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User-Centric Design and Implementation of File Sharing Platform with Real Time Collaboration.

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Abstract - *The necessity for seamless file sharing and remote device control has grown in importance in today's fast-paced digital world. The goal of this project is to close the gap between laptops and mobile devices by introducing a user-friendly Java-based application. Using Java's Socket class, the application enables simple wireless communication between a laptop serving as the server and a mobile device serving as the client. Quick file transfers between devices are possible without the inconvenience of extra storage or physical connections. Additionally, the application gives users the ability to remotely operate their laptops by letting them use their mobile devices as virtual keyboards, mice, and joysticks. This user-friendly interface increases convenience and productivity by giving users a flexible toolkit for interacting with their laptop remotely. The screen sharing feature of the application is essential to its functionality as it enables users to instantly mirror their laptop screens onto their mobile devices. This feature improves flexibility and accessibility, allowing users to work or present from anywhere with ease. It also makes remote monitoring and collaboration easier. This project intends to simplify the interaction between laptops and mobile devices by merging file sharing, remote control, and screen sharing features into a unified Java-based client-server architecture. In the end, it provides users with an all-inclusive solution for remote control and wireless file sharing, meeting the changing needs of contemporary digital workflows.*

Key Words: **Socket Programming, Robot Class, Wi-Fi Direct, Java, Android, File Sharing, Remote Control, Platform Independent**

1.INTRODUCTION

It is becoming more and more common to need to operate computers wirelessly in a variety of settings, from modern offices and conference rooms to portable work environments and classrooms. This is especially true when projecting screens onto larger displays like televisions or projectors. This project has a cutting-edge Android application that has been painstakingly designed to simplify Remote Desktop management. Technological progress has brought forth a new era wherein mobile devices now possess technological capabilities that were previously limited to classic PC designs. It is imperative that these devices be combined with this application in order to promote smooth operation and increased user engagement between desktop and mobile platforms.

Reducing the discomfort commonly associated with traditional computer use is the main goal of this application design. Through the application, users can easily search for files, navigate desktop applications, and carry out a variety of tasks, which contributes to improving user experience and productivity. Establishing a Wi-Fi link between the two systems is essential to its operation. The suggested program serves as an intermediate, allowing remote control orders to be sent from the user's mobile device to the computer. It also makes it easy for users to download files straight to their cellphones from the remote PC, which maximizes accessibility and workflow efficiency.

1.1 Proposed Model

The need to store important papers and information on mobile devices has become commonplace in the modern world, where smartphone usage is on the rise and mobile device popularity is unparalleled. Still, accessing material saved on PCs is crucial even with the vast storage capacities of mobile devices. When this happens, it might be quite difficult to find a certain document on the mobile device, especially if there is no way to physically access the computer. Our application offers a seamless workaround for this built-in barrier by letting customers access their computer systems straight from their mobile devices.

The primary objective of our project is to bridge the gap between mobile devices and computer systems, empowering users to browse, search, and download files from their computer's shared drive remotely. Users no longer need to be physically close to the computer in order to retrieve important files because a mobile application grants access to the shareable drive on the computer. This feature allows users to engage with their computer systems independently and without regard to location, improving accessibility while simultaneously promoting greater flexibility. Our suggested model essentially aims to rethink the idea of remote computer access by allowing users to easily include mobile devices into their computing workflows for increased convenience and productivity.

1.2 System Design

System Architecture:

Figure-1 illustrates the architectural structure of both the client and server sides of the proposed project system. On the client side, which consists of an Android device, various components are delineated, each with specific and well-defined functionalities. This Android device serves as the control interface for the remote PC, enabling users to interact with it remotely. Conversely, the server side comprises components responsible for facilitating communication and data exchange with the client device. Together, these components form a cohesive system architecture that enables seamless remote control and file access between the Android device and the remote PC.

