

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SMART DUSTBIN AUTO SANITIZER

NAME

REGISTRATION NO

**NUR ADRIENA FARHANIM BINTI
ANUAR**

08DEU20F2017

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

POLITEKNIK

SULTAN SALAHUDDIN ABDUL AZIZ SHAH

SMART DUSTBIN AUTO SANITIZER

NAME

REGISTRATION NO

NUR ADRIENA FARHANIM BINTI
ANUAR

08DEU20F2017

This report submitted to the Electrical Engineering Department in fulfillment of the requirement for a Diploma in Electrical Engineering

JABATAN KEJURUTERAAN ELEKTRIK

SESI 2 2022/2023

CONFIRMATION OF THE PROJECT

The project report titled "SMART DUSTBIN AUTO SANITIZER" has been submitted, reviewed and verified as a fulfills the conditions and requirements of the Project Writing as stipulated

Checked by:



Supervisor's name : PUAN NORHAYATI BT CHE HUSIN

Supervisor's signature:

Date :

Verified by:

Project Coordinator name :

Signature of Coordinator :

Date :

“I acknowledge this work is my own work except the excerpts I have already explained to our source”

1. Signature :

Name : **NUR ADRIENA FARHANIM BINTI ANUAR**

Registration Number : **08DEU20F2017**

Date : 6.6.2023

DECLARATION OF ORIGINALITY AND OWNERSHIP

TITLE : SMART DUSTBIN AUTO SANITIZER USING ARDUINO

SESSION: 2 : 2022/2023

1. I, **1. Nur Adriena Farhanim Binti Anuar (08DEU20F2017)**

is a final year student of **Diploma in Electronic Engineering (Medical), Department of Electrical, Politeknik Sultan Salahuddin Abdul Aziz Shah**, which is located at **Persiaran Usahawan,40140 Shah Alam Selangor Darul Ehsan**. (Hereinafter referred to as 'the Polytechnic').

- 2. I acknowledge that 'The Project above' and the intellectual property therein is the result of our original creation /creations without taking or impersonating any intellectual property from the other parties.
- 3. I agree to release the 'Project' intellectual property to 'The Polytechnics' to meet the requirements for awarding the **Diploma in Electrical Engineering** to me.

Made and in truth that is recognized by;

a) **Nur Adriena Farhanim Binti Anuar**
(Identification card No: - 08DEU20F2017)

)
.....
) **Nur Adriena Farhanim Binti Anuar**

In front of me, **Norhayati Binti Che Husin** (Click here to enter text.)

) 
.....
) **Norhayati Binti Che Husin**

As a project supervisor, on the date:

ACKNOWLEDGEMENTS

I have taken efforts in this Project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them. I am highly indebted to Puan Norhayati Bt Che Husin for their guidance and constant supervision as well as for providing necessary information regarding the Project & also for their support in completing the Project.

I would like to express my gratitude towards my parents & member of (Project 2) for their kind co-operation and encouragement which help me in completion of this Project. I would like to express my special gratitude and thanks to industry persons for giving me such attention and time.

My thanks and appreciations also go to my colleague in developing the Project and people who have willingly helped me out with their abilities.

ABSTRACT

This project is to design and develop a “SMART DUSTBIN AUTOMATIC SANITIZER”. Nowadays, maintaining good health is an essential part of our lives. Countries around the world are facing health related problems due to the spread of emerging and re-emerging infectious diseases. These infectious diseases can not only transfer from person-to-person but can also infect them by using or touching the waste generated by an infected person, so we need to ensure that the disposed waste does not lead to transfer of infection among others. This has increased the demand of an advanced waste managing system. However, inventions are proposed to manage the collection and disposal of waste but need to design a secure and smart waste management system. In order to do so, I have designed a system called ‘Smart Dustbin Auto Sanitiver’. It works on the basic fundamental of sensors. The main idea of this project is to create a clean, hygienic and disease-free environment.

ABSTRAK

Projek ini adalah untuk mereka bentuk dan membangunkan "SMART DUSTBIN AUTOMATIC SANITIZER". Pada masa kini, mengekalkan kesihatan yang baik adalah bahagian penting dalam kehidupan kita. Negara-negara di seluruh dunia menghadapi masalah berkaitan kesihatan akibat penyebaran penyakit berjangkit yang muncul dan muncul semula. Penyakit berjangkit ini bukan sahaja boleh berpindah dari orang ke orang tetapi juga boleh menjangkitinya dengan menggunakan atau menyentuh sisa yang dihasilkan oleh orang yang dijangkiti, jadi kita perlu memastikan bahawa sisa yang dibuang tidak membawa kepada pemindahan jangkitan antara lain. Ini telah meningkatkan permintaan sistem pengurusan sisa termaju. Walau bagaimanapun, ciptaan dicadangkan untuk menguruskan pengumpulan dan pelupusan sisa tetapi perlu mereka bentuk sistem pengurusan sisa yang selamat dan pintar. Untuk berbuat demikian, saya telah mereka satu sistem yang dipanggil 'Smart Dustbin Auto Sanitiver'. Ia berfungsi pada asas asas penderia. Idea utama projek ini adalah untuk mewujudkan persekitaran yang bersih, bersih dan bebas penyakit.

TABLE OF CONTENTS

| | |
|--|--------------------------------------|
| CONFIRMATION OF THE PROJECT | i |
| DECLARATION OF ORIGINALITY AND OWNERSHIP | iii |
| ACKNOWLEDGEMENTS | iv |
| ABSTRACT | Error! Bookmark not defined. |
| ABSTRAK | vi |
| TABLE OF CONTENTS | vii |
| LIST OF TABLES | ix |
| LIST OF FIGURES | x |
| LIST OF SYMBOLS | Error! Bookmark not defined. |
| LIST OF ABBREVIATIONS | Error! Bookmark not defined. |
| CHAPTER 1 | 1 |
| 1 INTRODUCTION | 1 |
| 1.1 Introduction | 1 |
| 1.2 Background Research | 1 |
| 1.3 Problem Statement | 1 |
| 1.4 Research Objectives | 2 |
| 1.5 Scope of Research | 2 |
| 1.6 Project Significance | 2 |
| 1.7 Chapter Summary | 2 |
| CHAPTER 2 | 3 |
| 2 LITERATURE REVIEW | 3 |
| 2.1 Introduction | 3 |
| 2.2 Smart Dustbin Auto Sanitizer (Literature Review Topic 1) | Error! Bookmark not defined. |
| 2.2.1 Previous Research (Subtopic Literature Review Topic 1) | Error! Book mark not defined. |
| 2.3 Control System (Literature Review Topic 2) | Error! Bookmark not defined. |
| 2.3.1 Microcontroller | 10 |
| 2.3.2 Programmable Logic Control (PLC) | 10 |
| 2.3.3 Arduino | 10 |
| 2.4 Chapter Summary | 10 |
| CHAPTER 3 | 11 |
| 3 RESEARCH METHODOLOGY | 11 |
| 3.1 Introduction | 11 |
| 3.2 Project Design and Overview. | 11 |
| 3.2.1 Block Diagram of the Project | 11 |
| 3.2.2 Flowchart of the Project 2 | 13 |
| 3.2.3 Project Description | 13 |

