

DEE6092 : PROJECT 2



AUTOMATIC DUSTBIN

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DIPLOMA ENGINEERING ELECTRONIC (COMPUTER)

DISEMBER 2016

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ACKNOWLEDGEMENTS

First and foremost, we offer sincerest gratitude to our supervisor Pn Che Fauziah Binti Adam for helping us to complete this proposal for project 1. The knowledge that you have taught us are very important and useful.

Apart from that, we want to thank all our friends for helping us to finish this progress of project. They have also helped us by giving any extra ideas for our project. The discussion about our project is a meaningful and useful moment it is because we have gathered a lot of ideas. Our mind are also open after gathered a lot of idea to make the project.

Besides that we want to thank to our parents for encourage us on this project. They support us very well for this project because they give us some money to buy the important material and component for our project.

At the end, I offer my regards and blessings to my colleagues and all of those who supported us in any respect during the completion of the project.

ABSTRACT

The name of our project is automatic dustbin. We usually created that use electric, electronics and mechanical movement. This product can make also our daily life become more easily and help to maintain our environment clean and fresh. Although In terms of health, the product on the market were less guaranteed healthy because there are cannot prevent from germs and bacteria. In addition, the quality of the dustbin that we have today is ordinary such as around the dustbin is dirty. Next, this Automatic Dustbin Open by manually, Open automatically by using PIR or IR sensor . When hand near 20cm from the lid. Easily get germs and bacteria onto your Reduce the risk of transferring germs hands. From one dirtiest place onto your hands .when the dustbin are full, we will receive message for clean up the dustbin .Odorless and have fresh environment around the dustbin. Must use one hand to open the lid and can use both hands to throw the other hand to throw the rubbish. This, idea is obtained after discovering and have been make renovation for a better uses. The automatic dustbin is mainly introduced to support and make a better uses. This project can be considered that it will fulfill the scope and the objective of this project.

CHAPTER 1

INTRODUCTION

1.1 Background of Study

Automatic describes of a machine or device having a controls that allow something to work or happen without being directly controlled by a persone. The idea is simple and is driven by the fact that dustbins require very frequent cleaning, which not always possible. This leads to unhelthy environment and spread of diseases. The aim is to accommodate more and get the dustbin cleaned timely using alert services.

Automatic Dustbin is very helpful to maintain hygiene. This is because when remove the automatic dustbin. It has sensors to detect hand and opened the lid on their own. We use the PIR sensor. And when the rubbish in our bins full uses sensors to detect Ultrasonic full trash bins and the door will not be open to receive trash again. Besides that we also use GSM 800L, it help for informing us to clean up the trash. The software application and the hardware implementation help the microcontroller read the messages sent by the user from a mobile phone or send messages to the mobile phone through the modem and accordingly .The measure of efficiency is based on how fast the microcontroller can detect the incoming message and act accordingly.

1.2 Problem statement

- Student mostly like littering rubbish everywhere
- Don't want to use the dustbin because around dustbin is dirty
- Don't want to touch the cover of dustbin to throw rubbish in to dustbin

1.3 Objective of research

- To develop the automatic dustbin by using arduino.
- To provide GSM systems in the automatic dustbin.

1.4 The objective of this power supply

- a) To supply the current to the circuit

For this project, we have using 12v from direct current then regulate to 5v power supply circuit. 12v is used for the motor servo. For PIR sensor , GSM module, sensor, and Arduino we use 5v. The regulator (IC 7805) used 4v.

1.4.1 Software

In order to work with this project, first the right of software implementation needs to be identified. The preliminary works for software searching are:

- i. Learn the usage of the assembly language and it criteria based on the project objectives.
- ii. Identified the software that will be used to load the program to the Arduino
- iii. Check and explore the entire menu in the software used in order to achieve the project objectives.

1.4.2 Hardware

For most hardware, there is some work that had been done before proceeding to the project requirements.

- i. . They figure out how to cover the dustbin.
- ii. Looking for materials to be used, such as screws, black cardboard and hot gum.
- iii. Prototypes built according to the design and project requirements.

