

# CONTROL HOME AUTOMATION WITH VOICE COMMAND USING ARDUINO

NUR ATIKAH BINTI MUHAMAD AYOB

BACHELOR OF COMPUTER SCIENCE  
(COMPUTER SYSTEMS AND NETWORKING)

UNIVERSITI MALAYSIA PAHANG

## UNIVERSITI MALAYSIA PAHANG

### DECLARATION OF THESIS AND COPYRIGHT

Author's Full Name : NUR ATIKAH BINTI MUHAMAD AYOB

Date of Birth : 21 FEBRUARY 1996

Title : CONTROL HOME AUTOMATION WITH VOICE  
COMMAND USING ARDUINO

Academic Session : SEMESTER 1 2018/2019

I declare that this thesis is classified as:

- ☐ CONFIDENTIAL (Contains confidential information under the Official Secret Act 1997)\*
- ☐ RESTRICTED (Contains restricted information as specified by the organization where research was done)\*
- ☒ OPEN ACCESS I agree that my thesis to be published as online open access (Full Text)

I acknowledge that Universiti Malaysia Pahang reserves the following rights:

1. The Thesis is the Property of Universiti Malaysia Pahang
2. The Library of Universiti Malaysia Pahang has the right to make copies of the thesis for the purpose of research only.
3. The Library has the right to make copies of the thesis for academic exchange.

Certified by:

\_\_\_\_\_  
(Student's Signature)

960221-10-5024

\_\_\_\_\_  
New IC/Passport Number  
Date: 12/12/2018

\_\_\_\_\_  
(Supervisor's Signature)

Dr. Jamaludin Bin  
Sallim\_\_\_\_\_  
Name of Supervisor  
Date: 12/12/2018

NOTE : \* If the thesis is CONFIDENTIAL or RESTRICTED, please attach a thesis declaration letter.

## THESIS DECLARATION LETTER (OPTIONAL)

Librarian,  
*Perpustakaan Universiti Malaysia Pahang,*  
Universiti Malaysia Pahang,  
Lebuhraya Tun Razak,  
26300, Gambang, Kuantan.

Dear Sir,

### CLASSIFICATION OF THESIS AS RESTRICTED

Please be informed that the following thesis is classified as RESTRICTED for a period of three (3) years from the date of this letter. The reasons for this classification are as listed below.

Author's Name  
Thesis Title

Reasons	(i)
	(ii)
	(iii)

Thank you.

Yours faithfully,

---

(Supervisor's Signature)

Date: 12/12/2018

Stamp:

Note: This letter should be written by the supervisor, addressed to the Librarian, *Perpustakaan Universiti Malaysia Pahang* with its copy attached to the thesis.



## **SUPERVISOR'S DECLARATION**

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of the degree of Computer Science (Computer Systems and Networking).

---

(Supervisor's Signature)

Full Name : Dr. Jamaludin Bin Sallim

Position : Senior Lecturer

Date : 12/12/2018



## **STUDENT'S DECLARATION**

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

---

(Student's Signature)

Full Name : NUR ATIKAH BINTI MUHAMAD AYOB

ID Number : CA15048

Date : 12 DECEMBER 2018

CONTROL HOME AUTOMATION WITH VOICE COMMAND USING  
ARDUINO

NUR ATIKAH BINTI MUHAMAD AYOB

Thesis submitted in fulfillment of the requirements  
for the award of the degree of  
Bachelor of Computer Science (Computer Systems and Networking)

Faculty of Computer Systems & Software Engineering  
UNIVERSITI MALAYSIA PAHANG

DECEMBER 2018

## **ACKNOWLEDGEMENTS**

All praise for the Almighty ALLAH S.W.T for His blessing that has allowed me to successfully carry out this assignment and give me strength and patience. First of all, I would like to extend my thanks to all who have given me the help, support and encouragement I wish for, if they were not possible, I could not complete this project well.

Moreover, sincere thanks to my supervisor Dr. Jamaludin Bin Sallim is above all his guidance to me to carry out this project. In addition, he has also given his support and help in solving the problems that I need to face about the writing of this thesis and gives me more interesting ideas on how to describe about this project. Without his advice, I certainly cannot complete this thesis perfectly.

Then, I would like to thank my colleagues for helping me in providing a constructive criticism for me to complete this assignment. They also helped me in terms of giving the right idea for me to run this project. They also often give me help if I need their help. Finally, I thank my family for supporting me spiritually throughout writing this thesis. May Allah bless us.

## **ABSTRAK**

Pada masa kini, seperti yang telah kita ketahui teknologi yang digunakan di rumah telah semakin canggih. Contohnya, pada zaman dahulu masih belum wujud lagi menggunakan kuasa elektrik. Perkara ini menyukarkan kehidupan mereka dengan ketidakadaan sumber kuasa elektrik. Manakala, pada zaman kini, semuanya telah berubah dan menjadi serba lengkap dengan adanya teknologi yang dapat memudahkan pengguna dalam mendapatkan sumber kuasa elektrik. Contohnya ialah kini telah terdapat penciptaan terhadap pemetik untuk menghidupkan suis lampu, televisyen atau kipas hanya dengan menekan butang pada pemetik tanpa perlu pengguna bangun untuk menghidupkan suis. Selain itu, tujuan projek ini dilaksanakan kerana, untuk memberi kelainan pada teknologi yang ada pada masa sekarang. Seterusnya, mempelbagaikan lagi cara bagi mengawal alatan elektrik di rumah. Di dalam kehidupan kita ini, semua orang pasti pernah merasakan keadaan yang menyebabkan kita tidak mendapatkan kesihatan yang baik atau di dalam situasi yang memenatkan. Perkara ini haruslah boleh di atasi dengan cepat dan mudah. Oleh itu kita memerlukan teknologi untuk mengatasi masalah ini. Maka, di dalam sistem ini ia dicipta bagi memudahkan pengguna dalam mengawal alatan elektrik hanya menggunakan satu aplikasi. Jadi, di dalam sistem ini terdiri daripada dua utama komponen iaitu perkakasan komponen iaitu menggunakan Arduino Uno R3 dan untuk komponen perisian menggunakan aplikasi mudah alih. Fokus sistem ini tentang bagaimana untuk membangunkan Sistem Automasi untuk mengawal peralatan rumah. Jadi dengan sistem ini, pengguna boleh mengawal suis dengan telefon mudah alih mereka. Kesimpulannya, adalah diharapkan bahawa sistem ini boleh menyumbang kepada pengguna bagi meningkatkan dan memudahkan kehidupan mereka.



## **ABSTRACT**

Nowadays, as we already know the technologies used at home have become increasingly rapidly. For example, in the past there has not been any use of electric power. This matter makes their lives unpredictable with the power source. Meanwhile, in the present time, everything has changed and become fully equipped with the technology that enables users to get electricity. An example is that there has now been a creation of the remote control to turn on the switch, television or fan switch simply by pressing the button on the remote control without the need for a user to switch on the main switch. Additionally, the purpose of this project is to be implemented because, to provide a disparity to the technology currently available. Next, diversify the way to control electrical appliances at home. In our lives, everyone must have felt the condition that we did not get good health or in a tiring situation. This should be done quickly and easily. So, we need technology to solve this problem. Thus, in this system it is created to facilitate the user in controlling electrical equipment using only one application. In this system consists of two main components namely component hardware which is using Arduino Uno R3 and for component software using mobile app. Focus this system on how to develop Automated Systems to control home appliances. This system can make users to control switches with their mobile phones. In conclusion, it is hoped that this system can contribute to the user to enhance and facilitate their lives.

## **TABLE OF CONTENT**

**DECLARATION**

**TITLE PAGE**

**ACKNOWLEDGEMENTS** **ii**

**ABSTRAK** **iii**

**ABSTRACT** **iv**

**TABLE OF CONTENT** **v**

**LIST OF TABLES** **viii**

**LIST OF FIGURES** **ix**

**LIST OF ABBREVIATIONS** **x**

**CHAPTER 1 INTRODUCTION** **1**

1.1 BACKGROUND STUDY 1

1.2 PROBLEM STATEMENT 2

1.3 AIM OF OBJECTIVE 2

1.4 SCOPE OF THE PROJECT 2

1.5 THESIS ORGANIZATION 3

**CHAPTER 2 LITERATURE REVIEW** **5**

2.1 INTRODUCTION 5

2.2 EXISTING SYSTEM 6

2.2.1 Electric switch on/off system using app via WI-FI 6

2.2.2 Control of light and fan with whistle and clap sounds 7

2.2.3 Smart living using Bluetooth-based android smartphone 8

2.3	REVIEW OF THE EXISTING SYSTEM	9
2.3.1	Comparing the existing system	9
2.3.2	Comparing between the advantage of existing system	11
2.3.3	Comparing between the disadvantage of existing system	12
2.4	CONCLUSION	13
	<b>CHAPTER 3 METHODOLOGY</b>	<b>14</b>
3.1	INTRODUCTION	14
3.2	DISCUSSION ON RAPID APPLICATION DEVELOPMENT	14
3.3	ADVANTAGE RAPID APPLICATION DEVELOPMENT (RAD)	15
3.4	RAPID APPLICATION DEVELOPMENT (RAD) LIFE CYCLE PHASE	16
3.4.1	Phase 1: Requirement Planning	17
3.4.2	Phase 2: User Design	17
3.4.3	Phase 3: Rapid Construction	18
3.4.4	Phase 4: Cutover	18
3.5	PRELIMINARY DESIGN	19
3.5.1	Printed Circuit Board	19
3.5.2	Flow Chart Diagram	19
3.5.3	Context Diagram	20
3.5.4	Use Case Diagram	21
3.6	TOOLS REQUIREMENT	22
3.6.1	Hardware Requirement	22
3.6.2	Software Requirement	24
3.6.3	Arduino Uno REV3	25
3.6.4	Arduino Uno REV3 ports	26
3.6.5	Arduino Software IDE	27

3.6.6	GANTT CHART	28
3.6.7	SUMMARY	29
<b>CHAPTER 4 RESULTS AND DISCUSSION</b>		<b>30</b>
4.1	INTRODUCTION	30
4.2	IMPLEMENTATION	30
4.3	PROJECT DEVELOPMENT AND TESTING	30
4.3.1	Hardware Development	31
4.3.2	Software Development	32
4.3.3	Arduino Software	32
4.3.2.1	Android Studio Software	33
4.4	RESULT DISSCUSSION	37
<b>CHAPTER 5 CONCLUSION</b>		<b>38</b>
5.1	INTRODUCTION	38
5.2	PROJECT CONSTRAINT	38
5.3	FUTURE WORK	39
5.4	CONCLUSION	40
<b>REFERENCES</b>		<b>41</b>
<b>APPENDIX A</b>		<b>43</b>
<b>APPENDIX B</b>		<b>44</b>

## **LIST OF TABLES**

Table 2.1 Comparison between three Existing Systems	10
Table 2.2 Advantage of existing system	11
Table 2.3 Disadvantage of existing system	12
Table 3.1 Hardware Requirement for the development	23
Table 3.2 Software Requirement for the development	24

## LIST OF FIGURES

Figure 2.1 System Architecture	6
Figure 2.2 Complete Block Diagram	7
Figure 2.3 System Architecture Diagram	8
Figure 3.1 RAD life cycle Phase	17
Figure 3.2 Overview project	19
Figure 3.3 Flow chart Diagram	20
Figure 3.4 Context Diagram	21
Figure 3.5 Use Case Diagram	22
Figure 3.6 Arduino Uno Rev3	25
Figure 3.7 Ports of Arduino Uno REV3	26
Figure 3.8 Example of command interface	27
Figure 3.9 Project Timeline	28
Figure 4.1 Schematic diagram	31
Figure 4.2 Connection between the hardware and Android Smart Phone	32
Figure 4.3 Arduino IDE	33
Figure 4.4 MainActivity.java	33
Figure 4.5 activity_main.xml (Design)	33
Figure 4.6 activity_main.xml (Text)	34
Figure 4.7 Main2Activity.java	34
Figure 4.8 activity_main2.xml (Design)	35
Figure 4.9 activity_main2.xml (Text)	35
Figure 4.10 Main3Activity.java	36
Figure 4.11 activity_main3.xml (Design)	36
Figure 4.12 activity_main3.xml (Text)	36
Figure 4.13 Arduino attach with bulb	37

## **LIST OF ABBREVIATIONS**

CHAUVC	Control Home Automation using Voice Command
RAD	Rapid Application Development
IDE	Integrate Development Environment
UMP	Universiti Malaysia Pahang

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 BACKGROUND STUDY**

Nowadays, there are many advancements that give a big impact, either inside or outside the country. As we already know, today's homes there are different tools for controlling electronic equipment. Furthermore, in order to create added value the focus should be on the smart home environment instead of only on the used technology (Rosslin & Tai-hoon, 2010). Therefore, we need a more advanced tool for our users to facilitate their use in everyday life

In addition, this project will enable users to control home appliances faster than using them manually. It requires a more sophisticated control device to do something new and can be easier to use by others. The lesser person will have difficulty when he is having trouble reaching the place of the switch. In addition, problems can also occur when an unhealthy person does the activity.

