



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**SMART CONTROLLED ELECTRICAL APPLIANCES VIA
BLUETOOTH**

This report submitted in accordance with requirement of the Universiti Teknikal
Malaysia Melaka (UTeM) for the Bachelor's Degree in Electrical Engineering
Technology (Hons)

by

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I hereby, declared this report entitled “Smart Controlled Electrical Appliances Via Bluetooth” is the results of my own research except as cited in references.

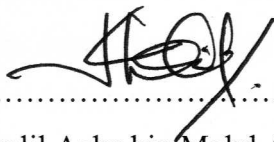
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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Power). The member of the supervisory is as follow:



.....
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ABSTRAK

Pada masa kini, keinginan memiliki rumah merupakan satu keperluan asas bagi sesebuah keluarga. Teknologi “rumah pintar” menjadi satu nilai tambah terhadap sesebuah nilai rumah itu. Pada zaman moden ini kesedaran tentang keselamatan, keselesaan dan keberkesanan penggunaan perkakas rumah menjadi pilihan utama kepada pembeli. Mereka bentuk “rumah pintar” mempunyai kos yang rendah sangat diperlukan dalam memasarkan sesebuah produk. Ini akan meningkatkan keselamatan, keselesaan selain dapat juga menjimatkan tenaga kepada pengguna. Menggunakan peralatan pintar dalam mengawal peralatan perkakas elektrik adalah lebih mudah. Projek ini dilakukan dengan mereka bentuk suis pintar dengan cara mengawal suis secara wayerles menggunakan telefon pintar dengan jarak jauh menggunakan teknologi bluetooth. Projek ini dibangunkan dengan menggunakan peralatan seperti Arduino Uno yang digunakan untuk mengawal segala aktiviti didalam rumah tersebut. Penambahan Bluetooth module perlu dilakukan supaya mendapat menghubungkan sambungan dengan telefon pintar dan main board. Para pengguna akan dapat mengawal peralatan rumah melalui telefon pintar walau pun berada dimana mana berada di kawasan rumah. Kenaikan kadar elektrik dan kadar jenayah yang semakin meningkat akan membuat pengguna lebih menekankan untuk memilih rumah pintar sebagai salah satu senarai yang patut ada pada kediaman yang mereka inginkan

ABSTRACT

Nowadays the desire to have own house is a basic requirements for a family. Intelligent house technology becomes a added value a house. In the modern era awareness about safety, comfort and effectiveness of the use of household appliances option to purchase the house. To design “smart home” low cost houses it very important to marketing this product. This system will improve the safety, comfort In addition it can also saves energy to consumers. Using smart appliances in control smart appliances it will make easier. This PSM have designing smart switch by wireless control using Smartphone with remote using Bluetooth technology. This project was developed using equipment such a Arduino board. It used to control all activities in the house. The addition of Bluetooth module needs to be added so that gets connection between Smartphone and main board. The users will be able to control home devices via Smartphone’s are everywhere even in the area of the house. The increase in electricity and crime rates will make consumers more emphasis to select smart home as one that should be on the list of homes they want.

DEDICATION

I dedicate to my parents and all the friends. Firstly I fell very lucky because get supported from my parent helping me in term financial, to buy some equipment and material to finish this project. I also proud get help my brother give moral support and idea and solution went I in a problem. I dedicate this work and special tank to Irfat, Din and Halim the my friend as help to together to complete this project.

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

PIC	-	Peripheral Interface Controller
VCC	-	Supply Voltage For A Circuit
IBM	-	International Business Machines
LAN	-	local area network
TX	-	Transmit
RX	-	Receive
HCI	-	Host Controller Interface
DC	-	Direct Current
MCU	-	Microcontroller Unit
I/O	-	Input Output

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CHAPTER 1

INTRODUCTION

1.1 Background

Standard Bluetooth technology appear at first when Ericsson Mobile Communications conducted a survey to find low power and low cost radio interface between mobile phones and their accessories. This study shows that short-range radio link solution can be implemented. Develop techniques and to gain broad market support, Ericsson, along with Intel, IBM, Toshiba, and Nokia Mobile Phones forming Special Interest Group (SIG) in 1998. Group is to establish a standard for the air interface and software control it, such as to achieve interoperability between different devices from different manufacturers.

