

## Notice

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## DESCRIPTION CN103365572A

Remote control method of electronic equipment and electronic equipment

### [0001]

Technical Field

### [0002]

The present invention relates to the field of electronic technology, and in particular to a remote control method of an electronic device and the electronic device.

### [0003]

Background Art

### [0004]

Currently, the main control input methods for human-computer desktop interaction include mouse, keyboard, touch screen, gesture recognition device, etc.

These control methods all require additional, specialized command input devices, resulting in a large amount of redundancy in computer input devices.

Moreover, the input device is tightly coupled to the computer, and one input device usually corresponds to only one computer. Therefore, it is difficult to flexibly control multiple computers using one input device, and it is also difficult for multiple people to control one computer using multiple input devices.

### [0005]

At the same time, in many cases, users hope to use computers conveniently and quickly, and the most effective way is to use the electronic devices that users carry with them as input devices.

For example, a user uses a mobile phone to control a computer at a certain distance.

#### **[0006]**

The solution proposed in the prior art is to use a mobile phone as a remote control to control a PC, a TV or other computer equipment. The disadvantages of this solution are:

#### **[0007]**

1) The remote control method is monotonous, usually only including channel selection and basic settings; 2) The interoperability is poor, and the smart TV desktop cannot be interactively operated; 3) The flexibility is low, the mobile phone and TV are highly coupled, and users cannot quickly switch between multiple TVs; 4) It is impossible to achieve visible and controllable.

#### **[0008]**

Summary of the invention

#### **[0009]**

The present invention provides a remote control method of an electronic device and the electronic device. The method and device provided by the present invention can solve the problem in display technology that a computer or a non-touch display device cannot be flexibly controlled by using one input device.

#### **[0010]**

The present invention provides a remote control method for an electronic device, which is applied between a first electronic device and a second electronic device, wherein the first electronic device and the second electronic device are connected wirelessly, the first electronic device includes an image acquisition device and a touch display unit, and the second electronic device includes a display unit, and the method includes:

#### **[0011]**

The first electronic device acquires a real-time image including the first display content displayed by the display unit through the image acquisition device, and displays the real-time image on the touch display unit;

#### **[0012]**

Establishing a first display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content;

#### **[0013]**

Detect touch operation information received by the touch display unit, and determine whether the touch point coordinates of the touch operation correspond to the first display content included in the real-time image according to the touch operation information; if so, convert the touch point coordinates corresponding to the touch operation into second coordinates in the display unit according to the first display coordinate conversion relationship, and send the touch command in the touch operation information to the second electronic device, so that the second electronic device can implement the operation on the second coordinate position through the touch command.

#### **[0014]**

Establishing a display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content includes:

#### **[0015]**

Performing an image recognition operation on the real-time image to determine boundary information of a first display content in the real-time image, and acquiring a first display coordinate set included in an area determined by the boundary information;

#### **[0016]**

Determining a second display coordinate set corresponding to the first display content in the display unit;

#### **[0017]**

A display coordinate conversion relationship between the first display coordinate set and the second display coordinate set is established.

#### **[0018]**

Establishing a display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content includes:

#### **[0019]**

Accepting image selection information input by a user, and determining boundary information of a first display content from the real-time image according to the selection information, and acquiring a first display coordinate set included in the area determined by the boundary information;

#### **[0020]**

Determining a second display coordinate set corresponding to the first display content in the display unit;

#### **[0021]**

A display coordinate conversion relationship between the first display coordinate set and the second display coordinate set is established.

#### **[0022]**

The first electronic device and the second electronic device are spaced apart by a set distance, the image acquisition device includes a panoramic camera and a zoom camera, and the first electronic device acquires a real-time image including the first display content displayed by the display unit through the image acquisition device, including:

#### **[0023]**

Acquire all display contents currently displayed by the display unit through the panoramic camera;

#### **[0024]**

The zoom camera is controlled by the received image zoom instruction to obtain a zoomed image of any area in the display unit.

