AUTONOMOUS WATERING ROBOT

Oleh

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Penghantaran Laporan Ini Adalah Untuk Memenuhi Keperluan Untuk Penganugerahan Diploma Kejuruteraan Elektronik (KOMPUTER) Di Jabatan Kejuruteraan Elektrik Politeknik Seberang Perai

ABSTRACT

The main objective of the product is to design and develop a gardening robot. This gardening robot is designed and produce mainly to take care of plants all around the house. This gardening robot is very useful for all people who love to gardening this could save their time and energy to take care their plants. This gardening robot is handle by a detector or a so called sensor to detect the temperature and humidity surrounding. After the detection it will watering the plant according to program. By using the gardening robot, human can avoid having a backache which is caused by bending while trim or watering the plants. Furthermore, we can save money by using this gardening rather than hiring a worker/ employee to take care of plants. This project have a sensor only to maintain its main objective. This product is able to watering the plants at least 3 litter or a bottle of water mineral and able to watering plants on the ground. As a conclusion, this autonomous watering robot is very useful for the adults especially to the gardener who love to take care of their plant as it reduce their burden by watering the plant.

ABSTRAK

Objektif utama produk ini ialah untuk mereka bentuk dan membangun robot berkebun .Robot berkebun inidireka dan menghasilkan terutamanya untuk menjaga tumbuh-tumbuhan di sekeliling rumah.Robot berkebun ini sangat berguna untuk semua orang yang suka berkebun ini dapat menjimatkan masa dan tenaga mereka untuk menjaga tanaman mereka . Robot berkebun ini dikendalikan oleh seorang pengesan atau sensor yang dikenali untuk mengesan suhu dan kelembapan sekitarnya.Selepas pengesanan, ia akan menyiram tumbuhan mengikut program. Dengan menggunakan robot berkebun, manusia boleh mengelakkan sakit belakang yang disebabkan oleh membongkok semasa memangkas atau menyiram tumbuhan.Tambahan pula, kita dapat menjimatkan wang dengan menggunakan perkebunan ini dan bukannya menyewa pekerja / pekerja untuk menjaga tanaman .Projek ini hanya mempunyai sensor untuk mengekalkan objektif utamanya . Produk ini dapat menyiram tumbuh-tumbuhan sekurang-kurangnya 3 liter atau sebotol mineral air dan dapat menyiram tumbuhan di atas tanah.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

In this project, we are going to make a robot which uses vision based row guidance method to drive through the row crops. Ultimately, a unique system has been described for Plant & Food Research which makes use of a number of electrical and computer systems engineering theories .A number of sensors are integrated into the robotic system including colour, proximity, temperature and humidity systems. The system required the use of vision, with custom algorithms being developed to identify plant growth rates. The entire system will integrated into a fully automated package. Below we have mentioned some of the study and research that we can do.

1.1 Objective

The main objective of this project is to make a tennis ball collector that can carry out a task.

The objective of this product are,

i. To create a AUTONOMOUS ROBOT that able to take care of plant for human
ii. To create a robot that can watering the plant according the time and amount of water that have been program for each plant

1.2 Problems Statement

People nowadays are facing so much problem, sometime they even don't have time to do what they like. Especially for those who are love gardening. Some people love gardening but the don't have time to do because of hectic live. In the meantime some people do hire an employee to work only for take care of their plants where they have to pay them with high salary

1.3 Scope and Limitation

Scope project are important element in this project. It can make sure the project can be finished on the time. Because to make a good project there must have a scope.

i. Able to carry 3 litter water or a bottle of water mineral
ii. Able to watering the plant that have been place on the ground

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

In this project, we are going to make a robot which uses vision based row guidance method to drive through the row crops. Ultimately, a unique system has been described for Plant & Food Research which makes use of a number of electrical and computer systems engineering theories .A number of sensors are integrated into the robotic system including color, proximity, temperature and humidity systems. The system required the use of vision, with custom algorithms being developed to identify plant growth rates. The entire system will integrated into a fully automated package. Below we have mentioned some of the study and research that we can do.

