KEMENTERIAN PENDIDIKAN MALAYSIA

POLITEKNIK MALAYSIA

Project Report

PROJECT 2

DEE6092

PROJECT TITLE: DRAIN CLEANER ROBOT

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CLASS: DEP5A

Appreciation

First of all, we wish to express gratitude to God for all his instructions and guidance. Thank God, work history course was successfully completed with inspiration, grace and guidance that was given by him.

Appreciation and gratitude goes to Mdm. Aslina binti Arbain as supervisor of our course work is too much help, and also as a facilitator guide us throughout the process of completing the project. Without guidance so precise and coherent than she was, where we are going to be able to produce a good course work.

CHAPTER 1

1.1 INTRODUCTION

A drain cleaner is a device that uses a brush to clean up drains or helps to prevent the occurrence of clogged drains. The term may also refer to the individual who uses performs the activity with chemical drain cleaners or devices known as plumber's snake. If a drain is clogged the first choice is normally a drain cleaner that can remove soft obstructions such as dust and rubbish that can accumulate close to interior drain openings. The brush pulls the the rubbish/dust along and brings to a side and it becomes easier to collect it as we don't need to sweep it all the drain. Drain cleaner robot can be used at every place and most types of drains. This device uses a wireless point to control it for forward and reverse.

1.2 BACKGROUND RESEARCH

In a drain cleaning is very common but also is a very important thing. If we do not deal with it, the whole drain will be full with dust and will clogged. In this advanced era, the drain cleaner is a common robot, but it is a very use full robot . So we made this drain cleaner robot in the price of economic machines. It uses a brush to clean up the drain and does not require the use of plugs, only need to use the battery. We use the transmitter for remote control to send the signal to the receiver, so we can control the robot car. Our drain cleaner is made by using a simple method then the brush installed below of the robot car. This project is to solve the problem of drain cleaning and also to make the job of a cleaner easier. If this type of drain cleaner is in every house or institute, there is no need of hiring cleaners as the robot will do the cleaning job.

1.3 Problem statement

In fact, all of us use sweep for drain cleaning. From time to time technology upgrades and we also need to upgrade. In addition, most of the people are working and they did not have enough time to clean or they have to hire cleaners. Furthermore, most of the designations of drain cleaner in the market are expensive and large in size.

1.4 PROBLEM SOLUTION

This project is helping people to clear dust in the drains. Our drain cleaner is a economic project. This project help people to save their money by not hiring cleaners and DIY their drain cleaning. We have the drain cleaning equipment needed to unblock drains and solve our problems quickly. We have made a robot that cleans the dirt, grease and rubbish that has caused the blocked drain, leaving our drain clear and open.

1.5 Issue of Project

Upon this project is completed, this will answered to these questions:

- How does this car works?
- Is it possible to clean the entire drain even though there is too much tiny dust surrounding?