| | | |
|----------|--|-----------|
| 3.3 | Project Hardware | 13 |
| 3.3.1 | Schematic Circuit | 14 |
| 3.3.2 | Description of Main Component | 14 |
| 3.3.2.1 | Component 1 | 15 |
| 3.3.2.2 | Component 2 | 15 |
| 3.3.2.3 | Component 3 | 16 |
| 3.3.3 | Circuit Operation | 18 |
| 3.4 | Project Software | 19 |
| 3.4.1 | Flowchart of the System | 20 |
| 3.4.2 | Description of Flowchart | 21 |
| 3.5 | Prototype Development | 22 |
| 3.5.1 | Mechanical Design/Product Layout | 23 |
| 3.6 | Sustainability Element in The Design Concept | 23 |
| 3.7 | Chapter Summary | 23 |
| | CHAPTER 4 | 24 |
| 4 | RESULTS AND DISCUSSION | 24 |
| 4.1 | Introduction | 24 |
| 4.2 | Results and Analysis | 24 |
| 4.3 | Discussion | 24 |
| 4.4 | Chapter Summary | 24 |
| | CHAPTER 5 | 25 |
| 5 | CONCLUSION AND RECOMMENDATIONS | 25 |
| 5.1 | Introduction | 25 |
| 5.2 | Conclusion | 25 |
| 5.3 | Suggestion for Future Work | 25 |
| 5.4 | Chapter Summary | 25 |
| | CHAPTER 6 | 26 |
| 6 | PROJECT MANAGEMENT AND COSTING | 26 |
| 6.1 | Introduction | 26 |
| 6.2 | Gant Chart and Activities of the Project | 26 |
| 6.3 | Milestone | 27 |
| 6.4 | Cost and Budgeting | 28 |
| 6.5 | Chapter Summary | 28 |
| | REFERENCES | 29 |
| 7 | APPENDICES | 30 |
| | APPENDIX A- DATA SHEET | 30 |
| | APPENDIX B- PROGRAMMING | 32 |
| | APPENDIX C- PROJECT MANUAL/PRODUCT CATALOGUE | 34 |

LIST OF TABLES

| TABLE | TITLE | PAGE |
|-------|---|---|
| | Table 2.1: Treatments to Smart Dustbin Auto Sanitizer in the Market..... | 9 |
| | Table 3.2: Means and Standard Deviations (In Brackets) Of Strength Scores (In Pounds Force) For Each Hand Of Males. Right Hand. | Error! Bookmark not defined. |

LIST OF FIGURES

| FIGURE | TITLE | PAGE |
|-------------|---|-------------------------------------|
| Figure 2.1: | Block diagram of open loop and closed loop system | Error! Bookmark not defined. |
| Figure 3.1: | Flow chart of operation of the system | Error! Bookmark not defined. |
| Figure 3.2: | Circuit Diagram | Error! Bookmark not defined. |
| Figure 3.3: | Front view of the project | 23 |

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, maintaining good health is an essential part of our lives. Countries around the world are facing health related problems due to the spread of emerging and re-emerging infectious diseases. These infectious diseases can not only transfer from person-to-person but can also infect them by using or touching the waste generated by an infected person, so we need to ensure that the disposed waste does not lead to transfer of infection among others. This has increased the demand of an advanced waste managing system. However, inventions are proposed to manage the collection and disposal of waste but need to design a secure and smart waste management system. In order to do so, I have designed a system called 'Smart Dustbin Auto Sanitiver'. It works on the basic fundamental of sensors. The main idea of this project is to create a clean, hygienic and disease-free environment.

1.2 Background Research

SMART DUSTBIN USING ARDUINO is an IOT based project. Here we are using arduino for code execution, for sensing we used ultrasonic sensor which will open lid and wait for few moment. It will bring drastic changes in tern of cleanliness with the help of technology. Everything is getting with smart technology for the betterment of human being. So this help in maintaining the environment clean with the help of technology. It is a sensor based dustbin so it would be easy to access/use for any age group

1.3 Problem Statement

- The user don't like to touch the rubbish because it is dirty.
- After throw the rubbish, people always not remember to wash their hand cleanly. - The rubbish is full until it falls out of the dustbin because it is very full and not cleaned or collected yet.
- Sometime, people keep throw the rubbish even the dustbin is full because they are not alert with it and don't care if the rubbish fall out the dustbin when it is no space yet.

1.4 Research Objectives

It mainly focuses on sanitization and segregation of waste without human intervention. In addition to this, it will help to prevent the emission of harmful gases from the decayed waste. The system can also detect waste and automatically notify the receiver when the bin is full. Thus, I can say that, it is an all in one dustbin which can be used in localities and at our homes.

1.5 Scope of Research

The aim of this project is to create a basic, healthy lifestyle to make everyone always in hygiene. It is include automatic system.

1.6 Project Significance

Smart Dustbin works on the principle of object detection using an ultrasonic sensor. The ultrasonic sensor transmits sound waves. These waves get reflected whenever an object comes into the vicinity of the sensor. This generates an electrical signal which is used to open the dustbin lid. First and foremost, automatic hand sanitizer dispensers are truly contactless. Built in motion sensors – instead of a manual push pad – ensures sanitizer is accurately dispensed when hands are placed in the dispensing area, without the need to touch anything.

1.7 Chapter Summary

An introduction to the project, which uses a capacitive sensor and arduino, can be found in this chapter. I then create the problem statement, project objective, and project scope for this project after conducting background research.

CHAPTER 2

LITERATURE REVIEW

1.8 Introduction

Engineering students and professionals today routinely research the project. This is as a result of their increased awareness and interest in the system. For them, the success of this project is essential to the development of technology and the future easement of human life.

1.9 Table Of Journal

| NO | TITLE/AUTHOR | OBJECTIVE | METHOD | RESULT |
|----|---|--|--|--|
| 1 | <ul style="list-style-type: none">○ Hand Sanitizer an Alternative to Hand Washing○ <u>Pallavi Singh, Ipshita Potlia, and Himanshu Chauhan</u> | In comparison to the hand sanitizer, soap and water are more efficacious in removing certain microbes, pesticides, and other chemical residues that dawdle on hands. Hand sanitizers are more effective in hospitals when hands are in contact | A search was performed using three databases, PubMed, Scopus, and Google Scholar published from 2010 to 2019. The keywords for the survey were “hand-washing,” “hand sanitizer,” and “effective.” After the relevant articles were found, the critical appraisal was made to select those that were suitable for the systematic review. The inclusion criteria of the study were surveys, clinical studies, no sample size | Evaluated that washing hands with soap and water are more practical and efficacious than using the sanitizer on greasy and soiled hands. An alcohol- based sanitizer, if used correctly and in appropriate volume, can disseminate certain type of microorganisms. |