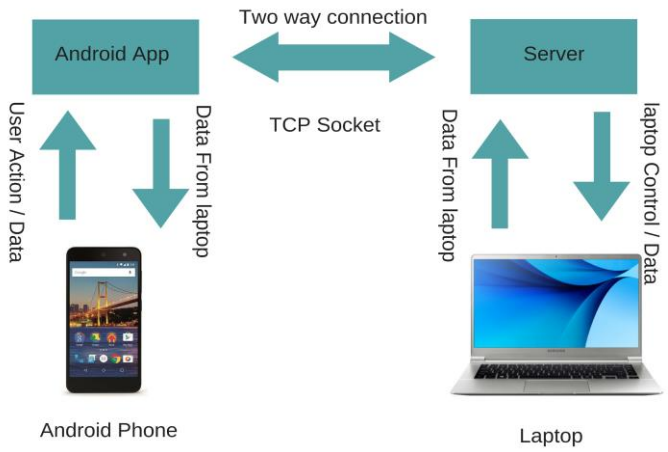

Fig -1: System Architecture

2. LITERATURE SURVEY:

Using Smartphone as an Intelligent PC Controller:

The goal of this project is to create a mobile application and software that will enable users to use a smartphone to interact with and manage a laptop or PC. It also allows you to use your smartphone as a controller for multiplayer games that are shown on external screens. Making use of a substantial external screen improves graphics performance, gives users more mobility, and encourages social interaction in different metropolitan environments.

Mobile Phone Controlling PC:

This study presents an innovative method of using a mobile phone to control a computer system. In contrast to conventional client-server approaches, the goal of this project is to interface mobile phone hardware and software with computers. Mobile phones can be used to turn on and off computers and to carry out certain activities. This creative integration improves user convenience and streamlines computer control.

Wi-Fi File Explorer:

A wireless file sharing feature between a PC and a mobile phone is presented by the Wi-Fi File Explorer project. Users can access files stored on their PC directly from their mobile device by connecting to a Wi-Fi network. This makes file management and transmission smooth and does away with the need for USB cords. Users may move different file types between devices and navigate around more effectively with features like media players and multiple file explorers, which improves ease and productivity.

3. TECHNOLOGY USED

This project relies heavily on Socket programming to facilitate connection between the Android application and the user's PC. Through the Android application, users can connect to their PC and access files saved on the PC's disk. Furthermore, the application has file transfer capability, enabling users to upload files from their Android device to the PC and download files from the PC to their device.

Notably, the Android-based application utilizes Java sockets to establish and manage communication with the computer. It's worth mentioning that the application employs the Robot class for certain functionalities, enhancing user interaction and control over the PC remotely. Overall, the project provides a seamless and intuitive platform for remote file access and management between Android devices and PCs, leveraging Socket programming and the Robot class for efficient communication and interaction.

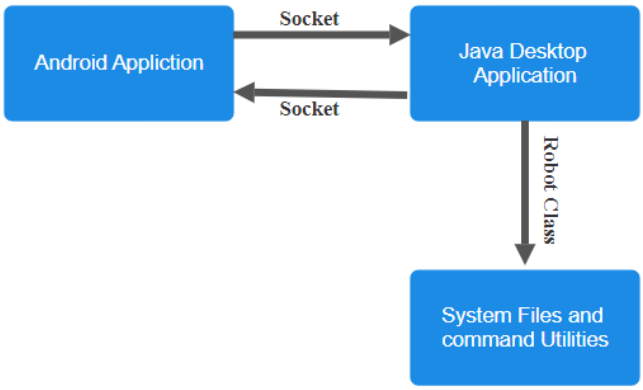

Fig -2: System Interaction

The utilization of the Robot class enhances the application's capabilities by allowing users to simulate keyboard and mouse inputs on the PC remotely. This feature enables users to perform tasks such as navigating the desktop, opening applications, and interacting with graphical user interfaces with ease. By combining Socket programming with the Robot class, the application ensures reliable and responsive communication between the Android device and the PC, facilitating seamless file access and remote-control

functionality. Overall, this approach provides users with a versatile and efficient solution for accessing and managing files on their PCs from their Android devices, without the need for complex web service calls.

3.1 Algorithms Used:

Connect Algorithm:

Using the ZXing library, the desktop program (server) generates a QR code that is shown on the server screen in order to establish a connection between the mobile device and laptop. The mobile application, also known as the client, uses the network address of the server to create a socket connection to the desktop after scanning the QR code to obtain the IP address and port number. This guarantees a reliable and safe connection between the devices.