1.5 Scope of Study

The project scope involves a method of upgrade a dustbin to a automatic dustbins by using GSM 800L module. The project starts from information research and research for reference whether printed or electronic. As well as information and advice from the supervisor is also very useful for the smooth running of the project. Then the project was sketched based on the information obtained. The circuit that have connect with lcd arduino has been created . After completion of the design of the circuit to be tested with simulations like multisim and then tested manually on board . After proven it is capable of functioning and then only its being mounted on the PCB The project also has the additional supply of dry cells (to avoid a failed operating system when a short circuit).The operation process of our project is starting from the users mobile phone . When the user sends a code to the GSM , then it will transmit the data received to the microcontroller . The microcontroller will then tell the solenoid-operated trace trash is full or not.

CHAPTER 2**LITERATURE REVIEW****2.1 PROJECT DESCRIPTION**

The system is connected to the building power supply and can be connected to the Internet via several communication solutions based on their availability. In case of power grid failure the system is provided with a secondary power supply based on rechargeable batteries which can keep the system functional for several hours. The main weaknesses of this system are the power supply and the Internet connection. To improve the reliability of this system, an autonomous diagnosis system has been added to the main monitoring server. The system will detect any change in the functioning state of the main system, like communication link failure, power grid failure or internal power source depletion and will report these events by sending a short message (SMS). (Yuksekkaya et al., 2006). The communication between the user and the home is established by the SMS (Short Message Service) protocol. A GSM modem is connected to the home automation server. The communication between the home automation server and the GSM modem is carried out by the AT (Attention) commands. (Rasid and Woodward, 2005)

(Scanail et al., 2006) developed a tele-monitoring system, based on short message service (SMS), to remotely monitor the long-term mobility levels of elderly people in their natural environment. Mobility is measured by an accelerometer-based portable unit, worn by each monitored subject. The portable unit houses the Analog Devices ADuC812S microcontroller board, Falcon A2D-1 GSM modem, and a battery-based power supply. Two integrated accelerometers are connected to the portable unit through the analog inputs of the microcontroller. Mobility level summaries are transmitted hourly, as an SMS message, directly from the portable unit to a remote server for long-term analysis. Each subject's mobility levels are monitored using custom-designed mobility alert software, and the appropriate medical personnel are alerted by SMS if the subject's mobility levels decrease. (Xu Meihua et al., 2009) described a remote medical monitoring system based on GSM (Global System for Mobile communications) network. This system takes advantage of the powerful GSM network to implement remote communication in the form of short messages and uses FPGA as the control center to realize the family medical monitoring network. The system is made up of user terminal equipments, GSM network and hospital terminal equipments.

2.2 DEVICE USED

1. GSM module 800L



What is GSM

GSM stands for Global System for Mobile Communication. It is a digital cellular technology used for transmitting mobile voice and data services. GSM is the most widely accepted standard in telecommunications and it is implemented globally. GSM is a circuit-switched system that divides each 200 kHz channel into eight 25 kHz time-slots. GSM operates on the mobile communication bands 900 MHz and 1800 MHz in most parts of the world. In the US, GSM operates in the bands 850 MHz and 1900 MHz. GSM makes use of narrowband Time Division Multiple Access (TDMA). GSM provides basic to advanced voice and data services including roaming service. Roaming is the ability to use your GSM phone number in another GSM network. GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own timeslot.

GSM SIM800L Module :

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number . GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI(International Mobile Equipment Identity) number similar to mobile phones for their identification

Applications

- SMS based Remote Control & Alerts
- Security Applications
- Sensor Monitoring
- GPRS Mode Remote Data Logging

Features

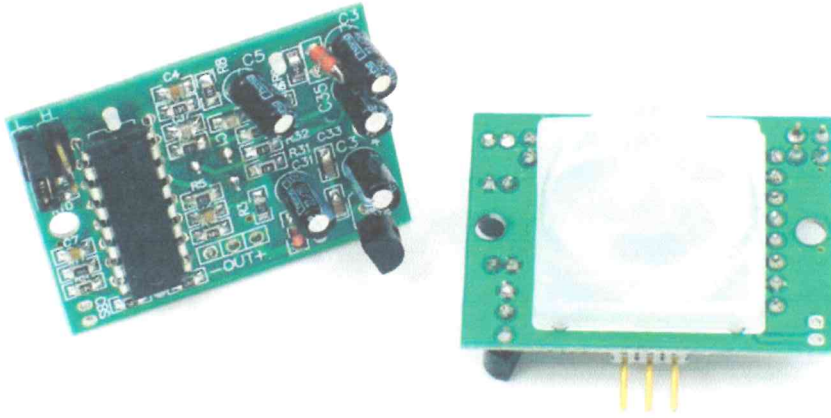
- Status of Modem Indicated by LED
- Simple to Use & Low Cost
- On board switching type power supply regulator
- RS232 output

