

Android Application for Remote Control of Personal Computers

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Annotation: The development of mobile devices, particularly in these modern times, has brought about a significant transformation in the way business is conducted. The capability of a mobile phone device is frequently anticipated to be comparable to that of a computer. In this day and age, the majority of people who use mobile phones feel that performing some things on their computers is inconvenient. The majority of people find that switching postures when sitting or stretching not only makes them feel more comfortable, but also makes them feel more at ease when they are browsing through their laptops. Standing five or ten feet away from the computer while being restricted to using only the keyboard and mouse can be an impractical situation. Additionally, the system provides the features to access the files that are available on the computer; if the file appears to be a media file, this Android app can play, pause, stop, mute, and turn on/off full-screen mode of the respective media. As a result, the application that is being proposed is intended to transform the handphone into a wireless keyboard or mouse that also includes a touch pad. The wireless network is the medium through which the link is established (WiFi). It has been demonstrated that this prototype is capable of performing the majority of the functions that are often associated with a computer.

Keywords: Personal Computers, Touch-pad, Keypad, Android Application, Remote Control, Multi-Scrolling, Pinch Gesture.

Introduction

Human being can't have Android without these essential and interdependent components. An RDX file outlining the specifications needed for a mobile device to run the software stack [5-9]. A mobile-optimized Linux kernel that manages memory, processes, and provides a low-level interface to the hardware. A media manager, SQLite, WebKit, and OpenGL are all part of the open-source application development libraries. The Dalvik virtual machine and the core libraries that offer functionality exclusive to Android are part of the run time that is utilised to execute and host applications [10-15]. The runtime is optimised for mobile devices to be minimal and efficient. Media compatibility with popular audio, video, and still image file types (MPEG4, H.264, MP3, AAC, AMR, JPG, PNG, GIF). Services provided include Bluetooth, EDGE, 3G, and Wi-Fi. Using SQL Lite for storing structured data. A Rich Development Environment (RDE) is a set of tools that comprises an Eclipse IDE plug-in, a device emulator, debugging tools, memory and performance benchmarking, and more [16-19].

Android, the mobile operating system, is free and open source. Android may be installed on any mobile device. Any OS can have the whole environment needed to build Android applications installed [20-24]. Android just needs 250 kbytes of space. With the separation of view and logic in the source code, the application model/lifecycle is future-oriented. The Android platform's emulator is sleek and user-friendly [25-31]. Eclipse and the Android Debug Bridge (ADB) allow users to install applications on emulators and devices (with ADT plug-in). To familiarise oneself with Android and its application development capabilities, Google provides excellent documentation in addition to numerous samples. Android is compatible with all the current methods and protocols for transferring data, media, and communication [32-36].

Literature Survey

According to Chong et al. [1], the development of mobile devices, particularly in the present day, has had a profound impact on the corporate landscape. A lot of people think a mobile phone should be able to do things a PC can. Most people who use mobile phones nowadays find it annoying when they have to utilise their laptops to complete certain things. While sitting or stretching, most people prefer to switch positions, and some even find it more comfortable than others while using computers. Constantly hunched over a computer, whether it's five or ten feet away, may be a real pain. Constant sitting causes aches and pains in the back and neck, but this prototype would alleviate those problems. This prototype will assist reduce the occurrence of such stressful times. The user experience needs more than just a keyboard and mouse to be truly handy; additional functions are still needed to fully realise the potential of the system. The potential of remote computer control through Android phone device is investigated in this study. The suggested model can mimic the functionality of a standard computer mouse and keyboard in many ways. It adds a wireless network capability to a mobile phone, thus making it a wireless keyboard and mouse.

A web-based system for remote exploration and control has been created by utilising web applications, databases, GSM networks, and Android mobile phones, as demonstrated by Milton and Khan [2]. An Android mobile phone and any electrical items linked to it can be controlled remotely using the web app. The first step is for the web app to transmit the command and store it in the database. The database sends commands to the Android mobile phone, which reads them. As a result of carrying out the order in accordance with the specified procedure, it produces the desired result. Automatically snapping images of the area and uploading them to the server is made possible using the command. Automatically transmitting the mobile phone's GPS position to the server's database is another feature it offers. As a result, its location and collateral status can be detected by the gadget. As a result, it has applications in security and monitoring systems. A DTMF tone signal can be produced on an Android phone by executing the command. When connected to a mobile phone, a DTMF detecting circuit may automatically discern the DTMF tone signal and produce an output of 4-bit digital code. Any electrical equipment can be controlled with this digital output code.