Other, using automatically through integration of home appliances with smart phone connectivity will provide a good innovative because it provides many benefits to users. The smartphones have the perfect features and can be made to communicate with any other device in the connection options network such as Bluetooth.

With this smartphone, we should be wise in using the opportunity to automate a task for this smart house, this smartphone can be connected to a temporary network indoors with electronic equipment. In this app it allows user to control using apps on smartphone which is can be control any home application. The system to turn on/off home application through this conversation is a mobile app developed with Android and can be targeted at a wide market that will benefit the public.



## **1.2 PROBLEM STATEMENT**

As we know, home application which is using electric power is one of the compulsory things that will exist in every home. It will be used by user to make their life more comfortable and easier in daily life. Others, it is placed in the necessary areas such as in the living room, bedroom and in the bathroom.

But the problem is when users used a normal method to open the electric switch, they have a risk of electric shock. Not only that, it brings to a waste of energy electricity when using normal method to control home application.

Additionally, if the user used voice control it will make more efficient either than used smartphone that have more than 3 buttons to control different type of home appliance.

## **1.3 AIM OF OBJECTIVE**

The main objective of this project is to improve the innovation of technology using remote control to voice control command with Bluetooth device. Objectives are a specific action and planning that are aimed to achieve successfully as well as with project goals.

- i. To develop more efficient way to turn on/off home application using voice command.
- ii. To learn and study existing light system and home automation concept.
- iii. To provide home application control that operates with wireless connection.

## **1.4 SCOPE OF THE PROJECT**

By understanding the operation and knowledge we can create the Control Home Automation Using Voice Command (CHAUVC). This scope is important to the system

which is they must be identified, so it is appropriate to implement. Below is the project scope that will include in this system which is:

- i. User
  - a. The user of this project is for people who have smartphones and have apps to control home appliances at home. The user will be easier to control by using their smartphone and with voice command.
- ii. Function available
  - a. Mobile Application used to control the switch using voice command.
  - b. Bluetooth device for the switch control.
  - c. Android Studio software was used to design GUI for user.

## **1.5 THESIS ORGANIZATION**

There will have five chapters in this project. Firstly, chapter one which is the background studies that tell about what are the new or difference type of technology that we can improve in our life. In this chapter it is also includes objective of the project to achieve the improvement of technology. Others, there are also have problem statement, scope and thesis organization. Throughout this chapter, problem statements will be identified where it leads to development to find a solution for the project.

Next, chapter two discusses literature review conducted to find out about project information. Literature review include the introduction of project studies in general, methods or technologies that are appropriate to meet the project. It is also as a reference source which can be used in the project to solve the problem happen in life.

Then, chapter three discusses the methodology used in project development and the overall approach about what we will be used to develop to this project. Through this chapter, a methodology will be selected for the development of the system that will be

described and explained. This chapter will also mention introductions, hardware, software and Gantt charts for use in the project in more detail.

Next, chapter four is about the implementation, testing and results of this project based on the experiment that we have done. This chapter will also include the explanation of the discussion that shows the objectives of the project are fulfilled.

Lastly, chapter 5 that discusses the conclusions of the project we have done. It concluded that the project that was implemented comprehensively with the objective that need to be achieved. In addition, it also covers the entire process and information required and summarizes the entire project and gathers all the data included in the project.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

In this chapter, the literature review will provide the current knowledge including substantive findings (“Wikipedia”, n.d.). It is also having a several topics that are related with this control home automation. In addition, among this related topic there is the same system as the project, and there is different hardware or software in the project system use. For example, it used Arduino Uno which is a module that has been equipped with the various things needed to support the microcontroller to work, we only need to plug it into power supply or connect it via USB cable to Arduino Uno PC (Dandge, Shirwadkar, Gite, Odhekar, & Kakad, 2016).

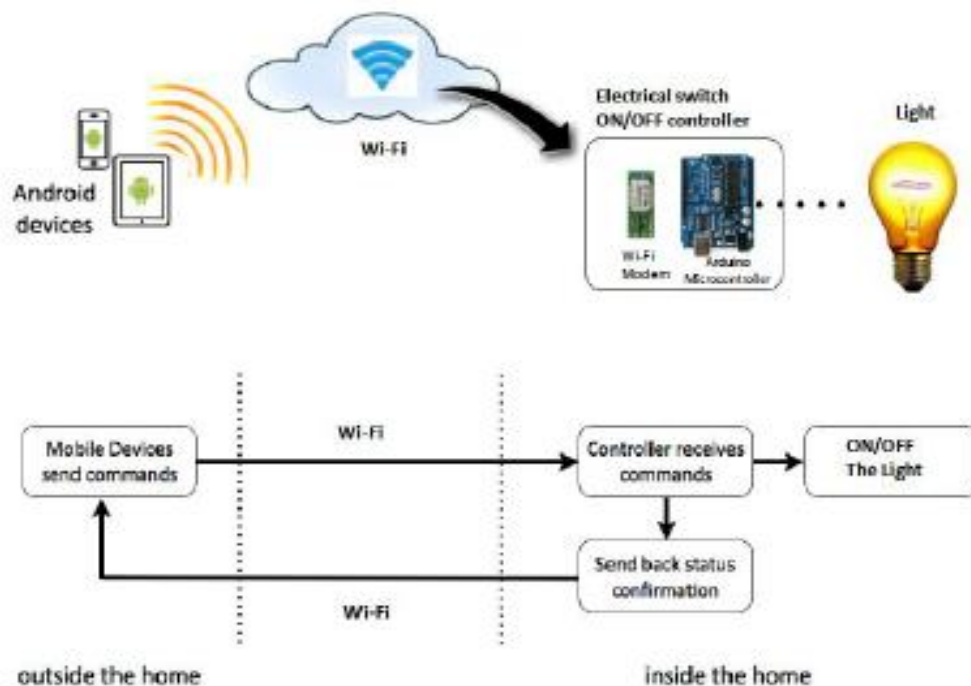
There are the reasons why we build this system to control home appliance with voice command using the Arduino. Based on the difference type of project that I have search and study, this application has difference in terms of the function how the project will be used to user. This system will be used to control home automation with voice that will be detected by using smartphone. Before that, we will choose suitable application to develop the in smartphone. This app is used to control home appliance. We will select the best software to develop the system based on the appropriate function used by the project to be run.

Others, this project which is the title is about Control Home Automation with voice command using Arduino is a project that provide user to handle the home appliance easily using smartphone. The user needs to use smartphone and android that control of home appliances is a deliberate use of practical or aesthetic effects.

## 2.2 EXISTING SYSTEM

In this chapter 2 of literature review, we choose three of a system. These three systems also come with difference type of function and also used difference type of tools and software that have in their system. Below is a description about the system that we have chosen. These systems include the function and the system design.

### 2.2.1 Electric switch on/off system using app via WI-FI



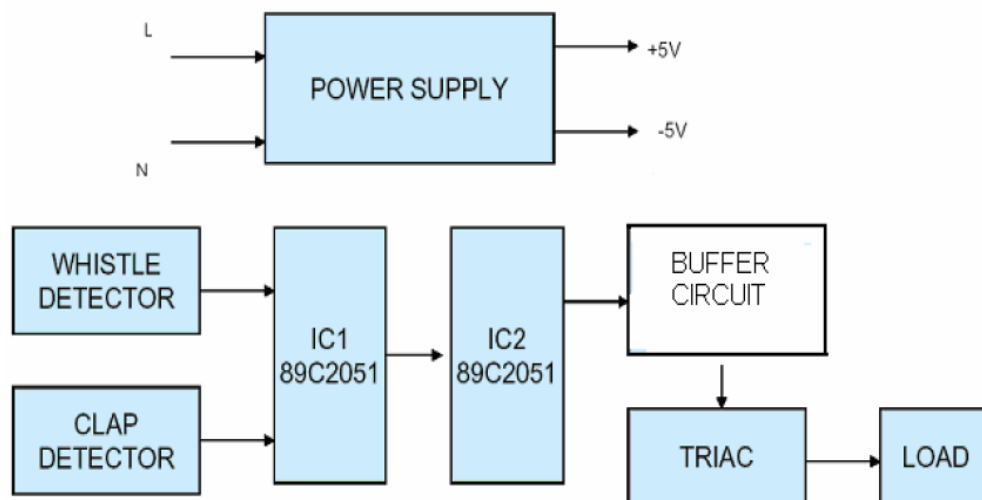
**Figure 2.1 System Architecture**

Figure 2.1 above is categorized as an overview of the overall control function of this system. The system shown works using Android smartphone applications. It is the primary source used to give instructions to the Wi-Fi module. This system used to control the light by using internet to connect the Wi-Fi to make it function. The user needs to have mobile phone to make it connect between the electric switch ON/OFF controller with Wi-Fi connection.

With the help of this smart tool, it can do a lot of work with or without internet as here we can make our homes and organizations more intelligent or more luxurious. In this app, mobile phones or smartphones are intended to be used by users to communicate with and control electric switches such as Lights and others using the Android App Wi-Fi module.

Next is how the application can work is when Wi-Fi transmits the data the app will provide using radio wave technology (Dandge et al., 2016). This Wi-Fi is required as a function of radio wave technology, because the data passed via Wi-Fi will be converted into an electromagnetic signal and then sent using the antenna. After that, this signal will be sent to the Arduino controller. This Arduino will continue to control the information it receives and continue to perform operations.

### 2.2.2 Control of light and fan with whistle and clap sounds



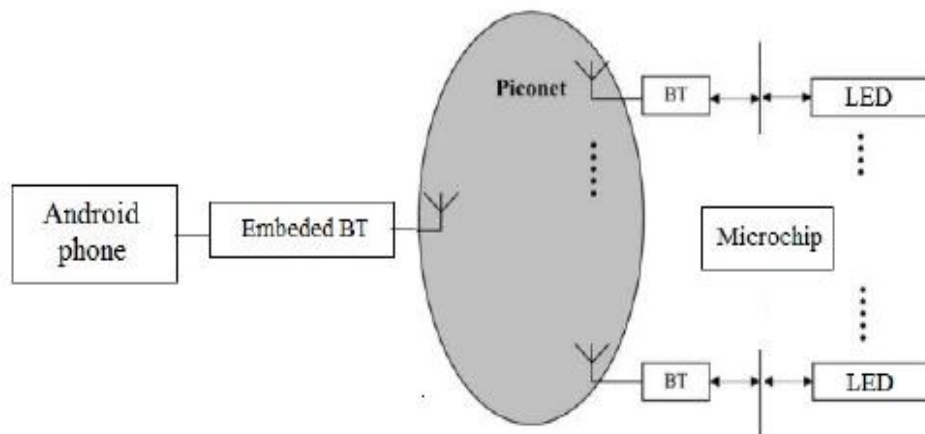
**Figure 2.2 Complete Block Diagram**

The system in figure 2.2 above shows it can control the light and fan with a whistle and clap that is detected using a condenser microphone. Output on the microphone when the whistle is detected from the sine wave (Murmu & Sonkar, 2004). On the other hand, for clap it will occur when there is a very high peak / amplitude trough that occur at very high frequencies followed by other peaks in the opposite direction.