The MODEM needs AT commands, for interacting with processor or controller, which are communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command. Different AT commands supported by the MODEM can be sent by the processor/controller/computer to interact with the GSM and GPRS cellular network.

Specification:-**Design for Industrial Application:-**

- High-powered industrial cellular module.
- Housing: iron, providing IP30 protection.
- Power range: DC 5~35V

2. PIR SENSOR

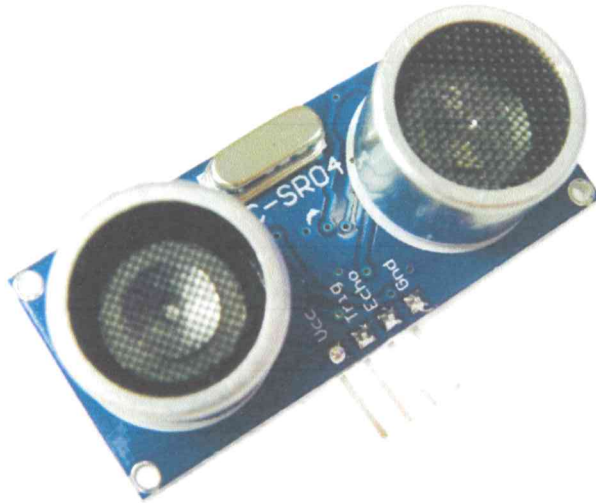


PIR is (Passive InfraRed sensor) A device used to detect motion by receiving infrared radiation. Passive Infra-Red (PIR) sensor is also a pyroelectric devices motion by measuring changes in the infrared levels emitted by surrounding objects. This motion can detect by checking for a high signal on a single I/O pin. Usually used as a security device in a monitored area (such as a room or hall) to detect appearance of human.

Features of this PIR

- 5V to 20V operation voltage with <math><100\mu\text{A}</math> current draw
- Single bit output (digital)
- Delay time adjustable
- Compatible with all types of microcontroller
- Small size makes it easy to conceal
- Plug n Play feature

3. ULTRASONIC SENSOR



Ultrasonic Sensor uses to determine distance to an object like bats or dolphins do. It offers excellent range accuracy and stable readings It will require an digital output and input pin to use it. Its operation is not affected by sunlight or black material like Sharp rangefinders are (although acoustically soft materials like cloth can be difficult to detect). Similar in performance to the SRF005 but with the low-price of a Sharp infrared sensor.. In this project it will use for detect the contents of the trash in dustbins whether it full or not.

Features of ultrasonic

- Power Supply :5V DC
- Quiescent Current : <2mA
- Working Current: 15mA
- Effectual Angle: <15°
- Ranging Distance : 2cm – 400 cm or 1" - 13ft
- Resolution : up to 0.3 cm
- Dimension: 45mm x 20mm x 15mm

4. CUBE SERVO (MOTOR)



G15 Cube Servo is a modular smart serial servo which incorporates gear reducer, precision high torque DC motor and control circuitry with networking functionality. It is made with high quality engineering plastic to provide high necessary strength and is able to sustain high external force up to 15 kg.cm holding torque. G15 provides 360° endless electrical rotation by using potentiometer to lead itself to solve some application such as to motorize a mobile robot. G15 also has LED indicator to show the status of the servo. The unique cubical design of G15 gives the highest flexibility in robotics model construction. By incorporating slid able slots and latches, G15 are able to eliminate the screws and nuts during the construction. This patented joining method enable user to connect a G15 to another G15 even easier and faster without any singlescrew.

