The remote control research based on the Android platform

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Abstract. With the rapid development of mobile terminals and wireless networks, the relationships between computers and mobile phones are more and more closely. Now, the mobile phones and computer become indispensable to modern society in the daily life. The information transmission and exchange between them has become increasingly frequent. The purpose of this research is to find a safe way of connection with low cost, low power consumption, convenient and flexible, so that we can finish the information exchange quickly and accurately between mobile phone and computer. Because of using a socket connection mode, the physical line media is not needed.

1. Introduction

In the rapid development of network technology and embedded technology, more and more people are constantly pursuing the efficiency of life now under the condition of the fast pace of life. At present, the remote control software becomes the indispensable tool for people to learn and work [1]. In many cases, such as people learn in different office, it can be used for the remote control software [2]. Cell phones are very portable mobile terminals and in many environments, we can use mobile phones to manage computers in real time.

This research is mainly about the mobile phone how to control the remote computer. The system contains the following functions. 1) To simulate the mouse control. It includes moving the mouse, the mouse click on left and right key, simulation mouse pulley operation, dragging and dropping files and custom function of up and down on the volume key. 2) Keyboard input control. It includes sending any text in Chinese or English to a computer, backspace button simulation, receiving the information from cell phone under DOS and control of the key direction. 3) The game controller simulation. In the landscape phone mode, the left key is to control the direction and the right shooting button for operation is equivalent to the mouse button click [3].

2. Framework and related technologies

2.1. The functional requirements

Android remote control platform requires the server (PC) and the client (Android phone application). In the communication, they will become the problem of the following technologies. The main problems are the network Socket programming and android multithreaded programming [4]. Computer is as the server and mobile phone is as the client. Both of them communicate with the socket way. First, computer opens one port, then the cell phone will connect computer's IP and port,
then the phone will send the corresponding string according to the different events, the next the server will parse the string and call the corresponding operation to simulate the mouse and keyboard. The remote control platform can realize the following functions. They include mainly the mouse control simulation and the keyboard control simulation and the game controller simulation. The program execution process is shown in Figure 1.

2.2. The whole structure
The whole structure of the software platform is with the method of socket communication within the client and server in a net. Computers and mobile phones need respectively to be the server and client. Then both of them can communicate. According to the trigger event and the corresponding string of the phone, computer can parse and complete the corresponding operations, so as to realize the remote control function of mobile phone. This is the overall architecture of the system, as shown in Figure 2. The Android frame is shown in Figure 3.
This research needs to solve the following work. It includes the design on the PC and on the phone.
(1) UI design on the android mobile phone. They need to be designed such as main page, handle mode interface, keyboard and mouse control panel interface, menu bar design interface. The platform framework adopts the eclipse and ADT and AndroidSDK. It can use the eclipse development plugin in the android for programming [5].
(2) The service program design on the android mobile phone. It includes the socket communication group and android multithreading [6]. The main parts are the response of the various menu events and the response to events of physical keys of mobile phone.
(3) Algorithm design and analysis of mouse moving distance of touchpad on Android mobile phone. It also includes the algorithm of the touchpad in the handle mode of Android mobile phone.
(4) The design and drawing of the main page of the UI service program on the PC side. It adopts Java's inherent class library and method and uses JFrame to create forms [7].
(5) The socket connection of the PC service program and how to receive real time data and trigger different behaviors. The response functions of the PC service program realize the events response.

2.3. The realized results
The remote control platform is divided into server and client in structure. The server front-end information is mainly composed of inputted IP and port information. The background operation mainly uses socket to receive and analyse packets. There are mainly four pages and a menu page in the client front-end. The back-end is mainly sending and computing package information according to the socket. The following pictures show some functions of the system. They are shown in Figure 4 and Figure 5.

3. Algorithm implementation
The main algorithm idea of the program is on the client under Android. These algorithms include mouse simulation algorithm, mouse wheel algorithm, multithreading and multi touch technology. When simulating mouse operation, the coordinate calculation of mouse shall be transferred to the coordinate calculation of PC server, and in addition, horizontal mouse operation shall be carried out in handle mode. These algorithms are very complex to implement.

3.1. The SOCKET communication technology analysis
Socket is a network programming interface, which is the cornerstone of communication. The application can access the communication protocol through the Socket. The socket communication flow chart on the server and the client is shown in Figure 6.

![Socket communication flow chart on the server and the client]

3.2. The mouse simulation algorithm and the mouse wheel algorithm
The main algorithmic thought of the platform is on the client side of Android. In the program, the mouse coordinate calculation including the transverse mode of the handle is needed to pass to the PC server. The mouse operation and the calculation of the coordinates of the cursor are the difficult parts in the algorithm. Some of the coordinate calculation algorithms are as follows.

### 3.3. Multithreading technology

In daily development, there are two ways to implement multithreading in Android and Java. The first is to inherit the thread class, and the second is to implement the runnable interface. The handler can be used to accept the data sent by the sub thread, and update the UI with this data in cooperation with the main thread. When the application starts, the first thing to start is a main thread. The main thread is the UI control in the management interface, which is responsible for event distribution. For example, if you click a button, Android will distribute the event to the button to respond to the button operation.

The handler can distribute message and runnable objects to the main thread. After distribution, each handler instance will be bound to the thread that created it. It has two functions: one is to arrange messages or runnable to perform corresponding operations in a certain place in a main thread, and the other is to arrange an action to perform an operation in a different thread.

### 3.4. Multi-touch technology

In essence, the Android system can realize multi-touch only with the support of LCD driver and program. Now, as long as the mobile phone uses the capacitive screen touch principle, the mobile phone can support multi-touch technology. This multi-touch technology will have a stronger sense of operation for zooming web pages and gesture operation. Therefore, multi-touch plays an irreplaceable role in enhancing user experience. In multi-touch technology, the MotionEvent object is used to process events on Android platform. When touch occurs, it is action Down, when the touch finger starts to move, it corresponds to action Move, and when the finger is released, it corresponds to action UP.

### 4. Conclusion
The effect of the computer remote control platform is very good after the test. This program is very practical. Using Java technology and Android technology, the functions of mobile phone to control computer are basically realized. By using socket communication, multithreading and Java app, the functions of each part of the platform are realized, which also embodies the strong charm of Java.

System still has shortcomings, such as system function also is not very complete. Image transmission and voice transmission have not been involved. Software function remains to be further improved. The interface should be further more friendly. The user is more convenient to use.

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