2.1.1 Arduino

We use ardunio Uno is a microcontroller board based on the ATmega328P.It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button.[2] It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start. This type Arduino is cheap and easy to programmable to this project.

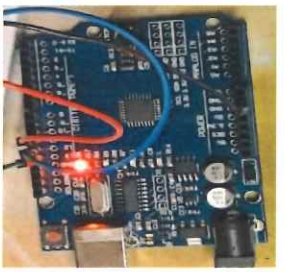

Figure 2.1.2 show example of arduino

2.1.2 Infrared Sensor

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion .These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor.

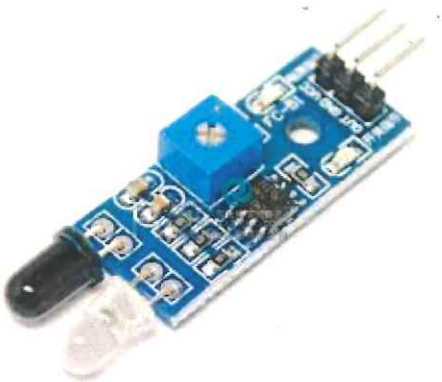

Figure 2.1.2 show ir sensor device

2.1.3 DC Motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

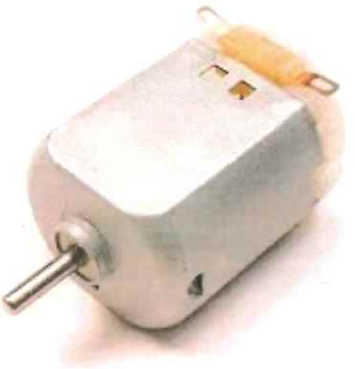

Figure 2.1.3 show example of DC MOTOR

2.1.4 Wheels

A wheel is a circular component that is intended to rotate on an axle bearing. The wheel is one of the main components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labour in machines. Wheels are also used for other purposes, such as a ship's wheel, steering wheel, potter's wheel and flywheel.

Figure 2.1.4 show example of wheel that use for robot

2.1.5 Water Pump

The pumping of water is a basic and practical technique, far more practical than scooping it up with one's hands or lifting it in a hand-held bucket. This is true whether the water is drawn from a fresh source, moved to a needed location, purified, or used for irrigation, washing, or sewage treatment, or for evacuating water from an undesirable location. Regardless of the outcome, the energy required to pump water is an extremely demanding component of water consumption. All other processes depend or benefit either from water descending from a higher elevation or some pressurized plumbing system

Figure 2.1.5 show example of DC WATER PUMP

2.1.7 Motor Driver (L298N)

The L298N is an integrated monolithic circuit in a 15- lead Multiwatt and PowerSO20 packages. It is a high voltage , high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the in-put signals .The emitters of the lower transistors of each bridge are connected together rand the corresponding external terminal can be used for the connection of an external sensing resistor. An additional Supply input is provided so that the logic works at a lower voltage

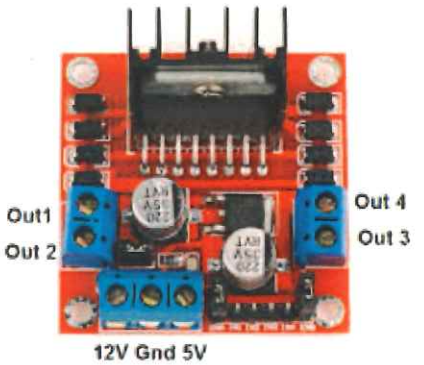

Figure 2.1.7 show MOTOR DRIVER DEVICE

2.1.8 Battery

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smart phones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode.

Figure 2.1.8 show example of battery

CHAPTER 3

METHODOLOGY

3.0 Introduction

This chapter is discussed about the methodology that has been used to complete this project. It was planned properly by getting the correct information from various sources from references book, journal, articles, internet and others. It also include interview session with our supervisor to get the information, advices and guidelines to complete this proposal report. All of the data and useful information were determined to analyze to get the best result. Generally there are several level to reach the complete product analysis which is

1) Design analysis to the available product.
2) Design concept based on the sketching and analysis drawing.
3) Produce the product concept.
4) Produce the real concept.