Features:

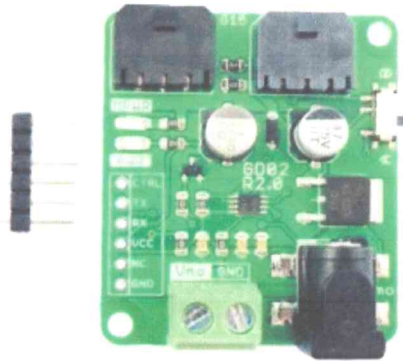
- Modular type robotic servo
- Cubical outlook and center output shaft to give highest flexibility during robotic model construction
- Five slide-able slots in different orientation
- Screw-less mounting method
- 360° endless electrical rotation (1088 steps)
- Daisy chain connection wiring among the G15 cube servos (each G15 cube servo has its own unique ID)
- Serial communication, Half-duplex Asynchronous (max speed up to 500k bps), TTL level, command packet
- Rotation speed or time to reach the desired position can be set
- Able to feedback its angular position, angular speed, current load, temperature and supply voltage
- Auto shutdown if overload, supply voltage error or high temperature is detected (user define the value)
- LED indicator to shows the status of the servo

- Built-in microcontroller built-in to handle all controls
- Origin: Malaysia

Specification:

- Voltage: 6.5 - 17.8VDC
- Holding Torque: 15kg.cm (at 12V)
- Rated Torque: 12kg.cm (at 12V)
- Speed: 63RPM (no load at 12V)
- Gear ratio: 194:1
- Current: 1.5A (max. at 12V)
- Weight: 63g
- Degree of rotation: 360° continuous
- Communication: Half Duplex Serial
- RoHS Compliant: Yes

5. G15 Driver



G15 Driver (GD02) is used to drive G15 Cube Servo. It is a Full to Half Duplex Communication Converter board. It converts UART full duplex communication to half-duplex single line communication which is required by G15 Cube Servo. GD02 has two ports for the Cube Servo. G15 Cube servo is a serial controlled servo motor which can be daisy chained. G02 has a separated port connector for motor's power supply. GD02 offers simple and easy way to user to control G15 Cube Servo with UART communication from any microcontroller board.

Specifications:

- UART Voltage: 3.3V or 5V
- Motor Voltage: 7-15VDC
- Maximum Continuous Current: 8A

G15 driver comes with:

- 2 x G15 Cube Servo ports (can be daisy chained to more servos)
- External power terminal for Cube Servo.
- 2 LEDs as logic power and servo power indicators.
- 3.3V and 5V signals compatible.

2.3 FUNCTION OF COMPONENTS

1) BRIDGE RECTIFIER

A bridge rectifier is an arrangement of four or more diodes in a bridge circuit configuration which provides the same output polarity for either input polarity. It is used for converting an alternating current (AC) input into a direct current (DC) output. A bridge rectifier provides full-wave rectification from a two-wire AC input, therefore resulting in lower weight and cost when compared to a rectifier with a 3-wire input from a transformer with a center-tapped secondary winding.

2) CAPACITOR

A capacitor is a passive electronic component that stores energy in the form of an electrostatic field. In the most simple form, a capacitor consists of two conducting plates separated by an insulating material called a dielectric. Capacitance is directly proportional to the surface area of the plate, and is inversely proportional to the separation between the plates. Capacitance also depends on the dielectric constant of the material separating the plates.

3) DIODE

Active Electronic Components Diode is made of a semiconductor material and has a function to send electric current to one direction but prevent electric current from the opposite direction. Therefore, it is often used as a rectifier diode in series Electronics. Diodes in general have two electrodes (terminals) are Anode (+) and cathode (-) and has a working principle based on the technology of semiconductor junction can drain current of the p-type side (anode) to the n-type (cathode) but cannot flow in the opposite direction.