The motivation of this PSM is to demonstrate the use of Bluetooth technology in access control applications. A specific application would be to turn off and turn on electrical equipment at a location.

At present, most access control solutions implemented through the use of conventional technologies, such as bar-coded swipe card and pin access code number. With the introduction of new mobile devices with Bluetooth, it is possible to replace older technology with access control applications developed using Bluetooth technology, enabling access control to be communicated in a wireless fashion. Because Bluetooth is a relatively new technology, not many Bluetooth applications

have been created. So write Bluetooth software systems will be a challenging, but exciting for our final year project.

1.2 Problem Statement

Currently, most access control solutions have been done use the conventional technologies, such as bar-coded swipe cards, and access pin numbers. To improve lifestyle in the modern era and more security make the Intelligent house technology is an option to users. To make low cost system is very important in era increasing cost of living. Bluetooth allows the development of wireless access control applications. Our project attempts to demonstrate the use of Bluetooth technology in access control applications. Our proposal has selected one particular application, which is described below. When someone wants to get into bed and forgot to turn off the lights or any other equipment, this allows someone is annoys to get out of bed and one place to another place to see the switch to ensure switches turn on or turn off. Other that control this method can make user more safety from electrical shock.

1.3 Objective

- i. To develop system to a control electrical appliances
- ii. To use Bluetooth Module as a communication to control system
- iii. To design graphical user interface (GUI)

1.4 Project Scope

- i. Build this project that can be configured using headphone through Bluetooth
- ii. Using Arduino communicate Bluetooth Module
- iii. Can control Electrical Appliances via Bluetooth example: lamp, aircond, fan
- iv. GUI using MIT2 app inventor

CHAPTER 2

LITERATURE REVIEW

This chapter will discuss the literature review of the home system. What will discuss is the technical terms and operation that have been used and it will help to enable and understand the term used.

2.1 Introduction

A literature review is an account of what has been published on a topic by accredited scholars and researchers, in terms of definition is a review of the research that has been made about a particular problem that has been identified and needs to be answered. It is done to investigate the understanding of the project and to identify what the main issues are. This study should describe, summarize, evaluate and clarify the project. It also goes beyond finding and include the identification and articulation of the relationship between literature and field research.

This study can be done through books, journals, websites, and other reports. From these sources, the literature review should be conducted in the vicinity of and related to the thesis and the results need to be synthesized into a summary, this is important to intend that we are able to define the main terms that will be used In addition, the questions that need further research are also summarized here. The term 'wireless' that has gained much attention recently to make a Bluetooth device to be more popular. Thus, come an idea of having a Controlled Electrical Appliances via Bluetooth

2.2 Bluetooth

This literature review will discuss about how to connection appliance between devices and how to connection and it work.

2.2.1 Bluetooth Method

From Forum Nokia Online, (April 2003) Bluetooth is a radio technology that allows short-range wireless connections between mobile devices. Bluetooth have three main objective why are they created. First small size, minimal power consumption (low energy usage), and not very expensive. This technology was why are they created to be simple to use.

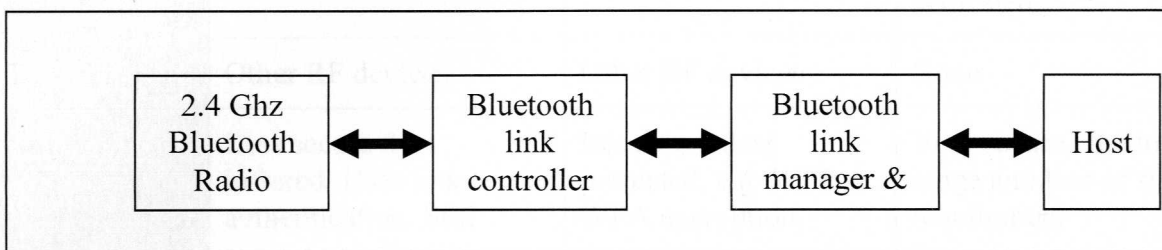


Figure 2.1 Bluetooth system blocks

To operates Bluetooth RF transceiver it use the unlicensed ISM band centered at 2.4 gigahertz. Bluetooth system made up from a link control unit, radio unit and a support unit for management link functions and host terminal interface (see Figure 2.2). Host Controller Interface (HCI) is a way for the host device to access the Bluetooth hardware capabilities. One some example, a laptop can be a host device and a PC card is inserted into a PC Bluetooth device through the HCI interface. [3]