| | | | | |
|---|---|--|--|---|
| | | with germs, but not soiled or greasy | restrictions, and only English papers. Any conference abstracts, case reports, and unpublished data were excluded from this study. | |
| 2 | ➤ A Smart Waste Bin for Smart Waste Management ➤ | to check the level of garbage filled in the dustbin and sends the alert to the municipal web server once if garbage is filled. After cleaning the dustbin, the driver confirms the task of emptying the garbage with the aid of RFID Tag. RFID is a computing technology that is used for verification process and in addition, it also enhances the smart garbage alert system by providing automatic identification of garbage | the bin was connected with a microcontrollerbased system which had IR wireless system with a main central system that shows the current status of the garbage bin. | This system monitors the garbage bins and informs about the level of garbage collected in the garbage bins. For this the system uses ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth. The working program is fed into the ATMEGA 16. Ultrasonic sensor senses the garbage level and accordingly send the signals to the ATMEGA16. ATMEGA16 process the received signal and passed further to the ESP8266. ESP8266 is a Wi-Fi |

| | | | | |
|--|--|---|--|--|
| | | <p>filled in the dustbin and sends the status of cleanup to the server affirming that the work is done.</p> | | <p>module (node MCU) which is also working as a transmitter in our system. ESP8266 plays very important role in reducing the hardware of the system. In this way when garbage crosses the threshold level, web page displays the location of that bin by using html. Sensor is used for sensing the garbage whether it is dry or wet. Motor (30 RPM) is used for purpose of Separation of garbage. When garbage is wet or dry according to the situation motor rotated anticlockwise or clockwise.</p> |
|--|--|---|--|--|

| | | | | |
|---|---|--|--|--|
| | | | <p>user is authorized or not. LCD also helps to make troubleshooting easier.</p> <p>Alarming option is provided to warn about an unauthorized usage.</p> <p>Microcontroller used is PIC16F877.</p> | <p>option through keypad. In this project we use a fingerprint sensor to read one identity to automatically operate the door of the car. For this, we use a microcontroller to enable the door opening or closing if the matching between scanned data and the already existing data is correct.</p> |
| 3 | <p>➤ A systematic of hand hygiene improvement strategies</p> <p>➤ <u>Anita Huis, Theo van Achterberg, Marijn de Bruin, Richard Groel, Lisette Schoonhoven, and Marlies Hulscher.</u></p> | <p>Many strategies have been designed and evaluated to address the problem of low hand hygiene (HH) compliance. Which of these strategies are most effective and how they work is still unclear. Here we describe frequently used improvement strategies and related determinants of behaviour change that</p> | <p>Systematic searches of experimental and quasiexperimental research on HH improvement strategies were conducted in Medline, Embase, CINAHL, and Cochrane databases from January 2000 to November 2009. First, we extracted the study characteristics using the EPOC Data Collection Checklist, including study objectives, setting, study design, target population,</p> | <p>The most frequently addressed determinants were knowledge, awareness, action control, and facilitation of behaviour. Fewer studies addressed social influence, attitude, self-efficacy, and intention. Thirteen studies used a controlled design to measure the effects of HH improvement strategies on HH behaviour. The</p> |

| | | | | |
|---|---|--|--|--|
| | | prompt good HH behaviour to provide a better overview of the choice and content of such strategies. | outcome measures, description of the intervention, analysis, and results. Second, we used the Taxonomy of Behavioural Change Techniques to identify targeted determinants. | effectiveness of the strategies varied substantially, but most controlled studies showed positive results. The median effect size of these strategies increased from 17.6 (relative difference) addressing one determinant to 49.5 for the studies that addressed five determinants. |
| 4 | ➤ ➤ Research work on smart bins and intelligent waste management systems | - critically analyzed and summarized around twenty research works and projects addressing this issue. It is observed that most the the recent works uses Arduino Uno as their platform. Most of the works have the same working principle that their system based on IoT | The sensed information is transmitted through RF signals to the PIC controller which in turn forwards the data to the central server. The data recorded can be checked on the webpage in the receiver's LCD that is connected to the server. For waste collection when the | IoT based sensor system is applied to detect the volume of trash. The GPS (Global Positioning system) system is used to identify the location of these smartbins. This location information is communicated to the waste management department through GSM (Global System for Mobile Communications) on smartphones. Using the Google Maps the location of the dustbin can be found. |

| | | | | |
|--|---|--|--|--|
| | ➤ | monitors the level of waste in the dustbin using the ultrasonic sensors installed in it. | | |
|--|---|--|--|--|

| | | | | |
|---|---|--|--|--|
| 5 | <p>➤ NODEMCU, IFTTT webhooks, Ultrasonic Sensor, Dustbin, jumper Wires</p> | <p>When garbage exceeds the threshold, the sensor activates the GSM modem, which warns the related authority before the bin is cleared. Various issues such as the affordability, the maintenance, and durability were addressed when these smart bins were planned, according to the conclusion..</p> | <p>uses arduino, servomotor, GSM module, ultrasonic sensor for doing the same result and it is not cost efficient. Ultrasonic sensor is present inside the dustbin where the height of the waste inside the dustbin is measured and it send a mail when the dustbin is above 70 percent. Only sending the notification is the existing method.</p> | <p>identify a dustbin is completed or otherwise. A dustbin updates its status percentage, and when more than 70 percent of the dustbin is filled, it sends an email that the dustbin is almost full. IFTTT Webhooks are used for collect NodeMCU data and, send an email when the trash level exceeds 70%. The device removes the need for people to regularly monitor the trash cans; instead, we will receive a message once the trash reaches fully functional.</p> |
|---|---|--|--|--|

1.9.1 Microcontroller

A microcontroller is a compact integrated circuit designed to govern a specific operation in an embedded system. A typical microcontroller includes a processor, memory and input/output (I/O) peripherals on a single chip.

1.9.2 Programmable Logic Control (PLC)

A programmable logic controller (PLC), or programmable controller is an industrial digital computer a type of tiny computer that can receive data through its inputs and send operating instructions through its outputs. Fundamentally, a PLC's job is to control a system's functions using the internal logic programmed into it.

1.9.3 Arduino

Arduino is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc and initially released in 2010. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

1.10 Chapter Summary

This chapter discusses the literature reviews of five journals that I discovered to be relevant to this study. One Atmel Atmega328p, one microcontroller, and the other Arduino were used from this five journals.

CHAPTER 3

RESEARCH METHODOLOGY

1.11 Introduction

A very thorough plan is being implemented in order to actualize this Project as a product that is ready to use with safety characteristics. To ensure that the Project is finished on time, a step-by-step process is followed. This involves gathering information from a sample dustbin sensing system

1.12 Project Design and Overview.

The scope of this project is to help the people that need to wash their hand after throwing the rubbish and to make sure the rubbish not abundant and not create an unpleasant smell, then it is also have benefit to people who are tired to change the plastic bag after empty the dustbin. It is to save the time, money and energy of the people. This project is also to help the environment from getting infected from rat, flies and poisonous insects. This project will take up around 7 months in total to finish build it. The estimated cost that has to spend about RM300- RM400. The hardware resources are available online and could purchase it there.