## **[0025]**

In a more optimized solution, the method further comprises:

## **[0026]**

Detecting the distance between the first electronic device and the second electronic device, if the first distance currently detected is different from the second distance previously detected, acquiring a second real-time image currently displayed in the touch display unit, and determining that the second real-time image includes the second display content displayed by the display unit;

## **[0027]**

A second display coordinate conversion relationship between the display coordinates corresponding to the second real-time image and the display coordinates corresponding to the second display content is established, and the first display coordinate conversion relationship is updated with the second display coordinate conversion relationship.

## **[0028]**

According to the above method, the present invention also provides an electronic device, wherein the electronic device is connected to a second electronic device in a wireless manner, and the electronic device includes an image acquisition unit and a touch display unit, including:

## **[0029]**

The image acquisition unit is used to acquire a real-time image including the first display content displayed by the display unit of the second electronic device, and send the real-time image to the touch display unit;

## **[0030]**

a corresponding relationship establishing unit, configured to establish a first display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content;

## **[0031]**

A control unit is used to detect touch operation information received by the touch display unit, determine whether the touch point coordinates of the touch operation correspond to the first display content contained in the real-time image according to the touch operation information, and if so, convert the touch point coordinates corresponding to the touch operation into second coordinates in the display unit according to the first display coordinate conversion relationship, and send the touch command in the touch operation information to the second electronic device, so that the second electronic device implements the operation on the second coordinate position through the touch command.

#### **[0032]**

The correspondence establishing unit is further used to perform an image recognition operation on the real-time image, determine boundary information of the first display content in the real-time image, and obtain a first display coordinate set included in the area determined by the boundary information; determine a second display coordinate set corresponding to the first display content in the display unit; and establish a display coordinate conversion relationship between the first display coordinate set and the second display coordinate set.

#### **[0033]**

The correspondence establishing unit is also used to accept image selection information input by a user, and determine boundary information of a first display content from the real-time image according to the selection information, and obtain a first display coordinate set included in the area determined by the boundary information; determine a second display coordinate set corresponding to the first display content in the display unit; and establish a display coordinate conversion relationship between the first display coordinate set and the second display coordinate set.

#### **[0034]**

In a more optimized embodiment, the image acquisition unit comprises:

#### **[0035]**

A panoramic camera, used to obtain all display contents currently displayed by the display unit;

#### **[0036]**

The zoom camera is used to obtain a zoomed image of any area in the display content of the display unit through the received image zoom instruction.

#### **[0037]**

Furthermore, the electronic device also includes:

#### **[0038]**

A distance measuring unit is used to detect the distance between the first electronic device and the second electronic device. If the first distance detected last time is different from the second distance detected last time, a second real-time image displayed in the current touch display unit is obtained, and it is determined that the second real-time image contains the second display content displayed by the display unit; a second display coordinate conversion relationship between the display coordinates corresponding to the second real-time image and the display coordinates corresponding to the second display content is established, and the first display coordinate conversion relationship is updated with the second display coordinate conversion relationship.

#### **[0039]**

One or two of the above technical solutions have at least the following technical effects:

#### **[0040]**

The method and device provided by the embodiment of the present invention use an electronic device including a zoom camera and a touch screen to control another electronic device. When a user obtains the content displayed on the display unit of another electronic device through the camera, it is displayed on the touch screen.

The user can control the desktop of the other electronic device within a certain distance range through the touch screen.

It is possible to control electronic devices with non-touch display screens by touch.