For the code development, firstly is for clap which is to facilitate the use in avoiding noisy noise, it will detect only two claps separated by some specific interclap time. Detected clap is classified as short clap and long clap. For short clap it will characterized by interclap time which is less than 0.5s and long clap the interclap time is greater than 0.5s but less than 1.5s. The short clap was designed as ON and increase intensity and long short was designed as decrease intensity and OFF.

Next is for whistle, it is operated at the length in which the whistle is blown and will be classified as long or short. This whistle will use by blown for no more than one second and more than one second. The code for short whistle it will ON and increase intensity and for long whistle is to decrease intensity and OFF.

### 2.2.3 Smart living using Bluetooth-based android smartphone



**Figure 2.3 System Architecture Diagram**

Based on figure 2.3 this system architecture established using a microchip and several Bluetooth modules. The proposed home lighting control system, it uses a small "piconet" set up with microchips and some Bluetooth modules. Additionally, the system is developed under the Android Platform which aims to monitor and control home lighting through Bluetooth enabled master-slave structures adopted in system architecture where Android-enabled Bluetooth phones are treated as temporary host controllers of other Bluetooth devices (Yan & Shi, 2013).

For this example, this switch will be connected to the home lighting system. The end of the microchip controller is set in voting status and will always check every input command every 500 milliseconds from the Android smartphone app and if it receives instructions to direct the microchip to change the light, then the microchip will send instructions to the master controller via Bluetooth. So, the Bluetooth app will perform the control light operation (on or off).

## **2.3 REVIEW OF THE EXISTING SYSTEM**

In this chapter, we will be discussing and make comparison about the existing system. Then, there are several comparisons that have in this three difference topic that we choose. There are three existing system and the comparison between these three different systems that will be discuss. The three of existing system are Electric switch on/off system using app via WI-FI, Control of light and fan with whistle and clap sounds and Control of light and fan with whistle and clap sounds.

### **2.3.1 Comparing the existing system**

Table 2.1 shows the comparison between Electric switch on/off system using app via WIFI, Control of light and fan with whistle and clap sounds and smart living using Bluetooth-based android smartphone.

In this table 2.1 it will talk about the comparison between the three existing system which is firstly it will include the title of the project, second is the author of each project that had been chosen randomly. Third, is about the date of journal or article was published. Forth, it is about the problem of the existing system. Which is the problem that occurs before the application is executed. Lastly, it is about the objective that is about statements that will provide the precise details about how the plan is to be achieved (Leyla Norman, 2018).



**Table 2.1 Comparison between three Existing Systems**

	APPROCH A	APPROAH B	APPROAH C
Title	Electric switch on/off system using app via WI-FI	Control of light and fan with whistle and clap sounds	Smart living using Bluetooth-based android smartphone.
Author	Prof. Jagruti A.Dandge	Prof.P.C Pandey & Prof.L.R.Su	Ming Yan and Hao Shi
Date	Mar 3, 2016	July 6, 2015	February 1 ,2013
Problem	<ul style="list-style-type: none"> <li>People that have health issues will be hard to Switch on/off the light that usually locate at the wall</li> </ul>	<ul style="list-style-type: none"> <li>Using alternative techniques to remotely control electrical device in house environment are not bring cost effective</li> </ul>	<ul style="list-style-type: none"> <li>In security concept people can easily</li> </ul>
Objective	<ul style="list-style-type: none"> <li>To provide more efficient way to control electricity from long-range via Wi-Fi</li> </ul>	<ul style="list-style-type: none"> <li>To control the intensity of a load using whistle and clap sound</li> </ul>	<ul style="list-style-type: none"> <li>To easy connected to the switch of lamp through easier way</li> </ul>

### 2.3.2 Comparing between the advantage of existing system

Table 2.2 below shows the advantage of each existing system which is the title is about electric switch on/off system using app via WIFI, Control of light and fan with whistle and clap sounds and smart living using Bluetooth-based android smartphone.

What is meaning by advantage is it a good or useful feature that exists on something and it also brings different benefits in the present system (Longman, 2015). The three existing projects have their own unique advantages and disadvantages. This advantage will further strengthen the project to get more and strong support from the users. The benefit of all these projects is needed to enable this system to bring benefits to users who will use this application in their lives.

Among the advantages that each application has to offer is that it should enable users to use this app all day long. Additionally, the other benefits that an application requires is saving energy in order to minimize costs to have a positive impact on productivity and competitiveness it is also important to protect the environment from reducing carbon emissions that contribute to global warming.

**Table 2.2 Advantage of existing system**

Aspect	Electric switch on/off system using app via WIFI	Control of light and fan with whistle and clap sounds	Smart living using Bluetooth-based android smartphone
Advantage	<ul style="list-style-type: none"><li>• Can control the switch of light from long range using WI-FI</li></ul>	<ul style="list-style-type: none"><li>• Can bring cost effective</li></ul>	<ul style="list-style-type: none"><li>• No need internet connection to make it function</li></ul>

### 2.3.3 Comparing between the disadvantage of existing system

Table 2.3 below shows the disadvantage of each existing system that is electric switch on/off system using app via WIFI, Control of light and fan with whistle and clap sounds and smart living using Bluetooth-based android smartphone.

Next, the table shown below is a weakness for each existing system and has been separately differentiated to make it easier to find out what the weaknesses are and will happen in each project. This is the thing that will happen and has become normal for every such thing. Furthermore, in each project there are difference weaknesses that happen. Sometimes this weakness can be an advantage for other systems and this will cause competition between other applications.

**Table 2.3 Disadvantage of existing system**

Aspect	Electric switch on/off system using app via WIFI	Control of light and fan with whistle and clap sounds	Smart living using Bluetooth-based android smartphone
Disadvantage	<ul style="list-style-type: none"><li>• No internet connection will make it not be controlled</li></ul>	<ul style="list-style-type: none"><li>• No sound that required to control the light and fan will make the light and fan unfunctionally</li></ul>	<ul style="list-style-type: none"><li>• Cannot use the Bluetooth connection from long-range</li></ul>

## **2.4 CONCLUSION**

Control Home Automation using Voice Command (CHAUVC) is an application that provides user to control the home appliance using voice which is the main use will make user save their time and energy. From what I have found from the research most of control of electricity they will be an available in market provides the operational functions using remote control. This application will be difference from other existing system that has been use before. This application also will provide many benefits that can be used for everyone in their life to be more comfortable every day.

## **CHAPTER 3**

### **METHODOLOGY**

#### **3.1 INTRODUCTION**

In this chapter, we will discuss the methodology used for the software application and hardware application restructuring that to be used. This chapter will discuss the methods used by the application to collect data. In addition, it is also one of the ways to know how the method is controlled. According to Othman Mohamed (2001), methodology is also an approach often used in research to collect data. Furthermore, the methodology is a systematic procedure used to combine the adaptation of the study approaches and data analysis that are in line with its own rules to ensure the research's performance is achieved perfectly and perfectly.

The development methodology is software engineering is a framework used for the structure, plan, and process of developing information systems. In more detail, the methodology of software development is an approach used by the organization and the project team to implement the framework of software development methods.

#### **3.2 DISCUSSION ON RAPID APPLICATION DEVELOPMENT**

From this chapter, we will use Rapid Application Development (RAD for this project. For general knowledge of Rapid Application Development (RAD), this model will describe a software development method that emphasizes a rapid prototype and repeat delivery will occur in this project. Therefore, this RAD model will be one of the sharp alternatives to the common waterfall development model, which often focus on planning and consecutive design practices. Rapid application development (RAD) was

introduced in 1991 in James Martin's book using the same name. With this model of rapid and advanced application development has become one of the most popular and powerful development methods as it has brought many positive changes.

Not only that, in RAD the different development phases will be returned as required by a process. Test will occur where it is done on every iteration, so developers and users can see and observe gradually. Rapid Application Development (RAD) will also limit the reasonable documentation that can be sent at each emphasis to code or application so that time and cost estimates will be low and facilitate developers and users. Based on (Wikipedia, 2017), the methodology held by the association will be reliable with the general administration style.

The RAD methodology is very customizable to change, along this line, it is suitable for this kind of project as this effort requires a short period of time to achieve. According to figure 3.1 below it will show all the phases in the Rapid Application Development (RAD) method.

### **3.3 ADVANTAGE RAPID APPLICATION DEVELOPMENT (RAD)**

By applying the rapid application development model, there is an advantage for this project. Advantages that we will achieve when using the development of applications that can quickly run and be used in the project so that it can further shorten the development time. The development time for this project is short, so this method of development is which is best suited for it. In addition, quick initial checks are another advantage over quick application development is a recurring development approach. Other, it can faster delivery where each prototype will undergo several separate test phases and all components are finally united together to make a final application. This is to ensure faster delivery of software and ensure lower bugs will occur.

Next, other advantages are found when using the application of rapid application development, it is easy to incorporate changes in some application elements that will be processed at the same time. Since there is no specific form of process management, the application changes will be carried out more easily. This can be the reason why this Rapid

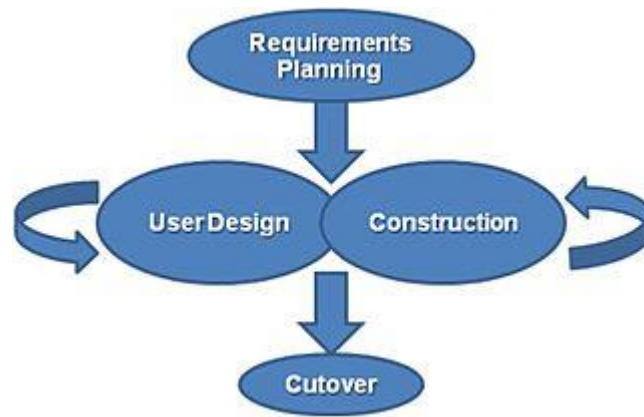
Application Development (RAD) has a good advantage because unlike the waterfall development, developers do not need to take a step back or restart the process from the beginning if the changes are suggested in the product.

Other, using the rapid application development model, it has several advantages for this project. Rapid application development in this project to shorten development time. The benefits we get from this model are flexible and customizable to transform our projects easily, adapt to changing circumstances and environments, and embrace new ideas that can be done in this project.

### **3.4 RAPID APPLICATION DEVELOPMENT (RAD) LIFE CYCLE PHASE**

The RAD model is a type of cumulative model components developed. Rapid Development Application are still being used today by some companies offering products that will provide some and all tools for RAD software development. Based on the concept of RAD can be developed faster. Additionally, it produces reliable output as it uses details, so users can analyse each the prototype of the system generated from it. It will generate feedback on their needs. With easier words, Rapid Application Development (RAD) is an alternative system to a traditional waterfall model that aims to develop software systems in short or short time constraints. In this project, it will use C language for use in moving this application, so software component can be reused. Based on the approach proposed by RAD, this model life cycle consists of four phases. The four phases contained in this model are:

- i. Requirement Planning
- ii. User design
- iii. Construction
- iv. Cutover



**Figure 3.1 RAD life cycle Phase**

### **3.4.1 Phase 1: Requirement Planning**

Based on this requirement planning, when we use this rapid application development model, there will be some advantages. The purpose of rapid application development in this project is to facilitate the provision of this project by shortening the development of time. For example, in this project will shorten the time for the user to ease the use in turning on the home appliances. Users only need to use smart phone to turn on by voice command. This makes it safer and time-consuming to use for all users.

In addition, the future benefits of this model are flexible. It can also be used to adapt to changing projects easily. Through this planning requirement, it is used to adapt to changing circumstances and environments in embracing new ideas that can be used in projects that will be implemented such as this project that uses smartphones as one of the easiest means of alternative.

### **3.4.2 Phase 2: User Design**

Furthermore, the design of the consumer when user feedback has been and will be collected with a rather heavy emphasis to determine the system architecture. In addition, it also allows initial modelling. It can also allow prototypes to be created. The prototype can be used and involved in the complete product. This step can be repeated as long as the project develops well.