1.6 Scope and Limitation

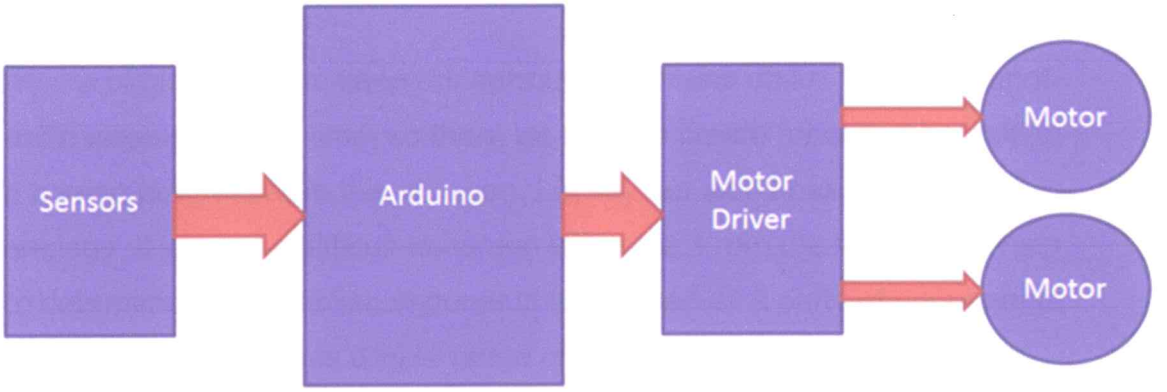
Scope

Technicians in drainage repairs, cleaning, and maintenance of older drain tile & replacement experts when upgrading to newer dual drainage systems. When it comes to dirty drains with full of tiny rubbish, Drain Cleaner's robot can give your foundation the protection it needs. Surface drains, will collect all manner of dirt and debris. Most drains will have removable grates which allow them to be cleaned out Reasonably Well with a robot. It happens to all of us. At Some point, the drain clogs and water backs up. At times Horribly unpleasant odors are unleashed. While then, we will call for lye-based drain cleaners, this dirt And rubbish can make Our Environment dirty and untidy. If preventative measures have failed to keep your Drains Clear; there is the need of a Drain Cleaner Robot.

Limitation

a) Higher noise immunity, which is not as likely to have interference from signals from other devices.
b) Blocked by common materials for example leaves, rubbish and tiny materials.
c) Small in size and it is also portable.

1.7 Operation of project



1.8 Conclusion of Chapter 1

In the beginning, we are planning thoroughly to make sure the progress is running good. With some incidents and unwanted errors we have go through from thick and thin. We are be able to proceed upon figured the problem statement, objective, issues, scope of project and the importance of project. Responsibility to attempt this kind of project is our priority, and we would see what are we going to do to the next level.

Chapter 2 (LITRATURE REVIEW)

2.1 Introduction

In the era of globalization, keep our surrounding drains clean. Human cannot do drain cleaning all the time, so there we need to create robot that be able to help human progresses in this situation. Let say our world has no such technology. It would be difficult to human to evolve. From the research, it help us to determine the suitable components to be used as a parts of our projects. Since the components has a wide range of selection, the study will help us choose the best to make a good drain cleaner robot.

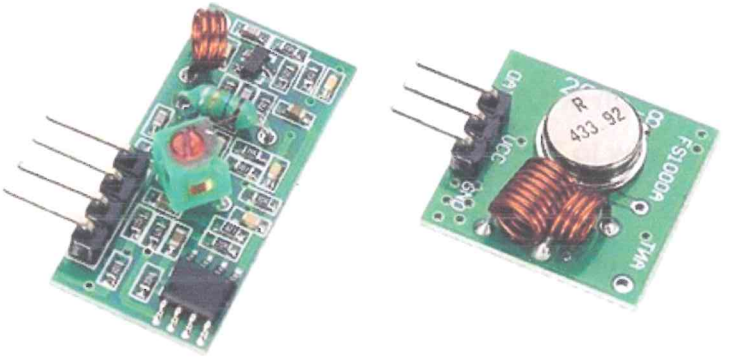
2.2 Remote Control Car

Remote controlled cars are type of cars that can be controlled by using remote. There are various types of robot cars, usually vehicles, that are remote controlled, such as cars, trucks, helicopters, boats, and even submarines.

There are four components of a remote controlled vehicle. The first component is the transmitter, which is the controller that the user has in their hand. This controller sends a signal, such as a radio wave, to the car. The receiver, such as an antenna and circuit board, sits inside of the toy and it takes the signal from the transmitter. When the receiver gets the signal, it activates motors inside the toy depending on the signal that the transmitter gives out. The motors inside of the toy are what allow the toy to be steered, to turn wheels, operate propellers, and do various other tasks. The final component of a remote controlled toy is the power source, which is usually a battery that is placed inside of the transmitter.

2.3 Transmitter and Receiver (433MHz)

The 433MHz RF Transmitter Receiver module is a wireless communication module that uses radio frequency (RF) as signal. It comes packaged as a separate transmitter and receiver. The receiver module can detect and output any radio signal in the 433 MHz range, whereas the transmitter can transmit a signal in this range via an input. Although we have seen some modules that can handle frequencies in the 315, 330 and 433 MHz ranges for the purpose of this post we are only going to work with the last frequency.



