HOME NETWORK MONITORING TOOLS FOR ANDROID

NUR HANIS FATINI BINTI ROSLI

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

BORANG PENGESAHAN STATUS LAPORAN

JUDUL**:** HOME NETWORK MONITORING TOOLS FOR ANDROID

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HOME NETWORK MONITORING TOOLS FOR ANDROID

NUR HANIS FATINI BINTI ROSLI

This report is submitted in partial fulfilment of the requirements for the

Bachelor of Computer Science (Computer Networking) with Honours

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2019

DECLARATION

I hereby declare that this project report entitled

HOME NETWORK MONITORING TOOLS FOR ANDROID

is written by me and is my own effort and that no part has been plagiarized

without citations.

STUDENT'S NAME: _____ Date : _____

(NUR HANIS FATINI BINTI ROSLI)

I hereby declare that I have read this project report and found

this project report is sufficient in term of the scope and quality for the award of

Bachelor of Computer Science (Computer Networking) with Honours.

SUPERVISOR'S NAME: _____ Date : _____

(MR. ERMAN BIN HAMID)

DEDICATION

To my beloved parents Rosli Bin Latip and Zalina Binti Yusuf,

Both who support me to get through everything during my studies.

To my Academic Advisor, Ts. Dr. Nazrulazhar Bin Bahaman

To my supervisor, Mr. Erman Bin Hamid.

For encouraging, motivating and believe me.

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Firstly, all Praise to Allah SWT the Almighty for giving me the strength to finish my PSM. Thanks to Allah because I manage to complete my final year project.

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Thank you to Universiti Teknikal Malaysia Melaka (UTeM) for the opportunity given. I pray to Allah SWT may He send you His blessing.

ABSTRACT

Home Network Monitoring Tools for Android is a project to develop a tool for user to discover and track the current device which connected to the Wi-Fi network. It will help users to understand the information of devices which connected with the Wi-Fi network through the mobile application in user-friendly form. The problem statement states the problem of unwanted access (intrusion) uncertainty in Wi-Fi network that could pose a threat to the network performance and security. Second, the difficulty in showing list of devices that currently used the network through mobile device, and the difficulty of how to monitor the network information in user-friendly form through mobile device. To solve the current problem, Home Network Monitoring Tools for Android is proposed to develop with the objective implement a medium lower cost for home network monitoring tool system. Furthermore, the purpose of this project is to develop a home network monitoring tool with android application for user to scan and monitor network which device are connected to the Wi-Fi network. Besides that, it also enables user to discover and track the network information that travels in the Wi-Fi network. To ensure the project can be successfully developed, the Waterfall Model methodology has been chosen. This is because the Waterfall Model is a software development methodology that uses linear sequential design approach. Each phase must be completed before the next phase can start. As a conclusion, the Home Network Monitoring Tools for Android can solve the user problem by using the network monitoring.

ABSTRAK

Home Network Monitoring Tools for Android adalah projek untuk membangunkan alat kepada pengguna untuk mengetahui dan menjejaki peranti semasa yang disambungkan ke rangkaian Wi-Fi. Ia akan membantu pengguna memahami maklumat peranti yang berkaitan dengan rangkaian Wi-Fi menerusi aplikasi mudah alih dalam bentuk mesra pengguna. Pernyataan masalah menyatakan masalah ketidakpastian akses (gangguan) yang tidak diingini dalam rangkaian Wi-Fi yang boleh menimbulkan ancaman terhadap prestasi dan keselamatan rangkaian. Kedua, kesukaran menunjukkan senarai peranti yang kini menggunakan rangkaian melalui peranti mudah alih, dan kesukaran untuk memantau maklumat rangkaian dalam bentuk mesra pengguna melalui peranti mudah alih. Untuk menyelesaikan masalah semasa, *Home Network Monitoring Tools for Android* dibangunkan dengan tujuan perlaksanaan kos rendah untuk sistem alat pemantauan rangkaian rumah. Tambahan pula, tujuan projek ini adalah untuk membangunkan *Home Network Monitoring Tools for Android* untuk pengguna mengimbas dan memantau rangkaian peranti mana yang disambungkan ke rangkaian Wi-Fi. Selain itu, ia juga membolehkan pengguna untuk mencari dan menjejaki maklumat rangkaian yang bergerak dalam rangkaian Wi-Fi. Untuk memastikan projek berjaya dibangunkan, metodologi *Waterfall Model* telah dipilih. Ini kerana *Waterfall Model* adalah metodologi pembangunan perisian yang menggunakan pendekatan reka bentuk berurutan linear. Setiap fasa mesti disiapkan sebelum fasa seterusnya boleh bermula. Sebagai kesimpulannya, *Home Network Monitoring Tools for Android* dapat menyelesaikan masalah pengguna dengan menggunakan pemantauan rangkaian.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Internet of things (IOT) has become one of the most promising technologies. The home network monitor is one of the most popular networking monitoring software for enterprises. The system that constantly monitors a computer network for slow or failing components and that notifies the network administrator with email and SMS. Network monitoring is used to monitor the network traffic. In addition, technological developments evolve from time to time and meet each user's daily affairs. Network monitoring can monitor the network element conditions such as switches, routers, servers and firewalls.

There are several difficulties or issues that user encounters such as the problem of unwanted access (intrusion) uncertainty in home network that could pose a threat to the network performance and security. Second, the difficulty in showing list of devices that currently used the network through mobile device. Lastly, the difficulty of how to monitor the network information in user-friendly form through mobile device.

Therefore, this project is use android application, hardware device and software application. The main function of home network monitoring tools for android is to scan and monitor network which device are connected to the Wi-Fi network. Enable to discover and track the network information that travels in the Wi-Fi network and display the information of devices which connect with Wi-Fi network.

1.2 Problem Statement

Network monitoring is use of a system that monitors a computer network, if a slowing or failing part is detected, the network monitoring program will alert the issue to network administrators and prevent a network outage. There are several difficulties or problems from the existing system that user faces as users usually have the issue of unwanted access (intrusion) uncertainty in home network that could pose a threat to the network performance and security. User need to be aware of unauthorized network access (intrusion) that could pose a threat to network security and efficiency. However, the problems from existing applications are the difficulty in showing list of devices that are access the network through mobile device. From the problem, this project may help users to understand the list of devices currently using the network in proper interface. Furthermore, the existing tools have difficulty of how to monitor the network information in user-friendly form through mobile device. Nevertheless, Home Network Monitoring Tools for Android can make easier for users to scan and view the Wi-Fi network in user-friendly form. The summary of problem statement for this research is shown in table 1.1.

Table 1.1: Summary of Problem Statement

PS	Problem Statement
PS1	The problem of unwanted access (intrusion) uncertainty in home network that could pose a threat to the network performance and security.
PS2	The difficulty in showing list of devices that currently used the Wi-Fi network through mobile device.
PS3	The difficulty of how to monitor the network information in user-friendly form through mobile device.

1.3 Project Research Question

Project Research Questions is to identify the question of the existing Home Network Monitoring Tools for Android. There are a few vulnerabilities that are required to analyse and change the current Home Network Monitoring Tools for Android. The table 1.2 shows the summary of the project research question.

Table 1.2: Summary of Project Research Question

PRQ	Project Research Question
PRQ1	What is the problem of unwanted access (intrusion) that pose a threat to the network performance and security?
PRQ2	What is the suitable technique for user to show the device that currently used the network?
PRQ3	What is the dissatisfaction of user in monitor the network information?

1.4 Project Objective

Project objective defines the improvement that wants to achieve at the end of the project. The improvement must be considered based on the problem statement and the project question of this project. The objectives for this project are shown in below.

1. To develop home network monitoring tools for android that can scan and monitor the current devices which connected to the Wi-Fi network.
2. To discover and track the device network information that travels in the Wi-Fi network.
3. To display information of devices connected with Wi-Fi network through the mobile application in user-friendly form.

1.5 Project Research Hypothesis

A research hypothesis is the statement created by researcher to improve the outcome of a research. The current home network monitoring has insufficient features and not very satisfying due to the difficulties to understand the home network monitoring. The figure 1.1 shows the problem of the current home network monitoring and the hypothesis to make an improvement.

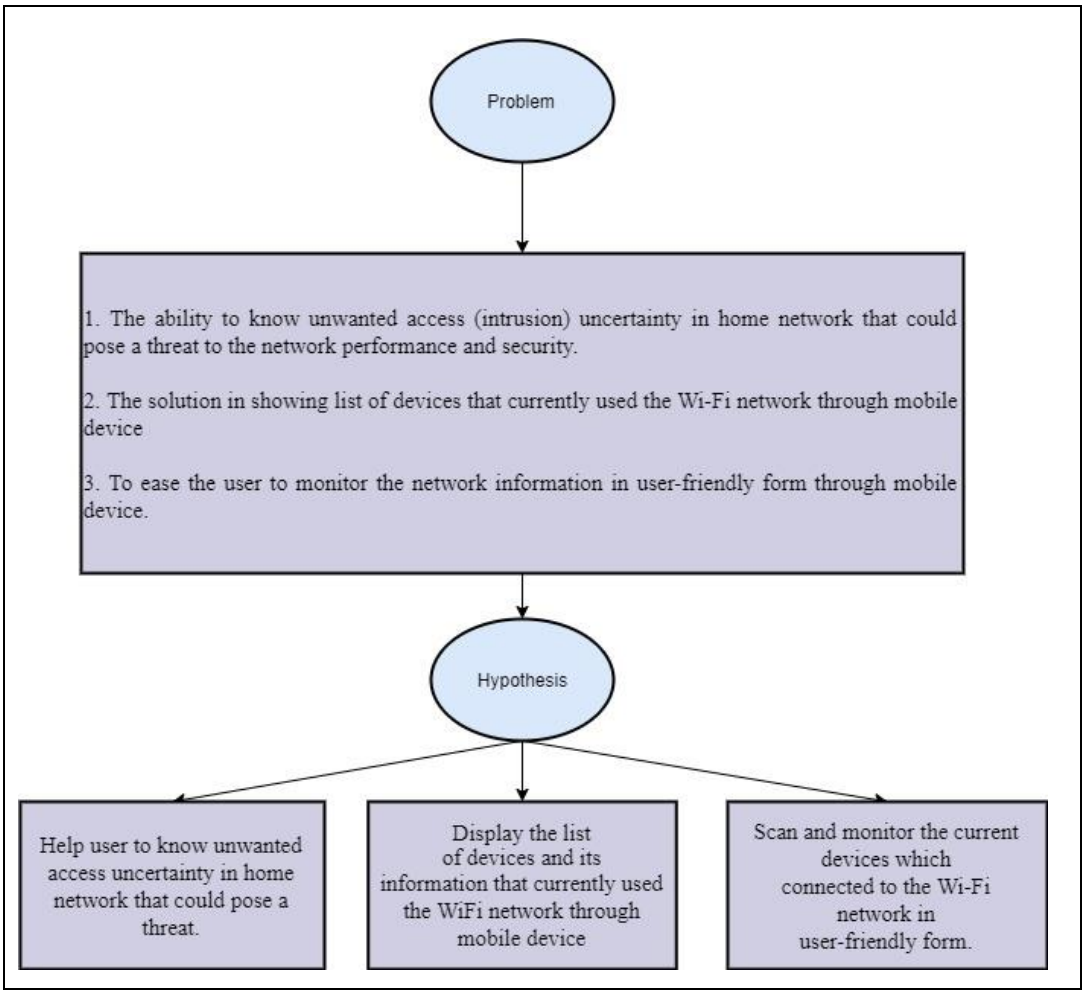


Figure 1.1: Project Research Hypothesis

1.6 Project Scope

A project scope is a certain process that need to success to get the final result as a product and service with specific features and functions. It also can give a view of the project.

1.6.1 Users

The target users of this project are the user who want to scan the Wi-Fi network for which current device connected to the Wi-Fi network.

1. **Platform – Wireless Networking Technology (Wi-Fi)**
   User who want to discover and track need to use platform to have internet connection with the Wi-Fi network to scan and monitor the current devices which access the Wi-Fi.

2. **Development Tools – Application**
   User can access Home Network Monitoring Tools for Android by using android application.

3. **HCI Techniques – GUI**
   This program software provides user-friendly HCI techniques for a user to access the GUI.

1.6.2 Modules/Functions

Module and function are important part of this program software. There is several module consisting of one or more independently developed module that will not be integrated until connecting the software. One or more function may be included in a single module.

1. **Responsive GUI**

   This module consists of Home Network Monitoring Tools for Android application, which GUI component for user to interact with system.

2. **Scan and monitor list of devices**

   This module allows users to scan Wi-Fi to discover the device that currently connected with the Wi-Fi network, to monitor the network information through mobile application, and the interface will show the list of devices and its information in proper interface for user to view.

1.7 Project Significant

Project significant defines the expected output from this project. The project will help users to recognize the device that currently connected to the Wi-Fi. This part can be referred to the objectives of this project. The project significant can be referring to the table 1.3 in below.

Table 1.3: Project Significant

PS	Project Significant
PS1	A propose Home Network Monitoring Tools for Android system will be developed.
PS2	Knowledge about components of Home Network Monitoring Tools for Android.
PS3	Framework for analysing the network information by visualize the devices connected to the Wi-Fi network through mobile device.

1.8 Conclusion

From this chapter, Home Network Monitoring Tools for Android is developed to help users to understand how to avoid the unwanted access (intrusion) uncertainty in home network. Besides that, it can discover and track the device network information that travels in the network and display information of devices connected with Wi-Fi network through the mobile application in user-friendly form. Lastly, in next chapter will explain about the literature review on how the home network monitor the Wi-Fi in Android works and so on.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The previous chapter has been discussed the problem statement, objectives and the scope of project. This chapter will discuss about the problem and solution in the existing home network monitoring tools, to be more understand about concept and technique that need to be implementing in this project. This chapter also will contain the related publish information and article, previous project finding and research that are related to the objective. Furthermore, this chapter will be compared the hardware or tools which is the most suitable to use in the project.