For information as well, this user's design allows the project to control the home appliance by using this voice control performed by us to integrate with the prototype user model to simplify the system process to be implemented. This design is quite important in the project that will be developed as it should take various aspects in its development so that the design is safe and comfortable to be used by all human beings.

### **3.4.3 Phase 3: Rapid Construction**

In this Construction Phase, once the user and basic system designs have commenced, the construction phase in the system will be the place of coding, testing and integration where the application takes place. Where, in this project it will use a Software that is Arduino Integrate Development Environment (IDE) that will be used to upload the source code and then it will be able to be the Arduino function as it has been encoded.

For the Arduino that will be used in this project, it will perform the main functions, and both are language C. Then, the Design of the User Form, in the Instant Construction phase is repeated as often as will be required. This is because these new components are needed and there will be various changes to meet project requirements regarding Control Home Automation using Voice Command.

### **3.4.4 Phase 4: Cutover**

In this fourth phase of this cutover, it consists of training or training activities by users. Which is it will show how the system operates. In addition, in this phase it allows the development team time to make an action transferring component to the immediate production environment. This project will involve supervisors and customers to ensure the system can be implemented.

When control home appliance using this voice can be used, before it is distributed to users to use this application in their livelihood, it will first try to find out whether the function on this project will achieve what is needed. In this phase, this project can also be improved if any deficiencies occur. Additionally, as it has been speculated, through

this phase all system defects and weaknesses in the project will enable them to improve in the future. When a new system is built, it will be sent and placed in a better operation.

### 3.5 PRELIMINARY DESIGN

In this section, it will discuss about the system architecture to be applied in this project, printed circuit board of the Control Home Automation using Voice Command.

#### 3.5.1 Printed Circuit Board

The figure below shows the overview of the project. From this layout it will shows how the hardware will connected to an Arduino board. Below it tells about the type of hardware that we will use in this project such as we use Bluetooth module, breadboard and small bulbs.

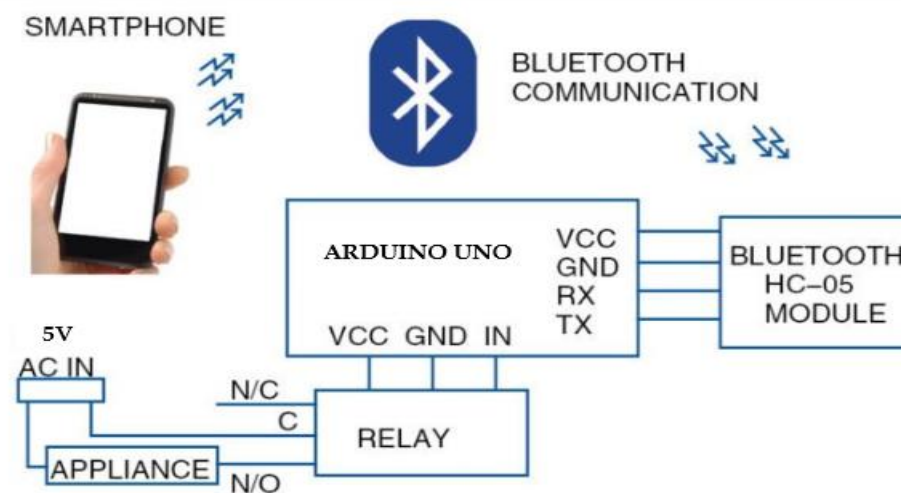
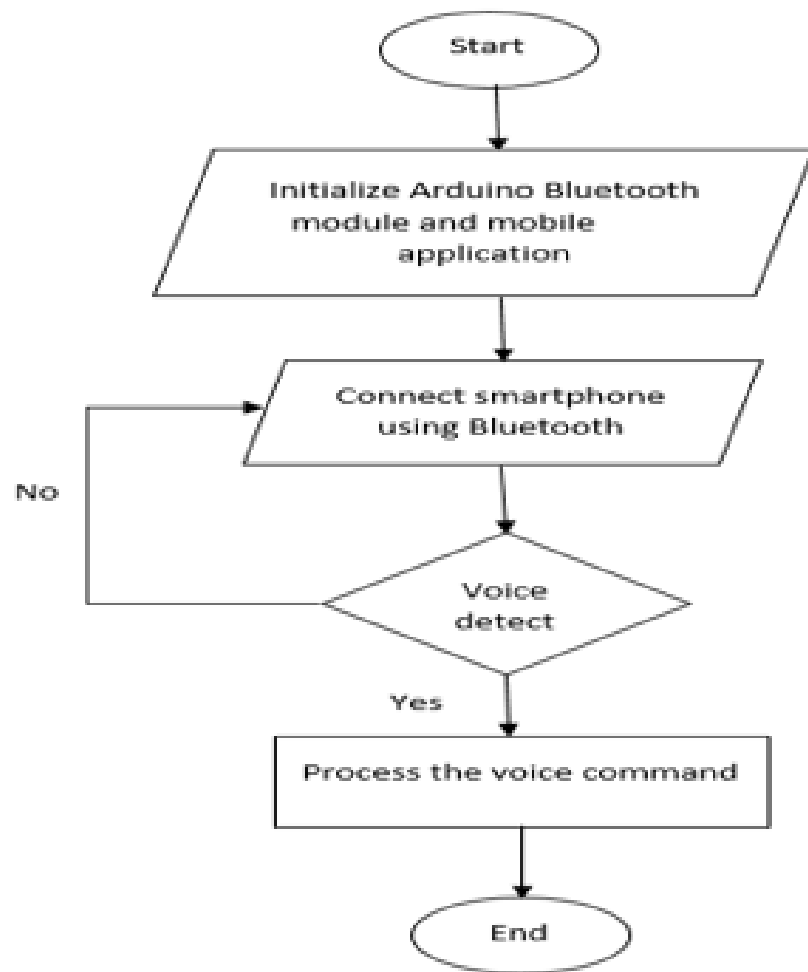


Figure 3.2 Overview project

#### 3.5.2 Flow Chart Diagram

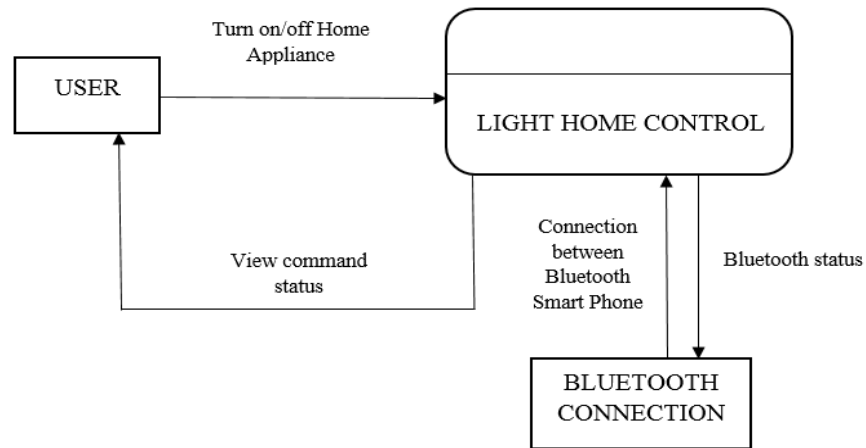
The figure 3.3 below is a flowchart diagram, it is flow of how the system will be function. Firstly, they need to be connected Arduino with the smartphone using Bluetooth. Then, the system can be proceeded to run the system to turn the home appliances on or off.



**Figure 3.3 Flow chart Diagram**

### **3.5.3 Context Diagram**

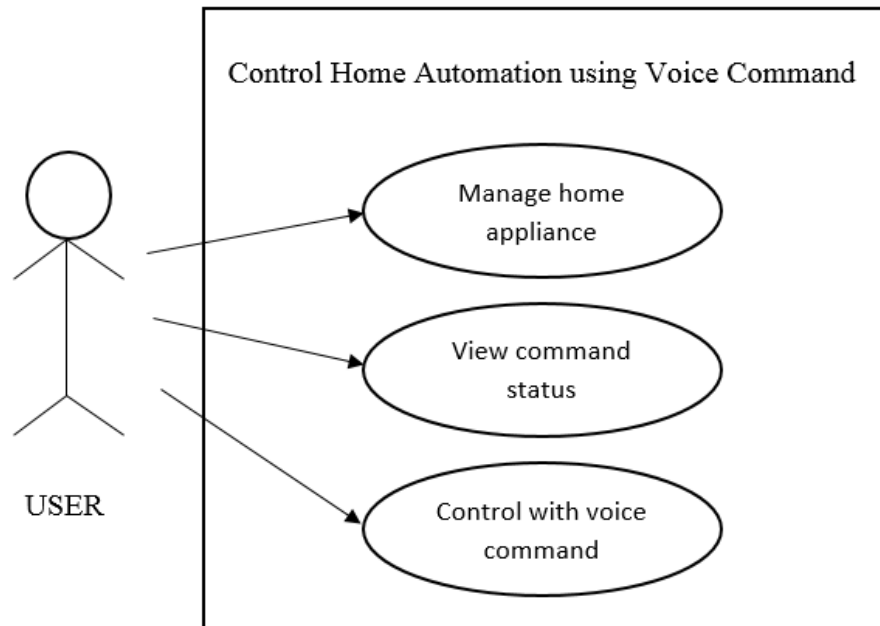
Context diagram is an outline used to characterize the limits in the middle of framework and their surroundings. For this case, this application is developed to help disabled and elderly people since they cannot reach the switch and have restrain to move freely and it is also can prevent bad incident to be happen. In this security aspect Control Home Automation using Voice Command (CHAUVC) also will places to a strategic place which is at the gate of the house. So, nobody will cannot knew about the switch to on/off the home appliance.



**Figure 3.4 Context Diagram**

### **3.5.4 Use Case Diagram**

In this use case diagram there are several functions that can be done in this project such as the user will control the home appliance only by using the mobile phone which will be connected via Bluetooth module. Additionally, the user can see the status of the Bluetooth connection state only through a smart phone. Based on figure 3.5 the use case diagram below describes a set of actions (use case) that some system or system (subject) should or can be done in collaboration with one or more external users of the system (actor) or it is shows as the interaction between user and the use case in the system. (Application, Data, & Group, 1995),



**Figure 3.5 Use Case Diagram**

### **3.6 TOOLS REQUIREMENT**

This section represents the hardware and software requirement that are vital during the system development of Control Home Automation using Voice command with Arduino. There are difference types of tools that we use in this project that are taking into all the aspect of the development process of the project using appropriate tools.

#### **3.6.1 Hardware Requirement**

Table 3.1 below shows the hardware requirement specification required in development of the system. The table describes the minimum specification of hardware required in development of the system.

This hardware is need for the project to be used to make it perfectly complete. All the hardware below shows all the tools that are need to make it works. Not only that, using this technique it can be explained to run the project operation (Evans, T.C., Gavrilovich, E., Mihai, R.C. and Isbasescu, I., 2015).

**Table 3.1 Hardware Requirement for the development**

<b>Hardware</b>	<b>Specification</b>
Laptop	<ul style="list-style-type: none"><li>• To develop the system, prepare the proposal and documents.</li></ul>
Smartphone	<ul style="list-style-type: none"><li>• To run android apps that monitoring the system.</li></ul>
Glue	<ul style="list-style-type: none"><li>• To stick the materials together to decorate the house prototype</li></ul>
Breadboard	<ul style="list-style-type: none"><li>• A device used as a construction base in developing an electronic circuit.</li></ul>
Bluetooth module	<ul style="list-style-type: none"><li>• Used for transparent wireless serial connection setup.</li></ul>
Arduino Uno R3 Microcontroller	<ul style="list-style-type: none"><li>• As microcontroller for the whole PIC.</li><li>• It contains everything needed to support the microcontroller.</li></ul>
Bulb	<ul style="list-style-type: none"><li>• Use an indicator the system.</li></ul>
Relay	<ul style="list-style-type: none"><li>• Control something that draws much more power</li></ul>
Jumper wire / wire	<ul style="list-style-type: none"><li>• Connection between hardware</li></ul>
Bulb holder	<ul style="list-style-type: none"><li>• To place the bulb into the bulb holder</li></ul>

### 3.6.2 Software Requirement

Table 3.2 below shows the software requirement needed in Control Home Automation using Voice command application. The table describes the minimum specification of software needed in developing the system.

