



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**AUTOMATIC WASTE DISPOSAL MANAGEMENT SYSTEM**

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

by

**MUHAMMAD NASIRUDDIN BIN NAZRI**

**B071210229**

**910314-08-5549**

FACULTY OF ENGINEERING TECHNOLOGY

2015

**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

TAJUK: **Automatic Waste Disposal Management System**

SESI PENGAJIAN: **2014/15 Semester 7**

Saya **MUHAMMAD NASIRUDDIN BIN NAZRI**

mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

1. Laporan PSM adalah hak milik Universiti Teknikal Malaysia Melaka dan penulis.
2. Perpustakaan Universiti Teknikal Malaysia Melaka dibenarkan membuat salinan untuk tujuan pengajian sahaja dengan izin penulis.
3. Perpustakaan dibenarkan membuat salinan laporan PSM ini sebagai bahan pertukaran antara institusi pengajian tinggi.
4. **\*\*Sila tandakan (✓)**

SULIT

(Mengandungi maklumat TERHAD yang telah ditentukan oleh organisasi/badan di mana penyelidikan dijalankan)

TERHAD

(Mengandungi maklumat yang berdarjah keselamatan atau kepentingan Malaysia sebagaimana yang termaktub dalam AKTA RAHSIA RASMI 1972)

TIDAK TERHAD

Disahkan oleh:

.....  
Alamat Tetap:

Lot 4194 Kampung Perik,

.....  
Cop Rasmi:

\_\_\_\_\_  
33600, Enggor,

\_\_\_\_\_  
Perak

\*\* Jika Laporan PSM ini SULIT atau TERHAD, sila lampirkan surat daripada pihak berkuasa/organisasi berkenaan dengan menyatakan sekali sebab dan tempoh laporan PSM ini perlu dikelaskan sebagai SULIT atau TERHAD.

**FAKULTI TEKNOLOGI KEJURUTERAAN**

Tel : +606 234 6623 | Faks : +606 23406526

Rujukan Kami (Our Ref) :  
Rujukan Tuan (Your Ref) :

11 DEC 2015

Pustakawan  
Perpustakaan UTeM  
Universiti Teknikal Malaysia Melaka  
Hang Tuah Jaya,  
76100 Durian Tunggal,  
Melaka.

Tuan/Puan,

**PENKELASAN LAPORAN PSM SEBAGAI SULIT/TERHAD LAPORAN  
PROJEK SARJANA MUDA TEKNOLOGI KEJURUTERAAN ELEKTRIK  
(KUASA INDUSTRI) : MUHAMMAD NASIRUDDIN BIN NAZRI**

Sukacita dimaklumkan bahawa Laporan PSM yang tersebut di atas bertajuk  
“**Automatic Waste Disposal Management System**” mohon dikelaskan  
sebagai \*SULIT / TERHAD untuk tempoh LIMA (5) tahun dari tarikh surat ini.

2. Hal ini adalah kerana IANYA MERUPAKAN PROJEK YANG DITAJA  
OLEH ORANG PERSENDIRIAN DAN HASIL KAJIANNYA ADALAH SULIT.

Sekian dimaklumkan. Terima kasih.

Yang benar,

\_\_\_\_\_  
Tandatangan dan Cop Penyelia

\* Potong yang tidak berkenaan

**NOTA:** BORANG INI HANYA DIISI JIKA DIKLASIFIKASIKAN SEBAGAI  
SULIT DAN TERHAD. JIKA LAPORAN DIKELASKAN SEBAGAI **TIDAK  
TERHAD**, MAKA BORANG INI **TIDAK PERLU DISERTAKAN DALAM  
LAPORAN PSM.**

## **DECLARATION**

I hereby, declared this report entitled “Automatic Waste Disposal Management System” is the results of my own research except as cited in references.

**Signature** :.....

**Name** : **MUHAMMAD NASIRUDDIN BIN  
NAZRI**

**Date** : .....

## **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) (Hons.). The member of the supervisory is as follow:

.....

(Project Supervisor)

## **ABSTRACT**

Industry is an important element in the national economy. The rapid increase in industrial activities and also increase the number of residents has led to the opening of the residential areas and industrial areas and new manufacturing. Therefore, the basic facilities should be provided to facilitate the development of the newly developed area. Among the facilities available are the business district, school and also wet market. Wet market or public market is the most popular method of retail business is an important location for the daily needs of food, especially raw materials at affordable prices.