#### **[0041]**

### **BRIEF DESCRIPTION OF THE DRAWINGS**

#### **[0042]**

FIG1 is a schematic diagram of a remote control method of an electronic device according to an embodiment of the present invention;

#### **[0043]**

FIG2 is a diagram showing that the entire desktop display content of the controlled electronic device is included in the real-time image in an embodiment of the present invention;

#### **[0044]**

FIG3 is a diagram showing that part of the desktop display content of the controlled electronic device is included in the timely image in an embodiment of the present invention;

#### **[0045]**

FIG4 is a schematic diagram showing that a first electronic device has a certain inclination angle relative to a bottom edge of a second electronic device according to an embodiment of the present invention;

#### **[0046]**

FIG5 is a simplified diagram of the effect of the schematic diagram shown in FIG4 according to an embodiment of the present invention;

#### **[0047]**

FIG6 is a schematic diagram of displaying a selection box in a real-time image according to an embodiment of the present invention;

#### **[0048]**

FIG7 is a schematic diagram of a real-time image after enlarging the image according to an embodiment of the present invention;

#### **[0049]**

FIG8 is a schematic diagram of coordinate conversion performed by a second electronic device including two cameras according to an embodiment of the present invention;

#### **[0050]**

FIG9 is a schematic diagram of the structure of an electronic device according to an embodiment of the present invention;



## **[0051]**

FIG. 10 is a schematic diagram of the structure of an image acquisition unit according to an embodiment of the present invention.

## **[0052]**

### DETAILED DESCRIPTION

## **[0053]**

An embodiment of the present invention provides a remote control method for an electronic device, the method being applied between a first electronic device and a second electronic device, wherein the first electronic device and the second electronic device are connected wirelessly, the first electronic device comprises an image acquisition device and a touch display unit, and the second electronic device comprises a display unit, the method comprising: the first electronic device acquires a real-time image including a first display content displayed by the display unit through the image acquisition device, and displays the real-time image in the touch display unit; establishes a first display coordinate conversion relationship between display coordinates corresponding to the real-time image and display coordinates corresponding to the first display content; detects touch operation information received by the touch display unit, determines whether the touch point coordinates of the touch operation correspond to the first display content included in the real-time image according to the touch operation information, and if so, converts the touch point coordinates corresponding to the touch operation into second coordinates in the display unit according to the first display coordinate conversion relationship, and sends a touch command in the touch operation information to the second electronic device, so that the second electronic device implements an operation on the second coordinate position through the touch command.

## **[0054]**

The method provided in the embodiment of the present invention is applied in a first electronic device and a second electronic device, wherein the first electronic device is connected to the second electronic device in a wireless manner, the first electronic device includes an image acquisition device and a touch display unit, and the second electronic device includes a display unit.

The image acquisition device of the first electronic device may be a camera, and the camera captures all contents displayed on the display unit of the second electronic device, and displays the captured image contents in real time on the touch display unit.

A coordinate correspondence between the image content and the display content of the display unit is established, so that the user can observe the desktop of the display unit on the touch display unit, and can also operate and control the second electronic device by operating the touch display unit.

The operation control includes all mouse type control commands and some advanced commands, such as forward, backward, zoom, return, shutdown, copy and paste, etc.

#### **[0055]**

Furthermore, the distance between the first electronic device and the second electronic device is determined by means of a distance meter, so as to establish or update a conversion function between the touch display unit coordinates and the display unit desktop coordinates.

In addition, two cameras are provided to realize digital zooming of the captured images through the zoom camera, presenting the details of the controlled desktop to the user for easy user control.

#### **[0056]**

Embodiment 1, as shown in FIG1 , an embodiment of the present invention provides a remote control method for an electronic device, the method being applied between a first electronic device and a second electronic device, wherein the first electronic device and the second electronic device are connected wirelessly, the first electronic device comprises an image acquisition device and a touch display unit, the second electronic device comprises a display unit, and in this embodiment, the image acquisition device comprises a camera. The specific implementation of the present invention is described in detail below with reference to the accompanying drawings:

#### **[0057]**

In the embodiment of the present invention, the display unit of the controlled electronic device (the second electronic device according to the above conditions) is within the scanning range of the image acquisition device.

#### **[0058]**

In this implementation, if the device camera or the display unit included in the second electronic device is also a touch display unit, reverse control of the first electronic device can also be achieved at the same time.

