VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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A PROJECT REPORT ON

“MirrorITpc”

Submitted in partial fulfilment of the requirements for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

Submitted By

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Near Mangalore University, MANGALORE – 574153, KARNATAKA

2021 – 2022

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CERTIFICATE

Certified that the project work entitled **"MirrorITpc"** carried out by **Mr. AYMAN ABDUL RAHMAN**, USN **4PA19CS402, Mr. DIXON VEIGAS,** USN **4PA19CS403, Mr. MOHAMMED ZAKIR**, USN **4PA19CS405 and Mr. SHAHEED SAMEEZ**, USN **4PA19CS406**, bonafide students of **P.A. College of Engineering** in partial fulfilment for the award of bachelor of engineering in **Department of Computer Science & Engineering** of the Visvesvaraya Technological University, Belagavi, during the year **2021-22**. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

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DECLARATION

We, students of Eighth Semester, B.E, in the Department of Computer Science and Engineering, P.A. College of Engineering, Mangalore declare that the project entitled "**MirrorITpc**" has been carried out by us and submitted in partial fulfilment of the course requirements for the award of degree in **Bachelor of Engineering** in **Computer Science and Engineering** of **Visvesvaraya Technological University, Belagavi** during the academic year 2021-2022.

The matter embodied in this report submitted has not been presented to any other University (or) Institution for the award of any Degree (or) Diploma.

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ABSTRACT

As all are familiar with both mobile phones and computers like home PC, laptops etc. and also all are having mobile phones with high or low prices. We know that a computer can be controlled by a user by using a client server basis. But I would like to share a new technology to control the computer system by using a mobile phone. We are connecting our mobile phones to laptops and PC’s mostly to share information, but in this project idea we can control the PC with our own mobile phones. The project involves interfacing the computer hardware and software and the mobile phone so that the computer could be switched on and off using the mobile phone and also some of the computer tasks could be performed using the same phone.

It basically turns your smartphone into wireless keyboard and mouse with touchpad. This application can be performed with some wireless connection between the PC or Laptop and the smartphone with Android operating system. By accessing the IP address of PC, we can establish a connection between them using Wi-Fi connection. This application not only turns your smartphone into wireless keyboard and mouse but it also provides various other features including File Transfer, File Download, Image Viewer, Presentation, Media Player, Live Screen and Power Off. The implemented application consists of two parts, the first one is an application for Android smartphone and the second one is for windows pc jar application that executes the command selected by user’s application. The outcome of this implementation is a handy, easy-to-use application.

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CHAPTER 1

INTRODUCTION

Our project is to develop android and windows application for controlling the pc which user can use the pc using android phone without mobile data or data cable which works through hotspot with specified IP address. Android apps that can control your other devices via local WIFI, Best of all, some of them even provide screen sharing capabilities to gain complete GUI control of your desktop or laptop. Features are Control Left Click, Right Click, Mouse Scroll, Type text, Transfer files from phone to laptop, download files from laptop to phone, use your laptop as speaker to play mp3 files of phone, see images of phone on laptop, Control presentation on laptop via phone, Suspend, Restart or Shut down your laptop using phone, fetch your laptop screen to Android (only single click supported), Browse Android files on Desktop (View and Download).

1.1 Overview

Nowadays, PC’s, Laptop’s and all other electronic gadgets are inseparable part of our everyday life. Personal computers are not any longer meant for working purpose, but more and more used for entertainment in people’s spare time. This is also applicable to the mobile phones, which have transformed into multifunctional devices with almost same features as computer’s have. Smartphones are common and commercially used device all over the world, user-friendly interface and lots of features such as Wi-Fi, Internet access, Bluetooth, Camera, Video recording etc. add-on to the Android smartphone to be popular all over the world with cheap cost. We propose application which is compatible and useful in both the areas, the aim is to utilize provided hardware features from smartphone devices along with various useful libraries from Android API. As a result, an application combining different pointing devices is created. The connection of a smartphone with the laptop is established wirelessly via Wi-Fi, for desktop an external modem is used to have a Wi-Fi connection. One of the most widely used mobile OS these days is Android. Android comprise not only operating system but also middleware and key applications. Android was founded by Andy Rubin, Rich Miner, Nick Sears and Chris White at Palo Alto of California, U. S in 2003.Later

Android Inc was acquired by Google in2005. After original release there have been number of updates in original version of Android. In our project the second application which refers to jar executable file that works on windows PC's, the android application which connects jar executable file using HOTSPOT features, so that the android application can control overall pc.

1.2 Objective

The Objective of this project is to develop android and windows application for controlling the pc which user can use the pc using android phone without mobile data or data cable which works through hotspot with specified IP address.

User should install the two applications such as mirrorITpc.apk for android and mirrorITpc.jar for windows, run jar executable file in windows and connect your mobile hotspot, jar provide specified IP address and connect your mobile app using jar IP address

Android app have features such as

- Keyboard typing capability with shortcut keys and multi-functional keys
- Touch-screen mouse control with two onscreen mouse buttons.
- File Transfer from android phone to windows pc
- File Download from windows pc to android phone
- We can display the phone Image file in windows pc
- We can control mp3 using mobile phone and the output of mp3 in windows pc
- We Can control Presentation without difficulties
- We can fetch the Live Screen of windows through mobile
- Power Off which have certain features like Shutdown, Restart, Sleep, Lock.

1.3 Existing System

There exist several situations where we want to wirelessly and comfortably operate a computer, where the computer screen is projected onto a big screen through a projector or big-screen television, such as classrooms, conference/meeting rooms, mobile, workgroup project environments and modern office environments, and even living rooms. Several specifically designed devices are available on the market for the purpose of operating computers remotely and wirelessly. Wireless keyboard, uses either Bluetooth or wireless USB mini-receiver plugged into the USB port of computer for the communication between the keyboard and the computer. Some wireless keyboards have a touchpad for controlling the mouse cursor. Wireless presentation controller, allows user to operate his/her computer remotely for PowerPoint presentation through Bluetooth connection.

However, all those devices have certain drawbacks. Wireless keyboard has limited flexibility and is not convenient for a presenter to carry it around in the room during the presentation. Presenters usually like to walk around while presenting. Carrying a wireless keyboard is definitely not convenient. Wireless presentation controller does have good mobility. However, most of such devices do not allow user to have full operation on the computer, such as running a program, moving or closing an application window, etc. Even it has a small touchpad for moving mouse cursor, however it is very difficult for the presenter to use it to move the mouse cursor while he/she is walking around [3].

The widely used and very popular smart devices, such as iPads, smartphones, PDAs, and smart game controllers, can be the excellent alternatives as computer remote controllers if we develop appropriate apps for them. This motivated us to develop an app for most popular mobile OS android to control action on PC.

1.4 Proposed System

This project is to develop android and windows application for controlling the pc. User can use the pc using android phone without mobile data. It works through hotspot with specified IP address. User should install the two applications. Applications are: mirrorITpc.apk for android and mirrorITpc.jar for windows.
The overall system is divided into two Sections:

1.4.1 Desktop connection

In Desktop connection the desktop first sends a unique id to the Application. Along with the unique id the desktop address is also recorded. Whole data processing and computing is done by the desktop.

1.4.2 Android Connection

In android connection the connection is formed to the desktop through the server with the help of unique id. Unique id is the id that is necessary for the user to form connection to the desktop.

After the connection is formed user can operate desktop through Android.

Steps Involve in establishment of Remote Management:

i) Establish Network

Here desktop is connected with the Mobile through Wi-Fi

ii) Establish Remote Connection

Here the android is connected to the server completing a full cycle connection.

iii) Screen casting

After the connection is successful the desktop sends image size and other data size in the format of bytes. Along with the size desktop also resizes the screen shots and transfer the image. If the size and image size match the android device sends authentication to the server which is then send to desktop and the process is carried on.

iv) Data Manipulation

The android device has different types of methods to control the desktop system. E.g.: keyboard system, Touchpad co-ordinate system, etc. This requires large scale manipulation of data. Only the desktop computers this data and the android device only transfer the instructions and data.

1.5 Advantages of The Proposed System

- In proposed system we have used better GUI
- Efficient design.
- Real time rendering
- Lightweight software
- Easy to access

- Multiple target OS
- Best algorithm used for screen sharing.