At wet markets, economic activity there will get impacted negatively on the environment. This situation includes the production of waste water, solid waste, even odor problems and flies that can cause diseases to the dealer and consumers. From time immemorial, many wet markets or public markets are built near rivers or estuaries. This is to facilitate the work of the discharges, waste, food and waste water directly into the river system. Although the country has developed, this situation still continues for most of the wet market until now. In addition, many public markets categorized as commercial trade was still not had a special management system established by the authorities and government. Therefore, a special project to be done to solve the problem of wet market management systems existing today.

## ABSTRAK

Industri adalah elemen penting dalam ekonomi negara. Peningkatan pesat dalam bidang industri dan juga menambah bilangan penduduk telah membawa kepada pembukaan kawasan perumahan dan kawasan perindustrian dan pembuatan baru. Oleh itu, kemudahan asas perlu disediakan untuk memudahkan pembangunan kawasan yang baru dibangunkan. Antara kemudahan yang disediakan ialah daerah perniagaan, sekolah dan juga pasar basah. Pasar basah atau pasar awam adalah kaedah yang paling popular perniagaan runcit adalah lokasi penting untuk keperluan harian makanan, terutamanya bahan-bahan mentah pada harga yang berpatutan.

Di pasar basah, aktiviti ekonomi akan mendapat kesan negatif terhadap alam sekitar. Situasi ini termasuk pengeluaran air sisa, sisa pepejal, walaupun masalah bau dan lalat yang boleh menyebabkan penyakit kepada peniaga dan pengguna. Dari zaman dahulu lagi, banyak pasar basah atau pasar awam yang dibina berhampiran sungai atau muara. Ini adalah untuk memudahkan kerja-kerja pelepasan, pembaziran, makanan dan air kumbahan terus ke dalam sistem sungai. Walaupun negara telah maju, keadaan ini masih berterusan bagi kebanyakan pasar basah sehingga sekarang. Di samping itu, banyak pasar basah yang dikategorikan sebagai perdagangan komersial masih tidak mempunyai sistem pengurusan khas yang ditubuhkan oleh pihak berkuasa atau kerajaan. Oleh itu, satu projek khas yang perlu dilakukan untuk menyelesaikan masalah sistem pengurusan pasar basah hari ini yang sedia ada.

## **DEDICATIONS**

At first dedicating this report to Almighty Allah. Without his sympathy and mercy i was not able to accomplish this work. To beloved my family especially to my father, Nazri bin Zainun and my mother, Rogayah binti Ali beloved supervisor, lecturers and friends. All of you have always been a source of strength for me.

Thank you.

## **ACKNOWLEDGMENTS**

I am very grateful to my God for the opportunity to complete this final project. To beloved my family especially to my father, Nazri bin Zainun and my mother, Rogayah binti Ali and my siblings more help to complete this thesis writing. To my beloved supervisor, lecturers and friends, all of you have always been a source of strength and support for me to finish this project.

# TABLE OF CONTENTS

DECLARATION .....	v
APPROVAL.....	vi
ABSTRACT.....	vii
ABSTRAK .....	viii
DEDICATIONS.....	ix
ACKNOWLEDGMENTS .....	x
TABLE OF CONTENTS.....	xi
LIST OF FIGURES .....	xiv
LIST OF TABLE .....	xvi
LIST OF SYMBOLS AND ABBREVIATIONS .....	xvii
CHAPTER 1 .....	1
1.0    Background .....	1
1.0.1    Municipal Source of Waste.....	1
1.0.2    Medical/Clinical Source of Waste .....	2
1.0.3    Industrial Sources of Waste .....	2
1.1    How are Waste Treated and Disposed Off? .....	2
1.1.1    Incineration Method of Waste Management.....	3
1.1.2    Landfill.....	3
1.2    Project Overview .....	5

