole of the central processing unit 104 is harnessed. In order to make such an activation request, the user goes to the interactive terminal 10 armed with their new identity card received beforehand by mail. This user acts on the touchscreen 101 and selects the card activation service. An activation request Req_{act} is transmitted to the set of device drivers 1042. This activation request Req_{act} is then routed to the operating system 1043. The operating system 1043 processes the request and transmits a suitable response Rep_{act} to the software platform 1041. This software platform 1041 sends the response Rep_{act} to the touchscreen 101 via the human-machine interface 10411. During the activation request, the interactive terminal may ask the user for a personal identification number PIN which they will have received beforehand, for example by telephone. This personal identification number PIN is transmitted by the touchscreen 101 to the operating system 1043 via the set of device drivers 1042. Furthermore, it may be necessary to verify biometric data of the user such as face-related data $Data_{face}$ and/or fingerprint data $Data_{finger}$. These data are transmitted to the operating system 1043 by the camera 102 and the fingerprint sensor 103, respectively, via the set of device drivers 1042.

[0062] Figure 8 illustrates the operation of a software architecture of the interactive terminal 10 comprising the detection kit 20 of the invention. This software architecture differs from the software architecture of the prior art shown in figure 7 in that it further comprises:

- a middleware library 2041 for contactless peripherals;
- a software development kit 2042 for the contactless detection frame 201;
- a software development kit 2043 for the device 205 for projecting a holographic numeric keyboard.

[0063] The middleware library 2041 is adapted to create an information network between the various applications developed for the contactless peripherals 201, 205. This middleware library 2041 is stored in the middleware sub-platform 10412.

[0064] The software development kit 2042 makes it possible to transmit responses to the contactless detection frame 201.

[0065] The software development kit 2043 makes it possible to transmit responses to the holographic numeric keyboard 205.

[0066] In order to perform a service, for example processing a request to activate a new identity card, the whole of the central processing unit 104 is harnessed. In order to make such an activation request, the user goes, armed with their new identity card received beforehand by mail, to the interactive terminal 10 equipped with the detection kit 20. This user acts on the contactless detection frame 201 and selects the card activation service. An activation request Req_{act} is transmitted to the set of device drivers 1042. This activation request Req_{act} is then routed to the operating system 1043. The operating system 1043 processes the request and transmits a suitable response Rep_{act} to the software platform 1041. The middleware library 2041 sends the response Rep_{act} to the contactless detection frame 201 via the software development kit 2042. During the activation request, the interactive terminal may ask the user for a personal identification number PIN which they will have received beforehand, for example by telephone. This personal identification number PIN is transmitted by the device 205 for projecting a holographic numeric keyboard to the operating system 1043 via the set of device drivers 1042. This projection device 205 is adapted to also interact with the software development kit 2043. Furthermore, it may be necessary to verify biometric data such as face-related data $Data_{face}$ and/or fingerprint data $Data_{finger}$. These data are transmitted to the operating system 1043 by the camera 102 and the fingerprint sensor 103, respectively.

[0067] In the embodiment of figure 8, the contactless detection frame 201 completely replaces the touchscreen 101. As a variant, the touchscreen 101 may remain active for presenting information, the confirmation by the user being carried out solely through the contactless detection frame 201. In this case, the response Rep_{act} is split into two coordinated sub-responses to the contactless detection frame 201 and to the touchscreen 101.

[0068] Figure 9 illustrates the various steps of a transformation method for obtaining the interactive terminal of figures 1 and 2 modified by the detection kit 20.

[0069] In a first step E1, the detection kit 20 is installed. This first step comprises a plurality of sub-steps:

- a step E11 of positioning the contactless detection frame 201 around the touchscreen 101;
- a step E12 of connecting the electric power supply module 202 to the interactive terminal 10;
- 5 - a step E13 of connecting the data transmission module to the interactive terminal 10;
- a step E14 of updating the software of the central processing unit 104 of the interactive terminal 10;
- identical steps may be performed for installing the device 205 for projecting a
10 holographic numeric keyboard.

[0070] In a step E2, the sensors 2014, 2015 of the contactless detection frame 201 are calibrated. This calibration operation may be carried out using a suitable recalibration tool.

[0071] The invention is not limited to the embodiments and variants presented and
15 other embodiments and variants will be clearly apparent to a person skilled in the art.

[0072] Thus, in order to promote user feedback following a click, it is possible to equip the detection frame with technology which makes it possible to give haptic feedback through ultrasound.

[0073] Thus, it is possible to control a directional speaker which emits sounds at the
20 moment of the click, either in the detection frame or on the device for projecting the holographic numeric keyboard. The speaker may be placed in the lower portion of the interactive terminal or in a ceiling above said interactive terminal. The link with the detection kit is made via software which is present in the interactive terminal.

CLAIMS

1. A detection kit intended to limit physical contact between a user and a touchscreen (101) of an interactive terminal (10), said detection kit (20) comprising:

- 5 - a contactless detection frame (201) which can be positioned around said touchscreen (101);
- an electric power supply module (202) which can supply power to said detection frame (201) from the interactive terminal (10);
- 10 - a data transmission module (203) which can make it possible to exchange data between the detection frame (201) and said interactive terminal (10);
- a software module (2041, 2042, 2043).

2. The detection kit as claimed in claim 1, wherein the contactless detection frame (201) comprises means (201A, 201B, 2011, 2012) for adapting the size of the
15 detection frame (201) to the touchscreen (101).

3. The detection kit as claimed in either one of claims 1 and 2, wherein the contactless detection frame (201) comprises means (2013) for fixing said frame (201) to the interactive terminal (10).

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4. The detection kit as claimed in any one of claims 1 to 3, wherein the contactless detection frame (201) comprises at least two sensors (2014, 2015), each sensor (2014, 2015) being able to detect movements of the user in an associated virtual plane.

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5. The detection kit as claimed in claim 4, wherein the virtual planes associated with the sensors (2014, 2015) are at a distance from one another and parallel to the touchscreen (101).

6. The detection kit as claimed in either one of claims 4 and 5, wherein the two sensors (2014, 2015) are selected from a list of sensors comprising at least:

- an infrared sensor;
- an ultrasound sensor;

5 - a depth camera.

7. The detection kit as claimed in any one of claims 1 to 6, wherein said detection kit (20) comprises a plurality of light-emitting diodes (2016) extending over the contactless detection frame (201), said light-emitting diodes (2016) being adapted to
10 be activated depending on the interactions of the user with at least one of said virtual planes.

8. The detection kit as claimed in any one of claims 1 to 7, wherein said detection kit (20) comprises a device (205) for projecting a holographic numeric keyboard.

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9. The detection kit as claimed in any one of claims 1 to 8, wherein said detection kit (20) comprises a holographic projection device which can replace the touchscreen.

10. An interactive terminal intended to be used by a user, said interactive terminal
20 (10) comprising a detection kit (20) as claimed in any one of claims 1 to 9.

11. A method for transforming an interactive terminal (10) in order to limit contact between a user and a touchscreen (101) of said interactive terminal (10), said method comprising:

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- a step of installing a detection kit (20) as claimed in any one of claims 1 to 9;
 - a step of calibrating sensors (2014, 2015) of said detection kit (20).