SMART GRASS CUTTER ROBOT

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POLITEKNIK SEBERANG PERAI

KEMENTERIAN PENGAJIAN TINGGI MALAYSIA

PROJECT 2

DEE 6092

SMART GRASS CUTTER ROBOT

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SMART GRASS CUTTER ROBOT

By,

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Penghantaran Lpaoran Ini Adalah Untuk Memenuhi Keperluan Untuk
Penganugerahan Diploma Kejuruteraan Elektronik (Komputer) di Jabatan
Kejuruteraan Elektrik Politeknik Seberang Perai

SESSION JUNE 2017

PROJECT REPORT COMFORMATION

I hereby declare that the work in this report is my own except for quotations and summaries which have been duly acknowledged.

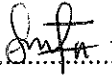NOR AZLIN BINTI YURMAN SYAH (10DTK15F1125)

Student : ....

Date : ......3/10/2017......

NURUL ATIKAH BINTI HASHIM (10DTK15F1040)
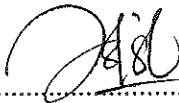
Student : ....

Date : ...3 / 10 / 2017......

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Date : ......3/ 10 /2017......

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PUAN ZAINAB BINTI YUSOF

ORGANISATION CHART

SMART GRASS CUTTER

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                    ┌─────────────────────────┐
                    │  PUAN ZAINAB BT YUSOF   │
                    │                         │
                    │      SUPERVISOR         │
                    └─────────────────────────┘
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NOR AZLIN BINTI YURMAN SYAH	NURUL ATIKAH BINTI HASHIM
"10DTK15F11125"	"10DTK15F1040"
PEMBAHAGIAN LAPORAN DAN ROBOT	PEMBAHAGIAN LAPORAN DAN ALATAN

SYAZWANI BINTI YACOB

"10DTK15F1022"

PEMBAHAGIAN REKA BENTUK DAN ALATAN
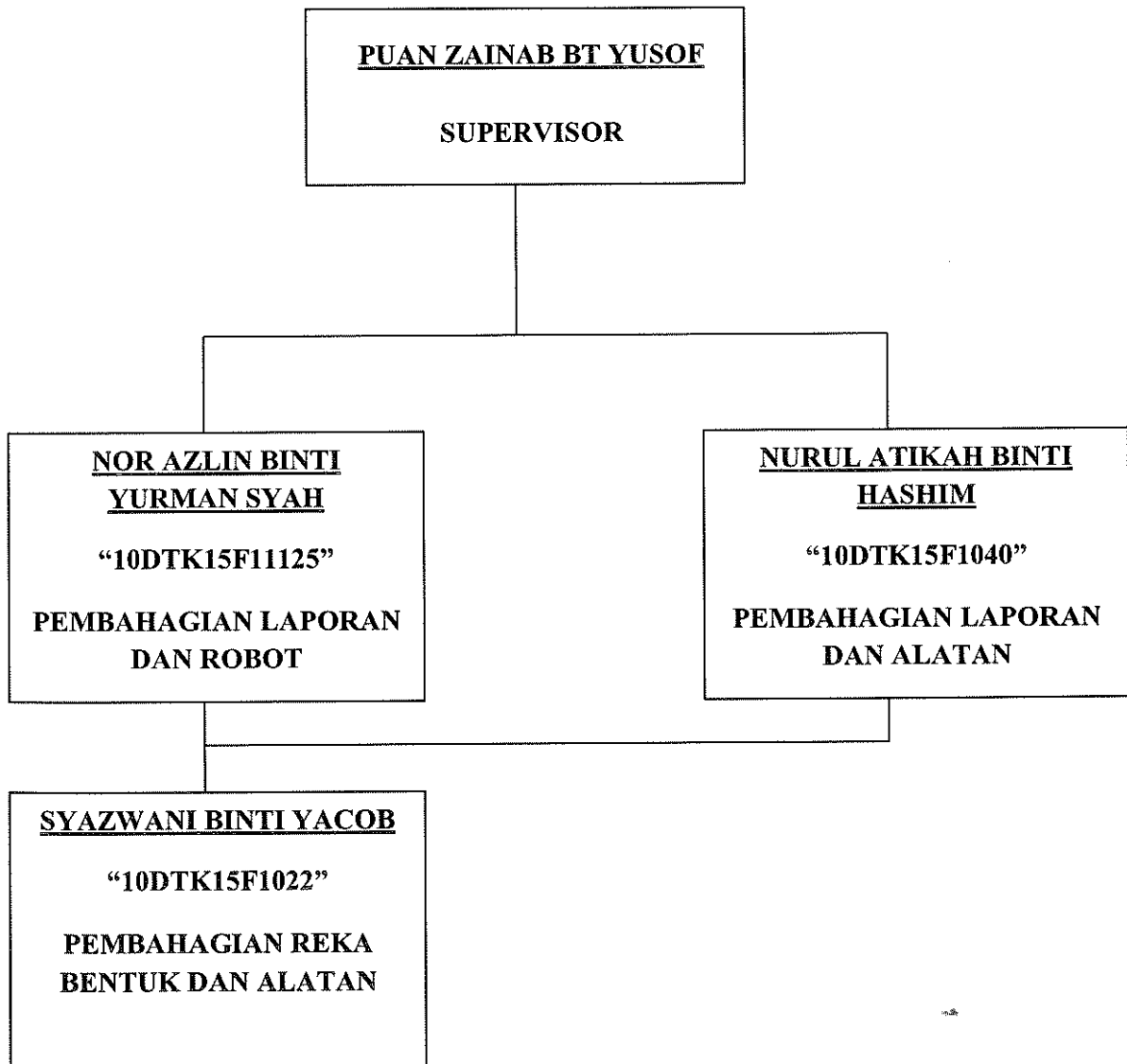
Dedicated to,

