

SMART MAIL BOX

MUHAMMAD AZHAR BIN ZULKAFLI

(10DEP15F1107)

MOHAMAD AMIRIZZUDDIN ASYRAF B. MOHAMAD AZHAR

(10DEP15F1016)

MOHAMAD KHAIRUL NAAIM BIN HASHIM

(10DEP15F1095)

DIPLOMA KEJURUTERAAN ELEKTRONIK (KOMUNIKASI)

JABATAN KEJURUTERAAN ELEKTRIK

POLITEKNIK SEBERANG PERAI

JUN 2017



**POLITEKNIK SEBERANG PERAI**

**PULAU PINANG**

**JABATAN KEJURUTERAAN ELEKTRIK**

**SMART MAIL BOX**

“I / We hereby declare that I have read this thesis and in my / our \* opinion this thesis is sufficient in terms of scope and quality for the award of the Diploma in Electronic  
(Communication Engineering)

Signature:.....

Supervisor: TUAN HAJI MOHD SHOHIMI BIN MAT ISA

Date: 1/11/2017.....

**SMART MAIL BOX**

**BY**

**MUHAMMAD AZHAR BIN ZULKAFI**

**(10DEP15F1107)**

**MOHAMAD AMIRIZZUDDIN ASYRAF BIN MOHAMAD AZHAR**

**(10DEP15F1016)**

**MOHAMAD KHAIRUL NAAIM BIN HASHIM**

**(10DEP15F1095)**

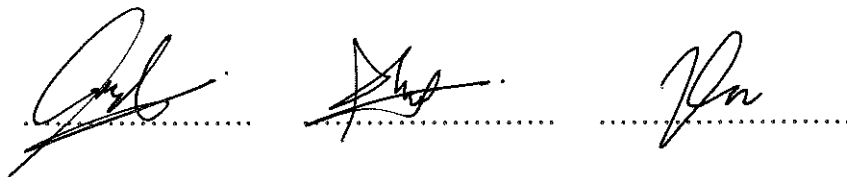
**A proposal project submitted in fulfillment of the requirement for the award of the Diploma of Electrical Engineering (Communication) Department of Electrical Engineering Polytechnic Seberang Perai (PSP).**

**JUN 2017**

**PROJECT REPORT COMFORMATION**

We hereby declare that the work in this report are we except for quotations and summaries which have been duly acknowledged.

Student :

Three handwritten signatures in black ink, each followed by a dotted line for identification.

**MUHAMMAD AZHAR BIN ZULKAFLI**

**MOHAMAD AMIRIZZUDDIN ASYRAF BIN MOHAMAD AZHAR**

**MOHAMAD KHAIRUL NAAIM BIN HASHIM**

Date: 1/11/2017.....

Supervisor : .....

**TUAN HAJI MOHD SHOHIMI BIN MAT ISA**

*Dedicated to,*

*Thanks to Allah,*

*For give us a good health and strength while making this report.*

*, My beloved father and mother,*

*Who has always been our epitome of love and always pray for our strength to finish up this report.*

*Our beloved relatives,*

*Our siblings,*

*Thank ypu for your support and pray.*

*The person who has been very understanding and helpful,*

**TUAN HAJI MOHD SHOHIMI BIN MAT ISA,**

*For the support and guidance. Hope that us always be remembered.*

*Our unforgettable friends,*

*Our housemate, our coursemate and all DEP students intake June 2015,*

*Our struggle not yet ends.*

*Finally, friends that always together during this third years study, Hopefully achieved what we aspired.*

## ACKNOWLEDGEMENT

First and foremost I would like to take this opportunity to express my gratitude to everyone who supported me throughout the course of this project. I would like to say a gratitude to our supportive supervisor, Tuan Haji Mohd Shohimi Bin Mat Isa for his aspiring guidance, invaluable constructive criticism and friendly advice during the project work. A sincerely grateful to him for sharing his truthful and illuminating views on a number of issues related to the project.

Other than that, I would like to express gratitude towards my parents, and my colleague for kind encouragement, co-operation and their willingness to help me out which help better in completion of this project.

It would not have been possible without the kind support and help of many individuals and organizations. I would like to extend our sincere thanks to all of them.