2.4 Arduino Uno

The Arduino hardware and software was designed for artists, designers, hobbyists, hackers, newbies, and anyone interested in creating interactive objects or environments. Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the internet, and even our smart-phone or our TV! This flexibility combined with the fact that the Arduino software is free, the hardware boards are pretty cheap, and both the software and hardware are easy to learn has led to a large community of users who have contributed code and released instructions for a huge variety of Arduino-based projects.

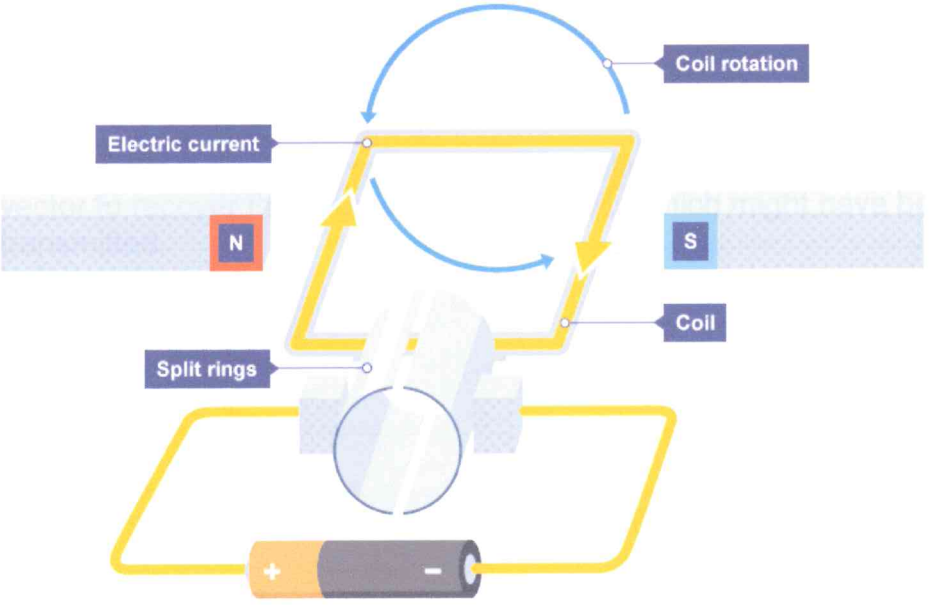
2.5 DC Motor

Electric motors use the forces produced by magnetic fields to produce a turning motion. If you put a length of wire in a magnetic field and pass a DC current through it (such as from a battery), the wire will move. This is called the motor effect.

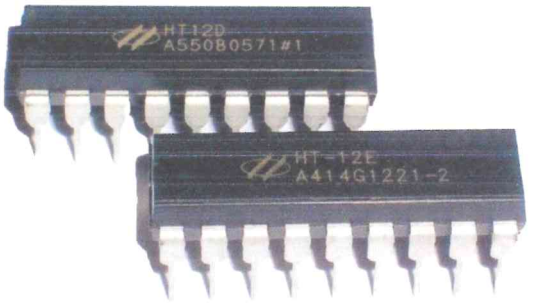
To make a simple DC motor, we need:

- two bar magnets
- a coil of wire wrapped around something to support it
- an axle for the coil of wire to spin around
- two half rings ('split rings')

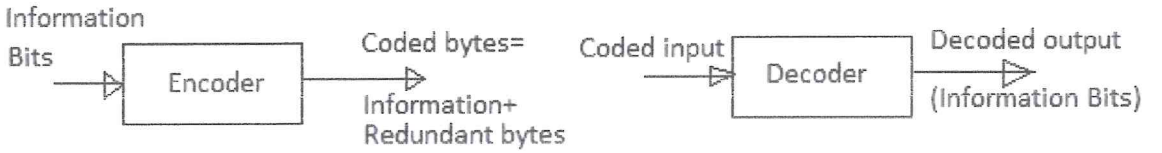
The two bar magnets are held so that the north pole of one magnet faces the south pole of the other magnet. The coil of wire is mounted in the gap between the two magnets. The split rings make electrical contact with the coil and reverse the current every half turn. When an electric current flows through the coil, a force is exerted on the coil, causing it to spin.



2.6 Encoder and Decoder



Encoder is the module which changes the stream of input bytes into output stream of bytes with added redundant bytes. Encoder module adds the redundancy as well as change the formats.