The main of this project is to focus on the hardware device and software development which it can be interact with Wi-Fi modem. In this project, Home Network Monitoring Tools for Android are used to scan the list of devices, rename the devices and view the list of information devices that connected with the Wi-Fi network.

2.2 Research Problem

A research problem consists of the concept and the theory for the area of concern.

2.2.1 Concept

Based on Faggiani, Gregori, Lenzini, Luconi, & Vecchio (2014), a Network Monitoring is "monitoring activities are executed on users' hardware, the organization that coordinates the monitoring activity is relieved of the economical and practical burden of managing a dedicated system. Some network monitoring tools inject packets into the network to infer the properties of interest (e.g., the maximum throughput or the round-trip time). Important benefits come directly from shifting network monitoring toward the end systems, networked services and applications can be observed where they are used, and this paves the way for an evaluation of performance metrics from the end user's perspective."

2.2.2 Theory

According to Solodo & Malarić (2013), a Wireless Network is "a wireless connection of computers into a network; providing mobility of computers. A WLAN system contains one or more APs and zero or more portals in addition to the distribution system. The quality of Wi-Fi network depends on distance from the router, the used antenna and quality of the device.". Therefore, home network monitoring tools for android is use to detect which devices are currently connected to the Wi-Fi. It will monitor the system to detect unwanted access (intrusion) uncertainty in home network that could pose a threat to the network performance and security. Besides that, it may help users to understand and easily to view the list of devices and its information which currently using the network. Nevertheless, Home Network Monitoring Tools for Android can enable users to scan and monitor the Wi-Fi network.

2.2.3 Previous Existing System

There are many types of Home Network Monitoring Tools being introduced in the market. The most common tools are:

1. Interactive Host Packet Visualizer (Puteri Syaheera Binti Mohd Shamsudin, 2018)
2. Fing Network Scanner (Carlo Medas and Marco De Angelis, 2009)
3. Network Analyzer Lite (Jiri Technet, 2018)
4. ezNetScan (Alan Henry, 2011)

The theory of all type in the network monitoring tools will be the same as those used to analyse network traffic by visualizing Wi-Fi connected through mobile devices. In this project, the research on Home Network Monitoring Tools for Android will be carrying out and compared with other type of network monitor tools. Figure 2.1 show the summary of Research Problem.

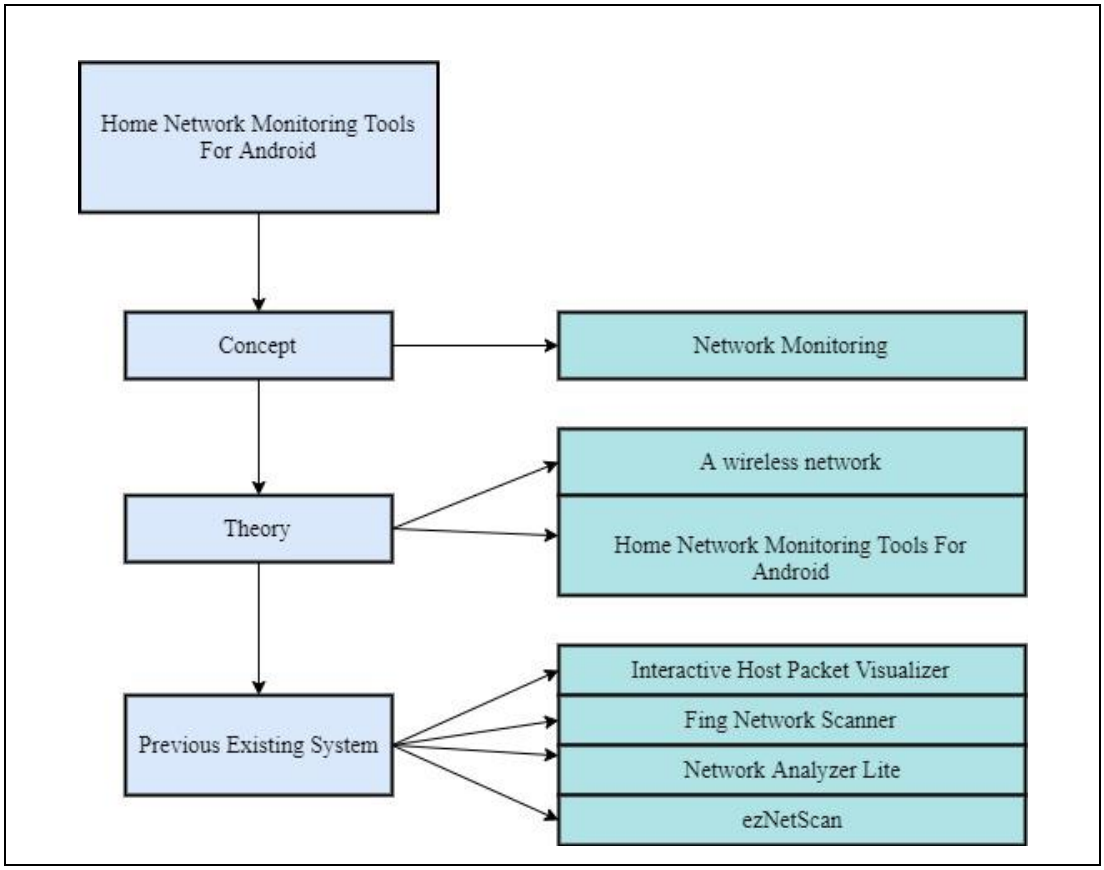


Figure 2.1: Summary of Research Problem

2.3 Research Question

The research question is the fundamental core of a research project, study or review of literature. In this project, we will be focused on the background of Wireless, the background of the android application and integrated development environment (IDE).

i. Background of Wireless

According to Shourbaji (1978), a Wireless Network is "Wireless Communication is an application of science and technology that has come to be vital for modern existence". "Computer technology has rapidly growth over the past decade, much of this can be attributed to the internet as many computers now have a need to be networked together to establish an online connection. As the technology continues to move from wired to wireless, the wireless LAN (local area network) has become one of the most popular networking environments.". Figure 2.2 is overview of wireless. Wireless may communicate directly with other wireless computers or via wireless AP in existing network.

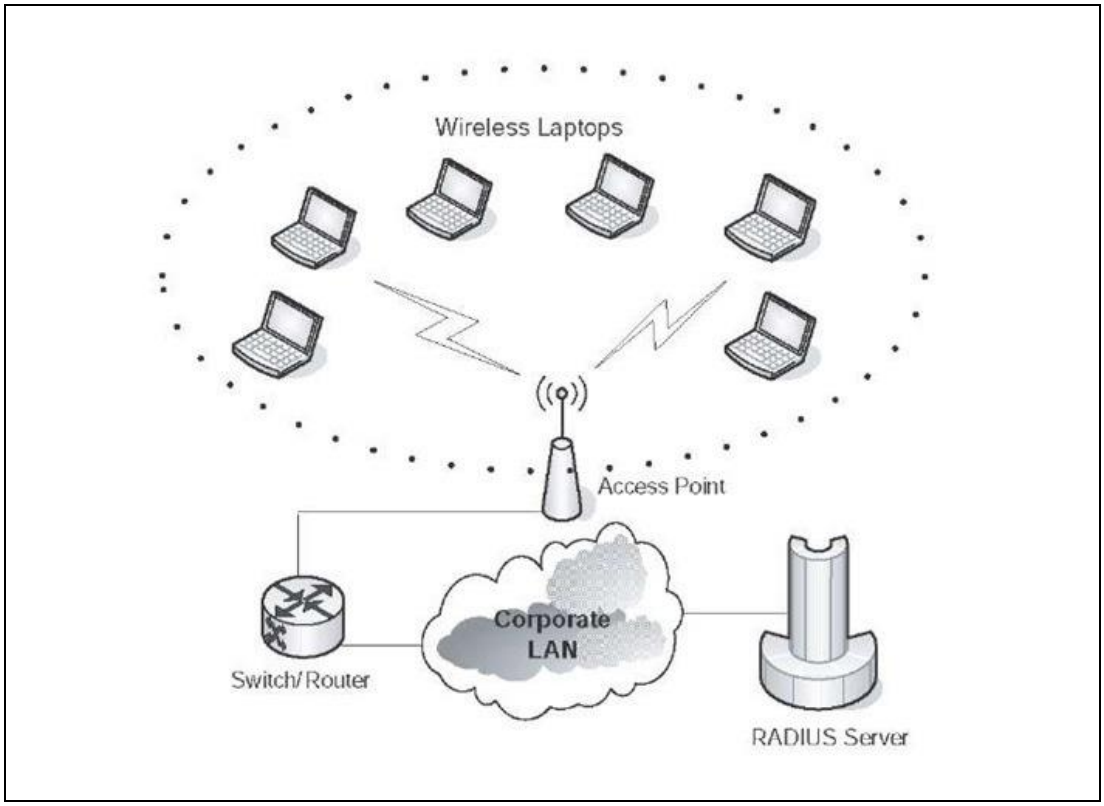


Figure 2.2: Overview of Wireless

Besides that, Shourbaji (1978) also mention the reason why everyone needs wireless in daily life. First, “An increasing number of LAN users are becoming mobile. These movable users require that they are connected to the network regardless of where they are because they want simultaneous access to the network. This makes the use of cables, or wired LANs, impractical if not impossible.”. Second, “Wireless LANs are very easy to install. There is no requirement for wiring every workstation and every room. This ease of installation makes wireless LANs inherently flexible. If a workstation must be moved, it can be done easily and without additional wiring, cable drops or reconfiguration of the network.”. Third, “Portability. If a company moves to a new location, the wireless system is much easier to move than ripping up all of the cables that a wired system would have snaked throughout the building.”.

Therefore, based on the researchers there are several Wireless LAN Technology, each of them has their own purpose and determine define how it works. First of wireless LAN Technology is Infrared, “The appearance of portable information terminals in work and living environments is increase the introduction of wireless digital links and local area networks (LAN’s). Wireless infrared communications refer to the use of free- space propagation of light waves in the near infrared band as a transmission medium for communication (Jatoi, Kamel, Ousta, & Gardezi, 2014). It provide a useful complement to radio-based systems, particularly for systems requiring low cost, light weight, moderate data rates, and only requiring short ranges (Jatoi et al., 2014).”.

Second of wireless LAN Technology is a Bluetooth, “Bluetooth is an industry specification for short-range connectivity for portable personal devices with its functional specification released out in 1999 by Bluetooth Special Interest Group. Using this band allows the Bluetooth protocol to become a standard around the world for interfacing devices together wirelessly. Communications protocol developed to allow the devices using Bluetooth to transfer data reliably over their wireless network.”.

Third of wireless LAN Technology is Home Radio Frequency, “In early 1997, several companies formed the Home RF working group to begin the development of a standard designed specifically for wireless voice and data networking in the home. (Goldsmith, By, & Heinzelman, 2004). Home Radio Frequency is an open industry specification developed by Home Radio Frequency Working (Wireless Networking Choices for the Broadband Internet Home, 2002) that defines how electronic devices such as PCs, cordless phones and other peripherals share and communicate voice, data and streaming media in and around the home.”. Figure 2.3 is the example of Network Device Type for Home Radio Frequency.

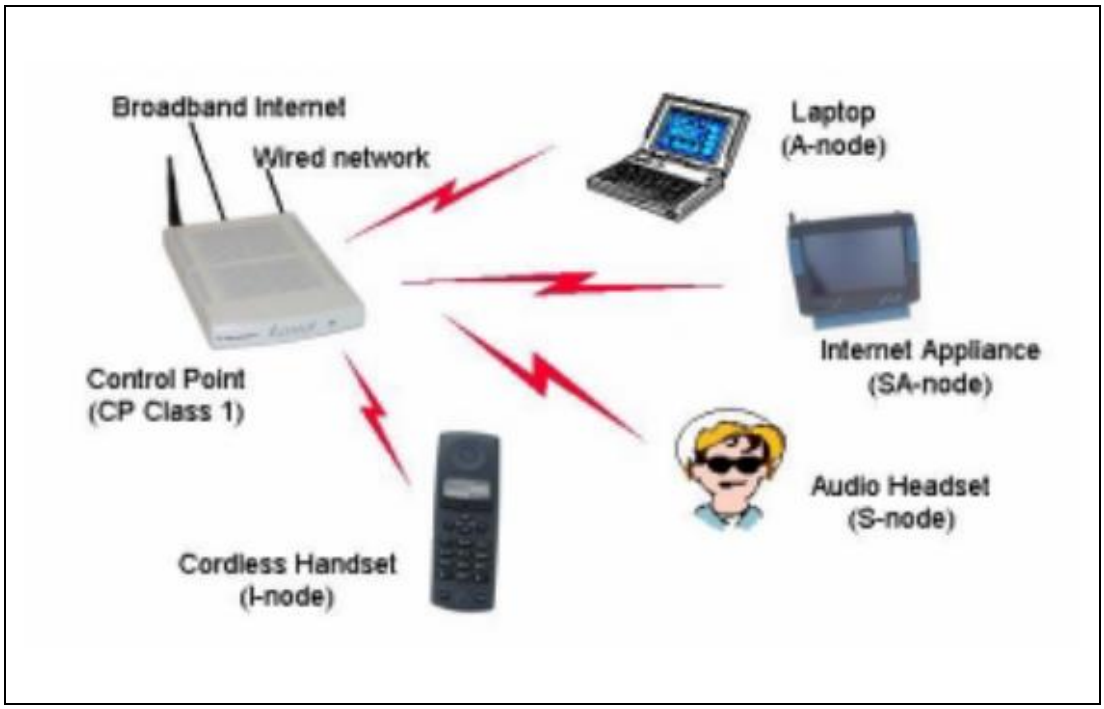


Figure 2.3: Home Radio Frequency Network Device Types

Based on Figure 2.4 (Goldsmith et al., 2004) define the differences between Bluetooth and Home Radio Frequency .