1.6 Literature Survey

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.Angel Gonzalez Villan(2018) explains about Remote Desktop Monitoring and Controlling. It can be done with the help of Socket Programming. System runs on a Java RMI mechanism in this project LAN or WAN will behave as a server. Process in this project is log in to the system, connect to a server, a desktop will be displayed to a server machine, Server can communicate and control with the client. This module also provides the server's IP and Port Number over which application is running. [1]

As China gradually enters the age of network information, technologies such as the Internet of Things based on computer networks have been more and more widely used, and they have also greatly improved the convenience of people's production and life. The development and promotion of the Internet of Things not only need to further strengthen the application of remote-control technology, but also put forward higher requirements for network security. The Internet of Things must reduce the security risks in the computer network based on the realization of remote automatic control, so as to ensure the safety of data and information and ensure the normal operation of the Internet of Things. This can ensure that the Internet of Things can give full play to its due functions, thereby promoting the modern development of my country's social economy. [2]

Remote desktop enables users to remotely access their computers via the Internet, which is widely used as a basic tool in areas such as remote work, remote assistance and remote administration. However, existing remote desktop is designed to work in the mode of updating user's real-time command and remote screen's state interactively for a better user experience, such working mode may cause serious side-channel information leakage problem in spite of encryption of the traffic, as revealed in this paper. We carry out an experimental research to assess the side-channel information leakage of six most popular remote desktop softwares in Windows 10 & 7 platforms: Anydesk, ConnectWise, MicroRDS, RealVNC, Teamviewer, and Zoho Assist. With the help of machine learning techniques including logistic regression, support vector machine, gradient boosting decision tree, random forest as well as statistic features of flow burst, we observe that an adversary can excellently uncover (top at 99.26% TPR, 0.57% FPR, 97.17% F1-score) 5 rough kinds of daily activities covering editing documents, reading documents, surfing webs, watching videos and installing softwares and even worse precisely classify 4 fine activities predefined as editing documents with Microsoft Office Word and the other three edit tools with high true positive rate and low false positive rate. Our results prove the fact for remote desktop traffic encryption mechanism is nothing sufficient to prevent side-channel information leakage and both users and providers of remote desktop should pay more attention to such serious privacy leakage problem. [3]

1.7 Feasibility Report

A feasibility study is a preliminary study which investigates the information of prospective users and determines the resources requirements, costs, benefits and feasibility of proposed system. A feasibility study takes under consideration varied constraints at intervals that the system should be implemented and operated. this stage, the resource required for the implementation like computing equipment, manpower and prices are estimated. The estimated available compared with out their resources and a price profit analysis of the system is formed. The feasibility analysis activity involves the analysis of the matter and collection of all relevant data with reference to the project. the most objectives of the feasibility study are to see whether or not the project would be feasible in terms of economic feasibility, technical feasibility and operational feasibility and schedule feasibility or not. it's to make sure that the computer file that are needed for the project are available. Thus, we evaluated the feasibility of the system in terms of the following categories:

- Technical feasibility
- Operational feasibility
- Economic feasibility
- Schedule feasibility

1.7.1 Technical Feasibility

Evaluating the technical feasibility is the trickiest part of a feasibility study. This is because, at the point in time there is no any detailed designed of the system, making it difficult to access issues like performance, costs (on account of the kind of technology to be deployed) etc. A number of issues have to be considered while doing a technical analysis; understand the different technologies involved in the proposed system. Before commencing the project, we have to be very clear about what are the technologies that are to be required for the development of the new system. Is the required technology available? Our system is technically feasible since all the required tools are easily available. Anaconda navigator, google colab and Flask framework makes the system more user and developer friendly and although all tools seem to be easily available there are challenges too.

1.7.2 Operational Feasibility

Proposed project is beneficial only if it can be turned into information systems that will meet the operating requirements. Simply stated, this test of feasibility asks if the system will work when it is developed and installed. Are there major barriers to Implementation? The proposed waste makes a simplified web application. It is simpler to operate and can be used in any webpages. It is free and not costly to operate.

1.7.3 Economic Feasibility

Economic feasibility attempts to weigh the costs of developing and implementing a new system, against the benefits that would accrue from having the new system in place. This feasibility study gives the top management the economic justification for the new system. A simple economic analysis which gives the actual comparison of costs and benefits are much more meaningful in this case. In addition, this proves to be useful point of reference to compare actual costs as the project progresses. There could be various types of intangible benefits on account of automation. These could increase improvement in product quality, better decision making, and timeliness of information, expediting activities, improved accuracy of operations, better documentation and record keeping, faster retrieval of information. This is a web-based application. Creation of application is not costly.

1.7.4 Schedule Feasibility

A project will fail if it takes too long to be completed before it is useful. Typically, this means estimating how long the system will take to develop, and if it can be completed in a given period of time using some methods like payback period. Schedule feasibility is a measure how reasonable the project timetable is. Given our technical expertise, are the project deadlines reasonable? Some project is initiated with specific deadlines. It is necessary to determine whether the deadlines are mandatory or desirable. A minor deviation can be encountered in the original schedule decided at the beginning of the project. The application development is feasible in terms of schedule.

CHAPTER 2

SOFTWARE REQUIREMENTS SPECIFICATION

2.1 Specific Requirements

After the analysis of the problems in the system, we are familiarized with the requirement that the current system needs. The requirement that system needs is categorized into the functional and non-functional requirements. These requirements are listed below:

2.1.1 Non-Functional Requirements

Non-functional requirements are a description of features, characteristics and attribute of the system as well as any constraints that may limit the boundaries of the proposed system. The non-functional requirement is essentially based on the performance, information, economy, control and security efficiency and services. Based on these the non-functional requirements are as following:

- User friendly
- System should provide better accuracy
- To perform with efficient throughput and response time

2.2 User Characteristics

- No prior knowledge about any programming code is required.
- User should have basic Knowledge of using Android as well as windows operating system.
- User can easily access the features one by one

2.3 General Constraints

- The main constraint here is that the user must have a wifi module in windows pc and Hotspot connection in android phone.
- The user should be anybody.

2.4 Assumptions and Dependencies

- The application is ready to use.
- It should provide the appropriate result without any error.

2.5 Functional Requirements

Functional requirement are the functions or features that must be included in any system to satisfy the business needs and be acceptable to the users. Based on this, the functional requirements that the system must require are as follows:

- System should be able to analyze data and classify each data
- System should be able to process new data

2.6 Performance Requirements

- Should have good user interface for a good experience (UI/UX).
- Should be error-free.
- Should not have glitches.

2.7 Supportability

- **Maintainability:**

  Maintainable software is easy to extend and fix, which encourages the software's uptake and use.
- **Portability:**
  This system can be run in any android system/desktop.
- **Compatibility:**

  This project can be run in any Android Phone/ Desktop.
- **Flexibility:**

  The system keeps on updating the data according to the changes that takes place.
- **Instability:**

  It is easy to run the project in any operating system.

2.8 Design Constraints

- The clarity of the images in the Application may be subject to the devices.
- The UI/UX might not look good in smaller size screens.
- The Application shall display information to the users when triggered.

2.9 Interfaces

All the interactions of the project with users, hardware and other software are specified here. The ‘mirrorITpc.apk and mirrorITpc.jar’ application is simple and easy to understand as well as to use.

2.9.1 User Interfaces

- The system provides a user-friendly interface.
- Appropriate messages are generated when user triggers an interactive object.
- Appropriate functions are processed when user triggers an interactive object.

2.9.2 Hardware Interfaces

Processor	: Android (Snapdragon 435, MediaTek MT6752) / Windows 2.4 GHz
RAM	: Android 2GB / Windows 1GB
Hard disk	: Windows 2GB /Android 500 MB
Hotspot/WIFI	: Windows/Android (3 and above)
I/O Parts	: Monitor (colour), Mouse, Keyboard.

2.9.3 Software Interfaces

Operating System	:	Windows 7 and above
Designing Tools	:	Android Studio and NetBeans
Front End	:	XML, FXML
Back End	:	Java
Target Platform	:	Android and Windows

CHAPTER 3

HIGH LEVEL DESIGN

System design is process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. One could see it as the application of the systems theory to product development. The purpose of System Design is to create technical solution that satisfies the functional requirements for the system. The functional specification produced during system requirements analysis is transformed into a physical architecture. System components are distributed across the physical architecture, usable interfaces are designed and prototyped and technical specifications are created for the application developers, enabling to build and test the system.

3.1 Design Considerations:

It describes many of the issues which need to be addressed or resolved before attempting to devise a complete design solution. Some of the aspects are:

- **Compatibility** - The software is able to operate with other products that are designed for interoperability with another product. For example, a piece of software may be backward compatible with an older version of itself.
- **Extensibility** - New capabilities can be added to the software without major changes to the underlying architecture.
- **Modularity** - the resulting software comprises well defined, independent components which leads to better maintainability. The components could be then implemented and tested in isolation before being integrated to form a desired software system. This allows division of work in a software development project.
- **Fault-tolerance** - The software is resistant to and able to recover from component failure.
- **Maintainability** - A measure of how easily bug fixes or functional modifications can be accomplished. High maintainability can be the product of modularity and extensibility.

- **Reliability** - The software is able to perform a required function under stated conditions for a specified period of time.
- **Reusability** - The ability to use some or all of the aspects of the pre-existing software in other projects with little to no modification.
- **Robustness** - The software is able to operate under stress or tolerate unpredictable or invalid input. For example, it can be designed with resilience to low memory conditions.
- **Security** - The software is able to withstand and resist hostile acts and influences.
- **Usability** - The software user interface must be usable for its target user/audience. Default values for the parameters must be chosen so that they are a good choice for the majority of the users
- **Performance** - The software performs its tasks within a time-frame that is acceptable for the user, and does not require too much memory.
- **Portability** - The software should be usable across a number of different conditions and environments.
- **Scalability** - The software adapts well to increasing data or added features or number of users.