FIGURE 3.1: FLOW CHART FOR AUTONOMOUS WATERING ROBOT

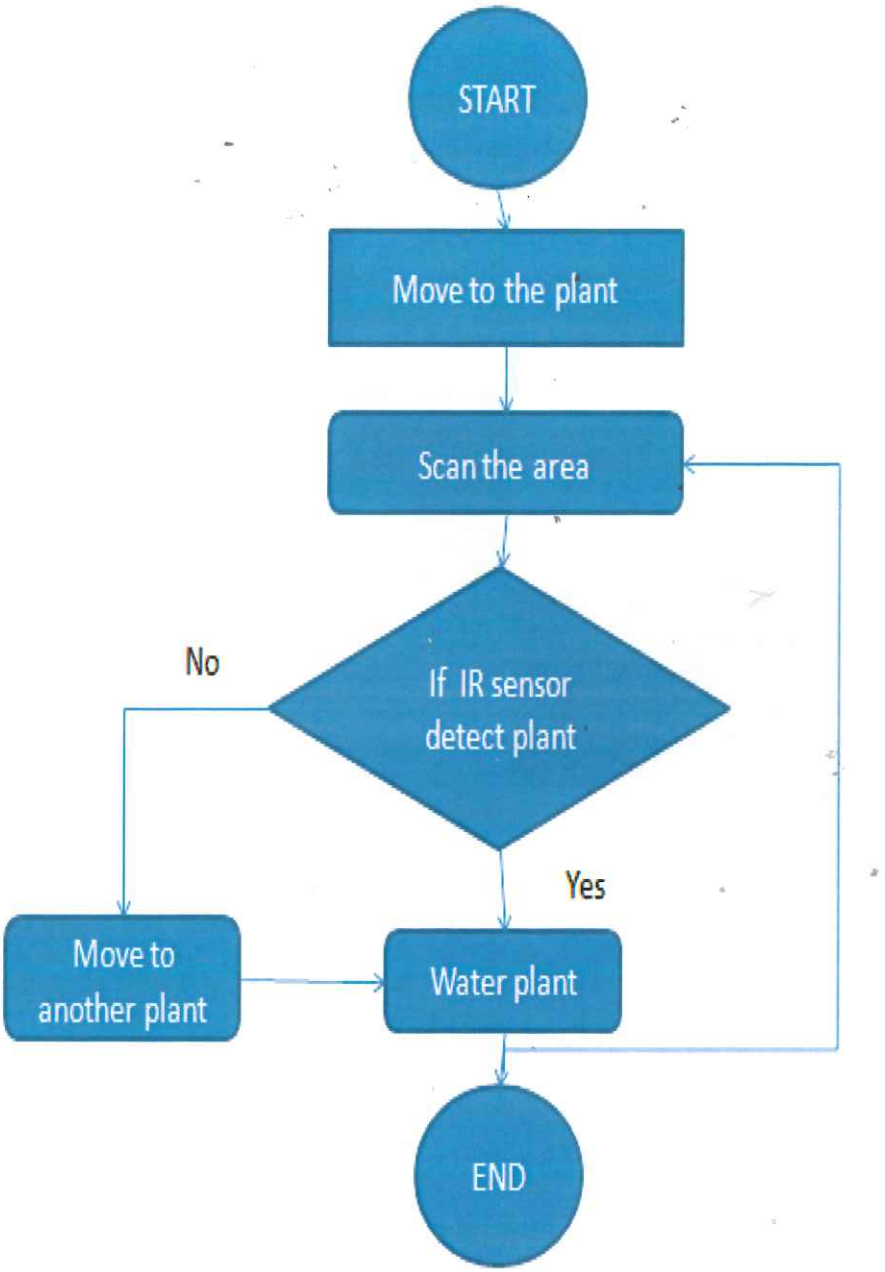

Figure 3.1 show how the robot work

FIGURE 3.2: GANTT CHART

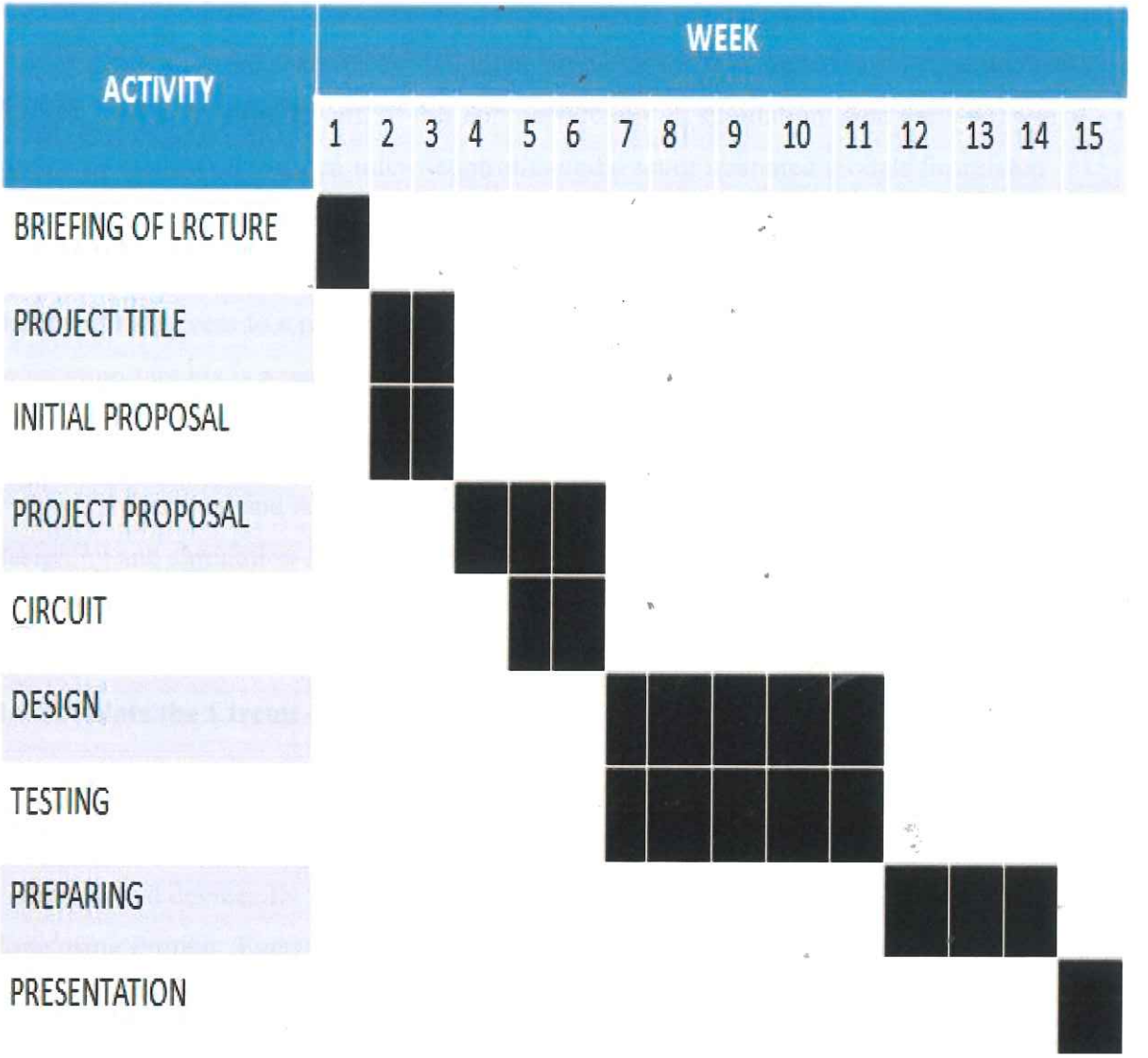

Figure 3.2 gantt chart show flow of project

3.3 Draw Schematic Diagram of circuit using PROTEUS.

PROTEUS V8.4 allows professional engineers to run interactive simulation of real designs ,and to reap the reward of this approach to circuit simulation .And then, a range of simulator models for popular micro-controller and a set of animated models for related peripheral devices such as CT-ARDUINO UNO and LCD displays, resistor and more.IT is possible to simulate complete micro-controller system and thus to develop the software for them without access to a physical prototype.IN a world where time to market is becoming more important his is a real advantage .Structurally, 6 Professional separated into two main components, which is ISIS 7.