Characteristic	Bluetooth	HomeRF
Operational Spectrum	2.402 - 2.480 GHz	2.404 - 2.478 GHz
Bandwidth	78 MHz	74 MHz
Modulation Type	FHSS (1600 Hops/sec), GFSK	FHSS (50 Hops/sec), 2-FSK, 4-FSK
Channel Access	Master-Slave Polling	CSMA/CA and TDMA
Data Rates	.721 Mbps Peak	.8, 1.6 Mbps
Data Traffic	PPP	TCP/IP
Range	Regular – 10 m High Power – 100 m	50 m
Error Robustness	1/3 rate FEC, 2/3 rate FEC, ARQ Type 1	CRC/ARQ Type I
Security	YES	YES
Communications Topology	Peer-to-Peer, Master-to-Slave	Peer-to-Peer, MS-to-BS
Vender Stability	Very Good	N/A
Device Scalability	Currently Very Low	Good
Data Scalability	Low	OK
Transmit Power	NA	100 mW
Energy Conservation	Yes	Directory Based
Capital Cost	Adapter: ~$30 Chipset: Under $4 in Bulk	N/A
Operational Cost	None	N/A

Figure 2.4: Differences between Bluetooth and Home Radio Frequency

Last of wireless LAN Technology is IEEE 802.11, “The 802.11 WLAN standard allows for transmission over different media. Compliant media include infrared light and two types of radio transmission within the unlicensed 2.4-GHz frequency band: frequency hopping spread spectrum (FHSS) and direct sequence spread spectrum (DSSS). Spread spectrum is a modulation technique developed in the 1940s that spreads a transmission signal over a broad band of radio frequencies.” Figure 2.5 (Goldsmith et al., 2004) define the differences of protocol IEEE.

Characteristic	802.11	802.11a	802.11b	802.11g
Operational Spectrum	2.4 - 2.4835 GHz	5.15 - 5.35 GHz, 5.725 - 5.825 GHz	2.4 - 2.4835 GHz	2.4 - 2.4835 GHz
Bandwidth	83.5 Mhz	300 Mhz	83.5 Mhz	83.5 Mhz
Modulation Type	1, 2 Mbps DSSS, 1, 2 Mbps FHSS	6, 9 Mbps BPSK, 12, 18 Mbps QPSK, 24, 26 Mbps 16-QAM, 48, 54 Mbps 64-QAM	1 Mbps DBPSK, 2 Mbps DBPSK, 5.5, 11 Mbps DQPSK/CCK	OFDM/CCK, OFDM, DQPSK/CCK, DQPSK, DBPSK
Channel Access	CSMA/CA with RTS/CTS	OFDM	CSMA/CA with RTS/CTS	CSMA/CA with RTS/CTS and OFDM
Data Rates	1, 2 Mbps	6, 9, 12, 18, 24, 36, 48, 54 Mbps	1, 2, 5.5, 11 Mbps	1, 2, 5.5, 6, 9, 11, 12, 22, 24, 33, 36, 54 Mbps
Data Traffic	TCP/IP	TCP/IP	TCP/IP	TCP/IP
Range	50 m	100 m	100 m	100 m
Error Robustness	CRC/ARQ Type II	CRC/ARQ Type II	CRC/ARQ Type II	CRC/ARQ Type II
Security	YES	YES	YES	YES
Communications Topology	Peer-to-Peer, MS-to-BS	Peer-to-Peer, MS-to-BS	Peer-to-Peer, MS-to-BS	Peer-to-Peer, MS-to-BS
Vender Stability	N/A	Very Good	Very Good	Very Good
Device Scalability	Low	Very Good	Very Good	Very Good
Data Scalability	OK	Very Good	Good	Very Good
Transmit Power	NA	NA	NA	NA
Energy Conservation	Directory Based	Directory Based	Directory Based	Directory Based
Capital Cost	N/A	Access Point: ≥$190 Adapter: ≥$66 Chipset: N/A	Access Point: ≥$50 Adapter: ≥$20 Chipset: N/A	Access Point: ≥$80 Adapter: ~$36 Chipset: N/A
Operational Cost	None	None	None	None

Figure 2.5: Differences of protocol IEEE.

ii. Background of Android Application.

According to Liu & Yu (2011), "Android is a comprehensive operating environment that based on Linux V2.6 kernal, it is also a layered system, the architecture of Android system".

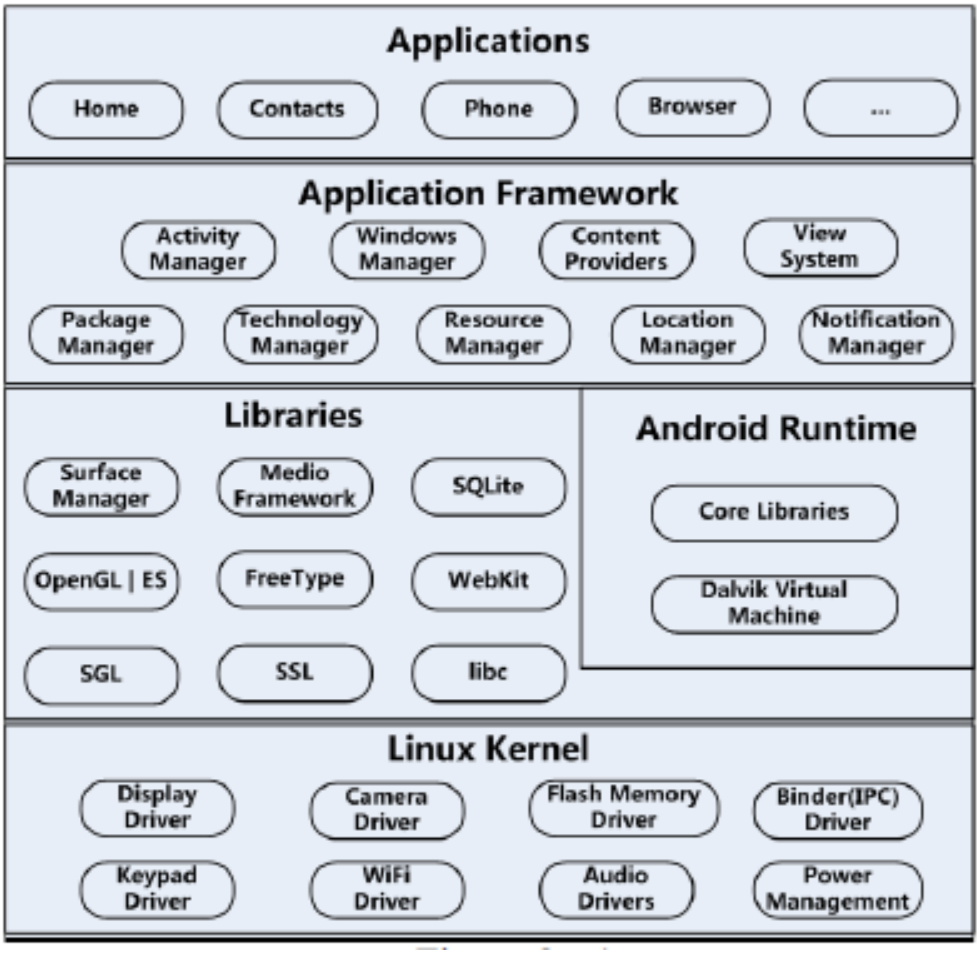


Figure 2.6: Architecture of Android System

Besides, Liu & Yu (2011) also mention that are four types of application components and each of them has their own purpose and lifecycle that define how it works.

The first component is Activity, “activity represents a single screen with a user interface. The activities in an application work together to form a cohesive user experience, but each one is independent of the others. As such, a different application can start any one of these activities. An activity is implemented as a subclass of Activity. The particular form that an activity show user and the amount of activities in an application depend on how the developer design the application. In a multiple activity application, typically, one activity is specified as the "main" activity, which is presented to the user when launching the application for the first time. Each activity can then start another activity in order to perform different actions. Each time a new activity starts, the previous activity is stopped, but the system preserves the activity in a stack (the "back stack")”.

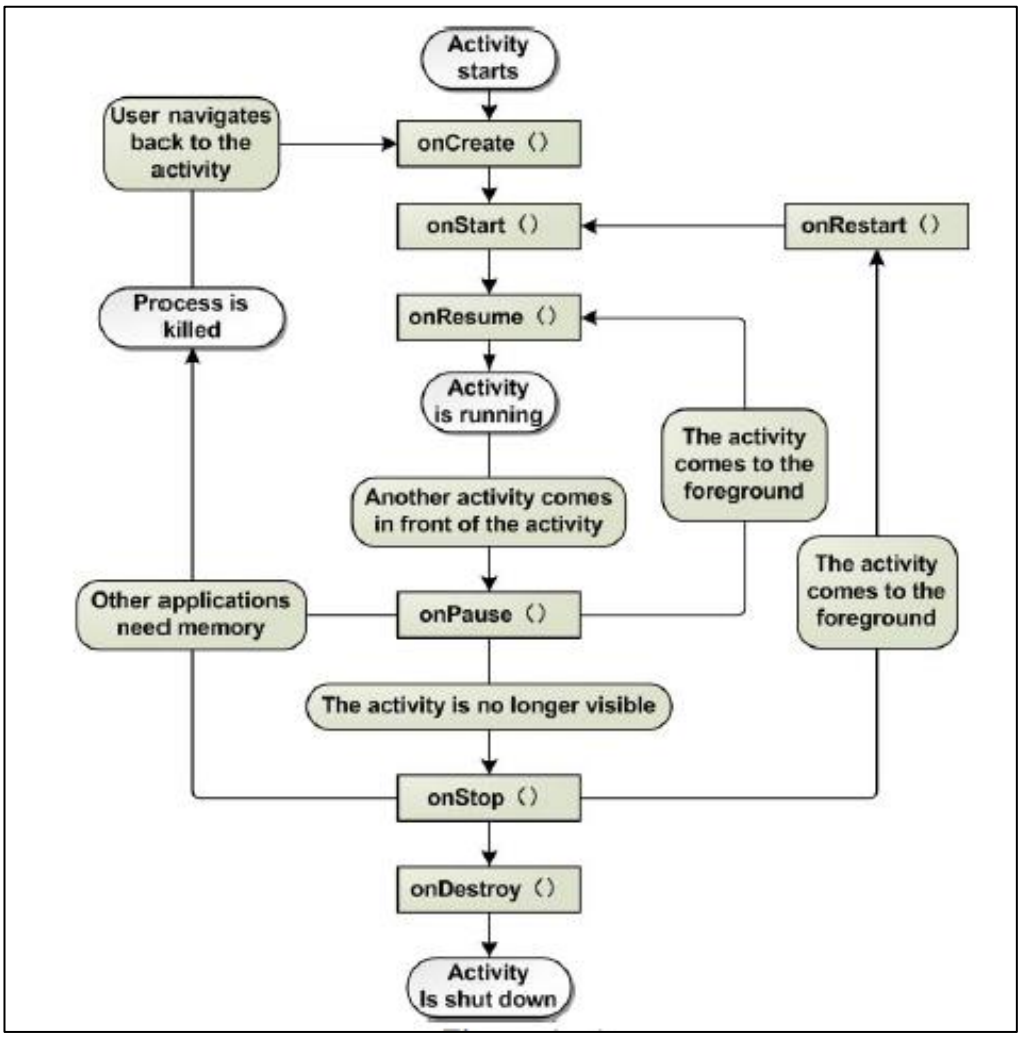


Figure 2.7: Lifecycle of an activity

Second component is Service. “Service is an Android component that runs in the background to perform long-running operations or to perform work for remote processes and does not provide a user interface. An activity can connect or bind a service that is running. (if the service is not running, launch it). When connected to a service, the activity can communicate with the service through the interface that the service exposed. Like other application components, service components always running in the main thread of an application by default. For the intensive or blocking operating a service performs (may slow down activity performance), it is usually started a new thread inside the service.”.

Third component is content providers which “provide data share mechanism among applications. The data that be shared could in the file system, a SQLite database, or any other persistent storage location an application can access. A content provider is implemented as a subclass of Content provider, it defines the data format it supported and provides a set of method to enable other applications to query or modify the data. But an application does not call these methods immediately, instead, it calls these methods by an object named Content Resolver.” “Content Resolver can communicate with every Content Provider. Content Resolver cooperated with Content Provider to manger IPC (inter process communication) while sharing data.”

The last component is “Broadcast Receivers is in charge of the reception of system wide broadcast and take response aiming at the information that a broadcast transmitted. Many broadcasts originate from the system—for example, a broadcast announcing that the screen has turned off, the battery is low. Applications can also initiate broadcasts. There could be any number of Broadcast Receivers in an application and each Broadcast Receiver implemented as a sub class of Broadcast Receiver. Although broadcast receivers don't display a user interface, they may create a status bar notification to alert the user when a broadcast event occurs. More commonly, though, a broadcast receiver is just a "gateway" to other components and is intended to do a very minimal amount of work.”.

i. Integrated Development Environment (IDE)

IDE is needed to develop the android application. There are two very popular IDE which are Android Studio (AS) and Eclipse. Both of them have their own strength and weakness. Table below shows the comparison between AS and Eclipse.

Table 2.1: Android System and Eclipse

Aspect	Android Studio	Eclipse
User Interface	Simple user interfaces because it is dedicated for android development.	Complex user interface because Eclipse compatible with multiple platforms and need to work on Android Development tools to create android application.
Gradle Structure	Gradle build system is more efficient and organized.	Apache Ant is robust XML based system.
Code Completion	The code completion is more intelligent by using IntelliJ platform.	Might give wrong result.
Google Cloud Platform	Build in support.	Need to add plugin to Google plugin for Eclipse to support it.
App testing and debugging	Android studio can set up test classes and including them in the run configuration of projects. Hence, program bugs can be detected and ironed out when it still in build stage.	Does not support.