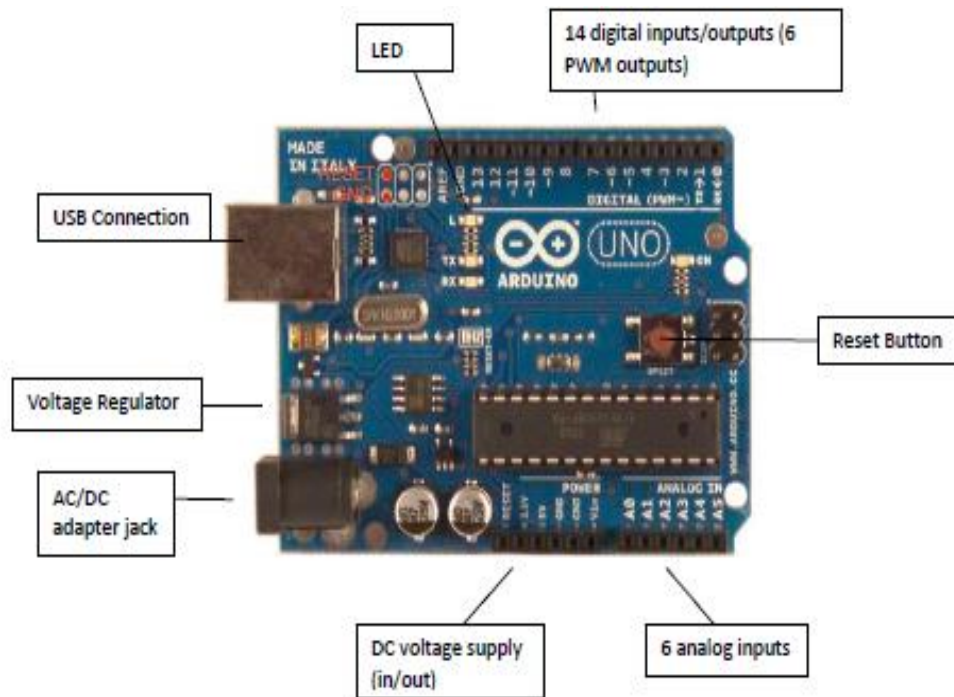
Next, it is about the software that is also need for the project to be implement it with this project. Without all this software like using the Microsoft Windows 10 operating System or using Microsoft Office Word (2010) this project will not work properly and give the best result for the project that will be build.

**Table 3.2 Software Requirement for the development**

Software	Specification
Microsoft Windows 10 operating System	<ul style="list-style-type: none"><li>• A platform to run the applications required for the documentation and development the system in this project.</li></ul>
Microsoft Office Word (2010)	<ul style="list-style-type: none"><li>• A graphical word processing to prepare the documentation.</li></ul>
Web browser software  - Mozilla Firefox - Google chromes	<ul style="list-style-type: none"><li>• It used to find or search information</li></ul>
Microsoft Excel (2010)	<ul style="list-style-type: none"><li>• A tool to prepare a Gantt Chart.</li></ul>
Arduino Integrate Development Environment (IDE)	<ul style="list-style-type: none"><li>• This used to upload the source code</li></ul>

Android Studio Software	<ul style="list-style-type: none"> <li>To create new application that control home appliances</li> </ul>
-------------------------	--

### 3.6.3 Arduino Uno REV3



**Figure 3.6 Arduino Uno Rev3**

This is the structure of a similar part of Arduino Leonardo but of different types. For the knowledge, which caused this model to differ from Arduino Leonardo it has an Atmega16U2 chip. The Atmega16U2 chip has been replaced with 8U2 and it does not use the USB-to-FTDI driver. In addition, the Arduino UNO Rev3 is a small, microcontroller that can be estimated and modest (Badamasi, 2014), it connects the monitor and can also be used with mouse and keyboard consoles. While this device is also ideal for giving customers the opportunity to explore more profoundly about programming and computing. Customers can learn how to program this device using C or C ++ languages (Wang & Chi, 2016). This device may perform other functions in the way it is used. For example, we can run on Smart Home Systems, to home security functions, and other IoT.



Furthermore, this is the reason why the Arduino UNO Rev3 model has been selected to complete and be used in the project as it has many excellent features and is needed in completing this project, for example, integration inputs in small devices and it also has a wide range of outputs (Wang & Chi, 2016). Arduino UNO Rev3 is a version that has been upgraded, it has been improved so it can upgrade IC boards. Additionally, it improves the layout of the board which has added on the reset switch led by an Arduino board. This board will provide an additional pin connector from 8 to 10 pin as opposed to the previous model of Rev2 which is less of its pin. This model also does not sync with Bluetooth, Wi-Fi console or keyboard built in the gate so it must compile through a board or other usable source.

Finally, this model also has a 3.3V and 5V bolster control circuit with USB 2A AC connector. ATmega328 on this Uno, it comes before customizing or synchronizing with a boot loader that can be used to the user to transfer to a new code to it without having to use it to another external hardware programmer. It is also used in conveying the first use of the STK500 convention. Additionally, it also coordinates using an A-B type USB cable to amplify or by connecting to AC-to-DC or battery.

### 3.6.4 Arduino Uno REV3 ports

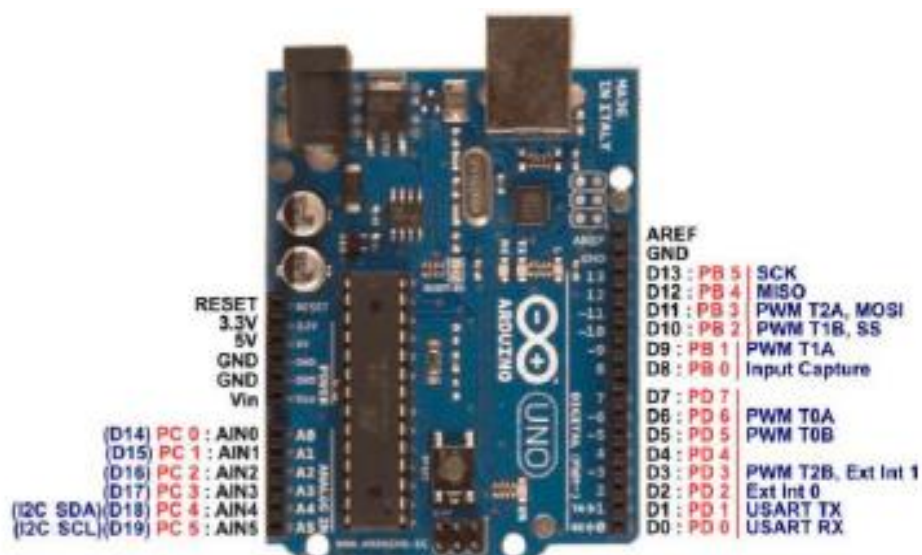


Figure 3.7 Ports of Arduino Uno REV3

Figure 3.7 above shows a port that is only available in most Arduino devices. It consists of 6 analog inputs, and 14 pin Digital I / O. Additionally, it has ground input and power and has 1 reset button on this board.

This port will also be controlled by the user via programming by Arduino Software IDE. Other programs can also enter code through this with examples such as MATLAB and Python. AREF is a voltage that is a reference to an analog input and can be used with an `analogReference()` code.

### 3.6.5 Arduino Software IDE



**Figure 3.8 Example of command interface**

Figure 3.8 above shows a key software used for Arduino device code programming by using the Arduino Software IDE. The advantages of this software is that it can support both C and C ++ languages using custom code restructuring rules. Additionally, the software also supplies libraries from the Wiring project, which has provided various and many common I / O procedures (Ac & For, 2017). Another benefit of using this software is that it contains a massive library that allows users to easily program code with it. Arduino IDE will also support all Arduino devices without the need for users to use any further installation required. It is enough to pair and play this device.

### 3.6.6 GANTT CHART

The project is plan in two sessions which is Projek Sarjana Muda 1 and Projek Sarjana Muda 2 for Universiti Malaysia Pahang (UMP). Rapid Application Development (RAD), requirement planning, and application design phases is the development method that has been done throughout PSM 1 session. While in PSM 2 session, the construction and cutover are done within it. The project started from 12/2/2018 and ended on 13/12/2018. Figure 3.9 shows the project timeline.

1	Task Name	Start Date	Finish Date	Duration(Days)
2	Requirement analysis	23/1/2018	6/2/2018	14
3	Writing chapter 1	6/2/2018	28/2/2018	22
4	Submit chapter 1	6/3/2018	9/3/2018	3
5	Research for literature review	9/3/2018	13/3/2018	4
6	Writing chapter 2	13/3/2018	20/3/2018	7
7	Research for methodology	20/3/2018	24/3/2018	4
8	Writing for chapter 3	24/3/2018	23/4/2018	30
9	Checking error before submit proposal	24/4/2018	30/4/2018	6
10	Submit chapter 3 and other form	1/5/2018	8/5/2018	7
11	Design project	13/8/2018	19/8/2018	6
12	Developing project Writing chapter 4	20/8/2018	30/8/2018	10
13	ImplementationDeveloping project	31/8/2018	15/9/2018	15
14	Testing Submit chapter 4	15/10/2018	16/10/2018	1
15	Writing chapter 4Writing chapter 5	16/10/2018	8/11/2018	23
16	Submit chapter 4Implementation	9/11/2018	20/11/2018	11
17	Writing chapter 5Testing	20/11/2018	25/11/2018	5
18	Submit chapter 5	25/11/2018	26/11/2018	1
19	Design poster	13/12/2018	17/12/2018	4
20	PSM2 karnival	18/12/2018	20/12/2018	2

**Figure 3.9 Project Timeline**

### **3.6.7 SUMMARY**

Conclusion, the purpose of this system is to use Bluetooth built-in mobile phone for automation. Subsequently, different hardware and software units are described in more detail. In-app software is completely designed using Android and uses Language C. Inside this application the Automated system will be based on Android Mobile Phone and Bluetooth. Others, this section also will be representing the testing plan proposed for the system. The testing plan for the system is done based on the use case designed for the system. The testing is done based on the test case designed.

## **CHAPTER 4**

### **RESULTS AND DISCUSSION**

#### **4.1 INTRODUCTION**

This chapter it explains the implementation of Control Home Automation using Voice Command (CHAUVC). Currently the implementation process, all the work is starting from the system construction until the test generation is designed and then finalized. It is also discussing about the function whether the system is running as planned or not. Besides, the system will be gained the result after all the functionality testing is conducted. Others, this discussion also will be including the result and finding that had been documented during the development and testing phase.

#### **4.2 IMPLEMENTATION**

The entire implementation of the project could be divided into two parts, which is software and hardware part. For the hardware part, we had to buy an Arduino Uno, a Bluetooth module, jumper wire, bulb, relay, wire, bulb holder and socket. After finished completing all the tools that need to build this project then setup all the hardware. The software part, we had to install the Android Studio Software and Arduino Software.

#### **4.3 PROJECT DEVELOPMENT AND TESTING**

A prototype is a model used to test and evaluate a design or a project. Based on Rapid Application Development (RAD) prototype model discussed in Chapter 3, in the Design section involves implementation and testing part including the process to produce hardware and software development. The project advancement and testing are a period

to demonstrate the improvement procedure of this project module by module, from starting until the end of the advancement process. It will likewise examine about the programming used, the issue happens when developing this project and the results that achieved at the end of the project. The component that involves in this project has been figured out by doing an analysis and experiment to make sure that it will be suitability for daily use.

#### 4.3.1 Hardware Development

In hardware development, it needs to know how to implement it with another tool. Firstly, we make connection using jumper wire between the Arduino board, Bluetooth module, relay module and Arduino Bread. After all the tools are completely connected. Then, we need to make connection between wire, bulb, socket and bulb holder. It is important since the connection is failed then the system will not function properly. Figure 4.1 its show all the connection between the hardware employed in this project.