Thanks to Allah,

For give us a good health and strength while making this report.

Our beloved father and mother,

Who has always been our epitome of love and always pray for our strength to finish up this report.

Our beloved relatives,

Our siblings,

Thank you for your support and pray.

The person who has been very understanding and helpful,

Mrs Zainab Bt Yusof

For the support and guidance. Hope that we are always be remembered.

Our unforgettable friends,

Our classmates, our coursemates and all DTK students intake June 2015,

Our struggle not yet ends.

Finally, friends that always together during this third years study,

Hopefully achieved what we aspired.

ACKNOWLEDGEMENT

Alhamdulillah, first of all we would like to thank Allah SWT as finally we were able to finish our project work that we have chosen the title "Grass Cutter System". This project work had been done with all afford by group members even though a little bit problem were happened among us while doing this project work. Luckily, all the problems can be settle down and we were able to adapt properly and wisely.

Besides that, we take this opportunity to express our gratitude to our supportive supervisor, Mrs Zainab Bt Yusof for his aspiring guidance, invaluably constructive criticism and friendly advice during the project work. A sincerely grateful to her for sharing the truthful and illuminating views on a number of issues related to the project.

Other than that, we would like to express gratitude towards our parents, and our colleague for kind encouragement, co-operation and their willingness to help us out which help better in completion of this project.

It would not have been possible without the kind support and help of many individuals and organizations. We would like to extend our sincere thanks to all of them.

ABSTRACT

The grass cutter system is the title chosen for use in the manufacture of robot that we have customized. Grass cutting system is an easy to use grass cutting system. As we can see, nowadays people do not care about home activities as we are always lazy about the situation around the house.

This project is a systematic system of grass cutting that uses the former robot sumo making the purpose of this project targeted at low land or landed areas such as playground, housing areas and etc.

As we can see, people nowadays are not involved in the care of growing plants due lack of time, and they find it difficult to handle from time to time. So, this will have an adverse effect on our nature in the future. This new system is the ideal system to provide an easy method as it does not have to handle it in a hurry.

Therefore, we make a lawn mower system using high tech with controls by remote controller in the hand. . This system will inspire, engage and support people to take their personal responsibility of taking care the environment and making it fun and sustainable. This project will be implementing using Arduino UNO by using C programming language. Also L298N that we are used as a motor driver.

ABSTRAK

Sistem pemotong rumput adalah tajuk yang dipilih untuk digunakan dalam pembuatan sumo robot yang telah kami ubahsuaikan. Sistem pemotong rumput adalah sistem memotong rumput yang mudah digunakan.

Projek ini adalah sistem pemotong rumput yang sistematik iaitu menggunakan sumo robot yang sediakala membuatkan tujuan projek ini adalah ditujukan dikawasan yang bertanah pamah atau tanah rata seperti kawasan tapak permainan, kawasan perumahan dan sebagainya.

