



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**‘YOU HAVE MAIL’ POST BOX CONTENT NOTIFICATION  
USING ZIGBEE**

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

by

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## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: 'You Have Mail' Post Box Content Notification Using ZigBee

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I hereby, declared this report entitled “You Have Mail Post Box Content Notification using ZigBee” 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 Engineering Technology (Telecommunications) (Hons.). The member of the supervisory is as follow:

.....

Nurulhalim Bin Hassim

(Project Supervisor)

## ABSTRAK

' Anda Mempunyai Mel Baru' peti surat Dengan Pemberitahuan Menggunakan ZigBee adalah satu sistem yang akan memberikan pemberitahuan melalui sistem tanpa wayar dan buzzer. Sebagai contoh, apabila surat dimasukkan ke dalam peti surat, buzzer akan menghasilkan bunyi untuk memberitahu pengguna kehadiran surat baru. Selain itu, peti surat terletak di luar rumah dan ini adalah untuk memudahkan posman menghantar surat. Di beberapa tempat seperti, apartmen, rumah flat dan kondominium, tuan rumah perlu seringkali berulang-alik ke peti surat untuk memeriksa peti surat dan mendapati tiada surat yang baru. Peti surat biasanya terletak di tingkat bawah dan sangat jauh dari rumah. Inilah sebabnya mengapa sesetengah daripada pengguna jarang memeriksa kotak pos mereka dan mereka tidak sedar bahawa ada surat yang penting dan kadang-kadang terlepas tarikh penting. Ada di antaranya yang mengabaikan kewujudan peti surat kerana kekurangan sistem pemberitahuan pada peti surat biasa. Projek ini boleh membantu pemilik rumah untuk mengatasi masalah mereka. Inovasi sistem peti surat menggunakan sistem tanpa wayar boleh membantu tuan rumah yang sentiasa sibuk. Sistem ini dibangunkan dengan mengintegrasikan litar pengesanan untuk mengesan kehadiran surat dengan sistem tanpa wayar dengan bantuan buzzer. Buzzer akan berbunyi apabila terdapat kehadiran surat baru. Apabila sensor yang terletak di bahagian bawah peti surat mengesan sebarang kehadiran surat, ia akan menghantar isyarat di dalam rumah dengan menggunakan Modul ZigBee Wireless Sensor Network (WSN).

## ABSTRACT

'You Have Mail' Post Box Content Notification Using ZigBee is a system that will give a notification through wireless system and buzzer. For instance, when any letter is put into the intelligent Smart Post Box System, buzzer will ring to notify user the presence of new letter. Furthermore, post box is usually located outside of house to facilitate the delivery of mail by the post man. At some places for example apartment, flat house and condominium, owner experience annoyance when they take a trip to the post box to check for mail only to find it to be. The post box is normally located downstairs far from owner's unit. This is why some of the users seldom check their post box and unaware the presence of important letter and sometimes miss out some datelines. Some of them even ignore the existence of post box because of its inefficiency. This project can help owner of house to overcome their problem. The innovation of post box system using wireless system could also help a busy person. This system was developed by integrating a detection circuit to acknowledge existing of items with a wireless system. A buzzer will ring where a presence of a new letter is detected in the post box. The presence notification will then be transmitted to the house using ZigBee Modules Wireless Sensor Network (WSN).

## DEDICATION

Dedicated to my beloved mother and father  
Zarina Binti Mohd Zair and Shahrudin Bin Kassim and my siblings that I love the  
most. The biggest appreciation to my supervisor Mr.Nurulhalim Bin Hassim for  
guidance and to my close friends.  
A special thanks for your support, encouragement and understandings to me and  
make me the best in your heart.

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My biggest appreciation goes to my family who has been so tolerant and supportive of me all these years. Deep thanks for their support, love and strength that they had given to me. I am so thankful to have them in my life.

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This project is crucial for me and I am sure I have completed it with my full heart. I hope with the successful of this project, any future problem that occur can be solved amicably.