4) IC 7805/7812

The **78xx** (sometimes **L78xx**, **LM78xx**, **MC78xx...**) is a family of self-contained fixed linear voltage regulator integrated circuit . The **78xx** family is commonly used in electronic circuits requiring a regulated power supply due to their ease-of-use and low cost. For ICs within the family, the **xx** is replaced with two digits, indicating the output voltage (for example, the **7805** has a 5volt output, while the **7812** produces 12 volts). The **78xx** line are positive voltage regulators: they produce a voltage that is positive relative to a common ground. There is a related line of **79xx** devices which are complementary negative voltage regulators. **78xx** and **79xx** ICs can be used in combination to provide positive and negative supply voltages in the same circuit

2.4 PCB EAGLE

EAGLE's board designer is where a good portion of the magic happens. It's here where the dimensions of the board come together, parts are arranged, and connected by copper traces. In the board editor, the conceptual, idealized schematic you've designed becomes a precisely dimensioned and routed PCB. In this tutorial we'll cover every step in EAGLE PCB design: from placing parts, to routing them, to generating gerber files to send to a fab house. We'll also go over the basics of EAGLE's board editor, beginning with explaining how the layers in EAGLE match up to the layers of a PCB.

The software is supplied on a CD-ROM and requires Microsoft Windows 95, 98, Me, NT 4.0(with SP6), 2000, XP, Vista or 7. User guide and instruction are included with the software.

PCB Eagle Standard :-

- Large database of components
- Schematic design and capture
- Manual PCB design
- Single sided auto-routing
- User-defined components
- Copper pour
- Bill of materials report generation
- Gerber and N.C drilling export
- Integrated publishing with next, graphics and spell-checking support
- Import circuit from Livewire

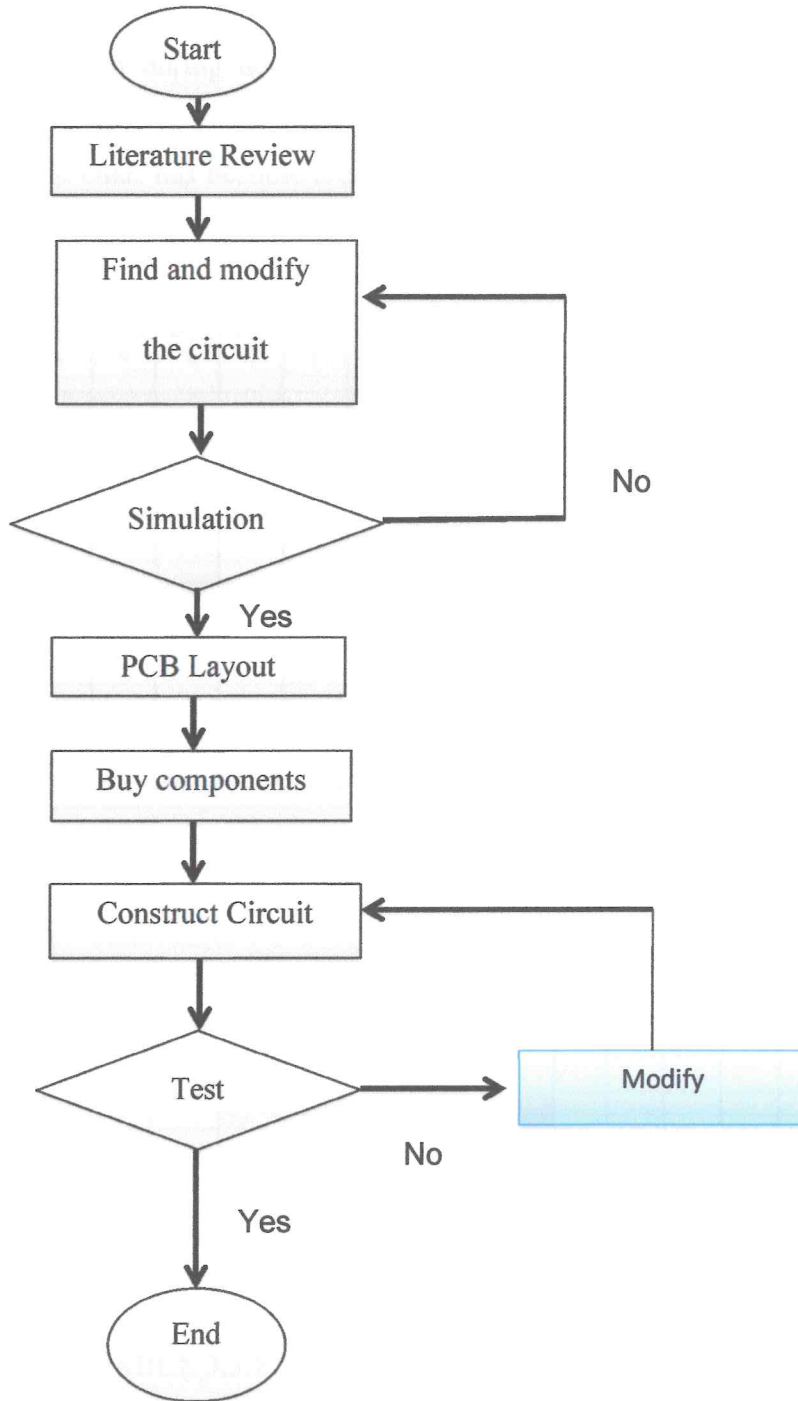
CHAPTER 3**METHODOLOGY****3.1 PROJECT METHODOLOGY**