In conclusion, based on the table 2.1 shown Android Studio is chosen as the IDE to develop an android application for this project. Based on Wulansari, Mahawati, & Hartini (2013) said “Android Studio is designed specifically for Android development and its main goal is to speed up the Android development process and make it easier and simpler”. However, it also has more advantage for example Android Studio has user interface because it is dedicated for android development., Android studio uses the Gradle build system for more efficient and organized system. Lastly, the code implement is really better and more reliable to write and test code.

2.4 Research Gap

Research gap is important for project to find the missing or insufficient of the information and improve the system to make more useful. In research gap will discuss the definition, importance of research gap, comparison of the existing system and critical review of current problem.

2.4.1 Definition

A research dap defined as the project or system which missing function or scope the ability limit as conclusion. Research need is defined as gap that limit the ability as a conclusion for a question. Research need is defined as gap that limits the ability of decision-makers from making decisions. Research gap is the research for the missing element for the existing research literature and fill the research approach to improve the existing project. Figure below shows the plan of the system in research gap.

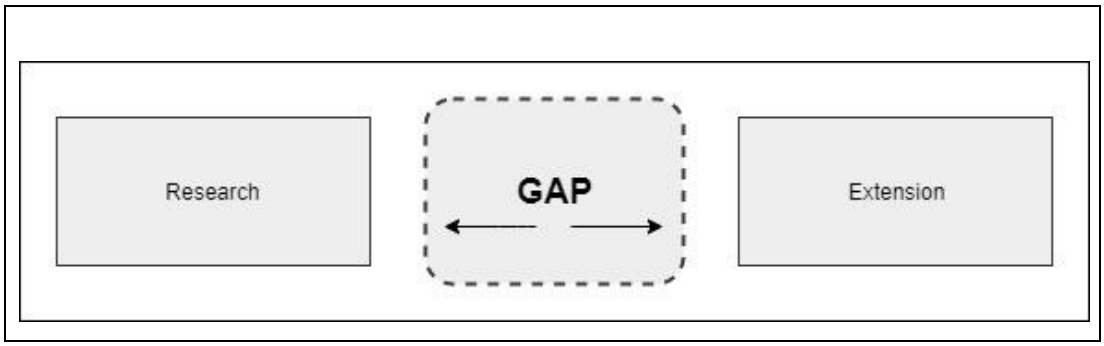


Figure 2.8: Plan the system in Research Gap

Figure below show the Research Gap for the Home Network Monitoring Tools for Android module using Wi-Fi network and android application. There are some extensions need to focus in the system function, usable and comprehensive.

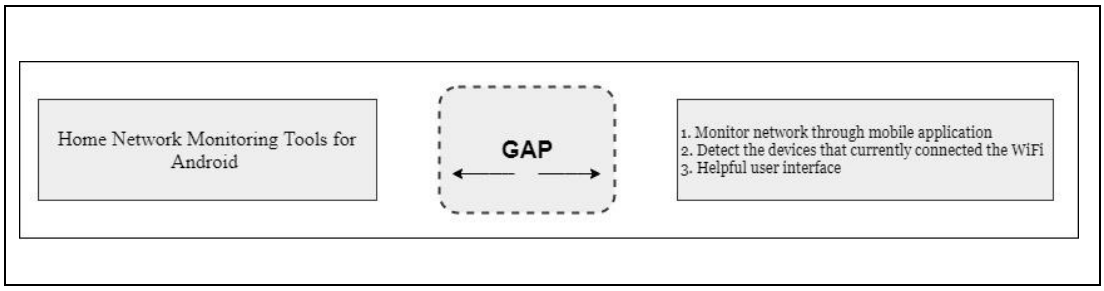


Figure 2.9: Research Gap for Home Network Monitoring Tools for Android

2.4.2 Importance of Research Gap

The important of research gap is because it explain the main issues, ideas, concept and frameworks identified in the literature review. Below shows the importance of identifying gaps in research.

i. Development for the future research scope.
ii. Determine the objectives of the future research.
iii. Clarifying the understanding about the research topic.

2.4.3 Comparison of Existing System

There are four (4) types of most common network monitoring tools on the market. For these four (4) types of network monitoring tools, some research has been carried out. First, Interactive Host Packet Visualizer (Puteri Syaheera Binti Mohd Shamsudin, 2018). Second, Fing network scanner (Male, Vatti, Meshram, & Bhanap (2018). Third, Network Analyzer Lite (Jiri Technet, 2018). Lastly, ezNetScan (Alan Henry, 2011).

Based on the (Puteri Syaheera Binti Mohd Shamsudin, 2018) in their research on Interactive Host Packet Visualizer which can capture packet analyser to detect unusual level of network traffic that traversing the network and it can monitor the system for unusual activities. However, the aim of the project is to complete status of all network activities by providing a complete visualize about bandwidth and resource utilization. This system provides the current packet analyser to help some issues that user encounters such as user who are not from the network field may be difficult to understand the information details and how the current packet analyser are working. From the researcher said to improving the outcome of a research, it needs capture the packet using Jpcap library, visualize the network traffic that travels in the network and make the tool more user-friendly. The system is used for the user in the visualization interface, who wants to analyse network traffic across the network.

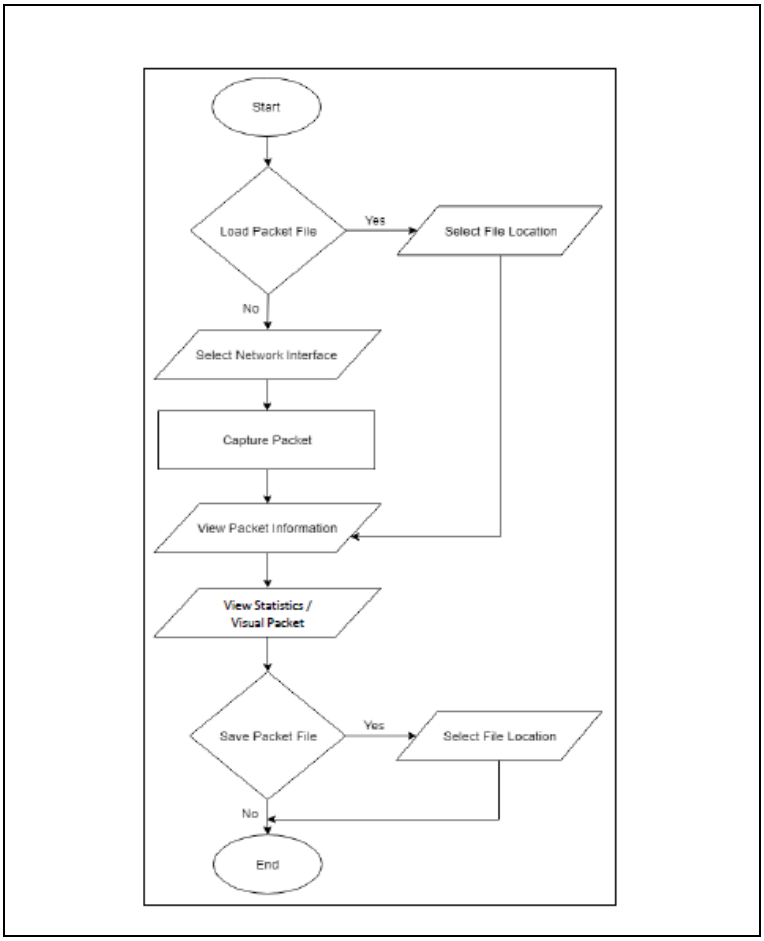


Figure 2.10: Flowchart of Interactive Host Packet Visualizer

Based on the Male, Vatti, Meshram, & Bhanap (2018) in their research on Fing network scanner which can discover the device that connected with the Wi-Fi network. Fing network scanner was published in Goggle PlayStore and AppsStore by Carlo Medas and Marco De Angelis in 2009. Based on researcher said this application can detect unlimited devices. Therefore, Fing application is allow user to identify details of the devices such as model, brand and version of the devices. Fing application is an open source and free. However, it also can view the network configuration such as IP address and MAC address, map connected device, troubleshoot networking problem and detect intruders.

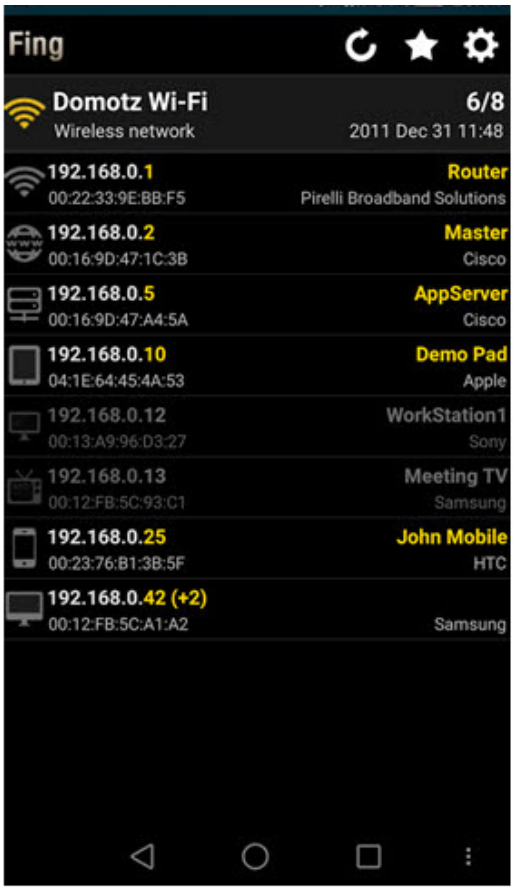


Figure 2.11: Fing Network Scanner

According to researchers, Network Analyzer Lite was published by Jiri Technet in 2018. It is programmed to scan all Wi-Fi network and detect problem in capabilities of devices. Network Analyzer Lite also can view current Wi-Fi connection and location. However, this application can view the detail of devices and analyse the Wi-Fi network. The Wi-Fi network will allow users to view all details include BSSID, SSID, subnet mask MNC, MCC, IP address, default gateway, DNS server and external IP. From all this information, it can make user easily to understand the algorithm. Based on researcher said Network Analyzer is fast, adaptive algorithm for scanning the port, detection of closed, firewall and open port because it is support IPv4 and IPv6.

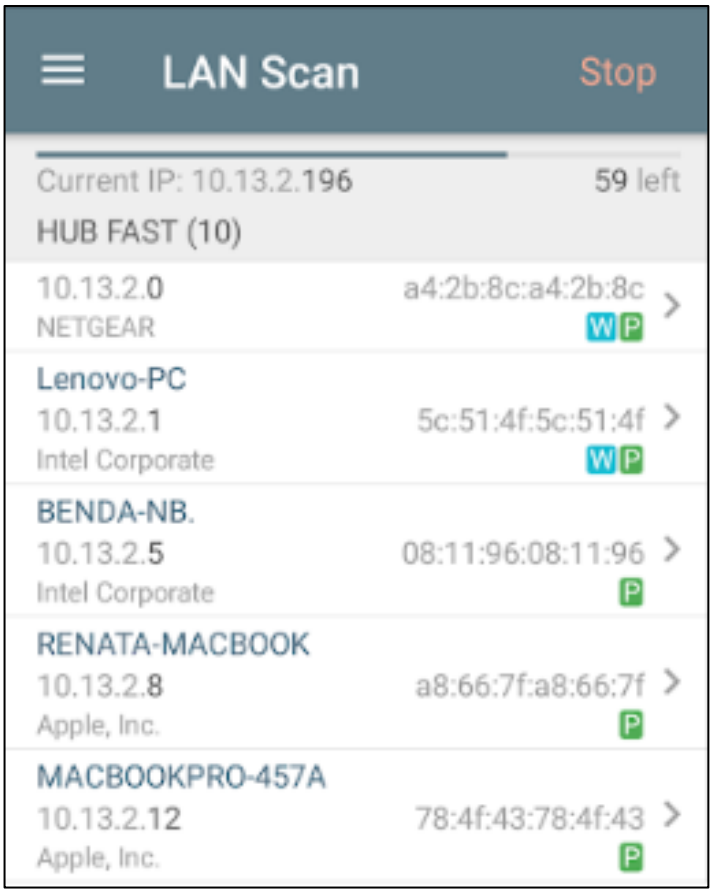


Figure 2.12: Network Analyzer Scanner

Based on Alan Henry (2011), ezNetScan provide scanning on the connected network to show how many devices are connected to the network. It also displays the devices with their local IP addresses, hostnames, MAC addresses and more. If the SNMP enabled on the devices on the connected network, it can collect SNMP data and show the installed applications and other useful information about the systems on network connected. It will even port scan specific devices, scan active services and perform pings and traceroutes inside and outside the local network. It can even send Wake-On-LAN requests to devices on connected network for the user.