Text

2.2.2 Strengths

The following table compares the Bluetooth radio to wireless LAN and infrared. These three technologies are the most commonly used in many of today's wireless applications. Each of them has their own set of advantages and disadvantages, and this makes each of them suitable to certain applications

Table 2.1 Different between infrared, Bluetooth and WiFi

	Bluetooth	Wireless LAN	Infrared
Typical Range	Medium (10 m)	Long (100 m)	Short (1 m)
Line-of-sight	No	No	Yes
Bandwidth	1 Mbps shared	11 Mbps shared	115 kbps & 4 Mbps dedicated
Interference	Other RF devices	Other RF devices	None
Security	Less secure than infrared. Uses link layer authentication. Still requires application layer security.	Insecure unless protected. e.g. WEP & WPA encryption	Very secure, due to range and line of sig requirement
Power Consumption	High. Needs to maintain a connection	Very high. Needs to maintain a connection.	Low. No constant connection like wire radios.

The main characteristics of Bluetooth which makes it ideal for use with our project are:

- i. Low price.
- ii. A little electronic component
- iii. Low power consumption
- iv. Can be upgrade

2.2.3 Bluetooth Configuration

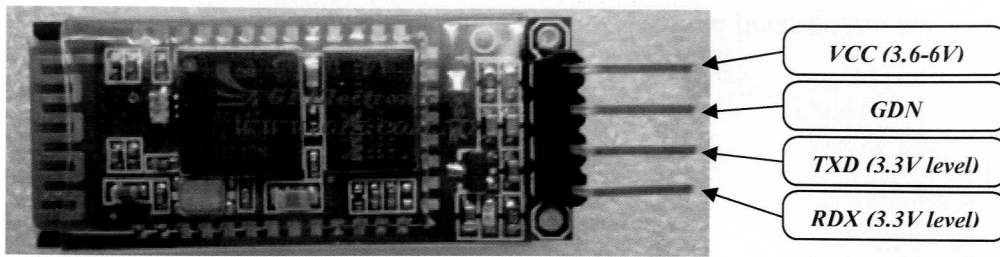


Figure 2.2 Bluetooth Module

Specification:

- i. Wireless Bluetooth serial pass-through
- ii. Operating Supply Voltage: **+3.6V ~ +5V**
- iii. Current : 30mA (before matching), 10mA(after matching)
- iv. Bluetooth V2.0 protocol standards
- v. Interface: VCC, GND, TX, RX
- vi. LED blinking: means no bluetooth connection
- vii. LED stay on: means connected and port was opened
- viii. Works as bluetooth slave device

2.3 Arduino

Arduino is a tool for making computers that can sense and control more of the physical world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs. Arduino projects can be stand-alone, or they can communicate with software running on your computer (e.g. Flash, Processing, MaxMSP.) The boards can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free.

The Arduino programming language is an implementation of Wiring, a similar physical computing platform, which is based on the Processing multimedia

programming environment. The boards can be built by hand or purchased preassembled; the software can be downloaded for free. The hardware reference designs (CAD files) are available under an open-source license, you are free to adapt them to your needs.

