

BLUETOOTH GRASS CUTTER

MOHAMMAD ZAHIR BIN MOHAMED ALI

10DEP15F1080

ANANTH A/L RAJA

10DEP15F1111

RISHIKESHAN A/L POOBALAN

10DEP15F1112

DIPLOMA ELECTRONIC ENGINEERING (COMMUNICATION)

POLYTECHNIC SEBERANG PERAI

JUNE 2017

BLUETOOTH GRASS CUTTER

BY

MOHAMMAD ZAHIR BIN MOHAMED ALI 10DEP15F1080

ANANTH A/L RAJA 10DEP15F1111

RISHIKESHAN A/L POOBALAN 10DEP15F1112

**DELIVERY OF THIS REPORT IS TO FULFILL THE REQUIREMENT FOR THE
AWARD OF DIPLOMA IN ELECTRONIC ENGINEERING (COMMUNICATION)
AT THE ELECTRICAL ENGINEERING DEPARTMENT OF POLYTECHNIC
SEBERANG PERAI**

JUNE 2017

PROJECT REPORT VALIDATION

This report was submitted to the Electrical Department in Polytechnic Seberang Perai as fulfilling a part of the award for the Diploma In Electrical Engineering (Communication)

Title of the Project Report: BLUETOOTH GRASS CUTTER

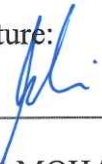
Supervisor Name: TUAN SYED ADNAN BIN SYED OTHMAN

Supervisor's signature: 

Date: 1 / 10 / 2017

“We acknowledge this work is our own work except the excerpts that we have explored.”

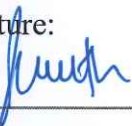
1. Signature:



Name: MOHAMMAD ZAHIR BIN MOHAMED ALI

Matrix NO.: 10DEP15F1080

2. Signature:



Name: ANANTH A/L RAJA

Matrix NO.: 10DEP15F1111

3. Signature:



Name: RISHIKESHAN A/L POOBALAN

Matrix NO.: 10DEP15F1112

DATE: 1 / 10 / 2017

ACKNOWLEDGEMENT

In the name of Allah S.W.T the Most Gracious and Merciful. Thanks and praise to Allah S.W.T for giving me strength and patience to complete our project successfully.

First of all, we would like to take this opportunity to dedicate our highest appreciation to our supervisor, Mr. Syed Adnan Bin Syed Othman for his guidance and idea contributions. He has made a lot of effort and advice in order to complete our project successfully. Many thanks as well for her time of a proofreading process.

Our sincere thanks go to all members of the staff of the Engineering Department, JKE, who helped us in many ways and for their assistance and share the information.

Finally, we express our gratefully to our beloved parents, brothers and sisters that have gave a lot of courage during finished this Final Year Project. we also thanks to all classmates that also give us a lot of support and idea to do this project.

ABSTRACT

In this report the development of a Bluetooth Grass Cutter is presented. The issue in the development of this project is to build a robot that able to cut the grass in lawn of your houses by just using your own android smartphones to control them. You just need to connect your smartphone to the Bluetooth module that have been inserted inside this project. Then once you are connected to the project's Bluetooth module, you are ready to cut some grass at your lawn inside your house. This project consists of an Arduino, a Bluetooth Module, two 3VDC motors, a L293D motor driver IC, a RS 550 Motor for the blades connected to a switch. For starting to cut the grass right after you have connected to the project you just need to place the project at your lawn and switch on the switch for the blade's motor. The blade's motor is a RS 550 Motor , we have used this type of motor is to ensure that the blades have enough rotation power in order to cut the grass. The blades that we have used is the normal blade that we use in the penknife. The purpose we use that blade because it is lightweight and can be replaced easily. The design for the Bluetooth grass cutter is very simple and inexpensive which cost us estimate around RM 150.00. It is far more cheaper and smaller in size between the current grass cutting machine that we are using. The idea for doing this project is to less burden the work for a person in order to cut the grass, also to less the pollution from the current grass cutting machine and also to reduce the usage of petrol to functioning the grass cutting machine. This project is developed mainly to the house owner who have a larger area of lawn in their houses, and also to the worker at some school where they can use this project to cut the grass without burden themselves.