3.1.1 Assumptions and Dependencies:

- IDE: Android Studio and NetBeans
- Tools: SDK and JDK
- Operating System: Windows 10(x64 based processor) and Android

3.1.2 General Constraints:

- Shared memory, when used for IPC, requires explicit synchronisation from the programmer. It may be the most efficient and most flexible mechanism, but that comes at an increased complexity cost.
- Hardware or software environment: The minimal requirement for hardware is intel i3 processor which is expensive.
- Memory and other capacity limitations: The system requires ram of 8gb and above.

- Requires installation of Android Studio, Java JDK and Android Emulator.

3.1.3 Development Methods:

Socket programming is a way of connecting two nodes on a network to communicate with each other. One socket(node) listens on a particular port at an IP, while other socket reaches out to the other to form a connection. Server forms the listener socket while client reaches out to the server. waits for the client to approach the server to make a connection. The backlog, defines the maximum length to which the queue of pending connections for socket may grow. If a connection request arrives when the queue is full, the client may receive an error with an indication of econnrefused.

3.2 Architectural Strategies:

The programming language used for the project is JAVA, with installation of JDK and SDK. The Android Studio is the main software for working on this project. the five layers are the basic components required to form the Android operating system. Each layer has its own function and groups various programs together to run specific functions of the operating system.

3.3 System Architecture:

System architecture is conceptual design that defines the structure and behaviour of a system. An architecture description is a formal description of a system, organized in a way that supports reasoning about the structural properties of system. It defines a system component and provides a plan from which products can be procured, and systems developed that will work together to implement the overall system

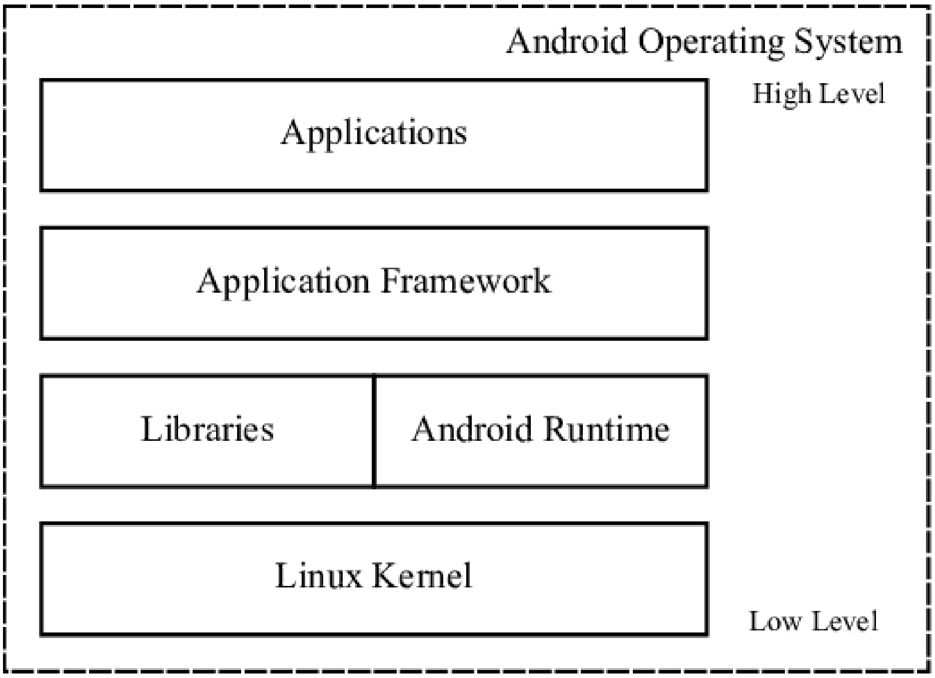

Fig 3.1: System Architecture of Android OS

Linux Kernel: Lower layer of android operating system is Linux kernel. It does not really interact with the users and developers. The Linux Kernel provides a level of abstraction between the device hardware and the upper layers of the Android software stack. Based on Linux version 2.6, the kernel provides pre-emptive multitasking, low level core system services such as memory, process and power management in addition to providing a network stack and device drivers for hardware such as the device display, Wi-Fi and audio. Also, the kernel handles all the things that Linux is really good at such as networking and a vast array of device drivers, which take the pain out of interfacing to peripheral hardware.

Libraries: On top of Linux kernel there is a set of c/c++ libraries used by the various components of the android system. Some of the core libraries are BSD, SQLite, SSL, SGL, and OpenGL.

Android Runtime: Dalvik is a purpose-built virtual machine designed specifically for android which was It was mainly developed for mobile devices. Dalvik Virtual Machine is same as JVM but only difference is that it is designed and optimized for

Android. Every android application runs in its own process is called Dalvik virtual machine. The Dalvik VM executes files in the Dalvik Executable (.dex) format which is optimized for minimal memory footprint

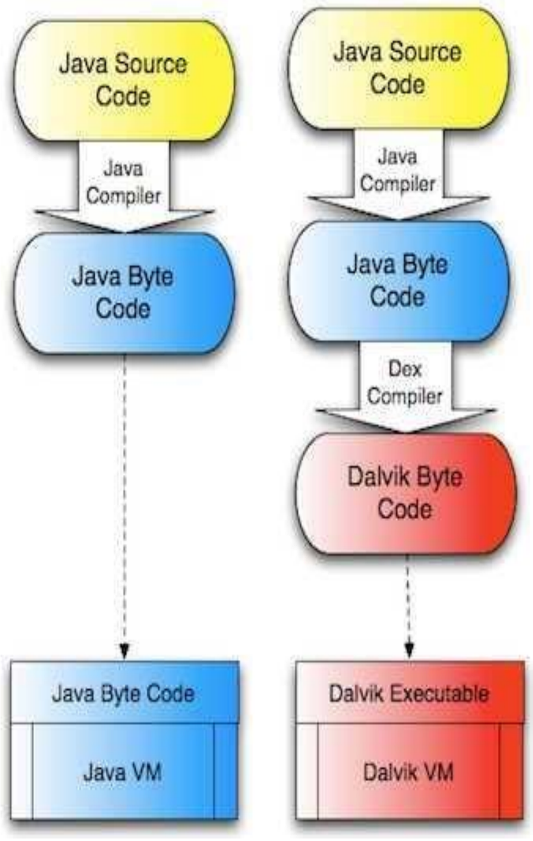

Fig 3.2: Dalvik VM

3.4 Flow Chart

A flowchart is a type of diagram that represents an algorithm, workflow or process. The flowchart shows the steps as boxes of various kinds, and their order by connecting the boxes with arrows. This diagrammatic representation illustrates a solution model to a given problem. Flowchart are used in analyzing, designing, documenting or managing process or program in various fields.

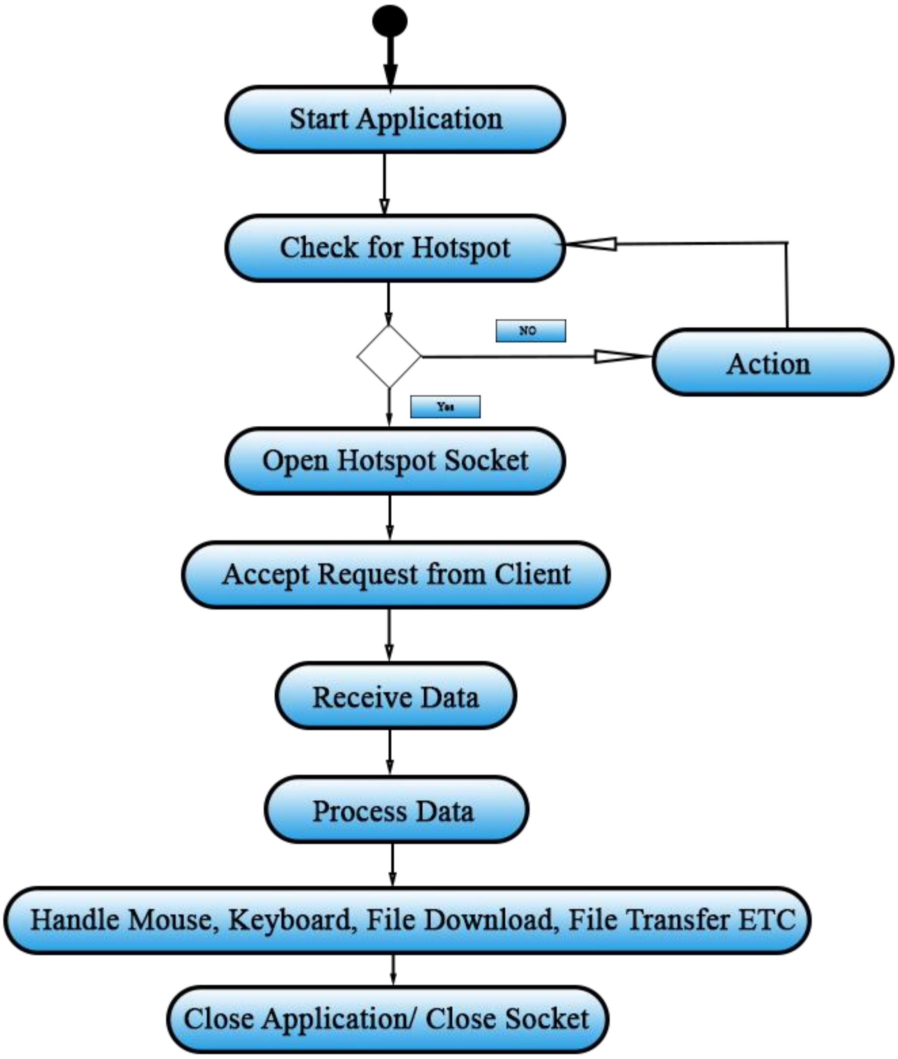
Start Application
Check for Hotspot
NO
Action
Yes
Open Hotspot Socket
Accept Request from Client
Receive Data
Process Data
Handle Mouse, Keyboard, File Download, File Transfer ETC
Close Application/ Close Socket

Fig 3.3: Flowchart of working application

CHAPTER 4

DETAILED DESIGN

Detailed design is a phase where in the internal logic of each of the modules specified in high-level design is decided. In this phase further details and algorithmic design of each of the modules are specified. Other lower-level components and subcomponents also described as well.4.1 Structured Chart Diagram.