## **[0059]**

Step 101: The first electronic device obtains a real-time image including the first display content displayed by the display unit through the image acquisition device, and displays the real-time image on the touch display unit;

## **[0060]**

In an embodiment of the present invention, the first display content can be all the contents of the current desktop of the display unit (as shown in Figure 2, where the diameter of the scanned area of the image acquisition device of the first electronic device is a-b), or it can be a part of the contents of the current desktop of the display unit (as shown in Figure 3).

In order to expand the scope of application of the method provided by the embodiment of the present invention, the first electronic device may be inclined at a certain angle to the horizontal plane (as shown in FIG. 4, and a simplified diagram is shown in FIG. 5, where the diameter of the scanned area of the image acquisition device of the first electronic device is a-b), with the lower left corner of the display unit of the second electronic device as the origin of the reference coordinate system, and the bottom edge as the reference line. The tilt angle is determined by the reference line.

## **[0061]**

In the embodiment of the present invention, the image acquisition device acquires the image in real time and needs to perform an update operation on the real-time image once the display content of the display unit changes.

## **[0062]**

In this implementation, the method for achieving real-time control of the display unit desktop content may be: periodically obtaining the content displayed on the display unit desktop.

The display content currently acquired is compared with the display content previously acquired. If the different pixel values are greater than a preset value, it is determined that the desktop content of the display unit has changed, and the real-time image is updated.

## **[0063]**

Step 102, establishing a first display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content;

#### **[0064]**

This step also includes performing an image recognition operation on the real-time image or determining the first display content in the real-time image through selection information input by a user.

#### **[0065]**

The method provided in the present invention can be implemented in a variety of ways to determine the first content in the real-time image. The following is a further description of determining the first display content in the real-time image in two ways: image recognition and user selection, which specifically include:

#### **[0066]**

(1) performing an image recognition operation on the real-time image to determine boundary information of a first display content in the real-time image, and obtaining a first display coordinate set included in an area determined by the boundary information;

#### **[0067]**

Determining a second display coordinate set corresponding to the first display content in the display unit;

#### **[0068]**

A display coordinate conversion relationship between the first display coordinate set and the second display coordinate set is established.

#### **[0069]**

(2) accepting image selection information input by a user, and determining boundary information of a first display content from the real-time image according to the selection information, and acquiring a first display coordinate set included in the area determined by the boundary information;

#### **[0070]**

In this embodiment, when image recognition is performed, a selection box is displayed on the touch display unit (as shown in FIG. 6 ).

By receiving the control information input by the user, the selection box is moved and scaled, so that the boundary of the first display content is overlapped with the boundary of the selection box, or the part of the first display content that needs corresponding operation control is selected in the selection box.

#### **[0071]**

Determining a second display coordinate set corresponding to the first display content in the display unit;

#### **[0072]**

A display coordinate conversion relationship between the first display coordinate set and the second display coordinate set is established.

#### **[0073]**

Step 103: Detect the touch operation information received by the touch display unit, and determine whether the touch point coordinates of the touch operation correspond to the first display content included in the real-time image according to the touch operation information; if so, convert the touch point coordinates corresponding to the touch operation into second coordinates in the display unit according to the first display coordinate conversion relationship, and send the touch command in the touch operation information to the second electronic device, so that the second electronic device can implement the operation on the second coordinate position through the touch command.

#### **[0074]**

In the implementation of the present invention, because the first electronic device can obtain a part of the desktop display content of the display unit, it is necessary to determine whether the coordinates of the touch point when the user performs a touch operation correspond to the first display image included in the real-time image. If so, it is determined that the touch operation is a touch operation performed on the display unit.

#### **[0075]**

The touch operation information includes touch point coordinates and touch operation instructions.