EXAMPLE: Convolutional Encoder
CTC Encoder
Differential Encoder

EXAMPLE: Viterbi Decoder
CTC Decoder
Differential Decoder

Encoder- Decoder

Decoder module utilizes redundant information present in the corrupt received vector to recover the original information bits which might have been transmitted.

2.7 IC Motor Driver L293D

A motor driver IC is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver ICs act as an interface between microprocessors in robots and the motors in the robot. The most commonly used motor driver IC's are from the L293 series such as L293D, L293NE, etc. These ICs are designed to control 2 DC motors simultaneously. L293D consist of two H-bridge. H-bridge is the simplest circuit for controlling a low current rated motor. For this tutorial we will be referring the motor driver IC as L293D only. L293D has 16 pins, they are comprised as follows:

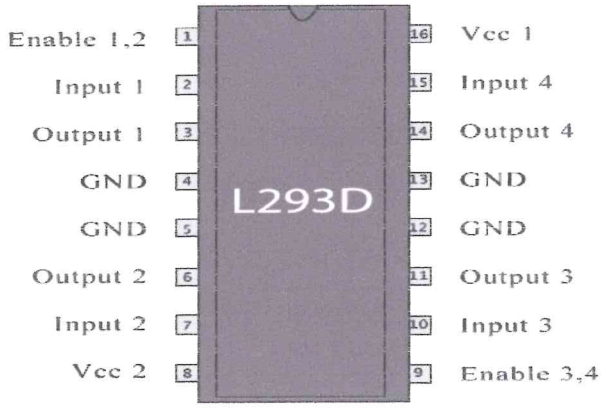
Ground Pins - 4

Input Pins - 4

Output Pins - 4

Enable pins - 2

Voltage Pins - 2



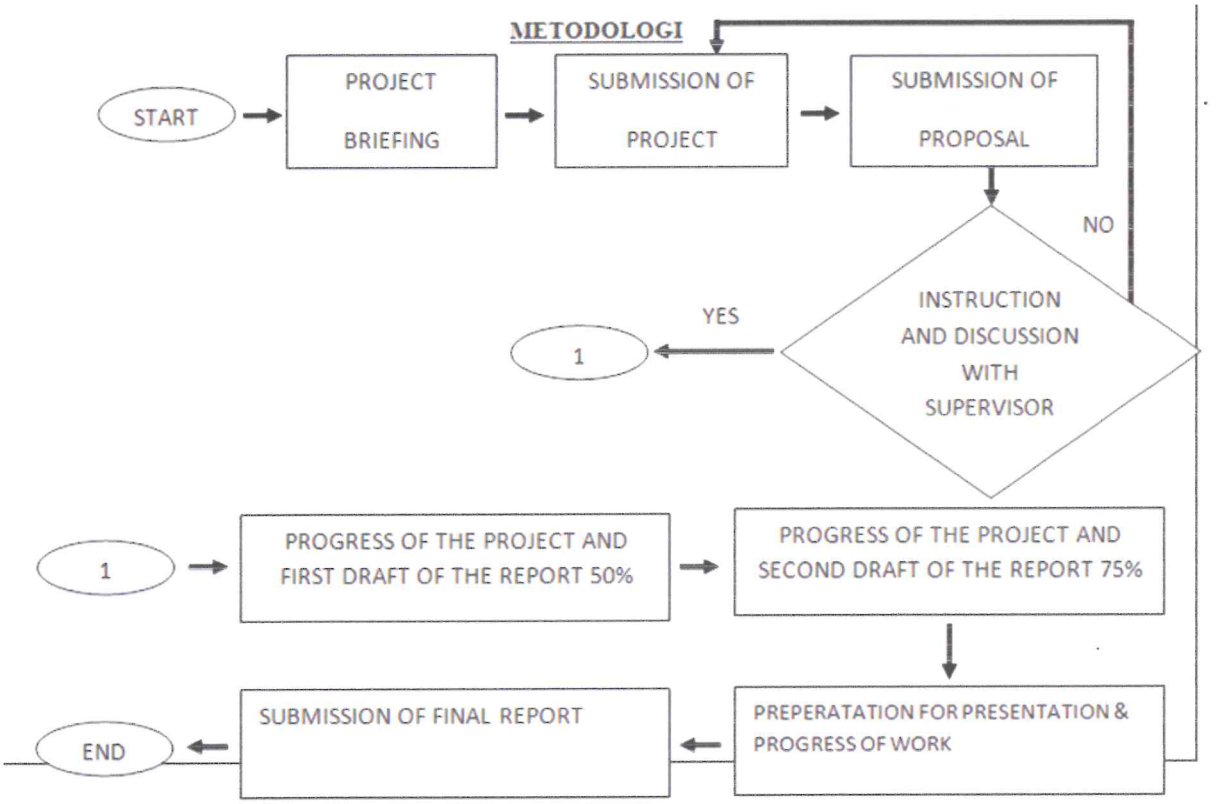
2.8 Brush Cleaner

A drain cleaner brush, also known as a sweeper, is a device that uses features, to clean up the drain by pushing the dust and dirt to corner and clean up the drain

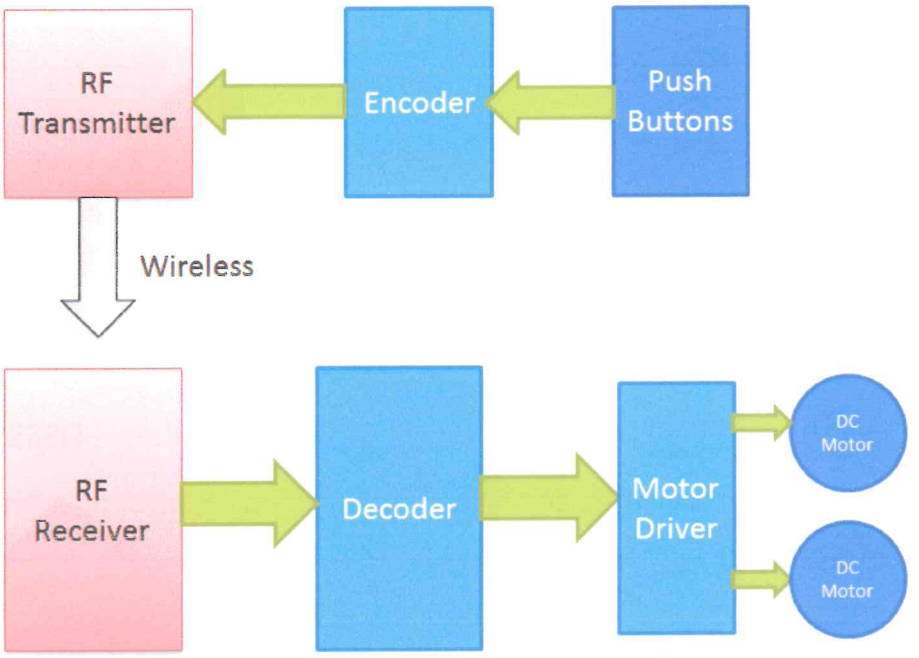
Chapter 3 (METHODOLOGY)

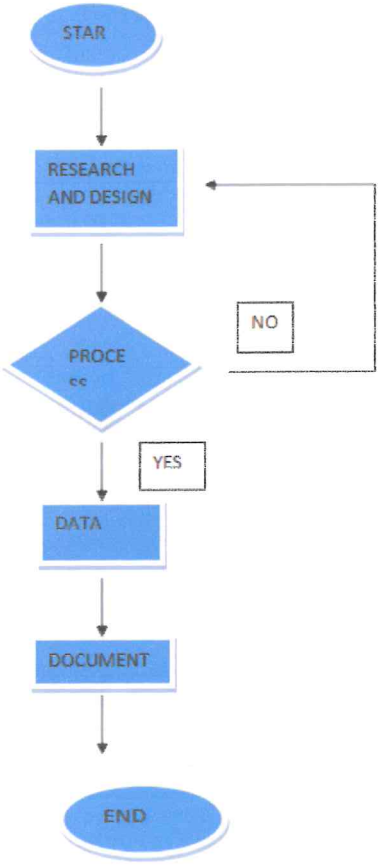
3.1 Introduction

In this chapter, research and effective procedures for problem statement are shown. During our project is carry on, there are some problem need to be resolved before anything unwanted error comes up. Supervisor gives suggestions and advises through our discussion will sort some things out.