ABSTRAK

Dalam laporan ini, perkembangan Bluetooth Cutter Grass dibentangkan. Isu dalam pembangunan projek ini adalah untuk membina robot yang dapat memotong rumput di halaman rumah anda dengan hanya menggunakan telefon pintar android anda sendiri untuk mengawalinya. Anda hanya perlu menyambung telefon pintar anda ke modul Bluetooth yang telah dimasukkan ke dalam projek ini. Kemudian apabila anda bersambung dengan modul Bluetooth projek, anda bersedia untuk memotong sesetengah rumput di halaman anda di dalam rumah anda. Projek ini terdiri daripada Arduino, Modul Bluetooth, dua motor 3VDC, pemandu L293D motor IC, motor RS 550 untuk pisau yang disambungkan ke suis. Untuk mula memotong rumput tepat selepas anda telah menyambung ke projek itu, anda hanya perlu meletakkan projek di rumput anda dan menghidupkan suis untuk motor bilah. Motor bilah adalah motor RS 550, kami menggunakan jenis motor ini untuk memastikan bilah mempunyai kuasa putaran yang cukup untuk memotong rumput. Bilah-bilah yang kami gunakan adalah bilah biasa yang kami gunakan di penknife. Tujuan kami menggunakan pisau itu kerana ia ringan dan mudah diganti. Reka bentuk pemotong rumput bluetooth adalah sangat mudah dan murah yang menelan kos kami sekitar RM 150.00. Ia jauh lebih murah dan lebih kecil saiz antara mesin pemotong rumput semasa yang kami gunakan. Idea untuk melakukan projek ini adalah untuk mengurangkan beban kerja bagi seseorang untuk memotong rumput, juga kurang pencemaran dari mesin pemotong rumput semasa dan juga untuk mengurangkan penggunaan petrol untuk berfungsi mesin pemotong rumput. Projek ini dibangunkan terutamanya kepada pemilik rumah yang mempunyai kawasan rumput yang lebih luas di rumah mereka, dan juga kepada pekerja di beberapa sekolah di mana mereka boleh menggunakan projek ini untuk memotong rumput tanpa membebani diri mereka sendiri.

LIST OF FIGURES

Figure

1.0: Example of lawn nearby house

1.1: Example of the movement of project

1.2: Example of the flow chart of the project

2.0: Bluetooth module

2.1: RS 550 Motor

2.2: DC Motor

2.3: Blades

2.4: Arduino Uno

2.5: Types Of Capacitor

2.6: Capacitor

2.7: Terminal Blocks

2.8: Pins Of Motor Driver

2.9: Motor Driver

3.0: Flow chart of project

3.1: Schematic of Grass Cutter

3.2: Toolbar Of Proteus Simulation

3.3: Transparent Paper That Have Cut

3.4: UV Expose Process

3.5: Process Of Remove Unused Copper

3.6: Drilling Process

3.7: Soldering Process

4.0: Motor RS 550 With Switch

4.1: Motor Driver

5.0: Perspex

6.0: Fully Done Project

LIST OF TABLES

Table

1.0: Gantt Chart Semester 4

2.0: Gantt Chart Semester 5

3.0 Project Costing

CONTENTS

ACKNOWLEDGEMENT	i
ABSTRACT	ii
ABSTRAK	iii
LIST OF FIGURES	iv-v
LIST OF TABLES	vi
CHAPTER	
1 INTRODUCTION	1
1.1 Project Introduction	1
1.2 Project Background	2
1.3 Problem Statement	2-3
1.4 Objective Project	4
1.5 Project Scope	4
1.6 Definition Of Terms	5
1.7 Conclusion	5
2 LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Bluetooth Module	7
2.3 Motor	8
2.4 DC Motor	9
2.5 Penknife	10
2.6 Arduino Uno	11
2.7 Capacitor	12
2.8 Terminal Block	13
2.9 L293D Motor Driver	14