1.3	Problem Statement .....	5
1.4	Objective .....	6
1.5	Project Scope .....	6
1.6	Summary .....	6
CHAPTER 2 .....		7
2.0	Introduction .....	7
2.1	Hierarchical Waste Management System.....	7
2.1.1	Reduce.....	8
2.1.2	Reuse .....	8
2.1.3	Recycle.....	9
2.2	Waste Management in Malaysia .....	10
2.3	Swedish Technology of Waste Management for Sustainable Urban Development .....	11
2.3.1	Envac at Residential Area .....	12
2.3.2	Envac at Vacuum Systems in City Center .....	13
2.3.3	Envac at Historical City Center .....	16
2.4	Wet Market Waste Management in Malaysia .....	17
2.5	Visual Basic.....	18
CHAPTER 3 .....		21
3.0	Introduction .....	21
3.1	Flow Chart Process.....	22
3.2	Design of Automatic Waste Disposal Management System.....	23
3.3	Hardware .....	25

3.3.1	Ultra-slim Photoelectric Sensor .....	25
3.3.2	Conveyor System .....	28
3.3.3	Waste Container .....	30
3.3.4	Levelling Waste Process .....	31
3.3.5	Serial RS232 Cable .....	32
3.3.6	Schematic Wiring Diagram.....	33
3.4	Software.....	35
3.4.1	Omron CX Programmer Software .....	35
3.4.2	Visual Basic Software .....	38
CHAPTER 4	.....	41
4.0	Introduction .....	41
4.1	Hardware System .....	41
4.2	Monitoring System .....	44
4.3	Project Analysis.....	48
CHAPTER 5	.....	50
5.0	Introduction .....	50
5.1	Conclusion.....	50
5.2	Suggestion for Future Work .....	51
APPENDIX A	.....	53
APPENDIX B	.....	62
APPENDIX C	.....	65
REFERENCES	.....	67

## LIST OF FIGURES

Figure 1.1: Incineration of Waste Activity .....	3
Figure 1.2: Landfill Area.....	4
Figure 2.1: 3R's Logo .....	8
Figure 2.2: Alam Flora Workers Cleaning Up the Illegal Dumping Site .....	10
Figure 2.3: Alam Flora Workers Service .....	10
Figure 2.4: The Waste Management Operation Using Sustainable Vacuum.....	11
Figure 2.5: Outdoor Waste Inlets in Quadrant Court, Wembley City, London. ....	12
Figure 2.6: The Self-Emptying Litterbin and The Waste Inlet for Households, Shops and Restaurants at Nyhavn, Copenhagen.....	13
Figure 2.7: Historical City Center at Vitória, Spain. ....	16
Figure 2.8: Unmanaged Waste Management .....	17
Figure 2.9: Visual Basic 6 .....	18
Figure 2.10: Visual Basic 6 Environment .....	19
Figure 3.1: Main Flowchart of Project.....	22
Figure 3.2: Underground Project Design .....	23
Figure 3.3: On The Ground Project Design .....	24
Figure 3.4: Combinations Underground and On The Ground Project Design.....	24
Figure 3.5: Ultra-slim Photoelectric Sensor EX-10 .....	26
Figure 3.6: Part Descriptions of Ultra-slim Photoelectric Sensor.....	26
Figure 3.7: I/O Circuit Diagram.....	26
Figure 3.8: Wiring Diagram for Emitter sensor .....	27
Figure 3.9: Conveyer System.....	28
Figure 3.10: Power Window Motor .....	29
Figure 3.11: Waste Container .....	30
Figure 3.12: Waste Levelling Processes .....	31
Figure 3.13: Connection XW2Z-200S-CV cable.....	32
Figure 3.14: Build in RS232 cable .....	33
Figure 3.15: USB-RS232 Converter Cable .....	33
Figure 3.16: Wiring Diagram.....	34
Figure 3.17: Ladder Diagram for Levelling Waste Sensor .....	36
Figure 3.18: Ladder Diagram for Conveyer System.....	36
Figure 3.19: Ladder Diagram for forward reverse DC motor in levelling waste process.....	37
Figure 3.20: Interface Monitoring System .....	38
Figure 3.21: Setting of PLC .....	39
Figure 3.22: MSComm Setting .....	39
Figure 3.23: Source code to Open Port .....	40