Automatic dustbin systems have 2 main blocks of systems which is receiver and controller. Receiver for this system is GSM module. This GSM acts as the signal receiver and received the short messaging system (SMS) from the user and sends the data to the Arduino. An Arduino is the major controller of the system. This Arduino has power supply connected to it which comes from the power supply circuit. The coding must be uploaded to Arduino by using Arduino software.

3.2 FLOW CHART

A flow chart is defined as a pictorial representation describing a process being studied or even used to plan stages of a project. Flow charts tend to provide people with a common language or reference point dealing with project or process.

3.2.1 FLOW CHART OF PROJECT PLANNING



3.3 MILESTONE TABLE

Other than that, we will explain about planning job table. According to planning job table topic, we will show our Gantt during development this project. Gantt chart also known as milestone table that is use to show time start and end time for project. The duration of each job or task can be display in Gant chart has become a common technique for represent the phase and activities of a project work breakdown structure, so they can be understood by a wide audience.

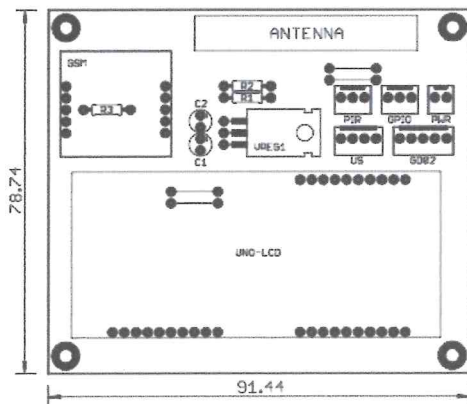
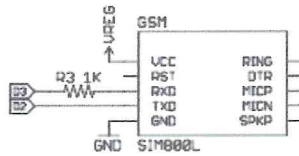
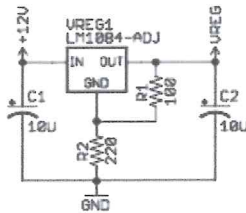
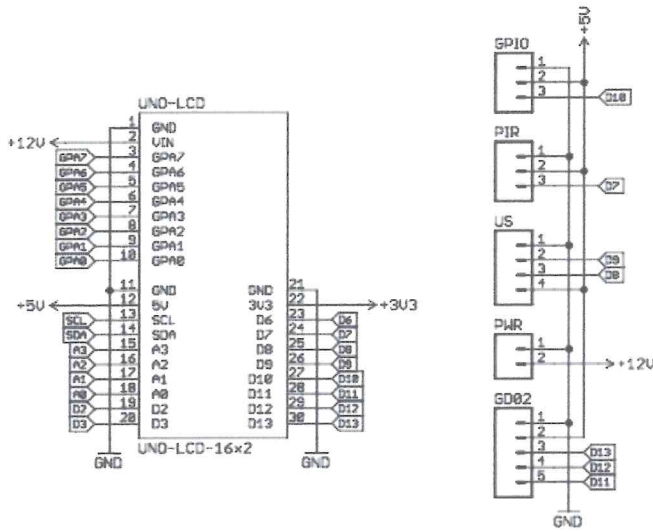
PROJECT PROGRESS	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	WEEK 10	WEEK 11	WEEK 12	WEEK 13	WEEK 14	WEEK 15
Finding Project	■	■	■	■	■									
Project Research						■	■	■	■					
Marking circuit										■	■	■		
Sketch Program Development													■	■
Testing The Circuit													■	■
Final Model Development														■