4.1 Classification:

The assessment is done on Intel Core i3 2.2 GHz machine with 8 GB installed RAM employing Windows 10. Meanwhile, Android Studio with JDK and SDK used for android application development.

4.2 Definition:

Socket programming is a way of connecting two nodes on a network to communicate with each other. One socket(node) listens on a particular port at an IP, while other socket reaches out to the other to form a connection. Server forms the listener socket while client reaches out to the server.

4.3 Responsibilities:

Sockets allow you to exchange information between processes on the same machine or across a network, distribute work to the most efficient machine, and they easily allow access to centralized data.

4.4 Data Flow Diagram:

A data flow diagram (DFD) is a graphical representation of the" flow" of data through an information system. DFDs can also be for the visualization of data processing. DFD provides no information about the timing or ordering of processes, or about whether processes will operate in sequence or in parallel. Initially, data is pre-processed and then feature is applied. The output from the feature extraction is then given to the classifier for classification. The input image to be checked for species is then pre-processed and result is input to the prediction process which compares the image with the results obtained after classification

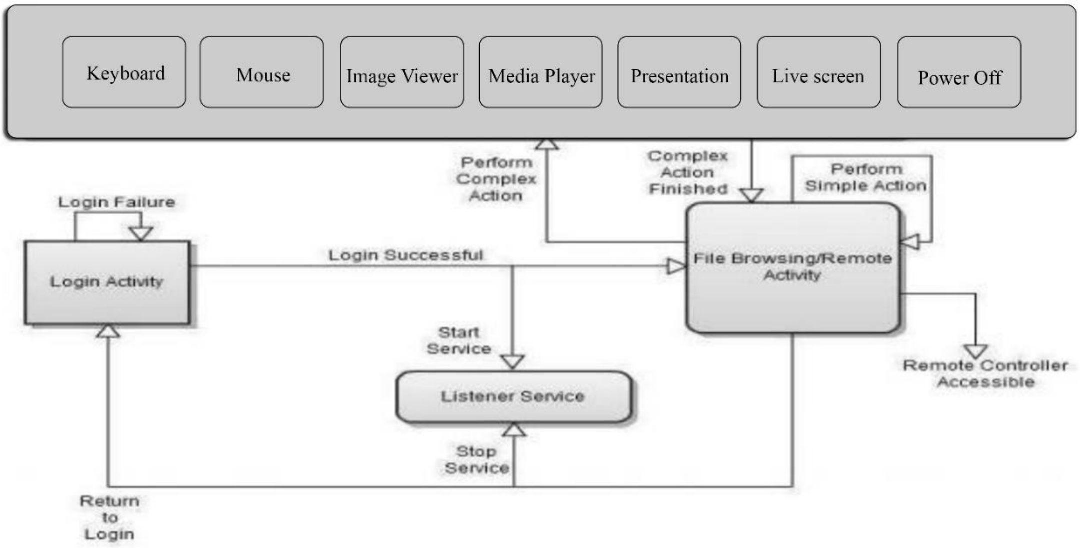

Fig 4.1: Data Flow Diagram

4.5 Resources:

The experiment is carried out using inbuilt library in Android SDK called Server Socket and Socket.

4.6 Interface / Exports:

In our experiments, we will design screen for login and we will design interface to control mouse, keyboard, file sharing, image viewer and screen mirroring Data is the most valuable thing for the Analytics and Machine learning. computing data is needed everywhere. When it comes to the real-world data, it is not improbable that data may contain incomplete, inconsistent, missing values. If the data is corrupted then it may hinder the process or provide inaccurate results.

CHAPTER 5

IMPLEMENTATION

The implementation phase of any project development is the most important phase as it yields the final solution, which solves the problem in hand. The implementation phase involves the actual materialization of the ideas, which are expressed in the analysis document, and development in the designed phase. Implementation of any code is often preceded by vital choices relating to choice of the platform and the language used, etc. These decisions are often influenced by several factors such as the real environment in which the system works and the speed that is required, other implementation specific details, etc.

This chapter describes about various tools which are used to implement the project and the programming language and environment used for the project and also explains how it is important to the system. This chapter covers the following information also

- Implementation Requirements.
- Guidelines for implementation.
- Implementation Procedure.

The complete project is divided into three parts-

A. mirrorITpc.apk -Android: Android part of the project which has been developed in Eclipse.
B. mirrorITpc.exe -Desktop: Desktop part of the project which has been developed in Netbeans.
C. MirrorITpc-Libraries: Library (jar file) used by both android as well as desktop part. It has been developed in Netbeans.

5.1 Packages and Classes structure

Desktop Part-

Java Packages	**Java Classes**
image	ImageViewer
music	MusicPlayer
mirrorITpc.desktop	MainScreen Utility
mirrorITpc.desktop.filesharing	FileAPI ReceiveFile SendFile SendFilesList
mirrorITpc.desktop.ipaddress	GetFreePort GetMyIpAddress
mirrorITpc.desktop.mousekeyboardcontrol	MouseKeyboardControl
mirrorITpc.desktop.poweroff	PowerOff
mirrorITpc.desktop.server	Server

Library-

Java Packages	**Java Classes**
file	AvatarFile

Android Part-

Java Packages	**Java Classes**
com.example.mirroriITpc	AvatarFile AvatarFileAdapter

	CallbackReceiver FileAPI HelpActivity MainActivity MusicControlActivity MusicImageAvatar MusicImageAvatarAdapter NavigationDrawerFragment NavigationDrawerItem NavigationDrawerItemAdapter Utility
com.example.mirroriITpc.connect	ConnectFragment MakeConnection ValidateIP
com.example.mirroriITpc.filedownload	DownloadFileFromServer FileDownloadFragment GetFilesListFromServer
com.example.mirroriITpc.filetransfer	FilesList FileTransferFragment TransferFileToServer
com.example.mirroriITpc.help	HelpFragment
com.example.mirroriITpc.imageviewer	ImagesList ImageViewerFragment
com.example.mirroriITpc.keyboard	KeyboardFragment
com.example.mirroriITpc.mediaplayer	MediaPlayerFragment SongsList
com.example.mirroriITpc.poweroff	PowerOffFragment

com.example.mirroriITpc.presentation	PresentationFragment
com.example.mirrorITpc.touchpad	TouchpadFragment

5.2 Implementation Requirements

The implementation requirement for developing model are:

- Framework – JavaFX
- IDE – Android Studio, NetBeans
- Language used for scripting – Java
- Operating System – Windows 7

5.2.1 NetBeans IDE

NetBeans is a software development platform written in Java. The NetBeans Platform allows applications to be developed from a set of modular software components called modules. Applications based on the NetBeans Platform, including the NetBeans integrated development environment (IDE), can be extended by third party developers.

The NetBeans IDE is primarily intended for development in Java, but also supports other languages, in particular PHP, C/C++ and HTML5.

NetBeans is cross-platform and runs on Microsoft Windows, Mac OS X, Linux, Solaris and other platforms supporting a compatible JVM.

The NetBeans Team actively support the product and seek feature suggestions from the wider community. Every release is preceded by a time for Community testing and feedback.

NetBeans began in 1996 as Xelfi (word play on Delphi),[7][8] a Java IDE student project under the guidance of the Faculty of Mathematics and Physics at Charles University in Prague. In 1997, Roman Stanek formed a company around the project and produced commercial versions of the NetBeans IDE until it was bought by Sun Microsystems in 1999. Sun open-sourced the NetBeans IDE in June of the following year. Since then, the NetBeans community has continued to grow. [9] In 2010, Sun (and thus NetBeans) was acquired by Oracle Corporation.