1.12.1 Block Diagram of the Project

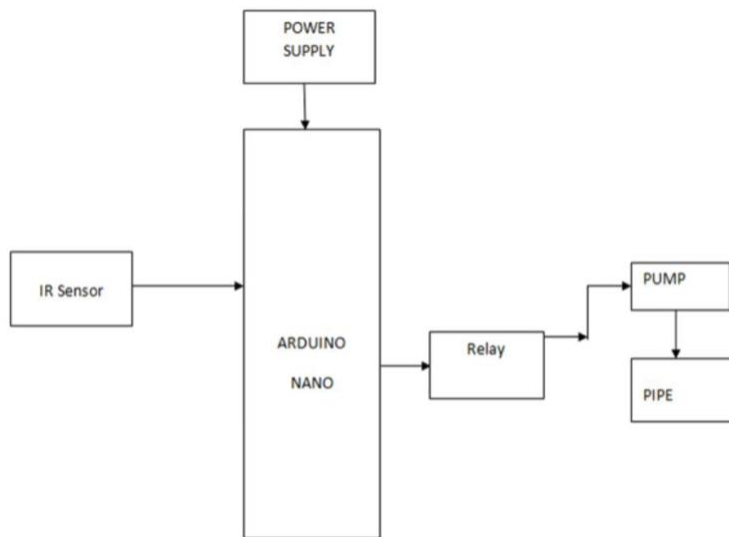
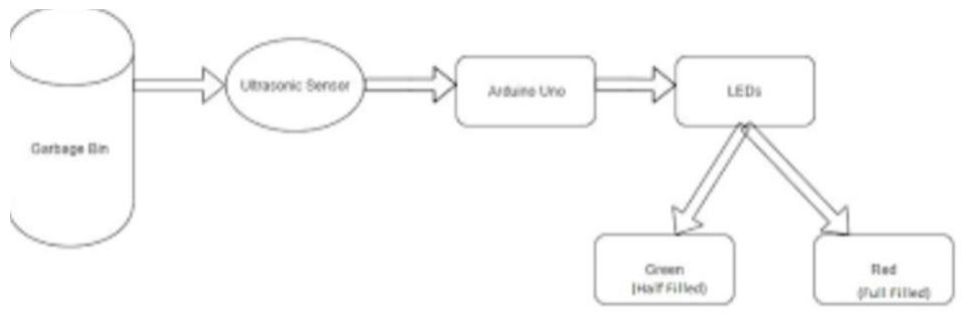
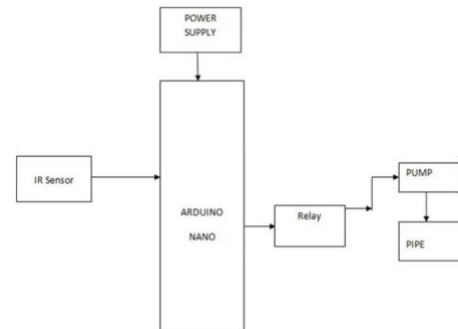


Figure 3.1: Block diagram of operation of the system

1.12.2 Flowchart of the Project 2

Error! Reference source not found. shows the circuit diagram of the whole system.



1.12.3 Project Description

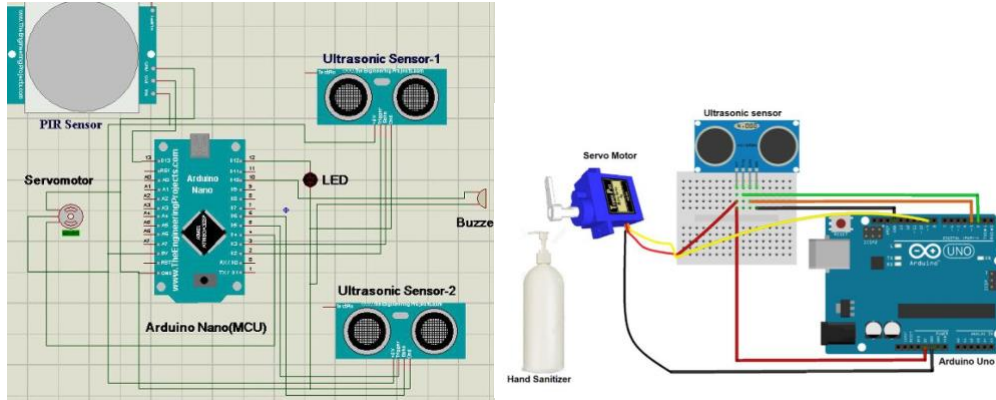
The only user interaction with our system is at the waste inlet where the users leave their waste. The units are typically placed conveniently within 30 meters from residential or office buildings in a group, with separate inlets for each different kind of waste. The users sort their waste at home and dispose of them in the respective units. We want to make sorting easy to encourage recycling and thus, enable a circular economy for the future. Compared to traditional waste rooms or bins, our inlets are completely sealed, minimizing smells, mess and unsanitary conditions as well as the risk for vermin.

1.13 Project Hardware

As mentioned in the chapter above, the controller was designed using an Arduino . A smart dustbin comprising of Arduino Nano ultra-sonic sensors, servomotors, and LED has been proposed. It determines the level of wastes in the dustbin and generates sound and light signals when it fills up. In addition, by using the PIR and ultrasonic sensor, the dustbin opens up automatically if the user approaches it and is within a range of 15cm. The advantage of the proposed system is that it is very cost-effective and also does not require any internet and GSM module. In future research, the proposed smart dustbin can be enhanced by adding wheels and other sensing mechanisms so that it can pickup trash automatically. It can also be made capable of detecting hazardous or environmentally friendly wastes. Other possible enhancements include the connection of smart dustbin with open-source computer vision(CV) which will enable the dustbin to open its lid only when the user is in front of it. To supply continuous energy to the dustbin, the DC battery can be placed with a DC rechargeable battery attached to the charging circuitry .

1.13.1 Schematic Circuit

Error! Reference source not found. shows the overall circuit diagram of this Project using one (1) arduino



1.13.2 Description of Main Component

ARDUINO UNO



The Arduino UNO is a type of Arduino product that is used in electronics project and circuit design mostly by the beginners. There are various features that make the board suitable for the use and preferred over other Arduino products. The selection of right Arduino products is based on user requirement but the Arduino UNO is a standard board compared to Arduino products. Arduino UNO is a low-cost, flexible, and easy-to-use programmable open-source microcontroller board that can be integrated into a variety of electronic projects. This board can be interfaced with other Arduino boards, Arduino shields, Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

1.13.2.1 Component 1

ULTRASONIC SENSOR



An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

1.13.2.2 Component 2

SERVO MOTOR



The servo motor is the motor used for servo system. The so-called servo system is a control system that acts according to the instructions. It can compare the actual state of the system with the corresponding state of the instructions, and use the comparison result for further control. Servo motors include direct current motors (with brush and brushless) and alternating current motors (synchronous and asynchronous). The function of the servo motor is to convert the control signal of the controller into the rotational angular displacement or angular velocity of the motor output shaft. Servo motor is used to drive the joints. Generally, servo motors used in robots should have the following characteristics: fast response speed, high starting torque, wide speed range, etc. When used in a collaborative robot, the servo motor should have the characteristics of small size, lightweight, and hollow structure to achieve safe human–robot collaboration.