Then, on figure 4.2 shows the Samsung J7 pro branded phone that is used to open the app to control home appliances. This Samsung J7 pro phone has an Android 7.0 platform (Nougat) and the memory used is microSD which can be up to 256 GB. It is one of the suitable Android Smart Phone that can be used by the user.

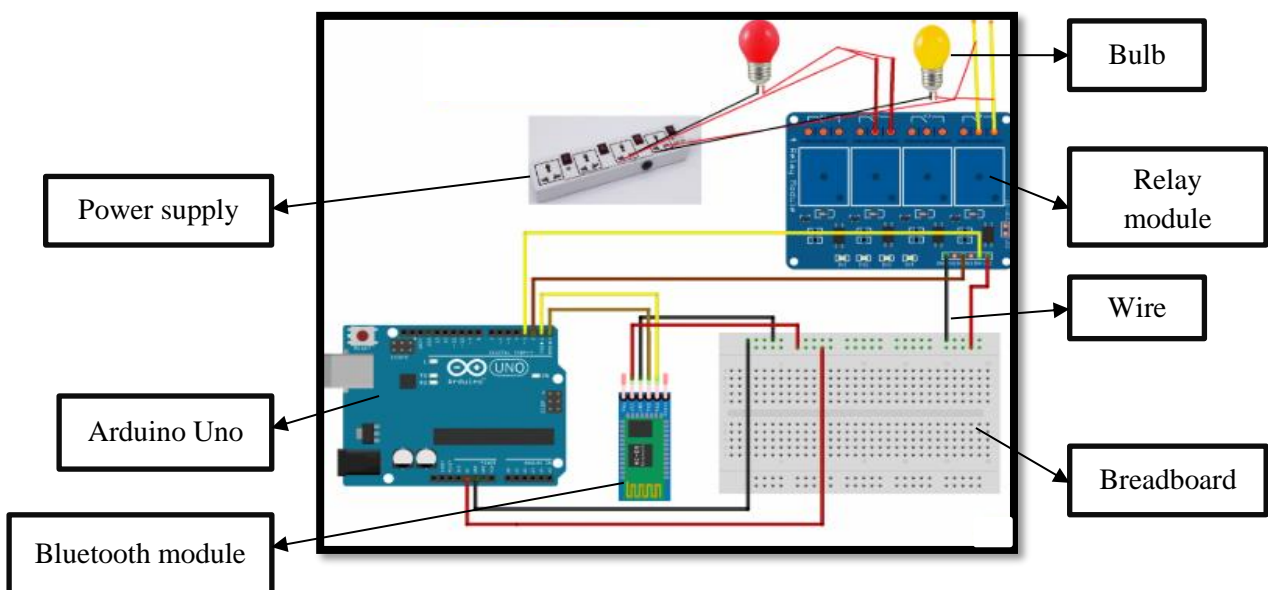


Figure 4.1 Schematic diagram



**Figure 4.2 Connection between the hardware and Android Smart Phone**

### 4.3.2 Software Development

The development of this project will have the software with two phases. First, using Arduino Software which is Arduino IDE and second is using Android Studio software.

### 4.3.3 Arduino Software

As we know, Arduino has its own platform to build the program, which is Arduino IDE (Integrated Development Environment). This compiler used to activate Arduino Uno board thus it can be used to receive the instructions from mobile application. Essentially, Arduino board must connect to the laptop by plugging USB cable to get started using this IDE. Using laptop also gives some currents to Arduino to be functioning well. Arduino software was used to write a command to the Arduino board. Function of this system is to control through voice command by the user.

```

File Edit Sketch Tools Help
electrical_devices

//-----//
void loop() {
  while (BT.available()) { //Check if there is an available byte to read
    delay(10); //Delay added to make thing stable
    char c = BT.read(); //Conduct a serial read
    device += c; //build the string.
  }
  if (device.length() > 0) {
    Serial.println(device);
  }

  if (device == "doneon")
  {
    digitalWrite(3, HIGH);
  }

  else if (device == "doneoff")
  {
    digitalWrite(3, LOW);
  }

  else if (device == "dtwoon")
  {
    digitalWrite (4,HIGH);
  }

  else if (device == "dtwooff")
  {
    digitalWrite(4, LOW);
  }
}

```

**Figure 4.3 Arduino IDE**

#### 4.3.2.1 Android Studio Software

Figure below shows, the interface that are make using Android Studio Software. They have three interface and it used java as a programming language in this system. The name for every .java includes MainActivity.java, Main2Activity.java, Main3Activity.java. Others, they are in .xml it have two which is firstly for design and second for the text. Name for .xml in this system is activity\_main.xml, activity\_main2.xml and activity\_main3.xml.

```
package com.example.nuratikah.homecontrol;

import ...

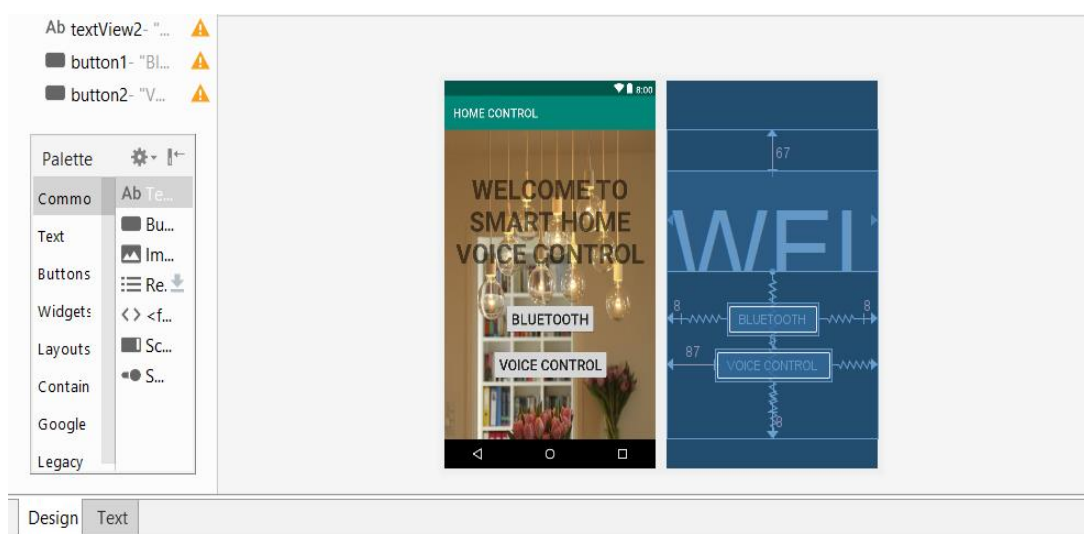
public class MainActivity extends AppCompatActivity {

    public Button button1;
    public Button button2;

    public void init() {
        button1 = (Button) findViewById(R.id.button1);
        button1.setOnClickListener((v) -> {
            Intent toy = new Intent( packageContext: MainActivity.this,Main2Activity.class);
            startActivity(toy);
        });
    }

    public void initt() {
        button2 = (Button) findViewById(R.id.button2);
        button2.setOnClickListener((v) -> {
```

**Figure 4.4 MainActivity.java**



**Figure 4.5 activity\_main.xml (Design)**



```

<?xml version="1.0" encoding="utf-8"?>
<android.support.constraint.ConstraintLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:background="@drawable/gambar1"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/textView2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginLeft="8dp"
        android:layout_marginTop="67dp"
        android:layout_marginRight="8dp"
        android:layout_marginBottom="8dp"
        android:selectAllOnFocus="true"
        android:text="WELCOME TO SMART HOME VOICE CONTROL"
        android:textAlignment="center"
        android:textSize="45sp"

```

**Figure 4.6 activity\_main.xml (Text)**

Figure 4.4, 4.5 and 4.6 above was describe about the main interface of this system which is include the button to enter the other page of this system. It is include to enter the Bluetooth interface and button to make a voice command.

```

public class Main2Activity extends AppCompatActivity {

    CheckBox enable_bt, visible_bt;
    ImageView search_bt;
    TextView name_bt;
    ListView listView;

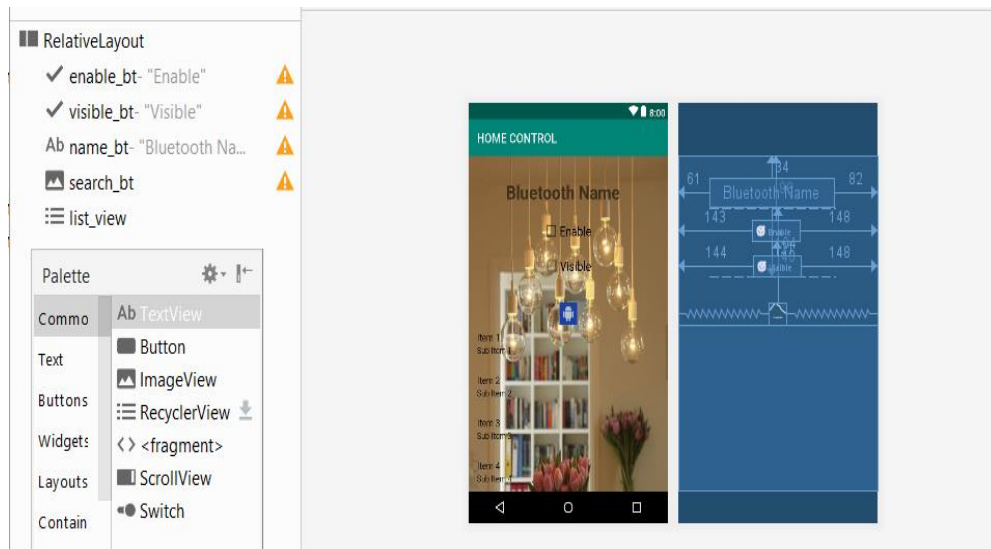
    private BluetoothAdapter BA;
    private Set<BluetoothDevice> pairedDevices;
    public static String EXTRA_ADDRESS = "device_address";

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main2);

        enable_bt = findViewById(R.id.enable_bt);
        visible_bt = findViewById(R.id.visible_bt);
        search_bt = findViewById(R.id.search_bt);
        name_bt = findViewById(R.id.name_bt);

```

**Figure 4.7 Main2Activity.java**



**Figure 4.8 activity\_main2.xml (Design)**

```

<CheckBox
    android:id="@+id/visible_bt"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_below="@+id/enable_bt"
    android:layout_alignParentStart="true"
    android:layout_alignParentLeft="true"
    android:layout_alignParentRight="true"
    android:layout_marginStart="144dp"
    android:layout_marginLeft="144dp"
    android:layout_marginTop="21dp"
    android:layout_marginRight="148dp"
    android:text="Visible"
    android:textAlignment="center"
    android:textSize="20sp" />

<TextView
    android:id="@+id/name_bt"
    android:layout_width="241dp"
    android:layout_height="wrap_content"

```

**Figure 4.9 activity\_main2.xml (Text)**

Then, figure 4.7, 4.8 and 4.9 above show about the Bluetooth interface. It makes for user to use the Bluetooth application that can connect between the smart phone and the Arduino project to control home appliance.

```

public class Main3Activity extends AppCompatActivity {

    static final UUID myUUID = UUID.fromString("00001101-0000-1000-8000-00805F9B34FB");
    public ProgressDialog progress;
    public boolean isBtConnected = false;

    private Button openMic;
    private TextView showVoiceText, TextofLights, TextofTV, TextofAC;
    private final int REQ_CODE_SPEECH_OUTPUT = 143;

    String address = null;
    BluetoothAdapter BA = null;
    BluetoothSocket btSocket = null;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main3);
        openMic = (Button) findViewById(R.id.button);
        showVoiceText = (TextView) findViewById(R.id.showVoiceOutput);
    }
}