#### **[0076]**

In the embodiment of the present invention, the first electronic device is generally a handheld device with a touch display unit, so in a specific application, there may be a change in the relative displacement between the first electronic device and the second electronic device. Therefore, after the relative displacement changes, it is necessary to update the display coordinate conversion relationship in real time. The specific implementation method includes:

#### **[0077]**

Detecting the distance between the first electronic device and the second electronic device, if the first distance currently detected is different from the second distance previously detected, acquiring a second real-time image currently displayed in the touch display unit, and determining that the second real-time image includes the second display content displayed by the display unit;

#### **[0078]**

A second display coordinate conversion relationship between the display coordinates corresponding to the second real-time image and the display coordinates corresponding to the second display content is established, and the first display coordinate conversion relationship is updated with the second display coordinate conversion relationship.

#### **[0079]**

In step 102, the process of establishing a first display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content may be implemented as follows:

#### **[0080]**

The first electronic device records the ratio of the horizontal and vertical coordinates of the user's touch point to the border of the display unit in the real-time image.

That is, the ratio of the horizontal coordinate of the user's touch point to the horizontal border is  $X_R$ , and the ratio of the vertical coordinate to the vertical border is  $Y_R$ .

After obtaining these two values, they are transmitted to the second electronic device, and the second electronic device then knows the position of the user's touch point.

Therefore, in this implementation, the second electronic device only needs to determine the horizontal inclination angle of the local device, the length of the controlled computer frame

(calculated in pixels), and the coordinates of the user's touch point on the local device to determine the correspondence between the touch operation coordinates in the touch display unit and the coordinates in the display unit.

The determination method in specific applications is:

#### **[0081]**

As shown in FIG5 , the correspondence between the desktop of the display unit 502 and the real-time image displayed by the touch display unit L, this method needs to convert the touch coordinates of the user on the touch screen into coordinates based on the display unit, and the conversion formula can be implemented by the following steps:

#### **[0082]**

In order to avoid loss of generality, it is necessary to record the tilt angle of the second electronic device, take the lower left corner of L as the origin of the reference coordinate system, record the origin coordinates of RL as  $(x_0, y_0)$ , and the coordinates of the user touch point U as  $(x_L, y_L)$ . Thus, the corresponding straight line function of the four sides of RL can be established, where the lengths of sides a and b can be recorded as  $l_a$  and  $l_b$  (the pixels of L can be used as the unit):

#### **[0083]**

Let the straight line functions of sides a and b be:  $f_a(x)$ ,  $f_b(x)$ ;

#### **[0084]**

The distances from point U to edges a and b can be obtained, namely  $d_a$  and  $d_b$ , respectively. From this, the relative coordinates of point U in RL can be obtained,  $X_R = d_b / l_b$  and  $Y_R = d_a / l_a$ .

#### **[0085]**

Further, in order to facilitate the operation of the user, the image acquisition device of the first electronic device in the embodiment of the present invention may include two cameras, the two cameras are a panoramic camera and a zoom camera respectively, when the user performs a touch operation on the real-time image in the touch display unit, the first electronic device acquires the real-time image including the first display content displayed by the display unit through the image acquisition device, including:

#### **[0086]**

Acquire all display contents currently displayed by the display unit through the panoramic camera;

#### **[0087]**

The received image zoom instruction controls the adjustment zoom camera to obtain a zoomed image of any area in the display unit (the enlarged real-time image is shown in Figure 7).

#### **[0088]**

In this embodiment, in case of the panoramic camera dual camera, the two cameras are G-camera and Z-camera.

Among them, G-camera is a fixed-focus camera (i.e. panoramic camera) that can capture the entire screen of the controlled computer.

Z-camera is a zoom camera (i.e. a zoom camera), and users can change the Z-camera to perform zoom shooting.

#### **[0089]**

In the embodiment of the present invention, coordinate conversion refers to converting the coordinates of a click on the first electronic device into the corresponding coordinates on the desktop of the second electronic device (controlled device).

The conversion formula is related to the distance between the first electronic device and the desktop of the second electronic device, the G-Camera angle, and the zoom multiple. The conversion formula can be implemented by the following steps:

#### **[0090]**

As shown in FIG8 , if the plane of the second electronic device is R1-R4, the user's G-Camera can take a panoramic photo of the desktop of the second electronic device and project it on G1-G2.