2.3.1 AtMega 2560

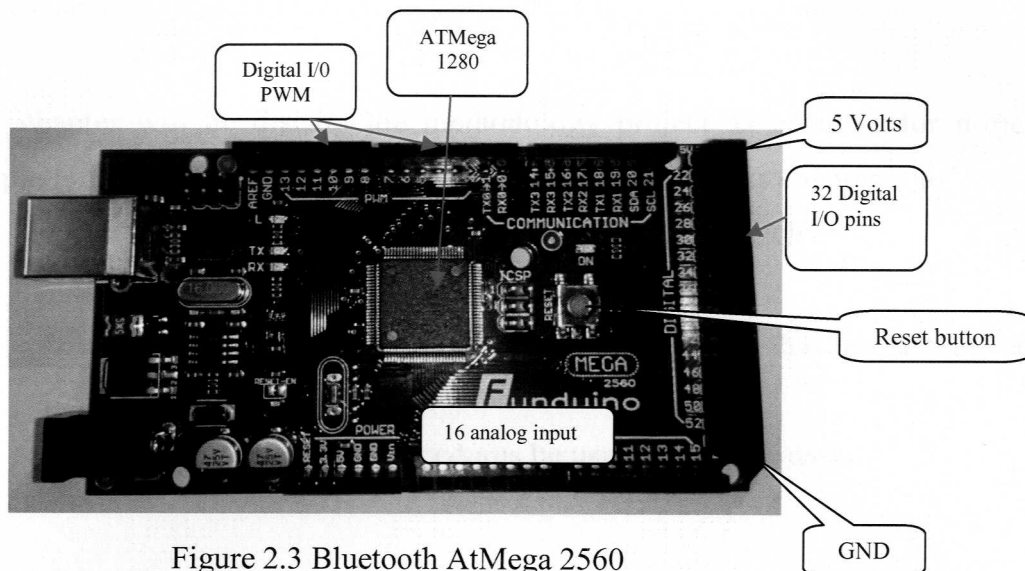


Figure 2.3 Bluetooth AtMega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila. The Mega 2560 is an update to the Arduino Mega, which it replaces. The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the ATmega16U2 (ATmega8U2 in the revision 1 and revision 2 boards) programmed as a USB-to-serial converter

CHAPTER 3

METHODOLOGY

This chapter will be discuss the methodology project as a whole for project completion according to the requirement. For purpose of this chapter is to

- i. describes the investigation methodology of this research
- ii. describe the sample selection
- iii. describe the procedures used in the design of the instrument and collecting data
- iv. explain of the statistical procedures be used to analyze data

3.1 Steps Procedure Development Project

Figure 3.1 illustrates the process of developing this project. The early process is definition phase. This step involves a process of literature review discovery of using different sources such as journal website, and books analyzed in a proper manner. In addition, the specification of components identified. The aim of the study conducted in the definition phase to ensure that the project objectives can be achieved. Hardware development is divided into two sections, namely the development of circuits, programming and mechanical development. Development begins with a combination of circuit electronic circuits. This step is essential to include a starting point in the circuit design to create the necessary systems