```

Figure 4.10 Main3Activity.java

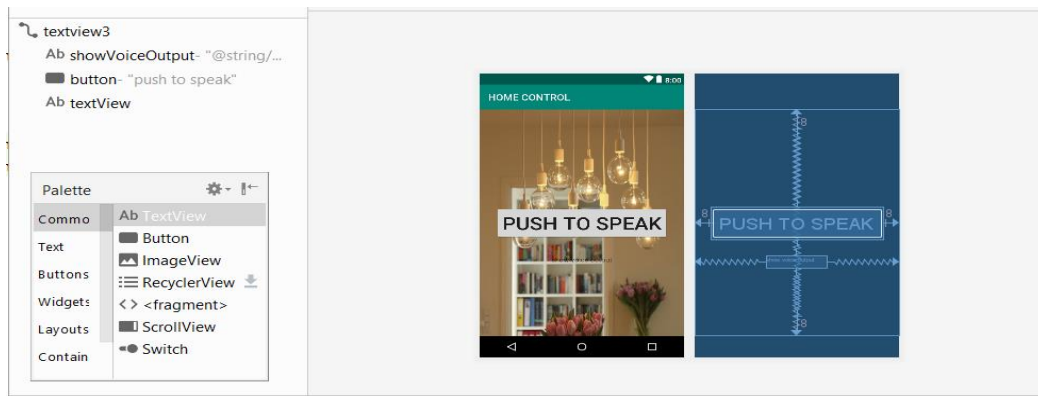


Figure 4.11 activity\_main3.xml (Design)

```

        android:layout_marginStart="8dp"
        android:layout_marginLeft="8dp"
        android:layout_marginTop="8dp"
        android:layout_marginEnd="8dp"
        android:layout_marginRight="8dp"
        android:layout_marginBottom="8dp"
        android:text="push to speak"
        android:textAlignment="center"
        android:textSize="40sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        tools:ignore="MissingConstraints" />

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content" />
</android.support.constraint.ConstraintLayout>

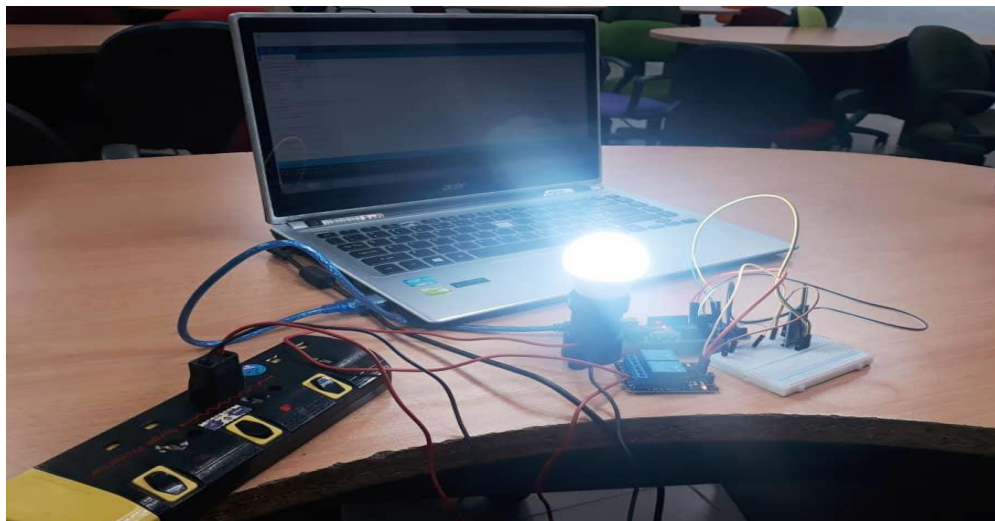
```

Figure 4.12 activity\_main3.xml (Text)

Figure 4.10, 4.11 and 4.12 above show the voice control, that used by user to give a command. User need to push the button and say the command to control home light, the fan or a television.

#### **4.4 RESULT DISSCUSSION**

In conclusion, the system has some difference with existing system based on the type of controlling system. Figure 4.13 below show we can see that the system has been run to test the functionality of the system those are acquired. The first test is pairing the Bluetooth between the Android phone and the Arduino board. The test is successfully, and its connection is working properly. Next, test is giving a voice command Android Smart Phone to control the home appliance. It shows that all the function in hardware is working properly. This system has advantage on controlling because it can be controlling all home appliance in using only one application. Figure 4.13 shows the output when the voice command has given.



**Figure 4.13 Arduino attach with bulb**

## **CHAPTER 5**

### **CONCLUSION**

#### **5.1 INTRODUCTION**

As a conclusion, it will discuss about this system that have been developed. In this chapter five it deduces and wrap up about the project's constraints. Others, in this chapter it is also have some suggestions that will be able to be applied and can be improved in the future.

#### **5.2 PROJECT CONSTRAINT**

There are few constraints of Control Home Automation using Voice Command (CHAUVC) during development. There are some constraints and challenges that must be considered in order to improve this project in the future. Below is a list of constraints for this project.

- i. This application provides and using single language, which is English only

In this application to control the home appliance using voice. This is one of the situations where the language functions of the created application are set and have been programmed into only one language. Those who want to use this app are advised to first understand the function before used it.

- ii. The mobile application is only available for Android user

Android is basically an open source which is based on the Linux Kernel which was introduced by Google (Dinesh et al. 2015). Then, for iOS it is a closed-source software. The software used to develop this project is Android Studio. Therefore, this has led to a situation where only users using Android smartphones can access this app which can then control home appliances as they cannot be installed and run on any hardware.

iii. **Arduino Uno Cannot Support with Big File Size**

During development this project, using Arduino board cannot support of source code which is contained big file size. In this Arduino board it is only have 32KB off flash memory that is build-in 30 inside. Others, to support the larger project and to overcome the constraint of memory, it will be better to make a project using Raspberry Pi or Arduino Mega 256KB that are recommended to use it.

iv. **Control Home Appliance with a clear voice command**

The system uses voice commands to control all home appliances. It is one of the fastest ways to control home appliances using smartphones and voice apps. However, this system uses a voice app that allows home appliances to be controlled but, it becomes a problem when users need to say a clear word to give instructions for the appliance or it cannot be work properly.

### **5.3 FUTURE WORK**

The project will be efficiency if we can make some improvement in this project. It must have some upgraded that can be more interactive and be useful for other people to use in their life. There are several suggestion and improvement that can be made for the future improvement of Control Home Automation using Voice Command (CHAUVC).

- i. Add more sensor that can be more beneficial for user such as temperature sensor, humidity sensor and others.

- ii. Add any type of multi-language to this application such as Malay or Chinese. Thus, it can be more user friendly.
- iii. Make this application that can be used by Windows and IOS user.

## **5.4 CONCLUSION**

As a conclusion to this project, in this report it has been documented to create a system that will be enables automation systems to be integrated into platforms based on predetermined and customized standards. Furthermore, in this Chapter Two it relates with three difference existing systems that have been reviewed and subsequently comparable with the proposed system and various types of hardware have also been evaluated for use as appropriate to the user. In Chapter Three, it concerns the methodology, requirements, scope of UML Diagrams and the tool requirements for such systems are determined. In Chapter Four, implementation of project and system tests has been conducted. Finally, in Chapter Five for conclusion and future, it tells about the constraints. Additionally, it will have the content that about the future work that have been listed for system improvements.

## REFERENCES

- Ac, O. F., & For, P. (2017). (12) Patent Application Publication (10) Pub. No.: US 2017/0139001 A1, 1(19).
- Application, F., Data, P., & Group, P. E. (1995). United States Patent [ 19 ] [ 11 ] Patent Number : [ 45 ] Date of Patent :, (19), 3–6. <https://doi.org/10.1074/JBC.274.42.30033>.(51)
- Badamasi, Y. A. (2014). The working principle of an Arduino. *Proceedings of the 11th International Conference on Electronics, Computer and Computation, ICECCO 2014*. <https://doi.org/10.1109/ICECCO.2014.6997578>
- Dandge, P. J. A., Shirwadkar, R., Gite, P., Odhekar, N., & Kakad, C. (2016). Electric Switch on / Off System Using Android App Via Wi-Fi, 1278–1282.
- Evans, T.C., Gavrilovich, E., Mihai, R.C. and Isbasescu, I., E. L. (2015). ( 12 ) Patent Application Publication ( 10 ) Pub . No .: US 2006 / 0222585 A1 Figure 1, 2(15), 354. <https://doi.org/10.1037/t24245-000>
- Murmu, K., & Sonkar, R. (2004). Control of Light and Fan with Whistle and Clap Sounds, (November), 15.
- Rosslin, J. R., & Tai-hoon, K. (2010). Applications, Systems and Methods in Smart Home Technology: A Review. *International Journal of Advanced Science and Technology*, 15(December), 37–48.
- Wang, Y., & Chi, Z. (2016). System of wireless temperature and humidity monitoring based on Arduino Uno platform. *Proceedings - 2016 6th International Conference on Instrumentation and Measurement, Computer, Communication and Control, IMCCC 2016*, 770–773. <https://doi.org/10.1109/IMCCC.2016.89>



Yan, M., & Shi, H. (2013). Smart Living Using Bluetooth-Based Android Smartphone. *International Journal of Wireless & Mobile Networks*, 5(1), 65–72.  
<https://doi.org/10.5121/ijwmn.2013.5105>

Wikipedia (2018, April 29) Literature Revie. Retrieve from  
[https://en.wikipedia.org/wiki/Literature\\_review](https://en.wikipedia.org/wiki/Literature_review)

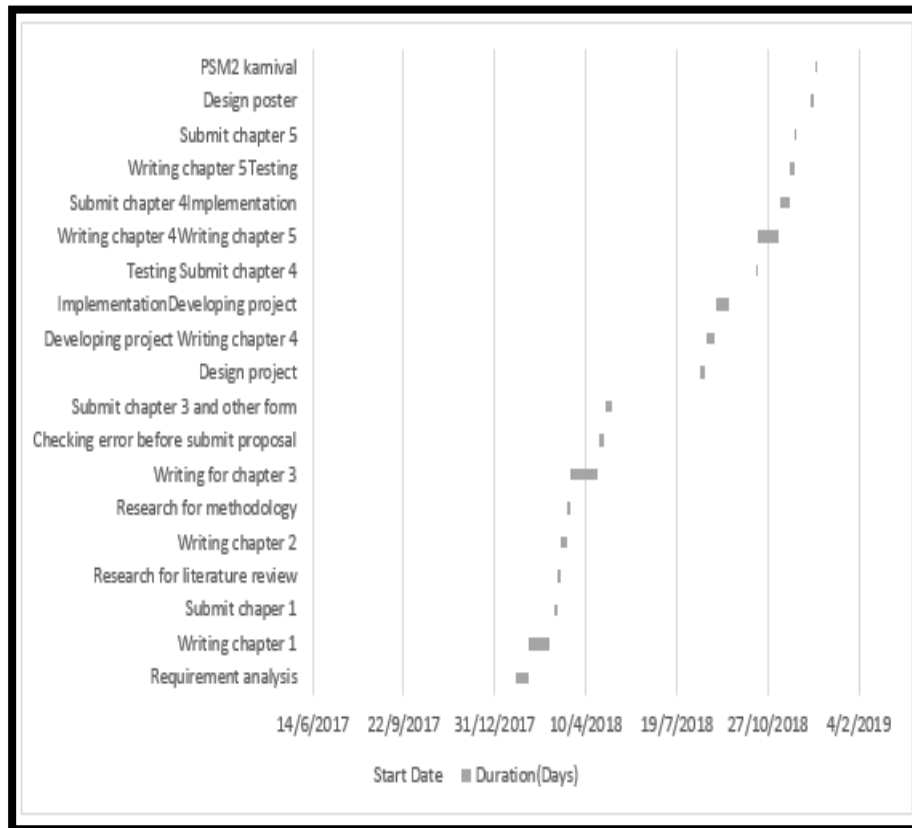
Leyla Norman (2018) What Is an Objectives Statement? Retrieve from  
<http://smallbusiness.chron.com/objectives-statement-24003.html>

Longman (2015) Advantage. Retrieve from  
<https://www.ldoceonline.com/dictionary/advantage>

Dinesh, R et al. 2015. “Library Access System Smartphone Application Using Android.”  
*International Journal of Computer Science and Mobile Computing* 43(3): 142–49.

