UNIVERSITI TEKNIKAL MALAYSIA MELAKA

WIRELESS CENTRALIZED ACCESS SMART HOME

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Telecommunications) with Honours.

by

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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor in Electronic Engineering Technology (Telecommunication) with Honors. The member of the supervisory is as follow:

……

(En.Mohd Saad Bin Hamid)

ABSTRAK

Akses wayarles berpusat rumah pintar direka untuk sistem rumah masa depan yang akan dilengkapi dengan teknologi terkini dan diberi kemudahan untuk orang ramai. Oleh itu rumah pintar akan memberikan impak yang besar dalam reka bentuk rumah dan akan menjadi sasaran utama dalam penyelidikan dan pembangunan (R & D) dan perniagaan pada masa hadapan. Dalam projek ini, papan Arduino akan digunakan sebagai unit kawalan induk daripada keseluruhan sistem. Idea utama adalah untuk membangunkan satu sistem pintar untuk mengawal perkakas rumah dengan menggunakan telefon pintar dan juga tanpa wayar. Pengguna boleh menekan suis untuk menghidupkan atau mematikan perkakas elektrik hanya dengan menggunakan telefon pintar mereka dengan keperluan Bluetooth. Teknologi Bluetooth digunakan sebagai platform untuk berkomunikasi antara telefon Android dan kotak kawalan. Untuk menjadikan system ini tanpa wayar, teknologi Frekuensi Radio akan digunakan.

ABSTRACT

A wireless centralized access smart home is designed for the future home system that will be equipped with the latest technology and given leisure for people. Hence the smart home will give a big impact in home design and will be the main target in research and development (R&D) and business in the future. In this project, Arduino board will be rolled as the master control unit of the whole system. The main idea is to develop a smart controlling system for home appliance by using smartphone and also wirelessly. The user can turn ON/OFF the electric appliance only by using their smartphone with the need of Bluetooth. Bluetooth technology is used as a platform to communicate between the Android device and control box. Furthermore, to make the system wireless RF technology is used.

DEDICATION

Alhamdulillah, praise to the Almighty Allah S.W.T

This thesis is dedicated to:

My beloved family,

My Parents,

My Supervisor,

My lecturers

And all my friends

Thanks for their encouragement and support

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Alhamdulillah, thank you Allah because of His blessing, I finally complete and finish my final year project successfully.

During the process to complete my project objective, I do a lot of research either by using internet, reading past year thesis, reference books and journal. With the guidance and support from peoples around me, I finally complete the project due to the time given. Here, I want to give credit to those who helped me to achieve what I had achieved in my final year project.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

RF	-	Radio Frequency
VB	-	Visual Basic
B4A	-	Basic4Android
R&D	-	Research and Development
PWM	-	Pulse Width Modulation
USB	-	Universal Serial Bus
AC	-	Alternating Current
DC	-	Direct Current
GND	-	Ground
IOERF	-	Least Used
RX	-	Receiver
TX	-	Transmitter
TTL	-	Transistor-Transistor Logic
SPI	-	Serial Peripheral Interface
LED	-	Light Emitted Diode
EDR	-	Enhanced Data Rate
IC	-	Integrated Circuit
SPDT	-	Single Pole Double Throw
DPDT	-	Double Pole Double Throw
PCB	-	Printed Circuit Board
NC	-	Normally Close
NO	-	Normally Open
CMOS	-	Complementary metal oxide semiconductor
ANT	-	Antenna
DIP	-	Dual in package
GSM	-	Global System for Mobile
PLC	-	Programmable Logic Controller
ADT	-	Android Development Tools
IDE	-	Integrated Development Environment

SDK	-	Software Development Kit
AVD	-	Android Virtual Device
IP	-	Internet Protocol
PC	-	Personal Computer
UV	-	Ultra Violet
IR	-	Infrared

CHAPTER 1
INTRODUCTION

The first chapter introduces brief idea of the project. It focused on the overview of the project, detailing the objectives, the problem statement, scope and outcome of the project.

1.1 Background

Mobile devices are not in any way as they used to be in the past. Not only have the screens grown in size and quality but also the internal hardware has grown to reach performances levels seen only in laptop computers some years ago. As the mobile application development is luring more and more developers into the market, Android also become an attractive topic in educational environment. The growing popularity of Android have made it interesting platform now. Wireless Centralized Access for Smart Home Control is a combination of Android mobile technology and embedded system. An application should be installed on the smartphone (Android device) to control various home appliance such as lamp. User can send command using the application.

Wireless communication technology used in this project is Bluetooth technology. Bluetooth is used as a platform to communicate and command information. In this project, Bluetooth technology is used to make a connection between the smartphone and the main circuit which is Arduino Board that connecting with the RF transmitter module. This Bluetooth device is connected to the circuit which sends code for respective command sent by user. Then the respective device connected to the circuit will be turned on or off for 240V appliance. Radio frequency (RF) technology will be used to communicate between the Arduino Board and the sub module (appliance). This project use basic 4 Android to programmed Android application.