## **Abstract**

The 'Smart Mail Box' project aims to let users know the existence of letters in their mailboxes. The project will generate a sound signal immediately when the letter is entered in the mailbox. With this project the user does not have to bother to check the mailbox every day. The project consists of 2 circuits, the 'LDR Sensor', and the Motor DC with Bluetooth Module. The LDR circuit is used as a light sensor in the letterbox because when the letter is inserted the light that is displayed on the circuit will be blocked and the signal will be given to the LDR circuit to produce a sound through the buzzer. The Motor DC circuit is used to control the mailbox with Bluetooth applying on a mobile phone. The time taken for their whole circuit is within 4 months. This is because the first, second and third attempts fail because the circuit is not working properly. Using Proteus 8 to create a schematic circuit and see the function of the circuit. After that, use the project board as the first step for circuit testing. After working, use the Printed Circuit Board (PCB) as the next step. While in the process of setting up the circuit, the former to place the circuit is also set up like a letterbox and a robot to control the mailbox.

## **Abstrak**

'Projek Smart Mail Box' bertujuan untuk pengguna mengetahui akan adanya surat di dalam peti surat masing-masing. Projek tersebut akan menghasilkan isyarat bunyi dengan serta merta apabila surat dimasukkan di dalam peti surat. Dengan adanya projek ini pengguna tidak perlu bersusah payah untuk memeriksa peti surat setiap hari. Projek ini terdiri daripada 2 buah litar iaitu litar 'LDR Sensor, dan Motor DC with Bluetooth Module. Litar LDR digunakan sebagai pengesan cahaya didalam peti surat kerana apabila surat dimasukkan cahaya yang dipancarkan kepada litar tersebut akan terhalang lantas isyarat akan diberikan kepada litar LDR berfungsi untuk mengeluarkan sesuatu bunyi. Litar Motor DC pula digunakan untuk mengawal peti surat dengan aplikasi Bluetooth pada telefon bimbit. Masa yang diambil untuk mereka keseluruhan litar adalah dalam lingkungan 4 bulan. Hal ini kerana percubaan yang pertama, kedua dan ketiga gagal kerana litar tidak berfungsi dengan baik. Menggunakan proteus 8 untuk mencipta litar skematik dan melihat fungsi litar tersebut. Selepas itu, menggunakan 'project board' sebagai langkah pertama untuk pengujian litar. Setelah berfungsi, menggunakan litar Printed Circuit Board (PCB) sebagai langkah seterusnya. Semasa dalam proses menyiapkan litar, bekas untuk meletakkan litar juga disediakan seperti peti surat dan robot untuk pergerakan peti surat.

## Contents

Abstract / Abstrak

Acknowledgement

### Chapter 1: Introduction

1.1 Introduction

1.2 Research background

1.3 Problem Statement

1.4 Objective of Study

1.5 Research Question

1.6 Scope of Study

1.7 Benefit of Study

1.8 Operation

### Chapter 2: Literature Review

2.1 Introduction

2.2 Theory

2.3 Previous Research

### Chapter 3: Methodology Research

3.1 Introduction

3.2 Step Preparation Project

3.3 Grant Chart

3.4 Week Planning

3.5 Usage of Fritzing Software

3.6 Process of The Circuit Designing

3.7 Etching

3.8 Drilling Process

3.9 Insert the component

3.10 Soldering



- 3.11 Circuit Testing
- 3.12 Project designation
- 3.13 Testing Component
- 3.14 Equipment
- 3.15 Component

#### Chapter 4 : Project Analysis And Discovery

- 4.1 Introduction
- 4.2 Test Project
- 4.3 Circuit Analysis
- 4.4 Troubleshooting
- 4.5 Testing of components
- 4.6 Components cost
- 4.7 Troubleshooting

#### Chapter 5 : Discussion And Conclusion

- 5.1 Suggestion
- 5.2 Conclusion

#### References

## **Chapter 1**

### **Introduction**

#### **1.1 Introduction**

In this globalization era, correspondence activity is still used by many people in our country but in other countries as well. Although the technology is growing, and letter post service is also very important that in the process of buying and selling, bank statements, statements of the company and others. Because these activities are still active in our country, we got an idea to create a product called 'Smart Mail Box'.

