



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**IMPLEMENTATION OF IOT IN SMART GARBAGE
SYSTEM**

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



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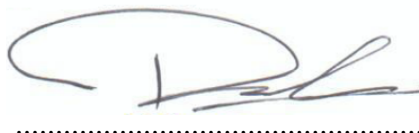
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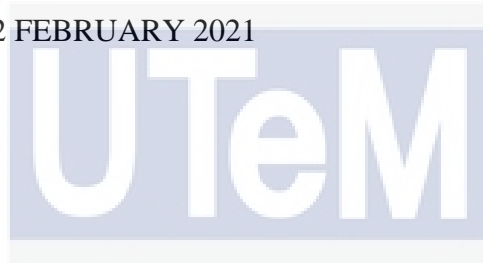
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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology with Honours. The member of the supervisory is as follow:

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ABSTRAK

Tesis ini membentangkan 'Implementation of IoT in Smart Garbage System' menggunakan Blynk yang membolehkan pengguna memantau kapasiti tong sampah mereka. Untuk menjaga dan meningkatkan kebersihan di sekitar kita, langkah-langkah seperti itu harus diambil. Projek ini adalah untuk membangunkan Blynk, sistem pemantauan sampah yang berkaitan dengan platform IoT. Sensor ultrasonik akan dipasang di atas tong sampah di dalam peranti ini untuk membaca jumlah sampah. Di aplikasi android, jumlah sampah akan diberitahu. Butiran masa nyata mengenai jumlah dan berat sampah di tong sampah akan direkodkan kepada pelanggan. Oleh kerana teknologi internet telah ditingkatkan di Malaysia, modul Wi-Fi ESP8266 digabungkan untuk dapat mengirim data melalui Wi-Fi. Pada zaman sekarang untuk menjadikan lebih mudah, mana-mana peranti kini disatukan dengan Wi-Fi. Ini membolehkan pengguna mengesan peranti tidak kira di mana dan pada bila-bila masa. Di samping itu, tong sampah juga dilengkapi dengan sistem penghantaran maklumat melalui pesanan ringkas (SMS). Hubungan antara tong dengan Sistem Komunikasi Mudah Alih Global telah diubah menjadi (GSM). Sekiranya penuh dengan sampah, sampah akan memberikan isyarat yang dapat didengar dan pada masa yang sama mengaktifkan Sistem Komunikasi Bergerak Global (GSM) dan menghantar maklumat tersebut kepada pengurusan pembersihan melalui pesanan ringkas (SMS). Dalam sistem ini, Arduino uno digunakan sebagai pengawal mikro untuk memberi kuasa kepada sistem. Sekiranya tahap sampah melebihi had, pekerja syarikat boleh mengambil lebih banyak tindakan untuk membersihkan tong sampah. Sebagai kesimpulan, selain menggunakan teknologi IoT, sistem pemantauan sampah ini dapat menjaga keselamatan kota dan bebas dari pelepasan.

ABSTRACT

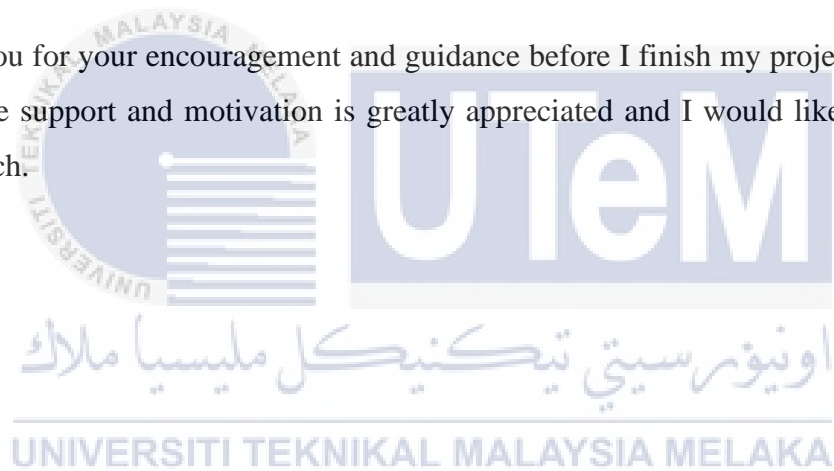
This thesis presents the Implementation of IoT in Smart Garbage System using Blynk that enables users to monitor the capacity of their garbage bins. To take care of and improve the cleanliness around us, such steps should be taken. This project is to develop Blynk, an IoT platform-related waste monitoring system. An ultrasonic sensor will be attached on top of the bin in this device to read the amount of garbage. In the android app, the garbage amount will be notified. Real-time details on the amount and weight of garbage in the bin would be recorded to the customer. Since internet technology has been upgraded in Malaysia, the ESP8266 Wi-Fi module is integrated to be able to send data via Wi-Fi. To make life simpler, any incoming device is now integrated with Wi-Fi for days. This allows users to track the device no matter where and at any time. In addition, the garbage bin is also fitted with an information transmission system via short messages (SMS). The relation between the bins with the Global Mobile Communications System has been changed to (GSM). If it is full of trash, the trash will give an audible signal and at the same time activate the Global Mobile Communications System (GSM) and send the information to the cleaning management via short message (SMS). In this system, the Arduino uno is used as a microcontroller to power the system. If the garbage level exceeds the limit, the employee of the company may take more action to clear the bin. To conclude, in addition to using IoT technology, this garbage monitoring system would be able to keep the city safe and free of emissions.