Figure 3.24: String send to PLC.....	40
Figure 4.1: Flowchart of operation for conveyor system.....	42
Figure 4.2: Connection between the system and PLC .....	43
Figure 4.3: Overall the system including hardware and software.....	43
Figure 4.4: Interface on automatic waste disposal management system .....	44
Figure 4.5: Monitoring System 1 .....	45
Figure 4.6: Monitoring System 2 .....	45
Figure 4.7: Monitoring System 3 .....	46
Figure 4.8: Monitoring System 4 .....	46
Figure 4.9: Chart graph for different observation .....	49

## LIST OF TABLE

Table 3.1: Specification of Power Window Motor .....	29
Table 4.1: Conditions in monitoring system with arrangement all condition.....	47
Table 4.2: The data for 2 different observations .....	48

## LIST OF SYMBOLS AND ABBREVIATIONS

SBM	=	Shape-Based Matching
PLC	=	Programmable Logic Circuit
VB6	=	Visual Basic 6
GUI	=	Graphical User Interface
LD	=	Ladder Diagram
I/O	=	Input or Output

# **CHAPTER 1**

## **INTRODUCTION**

### **1.0 Background**

Waste has become one major environmental issue anywhere around the world since the industrial revolution. Other than waste was produced in school, home and other public place, there is also remains waste from the industrial area, hospital, plantations and other sources. The human depend so many in material things and all of them almost end up as waste. Therefore, many private sector and government sector create a management to solve waste problem. Normally, the wastes are come from municipal area and industrial area and the waste dispose to the landfill.

#### **1.0.1 Municipal Source of Waste**

Municipal source of waste is referred to waste in areas with the huge population such as wet market, school, housing area, office, restaurant and other public places. This waste including daily item usages such as plastic bag, food debris, furniture which already break down, clothes that unused, plastic bottle and glass bottle.

### **1.0.2 Medical/Clinical Source of Waste**

Medical/clinical waste normally refers to waste produced from health care facilities, such as hospitals, clinics, dental surgeries, veterinary practices, medical teaching establishments, medical research and laboratories. This waste can be classified as hazard waste rather than general waste. This waste including the surgical items, body parts, pharmaceuticals, blood, needles, wound dressing materials and syringes.

### **1.0.3 Industrial Sources of Waste**

Industrial waste is the waste produced by industrial activity which includes any material that is rendered useless during a manufacturing process such as that of factories, mills, and mining operations. After industrial revolution, leather, food industries, manufacturing glass, textile, electronics, plastic and metal products has contributed to waste production.

## **1.1 How are Waste Treated and Disposed Off?**

Waste management is collection, transport, processing, recycling or disposal and waste material supervision. This term normally associated with material produced by human activity, with waste management generally does to reduce its impact in health, environment or aesthetic. Waste management could implicate solid, liquid, gas, or radioactive material, with the method and the expertise is different. This waste management must be well implemented to avoid its adverse effect on human health and the environment. The management of waste in metropolitan and rural areas is the general responsibility of the local government. There are several methods of managing all the various types of waste. Some of these methods cause additional harm to the environment, but not doing anything is not an option.

### 1.1.1 Incineration Method of Waste Management

Incineration is known as a disposal method including burning the trash. Sometimes this is simply referred to as thermal treatment, as a general category of high-temperature treatment of trash material. One of the advantages of incineration is that with this method can be reduced by half or more and it requires little usage of land.



Figure 1.1: Incineration of Waste Activity  
(Source: <<http://www.hdindonesia.com/pojok/bahaya-membakar-sampah>>02/06/2015)

Disadvantages to using this method produce too much carbon dioxide. Modern incineration processes are more efficient and release less dioxin than home fireplaces and backyard barbecues. This method is very common in Denmark, Germany, and the Netherlands. This method is effective but expensive.

### 1.1.2 Landfill

The landfill is the disposal of waste which cannot be reused, recycled or recovered, into or onto land. It forms the lowest aspect of the European Waste Framework Directive's waste hierarchy. The EU's Landfill Directive aims to reduce the amount of waste to landfill by finding ways to recover value from waste and develop more sustainable management practices.

Disposal to landfill is the least preferred option in the waste hierarchy and should only be used as a last resort after re-use, recycling and recovery options, as an escalating scale of taxation on materials being sent to landfill has made this an increasingly expensive option.

Proper landfills are also lined at the bottom to minimize the leakage of soil pollutants and other toxins from getting into the water table. This method is effective, but expensive and difficult.