Seperti yang kita dapat lihat, pada masa kini orang ramai tidak terlibat dalam pennjagaan tumbuh tumbuhan kerana kekurangan masa, dan mereka merasa sukar untuk mengendalikan dari semasa ke semasa. Jadi, ini akan mengakibatkan kesan buruk bagi sifat kita pada masa akan datang. Sistem baru ini adalah sistem ideal untuk memberikan satu kaedah yang mudah kerana tidak perlu mengendalikannya dalam keadaan tergesa gesa.

Oleh itu, kami membuat sistem pemotong rumput menggunakan robot yang berteknologi tinggi dengan kawalan oleh alat kawalan jauh ditangan. Sistem ini akan memberi inspirasi, secara tidak langsung, melibatkan diri dan menyokong orang ramai untuk memikul tanggungjawab mereka menjaga alam sekitar. Projek ini akan dilaksanakan menggunakan Arduino UNO dengan menggunakan bahasa pengaturcaraan C. Juga, kami menggunakan L298N sebagai pemandu motor.

CONTENT

CHAPTER 1

1.0   INTRODUCTION

The existence of a garden, or the so called green space within the building around our home and other buildings like the workplace, is more important to many. The garden can help us relax more in everyday life. Taking the time to cut grass using a sumo robot controlled by the remote control or on your smart phone can be a powerful remedial stress, can even inspire.

Studies have shown that many grass and garden parks are poorly designed and/or human lazy to keep green around the house. The incident is a necessary improvement in the greener grass care system.

Hopefully, the tips and suggestions offered will provide us with the tools necessary to create a beautiful landscape while saving energy, time, and money. The lawn care and cutting system can also provide oxygen in our home area as a plant, grass also produces oxygen in the process of photosynthesis.

In cutting the lawn requires the design of cutting systems and components when modifying your lawn or garden cutting system. Go to the Grass Cutter Guide found on the Main Menu for irrigation scheduling information.

1.1 RESEARCH BACKGROUND

By 2000, robotic are most important things in the future, no matter if they are used to work in industry or at our homes, mimic some of the human capabilities, or used to access dangerous environments, launched to space, or simply used to play with. They are help to human dependencies in performing a task. Robotic devices are commonly used in manufacturing industries and domestic use as well. Modern houses normally garden with grass need to be maintained at a short height, is most user upset. This project of manual lawn by using a robot programmed to perform such project work.

In today's environment, many of us are carrying a heavier workload than we used to, and feeling the crunch. You might not be able to control your workload, but you can control how you react to it. You can choose to be overwhelmed, or you can choose to accept where you are today, while taking steps to improve your situation. In order to cope with all the situations, as a human being need to be prepared with fresh ideas and surround ourselves in a harmony surrounding.

There is a way that can help to enhance ourselves and to relax our mind. It is just by having smart grass cutter in house. The problems can be solve by using only fingertips on our smartphones with installing the apps of "Arduino Bluetooth Controller".

1.2   MOTIVATION

Our motivation to undertake this project is due to our experience and observation of the inefficiencies of the current system which is cutting their grass in a traditional way or manual way. Besides that, I believe that nowadays people are taking for granted about our nature which is, it is much more important to care about the living organisms. These are our oxygen tank that we breathe every seconds and every day. Other than that, we are also need to raise awareness in careers of agriculture to all people including children, teenagers, youth, parents and adults. This is because they lack the knowledge and information about plants.

1.3   PROBLEM DESCRIPTION

Lawn mowing system is usually a very time-consuming activity, to be done in a reasonable amount of time, it requires a large amount of human resources. Traditionally, all the steps were executed by humans. Nowadays, some systems use technology to reduce the number of workers or the time required to cut the grass. With such systems, the control is very limited, and many resources are still wasted.

Blades is one of these resources that are used excessively for cutting and bramble clearing. Delay in the rotation of the blade is important to control the cutting of the grass. In the grass cutter systems have several disadvantages which is blade can be failure, it's manually operand, and difficult to operate in rainy seasons.

But at the sometimes, because of the system using the technology such robotic can be solve the several problem others besides above. Technology is probably a solution to reduce costs and prevent loss of resources.

3

1.4 OBJECTIVES

The objective of this project was to create a more efficient and orderly grass cutting system that uses blades with fast rotation to cut tall grass or low. We usually see the manually and conversional grass cutter are using fuel as the source power. But, just now we are create a differently uses of grass cutting system that to reduce oil consumption and also minimize the cost of labor.

The following aspects were considered in the choice of a design solution:

- Installation costs.
- Cost of components.
- Human intervention.
- Reliability.
- Power consumption.
- Maintenance.