## TABLE OF CONTENTS

<b>Abstract</b>	<b>i</b>
<b>Abstrak</b>	<b>ii</b>
<b>Dedication</b>	<b>iii</b>
<b>Acknowledgement</b>	<b>iv</b>
<b>Table Of Content</b>	<b>v</b>
<b>List Of Tables</b>	<b>vi</b>
<b>List Of Figures</b>	<b>vii</b>
<b>List Of Abbreviations, Symbols and Nomenclatures</b>	<b>viii</b>
<b>CHAPTER 1: INTRODUCTION</b>	<b>1</b>
1.1 Project Background	1
1.2 Objective	2
1.3 Problem Statement	2
1.4 Scope of Project	3
1.5 Method of Project	4
1.6 Thesis Outline	8

<b>CHAPTER 2: LITERATURE REVIEW</b>	<b>9</b>
2.1 Overview	9
2.2 Background of Mailing System	9
2.3 Wireless Technologies	10
2.3.1 Wireless Sensor Network (WSN)	13
2.3.2 ZigBee Series 1	13
2.3.3 ZigBee Construction and Features	16
2.3.4 Differences Between ZigBee	16
2.4 Microcontroller	17
2.4.1 Main Components	19
2.4.2 PIC 16F877A	21
2.4.3 Operation Of Microcontroller	22
2.4.4 Serial Communication	22
2.5 Sensor	23
2.6 IRS-01 Sensor Set	24
2.7 Buzzer	27
2.8 Literature Review Summary	27
<b>CHAPTER 3: PROJECT METHODOLOGY</b>	<b>29</b>
3.1 Introduction	29
3.2 Design Overview	30
3.3 Implementation Of Hardware	32
3.3.1 Arduino Uno	32

3.3.2	Push Button Switch or Tact Switch	34
3.3.3	Power Supply	36
3.3.4	IR Sensor	35
3.3.5	Interfacing ZigBee With Microcontroller	36
3.4	Software Implementation	37
3.4.1	Programming In Compiler	36
3.4.2	System Operation	38
3.5	Conclusion	38
<b>CHAPTER 4: RESULT AND DISCUSSION</b>		<b>39</b>
4.0	Introduction	<b>39</b>
4.1	Result	39
4.1.1	Current Measurement	40
4.1.2	Flow Of The Circuit	45
4.2	The Programming Used	47
4.3	Hardware	50
4.4	AT Commands	51
4.5	Discussion	53
4.6	Limitations	53
4.7	Future Research	54
4.8	Placement Of Device	54
<b>CHAPTER 5: CONCLUSION AND RECOMMENDATIONS</b>		<b>49</b>
<b>5.0</b>	<b>Introduction</b>	<b>55</b>

5.1	Future Research and Development	55
5.2	Recommendations	56
5.3	Conclusions	57
	<b>REFERENCES</b>	<b>58</b>
	<b>APPENDIX A</b>	<b>59</b>

## LIST OF TABLES

<b>TABLE</b>	<b>TITLE</b>	<b>PAGE</b>
2.1	ZigBee Construction And Features	16
2.2	Differences Between ZigBee Series 1 and 2	16
3.1	Important Ports Used	33
3.2	Transmitter Ports	33
3.3	Receiver Ports	33
3.4	Condition Of IR Sensors	36
4.1	List of All Conditions And Post Box Status	39
4.2	Current At Battery (2 Metre)	40
4.3	Current At Battery (10 Metre)	40
4.4	Current At Battery (11 Metre)	40
4.5	Current At Battery (15 Metre)	41
4.6	Output Power Used (2 Metre)	42
4.7	Output Power Used (10 Metre)	43
4.8	Output Power Used (11 Metre)	44
4.9	Output Power Used (15 Metre)	45
4.10	AT Commands	51