Figure 1.2: Landfill Area

(Source: <<http://www.triplepundit.com/2010/10/re3-diverting-landfill-waste-produce-green-energy/>>02/06/2015)

In many towns, sorting is not done, and all the waste (paper, food, diapers, glass) is mixed up and deposited. That is a problem because, glass and plastics take thousands of years to decompose. Additionally, the landfills soon become full, smelly and unsafe for the environment.

Proper waste management is not cheap, but it is something we all have to get involved and discuss it. The effect of not getting involved can be catastrophic to our health and environment.

## **1.2 Project Overview**

Nowadays, waste disposal management continues to be a rising challenge as a population grows at the municipal areas and along with the industrial development of countries. At the wet market, economic activity in wet markets impacted negatively on the environment. This is because of the inefficient waste management that cause of the production from waste water, solid waste, even odor problems and flies that can cause diseases to the dealer and consumers. Previous, many wet markets or public markets are built near rivers or estuaries (Fathi A. Rhoma et al, 2010). This is to facilitate the work of the discharges waste food and waste water directly into the river system. Although the country has developed, this situation still continues for most of the wet market until now. In addition, many public markets categorized as commercial trade was still not had a special management system established by the authorities and government. Therefore, a special project to be done to solve the problem of wet market wastes disposal management systems existing today.

## **1.3 Problem Statement**

Problems often arise from the disposal of solid waste is a matter of attitude takes for granted by some the dealers. Solid waste is discharged directly into rivers causing environmental pollution. Some examples of waste discharges resulting wet market activities are like the rest of the preservation of fish, chicken, vegetables and other raw materials that are considered small matters and underestimated by some the dealers. In addition, that far dump waste causing the dealers only placed that solid waste near at the site of their business((Mohd Khairul Bin Akub, 2007). These will giving less attractive scenery as well as interfere with the visitors who want to buy stuff in the wholesale market. As a result of these problems will disturb convenience of the public that always visited the wet market.

## **1.4 Objective**

There are three objectives of this project, which is stated in the following texts:

1. To study the use of PLC programming and Visual Basic programming.
2. To create an automatic waste disposal management system that to reduce cost of waste management
3. To produce the system that waste disposal management is more efficient and orderly.

## **1.5 Project Scope**

The main scopes of this project are as follows:

1. Creating a new project for solve waste management at the wet market.
2. Creating the waste management project base on PLC programming and Visual Basic programming.

## **1.6 Summary**

This chapter gives an introduction to the project, which is the development of waste management consist the objective and scope of the project that should be achieve at the end of this project.

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.0 Introduction**

This chapter will describe about what the system waste management dealt in Malaysia compare with management system in foreign countries. Besides that, the study of visual basic is relevant to this project. Apart from that, this topic will describe further with more comprehensive method related to this project.

#### **2.1 Hierarchical Waste Management System**

Hierarchical management structure means suitable method for the disposal of solid waste is typically carried out in an integrated manner. The use of reduction methods (Reduce), reuse (Reuse) and recycling (Recycle) or better known as the 3R method is still favored by the world community. This method is increasingly accepted as one of the disposal of solid waste management hierarchy in urban areas. The use of landfill as a means of disposing of waste gradually can be reduced in order to avoid pollution in the surrounding area. It also can make the landfill became more economical.



Figure 2.1: 3R's Logo

The waste hierarchy which emphasizes reduction method (Reduce) have been carried out by developed countries like the US and Australia. In the United States under the auspices of the Environment Protection Agency (EPA), their management practices by using these methods have been proven to reduce solid waste below the level of the previous disposal. Likewise with Sydney, that is an environmentally friendly town and waste zero. This use of the method has successfully ensured that waste has been thrown away already handled by way minimize its impact on environment altogether optimize method recycling and waste conversion to energy source.

### **2.1.1 Reduce**

Waste reduction is good technique because rubbish could be reduced. Environmental Protection Agency defines waste reduction as design, material manufacturing to mitigate quantity or poisoning before they buy or use. This including minimizes waste production in every step in manufacturing process or usage of a product.

### **2.1.2 Reuse**

Products are usually thrown as waste such as appliances, furniture, glass bottles, cans and bottles can be reused as new products. Reuse all this stuff to fix the product can provide benefit to the public by selling reusable materials and this can