3	METODOLOGY	15
3.1	Introduction	15
3.1.1	Flow Chart	16
3.2	Draw schematic diagram	17
3.2.2	Process Of The Circuit	18
3.3	Process Of The Circuit	19
3.3.1	Design The Circuit Diagram	19
3.4	Etching	20
3.4.1	Risk Of Etching	20
3.4.2	Safety	20
3.4.3	Etching Process	21-22
3.5	Drilling	22
3.5.1	Material And Equipment	22
3.5.2	Introduction Of Drilling Process	22-23
3.6	Insert Component	23
3.7	Soldering Process	23-24
3.8	Circuit Testing	25
3.9	Troubleshooting	25
3.10	Project Designation	26
3.10.1	Research and analysis project	26
3.10.2	The Project Reformation	26
3.10.3	Session Discussion And Problem Statement	26
4	FINDINGS AND ANALYSIS	27
4.1	Introduction	27
4.2	Bluetooth Grass Cutter	27-28
4.2.1	The Behavior Of the Bluetooth Grass Cutter	28

	4.2.2 The Bluetooth Grass Cutter Abilities	28-29
	4.3 Project Evaluation	29
	4.3.1 Problems In The Project	29
	4.3.2 Way To Solve The problems	30-31
	4.4 Project Coding	32-35
5	DISCUSSION AND CONCLUSION	36
	5.1 Introduction Discussion	36
	5.1.2 Problems Of Material	36
	5.1.3 Problems To Writing And Programming	36
	5.2 Introduction Conclusion	37
	5.2.1 Conclusion	37
	REFERENCE	38
	GANTT CHART	39-40
	PROJECT COSTING	41
	FULLY DONE PROJECT	42

CHAPTER 1

INTRODUCTION

1 PROJECT INTRODUCTION

The basis of this project is to design a Bluetooth Grass Cutter Machine that can be controlled with one's bluetooth device. The constituents used to create this include: a motors, motor controller, batteries, wheels, staple components for the frame and wheels, Arduino and etc. The techniques used to create and manipulate the machine include: Soldering of the circuit designed, motor driver, for the motor controller; Pulse Width Modulation (PWM) in the Arduino Uno for speed and direction control. The overall approach is to design an motor driver to control the motors, and to use the android phone to control the speed and direction of the motors. Upon completion of the project, one will be pleased that their machine could be mowed while inside the comfort of their home.

We had decided to do the bluetooth remote controlled grass cutter as our project for this sem. The main purpose we had doing this project is for less burden the work of a worker who is always carrying the grass cutter machine at their back under the hot sun. Moreover, we are doing this for lessen the air pollution and the sound pollution that coming from the grass cutter machine that exist now days. This is because now days machine use petrol and motor oil in order to make the machine works and it produce air pollution. The sound that coming from the machine is also very loud making others uncomfortable.

This project is chosen because we wanted to improve the system of grass cutting in our country. The old machine that we are using now is causing us a lot of problems. Such as it produce air pollution, sound pollution, damaging the environment, and can cause the worker to have a serious back pain because they are carrying the machine all the time they need to work. This project can overcome all of the problems that we are facing. This machine can be controlled from a certain distance and the worker doesn't need to carry the machine behind their back and standing under the hot sun and the controlling of the machine is very simple that all the person can control them. Moreover this project is using battery as the power source which is eco-friendly. And the project doesn't make loud sound as the old machine because the motor is small and powerful. Finally the environment could be safe because this project is low to the ground and have shield around the blade to make sure the stones or any other things can damaged the environment

2 PROJECT BACKGROUND

Existing Bluetooth grass cutter each have a distinct working principle. The user to perform a netime set up where the user just need to connect and use. The blade is set using a battery powered motor that is fixed at the bottom of the project. This ensure that the robot can cut the grass with a good condition and the grass would be in a decent height and look beautiful at the same time. The robot travels on the garden in a way that the user wanted to controlled the robot, as shown in Figure below, several times from side to side to ensure that the entire area is covered and that the grass is cut from different angles. The user need to make sure that the perimeter of the lawn must known by the user before he start to cut the grass on its cutting area.