Shi and Yan [3], As more advanced technologies and Android smartphones become available, smart living is slowly but surely becoming a part of people's daily lives. The technology required to produce intelligence, controllability, and ease of use is provided by Bluetooth, which seeks to transmit data wirelessly across short distances utilising short-wavelength radio waves. This paper presents a new Smart Living system that uses Bluetooth-based Android smartphones to manage house lights. It also includes a prototype of the system. We begin with a brief overview of Bluetooth, Smart Living, and Smartphones. Secondly, the hardware design, communication protocol, and system architecture are detailed. The illumination status can be more easily gathered and controlled using the microchip, which also serves as the interface for doing so. The Bluetooth module can communicate with a Bluetooth-enabled phone by sending and receiving orders. A single Bluetooth connection allows a host device to talk to as many as seven Bluetooth modules simultaneously. Because it's a Bluetooth

connection, the control distance is going to be a major hurdle. In particular, the paper's focus is on developing a Bluetooth-based home lighting management system as a means to actualize Smart Living. A system that can be controlled and monitored by an Android phone with Bluetooth and BF10-A modules for wireless lighting has been developed and tested.

The introduction of mobile phones as crucial electronic devices in our life was made by Kumar and Padmavathy [4]. The upshot is that security systems and home automation apps are already standard on most smartphones. An Android app that communicates with the security system via Wi-Fi Direct is presented in this article. Wi-Fi has a lot of room to grow and find real-world uses as it's still a young technology compared to others. When installed on mobile devices, the Android app can communicate with security systems and provide an intuitive user interface. You may use the app to control the locks on your home, open them, or even keep an eye on things from a distance. In response to these user commands, the security system takes action. The security system includes a CMOS camera and a motion detector for remote monitoring. At the end of the research, the mobile device was able to connect with the microcontroller from about 200 feet distant, even through solid barriers. About one second elapsed between locking and unlocking and taking action. No plans for a battery backup system's design or construction are available. The goal of this research was to design an Android mobile device's security interface.

Additionally, it was to be an easy-to-use, short-range system. We were able to accomplish the range and security requirements by utilising the mobile device's built-in WiFi capabilities [37]. In this stage, we assess the research's viability and present a business proposal outlining the research's broad strokes and rough budget. The suggested system's feasibility research needs to be executed during system analysis. This makes sure the business won't have any problems with the suggested system. Familiarity with the system's primary needs is crucial for conducting a feasibility study [38-41]. The purpose of this research is to determine the system's potential monetary effect on the market. Research and development of the technology can only be funded up to a certain point. There needs to be a rationale for the spending. From a monetary standpoint, our system protects the user's financial side [42-45].

The technical requirements, or viability, of the system are the focus of this study. The designed system shouldn't put a strain on the current technological infrastructure [46-49]. As a result, the available technical resources will be put to good use. Because of this, the client will face a great deal of pressure. We made sure that our system wouldn't put too much strain on the user. Our apps are designed for users with less technical experience [50-53]. We provide good lessons and make it easy so that users don't feel pressured to work on the app. One goal of the research is to find out how satisfied users are with the system. Instruction on how to make the most of the system is a part of this [54]. The user shouldn't see the system as an enemy but rather as an essential tool. How well the user is taught and becomes accustomed to the system determines the extent to which the users will embrace it. After receiving training on the application, the user requires nothing in the way of further instruction to operate the desktop using the offered modules [55-61].

System Analysis

Up until recently, controlling a PC from a mobile device over Bluetooth was not a reality. Unfortunately, there is no way to connect securely on the server end [62]. From afar, we are unable to access the duties related to media and presentations. In today's system, smartphones are the main tool for quick and intelligent tasks. Passwords in our system ensure the Remote Server's security [63-69]. Whether or whether the task is completed does not need to be visible to the user. The system's screen, which shows every operation, is held by the mobile. When you use our Android app with a wireless keyboard and mouse, you may easily transfer files to your PC [70-75]. To make things easier for the user, the remote server only needs to be started without any extra server-side operations. All users will find the user interface to be convenient, with appropriate fragment activity and a short screen that resembles a tutorial when first using it. A connection to a wireless network has been made [76-81]. Client-Server

interaction authentication correctly implemented. Make using a computer easier by making the screen of our mobile device available (Figure 1).