## LIST OF FIGURES

<b>FIGURE</b>	<b>TITLE</b>	<b>PAGE</b>
1.1	Overall Design Method	5
1.2	Planning For Circuit Design	6
1.3	Overall Project Function	7
2.1	Mesh Network Of ZigBee	15
2.2	Transmitter and Receiver	17
2.3	ZigBee Transmitter	20
2.4	A Starter Kit	20
2.5	Arduino Uno	21
2.6	PIC 16F877A	21
2.7	Serial Communication	22
2.8	IRS-01 Sensor Set	24
2.9	Optical Sensor	25
2.10	Operation Of Sensor	26
2.11	Buzzer	27
2.12	Flow Chart For Project Implementation	28
3.1	Block Diagram Of Post Box Notification	30
3.2	Step By Step Of Arrival	31
3.3	Symbol Of Miniature Tactile Switch	34
3.4	IC LM7805 and IC L878L33	35

3.6	Schematic Circuit Of +12V Power Supply	36
3.7	Flow Chart Of Microcontroller Main Program	37
4.1	Graph Distance Vs Current	41
4.2	Graph Distance Vs Output Power	45
4.3	The Flow Of Circuit	46
4.4	Post Box	50
4.5	Receiver Side	50
4.6	Address At Transmitter	52
4.7	Address At Receiver	52

## LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

IR	-	Infra-Red
LED	-	Light Emitting Diode
WSN	-	Wireless Sensor Network
PCS	-	Personal Communication Service
LTE	-	Long Term Evolution
HSPA	-	High Speed Packet Access
EV-DO	-	Evolution Data
RAM	-	Random Access Memory
ROM	-	Random Only Memory
EPROM	-	Erasable Programmable Read Only Memory
I/O	-	Input / Output
D/A	-	Digital /Analog



# CHAPTER 1

## INTRODUCTION

### 1.1 Project Background

In current time, the location of post box is always near the entrance of a house and most house owner were unable to know whether there is a new letter inside post box or not. Furthermore, owners are busy with their work until they do not have enough time to check on their post box. This project is to ease owners and give them a quick notification in a short time interval anywhere and anytime inside their house. In addition, the wireless technology revolution has increased rapidly and increasingly being apply in routine applications. It is functioning as one of the solution to ease the communication either among people or between people and devices. Wireless system offers system that is being utilized to send alert to owners through the ringing buzzer and blinking LED light. This technology is used to transmit notification for mail delivery through notification.

**'You Have Mail' Postbox Content Notification Using ZigBee** provided a great solution for busy owner. In simple words, it can help to alert owner about the presence of letters inside their post box. When there is a letter, a buzzer will ringing and an LED will blink.

Wireless technology refers to the use of electromagnetic waves that carry signals over the air. Wireless refers to a situation where communication is sent in the absence of wires and cables. It is the transfer of information between two or more points that are not connected to each other by any electrical conductor. By using this technology, the range of distance for the user to check the latest status of their post box will not be a problem.

## **1.2 Objective Of Project**

The objectives of this projects were to enhance the post box, and solve some problem faced by owner. In general, each owner of house has their own post box to receive any important letter or memo. For instance, if their work depends on the customer mail, this system is able to notify them on the arrival of mail inside their post box. In addition, this system is capable to provide convenience for house owner. In addition, the objectives for this project are:

- i. Ability to understand the basic concepts of wireless and their advancement
- ii. To create a product that will send a buzzer and LED notification via wireless system.
- iii. To study interface used in wireless system with the ZigBee Modules, Arduino Uno and IR sensor circuits.

## **1.3 Problem Statement**

For ages, some problem has risen due to use of post box. Some people needed to check their post box frequently to avoid missing important letter. Although it is not a big matter for some but, there are many people that wish they can identify the presence of mail with ease without going to the post box regularly and to check it. Sometimes, people tend to forget to pick up letters or maybe just do not have the time to do so. They might miss important or urgent letter which require urgent action before reaching due dates. The problems can be solved with this project where people will only need to check their post box when they receive a signal through a buzzer ringing and notification through LED to alert them.

## 1.4 Scope Of Project

A few scope and guidelines are listed and this is to ensure that the project will be conducted smoothly and according to plan. In addition, this scope would keep the project within its proposed boundary and to avoid over estimation and unachievable attempts.