Coordinate Mapping:

This algorithm uses sockets to transfer screen coordinates from the mobile application to the Java desktop program. The Java application takes these coordinates and transforms them into screen coordinates with respect to the desktop. It guarantees precise correspondence between user activities on the mobile interface and related desktop actions.

File browser:

To save resources, the File Browser algorithm effectively lists every file in a directory. The Java desktop application uses Java file APIs to retrieve all files under a path that it receives from the mobile app. Users can browse and choose files to transfer by navigating the list of files that is returned to the mobile application.

Key Actions:

This method emulates key events on the remote PC, including keyboard and mouse clicks. It analyzes mobile application input commands and uses Java's Robot class to translate them into relevant actions. Actions include left-clicking, right-clicking, keyboard inputs such as ctrl, alt, function, shift, and enter, as well as a variety of keyboard functions and navigation commands that are executed based on received input and mapped coordinates.

Screen Sharing:

The algorithm utilizes Java APIs to take screenshots of the desktop and shares them with the mobile application. Live screen sharing is made possible by continuously taking screenshots, with each screenshot being shared with the corresponding Android app. It guarantees that the desktop screen is displayed in real time on the mobile device, improving remote monitoring and teamwork.

File Transfer:

Efficient file transfers between a desktop computer and a mobile device are made possible by the File Transfer algorithm. Users can browse and choose which files to transfer from their desktop computer to the mobile device using a Wi-Fi direct interface. This algorithm makes sure that file transfers and management go smoothly, which increases user convenience and productivity.

Together, these techniques allow for features like live screen sharing, mouse and keyboard emulation, and remote file access between the Java desktop application and the Android smartphone application.

4. IMPLEMENTATION:

Java's ServerSocket and Socket classes are used in the development of the wireless file sharing application between a laptop and a mobile device, where the laptop serves as a server and the mobile device serves as a client. The laptop application simulates keyboard and mouse inputs and other remote -control operations using the Robot class. The laptop uses the Robot class to process the touch events that are captured by the mobile app. Input and output streams manage file transfers, guaranteeing effective data transfer across the devices. The application also generates and scans QR codes using the ZXing library, which simplifies the process of connecting devices by enabling users to create a secure connection by just scanning the QR code on the laptop screen with their mobile smartphone.

5. RESULTS:

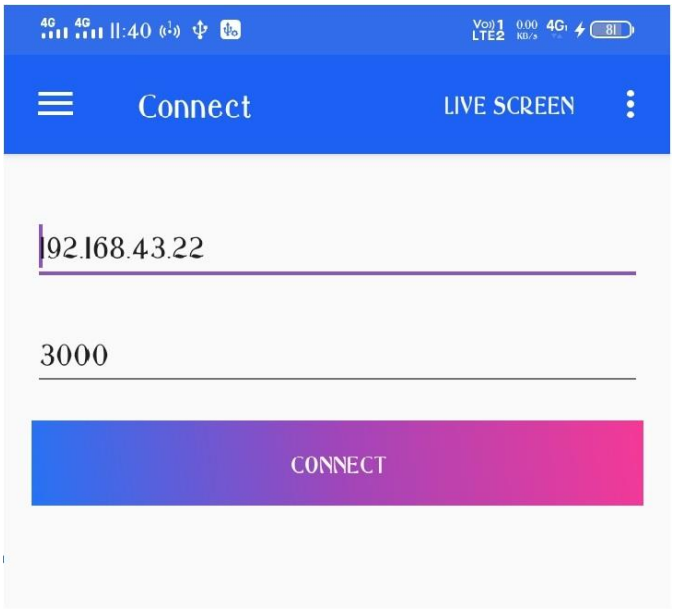

Fig -3: Android application's connection screen

Fig -3 is the initial screen of the android application in which user need to enter the IP address and Port number displayed on the server screen. Otherwise user can also scan the QR code to connect.