Under Oracle, NetBeans competed with JDeveloper, a freeware IDE that has historically been a product of the company. In September 2016, Oracle submitted a proposal to donate the NetBeans project to the Apache Software Foundation, stating that it was "opening up the NetBeans governance model to give NetBeans constituents a greater voice in the project's direction and future success through the upcoming release of Java 9 and NetBeans 9 and beyond". The move was endorsed by Java creator James Gosling.

NetBeans IDE 6.0 introduced support for developing IDE modules and rich client applications based on the NetBeans platform, a Java Swing GUI builder (formerly known as "Project Matisse"), improved CVS support, WebLogic 9 and JBoss 4 support, and many editor enhancements. NetBeans 6 is available in official repositories of major Linux distributions.

NetBeans IDE 6.5, released in November 2008, extended the existing Java EE features (including Java Persistence support, EJB 3 and JAX-WS). Additionally, the NetBeans Enterprise Pack supports the development of Java EE 5 enterprise applications, including SOA visual design tools, XML schema tools, web services orchestration (for BPEL), and UML modelling. The NetBeans IDE Bundle for C/C++ supports C/C++ and FORTRAN development.

NetBeans IDE 6.8 is the first IDE to provide complete support of Java EE 6 and the Glassfish Enterprise Server v3. Developers hosting their open-source projects on kenai.com additionally benefit from instant messaging and issue tracking integration and navigation right in the IDE, support for web application development with PHP 5.3 and the Symfony framework, and improved code completion, layouts, hints and navigation in JavaFX projects.

NetBeans IDE 6.9, released in June 2010, added support for OSGi, Spring Framework 3.0, Java EE dependency injection (JSR-299), Zend Framework for PHP, and easier code navigation (such as "Is Overridden/Implemented" annotations), formatting, hints, and refactoring across several languages.

NetBeans IDE 7.0 was released in April 2011. On August 1, 2011, the NetBeans Team released NetBeans IDE 7.0.1, which has full support for the official release of the Java SE 7 platform.

NetBeans IDE 7.3 was released in February 2013 which added support for HTML5 and web technologies.

NetBeans IDE 7.4 was released on October 15, 2013.

NetBeans IDE 8.0 was released on March 18, 2014.

NetBeans IDE 8.1 was released on November 4, 2015.

NetBeans IDE 8.2 was released on October 3, 2016.

NetBeans has a roadmap document for release plans

5.2.2 Core Java

Java is a set of computer software and specifications developed by Sun Microsystems, which was later acquired by the Oracle Corporation, that provides a system for developing application software and deploying it in a cross-platform computing environment. Java is used in a wide variety of computing platforms from embedded devices and mobile phones to enterprise servers and supercomputers. While they are less common than standalone Java applications, Java applets run in secure, sandboxed environments to provide many features of native applications and can be embedded in HTML pages.

Writing in the Java programming language is the primary way to produce code that will be deployed as byte code in a Java Virtual Machine (JVM); byte code compilers are also available for other languages, including Ada, JavaScript, Python, and Ruby. In addition, several languages have been designed to run natively on the JVM, including Scala, Clojure and Apache Groovy. Java syntax borrows heavily from C and C++, but object-oriented features are modelled after Smalltalk and Objective-C. Java eschews certain low-level constructs such as pointers and has a very simple memory model where every object is allocated on the heap and all variables of object types are references. Memory management is handled through integrated automatic garbage collection performed by the JVM.

On November 13, 2006, Sun Microsystems made the bulk of its implementation of Java available under the GNU General Public License (GPL).

The latest version is Java 8, the only supported (with e.g., security updates) version as of 2016. Oracle (and others) has announced that using older versions (than Java 8) of their JVM implementation presents serious risks due to unresolved security issues.

5.2.3 Android

Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android is a software platform and operating system for mobile devices based on the Linux operating system and developed by Google and the Open Handset Alliance. It allows developers to write managed code in a Java-like language that utilizes Google-developed Java libraries, but does not support programs developed in native code.

The unveiling of the Android platform on 5 November 2007 was announced with the founding of the Open Handset Alliance, a consortium of 34 hardware, software and telecom companies devoted to advancing open standards for mobile devices. When released in 2008, most of the Android platform will be made available under the Apache free-software and open-source license.

In July 2005, Google acquired Android Inc., a small start-up company based in Palo Alto, CA. Android's co-founders who went to work at Google included Andy Rubin (co-founder of Danger), Rich Miner (co-founder of Wildfire Communications, Inc), Nick Sears (once VP at T-Mobile), and Chris White (one of the first engineers at WebTV). At the time, little was known about the functions of Android Inc. other than they made software for mobile phones.

On 5 November 2007, the Open Handset Alliance, a consortium of several companies which include Google, HTC, Intel, Motorola, Qualcomm, T-Mobile, Sprint Nextel and NVIDIA, was unveiled with the goal to develop open standards for mobile devices. Along with the formation of the Open Handset Alliance, the OHA also unveiled their first product, Android, an open-source mobile device platform based on the Linux operating system.

Google has unveiled at least three prototypes for Android, at the Mobile World Congress on February 12, 2008. One prototype at the ARM booth displayed several basic Google applications. A 'd-pad' control zooming of items in the dock with a relatively quick response.

5.2.4 Android Virtual Device

The Android Virtual Device (AVD) is an emulator included in the Android SDK. The AVD lets a user to run, build and test an application without the need for any physical devices. AVD can be considered an exact replica of a real Android device, except that lacks a few features. The AVD cannot be used to make calls. The Android market is not accessible from the AVD. The applications that use sensor and Bluetooth cannot be tested in AVD. Except for this, testing an application in the AVD appears similar as in a physical Android device. Android mobile phones can also be used as emulators instead of using emulator provided by SDK. All the instruction sets required for using an Android device as an emulator can be found in the Android developer’s official website. Also using an Android device as an emulator is faster compared to using AVD. Figure 9 shows the Android Virtual Device provided by an Android SDK.

Figure 9 shows an emulator used to run, build and test an Android application.Also multiple emulators can be run at a time without affecting any other emulators. This feature is possible because of the Dalvik Virtual Machine (DVM). Each Android application has its own instance of DVM. When Java classes are written in Eclipse, the class files are compiled and converted into the .dex file by the dx tool. The .dex files are Dalvik Executable files that are executed by DVM. Issues such as threading and low memory management in DVM are all managed by the Linux kernel.

CHAPTER 6

TESTING

Testing is a phase of software development cycle. The aim of testing is to discover defeats by testing individual program components. These components may be functions, objects or modules. During testing, the program to be tested is executed with a set of test cases, and the output of the program for the test cases is evaluated to determine if the program is performing as expected.

In the system testing, the tested individual components are integrated and the total system will be tested. In this stage, testing should focus on whether the system meets its functional requirements and it should not behave in unexpected ways. Test cases are inputs to test the system and the outputs are predicted from these inputs, if the system operates according to its specification, then test case results in pass.

This chapter explains the following information:

- Various Environments used for testing.
- Unit test cases for each module.
- Integration testing

6.1 Test Environment

The software application was tested on the following host and target platforms:

<u>Host Machine Configuration</u>:

Processor	:	Intel(R) Core (TM) i3
CPU Speed	:	1.00GHz 1.19 GHz
RAM Used	:	4.00 GB
HDD	:	1TB
OS Used	:	Windows 10 Home Single Language

Target Platform Configuration-1:

Target Platform	:	Any android device.
Device Name	:	realme 5 pro
Android Version	:	10

Target Platform Configuration-2:

Target Platform	:	Windows 11
Device Name	:	Any laptop
Version	:	Any windows version

6.2 Unit Testing

Unit testing is the process of testing individual components in the system. There are different types of components that can be tested in this stage. The components can be as follows:

- Individual functions or methods within an object
- Composite components made up of several different objects or functions. These composite components have a defined interface that is used to access their functionality.

6.2.1 Testing Strategy

The approach we follow is the manual unit testing approach. Usually involves a debugging session within an IDE, utilizing breakpoints and step-through debugging. Involves providing a range of inputs which include both valid and invalid inputs and checking the response of the unit. Advantage of manual approach is that it is highly visible to current developer. Since the code is fresh in the developer’s minds, any bugs can usually be fixed rather quickly. Each test case includes many features describing the input output transformations.

The features to be tested, most importantly includes the accuracy of the individual unit and also the range of inputs for which the unit functions properly. The items to be tested include all the individual units or functions, which collectively form the whole system. In case of unit testing the items to be tested are the individual units. Sample input, which can be any valid input for the unit and its corresponding expected output and the actual output. The testing strategy also includes remarks on the performance of unit in that test case.

6.2.2 Unit Test Cases

The following are the Test cases for unit test. The test cases are performed in the NetBeans and android studio on the host machine.