When the user uses the Z-Camera to browse, the user moves forward and backward with the straight line x as the axis. It is assumed that the wide angle of the lens remains unchanged during the movement.

#### **[0091]**

When the Z-Camera moves to the position shown in the figure, the range displayed on the touch screen is the R2-R3 segment.



The meanings of the symbols in Figure XX are shown in Table 1.

[0092]

<img file="BDA0000147098690000111.TIF" he="529" img-content="drawing" img-format="tif" inline="no" orientation="portrait" wi="700"/>

[0093]

Table 1

[0094]

Take the horizontal axis as an example to derive the conversion formula:

[0095]

The goal of coordinate conversion is to convert the coordinates of the user's operating point P on the Z-Camera to the corresponding point Q on the plane of the second electronic device.

[0096]

The relative position of the user touch point P satisfies

[0098]

Among them,  $R_2 R_3$  is determined by the user adjusting the camera magnification, so  $R_2 R_3$  is the product of the zoom ratio and the panoramic range  $OR_5$ , so:

[0099]

$R_2 R_3 = \beta \cdot OR_5$  ,

[0100]

so

[0101]

According to the above figure, we can also infer

### [0103]

$$OR_{2} = \tan\theta(x_{0}x_{2} - x_{0}x_{1} - x_{1}x_{2})$$

### [0104]

$$OR_{5} = 2\tan\theta \cdot x_{0}x_{2} + G_{0}G_{2} - G_{1}^2$$

### [0105]

Since  $R_{1Q}(R_{2O} - R_{1O}) + R_{2Q}$ , after comprehensive arrangement, the horizontal coordinate  $R_{1Q}$  of point Q is obtained as follows:

### [0107]

As shown in FIG9 , according to the above method, the present invention further provides an electronic device, which is connected to a second electronic device by wireless means, and the electronic device includes an image acquisition unit 901 and a touch display unit 902, including:

### [0108]

The image acquisition unit 901 is used to acquire a real-time image including the first display content displayed by the display unit of the second electronic device, and send the real-time image to the touch display unit;

### [0109]

A corresponding relationship establishing unit 903, configured to establish a first display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content;

### [0110]

The control unit 904 is used to detect the touch operation information received by the touch display unit, and determine whether the touch point coordinates of the touch operation correspond to the first display content contained in the real-time image according to the touch operation information; if so, convert the touch point coordinates corresponding to the

touch operation into second coordinates in the display unit according to the first display coordinate conversion relationship, and send the touch command in the touch operation information to the second electronic device, so that the second electronic device can implement the operation on the second coordinate position through the touch command.

#### **[0111]**

The correspondence establishing unit 903 is further configured to perform an image recognition operation on the real-time image or determine the first display content in the real-time image through selection information input by a user.

#### **[0112]**

The electronic device provided by the embodiment of the present invention can determine the first content in the real-time image in a variety of ways. The following further describes the determination of the first display content in the real-time image in two ways: image recognition and user selection, specifically including:

#### **[0113]**

The correspondence establishing unit 903 is further used to perform an image recognition operation on the real-time image, determine the boundary information of the first display content in the real-time image, and obtain a first display coordinate set included in the area determined by the boundary information; determine a second display coordinate set corresponding to the first display content in the display unit; and establish a display coordinate conversion relationship between the first display coordinate set and the second display coordinate set.

#### **[0114]**

The correspondence establishing unit 903 is also used to accept image selection information input by a user, and determine boundary information of the first display content from the real-time image according to the selection information, and obtain a first display coordinate set included in the area determined by the boundary information; determine a second display coordinate set corresponding to the first display content in the display unit; and establish a display coordinate conversion relationship between the first display coordinate set and the second display coordinate set.