#### **1.2 Research Background**

This project is a simple but efficient mail notifier system is designed using Arduino and few other components. This system notifies the user whenever there is a mail and hence avoiding the need to check for mail frequently.

### **1.3 Problem Statement**

In this era when seen every home has a mailbox that is parking or whatever letter that important statement to the landlord. After making a few observations, we found that most residents are not aware of the postman sent letters to their mail boxes. Based on these observations, they are often busy working, while housewives were in the house to transact business in their home. Therefore, we created a product that is Smart Mail Box to alert residents if their mailbox has a letter.

### **1.4 Objective of The Study**

- to design the robot that can control the mail box.
- to design a simple mail alert system.
- to design the project to notify for users when their receive a mail.

In the construction and completion of the project there are a number of objectives used among users do not need to check their mailbox every day. In addition, residents also do not need to wait attendance postman to receive their mail. This is because, when the letter into the mailbox, the signal will be send a message to smart phone to inform residents about the existence of such content in their mailbox.

### **1.5 Research Question**

This study will answer the following research questions:

1. How far the Bluetooth can be detected by smart phone?
2. How loud is the buzzer sound?

### **1.6 Scope of Study**

The scope of this project is focused on 'Smart Mail Box' where it uses resources of 9v battery. Addition, Smart Mail Box using a wireless system has two circuits. First circuit is to alert that you have a mail. Second circuit is to control the mail box using an application of Bluetooth in your smart phone.

## **1.7 Benefit of Study**

Each project has their own benefit. If not, there is no use to do the project. The main important of this system notifies the user whenever there is a mail and hence avoiding the need to check for mail frequently. If we don't check our mail box regularly, we might miss the deadlines for payment of bills etc. They just need a smartphone on them. Besides, people only need a smartphone to control the mail box.

- Less risk to lost the letters in mail box
- very save and easy to used

## **1.8 Operation**

In this project, a simple mail alert system is developed using simple and cheap wireless communication devices. The aim of the project is to notify the user with a message whenever he/she receives a mail in their mailbox. Nowadays, people have smartphones with them all the time. So it makes sense to use these to control the mail box. Presented here is a smart mail box is using a simple Android app, which you can use to control the mail box. Commands are sent via Bluetooth to Arduino Uno.

## **Chapter 2**

### **Literature Review**

#### **2.1 Introduction**

This chapter will describe anything related to smart mail box, Bluetooth technology, Bluetooth module, Arduino and it will contain some examples to smart mail box projects.

## 2.2 Theory

Bluetooth sends and receives radio waves in a band of 79 different frequencies (channels) centered on 2.45 GHz, set apart from radio, television, and cellphones, and reserved for use by industrial, scientific, and medical gadgets. Don't worry: you're not going to interfere with someone's life-support machine by using Bluetooth in your home, because the low power of your transmitters won't carry your signals that far! Bluetooth's short-range transmitters are one of its biggest plus points. They use virtually no power and, because they don't travel far, are theoretically more secure than wireless networks that operate over longer ranges, such as Wi-Fi. Bluetooth devices automatically detect and connect to one another and up to eight of them can communicate at any one time. They don't interfere with one another because each pair of devices uses a different one of the 79 available channels. If two devices want to talk, they pick a channel randomly and, if that's already taken, randomly switch to one of the others (a technique known as spread-spectrum frequency hopping). To minimize the risks of interference from other electrical appliances (and also to improve security), pairs of devices constantly shift the frequency they're using—thousands of times a second.

A photoresistor (or light-dependent resistor, LDR, or photoconductive cell) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor is made of a high resistance semiconductor.