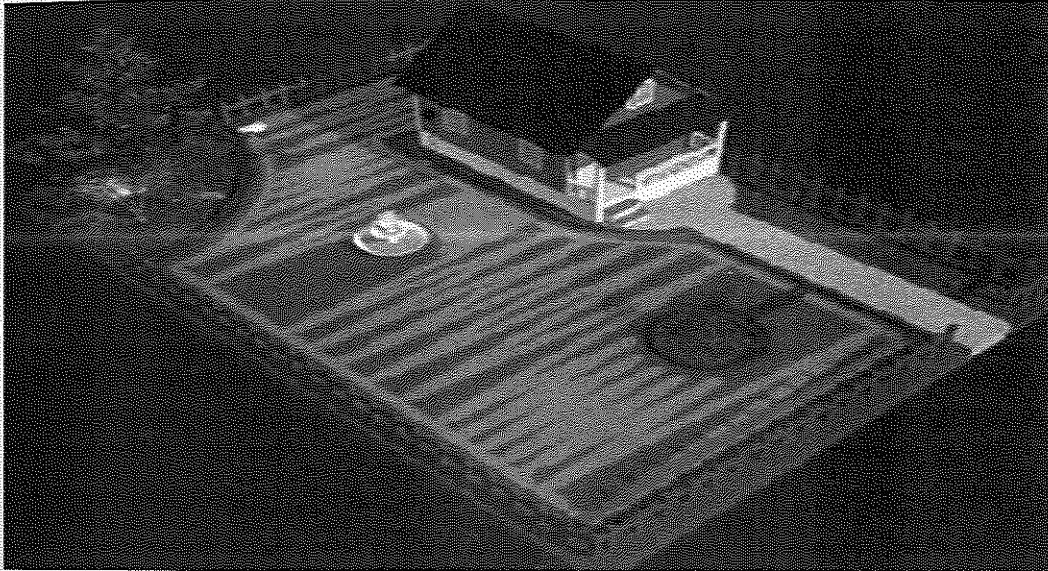


Figure1 Example of lawn nearby the house

1.3 PROBLEM STATEMENT

Nowadays the human kind are having trouble to appoint another person to cut the grass at their house or the lawn. So they have to give a lot of money to the person because the work of cutting the grass is not easy. But the person who they appoint also can face a lot of problems. The problem that we faced is the worker that using the machine daily may be having major back problem in the future. The machine also produces sound and air pollution. The size of the machine is very big. The environment usually get damaged from the activity of grass cutting for example the windshield of the car get broken or crack because of the stone that hits the car windshields when the worker cutting the grass.