A critical consideration is the installation costs, since costs generally determine the feasibility and viability of a project. The installation must be simple enough for a domestic user. Also, cost of components are needed must be enough to complete the grass cutting system using a robotic that have programmed. Since the objective is to minimize the cost of labor, minimal supervision and calibration must be needed. Because of that, this project including the technology system which are dangerous if not have scheduling to do this project. The system must operate with optimized consistency. The power consumption must also be monitored. For maintenance, the replacement parts must be readily available and easy to install in the case of failure.

1.5 SYSTEM SCOPE

This grass cutting system is actually related to the surrounding plant life and its owners.

This ideal grass cutting system is the scope for home users who are always busy in daily work. Therefore, this system is made to simplify the work in the home page cleanliness or around the house just giving directions/ instructions through the tip of the finger just that your smartphone.

1.6 SYSTEM LIMITATION

The proposed system causes a lot of vague situations. For example without the power supply, these systems will not functioning due to fully dependent to the power supply. Power supply that we are use is batteries that to move our robot grass cutter. Besides, the limitation of this system is, for large time required to remove the grass. There are having a very time-consuming, manually operate and also difficult to operate in rainy seasons.

1.7 PROPOSED SOLUTION

In order to solve the problem that are facing now, I proposed a smart grass cutter system called as 'Plants, Cutting Grass System'. Grass Cutter System is a simple and easy to use in daily life. Because it is in accordance with the instructions from its owner. Even though this system are use in traditional or manual system. That doesn't mean it's not enough of good quality in grass cutting system. But, have many way to reduce human resource or labour, we are proposed some ideas that injected some intelligent on it to make it more intelligent by the helps of internet. For the system functionalities, we will make sure that the user will be at ease when using this system or method due to we'll provide a very user-friendly system to use. We are use the apps by "Arduino Bluetooth Controller" into our robot to moving also then, cut the grass.

CHAPTER 2

LITERATURE REVIEW

2.0 INTRODUCTION

A literature review is a body of text that aims to review the critical points of current knowledge and or methodological approaches on a particular topic. Literature reviews are secondary sources, and as such, do not report any new or original experimental work.

Most often associated with academic-oriented literature, such as thesis, a literature review usually precedes a research proposal and results section. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area. A well-structured literature review is characterized by a logical flow of ideas involved current and relevant references with consistent, appropriate referencing style such proper use of terminology and an unbiased and comprehensive view of the previous research on the topic.

Hence, systematic and detailed planning must be arranged for produce a complete and perfect project. First step that we need made it, was design daub (sketching) to get the real image of machine that we want to be produced. Due to this, the work design and study that we made is a continuing process and it involving problem solving activity creatively namely which is known as literature study.