Professional and ARES 7 Professional .ISIS 7 Professional mainly involved on circuit designing and simulation .In our project we use Proteus to design a schematic diagram.

3.4 Simulate the Circuit Using Proteus

After completing the circuit assembly and configuration, now it's time to verify whether the source code compiled is virtually accurate or not. Proteus offer a whole lot variety virtual devices.IN fact, simulation using oscilloscope and function generator can be done using Proteus .Even virtual hyper terminal is provided to demonstrate how your code perform in real world without really doing the hardware section yet.

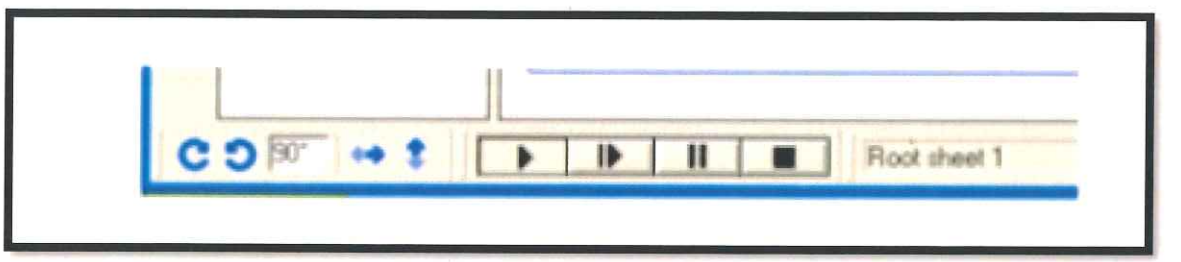

Figure 3.6.1 Toolbar of Proteus simulation.

3.5 Process of Circuit Design.

Design the circuit diagram.

After decide what kind of project that we want to build .We need to make a research about the circuit, electronic component that we need to used, hardware and so on .These things actually can help us to make a better in designing circuit .For example, we need to know the size, foot of component, polarity of the component, the component method compilation and etc. to make a circuit diagram.

In the first step in Circuit Designing process is make a circuit diagram that can be used in the next process. Among steps in the circuit diagram are:

i. Before the circuit is produced the things that we need to be emphasized are the position of symbols and components used in the schematic circuit. Once we know the entire production circuit, the circuit can be drawn using software, namely Proteus ISIS Professional.

ii. Then make sure that the connection of the components is correct.

3.6 Etching

Etching is a "subtractive" method used for the production of printed circuit boards .Acid is used to remove unwanted copper from a prefabricated laminate .This is done by applying a temporary mask that protects part of the laminate from the acid and leaves the desired copper layer untouched .Etching is where the excess copper is removed to leave the individual tracks or traces as they as they are sometimes called. Buckets, bubble tanks, and spray machines lots of different ways to etching ,but most firms currently use high pressure conveyerised spray equipment .Many different slow controlled speed etches used for surface preparation to the faster etches used for etching the tracks. Some are best used in horizontal spray process equipment while others are best used in tanks.

3.7 Risk Of Etching

i. There is a risk of injuries due to the chemicals involved.

ii. The quality of the result depends on several factors which you won't be able to master completely by using good machinery.

iii. There is the problem of waste disposal. Toxic chemicals require a proper disposal service.

3.8 Safety

Since the work involve dangerous chemical and power tools,we will need to take the necessary safety precautions:

i. Wear safety equipment during the whole process-gloves, protection glass and an apron.

ii. Work near an emergency eyewash station a first aid box and a phone.

iii. Familiarize yourself with the proper use of all equipment and tools in the lab-if you are unsure of anything,ask a supervisor of the project.