3.2 Flow Chart

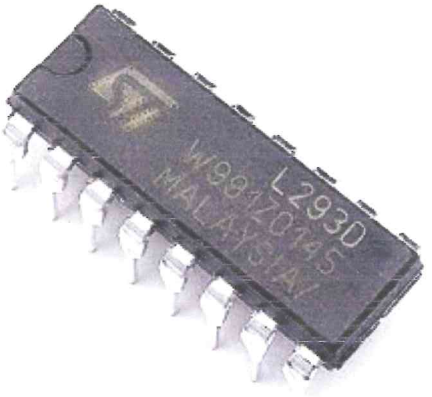




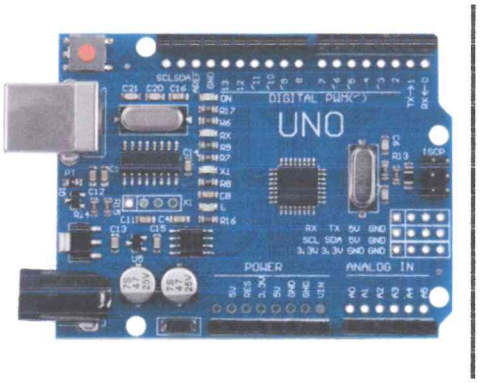
3.3 Components

Resistor

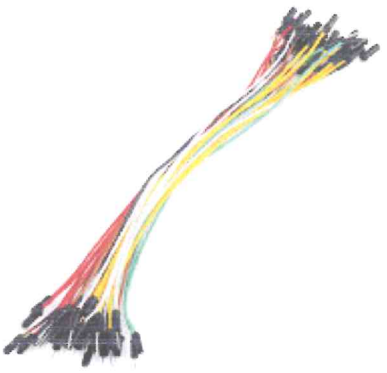
IC L239D



Arduino UNO

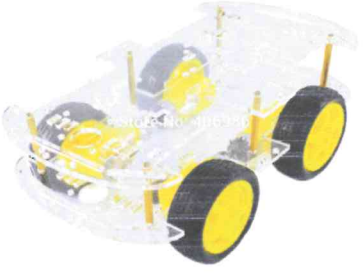


Jumper wire (Male to Male)

