



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF GARBAGE MONITORING
SYSTEMS BY USING ULTRASONIC SENSOR TO HELP
THE SANITARY AGENCY MONITOR THE GARBAGE
IN AREA**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of of Electronics Engineering Technology (Telecommunication) with Honours.

by

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ABSTRACT

Development of garbage monitoring system by using ultrasonic sensor to help the sanitary agency monitor the garbage in area. The project aims to develop one of the monitoring systems that for the use of municipal corporation and sanitary agency. It also can facilitate them and improve the managing and monitoring system of the dustbin. Municipal corporation are facing difficulty in monitoring dustbin because there is no device that can be used to regularly observe the garbage. They are forced to rely on their workers as they will give report after their duty. Besides that, municipal corporation keep getting a complain without any way to verify the complains. This project is based on Arduino system as a microcontroller with using Mit app inventor application to monitor the level of garbage by detecting weight of waste and level of waste. It will be connected to Wi-Fi module so that data can be transfer wirelessly. It will help municipal corporation in carrying out their work without any deception from their workers. The populated areas are also in clean condition with waste collection following schedule. The proposed of this project to help municipal corporation as well public in keeping the area clean with using system that are more systematically

ABSTRAK

Pembangunan sistem pemantauan sampah dengan menggunakan sensor ultrasonik untuk membantu agensi kebersihan memantau sampah di kawasan terlibat. Projek ini bertujuan untuk membangunkan salah satu sistem pemantauan yang digunakan untuk perbadanan perbandaran dan agensi kebersihan. Ia juga dapat memudahkan mereka dan meningkatkan sistem pengurusan dan pemantauan tong sampah. Perbadanan perbandaran menghadapi kesukaran memantau habuk kerana tiada alat yang boleh digunakan untuk memantau keadaan tong sampah. Mereka terpaksa bergantung kepada pekerja mereka dengan pekerja mereka akan melaporkan selepas tugas mereka selesai. Selain itu, perbadanan perbandaran terus menerus mendapat aduan tanpa sebarang cara untuk mengesahkan aduan tersebut. Projek ini berdasarkan sistem Arduino sebagai mikrokontroler dengan menggunakan aplikasi Mit app inventor untuk memantau tahap sampah dengan mengesan berat sampah dan tahap sampah. Ia akan disambungkan ke modul Wi-Fi supaya data boleh ditransfer secara tanpa wayar. Ia akan membantu perbandaran tempatan dalam menjalankan kerja mereka tanpa sebarang penipuan daripada pekerja mereka. Kawasan penduduk juga berada dalam keadaan bersih dengan pengumpulan sampah mengikut jadual. Cadangan projek ini untuk membantu pihak perbandaran tempatan serta orang awam dalam menjaga kawasan supaya lebih bersih dengan menggunakan sistem yang lebih sistematik

DEDICATION

Special dedication to my beloved parents,

En. Che Japar & Pn. Hasnah

My family,

Most honourable man, my supervisor,

En Mohd Anuar Bin Adip

My beloved friends,

Nabil, Imran, Zulfan, Amin, Din, Muaz

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LIST OF SYMBOLS

kg	-	kilogram
m	-	meter
cm	-	centimetre
mm	-	millimetre
V	-	Voltage
A	-	Ampere
M	-	Mega
Hz	-	Hertz
m	-	milli
kB	-	kilobytes
Ω	-	Ohms

LIST OF ABBREVIATIONS

IOT	Internet of Things
GSM	Global System for Mobile Communications
LCD	liquid-crystal display
ID	Identification
GPS	Global Positioning System
app	Application
AVR	Alf and Vegard's RISC processor
IR	Infrared
VCC	Voltage Common Collector
VDD	Voltage Drain
RX	Receiver
TX	transmitter
PWM	Pulse Width Modulation
ICSP	In Circuit Serial Programming
V_{in}	Voltage Input
GND	Ground
USB	Universal Serial Bus
I/O	Input and Output
SOC	Wireless system-on-chip
TCP/IP	Transmission Control Protocol/Internet Protocol

IDE Integrated Development Environment

PCB Printed Circuit Board

API Application Program Interface

IDE Integrated Development Environment

Wi-Fi Wireless Fidelity

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter is focussing to briefly describe of project that want to be run. It gives some explanation background of this project, how the idea gets inspired, problem statement that lead to the idea of the project and objective that need to archive from this project. It also will come out with expected output from expected input and impact of this project to the citizen.