This project will show the advancement of a normal post box with introduction of a sensor circuit, Arduino Uno, two modules ZigBee Series 1 one for transmitter and the other for receiver. A programming control system to be used as interface between the system and users. X-CTU Software is a software that will be used to indicate data either being transmitted or received by the ZigBee Modules.

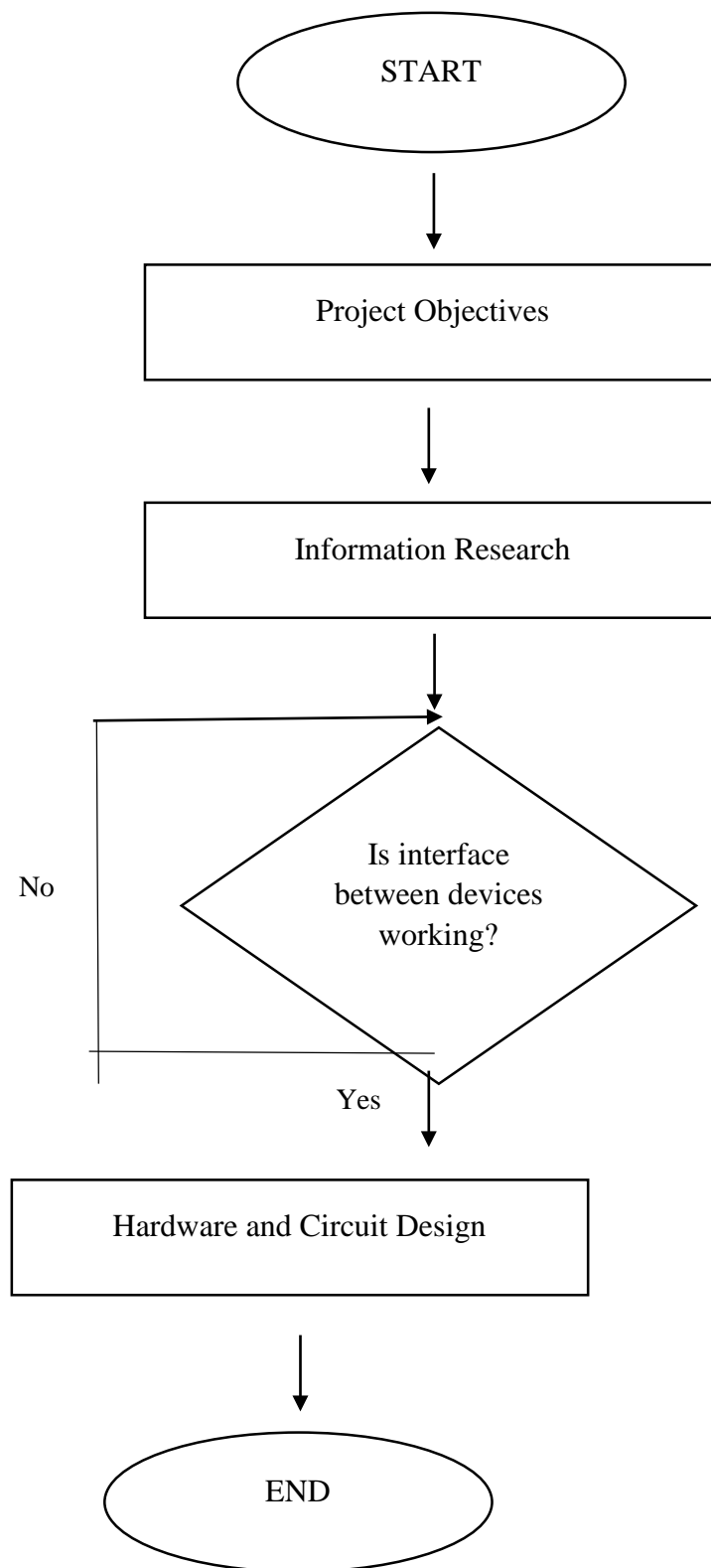
- ❖ The implementation of this project involved both hardware and software.
- ❖ This project involved the design and construction of circuit.
- ❖ The functionality covers only the size area of a post box.
- ❖ The notification will be through an LED and a buzzer and where the post box is not empty, it will produce a sound and blinking LED.