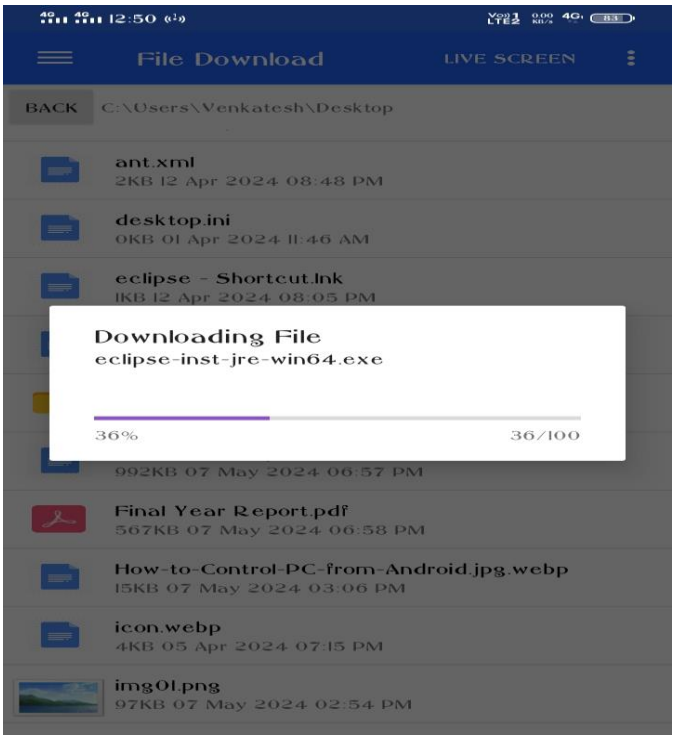

Fig -4: Android application's file transfer screen

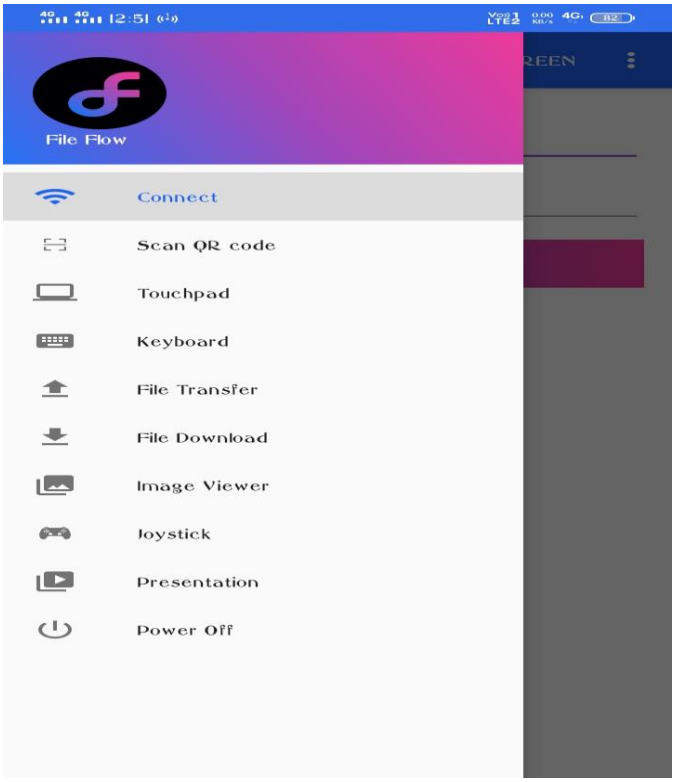

Fig -5: Android application's navigation menu screen

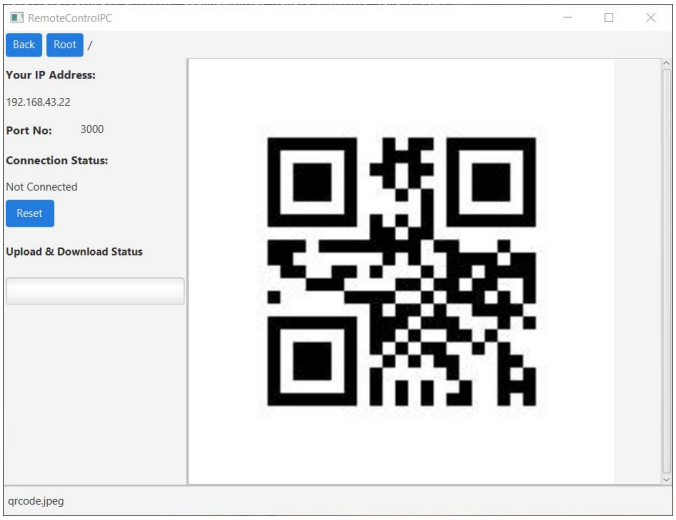

Fig -6: Initial Screen of Server application

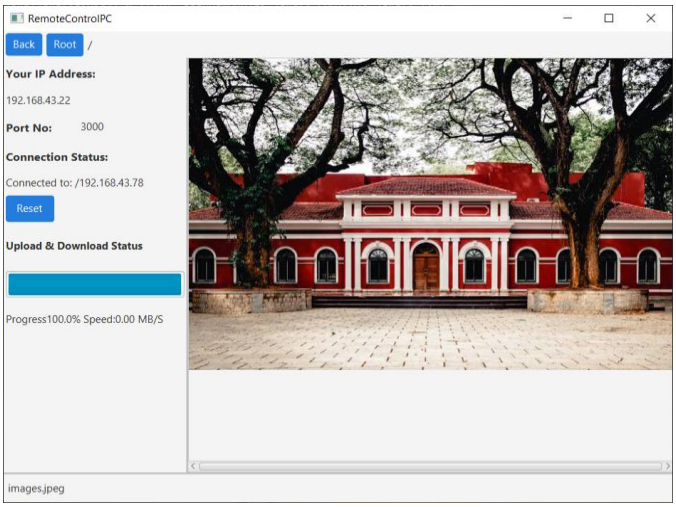

Fig -7: Server application's Image viewer Screen

6. CONCLUSIONS

6.1 Advantages of System:

Enhanced Remote Control:

The project provides users with flexibility and convenience by enabling them to remotely run their desktop or laptop using their smartphone. A user can perform a number of tasks on their computer without being physically present, including as accessing apps, navigating the desktop, and typing instructions.

Improved Accessibility:

Through the use of a smartphone as an interface and controller, the project improves computer resource accessibility. There is less need for direct physical interaction between the user and the personal computer or laptop because users may access data, open programs, and

control their computer from anywhere within the Wi-Fi network range.

Efficient File Sharing:

The project makes it easier for a laptop or PC and a smartphone to share files wirelessly. Without the inconvenience of using external storage devices or connecting wires, users can transfer files between devices with ease. This improves communication between Android and laptop devices and simplifies file management.

Real-time Screen Sharing:

Users can view the desktop of their personal computer in real time on their smartphone by utilizing the screen mirroring feature. With the use of this feature, users may collaborate, monitor, and debug their computers remotely while they are not in close proximity to them.

6.2 Conclusion:

In conclusion, the integration of file sharing, live screen sharing, and remote-control features into a unified application marks a significant advancement in remote computing technology. This comprehensive solution offers users seamless access to computing resources from anywhere, enhancing productivity, collaboration, and flexibility. With secure file sharing capabilities, users can effortlessly transfer and access files between devices, streamlining workflow and eliminating the need for physical storage devices. Live screen sharing enables real-time visualization of a remote desktop environment, facilitating effective collaboration, troubleshooting, and remote monitoring. Additionally, remote control functionality empowers users to manipulate peripheral devices and interact with remote PCs as if they were physically present, providing a seamless and efficient computing experience. By combining these features into a single application, users benefit from enhanced connectivity, accessibility, and efficiency, revolutionizing the way we interact with computing resources remotely.

6.3 Future Scope:

A] Cross-platform compatibility**:**

Extend support for file sharing between a wider range of devices, such as iOS devices and Macs, to increase the app's versatility and appeal.

B] Bulk file transfer:

Enable users to transfer multiple files or entire folders in a single operation, streamlining the process of sharing large amounts of data.

C] TV can be controlled by mobile. In future TV can be controlled by a computer (already started in some areas).

D] An Android phone will manage the entire desktop, allowing us to use apps such as Windows Media Player, Internet Explorer, Word processing, and desktop games.

E] In order to keep working on this application, we would incorporate the encryption algorithm to guard against data leaks. For improved visualization, we will also try to show the target PC's screen on the android phone itself.

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