Table. 6.1 UTC 1.1

Sl. No. of test case:	UTC 1.1
Name of Test:	Android Application
Item / Feature being tested:	Android to pc connection
Sample Input:	IP address
Expected Output	Connected to pc
Actual Output:	Connected to pc
Remarks:	Test Successful

Table. 6.2 UTC 1.2

Sl. No. of test case:	UTC 1.2
Name of Test:	Keyboard
Item / Feature being tested:	Keyboard Keys to be printed in pc
Sample Input:	Keyboard Keys
Expected Output	Keys Entered
Actual Output:	Keys Entered
Remarks:	Test Successful

Table. 6.3 UTC 1.3

Sl. No. of test case:	UTC 1.3
Name of Test:	Mouse

Item / Feature being tested:	Mouse interaction in pc
Sample Input:	Mouse interaction and button
Expected Output	Mouse interacted
Actual Output:	Mouse interacted
Remarks:	Test Successful

Table. 6.4 UTC 1.4

Sl. No. of test case:	UTC 1.4
Name of Test:	File Transfer
Item / Feature being tested:	File Transfer to pc
Sample Input:	Transferring the file
Expected Output	File Transferred
Actual Output:	File Transferred
Remarks:	Test Successful

Table. 6.5 UTC 1.5

Sl. No. of test case:	UTC 1.5
Name of Test:	File Download
Item / Feature being tested:	File Download from pc
Sample Input:	Downloading the file
Expected Output	File Downloaded
Actual Output:	File Downloaded
Remarks:	Test Successful

Table. 6.6 UTC 1.6

Sl. No. of test case:	UTC 1.6
Name of Test:	Image viewer
Item / Feature being tested:	Image viewed in pc
Sample Input:	Viewing the image
Expected Output	Image viewed
Actual Output:	Image viewed
Remarks:	Test Successful

Table. 6.7 UTC 1.7

Sl.No. of test case:	UTC 1.7
Name of Test:	Media Player
Item / Feature being tested:	Media Played in pc
Sample Input:	Playing the media
Expected Output	Media Played
Actual Output:	Media Played
Remarks:	Test Successful

Table. 6.8 UTC 1.8

Sl.No. of test case:	UTC 1.8
Name of Test:	Presentation
Item / Feature being tested:	Control the ppt
Sample Input:	Controlling the ppt
Expected Output	Ppt is controlled
Actual Output:	Ppt is controlled
Remarks:	Test Successful

Table. 6.9 UTC 1.9

Sl.No. of test case:	UTC 1.9
Name of Test:	Live Screen
Item / Feature being tested:	Mirror the pc screen
Sample Input:	Mirroring the pc screen
Expected Output	Viewed the mirrored screen
Actual Output:	Viewed the mirrored screen
Remarks:	Test Successful

Table. 6.10 UTC 2.0

Sl.No. of test case:	UTC 2.0
Name of Test:	Power Off
Item / Feature being tested:	Off the system/pc
Sample Input:	Shutdown the pc

Expected Output	Off the pc
Actual Output:	Off the pc
Remarks:	Test Successful

6.3 Integration Testing

Once individual program components have been tested, they must be integrated to create a partial or complete system. This integration process involves building the system and testing the resultant system for problems that arise from component interactions. Integration tests should be developed from the system specification and integration testing should begin as soon as usable versions of some of the system components are available.

The main difficulty that arises in integration testing is localizing errors that are discovered during the process. These are complex interactions between the system components and, when an anomalous output is discovered, it may be hard to find the source of the error. To make it easier to locate the errors, we have used incremental approach to system integration and testing.

6.3.1 Testing Strategy

The approach we follow is bottom-up integration where low-level components are integrated and tested before the high-level components have been developed. This approach does not require the architectural design of the system to be complete so it can start at an early stage in the development process. It may be used where the system reuses and modifies components from other systems. It may be necessary to create an artificial environment so that the execution of the lower-level components can be observed.

The strategy comprises of the features to be tested which includes the accuracy with which the integrated modules function. The synchronization of the modules with each other. The items to be tested include the functionality of individual modules taken together. The purpose of testing is to check whether the integrated modules perform as expected. The pass or fail criteria is the matching of the expected and the actual outputs of the integrated modules.

6.3.2 Integration of Test Cases

The following are the Test cases for integration test. The test cases were carried out in the target platform. The build test case was carried out in the host machine.

Table.6.11 ITC1.1

Sl. No. of test case:	ITC1.1
Name of test:	Build Android Application.
Item / Feature being tested:	Build.
Sample Input:	XML and JAVA code
Expected output:	Build completed with a result of 'Succeeded'
Actual output:	Build completed with a result of 'Succeeded'
Remarks:	Test Successful

Table.6.12 ITC1.2

Sl. No. of test case:	ITC1.2
Name of test:	Android device
Item / Feature being tested:	Deploy
Sample Input:	Xml & java files
Expected output:	Build completed
Actual output:	Build completed
Remarks:	Test Successful

Table.6.13 ITC1.3

Sl. No. of test case:	ITC1.3
Name of test:	Executing jar file

Item / Feature being tested:	Execution
Sample Input:	Fxml & java files
Expected output:	Build completed
Actual output:	Build completed
Remarks:	Test Successful

6.4 Summary

This chapter describes the test environment and various tests carried out to test the project. The software modules were tested for the functionality envisaged and were found to perform as per specification.

CHAPTER 7

CONCLUSION

The goal of the project was to develop a remote desktop application using Java with Wi-Fi as a communicating medium. The project gives a user full access to the mouse and the keyboard of the server computer to be handled by using Android phones. This project was mainly targeted to acquire ideas on Android and computer applications development using Java. The project was successfully carried out and was completed within the schedule. Despite being available for use, the application has some bugs in it, such as untimely crashing and irregularity in mouse movement and works only for a keyboard with an English layout. Also, this project cannot be used on the phones without Bluetooth and the phone with the Android operating system earlier than version 2.0. Bluetooth was successfully implemented into the phone to communicate between the server and the client application.

7.1 Limitations

The applications worked well in all the devices when the distance between the client and server was from 1-10 meters. However, when the distance between the client and server was from 10 -20 meters, there were a few interruptions encountered in WIFI communication between the client and server devices. This project can only be used for the computers that use English language layout keyboard. The application sometimes can crash as Wi-Fi might not work properly. Thus, despite of several limitations, a functional remote desktop application was developed. However further modification can be done to the server and client applications to fix the errors and to provide additional features.

7.2 Future Scope

This report describes how to turn smart devices, more specifically smartphones, into computer remote controllers. The system presented above can be widely used in classrooms and meeting/conference rooms for presentation and interactive discussion. Currently we are exploring approaches of using smart devices as controllers or operators for other devices. We are also exploring possibilities of developing app for desktop which will control mobile functionalities and apps e.g calling, texting from desktop app.

REFERENCES

[1] Meihui,Xu,et.al. “The remote control research based on the Android platform. ” *Journal of Physics: Conference Series.*Vol.1605.No.1.IOP Publishing,2020.

[2] Wang, Aihua.” Internet of Things Computer Network Security and Remote Control Technology Application.”2020 5th International Conference on Mechanical,Control and Computer Engineering (ICMCCE).IEE,2020.

[3] Jiang,Minghao,et al. ”I Know What You Are Doing with Remote Desktop.”2019 IEEE 38th International Performance Computing and Communications Conference (IPCCC).IEEE,2019

APPENDIX A

List of Figures Page No.

APPENDIX B

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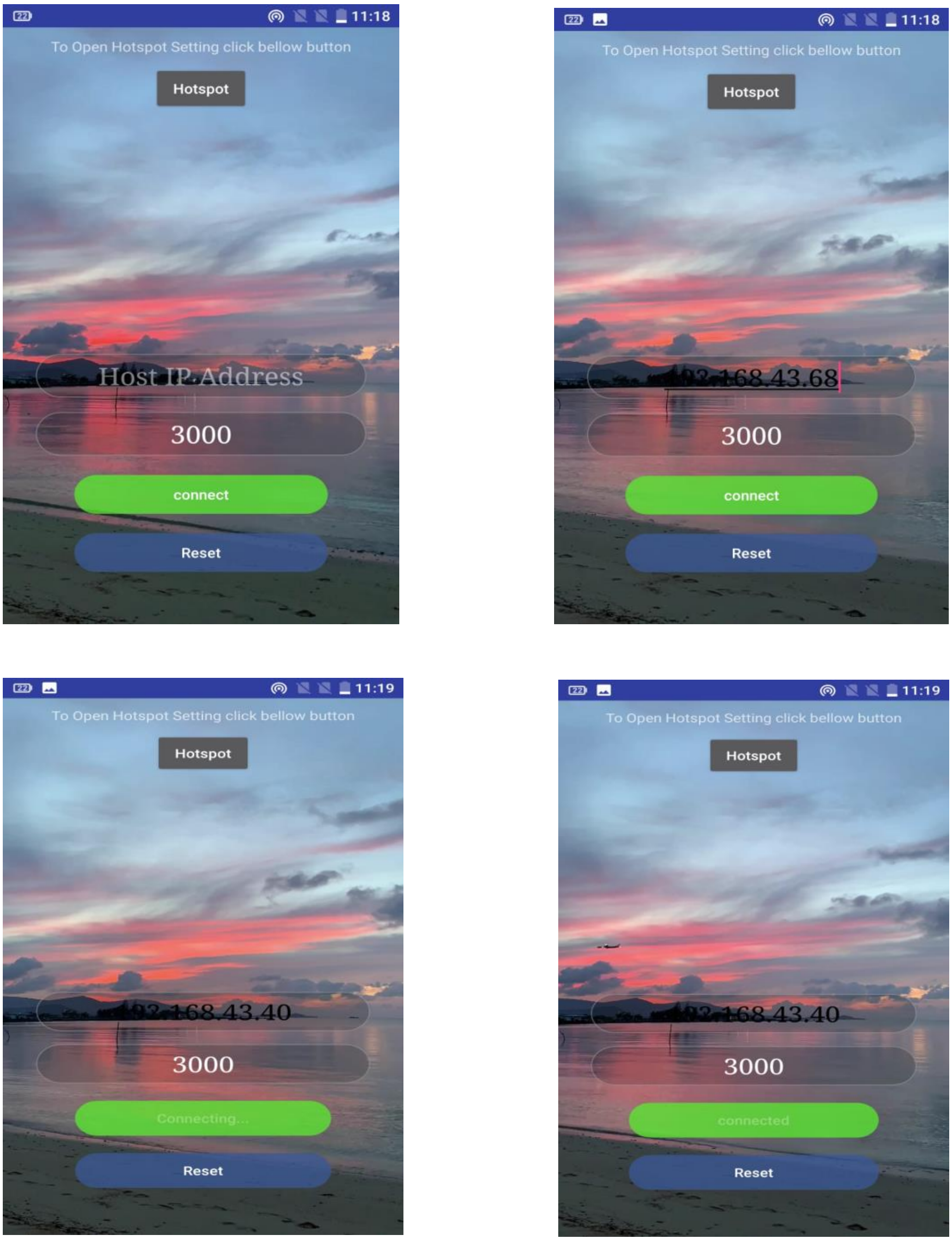
APPENDIX C

