



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF BLUETOOTH HOME REMOTE
SWITCHING BASED ON ANDROID APPLICATION**

This report is submitted in accordance with the requirement of Universiti Teknikal
Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology
(Industrial Electronic) with Honours

by

SITI NASHAYU BINTI OMAR

B071310693

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No.1301 Lorong 45 Taman Ria

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AHMAD NIZAMUDDIN BIN MUHAMMAD MUSTAFA
Pensyarah
Jabatan Teknologi Kejuruteraan Elektronik dan Komputer
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I hereby, declared this report entitled “DEVELOPMENT OF BLUETOOTH HOME REMOTE SWITCHING BASED ON ANDROID APPLICATION” is the outcomes of my own research except as cited in references.


Signature : 

Author's Name : Siti Nashayu binti Omar

Date : 23/1/2017

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 Electronic Engineering Technology (Industrial Electronic) (Hons.). The member of the supervisory is as follow:

Signature : 

Supervisor Name: Mr Ahmad Nizamuddin bin Muhammad Mustafa

Date : 23/1/2017

ABSTRAK

Kawalan Pensuisan Rumah Bluetooth berdasarkan Aplikasi Android direka untuk sistem rumah yang akan dilengkapi dengan teknologi terkini. Dalam projek ini, Arduino akan bertugas sebagai unit kawalan induk sistem keseluruhan. Idea utama adalah untuk membangunkan satu sistem lampu kawalan pintar untuk rumah dengan menggunakan telefon pintar dan juga secara tanpa wayar. Untuk analisis sensor pengesanan manusia akan digunakan untuk mengesan manusia di sesuatu tempat di dalam rumah. Pengguna boleh BUKA dan TUTUP lampu dengan menggunakan telefon pintar mereka dengan perantaraan Bluetooth. Teknologi Bluetooth digunakan sebagai platform untuk berkomunikasi antara peranti Android dan Arduino.

ABSTRACT

Bluetooth Home Remote Switching Based on Android Application is designed for the home system that is equipped with the latest technology. In this project, Arduino board played the role of the master control unit for the whole system. The main idea is to develop a smart controlling lamp system for home by using a smartphone and also wirelessly. For the analysis, human detection sensor is used to detect the presence of people in the house. Users can switch ON and OFF the lamp by using Bluetooth on their smartphones. Bluetooth technology is used as the medium to communicate between the Android device and Arduino Microcontroller.

DEDICATION

To my beloved parents, Mr Omar bin Din and Mrs Rubiah binti Kaus who always inspiring me along the process of completing the project.

To my respected supervisor, Mr Ahmad Nizamuddin bin Muhammad Mustafa, thank you for all the guidance in this project.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMECLATURE

PWM	-	Pulse Width Modulation
AC	-	Alternating Current
DC	-	Direct Current
GND	-	Ground
NC	-	Normally Close
NO	-	Normally Open
COM	-	Common
RX	-	Receiver
TX	-	Transmitter
APP	-	Application
PIR	-	Passive Infra-Red
IR	-	Infrared
OS	-	Operating System
PAN	-	Personal Area Network
LAN	-	Local Area Network
WAN	-	wide Area Network
WLAN	-	Wireless Local Area Network
GUI	-	Graphical User Interface
BT	-	Bluetooth
TTL	-	Transistor-Transistor Logic
V	-	Voltage

kB	-	kilobyte
mA	-	miliAmpere
IDE	-	Integrated Development Environment
MIT	-	Massachusetts Institute of Technology

CHAPTER 1

INTRODUCTION

1.1 Background

The past era has shown significant development in the arena of smart devices. Several smart device such as mobile phones, tablets and iPad have become convenience universal tools in routine life. Their versatilities are created on their computing power, their combination with other devices and services. Ever since the development of mobile applications has attracted more developers into the market, Android has become the topic of interest in the education environment. The growing popularity of Android has made it interesting platform nowadays. However, these smart devices have an even comprehensive usability range. For instance, they can be used for wireless industrial measurements with existing sensors.

Next, the wireless communication technology has become an integral part of several types of communication devices as it allows users to communicate even from isolated areas .One of the examples of wireless communication technology is Bluetooth Technology. The wireless connectivity of existing industrial sensor is accomplished by completing them with a Bluetooth module, which digitizes the data and transmit it to any Bluetooth capable smart device for advance processing, evaluating and logging.

1.2 Problem statement

People are chasing ever-growing high quality of their lives today. There are many home appliances in our living space, therefore we need to make them more intelligent so as to make living life more safely, convenient and comfortable for users

mainly for elders and disabled who have more reliance on home care. They need to control and manage these versatile facilities and appliances in a house and control any sort electrical appliances provided with remote access from smart phone. Generally, original wall switches are located in different place of a house, thus require the need of manual operations like pressing to switch it on or off. It becomes very problem for the elderly or physically handicapped people to operate them. This study is focusing on the elderly or physically disabled to make they live comfortable. For example, if a person is distress from a disability from leg up to the waist, especially those who use wheelchairs, they cannot reach the switch inside the house. With the array of this project, it is easy for people like this to control the use of electricity without the need to walk far to find the light switch in the house.