## 1.5 Method Of Project

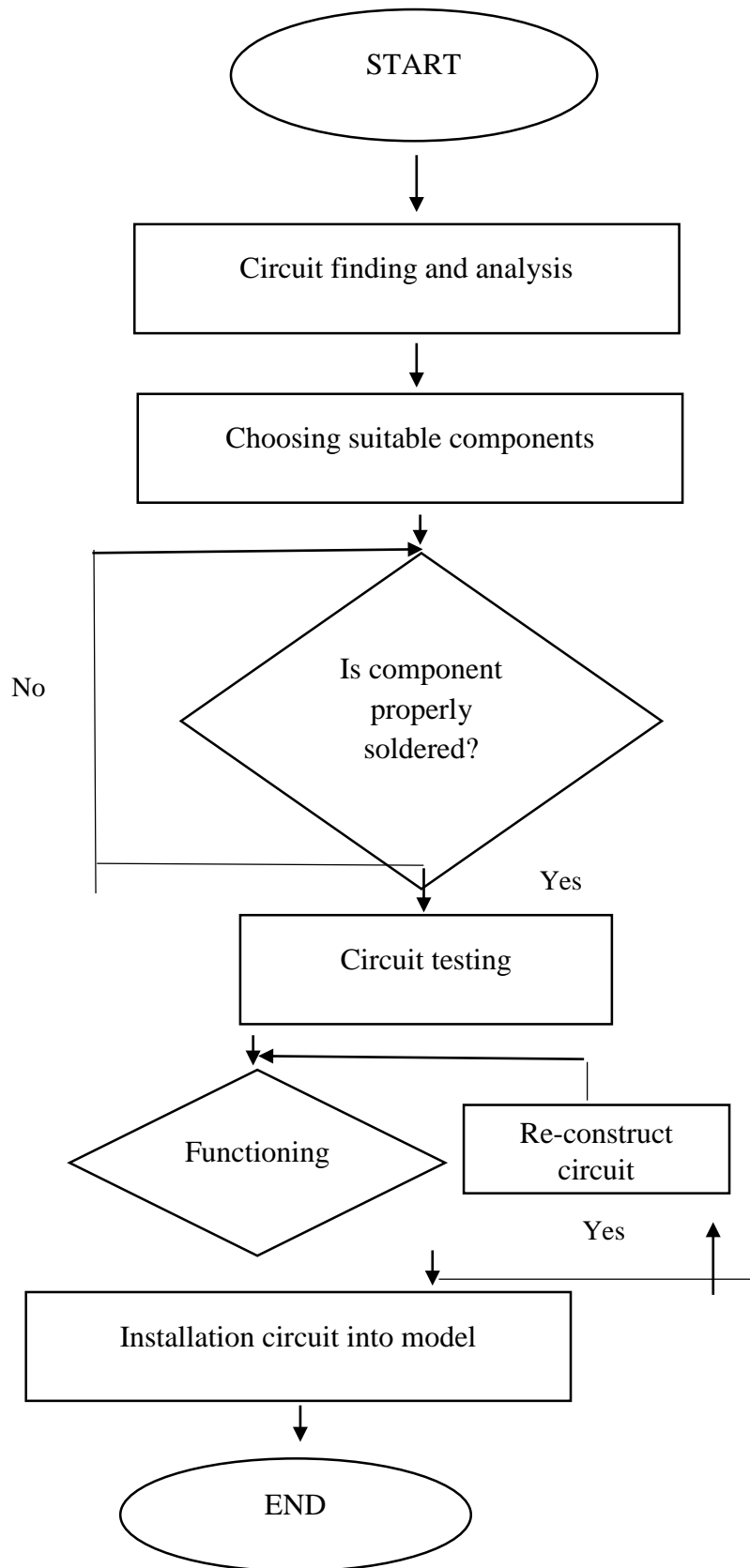
Project methodology is simplified in a flow charts. Figure 1.1 shows the flow chart of overall design method. First step is objectives of the project. Then, research on information for hardware and software. This project is carried out step by step according to the flow.