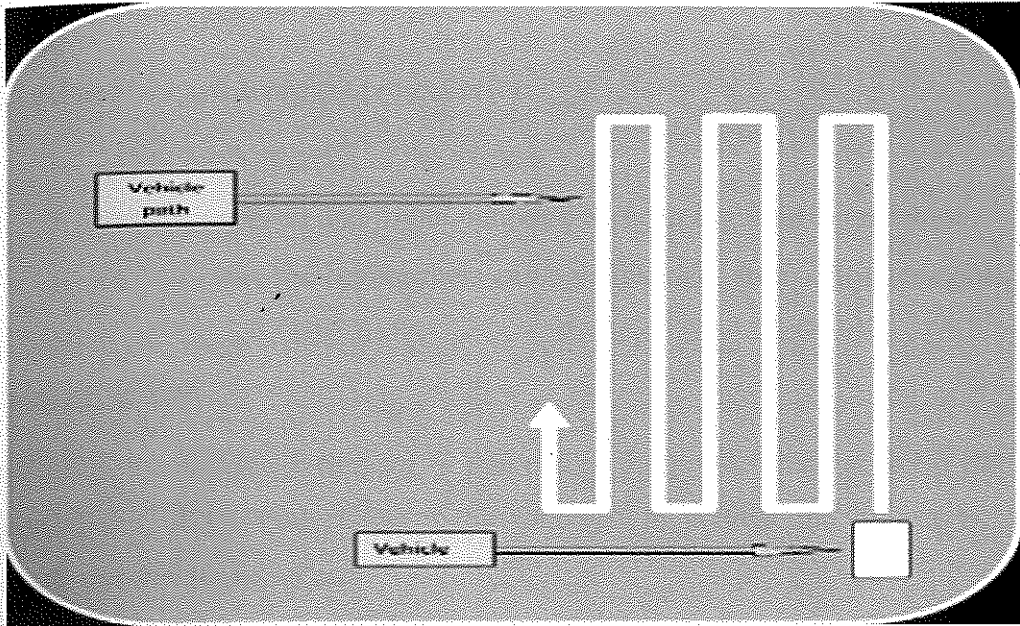


Figure 1.1 Example of the movement of project

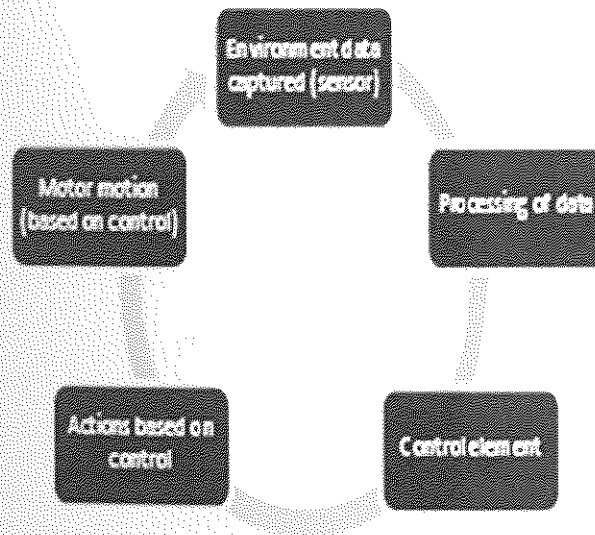


Figure 1.2 Example of the flowchart of the project

4 OBJECTIVE PROJECT

The main purpose we are doing the project is for:

1. To lessen the burden of the worker.
2. To reduce the air and sound pollution that coming from the machine.
3. To make sure the environment can't get damaged from cutting the grass.

5 PROJECT SCOPE

Scope project is an important element to make sure the project can be finish like how the schedule runs. So, scope project has to be followed to prevent the project out from the objective. Scopes of the project are:

- a.) Users must identify where is the grass is a lot. The users must defined the grass lawn area because this project is used to cut the grass.
- b.) Grass cutter machine is create to reduce air pollution surrounding the environment and reduce the noise pollution that occurs when using the normal grass cutter.

6 DEFINITION OF TERMS

Terms that can describe our project more details in this study are:

a) DC Motor

It can convert electrical energy into mechanical energy.

b) Trimmer line (BLADE)

It is a tool which uses a flexible monofilament line instead of a blade for cutting grass and other plants near objects, or on steep or irregular terrain. It consists of a cutting head at the end of a long shaft with a handle or handles and sometimes a shoulder strap.

c) Wheel

It is easy to move from one place to another place.

d) Arduino Uno

A microcontroller board based on the ATmega328P. It has 14 digital pins where 6 can be used as PWM, 6 analog inputs, a 16 MHz quartz crystal.

e) Bluetooth Module HC 06

Module that is used to connect the robot to the android hand phone in order to control the robot.