1.13.2.3 Component 3

IR SENSOR



IR sensors are now widely used in motion detectors, which are used in building services to switch on lamps or in alarm systems to detect unwelcome guests. In a defined angle range, the sensor elements detect the heat radiation (infrared radiation) that changes over time and space due to the movement of people.

1.13.2.4 Component 4

BUZZER



When a voltage is applied across the two electrodes, the piezoelectric material mechanically deforms due to the applied voltage. This movement of the piezo disk within the buzzer creates sound in a similar manner as the movement of the ferromagnetic disk in a magnetic buzzer or the speaker cone mentioned above.

1.13.2.5 Component 5

LED (RED & GREEN)



A light-emitting diode is a semiconductor device that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light is determined by the energy required for electrons to cross the band gap of the semiconductor.

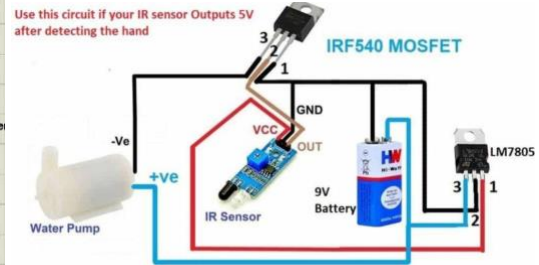
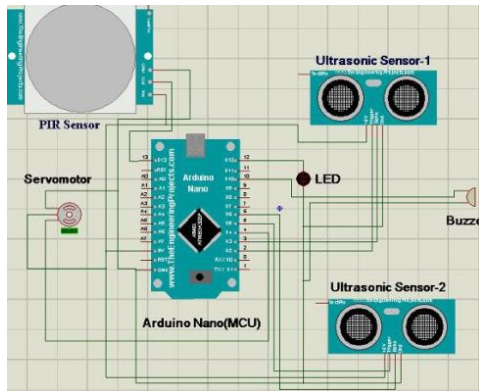
1.13.2.6 Component 6

POWER SUPPLY

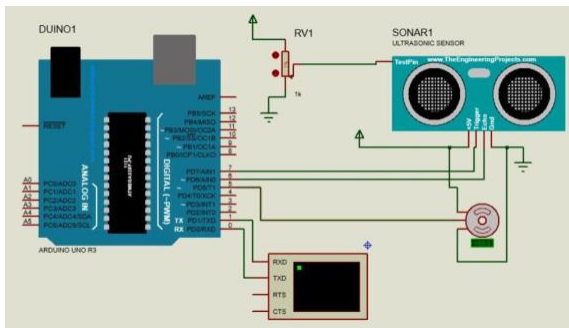
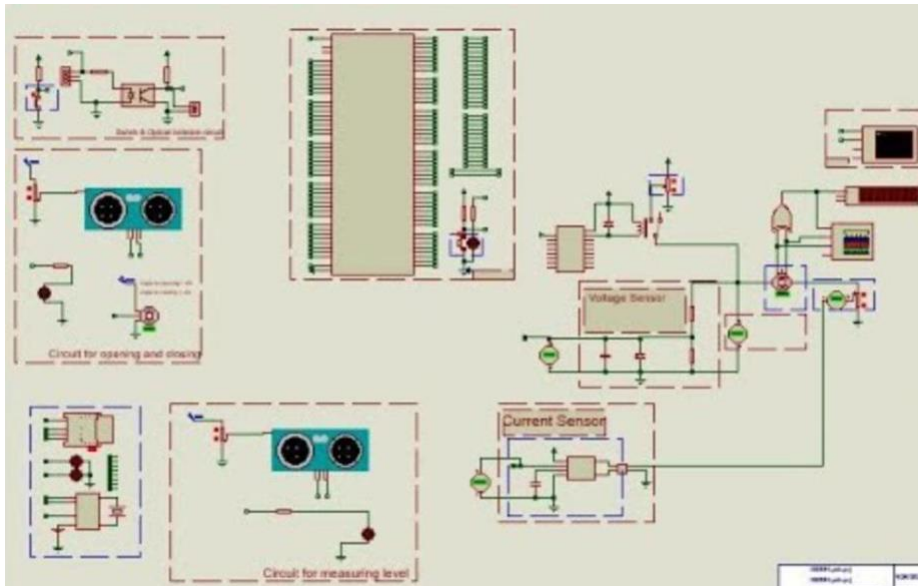


It basically consists of the following elements: transformer, rectifier, filter and regulator circuits. Power supply units (PSU) are used in computers, amateur radio transmitters and receivers, and all other electronic equipment that use DC voltage as an input.

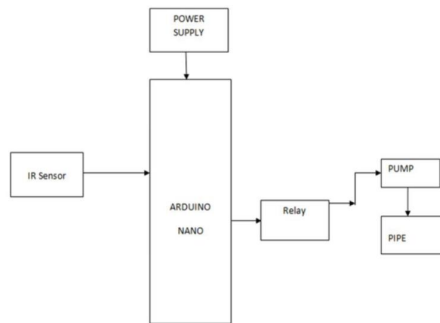
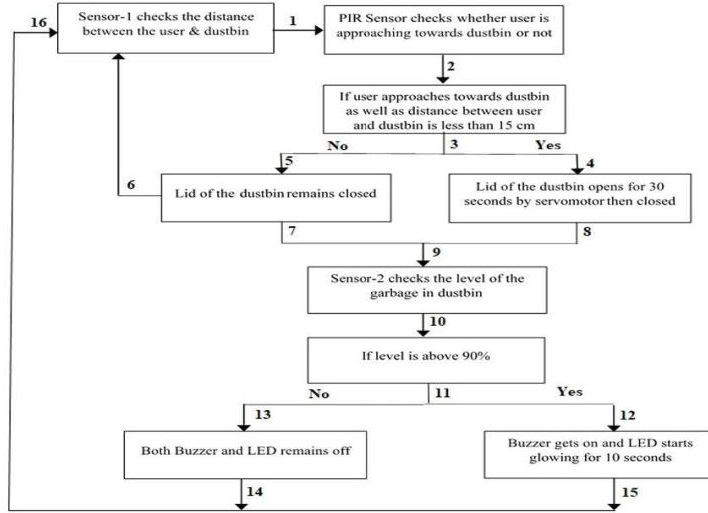
1.13.3 Circuit Operation



1.14 Project Software



1.14.1 Flowchart of the System



1.14.2 Description of Flowchart

- It is important to dispose of the trash properly. It is a responsibility with which everyone should comply. In the era of Covid-19, people are trying to innovate everyday life things and make things as contactless as possible. Smart dustbin is one of those innovative ideas.