This flow chart shows the circuit implementation. As in Figure 1.2 this will focus mainly on how the circuit hardware of the project is being developed. Circuits and compatibility with the project is analysed. After compatibility has been made, suitable components and devices are chosen to suit.

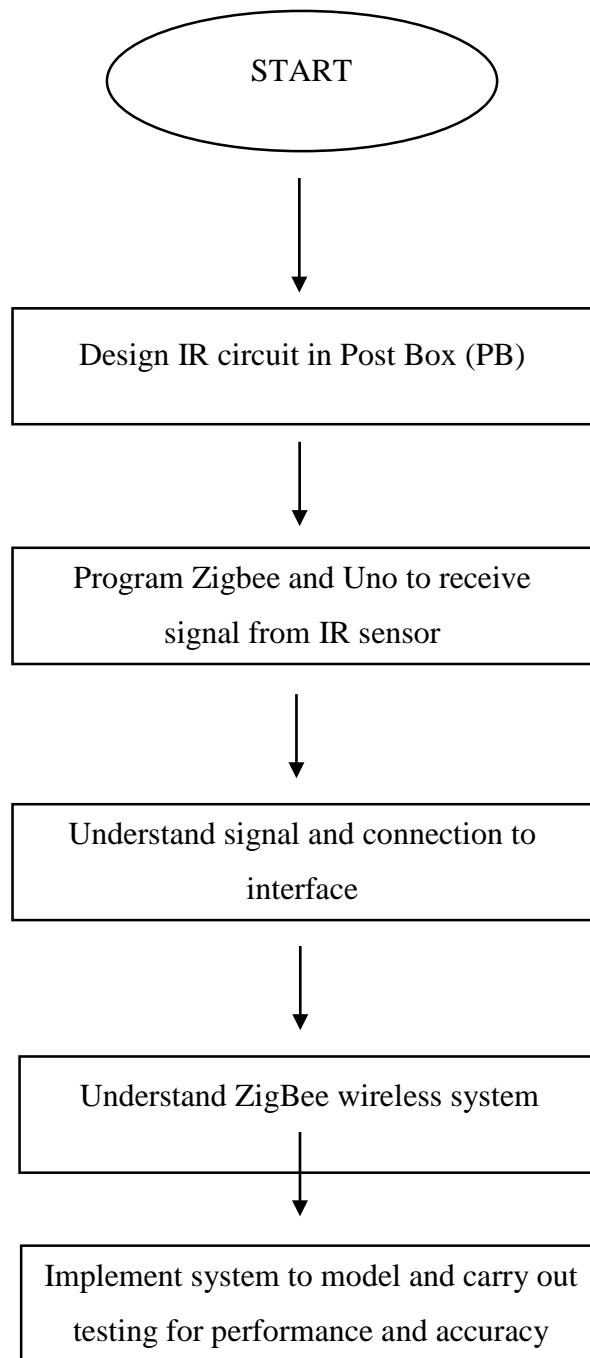
Lastly, as shown in Figure 1.3 the process of post box when a mail being inserted in it. When a sensor circuits detect a presence of document, it will send a notification through blinking of LED and ringing of buzzer.



**Figure 1.1: Overall Design Method**



**Figure 1.2: Planning For Circuit Design**



**Figure 1.3: Overall Project Function**

## **1.6 Thesis Outline**

This report will have 5 chapters. For Chapter 1, it will describes about the objectives of this project and its scope. Then, it Chapter 2, a reading on several journals, books, news paper, magazine and some other sources will be put in literature review. There is a complete literature study of the designation of wireless ZigBee Series 1 on post box with enhancement. Similarly, it will relate with this project. Chapter 3 will cover the method used to achieve some of the project objective. Later on Chapter Four, would focus on explanation about the result for the experiment and analytical model. Lastly for Chapter Five, would focus more on results and discussion. Discussion will be made based on the overall results obtained while conducting an experiment and recommendations.