6.7 CONCLUSION

The production of a grass cutter machine to prevent air pollution by reducing the usage of petrol, and prevent the noise pollution that is made by the old grass cutter. By using this product we can save money from buying the petrol for the old grass cutter. If we used this product we could save the environment by reducing the pollutions and reducing the human power to cut the grass at the big area of lawn.

CHAPTER 2

LITERATURE REVIEW

1 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; current and relevant references with consistent, appropriate referencing style; proper use of terminology and an unbiased and comprehensive view of the previous research on the topic.

The report that we want to be produced needed a few factor that should be taken consideration until that project implemented. To get a quality project result, we need to study about the type of material, design , components that we used, framework installation , installation method and maintenance ,level of product safety, structural strength, project size and so on that we need make it and consider the result that we get. This is all ensure that no any problems would arise during the completion or even when presenting the project.

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) for 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 Bluetooth Module HC 06

This Bluetooth module can easily achieve serial wireless data transmission. Its operating frequency is among the most popular 2.4GHz ISM frequency band (i.e. Industrial, scientific and medical). It adopts Bluetooth 2.0+EDR standard. In Bluetooth 2.0, signal transmit time of different devices stands at a 0.5 seconds interval so that the workload of bluetooth chip can be reduced substantially and more sleeping time can be saved for bluetooth. This module is set with serial interface, which is easy to use and simplifies the overall design/development cycle.

Specification:

Bluetooth protocol: Bluetooth 2.0+ EDR standard

USB protocol: USB v1.1/2.0

Operating frequency: 2.4GHz ISM frequency band

Modulation mode: Gauss frequency Shift Keying

Transmit power: $\leq 4\text{dBm}$, second stage

Sensitivity: $\leq -84\text{dBm}$ at 0.1% Bit Error Rate

Transmission speed: 2.1Mbps(Max)/160 kbps(Asynchronous) ; 1Mbps/1Mbps(Synchronous)

Safety feature: Authentication and encryption

Supported configuration: Bluetooth serial port (major and minor)

Supply Voltage: +3.3 VDC 50mA

Operating temperature: -20 to 55°C

Size: 36.5*16mm

Weight: 4g

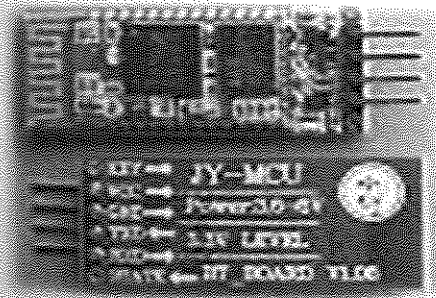


Figure 2 Bluetooth Module

3 Motors

Specifications

Model: RS550 12V

Weight: 7.7 oz

Operating v: 6v - 14.4v

Length of motor: 2.24 in

Nominal v: 12v

Diameter (with flux ring): 1.52 in

No Load RPM: 19300

Diameter (no flux ring): 1.41 in

No Load A: 1.4A

Shaft Diameter: 0.125 in

Stall Torque: 69.16 oz-in

Shaft Length: 0.3 in

Stall Current: 85A

Mounting Screws (2): M3Kt: oz-in

Kv: rpm/V Efficiency: 76% RPM

Peak Eff: 17100 Torque

Peak Eff: 7.86 oz-in

A Current - Peak Eff: 10.9A

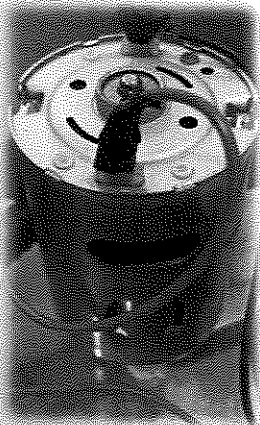


Figure 2.1 RS 550 motor

4 DC Motor

.C Motors For the robot to be able to move around the garden and follow the required path, standard D.C motors were chosen for this project. The motor selection takes into consideration the cost, speed and power consumption. From the design method chosen it was concluded that three motors are required, where two would serve the function of driving the robot around the garden and a further motor required to move the blades that cut the grass. A motor driver would be required in order to power these motors and for control functions.