- The smart dustbin uses an Ultrasonic sensor HC-SR04 to detect objects in front.

- It then sends the signals to Arduino Uno. The Arduino understands the signal and sends a signal to the Servomotor which opens the flap on top of the dustbin.

- Here I have program it to open the flap for only 3 seconds after 3 seconds the flap automatically closes. You can change that time just by making minor changes to the code in Arduino IDE.

- The circuit diagram for smart dustbin contains three main components: Arduino Uno, Power supply and an ultrasonic sensor.

- The Ultrasonic sensor HC-SR04 pins echo and trig are connected to Arduino Uno pins 5 and 6 respectively. The VCC pin is connected to 5V on Arduino Uno and both the grounds are connected together.

- A 9v battery has been connected to Vin pin on the Arduino Uno and grounds are connected together.

- Development Board - Arduino UNO - A Processor Unit in this project.

The Arduino Uno will process the data collected from an Ultrasonic sensor, and control the servo motor to press the pump bottle of hand sanitiser.

- Ultrasonic Sensor - A key component to detect the distance between people and hands with the automatic dispenser when it detected the hands for about 3-4 seconds.

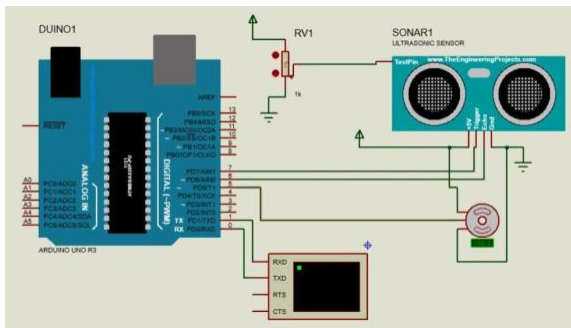
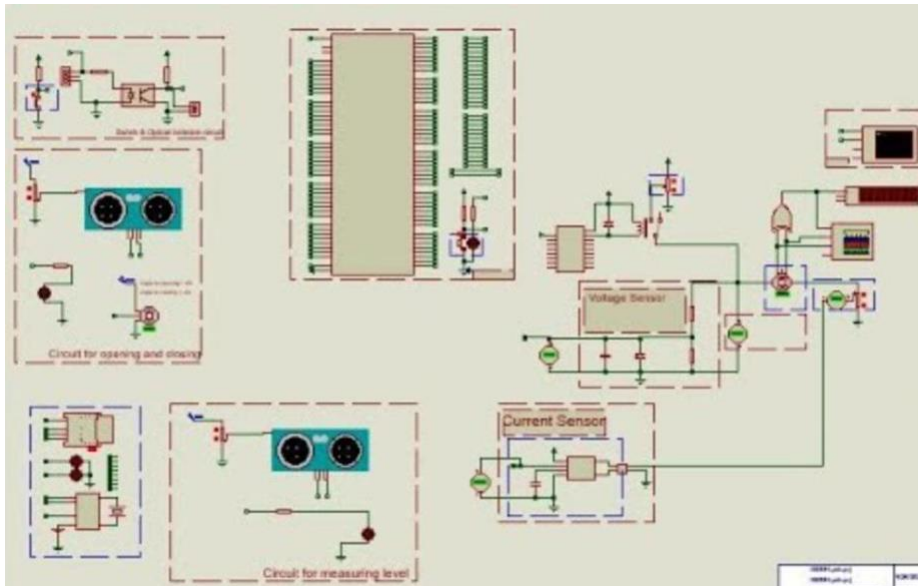
- Servo Motor - Driver to press the pump bottle.

- 3D Printed Case - Mount the built IoT suite to a pump bottle.

- Jumper Wire - Connect the Arduino Uno with IoT sensors and drivers.

- Power supply - it is connected to the arduino uno

1.15 Prototype Development



1.15.1 Mechanical Design/Product Layout

Figure 0.1 shows the design of the product ...



Figure 0.1: Front view of the Project

1.16 Sustainability Element in The Design Concept

In this sub-topic student should elaborate on the design criteria of their Project either environmental design criteria, social design criteria use of sustainable design tool or economic design criteria. Also explain contribution to the society of the Project proposed.

1.17 Chapter Summary

The project's research methodology is covered in this chapter. I've included the project's block diagram, project description, hardware, circuit diagram, component description, circuit operation, project flowchart, and flowchart description in this study technique.

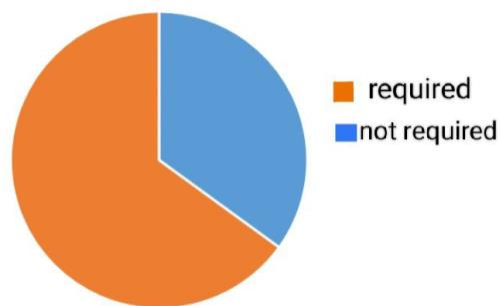
CHAPTER 4

RESULTS AND DISCUSSION

1.18 Introduction

The steps taken in the observation to examine every point of view from the user have already been implemented. The next step is to place the product in one place for a period of time and ensure that users give feedback on their improvement or acceptance of this Smart Dustbin Auto Sanitizer.

1.19 Results and Analysis



1.20 Discussion

From the results, some steps can be taken as a way to improve in the future. Each of them gave feedback after trying to use the Smart Dustbin Auto Sanitizer product. Smart Dustbin Auto Sanitizer is a new tool that wants to be given full support to ensure that the product can get a high marketability scope for the common good. Considering that more and more infectious diseases involve contact, in this way the responsible party may help reduce the spread and help the special group by making it easier for them to stay hygienic without needing a lot of movement and will reduce the risk of harm. Most of them are required to have this product.

1.21 Chapter Summary

The project's results and discussion is covered in this chapter. I've included the project's introduction, results and analysis, and discussion.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

1.22 Introduction

All studies play an important role to produce a conclusion, before the conclusion and discussion. It is the result of observation from each part to examine the available conclusions. For example, all products have been designed but all of them are isolated with their own functions. There is no special combination as completely designed as the Smart Dustbin Auto Sanitizer that has been created.

1.23 Conclusion

A simple but useful project called Smart Dustbin using Arduino is designed and developed here. Using this project, the lid of the dustbin stays closed, so that waste is not exposed (to avoid flies and mosquitos) and when you want dispose any waste, it will automatically open the lid. The automatic hand sanitizer device proposed in this paper is ultimately expected to contribute to contactless hand disinfection in public places and virus infection prevention. Additionally, it is economical and eco-friendly by decreasing waste emissions.