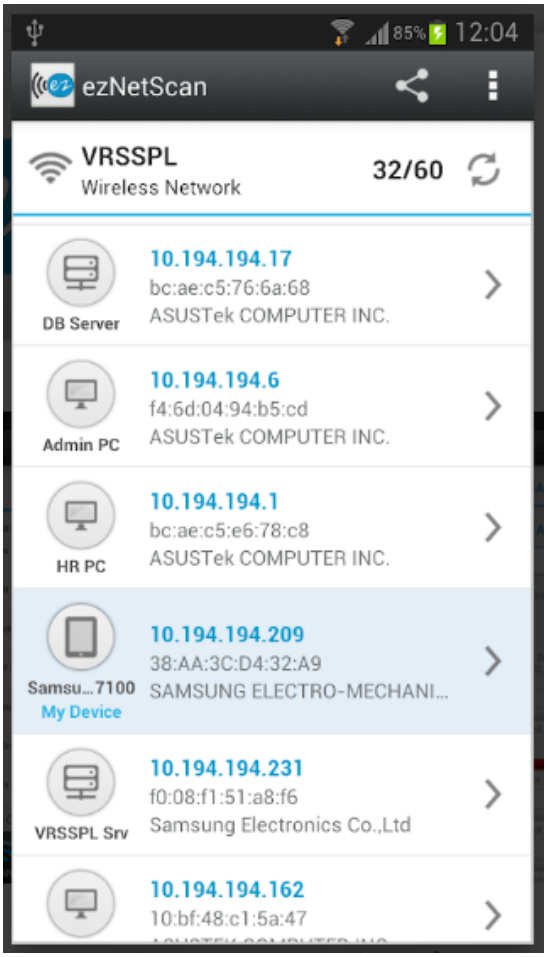


Figure 2.13: ezNetScan Scanner

2.4.4 Critical Review of Current Problem and Justification

From the research being analysed, there are many types of development and methods being used. As a conclusion of the system and a summary has been done as shown in table 2.2. There are four type of different system which is Interactive Host Packet Visualizer (Puteri Syaheera Binti Mohd Shamsudin, 2018) , Fing Network Scanner (Male, Vatti, Meshram, & Bhanap , 2018), Network Analyzer Lite (Jiri Technet , 2018) and ezNetScan (Alan Henry, 2011).

Interactive Host Packet Visualizer (Puteri Syaheera Binti Mohd Shamsudin, 2019) is a software system that created to visualize the packet and display the information in graphic form. It also helps the user to understand the packet information. Besides, it provides the proper visualization component and analyse all the incoming packets into the desktop.

Fing Network Scanner (Male, Vatti, Meshram, & Bhanap, 2018) is a software system that created to identify all devices that connected to any network in fast and accurate. However, it also helps to identify network intruders, Wi-Fi thieves and unknown device on our network. It can be run speed test, rate ISPs and find the best providers in our area. The Fing Network Scanner allow user to scan any network to discovers all connected devices and recognise the device to get IP address, MAC address, device name and model.

Network Analyzer Lite (Jiri Technet, 2018) is a software system that created to analysis, scanning and problem detection. Network analyser provides high performance Wi-Fi device discovery including all the device’s address and device name. Furthermore, it contains standard network diagnostic tools and network information. Network Analyzer Lite has fast adaptive port scanner and network speed testing against various locations.

ezNetScan (Alan Henry, 2011) is a handy network software tools for network monitoring. It allows to scan the wireless network and displays the list of all connected device with the wireless network. It has various other option to allow easily customize the network list further that includes assign device to specific icon, tag name for device and additional note to any device. This application has SNMP based features which allow the user to list out installed software and hardware information of devices connected to the network.

By studying the related work, the idea of the proposed solution can be obtained. Table 2.2 shows the summary of the comparison between the existing system.

Table 2.2: The comparison between the existing system.

Aspect	**Interactive Host Packet Visualizer**	**Fing Network Scanner**	**Network Analyzer Lite**	**ezNetScan**
Operating System	Windows	Android Application	Android Application	Android Application
User Interface	GUI	GUI	GUI	GUI
Graphical Overview	Yes	Yes	Yes	Yes
Cost	Free	Free	Free	Free
Open Source	Yes	Yes	Yes	Yes
Display protocol in OSI Layer Structure	Yes	Yes	Yes	Yes
Libpcap used	Yes	Yes	Yes	Yes
User-friendly element used	Valuable (useful)	Valuable (useful)	Valuable (useful)	Valuable (useful)

**Lipbcap is an application programming interface for capturing network traffic.*

2.5 Proposed Solution

By study the fact finding of the existing systems, the solution of the propose project system is found. The Home Network Monitoring Tools for Android is suggested to be implement for the project problem. Based on Fing Network Scanner (Male, Vatti, Meshram, & Bhanap, 2018) is some design in this system are going to be used in the propose project. As for the hardware, this propose project system use the Wi-Fi modem as Wi-Fi network that needs to implement the internet access and internetworking for the structure. The hardware device will allow to communication directly from one device to another without an access point. The hardware cost use average than before which makes the propose project cost is cheaper because it is in under development. In this project, a software system will be created by visualize can scan and monitor the current devices which connected to the Wi-Fi network, discover and track the device network information that travels in the Wi-Fi network. and display information of devices connected with Wi-Fi network through the mobile application in user-friendly form. It will help users to understand by display the list of devices and its information which connect with Wi-Fi network. Besides that, Home Network Monitoring Tools will be developed in android application (Android Studio) by scan and monitor the current device connected with Wi-Fi network.

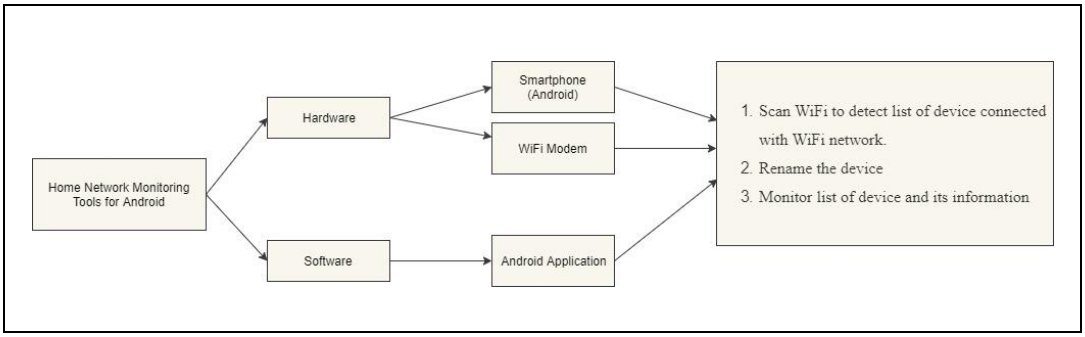


Figure 2.14: Proposed solution.

2.6 Conclusion

In conclusion, literature review is a necessary chapter and it is very important part to build the project concept, it helps to understand the existing features of the system and to get clear picture to implement the system. The research and study will make the progression on doing this project smoothly and more understanding. Lastly, in next chapter will explain about the methodology used in the project.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter is about the methodology used in the project. Methodology relates to the theoretical, systematic assessment of the techniques applied to the field of research. According to Gershon (2010) “The methodologies are then compared in terms of how each can be implemented. A scoring system is developed, where a company can list its implementation criteria and measure how well each methodology satisfies these criteria. The goal is to make recommendations as to which type of methodology should best be implemented in which type of organization under what circumstances.”.

There are many types of methodology applied to different types of development which includes Agile, Rapid Application Development (RAD), Waterfall, and Object-Oriented Methodology. Every software development methodology consists of different scope and the advantages. The most suitable methodology can help the progression of the project become smoothly and conduct the project in the correct way.

According to Balaji (2012), " Each phase is completed in specified period of time after that it moves to next phase. As its linear model, it's easy to implement.". However, it has been chosen the best methodology for this project is the Waterfall methodologies. From the researcher said, it can be concluded that Waterfall model is a linear sequential design approach. It is usually software developers will use these methodologies to build the system. Each phase must be completed before the next phases can begin. This causes there is no overlapping in the phases. The waterfall model is a sequential design method where progress is seen as flowing downwards like a waterfall through the Requirement Analysis, Design, Development, Testing and Maintenance stages.

3.2 Methodology

This project, Waterfall model will be implemented. This methodology is the most suitable as it designs to produce good system. It is simple to comprehend and to be use. Usually, software developers will use these methodologies to build the system. Furthermore, each phase must be completed before the next phases can begin. This causes there is no overlapping in the phases.

Based on McCormick (2012), "One important aspect that is worth mentioning is that this model is designed such that until the preceding phase is complete, you cannot move on to the next phase of development " . The model of the waterfall is called the Linear-Sequential Life Cycle Model. Based on researcher, the waterfall model is a sequential design process in which progress is seen as flowing downwards like a waterfall through the phases of Requirement Analysis, Design, Development, Testing and Maintenance. The figure 3.1 shows the process of Waterfall model.

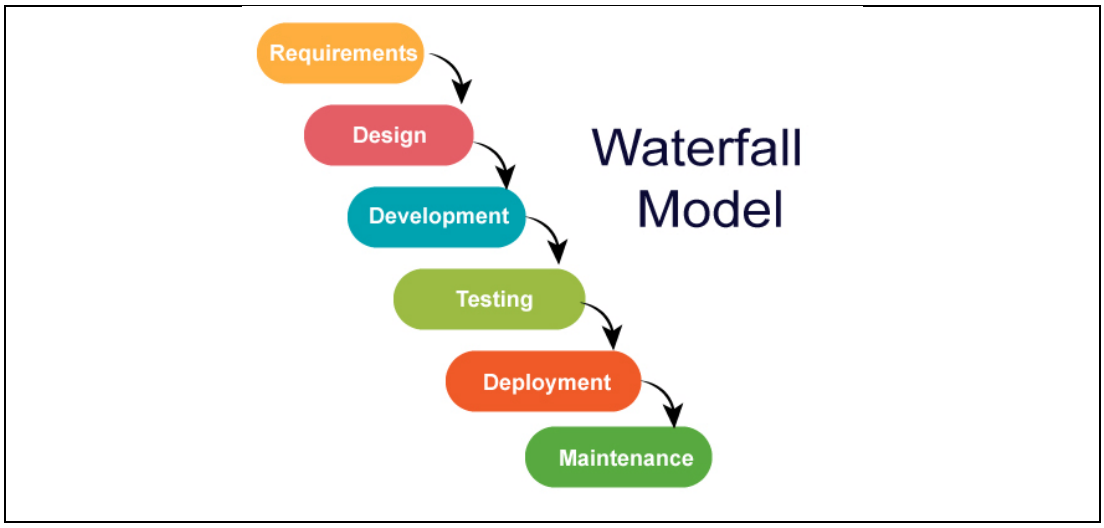


Figure 3.1: Process of waterfall model

3.3 Research Process

The Research Process is referring to the step-by-step development of the product. There are several stages included which are Requirement Analysis, Design, Development, Testing and Maintenance process. Every stage is important for carry out the project. The flow of the research process can be referred to the Figure 3.2.

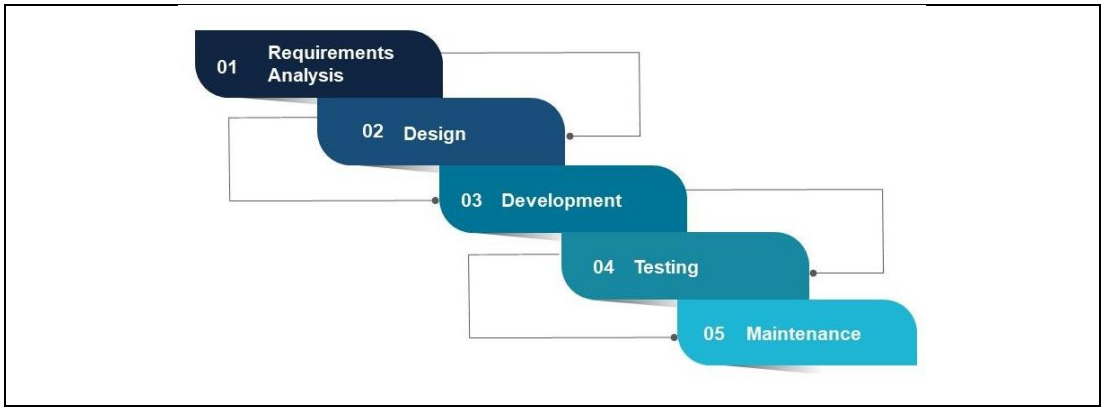


Figure 3.2: Flow of Research Process

3.3.1 Requirement Analysis

For the requirement analysis phase, all possible requirements of the system to be developed are implemented in this phase. Requirements are set of functionalities and constraints expected from the system by the end-user (who will use the system). The requirements are gathered from the end-user by make the surveys, these requirements are analyses for their validity and the possibility of incorporating the requirements in the system to be development is also studied. Finally, a requirement specification documents created which serves the purpose of guideline for the next phase of the model.

Android application is a software application running on the Android platform. Android platform is built for mobile devices, a typical android application is designed for a smartphone or a table PC running on Android OS. There are four application components that make up the android application. The components are Activity, Content provider, Broadcast Receiver and Service. Besides, there are two IDE to develop the android applications which are android studio and Eclipse. The chosen IDE is android studio.

3.3.2 Design

In this design phase, before start for the actual coding, it is important to understand what we are going to create and how the interface will look like. In this phase, the requirement specifications are studied from the first phase and the design of the system is prepared. The system design will help in specifying hardware and system requirements and also helps in defining overall system architecture.

a) System architecture design

The product design is conceptualized of how the flow of the product. Below shows the System architecture of the Home Network Monitoring Tools for Android and the overall flow of the product. An interface will be created by using Android Studio to develop Home Network Monitoring Tools for Android. The Home Network Monitoring Tools for Android will scan the network information to discover and track the current devices connected with Wi-Fi network. The figure 3.3 shows that the system architecture design has android smartphone that connected to the Wi-Fi modem. The details of project design will be discussed in details in chapter 4.