2.1 GENERAL DESCRIPTION OF EXCISTING SYSTEM (problems, weakness, opportunities)

In agriculture fields or in nursery or even in house hold growing grass is commonly found problem. Removal of the grass is also a tedious job involving lot of human efforts. In the modern world as time for carrying out anything has reduced drastically so as to be done the removal of grass involving use of a machine.
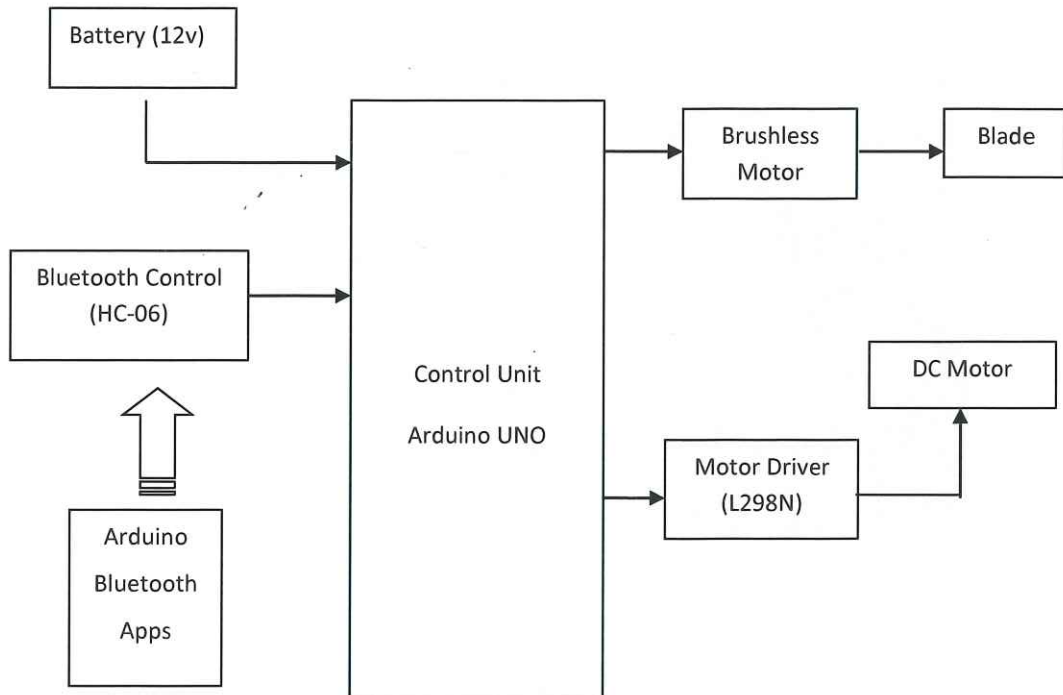
This machine can be called as grass cutter. Depending on its variants it can be termed differently like solar powered battery powered etc. In its simple construction a very high speed motor is connected to an end of a holding rod that is hang with a shoulder and held with hand to the free and of this rod a battery pack is attached. The cutter used is actually a flexible wire that cuts the grass with high speed rotation. The high speed rotation of the blades along with the centrifugal force acted on it due to its minimal weight enable the flexible plastic wires cut the grass easily despite being not any hard and sharp material which is generally associated with any cutting blades.

2.2 IMPORTANCE OF THE PROJECT TO SOCEITY

Generally this project (mechanical lawn mower) has a great effect towards development and maintenance of any community in the societies which one nominated below.

a) Cutting grass of secondary primary and tertiary field thereby reducing human effort needed.

b) Great portion of farmland can easily cut or brushed with lawn mower in one day.

c) This project reduced number of personnel that needed in a particular farm operation.

d) To reduce man power and to improve the economy of the country.

e) Provisions of foreign exchange in the country.

f) To reduce importation cost t o our country (Nigeria).

g) It encourage pupils, and student to be regular and the school because no more cutting of grass with cutlass by pupils or student.

2.3 FULL SYSTEM BLOCK DIAGRAM

```
Battery (12v)
      │
      │                    ┌──────────────┐        ┌──────────┐      ┌────────┐
      └───────────────────▶│              │───────▶│ Brushless│─────▶│ Blade  │
                           │              │        │  Motor   │      └────────┘
┌──────────────────┐      │              │        └──────────┘
│ Bluetooth Control│──────▶│ Control Unit │
│     (HC-06)      │      │              │                            ┌──────────┐
└──────────────────┘      │ Arduino UNO  │                            │ DC Motor │
        ▲                 │              │        ┌──────────┐        └──────────┘
        │                 │              │───────▶│  Motor   │──────────▶│
        │                 │              │        │  Driver  │
┌──────────────┐         └──────────────┘        │ (L298N)  │
│   Arduino    │                                  └──────────┘
│  Bluetooth   │
│    Apps      │
└──────────────┘
```