Previous studies have reported that, among the problems faced by disabled Malaysians are the lack of disabled-friendly facilities, for example, the house lighting switch design that is placed at a height of 1500mm where this situation is difficult for the disabled to switch it on when they are using wheelchair, due to the comfortable height to raise hand when sitting on the wheelchair is 1300mm. So, in this project, we propose a system by upgrading the switching system in the house by using android applications and wireless communication technology such as Bluetooth (Ramlee et al. 2013).

1.3 Objective

1. To study the interface of Home Switching and Android Application.
2. To design the android interface by using software for Android.
3. To demonstrate the android application interface with the switching functionality.
4. To analyse the input received from android device based on the sensor used in every room in the house area.

1.4 Project Scope and Limitations

Smart home system improves the living standards and also helps the elderly and disabled people to control the electrical system in the house. Home automation has highly advanced automatic systems for lighting, temperature control security, appliances and many other functions.

The “Bluetooth Home Remote Switching” is one of realization of Smart Home ideals using specific set of technology. The project scope and limitations in this project is focus to control the switching the lights in the house by using smart phone and Bluetooth technology. Then, make the analysis by using sensor. The parameters for this project can be classified as:

1.4.1 Mobile Operating System

Mobile operating system is known as Mobile OS. This operating system can also be used in PDA, Tablet, Smartphone and etc. Mobile Operating System consists of Android OS, iPhone OS, Symbian and Windows Phone 7Series (Wukkadada et al. 2015).

The mobile operating system that will be used in this project is android OS. It will be used to control the homes “ON” and “OFF” switches of the lamp. Android OS is chosen because android is a freeware operating system develop by using Linux compared to iOS which is not a freeware utility. Furthermore, iOS is fully based on Unix platform. Android is a user friendly device because it supports an open source which makes it easy to be download to any application that can be installed on any android compatible devices as well as on Computer. Moreover, the app software that support android is cheaper compared to iOS.

1.4.2 Wireless Communication

Wireless Communication is one of the vital mediums of transmission of data or information to another device. The communication is set and the information is transmitted over the air, without requiring any cable, by using electromagnetic waves. Wireless communication technology becomes an important part of several types of communication devices as it allows users to communicate even from a remote area. Example of types of wireless communication technologies are Wi-Fi, Bluetooth, Zig-Bee and etc.

In this project, the wireless communication technology will use Bluetooth Technology. Bluetooth will be used to communicate between Android and Controller Module. Since, the scope of this project, to apply in the house. It is suitable to use Bluetooth Technology that can cover a short range communication. By comparison, the range of Wi-Fi and Zig Bee are of larger range. It is suitable to be used in the office, campus and etc... Bluetooth also can connect to a variety of different electronic devices (Parmar 2014). Details about Bluetooth technology will be discussed in the next chapter.

1.4.3 Human Detection Sensor

In this project, human detection sensor will be used for analysis to detect the presence of a human in the house within a certain range. Human detection sensor will be placed in every room in the house. Details about human detection sensor will be discussed in the next chapter.

1.5 Project Methodology

In this project, the methodology started by discussing with the supervisor, then studies of the project have been designed by other person. For the following

stage, all the information related to software and hardware components are gathered by researching in various sources.

In this project, Android OS will be used. An application should be installed on the Android smartphone to control lamp in the house area. User can control the home system by using mobile application.

Wireless communication technology used in this project is Bluetooth technology. Bluetooth as a platform to transfer and receives a command information. In this project, the Bluetooth module is used to make a connection between the smartphone and the main circuit which is Arduino Microcontroller. This Bluetooth module will connected to Arduino Microcontroller. Next, it will send codes for particular command. Then, the respective device connected to the circuit can be turned “ON” or “OFF” the lamp by using Smart Phone.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, we will highlight the hardware part such as Arduino Microcontroller, Bluetooth Technology, Sensor and Relay through the review research and references from the current existing projects. Other than that, the comparison each components also will be discuss in this chapter.

2.2 Literature Review Current Existing Project

2.2.1 Design of Small Smart Home System Based on Arduino

This project was done by Andi Adriansyah and Akhmad Wahyu Dani from Mercu Buana University. The objective of this project is to utilize WLAN network based on Arduino Uno microcontroller to create and design a Small Smart Home System. By using this system, the lights, room temperature, alarm and other household appliances can be controlled and monitored. Result from this testing the system show the proper control and control monitoring function can be performed from a device connected to a network that support HTLM5 (Adriansyah & Dani 2014).