1.1 Background of Project

Malaysian Government has a vision of making the country with technologically advanced country besides not forgetting its impact on the environment. In archiving these efforts, there are various efforts in terms of changes education pattern, evolution of urban area, as well as technology development. Beside of growth urban area, the problem of garbage is often a complaint among the people of Malaysian itself at the point when there are lodging regions in certain urban communities inside Malaysia that are not very well managed. Effect from this problem can cause unhealthy environment to among population while it also makes the area become tidy. There are various causes that cause junk waste not managed properly such as the garbage bins along did not integrate with the current technological advances. Because in Malaysia, garbage management is mostly managed by concessionaires who have been hired by municipalities so they must have their own initiative in making garbage management systems more efficient.

Because of these issues, there are inspired to produce with ideas that make waste management to be more effective. With that, they have improved the collection system of garbage collection, providing special waste bins to be managed outdoors and to hear and act immediately when there is a complaint from the surrounding residents or

customers. Unfortunately, these efforts have not been sufficient to overcome waste management problems as most of these efforts are using more traditional methods of reliance on manpower which are not competent as using technology. This makes them neglect to effectively manage waste. With the rapid development of technology, they have to implement the technology of garbage management system to make housing area clean and safe.

1.2 Problem Statement

Garbage can be categorized into several types, including household waste, import waste, commercial waste, institutional waste, construction waste, industrial waste, public waste and any waste from time to time (official web page JPSPN, 2017). It's also can be categorized with composition of paper, plastic, glass and other. The resulting waste in the home is more difficult to manage than other wastes because the waste is not in use or isolated. This causes the municipalities to experience difficulties when picking the waste.

Table 1.0 list of waste and their percentage

Component	Percent %
leftover	45
plastic	24
paper	7
metal	6
glass	3
other	15
total	100

(Source: JPSPN, 2013)

Table above show the percentage of categorized waste that are been thrown by Malaysian citizen. Residual composition is influenced by many factors, such as economy, culture, geography, energy sources and climate.

Table 1.2 growth rate population in Malaysia

Negeri	1996	1997	1998	1999	2000	2010¹	Kadar Pertumbuhan Purata (1998-2000, dalam %)
Kuala Lumpur	n.a.	n.a.	1,058	1,070	1,082	1,205	1.14
Selangor	n.a.	n.a.	1,169	1,204	1,240	1,617	3.04
Pahang	n.a.	n.a.	202	206	210	252	1.98
Kelantan	n.a.	n.a.	123	126	120	120	-1.22
Terengganu	n.a.	n.a.	119	122	125	157	2.52
N. Sembilan	245	250	267	278	291	427	4.69
Melaka	192	200	208	216	225	322	4.30
Johor	854	890	927	956	1,005	1,456	4.49
Perlis	26	27	28	28	29	34	1.79
Kedah	507	538	569	569	631	977	5.49
Pulau Pinang	570	591	611	611	648	844	3.03
Perak	672	696	719	719	763	996	3.06
Jumlah	3,066	3,192	6,000	6,137	6,378	8,407	2.86

(Source: Tarmudi, 2012)

As the increase population in Malaysia, the amount of waste that are produced by public will also increase. Waste management in Malaysia that is seen to be increasingly critical is due to the ongoing waste generation. The latest data was recorded by the Solid Waste Management and Public Cleansing Corporation (SWCorp) for seven states under its supervision as of June last year (Nur Lela Zulkipli and Garret Dawum, 2016). Generate of domestic waste is more alarming with there are some housing areas that do not have a good waste management system. The result is the trash left outside the trash can and will be cluttered by the roadside. This situation will bring pollution to the environment. Irregular collection schedule contractor appointed by the local municipalities caused many areas that are crowded with residents especially the neighbourhood around the apartment faced garbage dumps which not only cause the smell but also exacerbate the landscape of the surrounding area.

This waste management issue is also affected by the incompetence of concessionaires in handling waste management as prescribed. This incompetence can be

seen in terms of collections where the designated collection period does not comply with the schedule set. This will cause the litter that has been accumulated over a long period of time to become smelly and attract the attention of pests that can cause disease. In addition, leachate dissolves along the road during transport or on the vehicle also becomes one of the effects of the trash when the waste is not being managed on time as long-lost garbage is likely to leak and cause the wastewater out.



Figure 1.0 article about scheduled of waste collection changing

Besides that, unregulated waste management not only creates uncomfortable but also poses a risk to the surrounding population against illness due to this problem. “Selangor State the most unmanaged garbage and not collected, thus recording the highest dengue cases in Malaysia”, Tan Sri Noh Omar, The Ministry of Housing and Local Government. The problem of insect / animal borne diseases also involves mice, flies and cockroaches. Breeding of these insects / animals occurs near garbage dumps due to poorly managed food waste mixed with other waste, causing the food waste to be a source of food for these insects / animals. As example, when the waste not collected on that day, and are left outside garbage bin, it will attract stray dog to find food causes litter scattered,