2.4 CIRCUIT DESCRIPTION

The circuit on this system can be devided into 2 part

1. A brain which is L298N which will control instruction the whole system.
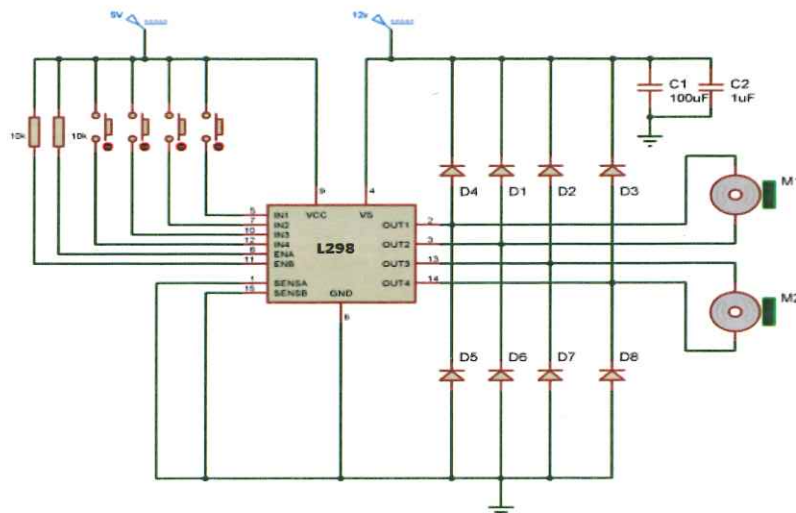
    • Connection motor with microcontrller
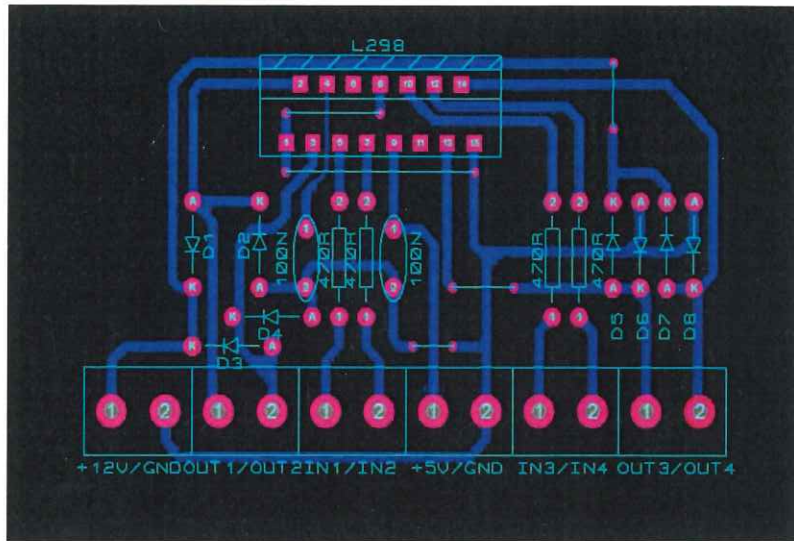