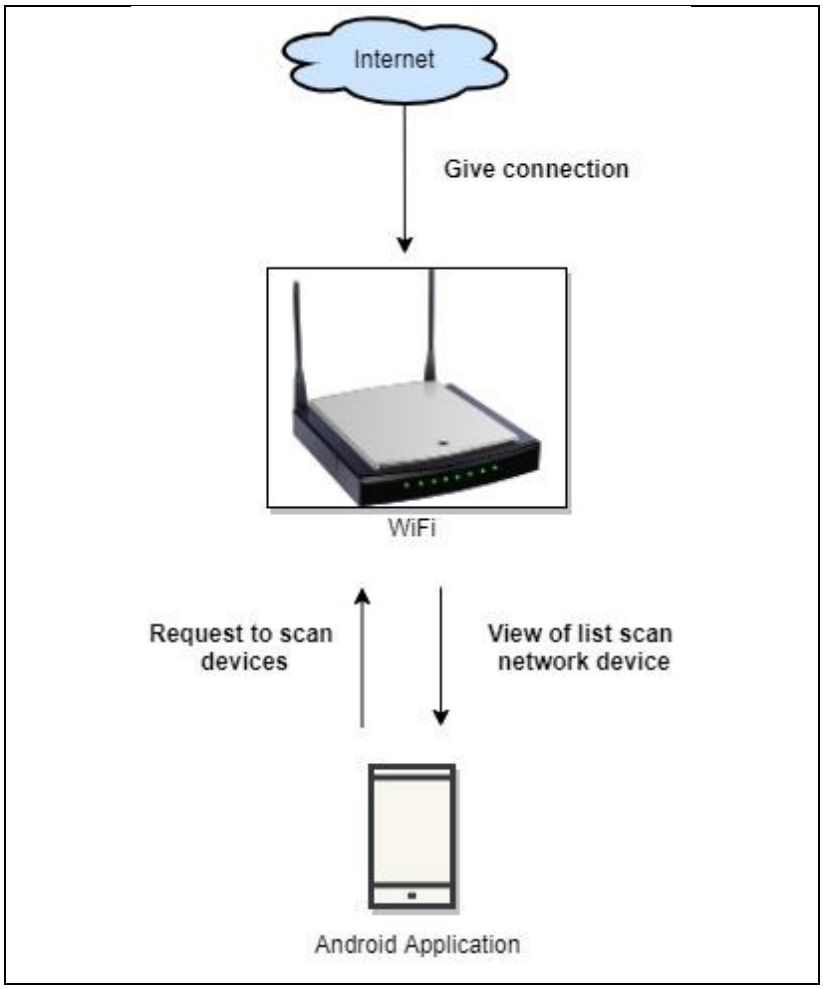


Figure 3.3: System architecture design

b) System flowchart design

Figure 3.4 represents a workflow or process of the Home Network Monitoring Tools for Android. It shows the input, output, data process and decision making of the tool.

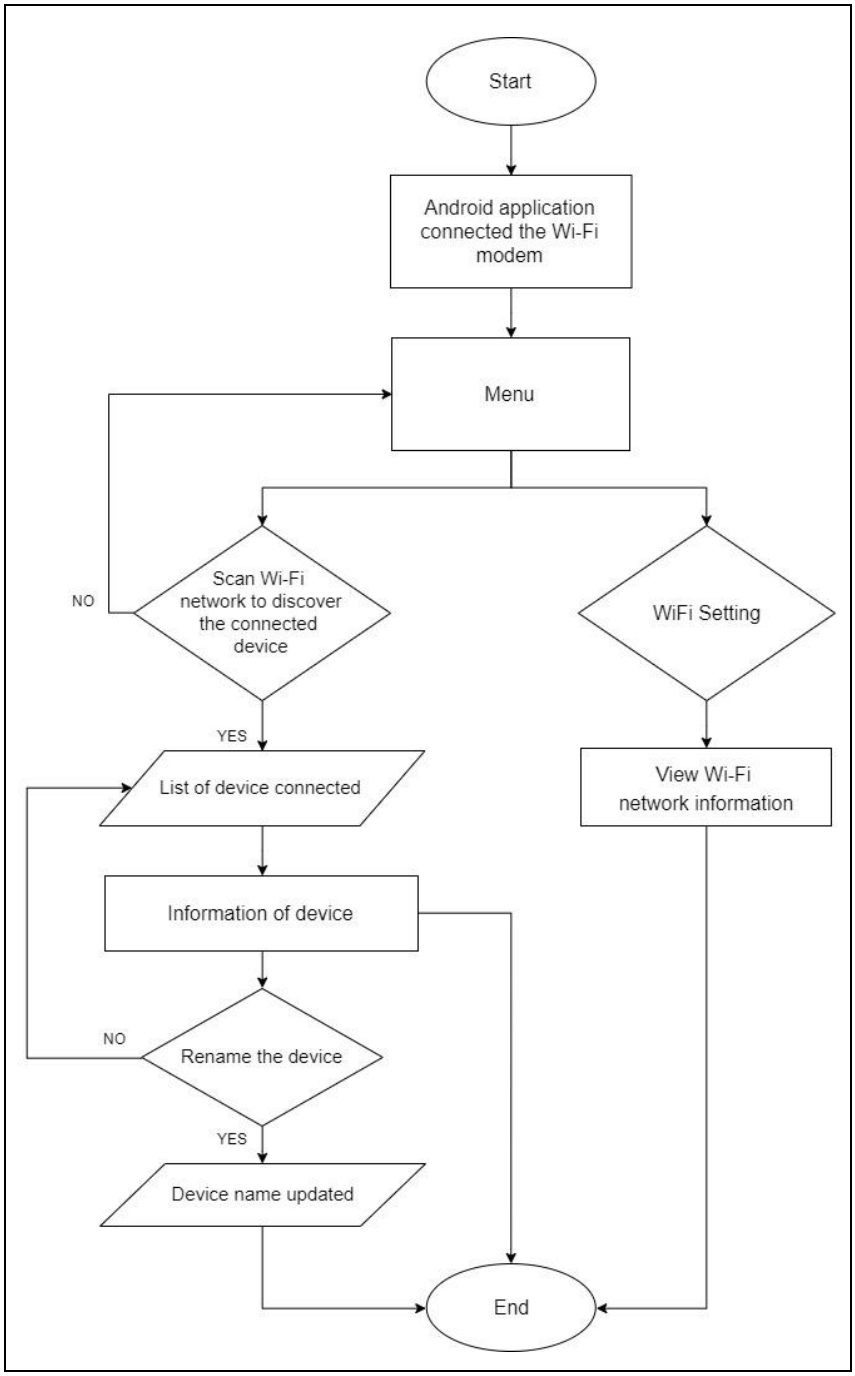


Figure 3.4: System flowchart design

3.3.3 Development

In this development phase, describe how to develop the system in reality from the version and plans. There are total of two (2) stages involved in the implementation which includes hardware connection and software application. All the details of implementation will be further discussed on chapter 5.

a) Hardware Connection

The figure 3.5 shows that the system architecture design has android smartphone that connected to the Wi-Fi modem. Wi-Fi modem is responsible to allow the local network have internet access. Besides that, there is an android smartphone used in this project. The android smartphone is for user to scan the current device which connected the Wi-Fi modem.

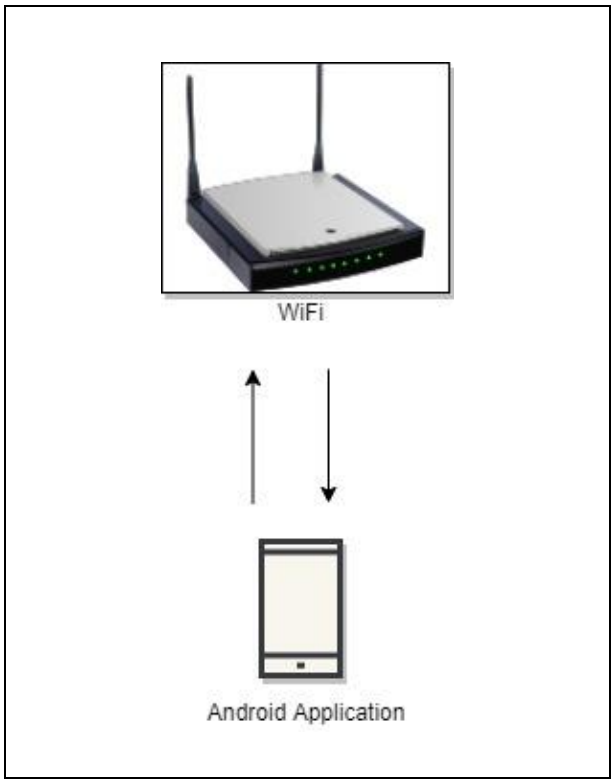


Figure 3.5: Hardware connection

b) Software application

Home Network Monitoring Tools for Android is a monitoring application that created by using Java language to capture packet. The figure 3.6 shows the software application of the Home Network Monitoring Tools for Android in details.

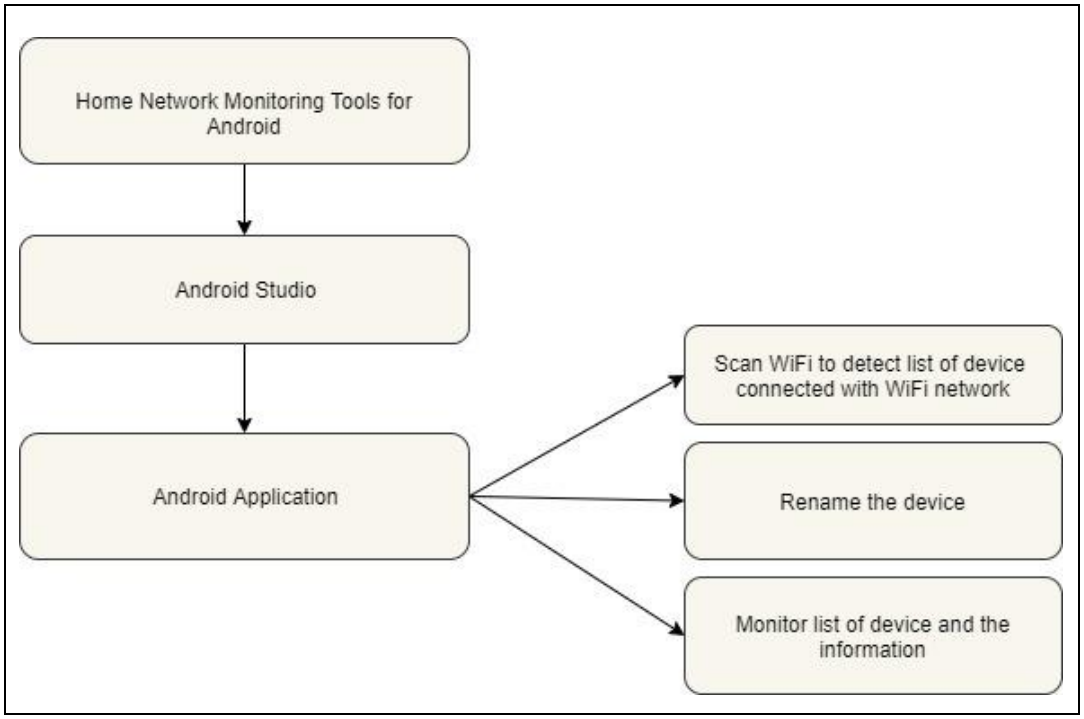


Figure 3.6: Software application

Figure 3.6 show the software application of the Home Network Monitoring Tools for Android. Android Studio is used to create the android application. Firstly, it needs to scan to show the list of devices over the Wi-Fi network. Next, it can rename the list of devices. Then, from the list of devices user can monitor the list of information devices.

3.3.4 Testing

Testing is a process of executing a system application and make sure it's running well as expected. In order to carry out the testing process for Home Network Monitoring Tools for Android, there are 2 phases will be focus on which is hardware testing and software application testing. Moreover, every testing process has to follow the correct procedure. An explanation in details will be discussed on chapter 6.

a) Hardware testing

Hardware testing includes the Wi-Fi modem and android smartphone. The testing is to make sure if the hardware device can be connected to each other. The Wi-Fi modem needs the internet connection to have Wi-Fi network for the smartphone can connected with Wi-Fi network.

b) Software application testing

Software application testing include the android application software. However, the testing is need to be test for the android application to discover and track the network traffic that travels in the Wi-Fi network through the android application. The android application allows the user to scan the device which connected to the Wi-Fi and monitor the information of the device. Every created function of the software will be tested and make sure it can correctly without any error. The tool also will be tested and verify the effectiveness of the Home Network Monitoring Tools for Android.

3.3.5 Maintenance

Maintenance is a phase that will be used after receiving user feedback to repair or upgrade and keep the product in good condition. Besides that, it allows to maintain efficient operation of equipment and software. Perhaps not all the first version development is acceptable for each user, so it takes the maintenance phase to repair or maintain product performance.

3.4 Project Requirement

Project requirement have some requirements hardware and software need to fulfil to ensure the progression of the project can run smoothly. The following shows the details of hardware and software requirements

a) Hardware requirement

The hardware requirements need in this project are:

Table 3.1: Hardware Requirements

Hardware	Specification
Wireless Router (Wi-Fi Modem) 	150Mbps Wireless N ADSL2+ Modem Router WAN: One 10/100 Mbps Ethernet RJ-45 port with auto MDI/MDIX support. LAN: Four 10/100 Mbps Ethernet RJ-45 ports with auto MDI/MDIX support. 1 Power On/Off Button 1 Reset Button 1 Wi-Fi on/Off Button Power: 9VDC/0.6A

Laptop 	Processor: Intel® Core™ i5 – 4200U CPU @ 1.6@GHz 2.3GHz Operating System: Microsoft Windows 10 Home Single Language RAM: 4.00 GB
Android smartphone 	Processor: Qualcomm Snapdragon 400 8928 Processor clock: 1.60 GHz Number of cores: 4 GPU: Adreno 305

b) Software requirement

The software requirement need in this project are:

Table 3.2: Software Requirement

Software	Specification
Android Studio	Used Java Language to create android application.
Android SDK	Used to provide the API libraries and necessary developer tool for android studio.

3.5 Research Technique

To develop the Home Network Monitoring Tools for Android, the internet has been chosen to connect the Wi-Fi modem with android smartphone. Next, the android studio also needs in order to create the android application. Android Studio is the official integrated development environment (IDE) for the Android platform. In android studio, internet is used to retrieve the network information on each device.