TABLE 3.3.1.1 : Project 1 Progress

Project progress	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Project ideas	■	■	■	■	■	■	■	■						
Finishing relay circuit			■	■	■									
Study coding for arduino		■	■	■	■	■	■	■						
Testing				■	■	■	■	■	■					
Troubleshooting								■	■	■	■			
Prototype									■	■	■			
Final report										■	■	■		
Supervisor presentation													■	
Project presentation														■

TABLE 3.3.1.2 : Project 2 Progress

3.4 CIRCUIT BY USING PCB EAGLE



3.5 HARDWARE DEVELOPMENT

This will explain about the development process of the project

3.5.1 ETCHING PROCESS

Etching process depend on how littering circuit. There are different ways of it. In this project we print the circuit on photopaper and stick it with masking tape on PCB board. The way we use is by using laminating machine . Then we put the board in the machine for 6-7 times or do the laminating repeated step 10 time to make sure the layout is attached to the board . After that we put the board in cold water so that the photo paper come out easily . Finally the board is put in the etching machine to remove the useless copper from board .

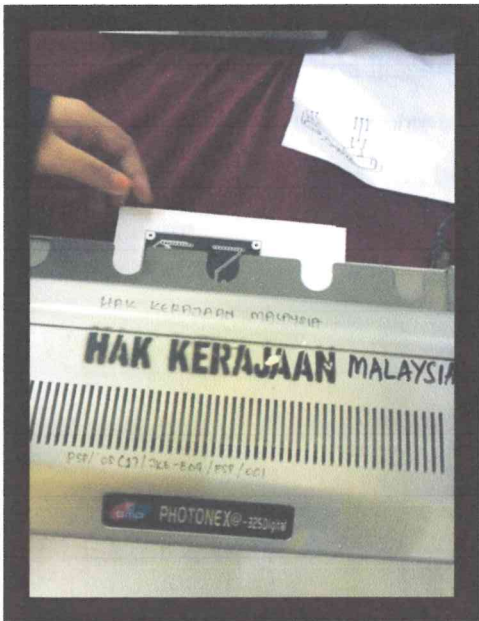


Figure 3.4.1.1 : Laminating Process



Figure 3.4.1.2 : Remove copper from board with ferric chloride

3.5.2 DRILLING PROCESS

Prior to drill hole, the source terminal or point marked hole using a center punch. The selection of the drill should be appropriate to the size of the component to be installed.

The process of punching holes in the PCB board is intended to include components before soldering. When drilling holes, points “drill” should penetrate completely into the back of the PCB. Eye “drill” is used dependent on the size of the head of the component and use the appropriate size so that the resulting hole is not to big or tool small. Before starting process of drilling, hole to be drilled shall be marked.

3.5.3 INSERT THE COMPONENT

Foot of component was inserted into the drilled hole . Components that are installed must be inspected prior to use multimeter to find out whether These components are in good condition or not .This process quite important because we should insert the component correctly to avoid the circuit failure .



3.5.4 SOLDERING

Steps to solder :

- i. Quickly remove the tip of the soldering iron from heat up the soldering iron for 5 – 10 minutes , allowing the iron to reach maximum operating temperature . Apply a small amount of solder to the tip and rotate so the entire tip becomes lightly covered with a thin layer of solder .
- ii. Connect the two surface to be soldered together so the metal parts are touching . If soldering wires, simply twist the two wire ends so they don't pull apart while being soldered.
- iii. Touch the hot tip of the soldering iron to all metal parts touching so they are evenly heated. Allow the surface to heat for 3-5 seconds, then touch the tip of the solder to the heated metal objects , not directly to the tip of soldering iron .
- iv. Wipe the soldered surface and the tip of the iron on a wet sponge immediately to remove solder. Wiping the solder off the tip will prevent it from burning and forming a black coat on the soldering iron tip
- v. Allow the solder to joint and cool for several minutes before applying power to the wires or the device soldered

PROJECT

AUTOMATIC DUSTBIN