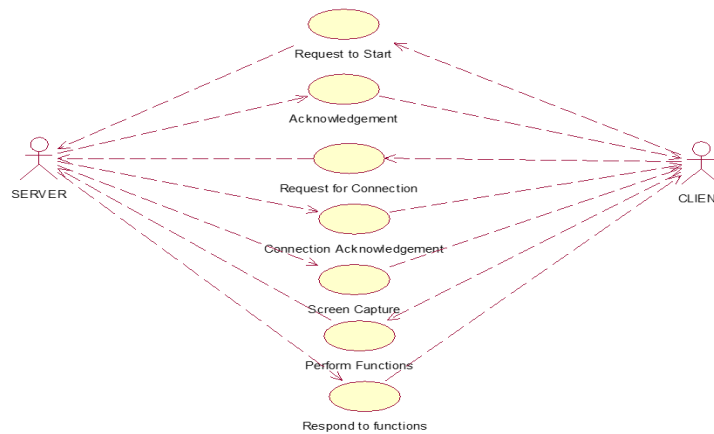


Figure 1: Use case Diagram

Human beings may document and validate your reasoning with the use of sequence diagrams, which visually represent the flow of logic within your system [82-89]. They find widespread application in analysis and design. When it comes to dynamic modelling, sequence diagrams are by far the most used UML item. They let you identify the behaviour of your system (Figure 2).

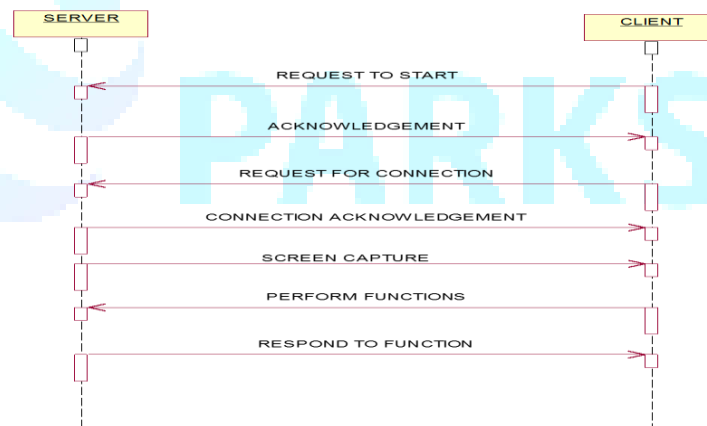


Figure 2: Sequence Diagram

The collaboration diagram is an additional kind of interaction diagram. An interaction diagram depicts the messages exchanged among objects in a collaboration to accomplish a common goal, whereas a collaboration diagram depicts a group of items connected to a certain context [90-96]. Using choice, iteration, and concurrency, activity diagrams graphically depict processes of sequential operations and activities. Activity diagrams are a great tool for describing the operational and business processes that go through a system [97-101].

Implementation

Create an app for the Android platform. The screen of our portable device does not allow us to operate our personal computer when seated in one location. Thus, Bluetooth and WiFi are used in place of GPS in an Android interior navigation software (Global Positioning System) [102-105]. In order to carry out the tasks, we develop

and install an Android application on the user's mobile phone, which is known as the mobile client. The authentication and connection setup procedures make up the Application First Page. Create a main server that uses the jar format. Password, WiFi, and Bluetooth server information are all displayed here. The mobile clients are able to communicate with the server application [106-111]. Their mobile client and the server can communicate by Bluetooth or Wi-Fi. Java is a great language to use for developing a server application. On your server side, you will see a notification that says "Server Started" when the server starts. Client-Server communication is made more secure with the use of a password. Both the server and the client will display this password when they establish the connection [112-116]. A "Connection Established" message will be shown if the passwords of the two computers are same. In such a case, the client will see "Connection Refused" displayed. The Unauthorized User cannot access the server. This section details how a standard computer's mouse and keyboard work [117-121].

There are left and right click buttons, just like a wired mouse, and the layout of the keyboard is similar to that of an Android keyboard. Play, pause, skip, previous, stop, shuffle, and repeat are some of the keys that this module uses to control the music and films [122-127]. Using the presentation as a guide, you can open PowerPoint, where you'll find controls to go to the next and previous slides, make edits, and even use the laser pointer. Once you launch File Explorer, it will copy all of the partitions from your computer to the device. Using your mobile device, you can choose the necessary files [128-131]. After you connect your mobile device to the internet, the client's screen will mirror that of the connected computer, allowing them to more easily access their laptop or desktop up to a given distance, provided that the connection remains stable (Figure 3).