3.9 Etching Process

Etching is the process of using acid to remove coppers that not need on the PCB(PRINTED CIRCUIT BOARD).This acid is Acid Ferric Chloride III.is used to remove that coppers

The steps of the etching process are:

i. Print the schematic onto photo paper and cut it with the same size of PCB board

ii. Put the schematic diagram on PCB board.

iii. Etch the circuit onto the PCB Board together with photo paper .It's to make PCB paper joined with board.

iv. This process takes about 120 second under 140.

3.10 Introduction Of Drilling Process

After the etching process finished,the PCB will be punched using hand drilling machine. Hole is necessary to mount component (example; resistor, CT-Arduino,LCD and etc.).Before drilling,a dot punch is used to mark the hole position.This serves as a shallow guide for the drill bit to align easily while drilling .Any other sharp pointed tool can be used to do the marking .Points/eye drill used must be appropriate to the hole to be punched between 0.75 to 1.0mm.

The purpose of this process is to facilitate the installation work on the circuit components of the PCB .During drilling ,do not be pressed too strong because it may cause eye drill broken up and dangerous for the people around. Hold the drill steady and drill in straight slowly. The hole be drilled with little force applied.

3.11 Insert The Component

Foot of component was inserted into the drilled hole that has been completed that are installed must be inspected prior to use multimeter to find out whether these components are in good condition or not. This process is quite important because we should insert the component correctly to avoid from circuit failure. Besides,some components have their own pole like diode, capacitor and other else. After finished the inserting process, we check it once again with schematic to make sure all the component were at the position or holes.

3.12 Soldering Process

Soldering is defined as "the joining of metal by a fusion of alloys which have relatively low points' .in other words, we use a metal that has a low melting point".In other words, we use a metal that has a low melting point to add here the surface to be soldered together. Soldering is more like gluing with molten metal than anything else. Soldering is also a must have skill for all sorts of electrical and electronics work. It is also a skill that must be taught correctly and developed with practice.

Step to Solder:

i. Quickly remove the tip of the soldering iron from Heat up the soldering iron for five to 10 minutes, allowing the iron to reach maximum operating temperature .If the soldering iron has two temperature settings selectable with a switch,select lower temperature when soldering small electronic components to a board and select the higher temperature when soldering heavier wires.Apply a small amount of solder to the tip and rotate so the entire tip become lightly covered with a thin layer of solder. This is called "tinning"the tip.

ii. Connect the two surfaces to be soldered together so the metal parts are touching.If soldering wires,simply twist the two wire ends together so they don't pull apart while seat the component wire into the holes of the circuit board where the component is to be placed.

iii. Touch the hot tip of the soldering iron to all metal parts touching together so they are evenly heated.Allow the surface to heat for just three to five second,then touch the tip of the solder to the heated metal amount of solder tofloe onto the metal components or wire until just enough solder has been applied to cover the entire surface of the wire or components.

iv. The soldered surface and wipe the tip of iron on wet sponge immediately to remove solder.Wiping the solder off the tip will prevent it from burning a black coat on the soldering iron tip.

v. Allow the solder joint to cool for several minutes before applying power to the wire or the device soldered.

3.13 Circuit testing

For testing and improvement process, we took almost four week to make it work.In the calendar project activities, we were given four weeks to settle all the testing and improvement process. The purpose of testing the electric was too determined and located any of the following condition:

1. An open circuit
2. A ground, which with another conductor in the same circuit.
3. A ground, which is a short circuit between the conductor and circuit.
4. Leakage (a high resistance path across a portion of the circuit to another circuit, or to ground).
5. A across(a short circuit or leakage between conductors of different circuit).

As a first step, we have done the short circuit testing using an analogmultimeter. Before using the multimeter, we set up the multimeter to zero. To pointer the meter exactly on the zero line,we rotate the adjusting screw, then we connect the multimeter probes to the circuit being tested.After that, we observed the meter needle movement.Luckily the needle does not move, this circuit as not short.

Then we move on the second step, which is testing an open circuit Open circuit test, sometimes called no-load test, Is one of the method in electrical engineering order to determine a break exists in a complete conducting path way. Open circuit can cause by exercise current. Again multimeter was used to check whether the circuit are open in normal condition .We only gave the required current to the circuit, so we did not face an open circuit problem. This mean our circuits were in normal condition.