Figure 2.4 1(a) L298N Circuit
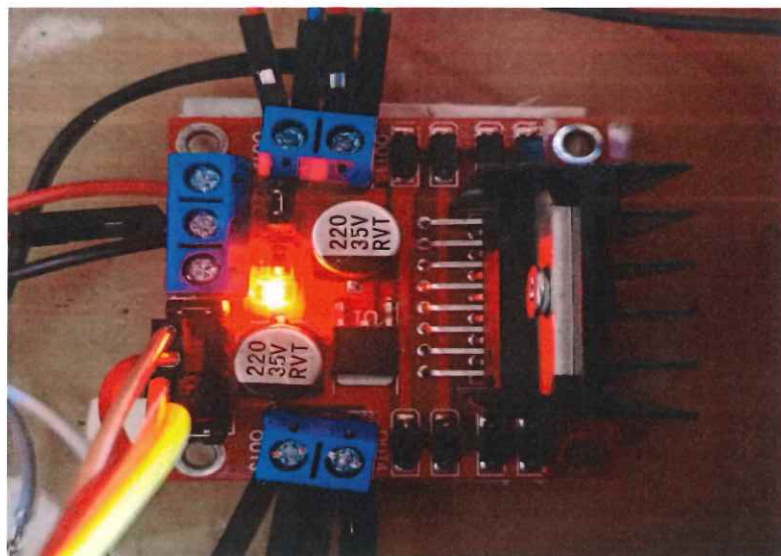
8

Figure 2.4 1(b) L298N in ARES

Figure 2.4 1(c) L298N

2. Second circuit is a Relay Cicuit .
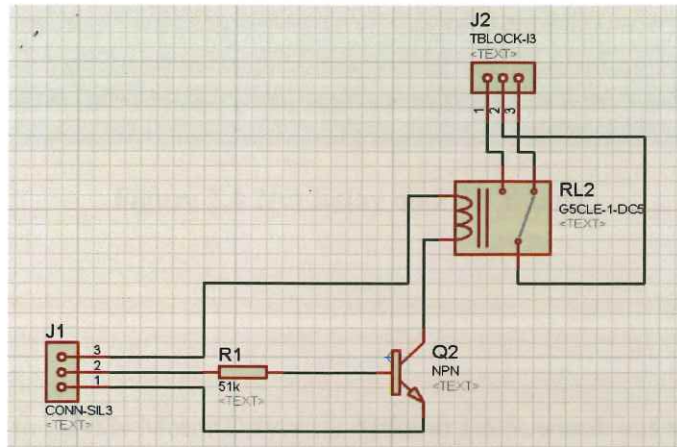   - Connect to Brushless Motor
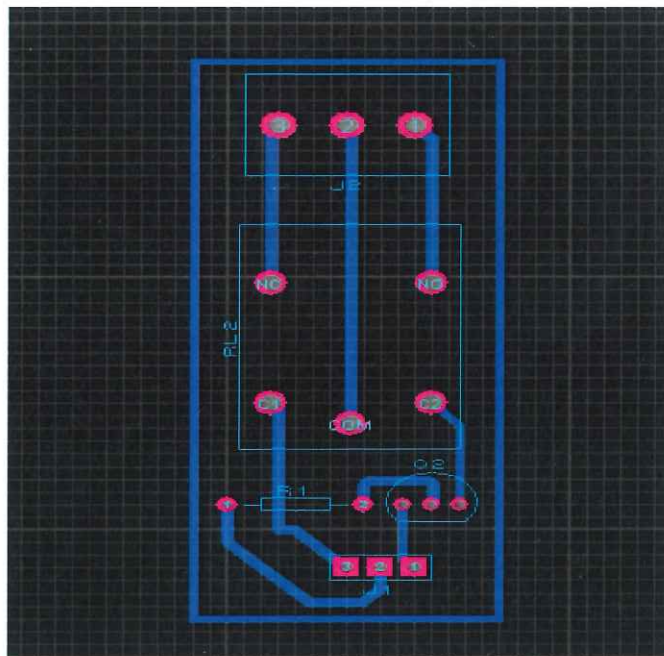   - Relay for grass cutter blade

Figure 2.4 2(a) Relay Circuit

Figure 2.4 2(b) Relay in ARES

Figure 2.4 2(c) Relay on PCB Board

2.5 SOFTWARE

Software to write code to L298N Motor Driver tis Arduino 1.6.5, which has written in C language. Below is the code to for this system

```
#define in1 3

#define in2 5

#define in3 6

#define in4 9

#define MOTOR1 10 //relay


int command;

int Speed;

int Speedsec;

int Turnradius = 200;

int val = 0;


void setup() {

    pinMode(in1, OUTPUT);

    pinMode(in2, OUTPUT);

    pinMode(in3, OUTPUT);

    pinMode(in4, OUTPUT);
```

```arduino
    pinMode(MOTOR1, OUTPUT);

    Serial.begin(9600);    //Set the baud rate to your Bluetooth module.

}


void loop() {
    if (Serial.available() > 0) {

        command = Serial.read();

        Stop();

        switch (command) {
            case 'F':

                forward();

                break;

            case 'B':

                back();

                break;

            case 'L':

                left();

                break;

            case 'R':

                right();

                break;

            case 'G':

                forwardleft();

                break;

            case 'I':

                forwardright();

                break;

            case 'H':

                backleft();
```

```
    break;
case 'J':

   backright();

   break;
case '0':

   Speed = 128;

   break;
case '1':

   Speed = 140;

   break;
case '2':

   Speed = 153;

   break;
case '3':

   Speed = 165;

   break;
case '4':

   Speed = 178;

   break;
case '5':

   Speed = 191;

   break;
case '6':

   Speed = 204;

   break;
case '7':

   Speed = 216;

   break;
case '8':
```

```
            Speed = 229;

            break;

        case '9':

            Speed = 242;

            break;

        case 'q':

            Speed = 255;

            break;

        case 'w':

            digitalWrite(MOTOR1, HIGH);

            break;

        case 'W':

            digitalWrite(MOTOR1, LOW);

            break;

        }

    Speedsec = Speed - Turnradius;

  }

}

void forward() {

  analogWrite(in1, Speed);

  analogWrite(in3, Speed);

}

void back() {

  analogWrite(in2, Speed);

  analogWrite(in4, Speed);

}

void left() {

  analogWrite(in3, Speed);

  analogWrite(in2, Speed);
```

```
}

void right() {

    analogWrite(in4, Speed);

    analogWrite(in1, Speed);

}

void forwardleft() {

    analogWrite(in1, Speedsec);

    analogWrite(in3, Speed);

}

void forwardright() {

    analogWrite(in1, Speed);

    analogWrite(in3, Speedsec);

}

void backright() {

    analogWrite(in2, Speed);

    analogWrite(in4, Speedsec);

}

void backleft() {

    analogWrite(in2, Speed);

    analogWrite(in4, Speedsec);

}

void Stop() {

    analogWrite(in1, 0);

    analogWrite(in2, 0);

    analogWrite(in3, 0);

    analogWrite(in4, 0);

}
```
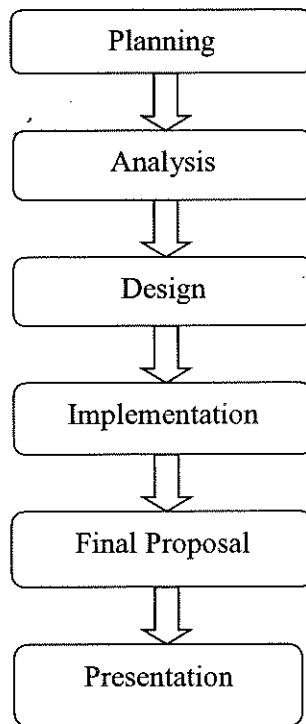
2.6 FLOWCHART OF PROJECT

```
┌─────────────────────────┐
│        Planning         │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│        Analysis         │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│         Design          │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│     Implementation      │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│      Final Proposal     │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│      Presentation       │
└─────────────────────────┘
```