User Manual:

Login Page:



To Open Hotspot Setting click bellow button

Host IP Address

3000

To Open Hotspot Setting click bellow button

192.168.43.68

3000

To Open Hotspot Setting click bellow button

192.168.43.40

3000

To Open Hotspot Setting click bellow button

192.168.43.40

3000

Fig 1: Login Page

This is the login activity where we should enter the host IP address and Port number.

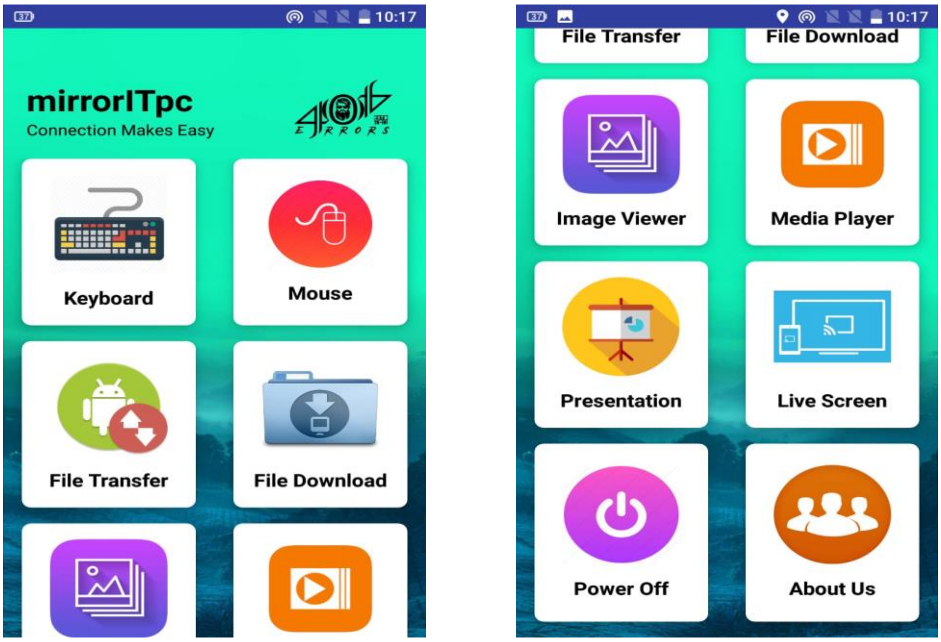
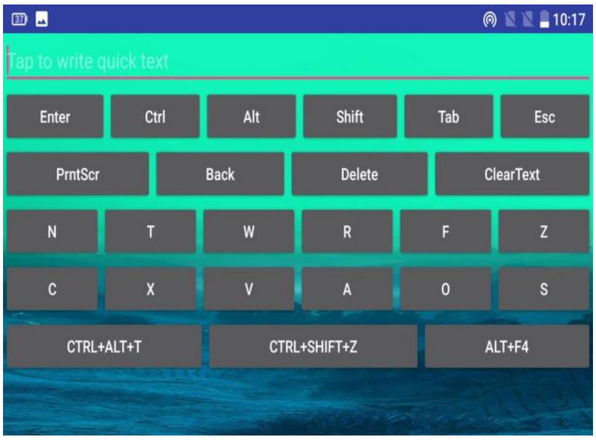


Fig 2: Main Page

This is main Activity where we have different operations that we want to perform.



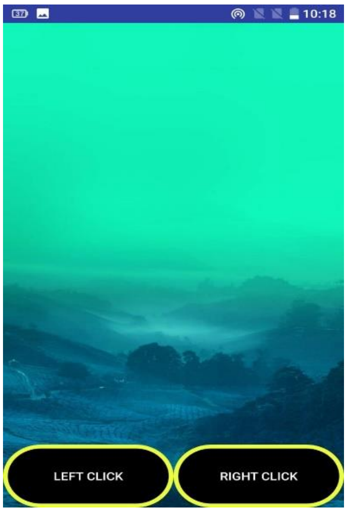
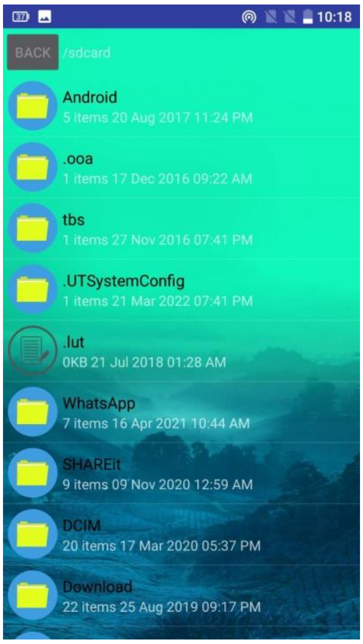


Fig 3: Keyboard Fig 4: Mouse

Fig 3 shows the keyboard where we have some shortcut keys which can be performed in pc and some alphabet keys,shift key,alt key,etc

Fig 4 is the mouse, where we can perform mouse operations such as right and left click options and touch pad to move the cursor.



Android
5 items 20 Aug 2017 11:24 PM

.ooa
1 items 17 Dec 2016 09:22 AM

tbs
1 items 27 Nov 2016 07:41 PM

.UTSystemConfig
1 items 21 Mar 2022 07:41 PM

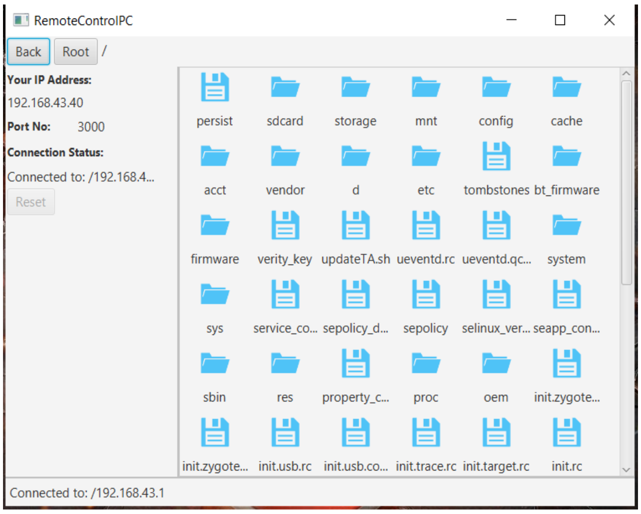
.lut
0KB 21 Jul 2018 01:28 AM

WhatsApp
7 items 16 Apr 2021 10:44 AM

SHAREit
9 items 09 Nov 2020 12:59 AM

DCIM
20 items 17 Mar 2020 05:37 PM

Download
22 items 25 Aug 2019 09:17 PM



Your IP Address:
192.168.43.40
Port No: 3000
Connection Status:
Connected to: /192.168.4...