1.2 Problem Statement

There are many home appliances in our living space, need to make them intelligent so as to make living life more safety, convenient and comfortable for users especially for older and disabled people who more reliance on home care. If the area of home is bigger, it is not easy to control home appliances at different location in the home. It will be wasting time and energy to controls all home appliances. Many electrical switches and devices need to control all the home appliances. Many electrical switches and device need to control all the home appliances causes higher cost in hardware wiring. For the controller, need to have wiring, so that it will make more cost. Sometimes many home appliances also cause waste electricity if users forget to switch off the electrical device.

1.3 Objective

The objectives of this project are:

1. To design a smart home appliance control system.
2. To design master slave communication module.
3. To understand the basic concept of design interface by using Basic4Android software.

1.4 Scope Of Project

The scope are listed to ensure the project is conducted within its intended boundary. Scope is useful to ensure the project is heading in the right direction to achieve the goal. The scopes of this project are to study the basic of Android from several published papers and books and also study the code use to control the appliances such as lamp. The main focus of this project is to apply what already learned about the Android application. The parameters for this project can be classified as:

1.4.1 The Basic Concept of Android Application

In this project, Android application is use to control home appliance. Android is a software bunch comprising not only operating system but also middleware and key applications. Android applications are composed of one or more application components (activities, services, content providers, and broadcast receivers).

1.4.2 The Basic Switching of the Appliance

From the Android phone, the user can send the command through Bluetooth module and the data will be forward or send to the Arduino board. Arduino board will trigger

the switch in the RF transmitter module, when RF receiver module will receive data, it will trigger the relay in order to switch on the lamp.

1.4.3 The Software Used to Program Android Device

This project is use Basic4Android software to program Android device. Basic4 Android can be used to design interface on the Android phone. The code used in basic4 Android is simple and the language used is visual basic

1.4.4 Development of Master/Slave Controller Module

Master controller module consist of Arduino board which is connected with RF transmitter circuit. RF transmitter is used with the encoder PT2262. The slave controller module consist of RF receiver module with decoder PT2272 will be connected with the relay circuit and 240V appliance.

1.4.5 The Other Technologies Used to Communicate Between Android Phone and the Master Module

In this project, Bluetooth is use to communicate between Android phone and the master module. By using Bluetooth module HC05, the Android phone can send data/command to Arduino board.

1.5 Project Methodology

Project methodology is an important part where it is show the step of the project to be complete. The objectives must be achieved to obtain a successful outcome in this project. Project started with having discussions with supervisor, then study the project have been designed by other company or person. For the following stage, all the information related to hardware and software components information is seeking and the most suitable would be selected for used in this project. If the output of the system did not fulfil the desired output, so the troubleshooting would be carry out until it reaches the project requirements. Flow chart for this project is shown on the chapter 3.

1.6 Thesis Structure

Chapter 1:

The first chapter introduces brief idea of the project. It focused on the overview of the project, detailing the objectives, the problem statement, scope and outcome of the project.

Chapter 2:

Projects background is discussed in this chapter. The method concept, theory, and some characteristic of component of hardware that used in this project is discussed in this chapter. This chapter also contain a definition of term used in this project also discusses the concept of the research and how it related with the theory.

Chapter3:

This section is methodology chapter. Methodology chapter is a schedule or steps that need to be complete, detailed reports of studies done to achieve aim objective. This chapter explains the procedure taken to complete the project. It consist the detail development of this project.

Chapter4:

The chapter four is about the result and discussion that we obtain based on the methodology that we used. All the simulations, data collection and analysis obtained were discussed in detail. The results were compared with the outlined objectives in order to state some hypothesis and conclusion.

Chapter 5:

The chapter five is about the conclusion and future work. In this section, we will conclude what we have done and followed by some recommendation on how to improve the performance of the system based on the desired results.

CHAPTER 2
LITERATURE REVIEW

In order to make this project successful, some studies and information has been done. The information is fetching from many sources such as books, articles, journals, and internet. All of this information is very useful as a guide in doing this project. This studies of information based on some major component and topic that related to the project that will be used in the project such as hardware and software.

2.1 SOFTWARE PART

2.1.1 BASIC4ANDROID Software

World is contracting with the growth of mobile phone technology. As the number of users is increasing day by day facilities are also increasing. Starting with the simple regular handsets which were used just for making phone calls, mobile have changed our lives and have become a part of it. Now, they are not used just for making calls but they have innumerable uses and can be used as a camera, music player, tablet, and PC, TV and web browser (Cook, 2012) and with the new technologies, new software and operating system are required. Android is a powerful operating system supporting a large number of applications in smartphones. These applications make life more comfortable and advanced for the users.

Therefore, Basic4Android is used to develop an Android apps that use window-based development environment where it use a familiar programming languages and simple

interface software while it also used Windows-based package that's modelled on Visual Basic (VB). Basic4Android (B4A) software as shown in Figure 2.0 is the simplest and most powerful rapid application development (R&D) tool available for the Android platform. It not quite but it is much easier than diving straight into Eclipse and Java and much closer to the native Android way of doing things.

Figure 2.0: Basic4Android Software

In this project, Basic4Android software is used to make an interface to the Android phone. Figure 2.2 shows the example of designing interface by using Basic4Android software.