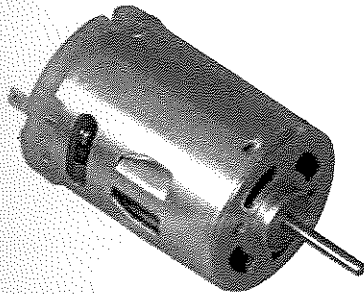


Figure 2.2 DC Motor

5 Penknife Blade

penknife, or **pen knife**, is a British English term for a small folding knife.^[1] One popular folk etymology makes an association between the size of a penknife and a small ballpoint pen, however the phrase "penknife" is much older. Originally, penknives were used for thinning and pointing quills to prepare them for use as dip pens and, later, for repairing or re-pointing the nib.^[1] They did not necessarily have folding blades, but resembled a scalpel or wood knife by having a short, fixed blade at the end of a long handle.

Today the word penknife is the common British English term for both a pocketknife, which can have single or multiple blades, and for multi-tools, with additional tools incorporated into the design.^[2]

Over the last hundred years there has been a proliferation of multi-function knives with assorted blades and gadgets, including; awls, reamers, scissors, nail files, corkscrews, tweezers, toothpicks, and so on. The tradition continues with the incorporation of modern devices such as ballpoint pens, LED torches, and USB flash drives.^[3]

The most famous example of a multi-function penknife is the Swiss Army knife, some versions of which number dozens of functions and are really more of a folding multi-tool, incorporating one blade or two, than a penknife with extras.^[3]

A larger folding knife, especially one in which the blade locks into place, is often called a claspknife.^[3]



Figure 2.3 Blades

6 Arduino Uno

Arduino is an open source, computer hardware and software company, project, and user community that designs and manufactures 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, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),^[1] permitting the manufacture of Arduino boards and software distribution by anyone. 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. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using additional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy,^[2] aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats, and motion detectors.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

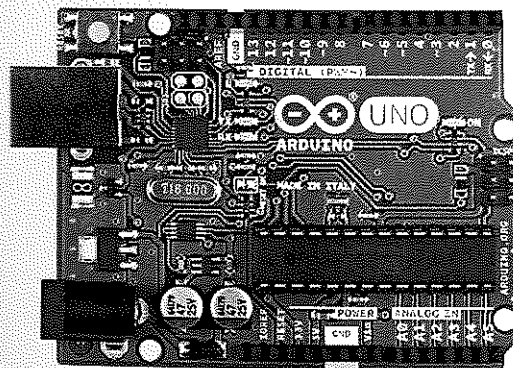


Figure 2.4 Arduino UNO

7 Capacitor

A capacitor (originally known as a condenser) is a passive two-terminal electrical component used to store energy electrostatically in an electric field. The forms of practical capacitors vary widely, but all contain at least two electrical conductors (plates) separated by a dielectric. The conductors can be thin films, foils or sintered beads of metal or conductive electrolyte, etc. The nonconducting dielectric acts to increase the capacitor's charge capacity. A dielectric can be glass, ceramic, plastic film, air, vacuum, paper, mica, oxide layer etc. Capacitors are widely used as parts of electrical circuits in many common electrical devices. Unlike a resistor, an ideal capacitor does not dissipate energy. Instead, a capacitor stores energy in the form of an electrostatic field between its plates.