## APPENDIX A

### GANTT CHART



## APPENDIX B

### CODING

#### MainActivity.java

```
package com.example.nuratikah.homecontrol;

import android.content.Intent;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;

public class MainActivity extends AppCompatActivity {

    public Button button1;
    public Button button2;

    public void init(){

        button1 = (Button) findViewById(R.id.button1);
        button1.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {

                Intent toy = new
Intent(MainActivity.this,BluetoothActivity.class);
                startActivity(toy);
            }
        });
    }

    public void initt(){

        button2 = (Button) findViewById(R.id.button2);
        button2.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {

                Intent toyy = new
Intent(MainActivity.this,Main3Activity.class);
                startActivity(toyy);
            }
        });
    }

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        init();
        initt();
    }
}
```

## BluetoothActivity.java

```
package com.example.nuratikah.homecontrol;

import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.view.Menu;
import android.view.MenuItem;
import android.view.View;
import android.widget.Button;
import android.widget.ListView;
import java.util.Set;
import java.io.OutputStream;
import java.util.ArrayList;
import java.util.Set;
import android.widget.Toast;
import android.widget.AdapterView;
import android.widget.AdapterView;
import android.widget.TextView;
import android.content.Intent;
import android.bluetooth.BluetoothAdapter;
import android.bluetooth.BluetoothDevice;

public class BluetoothActivity extends AppCompatActivity {

    Button btnPaired;
    ListView devicelist;
    private BluetoothAdapter myBluetooth = null; // initialized
    private Set<BluetoothDevice> pairedDevices;
    //private OutputStream outputStream = null;
    public static String EXTRA_ADDRESS = "device_address";

    @Override
    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_bluetooth);

        btnPaired = findViewById(R.id.button);
        devicelist = findViewById(R.id.ListView);

        //if the device has bluetooth
        myBluetooth = BluetoothAdapter.getDefaultAdapter();

        if(myBluetooth == null)
        {
            //Show a message that the device has no bluetooth adapter
            Toast.makeText(getApplicationContext(), "Bluetooth Device Not
Available", Toast.LENGTH_LONG).show();

            //finish apk
            finish();
        }
        else if(!myBluetooth.isEnabled())
        {
            //Ask to the user turn the bluetooth on
            Intent turnBTon = new
Intent(BluetoothAdapter.ACTION_REQUEST_ENABLE);
            startActivityForResult(turnBTon,1);
        }

        btnPaired.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v)
```

```

        {
            pairedDevicesList();
        }
    });
}

private void pairedDevicesList()
{
    pairedDevices = myBluetooth.getBondedDevices();
    ArrayList list = new ArrayList();

    if (pairedDevices.size() > 0)
    {
        for (BluetoothDevice bt : pairedDevices)
        {
            list.add(bt.getName() + "\n" + bt.getAddress()); //Get the
device's name and the address
        }
    }
    else
    {
        Toast.makeText(getApplicationContext(), "No Paired Bluetooth
Devices Found.", Toast.LENGTH_LONG).show();
    }

    final ArrayAdapter adapter = new
ArrayAdapter(this, android.R.layout.simple_list_item_1, list);

    deviceList.setAdapter(adapter);
    deviceList.setOnItemClickListener(myItemClickListener); //Method
called when the device from the list is clicked
}

private AdapterView.OnItemClickListener myItemClickListener = new
AdapterView.OnItemClickListener()
{
    public void onItemClick (AdapterView<?> av, View v, int arg2, long
arg3)
    {
        // Get the device MAC address, the last 17 chars in the View
        String info = ((TextView) v).getText().toString();
        String address = info.substring(info.length() - 17); // Make an
intent to start next activity.

        Intent i = new Intent(BluetoothActivity.this,
Main3Activity.class);

        //Change the activity.
        i.putExtra(EXTRA_ADDRESS, address); //this will be received at
Main3Activity (class) Activity
        startActivity(i);
    }
};
}

```

## Main3Activity.java

```
package com.example.nuratikah.homecontrol;

import android.content.ActivityNotFoundException;
import android.content.Intent;
import android.os.AsyncTask;
import android.app.ProgressDialog;
import android.bluetooth.BluetoothAdapter;
import android.bluetooth.BluetoothDevice;
import android.bluetooth.BluetoothSocket;
import android.speech.RecognizerIntent;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import java.io.IOException;

import java.util.ArrayList;
import java.util.Locale;
import java.util.UUID;

import android.widget.Toast;

public class Main3Activity extends AppCompatActivity {

    static final UUID myUUID = UUID.fromString("00001101-0000-1000-8000-00805F9B34FB");
    public ProgressDialog progress;
    public boolean isBtConnected = false;

    private Button openMic;
    private TextView showVoiceText;
    private final int REQ_CODE_SPEECH_OUTPUT = 143;

    String address = null;
    BluetoothAdapter BA = null;
    BluetoothSocket btSocket = null;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        Intent newint = getIntent();
        address = newint.getStringExtra(BluetoothActivity.EXTRA_ADDRESS);
        setContentView(R.layout.activity_main3);
        openMic = (Button) findViewById(R.id.button);
        showVoiceText = (TextView) findViewById(R.id.showVoiceOutput);
        new ConnectBT().execute();

        openMic.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                PUSH_TO_SPEAK();
            }
        });
        BA = BluetoothAdapter.getDefaultAdapter();

        if (BA == null) {
            Toast.makeText(getApplicationContext(), "Bluetooth Device Not Available", Toast.LENGTH_LONG).show();
            finish();
        }
        else if (!BA.isEnabled()) {

```

```

        //Ask to the user turn the bluetooth on
        Intent turnBTon = new
Intent(BluetoothAdapter.ACTION_REQUEST_ENABLE);
        startActivityForResult(turnBTon, 1);
    }
}

private void msg(String s) {
    Toast.makeText(getApplicationContext(), s, Toast.LENGTH_LONG).show();
}

private void PUSH_TO_SPEAK() {
    Intent intent = new Intent(RecognizerIntent.ACTION_RECOGNIZE_SPEECH);
    intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE_MODEL,
RecognizerIntent.LANGUAGE_MODEL_FREE_FORM);
    intent.putExtra(RecognizerIntent.EXTRA_LANGUAGE, Locale.getDefault());
    intent.putExtra(RecognizerIntent.EXTRA_PROMPT, "SPEAK NOW");

    try {
        startActivityForResult(intent, REQ_CODE_SPEECH_OUTPUT);
    } catch (ActivityNotFoundException tim) {
        Toast.makeText(getApplicationContext(),
            getString(R.string.speech_not_supported),
            Toast.LENGTH_SHORT).show();
    }
}

@Override
protected void onActivityResult(int requestCode, int resultCode, Intent
data) {
    super.onActivityResult(requestCode, resultCode, data);

    switch (requestCode) {
        case REQ_CODE_SPEECH_OUTPUT: {
            if(resultCode == RESULT_OK && null != data){
                ArrayList<String> voiceInText =
data.getStringArrayListExtra(RecognizerIntent.EXTRA_RESULTS);
                showVoiceText.setText(voiceInText.get(0));
                if (showVoiceText.getText().toString().equals("show
devices")) {

                    startActivity(new Intent(Main3Activity.this,
BluetoothActivity.class));

                    if (showVoiceText.getText().toString().equals("connect
smart home")) {
                        if(!isBtConnected){
                            new ConnectBT().execute();
                        } else {
                            Toast.makeText(getApplicationContext(), "Please
Pair devices", Toast.LENGTH_LONG).show();
                        }
                    }

                    if (showVoiceText.getText().toString().equals("light on"))
{
                        turnOnLight();
                    }

                    if (showVoiceText.getText().toString().equals("light
off")) {
                        turnOffLight();
                    }

                    if (showVoiceText.getText().toString().equals("TV on")) {

```

```

        turnOnTV(); }

        if (showVoiceText.getText().toString().equals("TV off")) {
            turnOffTV();}
        break;}}}

private void turnOnLight(){
    if (btSocket != null) {
        try {
            btSocket.getOutputStream().write("LONN".getBytes());
        } catch (IOException e) {
            msg("Error");
        }
    }
}

private void turnOffLight(){
    if (btSocket != null) {
        try {
            btSocket.getOutputStream().write("LOFF".getBytes());
        } catch (IOException e) {
            msg("Error");
        }
    }
}

private void turnOnTV(){
    try
    {btSocket.getOutputStream().write("TON".getBytes());}
    catch (IOException e) { msg("Error");
    }
}

private void turnOffTV(){
    try
    {btSocket.getOutputStream().write("TOFF".getBytes());}
    catch (IOException e) { msg("Error");
    }}private class ConnectBT extends AsyncTask<Void, Void, Void>
{
    private boolean ConnectSuccess = true;

    @Override
    protected void onPreExecute() {
        progress = ProgressDialog.show(Main3Activity.this, "Loading...",
        "Please wait!!!"); //show a progress dialog
    }

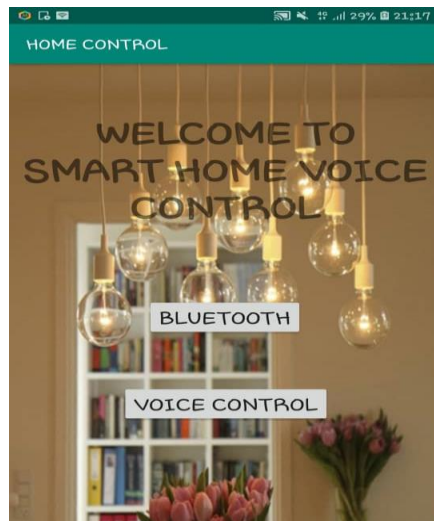
    @Override
    protected Void doInBackground(Void... devices    {
        try
        {if (btSocket == null || !isBtConnected){
            BA = BluetoothAdapter.getDefaultAdapter
BluetoothDevice disposition = BA.getRemoteDevice(address
btSocket = disposition.createInsecureRfcommSocketToServiceRecord(myUUID
BluetoothAdapter.getDefaultAdapter().cancelDiscovery();
            btSocket.connect();}
        } catch (IOException e){
            ConnectSuccess = false; }return null;}

    @Override
    protected void onPostExecute(Void result)    {
        super.onPostExecute(result);
        if (!ConnectSuccess)
        {
            msg("Connection Failed. Bluetooth unavailable? Try
again.");finish();}
        else{
            msg("Connected.");
            isBtConnected = true;}
        progress.dismiss();
    }
}
}

```



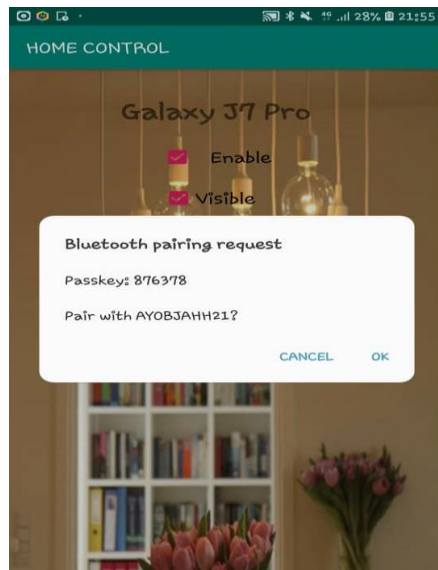
## INTERFACE



Interface 1



Interface 2



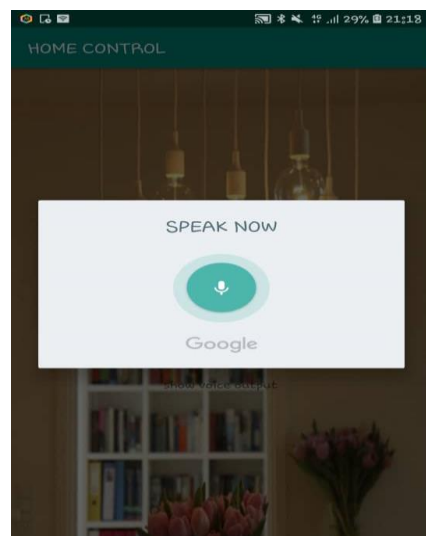
Interface 3



Interface 4



Interface 5



Interface 6