DEDICATION

Alhamdulillah, praise to the Almighty Allah S.W.T

To my beloved parents, thank you for all the sarifices given. I cannot repay all the effort both of done, only god can. This will also be dedicated to my friends and supervisor of Universiti Teknikal Malaysia Melaka who are directly or indirectly involved in completing this project report and helping me to complete this project in this final year.

Thank you for your encouragement and guidance before I finish my project for the final year. The support and motivation is greatly appreciated and I would like to thank you very much.



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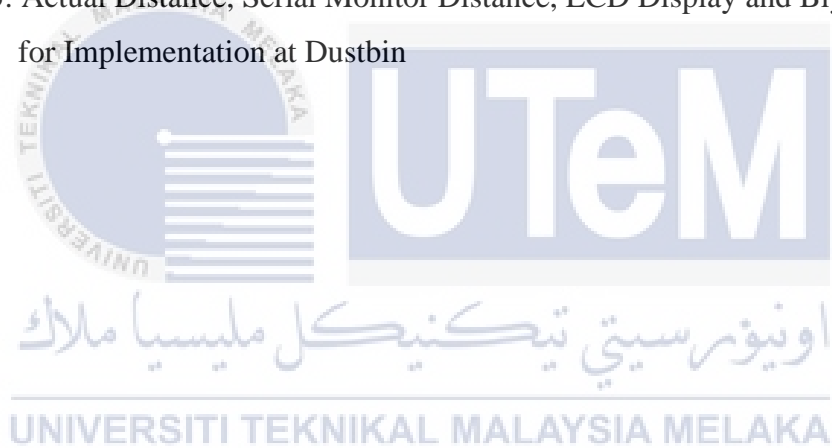
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LIST OF ABBREVIATIONS

IoT	Internet of Things
SWCorp	Solid Waste and Public Cleansing Management Corporation
MSW	Municipal Solid Waste
SWM	Solid Waste Management
GSM	Global System for Mobile Communications
GPRS	General Packet Radio Service
RF	Radio Frequency
DTN	Data Transfer Nodes (DTN)
DSS	Decision Support System
WSN	Wireless Sensor Network
RFID	Radio Frequency Identification
SGS	Smart Garbage System
LCD	Liquid-Crystal Display
LAN	Local Area Network
IR4.0	Industrial Revolution 4.0
SMS	Short Message Service
IDE	Integrated Development Environment
VCC	Voltage Common Collector
TRIG	Trigger
GND	Ground
DC	Direct Current

USB	Universal Serial Bus
ECHO	Echo
I2C	Inter-Intergrated Circuit
V	Voltage
I	Input
O	Output
I/O	Input and Output



CHAPTER 1

INTRODUCTION

1.1 Background

Waste management has become a significant challenge in town areas for most countries round the world. Often, garbage bins in the residential area, beside the buildings are filled with garbage. The overflowed garbage will cause several problems for a neighboring residential area as well as for the community. Generally, waste organisation in Malaysia is monitor by the municipal council. Locally, in Melaka, the waste organisation managed by Solid Waste and Public Cleansing Management Corporation (SWCorp) was decided responsibility by the municipal council to be in charge of the waste. Though recycled waste is collected once a week, local waste is collected twice a week. The garbage collector is not on duty to monitor the garbage bins for 24 hours. The garbage collector does not distinguish the status of the garbage bins, whichever filled or unfilled. Therefore, the problem of an overflow of garbage bin is often and inevitable. The problem of an overflow caused by improper management and waste management can cause many problems for society. These issues range from administration and finance issues to environmental and health issues.

From administration and finance issues, improper waste management and overflow will not only deteriorate the area's environment but also incur more costs to clean up the affected area. In other words, it is a costly investment to distribute garbage to every garbage bin in every resident area every day. If the garbage bins are empty, the collection process can only accomplish a trip in exchange for nothing. Besides, the

garbage trucks are typically wide in size and block the path of the other vehicles on the busy traffic road. When every day, the garbage truck had to go to the residential area to collect garbage that could be one of the city's leading causes of traffic congestion.