1.24 Suggestion for Future Work

This project is an innovation from original device. This project was upgrade LED for add-ons that use to display process which in running. If a old device use 'manual' to notice if the trash is full but in this project was used LED and buzzer to inform it. Microcontroller also add-ons because this component will control all process in this project. Recommendation for this project in next time is this project will make as a portable that can use at everywhere in every time that need. Another else, ultrasonic sensor for next time project can upgrade more fast because it can detect object in front of it and automatically open it. It is also hygiene way after used it because it has auto sanitizer that automatically spray to your hand without touch it, just put your hand for about 3 seconds and it will automatically spray the hand sanitizer to your hand after detected it. Hopefully this recommendation will be useful to upgrade Smart Dustbin Auto Sanitizer. This product should be user-friendly and portable for upgrade healthy in daily life.

1.25 Chapter Summary

The project's conclusion and recommendation is covered in this chapter. I've included the project's introduction, conclusion and suggestion for future work.

CHAPTER 6

PROJECT MANAGEMENT AND COSTING

1.26 Introduction

It is difficult for us to innovate it because we didn't have a sponsor so we had to use our own money to buy most of the essential components and supplies for the project. Estimated price is RM300.00. Compared to other projects, the cost is much lower than the budget. Development costs are still manageable for the next five months. Research shows that it is possible and achievable. Gant Chart and Activities of the Project

Gantt Chart and Activities of the Project

Legend:

- Green Task (Plan)
- Yellow Task (Actual)
- Red Task (Planned)
- Blue Task (Actual)

POLITEKNIK DATAR MALAYSIA BERHAD, ACEH NEGERI
KAMPUS BUKIT KALAM, BELANTARA

POLITEKNIK
POLITEKNIK DATAR MALAYSIA BERHAD

| Milestone | | | | | | | | | | | | | | | | | | | | | |
|-----------|-----|---|--------------|-----------------|-----------|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|---------|--|
| TITLE : | | | | | | | | | | | | | | | | | | | | | |
| Code | No. | Task Name | Dependencies | Duration (Days) | Cost (RM) | Start | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 | Week 13 | Week 14 | |
| | 1 | GET AIR POLLUTION MONITORING WITH THE USE OF SYSTEM | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 2 | START | | 1 | 0.00 | | | | | | | | | | | | | | | | |
| | 3 | INVESTIGATION REPORT | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 4 | DO THE RESEARCH TO GET A PROJECT THAT RELATED TO AIR POLLUTION IN A.I | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 5 | PREPARE A QUALITY PROJECT DOCUMENT | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 6 | SEARCH ONLINE THE CURRENT SYSTEM | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 7 | FORM A CONCEPT OF PROJECT NAME | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 8 | FORM THE ELEMENTS OF THE PROJECT | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 9 | PREPARE AND SUBMIT THE INVESTIGATION REPORT | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 10 | PREPARE PROPOSAL (BIBLIOGRAPHY, LITERATURE, THEORY) | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 11 | PREPARE COMPONENTS AND MATERIALS | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 12 | CONDUCT QUALITY CONTROL THROUGH LABORATORY AND ONLINE PROGRAMMING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 13 | PREPARE CIRCUIT SCHEMATIC AND CIRCUIT SIMULATION | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 14 | PREPARE FOR REPORT WRITING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 15 | PREPARE FOR JUNE SESSION OF THE MONTH | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 16 | CONDUCTING TEST AND TECHNIQUE | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 17 | CONDUCTING ANALYSIS TESTING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 18 | DOCUMENT WRITING REPORT (FINAL PROFESSIONAL) | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 19 | PROPOSAL WRITING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 20 | LABORATORY WRITING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 21 | LABORATORY WRITING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 22 | INSTALLATION | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 23 | INSTALLATION OF LABORATORY ON THE | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 24 | INSTALLATION OF WIRING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 25 | INSTALLATION OF SOFTWARE | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 26 | INSTALLATION OF CONTROL CIRCUIT SYSTEM | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 27 | INSTALLATION OF PROJECT CIRCUIT | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 28 | TESTING | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 29 | SET FOR AUTOMATIC PART | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 30 | SET FOR MICROPROCESSOR PART | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 31 | SET FOR MANUAL PROJECT | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 32 | SET FOR MANUAL PROJECT | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 33 | DOCUMENTS | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 34 | INSTALLATION OF BLUE PRINTS | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 35 | INSTALLATION OF PROJECT CONTROL SYSTEM | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 36 | PREPARATION OF INSTRUMENTATION | | 10 | 0.00 | | | | | | | | | | | | | | | | |
| | 37 | END | | 10 | 0.00 | | | | | | | | | | | | | | | | |

1.27 Milestone

CARTA GANTT : PERANCANGAN DAN PELAKSANAAN PROJEK PELAJAR

SESI : 2 : 2022/2023

JABATAN JKE

KOD KURSUS : DEE50102

TAJUK PROJEK : SMART DUSTBIN AUTO SANITIZER

| 1 | | | | | | | | | | | | | | | | |
|----|--|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|--|
| 2 | NUR ADRIENA FARHANIM BINTI ANUAR | | | | | | | | | | | | | | | |
| 3 | MINGGU/AKTIVITI PROJEK | M1 | M2 | M3 | M4 | M5 | M6 | M7 | M8 | M9 | M10 | M11 | M12 | M13 | M14 | |
| 4 | INSTALLATION OF COMPONENTS ON PCB | █ | █ | | | | | | | | | | | | | |
| 5 | INSTALLATION OF WIRING | | █ | █ | | | | | | | | | | | | |
| 6 | INSTALLATION OF SOFTWARE | | | █ | █ | █ | | | | | | | | | | |
| 7 | INSTALLATION OF CONTROL CIRCUIT/SYSTEM | | | | █ | █ | | | | | | | | | | |
| 8 | INSTALLATION OF PROJECT CASING | | | | | █ | █ | | | | | | | | | |
| 9 | COMPLETED INSTALLATION OF PROJECT CASING | | | | | █ | █ | █ | █ | | | | | | | |
| 10 | TEST THE ELECTRONIC PART | | | | | | | | █ | █ | █ | | | | | |
| 11 | TEST THE MECHANICAL PART | | | | | | | | | | █ | █ | █ | | | |
| 12 | TEST THE OVERALL PROCESS /PROJECT | | | | | | | | | | | █ | █ | | | |
| 13 | PREPARATION OF SLIDE PRESENTATION | | | | | | | | | | | | █ | █ | | |
| 14 | PREPARATION OF LOGBOOK | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | |
| 15 | PREPARATION OF PROJECT 2 FINAL REPORT | | | | | | | | | | | | █ | █ | █ | |
| 16 | PREPARATION OF INSTRUCTION MANUAL | | | | | | | | | | | | | █ | █ | |
| 17 | COMPLETED ALL REPORT AND DONE WITH PRODUCT | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | █ | |

1.28 Cost and Budgeting

This project involves the cost of purchasing components and materials throughout its implementation. components involving cost are hardware Arduino set, Ultrasonic sensor, Servo motor, IR Sensor. All of these components are purchased through electronic stores methods to make fast and save cost of delivery than online store. The overall gross budget estimate in the implementation of this project is RM 200 and other expenses is at RM 100 as shown in Table 1 According to this budget cost, this project is can be considered as a less costly project compared to other projects that can cost over a thousand ringgit. The cost of the project is also in line with one of the key features of a good project developer that is low cost but have a high quality project.