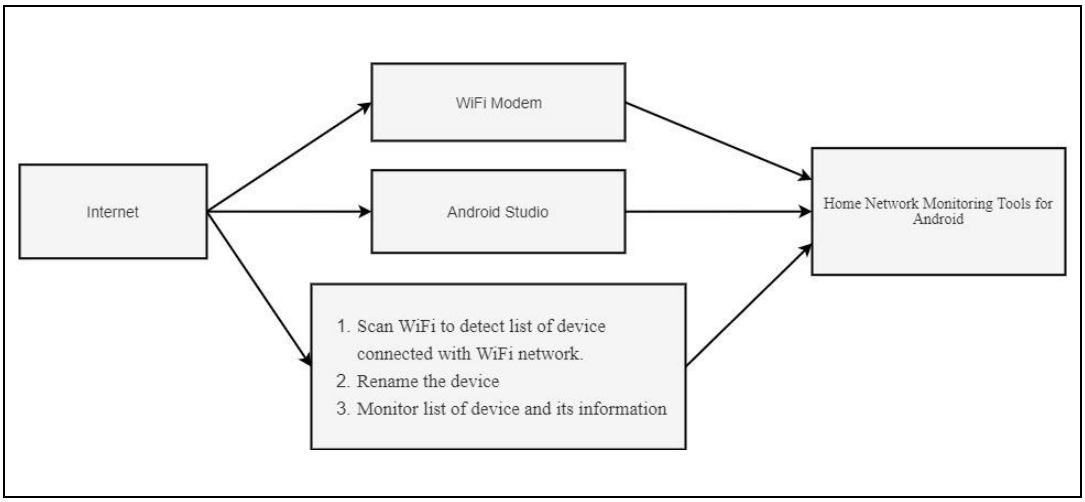


Figure 3.7: Research Technique

3.6 Research Framework

In order to carry out this project, a framework is design to have a picture about the project. First, identify the problem. In this project, the main problem is with the issues of unwanted access (intrusion) uncertainty in home network that could pose a threat to the network performance and security. After problem is identified, research is done to analysis the solution of overcome the problem. Next, study is conducted to gain the knowledge about the theory in this project such as what is Wireless, Android Application, IDE to create android application, what is technique of previous existing system and the propose solution to develop this project. This knowledge is important as theory is needed to implement the method in the project. The strategies in this project are including the Waterfall methodology, Wi-Fi modem and android studio. The strategies are chosen in order to develop the Home Network Monitoring Tools for Android.

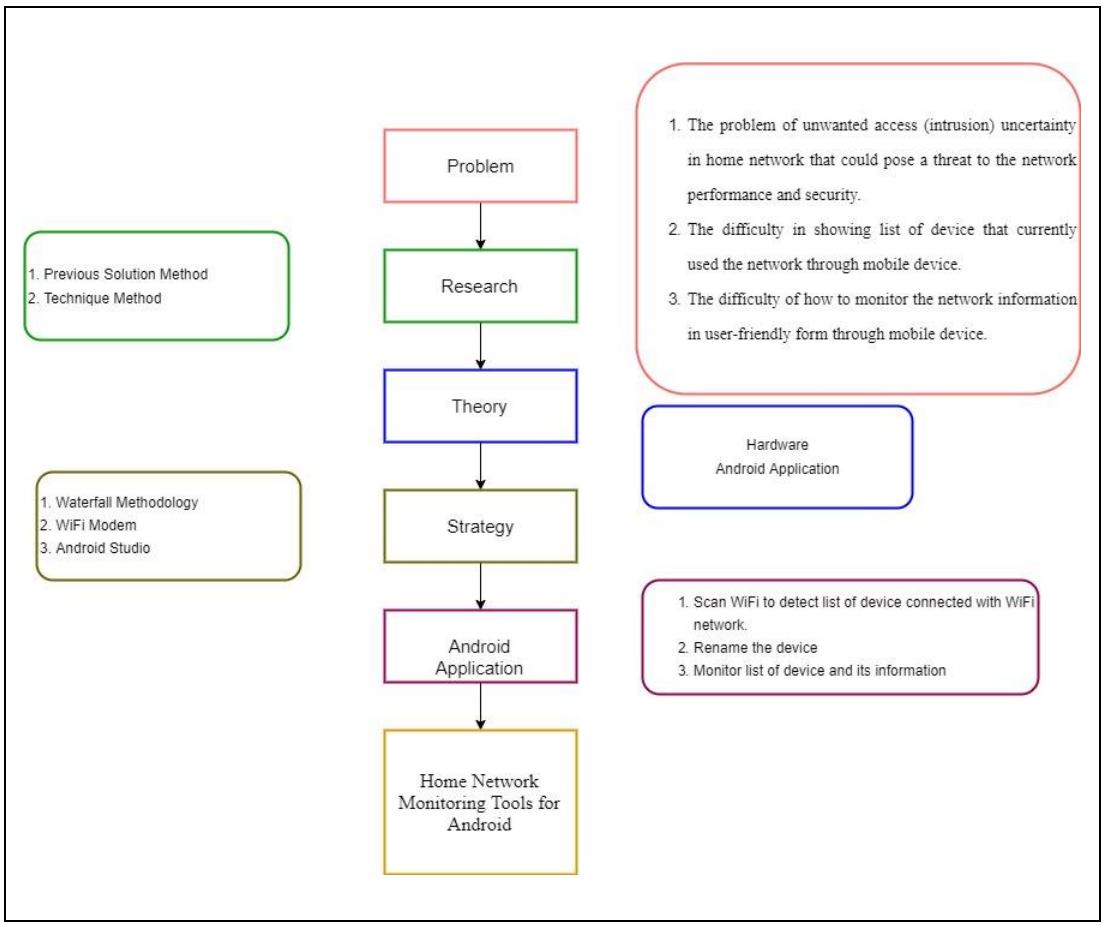


Figure 3.8: Research Framework

3.7 Project Milestone

Project milestone is used as a reference point that will used to monitor the project's progress and marks the major activities in a project. In order to make sure the flow of this project runs smoothly, the project milestone will be created and well planned to ensure all the activities in the project are able to be completed within the project timeline. Gantt chart will be able to track the time of every progression of the chapter to ensure that all tasks can be completed on the given time. Table 3.2 shows the summary of the milestone table.

Table 3.3: Summary of the milestone.

Week	Phase	Action	Deliverables
1-4 (PSM 1)	Planning	Identify title, problem statement and scope	Complete Proposal
		Study and research the literature review. Write and submit project proposal to supervisor.	
		Proposal accepted.	
		Identify title, problem statement, objective and scope of project.	Chapter 1: Introduction
		Chapter 1 is done and submitted to supervisor for evaluation.	Progress report Chapter 1.
5-9 (PSM 1)	Analysis	Studies on related work and previous research and critical review of the project.	Chapter 2: Literature Review
		Study methodology on previous research.	Chapter3: Methodology
		Information collection and analysis.	Chapter 4: Analysis and Design

10-13 (PSM 1)	Design	Design the network and choose the tools for implement	Chapter 4: Analysis and Design
		Design the environment for implementation.	Progress report on Chapter 4
		Project Demo	
14-15		PSM I: Final Presentation	
1-15 (PSM 2)		Chapter 5: Implementation	
		Chapter 6: Testing	
		Chapter 7: Conclusion	
		PSM II: Final Demonstration	

3.8 Conclusion

As a conclusion, this chapter explains the methodology that will be use in this project. Waterfall methodology consists of different phase that will help to develop the system faster and efficient. The milestones set the time to finish the project so that the progression of the project will always in track. This is very important to make sure the project can finish in time.

CHAPTER 4: ANALYSIS AND DESIGN

4.1 Introduction

Analysis and design are the next phase in the Waterfall Methodology. The analysis is explained about the problem and requirement analysis. Hardware and software requirement are included in this chapter. In this chapter, it will define the results of the analysis of the preliminary design and the result of the detailed design. It will also focus on the analysis of the requirements of the project. The flow of this system will be draft and shown clearly explain how the project will function.

The requirements include the hardware and software needed on this project. The block diagram architecture and proper analysis in detail for this project will also be stated to ensure the project can be completed and well designed. The design phase is important because it may affect the whole project. Other than that, the important thing in this phase are need to be more careful, give the best solution and idea. Each design will be described in details to make it clear and easy to understand.

4.2 Problem Analysis

In this project Home Network Monitoring Tools for Android, the problem from the existing system that user faces as users usually have the issue of unwanted access (intrusion) uncertainty in home network that could pose a threat to the network performance and security. However, the problems from existing applications are the difficulty in showing list of devices that are access the network through mobile device. Furthermore, the existing tools have difficulty of how to monitor the network usage data in user-friendly form through mobile device.

4.3 Requirement Analysis

Requirement analysis is the process of user requirement in the system. In requirement analysis will included the data requirement and functional requirement.

4.3.1 Data Requirement

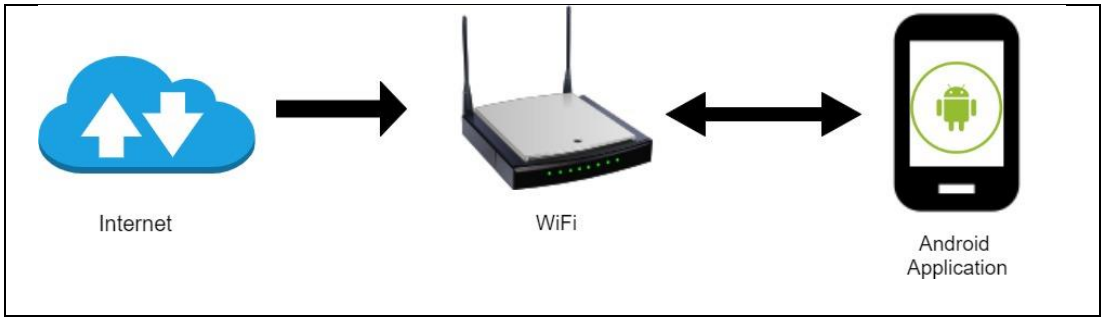


Figure 4.1: Data Flow

Figure 4.1 shows the data flow of the Home Network Monitoring Tools for Android. The Responsive GUI module is a GUI component for user to interact with the application system in proper. The android application runs from the smartphone must connect with the Wi-Fi modem to have an internet connection to start scanning of which current device are currently connected with the Wi-Fi network. Then, scan and view module will scan the Wi-Fi network to get the list of information devices connected and using internet from the Wi-Fi network. Next, it will display the list information of devices connected with the IP addresses, MAC addresses, device name for user to monitor.

4.3.2 Functional Requirement

This project has several blocks namely input/output block, internet, Wi-Fi and Development block. Figure below shows the determining of block diagram for this project.

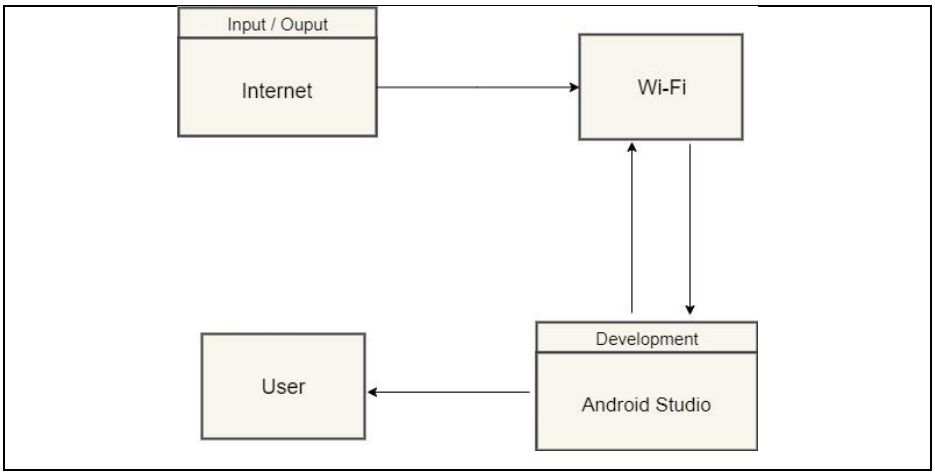


Figure 4.2:Block Diagram

i. Internet

The internet will give the wi-fi modem to have an internet connection that will build a wi-fi network for an internet to send the network traffic to the android application.

ii. Input / Output

The wi-fi modem needs an internet connection to build a wi-fi network for the android application to connect and start scan the network traffic over the wi-fi network. The network traffic will be sent by the internet thru the wi-fi network when the android application request to get the information of network traffic.

iii. Development

The function is located at the development block. The function is included to develop an android application by using Android Studio which allows the user to scan the wi-fi network from the android application. It can discover which current device connected with the wi-fi network. It also can track the network traffic that travels in the wi-fi network. Then, the network traffic get from the wi-fi modem network will send to the android application when the user uses the application to scan the device which connected with the wi-fi network. Furthermore, the android application also able to show the list of devices, rename the devices and view the list of information devices which connected with the wi-fi network.

4.4 Hardware Requirement

1. Wireless Router (Wi-Fi Modem)

A wireless router is a device that performs a router`s functions as well as a wireless access point`s function. It is used to provide internet access or a private network of computers. Other than that, it can work in a wired local area network, in a wireless-only LAN, or in a mixed wired and wireless network, depending on the manufacturer and model. In this project, it uses to connect to the ISP to get an internet.

Figure 4.3: Wireless Router (Modem Home Wi-Fi)

2. Laptop Asus A550L

A laptop plays an important role in this project as it can use to develop software and write project report. Laptop is a machine or device performing processes, calculations and operations based on software or hardware program instructions. It is designed to run applications and provides a variety of solutions by combining integrated hardware and software components. In this project, it uses to develop the Home Network Monitoring Tools for Android by using Android studio.