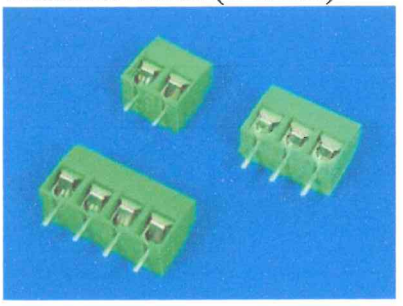


9v eve-ready battery

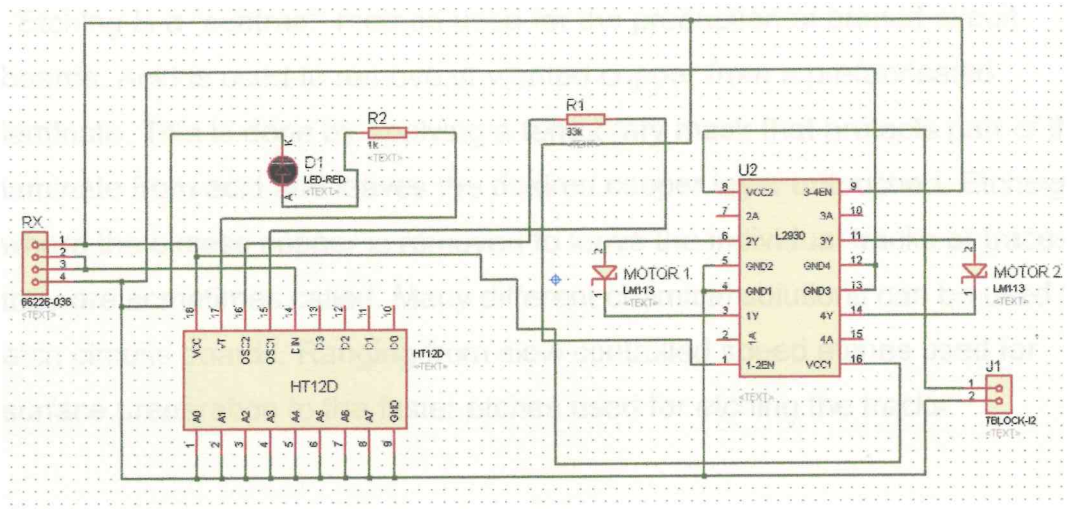
4WD ROBOT CAR

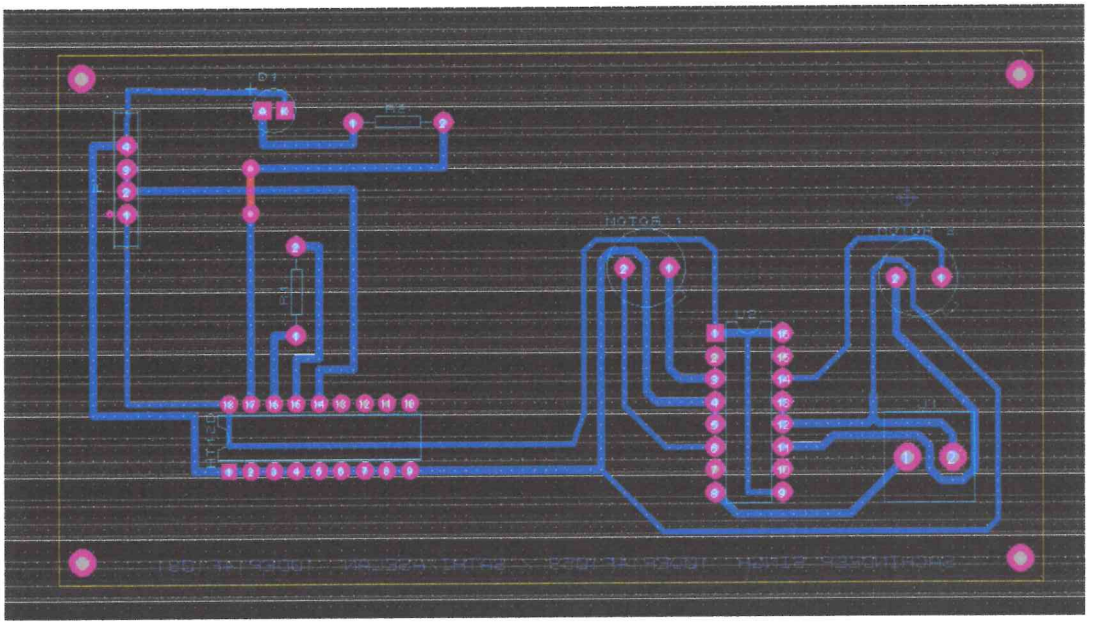


Terminal Block (T-block)



3.4 Design of Circuit





3.5 Etching Process

Etching is a "subtract" method used for the production of primed 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 acid and leaves the desired cooper layer untouched. Etching is where the excess copper is removed to leave the individual tracks or traces as they are sometimes called. Many different chemical solutions can be used to etch circuits boards. Ranging from slow controlled speed etches used for surface preparation to the faster etches used for etching the tracks.

Etching is the process of using acid to remove coppers that not need on the PCB. This acid is Acid Ferric Chloride III.

The steps of the etching process are:

1. Print the schematic onto transparent paper and cut it with the same size of PCB.
2. Stick the schematic diagram on PCB board.
3. Paste the etching circuit onto transparent paper with UV board using expose machine.
4. This process takes about 90 second.
5. Dilute the acid with little hot water and make sure that the mixture is not too liquid and too connected.
6. Then put the board into the mixed.
7. When PCB was soaked into this mix, we must always shake the container.
8. After acid remove unused copper, take the PCB to wash with clean water.
9. Then used and paper to rub the lines colors .