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

## 2.3 Previous Research

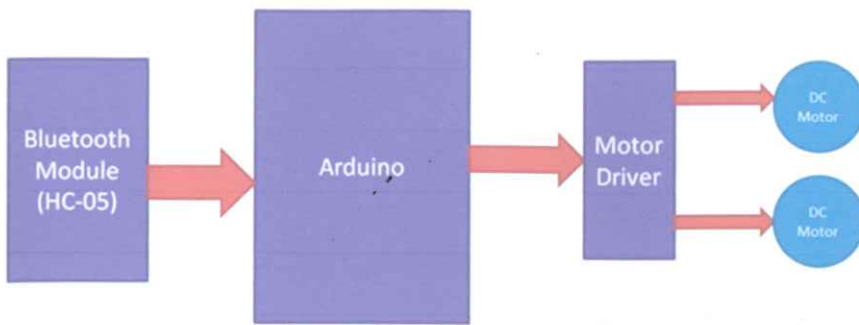


Figure 2.3.1 show how Bluetooth module connect with arduino to make the wheel rotate

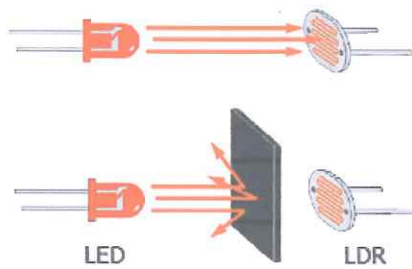


Figure 2.3.2 show how Laser trip

## CHAPTER 3

### METHODOLOGY

#### 3.1 Introduction

**Methodology** is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. It links to the steps and uses flow chart to see the flow of the project that have been done. 'Gantt' chart are also can be used to show all activities that have been done in the period in making the project.



### 3.2 Step Preparation Projects

Here is the sequence of process that need to be follow all the step to make the projects.

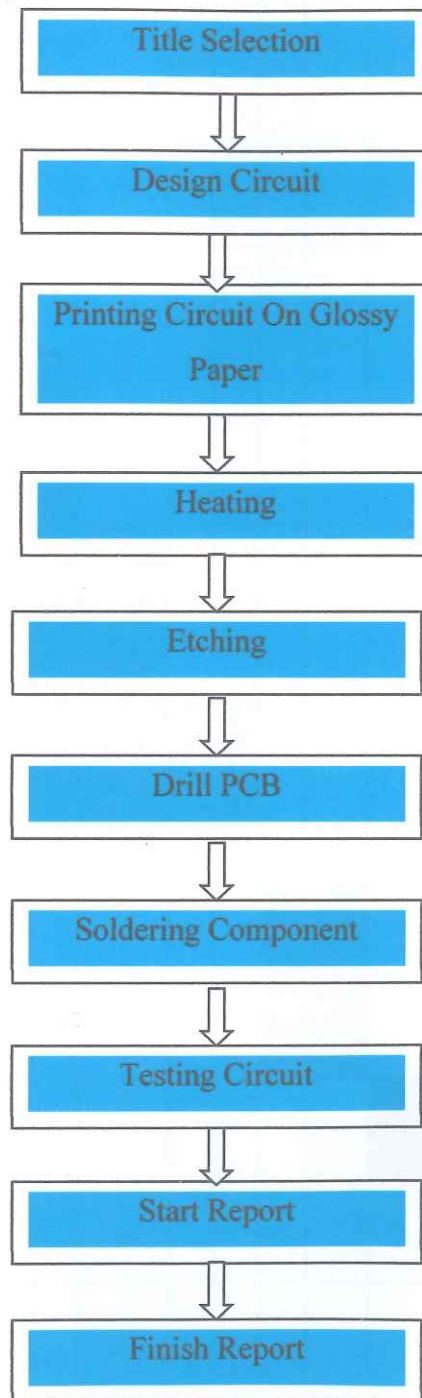


Figure 3.2 : Step preparation projects

### 3.3 Gantt Chart

ACTIVITY	WEEK																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Students Registration		■																
Project Briefing			■															
Submission of Project Title				■														
Assistance and Discussion				■	■	■												
Design circuit using proteus (New circuit)				■	■	■	■	■										
Troubleshooting									■	■								
Simulate									■	■								
Design ARES											■	■						
Etching & Soldering													■					
Testing															■			

Table 3.3 :  
Gantt chart  
Projects  
3.4 Week  
Planning

Progress The Project, Second Draft of The Report and presentation																				
Preparation for presentation																				
Presentation																				