Figure 4.4: Laptop

3. Android Smartphone

An android smartphone is needed for development and need to be test in android smartphone.

Figure 4.5: Oppo R1L

4.5 Software Requirement

1. Android Studio

Android Studio is an official IDE for Android platform. Android Studio allow the user to develop the application. Figure 4.4 shows the icon for android studio.

Figure 4.6: Android Studio

2. Android SDK

Android SDK allows mobile software developers the opportunity to develop with the platform and create new and interesting work. The kit contains everything to start building apps. The Android SDK also comes with an emulated virtual device that is fully functional to for testing and debugging.

Figure 4.7: Android SDK

4.6 High Level Design

High level design is architecture that would develop a software tool. It will be provided an entire system, identifying the main components for the product and interfaces that would be developed. Figure below will show the System Architecture and the Interface and Flow Design.

4.6.1 System Architecture

The figure 4.7 shows the system architecture design has android smartphone connected to the Wi-Fi modem. Wi-Fi modem is responsible to allow the local network have an internet access. Furthermore, the Wi-Fi modem and smartphone used as a hardware device to send and receive the network traffic. Android smartphone is used to monitor the network traffic over the Wi-Fi network.

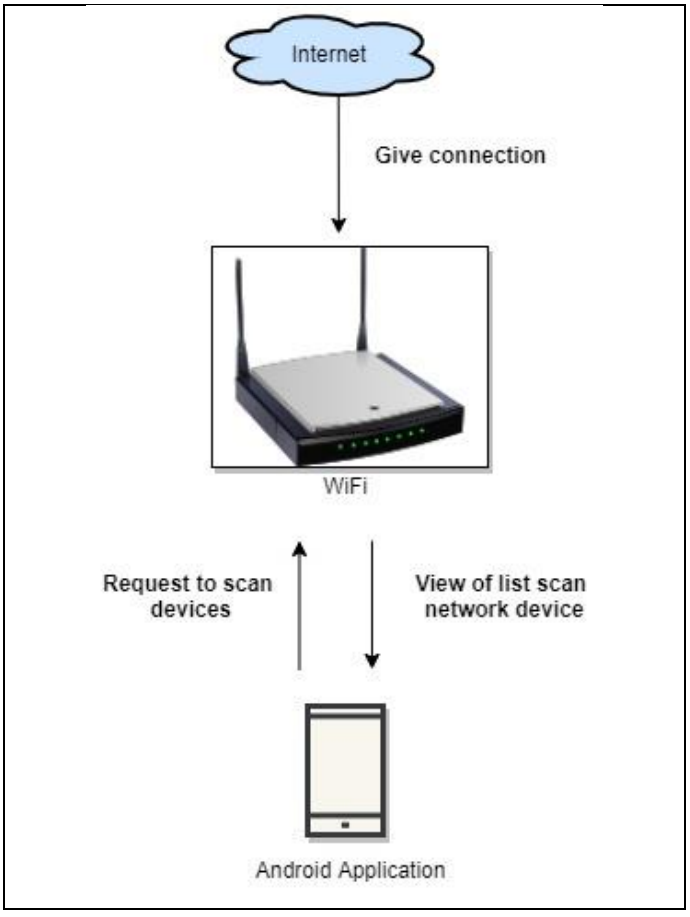


Figure 4.8: System Architecture

4.6.2 Interface and Flow design

A propose user interface will be designed for the Home Network Monitoring Tools for Android. The interface allows the user to have some basic idea on how the flow system is works. Figure below shows the interface and flow design of the project.

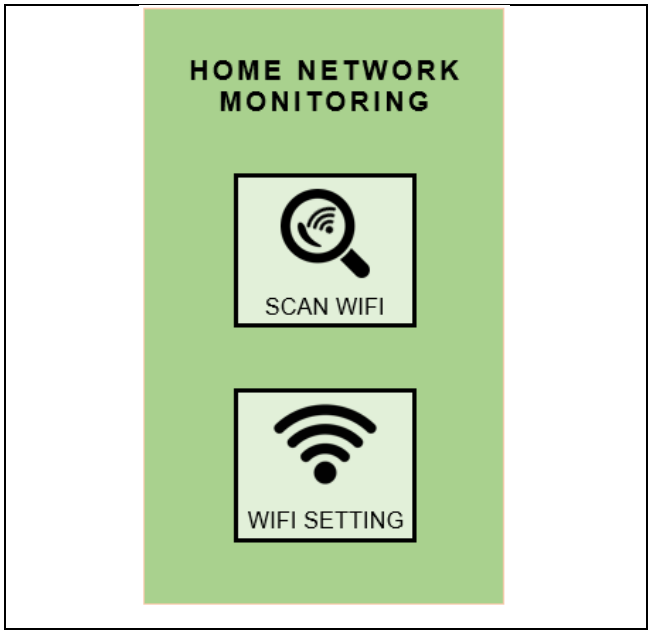


Figure 4.9: Menu Interface

Figure 4.9 shows the main interface of the Home Network Monitoring Tools for Android. There are two options, which are Scan Wi-Fi or Wi-Fi Setting. When a user selected either of this option it will go to the next interface. For Scan Wi-Fi, it will go to List of Devices Interface. The Wi-Fi Setting will go to the Network Information interface.

Table 4.1: Function of Menu Interface

Function	
Scan WiFi 	Scan WiFi, user select and go to List of Devices Interface
WiFi Setting 	WiFi Setting, user select and go to Network Information interface.

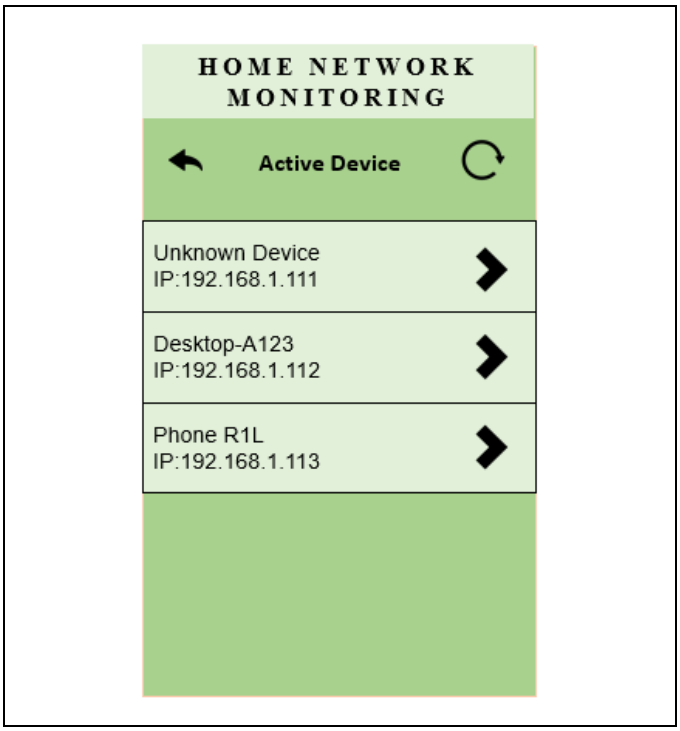


Figure 4.10: List of Devices Interface

Figure 4.10 shows the List of Devices Interface. After the user has selected the Scan Wi-Fi button, it will display the List of Devices interface. In this interface, user can view the active device which currently connected to the Wi-Fi.

Table 4.2: List of Devices Function

Function	
Back Button 	Back Button is enable the user go to the Menu interface.
Refresh Button 	Refresh Button allows the user to access the current list of devices.
Next Button 	Next Button is enable user go to the Information of Device interface.

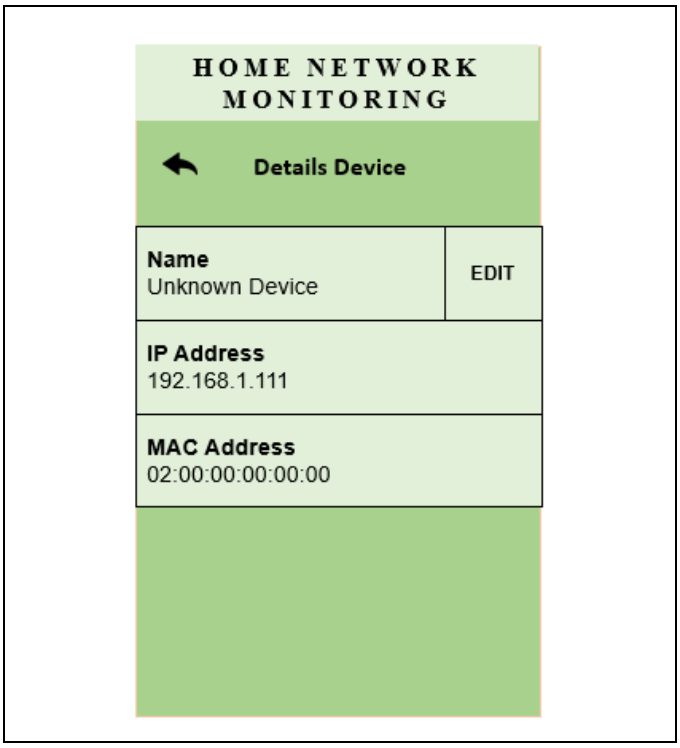


Figure 4.11: Information of Device Interface.

Figure 4.11 shows the Information of Device interface. After the user has selected the Next Button at List of Devices Interface, the Information of Device interface will be shown. In this interface, it will display the information of device such as Name, IP Address and MAC Address.

Table 4.3: Information of Device Function

Function	
Back Button 	Back Button is enable user go to the Menu interface
Edit Button 	Edit Button is enable user to change the device name.

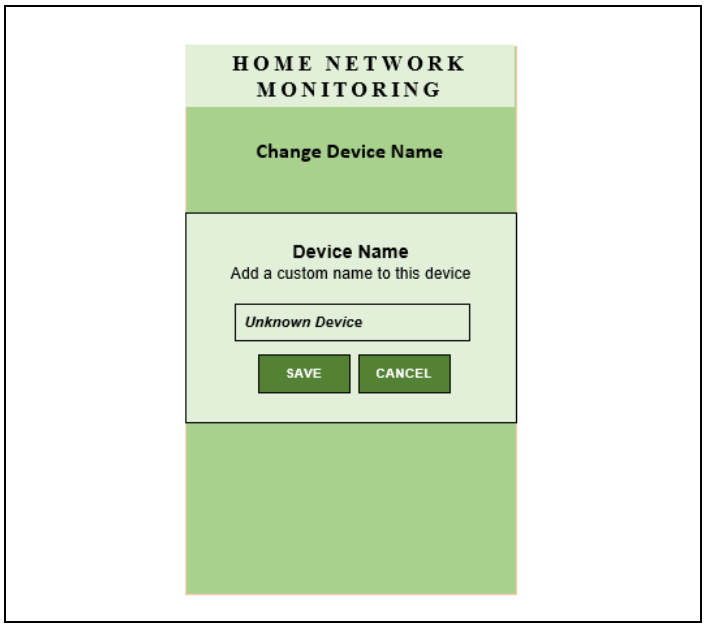
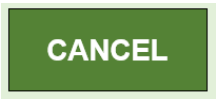


Figure 4.12: Change Device Name Interface

Figure 4.12 shows the Change Device Name Interface. This interface will show the Change Device Name Interface which is allow the user to change the device name if needed.

Table 4.4: Change Device Name Function

Function	
Save Button 	Save the form and go to the List of Devices Interface.
Cancel Button 	Cancel the form and go back to the View Device Interface

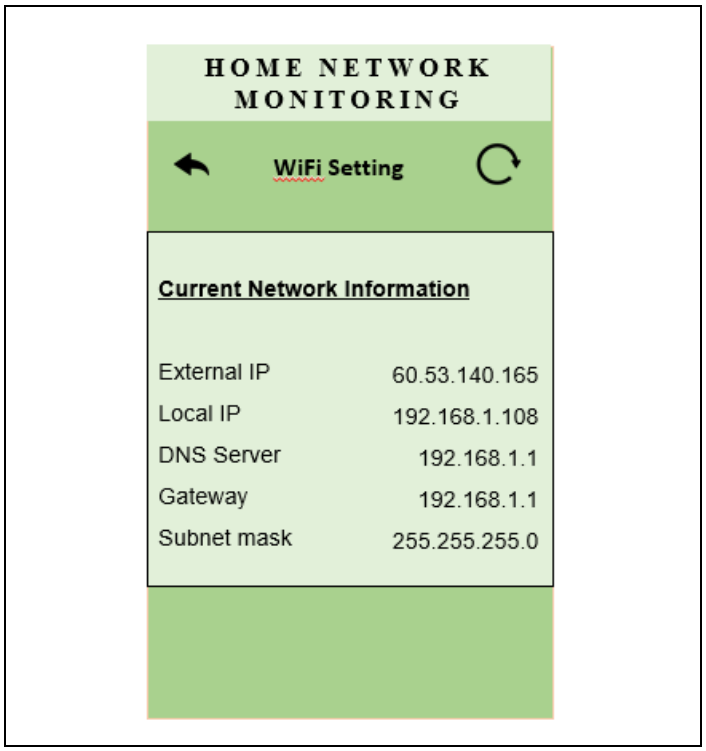


Figure 4.13: Network Information interface

Figure 4.13 shows the Network Information interface. This interface will show the information of wi-fi network setting where the user can view the External IP, Local IP, DNS Server, Gateway and Subnet Mask.

Table 4.5: Network Information Function

Function	
Back Button 	Back Button is enable user go to the Menu interface
Refresh Button 	Refresh Button allows the user to view Network Information.

4.7 Conclusion

Analysis and design are one of the important parts to implement a project. All software and hardware requirements need to be identified and studied before carry out a project. This chapter is the pre-preparation stage for the implementation and it also includes the flow of the overall system so that to have a better understanding before implement it. The next chapter Implementation will discuss how the project to be implement and the output expected for this project.

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