#### **[0115]**

As shown in FIG10 , in order to facilitate the user's operation, the image acquisition unit 901 of the first electronic device in the embodiment of the present invention may include two cameras, which are a panoramic camera 1001 and a zoom camera 1002:

#### **[0116]**

The panoramic camera 1001 is used to obtain all display contents currently displayed by the display unit;

#### **[0117]**

The zoom camera 1002 is used to obtain a zoomed image of any area in the display content of the display unit through the received image zoom instruction.

#### **[0118]**

In the embodiment of the present invention, the first electronic device is generally a handheld device with a touch display unit, so in a specific application, there may be a change in the relative displacement between the first electronic device and the second electronic device. Therefore, after the relative displacement changes, it is necessary to update the display coordinate conversion relationship in real time. The device provided by the embodiment of the present invention also includes:

#### **[0119]**

The distance measuring unit 905 is used to detect the distance between the first electronic device and the second electronic device. If the first distance detected currently is different from the second distance detected previously, a second real-time image displayed in the current touch display unit is obtained, and it is determined that the second real-time image contains the second display content displayed by the display unit; a second display coordinate transformation relationship between the display coordinates corresponding to the second real-time image and the display coordinates corresponding to the second display content is established, and the first display coordinate transformation relationship is updated with the second display coordinate transformation relationship.

#### **[0120]**

The above one or more technical solutions in the embodiments of the present application have at least the following technical effects:

#### **[0121]**

The method and device provided by the embodiment of the present invention use an electronic device including a zoom camera and a touch screen to control another electronic device. When a user obtains the content displayed on the display unit of another electronic device through the camera, it is displayed on the touch screen.

The user can control the desktop of another electronic device within a certain distance range through the touch screen;

#### **[0122]**

This method can enable users to flexibly control multiple computers, and can also enable multiple users to control one computer;

#### **[0123]**

This method has no restrictions on the controlled computer desktop and can be applied to a variety of computer display modes, including CRT, LCD, LED, liquid crystal, capacitive screen, resistive screen, projection, etc.

#### **[0124]**

This method only requires the controlled computer to provide a wireless input interface, without other software and hardware requirements;

#### **[0125]**

Cameras and touch screens have become standard features of smartphones, and rangefinders can also be easily integrated into handheld devices such as mobile phones. Therefore, this method can be easily implemented on handheld devices such as mobile phones.

#### **[0126]**

The method described in the present invention is not limited to the embodiments described in the specific implementation manner. A person skilled in the art may derive other implementation manners based on the technical solution of the present invention, which also fall within the technical innovation scope of the present invention.

#### **[0127]**

Obviously, those skilled in the art can make various changes and modifications to the present invention without departing from the spirit and scope of the invention.

Thus, if these modifications and variations of the present invention fall within the scope of the claims of the present invention and their equivalent technologies, the present invention is also intended to include these modifications and variations.

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## CLAIMS CN103365572A

1.

A remote control method for an electronic device, the method is applied between a first electronic device and a second electronic device, wherein the first electronic device and the second electronic device are connected wirelessly, the first electronic device includes an image acquisition device and a touch display unit, and the second electronic device includes a display unit, wherein the method includes:

The first electronic device acquires a real-time image including the first display content displayed by the display unit through the image acquisition device, and displays the real-time image on the touch display unit;

Establishing a first display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content;

Detect touch operation information received by the touch display unit, and determine whether the touch point coordinates of the touch operation correspond to the first display content included in the real-time image according to the touch operation information; if so, convert the touch point coordinates corresponding to the touch operation into second coordinates in the display unit according to the first display coordinate conversion relationship, and send the touch command in the touch operation information to the second electronic device, so that the second electronic device can implement the operation on the second coordinate position through the touch command.

2.

The method according to claim 1, wherein establishing a display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content comprises:

Performing an image recognition operation on the real-time image to determine boundary information of a first display content in the real-time image, and acquiring a first display coordinate set included in an area determined by the boundary information;

Determining a second display coordinate set corresponding to the first display content in the display unit;

A display coordinate conversion relationship between the first display coordinate set and the second display coordinate set is established.