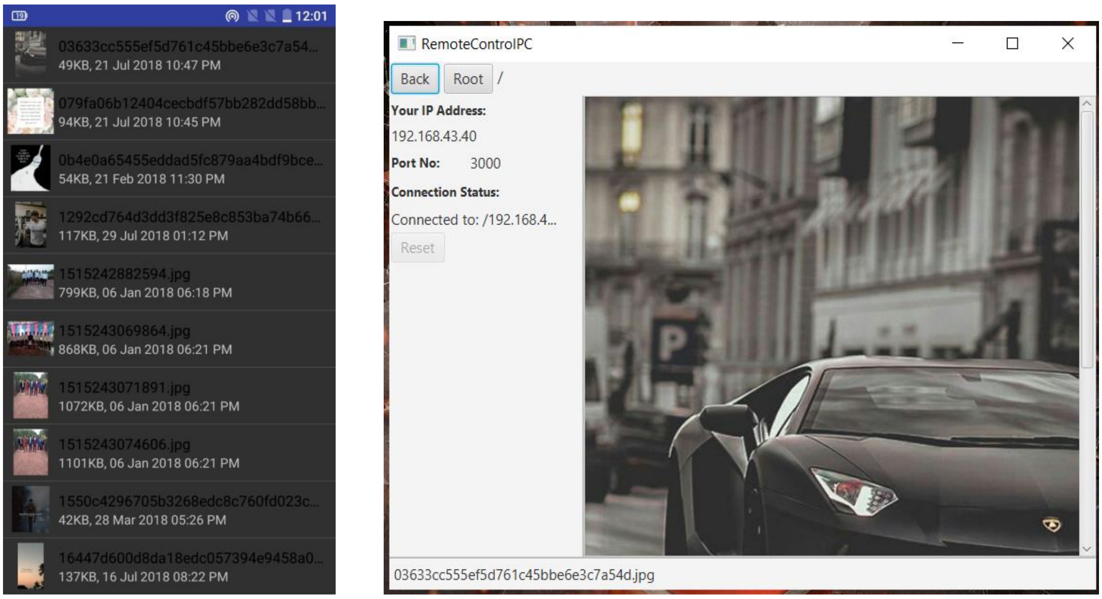
persist, sdcard, storage, mnt, config, cache, acct, vendor, d, etc, tombstones, bt_firmware, firmware, verity_key, updateTA.sh, ueventd.rc, ueventd.qc..., system, sys, service_co..., sepolicy_d..., sepolicy, selinux_ver..., seapp_con..., sbin, res, property_c..., proc, oem, init.zygote..., init.zygote..., init.usb.rc, init.usb.co..., init.trace.rc, init.target.rc, init.rc

Connected to: /192.168.43.1

Fig 5: File Transfer Fig 6: File Download

Fig 5 is the File Transfer,where we transfer the files from android device to pc.

Fig 6 is the File Download,where we download the files from pc to android device.



03633cc555ef5d761c45bbe6e3c7a54...
49KB, 21 Jul 2018 10:47 PM

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94KB, 21 Jul 2018 10:45 PM

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54KB, 21 Feb 2018 11:30 PM

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117KB, 29 Jul 2018 01:12 PM

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799KB, 06 Jan 2018 06:18 PM

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868KB, 06 Jan 2018 06:21 PM

1515243071891.jpg
1072KB, 06 Jan 2018 06:21 PM

1515243074606.jpg
1101KB, 06 Jan 2018 06:21 PM

1550c4296705b3268edc8c760fd023c...
42KB, 28 Mar 2018 05:26 PM

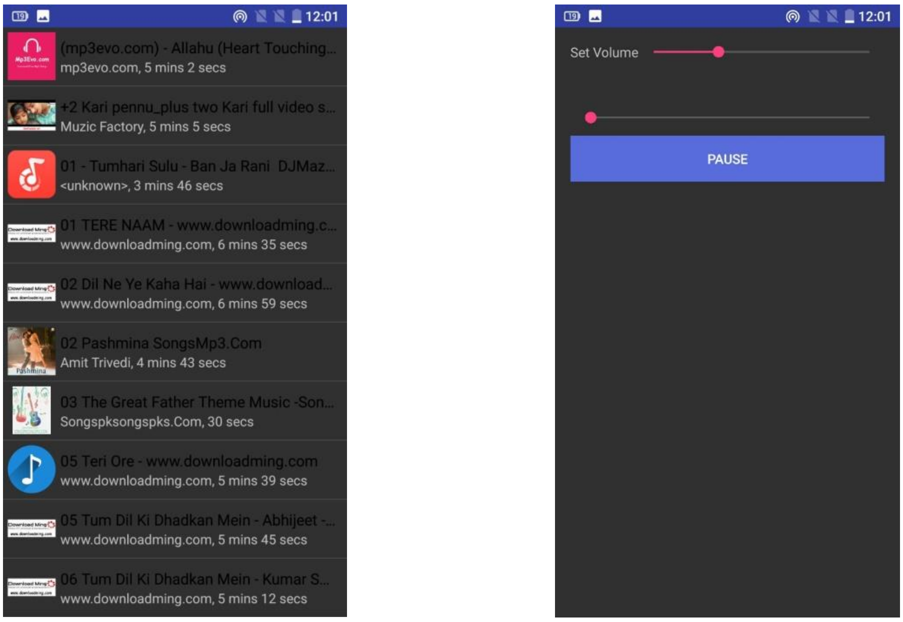
16447d600d8da18edc057394e9458a0...
137KB, 16 Jul 2018 08:22 PM

Your IP Address:
192.168.43.40
Port No: 3000
Connection Status:
Connected to: /192.168.4...

03633cc555ef5d761c45bbe6e3c7a54d.jpg

Fig 7: Image Viewer

Fig 7 is the Image Viewer, where we view the images from android device to pc.



12:01

(mp3evo.com) - Allahu (Heart Touching...
mp3evo.com, 5 mins 2 secs

+2 Kari pennu_plus two Kari full video s...
Muzic Factory, 5 mins 5 secs

01 - Tumhari Sulu - Ban Ja Rani DJMaz...
<unknown>, 3 mins 46 secs

01 TERE NAAM - www.downloadming.c...
www.downloadming.com, 6 mins 35 secs

02 Dil Ne Ye Kaha Hai - www.download...
www.downloadming.com, 6 mins 59 secs

02 Pashmina SongsMp3.Com
Amit Trivedi, 4 mins 43 secs

03 The Great Father Theme Music -Son...
Songspksongspks.Com, 30 secs

05 Teri Ore - www.downloadming.com
www.downloadming.com, 5 mins 39 secs

05 Tum Dil Ki Dhadkan Mein - Abhijeet -...
www.downloadming.com, 5 mins 45 secs

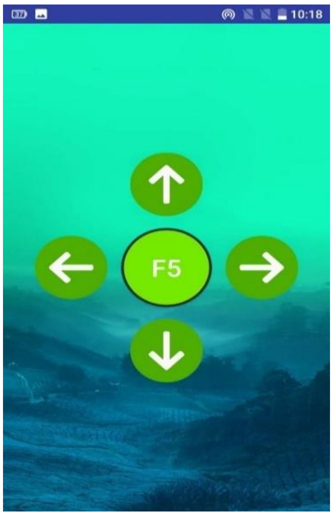
06 Tum Dil Ki Dhadkan Mein - Kumar S...
www.downloadming.com, 5 mins 12 secs

12:01

Set Volume

Fig 8: Media Player

Fig 8 is the Media Player,where we play the songs in android device which is present in android device and can be heard in pc.



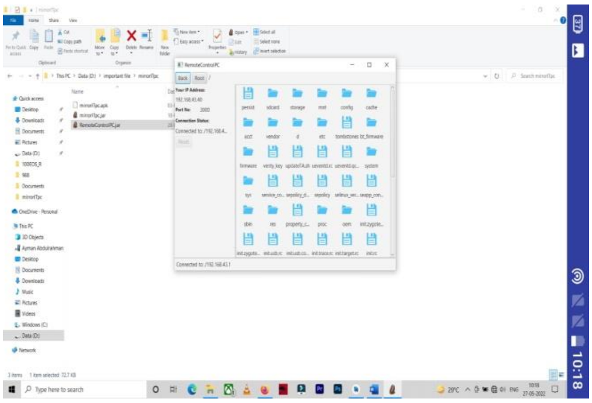


Fig 9: Presentation

Fig 10: Live Screen

Fig 9 is the Presentation window, where we can click on F5 for slideshow and also we can change the slides through the arrow keys.

Fig 10 shows the Live Screen of the pc in android device

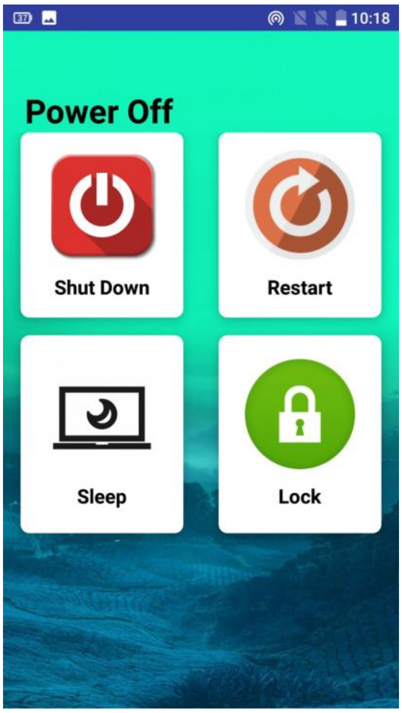


Fig 11: Power Off

Fig 11 is the Power Off option, where we have multiple options such as ShutDown,Restart,Sleep and Lock.