2.7   COMPONENT OF PROJECT

This is the proposed for Plant watering system of material as on planned.

Component Of Smart Grass Cutter Robot	
Description	Quantity
Bluetooth HC-06	1
Battery 12v 2.6Ah	1
Original Arduino UNO	1
Relay 5v	1
Transistor	1
Resistor	1
Blade	1
Motor Controller	4
Tyre RC	4
Recharging batteries	1
Terminal Block	1
L298N	1
Brushless Motor	1
Connector Couple Wire Battery	1
Battery 12V 2.6Ah	1
Jumper Wire	More than 10

a. USB type B

Universal Serial Bus (USB) is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices.
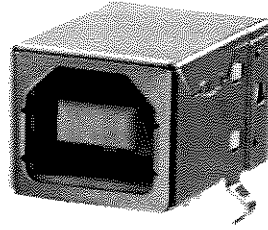

Figure 2.7(a) USB type B

b. Brushless DC Motor

BRUSHLESS D.C MOTOR: This is a relatively new class of motors whose application have been increasing at a rapid rate each year, due to both declining costs as well as increasing functionality. A brushless DC motor is similar to that brush DC motor in that it has an internal shaft position feedback which tells which windings to switch on at which an exact moment. This internal feedback gives both the brush DC motor and brushless DC motor their unique characteristics. Linear speed-torque curves which are well suited for speed and position control and high starting torque. The internal feedback is accomplished in a brush type DC motor with the mechanical commutator (a series of copper bar which are insulated from each other) and the mechanical brushes through which the current is fed into the commutator bars and switched sequentially into the appropriate winding in the armature.
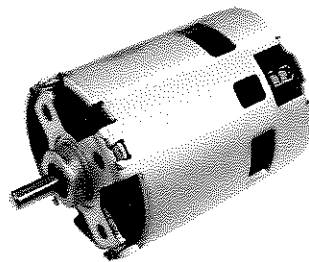

Figure 2.7(b) Brushless DC Motor

c. Relay

A relay is an electrically operated switch. We use it in the grass cutting machine model for controlling the motor connected to blades as a switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays found extensive use in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly drive an electric motor is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device triggered by light to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protection relays".
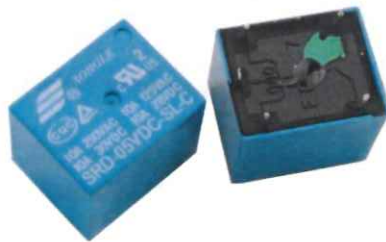

Figure 2.7(c) Relay 5V

d. Arduino

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software. Arduino boards are available commercially in preassembled form, or as do-it-yourself kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (*shields*) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.
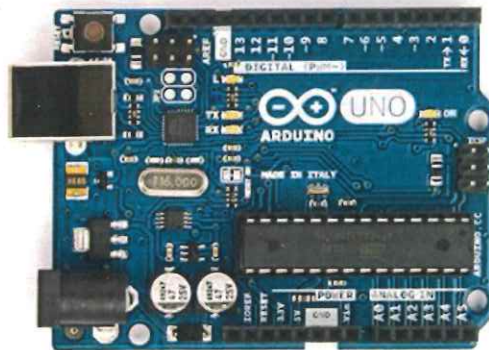

Figure 2.7(d) Arduino UNO