### 3.

The method according to claim 1, wherein establishing a display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content comprises:

Accepting image selection information input by a user, and determining boundary information of a first display content from the real-time image according to the selection information, and acquiring a first display coordinate set included in the area determined by the boundary information;

Determining a second display coordinate set corresponding to the first display content in the display unit;

A display coordinate conversion relationship between the first display coordinate set and the second display coordinate set is established.

### 4.

The method according to claim 1, wherein the first electronic device and the second electronic device are separated by a set distance, the image acquisition device comprises a panoramic camera and a zoom camera, and the first electronic device acquires a real-time image including the first display content displayed by the display unit through the image acquisition device, comprising:

Acquire all display contents currently displayed by the display unit through the panoramic camera;

The zoom camera is controlled by the received image zoom instruction to obtain a zoomed image of any area in the display unit.

### 5.



The method according to any one of claims 1 to 4, characterized in that the method further comprises:

Detecting the distance between the first electronic device and the second electronic device, if the first distance currently detected is different from the second distance previously detected, acquiring a second real-time image currently displayed in the touch display unit, and determining that the second real-time image includes the second display content displayed by the display unit;

A second display coordinate conversion relationship between the display coordinates corresponding to the second real-time image and the display coordinates corresponding to the second display content is established, and the first display coordinate conversion relationship is updated with the second display coordinate conversion relationship.

## 6.

An electronic device is connected to a second electronic device in a wireless manner, the electronic device comprises an image acquisition unit and a touch display unit, and is characterized in that it comprises:

The image acquisition unit is used to acquire a real-time image including the first display content displayed by the display unit of the second electronic device, and send the real-time image to the touch display unit;

a corresponding relationship establishing unit, configured to establish a first display coordinate conversion relationship between the display coordinates corresponding to the real-time image and the display coordinates corresponding to the first display content;

A control unit is used to detect touch operation information received by the touch display unit, determine whether the touch point coordinates of the touch operation correspond to the first display content contained in the real-time image according to the touch operation information, and if so, convert the touch point coordinates corresponding to the touch operation into second coordinates in the display unit according to the first display coordinate conversion relationship, and send the touch command in the touch operation information to the second electronic device, so that the second electronic device implements the operation on the second coordinate position through the touch command.

## 7.

The electronic device as claimed in claim 6, characterized in that the corresponding relationship establishing unit is further used to perform an image recognition operation on the real-time image, determine the boundary information of the first display content in the real-time image, and obtain a first display coordinate set included in the area determined by the boundary information; determine a second display coordinate set corresponding to the

first display content in the display unit; and establish a display coordinate conversion relationship between the first display coordinate set and the second display coordinate set.

## 8.

The electronic device as described in claim 6 is characterized in that the correspondence establishing unit is also used to accept image selection information input by a user, and determine the boundary information of the first display content from the real-time image according to the selection information, and obtain the first display coordinate set included in the area determined by the boundary information; determine the second display coordinate set corresponding to the first display content in the display unit; and establish a display coordinate conversion relationship between the first display coordinate set and the second display coordinate set.

## 9.

The electronic device according to claim 6, wherein the image acquisition unit comprises:  
A panoramic camera, used to obtain all display contents currently displayed by the display unit;

The zoom camera is used to obtain a zoomed image of any area in the display content of the display unit through the received image zoom instruction.

## 10.

The electronic device according to any one of claims 6 to 9, characterized in that the electronic device further comprises:

A distance measuring unit is used to detect the distance between the first electronic device and the second electronic device. If the first distance detected currently is different from the second distance detected previously, a second real-time image displayed in the current touch display unit is obtained, and it is determined that the second real-time image contains the second display content displayed by the display unit; a second display coordinate conversion relationship between the display coordinates corresponding to the second real-time image and the display coordinates corresponding to the second display content is established, and the first display coordinate conversion relationship is updated with the second display coordinate conversion relationship.