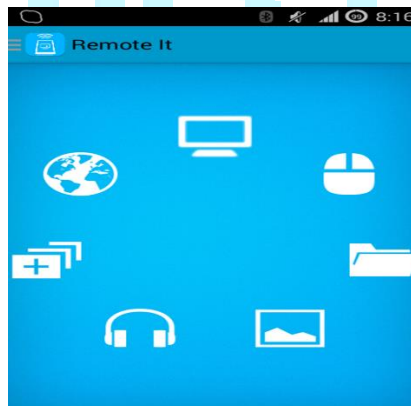


Figure 3: Screenshot of the home page

System Testing

The goal of doing tests is to identify mistakes. Finding any and all potential issues with a product is what testing is all about. Assemblies, subassemblies, components, and the final product can all be tested in this manner. Software testing is the process of putting a programme through its paces to make sure it works as expected and doesn't crash. Different kinds of examinations are available [132]. There is a distinct need for each test type. To ensure that the program's underlying logic is working as it should and that programme inputs generate legitimate outputs, unit testing is conducted by creating test cases. It is important to validate all decision branches and the internal code flow. Unit testing is the process of evaluating certain parts of an application's code. It's done after each item is finished before they are integrated. This intrusive structural testing is dependent on prior understanding of its build. By focusing on a single business process, application, or system configuration, unit tests are able to do fundamental component-level testing. The purpose of unit testing is to verify that all individual business process paths adhere to the established requirements and have well-defined inputs and outputs. In our system, unit testing occurs after each module is completed. For example, after the mouse module is finished, it will be tested to see if

it points the cursor where the user places it. Similarly, after the keyboard module is finished, it will be tested to make sure all the keys, including the alphabet, are functioning properly. For other modules, each functionality will be checked individually.

The purpose of an integration test is to verify that two or more pieces of software can function together as intended. Screen or field outputs are the primary focus of event-driven testing. All of the parts work together as they should. Finding issues that manifest as a result of combining components is the main goal of integration testing. Integration The server side is where our system's testing takes place. As a component, the server is put through its paces, with the aim of ensuring that the wifi and Bluetooth servers are functioning properly and linked to the client. Various phones and computers were used to test the research's applications.

Additionally, my coworkers were given the applications to test, and we received comments. Phones running Android versions lower than 3.0 will not be able to utilise the research's Android app. Before testing the research, make sure that the client and server both have fully functional Wi-Fi or Bluetooth. In addition, the client and server need to be in range, which varies by phone model and Bluetooth or Wi-Fi version. Newer Bluetooth devices have a maximum range of 100 metres. All of this was considered when the testing was carried out. What follows are the test cases.

There was no change to the client app's user interface, therefore using it on various phones was simple and nearly identical due to the phones' nearly identical screen sizes. While testing the programme, we experienced an interruption when bringing the server and client within a specific range of 10-20 metres. At distances more than 20 metres, the signal was feeble. The phones were experiencing problems establishing a connection to the server. As long as the Bluetooth range between the client and server was less than 10 metres, the research performed smoothly. But within a 20-meter Wi-Fi range, the initiative was a success.

Various computers were used to execute the server programme, while the LG Optimus L7 was used as the client to test the research. Within a 10-meter range, this research ran smoothly on all of the tested PCs and did not encounter any of the problems described in the test cases. Taken together, all devices performed admirably within a certain range when executing this assignment. The server programme ran smoothly on all of the machines. Nevertheless, there were some instances of the client application crashing while in use. The crash could have been caused by a poor signal or a problem with the Bluetooth connection. Additionally, other users were assigned the research for testing purposes. The apps were deemed user-friendly by the users. An integral aspect of every research, User Acceptance Testing necessitates heavy involvement from the target audience. Furthermore, it verifies that the system satisfies the functional specifications. An important part of our system is the acceptance test, which ensures that the final user is happy with the way the system was built. The system has to be modified to ensure end-user satisfaction in the event that any modules do not function.

Conclusion

Within the scope of this study, the possibility of remotely managing the computer through the use of an Android phone device is investigated. The prototype that has been developed is capable of controlling a variety of tasks that a typical computer keyboard and mouse would carry out. It essentially transforms a mobile phone into a wireless computer, allowing you to access the screen of your personal computer and carry out operations on your mobile device by utilising a wireless network. This makes it easier for people who use mobile phones to operate their devices by using the prototype. Additionally, the system that has been presented has been developed in such a way that the mobile device may control the computer for a given distance, which is similar to the distance that Wi-Fi and Bluetooth cover. GPRS may be able to take the place of the distant connection that is established by SMS in the future directions of this research. GPRS is capable of operating at greater distances, which enables the user to access their computer from a greater distance.

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