| No. | Component and materials | The unit price | Quantity | Total |
|-------------------------------|-------------------------|----------------|----------|-------|
| 1. | Arduino Uno | RM 39 | 1 | RM39 |
| 2. | Ultrasonic Sensor | RM 12 | 2 | RM 24 |
| 3. | Servo Motor | RM 18 | 2 | RM 36 |
| 4. | IR Sensor | RM 12 | 2 | RM 24 |
| 5. | LED (green) | RM 5 | 1 | RM 5 |
| 6. | LED (red) | RM 5 | 1 | RM 5 |
| 7. | Pump | RM 28 | 1 | RM28 |
| 8. | Jumper Wire (set) | RM 12 | 1 | RM12 |
| 9. | Buzzer | RM 17 | 1 | RM17 |
| 10. | Dustbin | RM 34 | 1 | RM 34 |
| TOTAL : RM 200 | | | | |
| | List of Other Costing | | | |
| 1. | Transportation | | | |
| 2. | Craft work | | | |
| 3. | Internet | | | |
| 4. | Indicator | | | |
| TOTAL : RM 100 | | | | |
| OVERALL TOTAL : RM 300 | | | | |

1.29 Chapter Summary

Costing and project management have both been covered in this chapter. A ganttchart and the project's operations are given. The project's cost and budget list, complete with component quantities and the amount, is also included.

REFERENCES

- Kumar NS, Vuayalakshmi B, Prarthana RJ, Shankar A. IOT based smart garbage alert system using Arduino UNO. In 2016 IEEE Region 10 Conference (TENCON) 2016 Nov 22 (pp. 1028-1034). IEEE.
- Rafeeq M, Alam S. Automation of plastic, metal and glass waste materials segregation using arduino in scrap industry. In 2016 International Conference on Communication and Electronics Systems (ICCES) 2016 Oct 21 (pp. 1-5). IEEE
- Hassan SA, Jameel NG, Şekeroğlu B. Smart solid waste monitoring and collection system. International Journal. 2016 Oct;6(10).
- Medium - D.I.Y. Automatic Alcohol Dispenser: <https://medium.com/asbavensky/d-i-y-automatic-alcohol-dispenser-a82bc3828de6>
- Arduino Project Hub - Automatic Soap Dispenser © GPL3+: https://create.arduino.cc/projecthub/FANUEL_CONRAD/automatic-soap-dispenser-75abd6
- Viral Science - Automatic Soap Dispenser: <https://www.viralsciencecreativity.com/post/arduino-automatic-soap-dispenser>

APPENDICES
APPENDIX A- DATA SHEET

APPENDIX B- PROGRAMMING

```
#include //servo Library
Servo servo;
int trigPin = 5;
int echoPin = 6;
int servoPin = 7;
int led= 10;
long duration, dist, average;
long aver[3]; //array for average

void setup() {
  Serial.begin(9600);
  servo.attach(servoPin);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin, INPUT);
  servo.write(0); //close cap on power on
  delay(100);
  servo.detach();
}

void measure() {
  digitalWrite(10,HIGH);
  digitalWrite(trigPin, LOW);
  delayMicroseconds(5);
  digitalWrite(trigPin, HIGH);
  delayMicroseconds(15);
  digitalWrite(trigPin, LOW);
  pinMode(echoPin, INPUT);
  duration = pulseIn(echoPin, HIGH);
  dist = (duration/2) / 29.1; //obtain distance
}

void loop() {
  for (int i=0;i<=2;i++) { //average distance
    measure();
    aver[i]=dist;
    delay(10); //delay between measurements
  }
  dist=(aver[0]+aver[1]+aver[2])/3;

  if ( dist<50 ) {
    //Change distance as per your need
    servo.attach(servoPin);
    delay(1);
    servo.write(0);
    delay(3000);
    servo.write(150);
    delay(1000);
    servo.detach();
  }
  Serial.print(dist);
}
}
```

```
#include <Servo.h>
```

```
//defines servo objectServo myservo;
```

```

// defines pins numbers
const int trigPin = 5;
const int echoPin = 6;
// defines variable
int threshold = 20;
//define threshold for the sensing distance
int distance ;
void setup() {
    pinMode(trigPin, OUTPUT); // Sets the trigPin as an Output
    pinMode(echoPin, INPUT); // Sets the echoPin as an Input
    Serial.begin(9600); // Starts the serial communication
    myservo.attach(9, 500, 2400); // Refine the pulse width for MG996R
    myservo.write(90); // Center to 90 degree first
    delay(3000);
}
void loop() {
    long duration;
    distance = 0; // Clears the trigPin
    digitalWrite(trigPin, LOW);
    delayMicroseconds(2);
    // Sets the trigPin on HIGH state for 10 micro seconds
    digitalWrite(trigPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(trigPin, LOW);
    duration = pulseIn(echoPin, HIGH); // Reads the echoPin, returns the sound wave travel time in microseconds
    distance = duration * 0.034 / 2; // Calculating the distance
    if (distance < threshold) pulling_servo(); //Press the sanitizer if their are object within the threshold distance
    else release_servo(); //Release servo if the distance back to normal
}

void pulling_servo() {
    Serial.println(distance);
    // Prints the distance on the Serial Monitor when it is lower than the threshold
    myservo.write(0);
    delay(2000);
}
void release_servo() {
    Serial.println(distance);
}

```

```

// Prints the distance on the Serial Monitor when it is lower than the threshold
myservo.write(90);
delay(1000);
}

```

APPENDIX C- PROJECT MANUAL/PRODUCT CATALOGUE




SMART DUSTBIN & AUTO SANITIZER

Nama Pelajar : NUR ADRIENA FARHANIM BINTI ANUAR
 No. Pendaftaran :08DEU20F2017
 Nama Penyelia : NORHAYATI BT CHE HUSIN

PROBLEM STATEMENT

- The user don't like to touch the rubbish because it is dirty.
- After throw the rubbish, people always not remember to wash their hand cleanly.
- Sometime, people keep throw the rubbish even the dustbin is full because they are not alert with it and don't care if the rubbish fall out the dustbin when it is no space yet.

IMPACT IN FUTURE

- helps prevent the bins from overflowing, contributing to healthier
- The lid of the dustbin will automatically open when an object comes near to the dustbin and after a certain time period it will close the lid.
- good hand hygiene helps stop the spread of germs and illnesses.

OBJECTIVE

- to create a cleaner, safer, more hygienic environment and enhanced operational efficiency while reducing management costs

BLOCK DIAGRAM



RESULT



Starting



Automatically open when someone want to throw the rubbish



The LED (red) blinking if the dustbin is full



The hand sanitizer will automatically spray to your hand

IDEAS

- The ideas come when the dustbin always full until the rubbish fall out and forgot to wash the hand after that