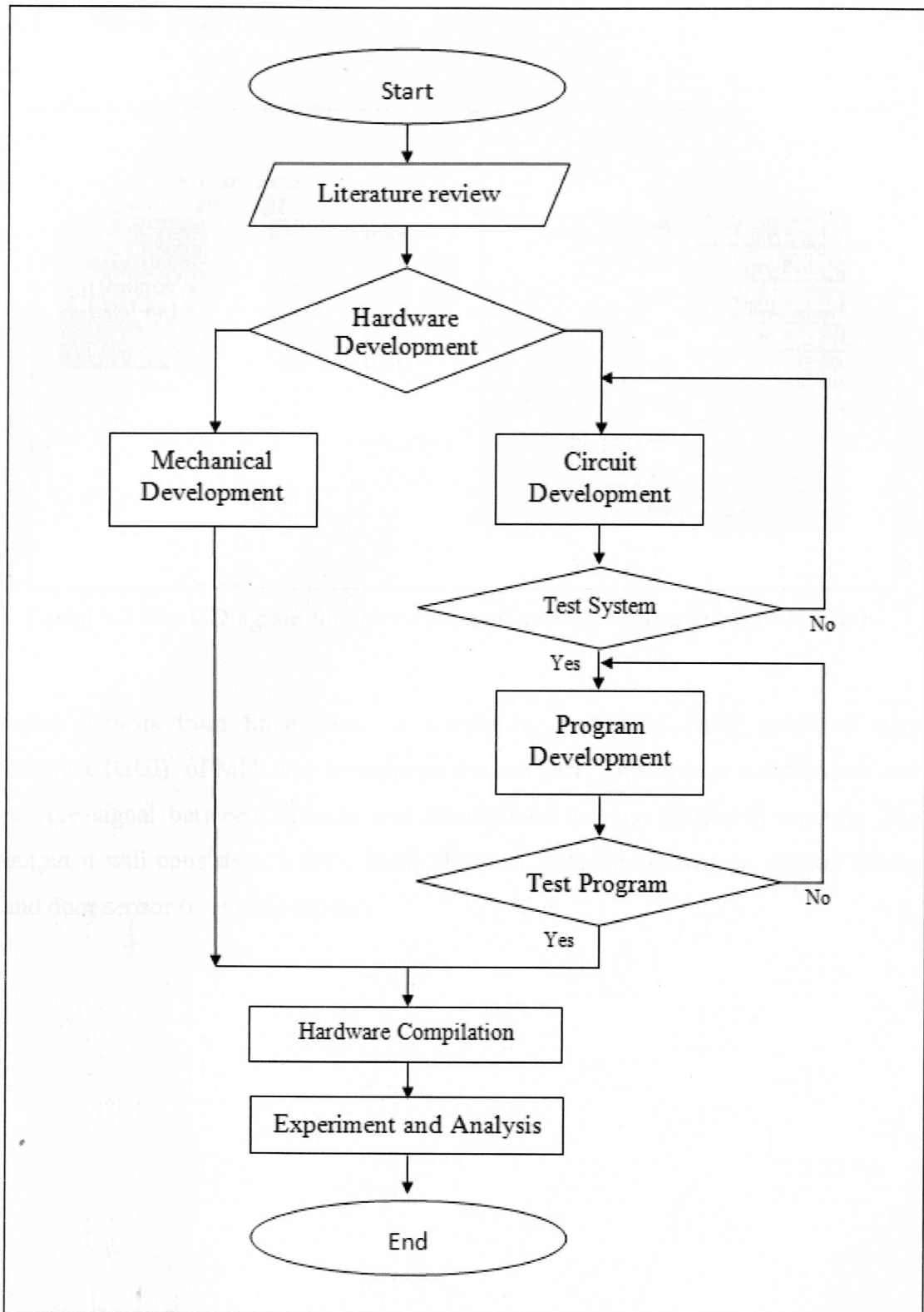


Figure 3.1 Project Flow Chart

3.2 Block Diagram

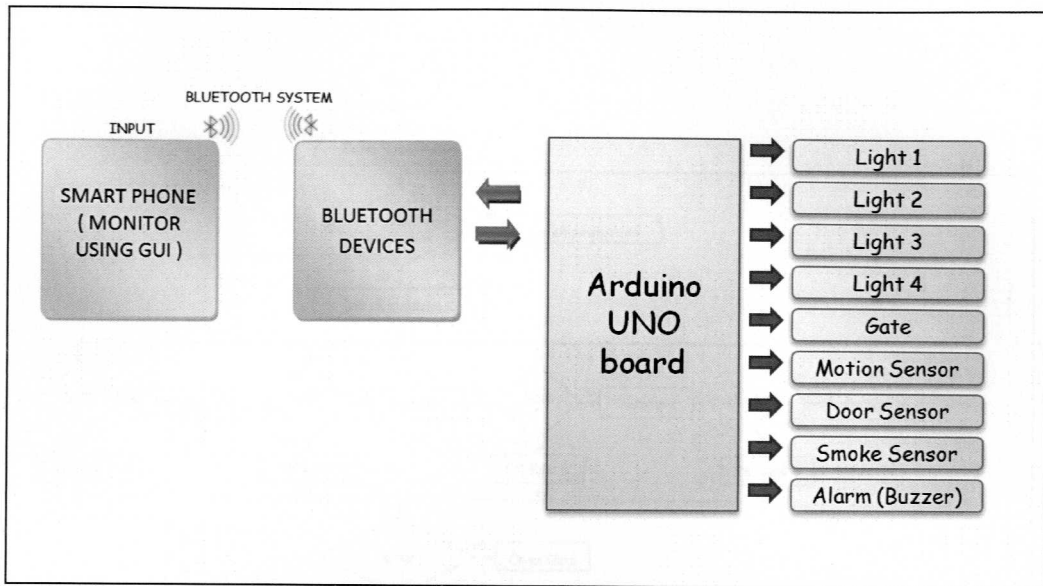


Figure 3.2 Block Diagram for Development Controlled Electrical via Bluetooth

Input consists from Smartphone is monitoring system by using graphical user interface (GUI) of MIT App Inventor as the software. This system will transmit and receive signal between Arduino and Smartphone through Bluetooth module. The output it will consists is a light, alarm (buzzer), gate, smoke sensor, motion sensor and door sensor (magnetic sensor).