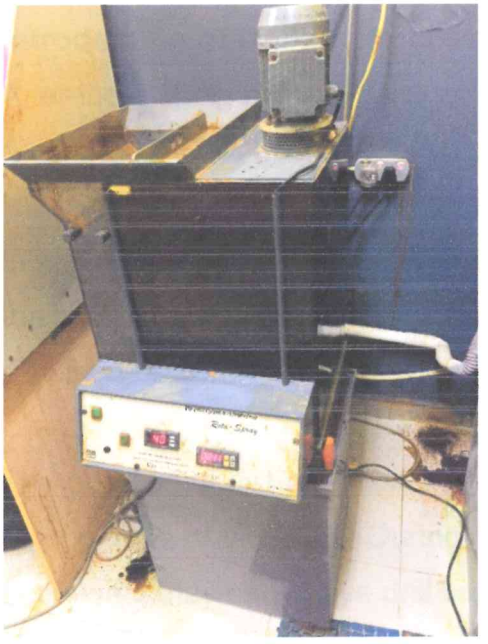
These are the illustration of making Etching process:

Step 1 : Cut PCB Board

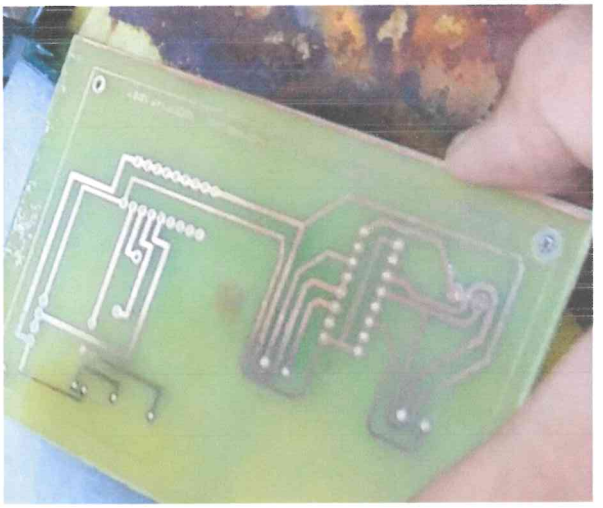
Step 2: Using UV machine by exposing the ray onto the PCB for single sided

Step 3: Soak PCB into developer and then mix up with some acidic fluid by pouring in a container

Step 4: Transfer PCB into an etching machine to start shaking



Step 5: Done etching, dry it and then we are good to go



Drilling Process

Material and Equipments :

- Bench clamp or support
- Dot punch or sharp tool
- Drilling machine
- O.8mm and 1.00mm

Introduction of Drilling Process

After the etching process finished , the PCB will be punched using drilling machine . Hole is necessary to mount component . Before drilling , a dot punch is used to mark the hole position. The serves as a shallow guide for the drill bit to align easily while drilling . Any other sharp pointed too; can be used to do the marking . Points/eye drill used must be appropriate to the hole to be punched between 0.75 to 1.0 mm .

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 will be drilled with little force applied .

Soldering Process

Soldering is defined as "the joining of metals by a fusion of alloys which has a low melting point". In other words , we use a metal that has a low melting point to adhere the surfaces 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 develop with practice .

Chapter 4 (ANALYSIS)

4.1 Introduction

In this chapter, we have finished the entire configuration by using transmitter, receiver and motor driver IC L293D. We will discuss the result that we got and do experimental in order to investigate the performance and ability of the drain cleaner robot.

4.2 Arduino Codding

```
sketch_aug25b
int pwm=13; int forward=12; int reverse=11;

int encoderValue=0; void count(void); void setup()
{
Serial.begin(9600);
pinMode(21,INPUT);
attachInterrupt(2,count,FALLING);
encoderValue=0;
}
void loop()
{
digitalWrite(pwm,1);
digitalWrite(forward,0);
analogWrite(reverse,140);
Serial.print("Starting\n");
}
```

```
sketch_aug25b
// to print encoder value on the screen Serial.print("Encoder Value="); Serial.println(encoderValue); //Setting value of encoder

//defining the while statement condition if(encoderValue<5000)

break; // loop will break as soon as encoder value reaches 5000 or above digitalWrite(forward,1);

digitalWrite(reverse,0);

analogWrite(pwm,150);

}

digitalWrite(forward,1);

digitalWrite(reverse,1);

analogWrite(pwm,255);

}

void count()

{

encoderValue++;

}
```