From an environmental and health point of view, inadequate management of the garbage bins and the overflowing problems of garbage would certainly have detrimental impacts on the atmosphere and public health. The overflowing garbage bin will worsen the area as the solid waste smell, and the liquid waste spreads throughout the area, affecting the lives of the neighbourhoods. The scent of the overflow garbage bin can, in effect, attract the stray dog, rodent and cat to the garbage bin. These animals would make the situation even worse by spreading diseases, rubbishes in the residential area. Thus the life and health of the neighbouring person as well as the environment are affected.

Malaysia experiences tests with respect to the solid waste sector because of populace and tourism growth, financial growth for sustainable expansion and inadequate application of waste legislation organisation and community attitudes amongst residents (Behzad et al., 2011). In year 2012, a total daily generation of 33,000 tons of municipal solid waste (MSW) was recorded which exceeded the projected generation of waste (The Malaysian Times, 2013). Consequently, the need to use another way to correctly manage the solid waste avoid unwanted impacts to human well-being and the surrounding areas. In figure 1.1, shows referring to the Solid Waste Management (SWM) Lab 2015 Report, it is projected that Malaysians are predictable to produce 49,670 tons of waste per day by the year 2020 (Malaysia's Performance Management and Delivery Unit (PEMANDU), 2015).

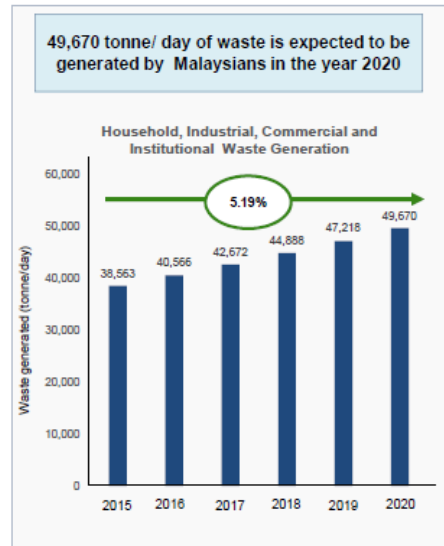


Figure 1.1: Expected Waste in 2015-2020

(http://www.kpkt.gov.my/resources/index/user_1/Attachments/hebahan_slider/slaid_dapatan_makmal.pdf)



aid_dapatan_makmal.pdf



1.2 Problem Statement

For solve these problems, the best solution is implementation of IoT in smart garbage system to reduction the total of the collection solid waste as well as less times consuming for collecting in residential area. Similarly, the use of smart garbage system to collect waste reduces the traffic jam and protects both the public environment and public health. The scheme trails an IoT-based technique where the castoff waste from the smart garbage is constantly check by sensors that notify the filling level of respectively section, in actual (Pardini et al., 2020). Smart waste management systems provide a modern way to develop waste management systems by using new technologies such as radio frequency (RF) transmitters and ultrasonic sensors with GSM/GPRS as well as Arduino Mega and Arduino Uno.

Waste management system residential area is important for Malaysia environmental and sustainable growth. Maintaining general waste in the garbage mix is one of the problems with our of the main problems with our environment, environmental pollution often affects the management of solid waste that is successful for public health, and prevents many health-related diseases to the public. Local waste is collected twice a week, whilst recycled waste is collected once a week. However, waste collection is still practiced but the present collection does not let local municipalities to either distinguish the full or empty status of the garbage bins. As the population increases, the task of gathering waste becomes sporadic and meaningless. Although there is no formal schedule for any form of waste collection, too much waste can attract animals and insects. Therefore, the problem of overflow garbage bins problem is always and unavoidable. Problems of overflow caused by unsuitable management and waste management may cause many problems for society.

1.3 Objective

The objective of this project is:

- i. To develop smart garbage bins integrated with IoT.
- ii. To develop program solid waste monitoring and the management of the general collection procedure thru IoT.
- iii. Integrate the dustbin project that uses the communication system to sending information data.

1.4 Project Scope and Limitation

The main scope of this project is to implementation of IoT in smart garbage system. This project provides a higher quality service to the citizens. Thus, a smart garbage system can settlement and maximize the treatment of solid municipal waste. So, immediately and solid waste collection get smarter city service operation for the network tracking the status of solid waste garbage bins. The study for this project will be cover on using Arduino and coding for Arduino.

Then, the project research on how interconnected systems can be extend by modelling, analysing, optimizing and visualizing the operation of the service. In this study, limitation was available in this project. For this project cannot work when the garbage bins did not connect with internet. Also, limitation this project did not separate the types of waste like plastic and paper etc.