Weeks	Planning
1	<p>Project Briefing</p> <ul style="list-style-type: none"> <li>- Implementation and evaluation procedures</li> <li>- Reporting format</li> <li>- Provide guidance and planning</li> </ul>
2	<ul style="list-style-type: none"> <li>- Discussion about project title</li> <li>- Design the picture of the project</li> </ul>
3	<ul style="list-style-type: none"> <li>- List the procedure of the making "Smart Mail Box" project</li> </ul>
4	<ul style="list-style-type: none"> <li>- Submission of Project Title</li> </ul>
5	<p>Assistance and Discussion</p> <ul style="list-style-type: none"> <li>- Identify the problem projects</li> </ul>
6	<ul style="list-style-type: none"> <li>- List the component that needed</li> <li>- Making comparison with the price of the component</li> </ul>

7-8	<ul style="list-style-type: none"> <li>- Design circuit using Proteus ISIS Professional software</li> <li>- Troubleshooting</li> <li>- Solve problem circuit</li> <li>- Simulate</li> <li>- Etching &amp; Soldering</li> <li>- Testing</li> </ul>
9 - 13	<ul style="list-style-type: none"> <li>- Build the project with step by step</li> </ul>
14	<p>Project Briefing</p> <ul style="list-style-type: none"> <li>- Implementation and evaluation procedures</li> <li>- Reporting format</li> <li>- Provide guidance and planning</li> </ul>
15	<ul style="list-style-type: none"> <li>- Making final report, pemplate and template</li> </ul>
16	<ul style="list-style-type: none"> <li>- Preparation for presentation</li> <li>- Receive and evaluate</li> <li>- Provision of equipment and presentation materials</li> </ul>
17	<ul style="list-style-type: none"> <li>- Presentation</li> </ul>

### 3.5 Usage of Proteus Software

PROTEUS 7 allows professional engineers to run interactive simulations of real designs, and to reap the rewards of this approach to circuit simulation. And then a range of simulator models for popular micro-controllers and a set of animated models for related peripheral devices such as PIC and LCD displays, resistor, and more. It is possible to simulate complete micro-controller systems and thus to develop the software for them without access to a

physical prototype. In a world where time to market is becoming more and more important this is a real advantage. Structurally, Proteus 7 Professional separated into two main components, which are ISIS 7 Professional and ARES 7 Professional. ISIS 7 Professional mainly involved on circuit designing and simulation. In my project I use Proteus to design a schematic diagram.

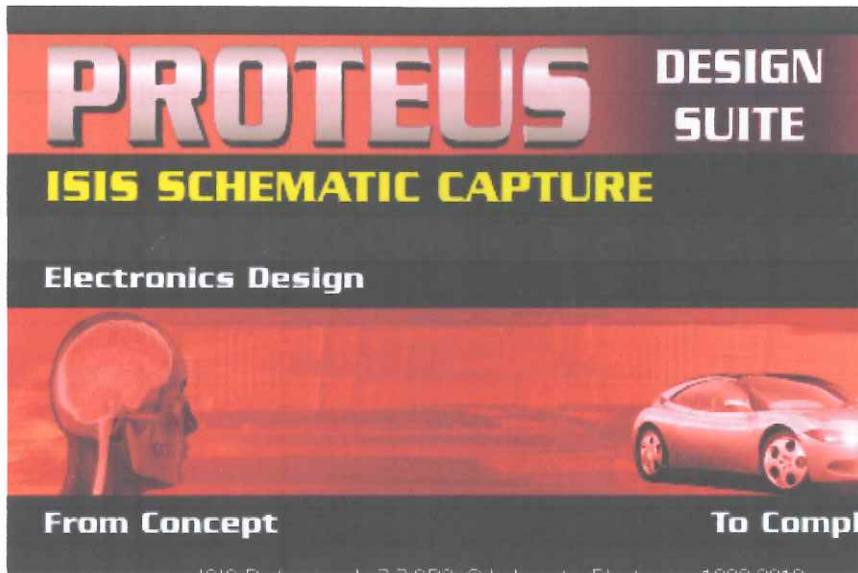


Figure 3.5 : Software Proteus

### 3.6 Process Of The Circuit Designing

#### 3.6.1 Design The Circuit Diagram

After decide what kind of project that want to build. I need to make a research about the circuit, electronic component that I need to used, hardware and so on. These things actually can help us to make a better in designing circuit. For example, I need to know the size, foot of