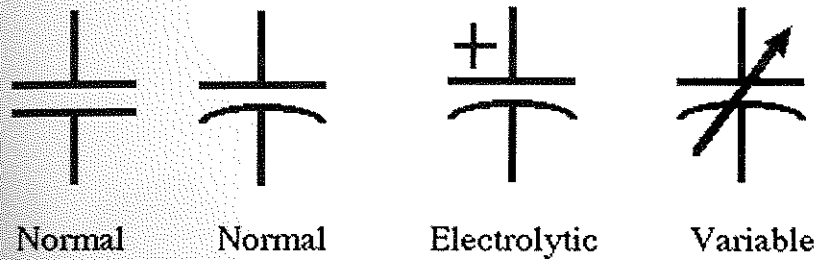


Figure 2.5 Types of capacitor

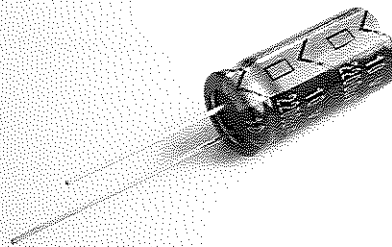


Figure 2.6 Capacitor

3 Terminal block

A terminal block is a screw-type electrical connector where the wires are clamped down to the metal part by a screw. It is a connector which allows more than one circuit to connect to another circuit. It often contains two long aluminum or copper strips that are designed to connect different components. These strips create a bus bar for power distribution that is sent to the connected components. A barrier strip is composed of several screw terminals.

Types of Terminal Blocks & Barrier Strips

There are several different kinds of terminal blocks & barrier strips at Future Electronics. We stock many of the most common types categorized by manufacturer, category and packaging type. Our parametric filters will allow you to refine your search results according to the required specifications.

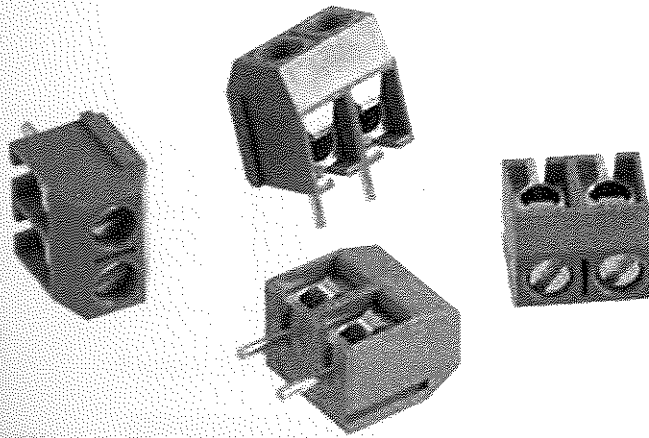


Figure 2.7 Terminal Blocks

9 L293D

L293D is a motor driver. As its name suggests it can drive a motor (normally DC motors up to certain range). Since the output voltage of 8051 is limited to 5V only thus motors with higher required voltage need some drivers to provide them their desired input voltage. L293D is a 16-pin IC which can control a pair of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. The L293D can drive small and quiet big motors as well. It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor. There are two Enable pins in L293D. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low then the motor in the corresponding direction will suspend working. It's like a switch. There are 4 input pins for this L293D, pin 2, 7 on the left and pin 15, 10 on the right. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.

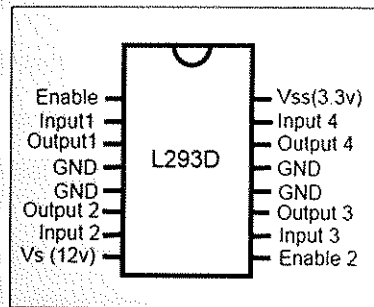


Figure 2.8 Pins of Motor Driver

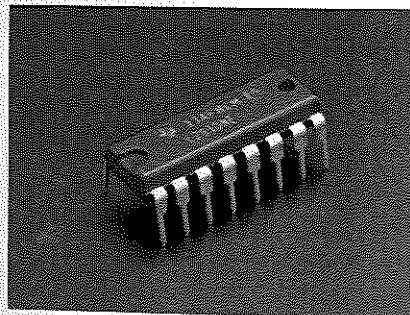


Figure 2.9 Motor Driver

CHAPTER 3

METHODOLOGY

1 Introduction

Methodology can be the 'analysis of the principles of methods, rules, and postulates employed by a discipline', 'the systematic study of methods that are, can be, or have been applied within a discipline' or 'a particular procedure or set of procedures'.

Methodology includes a philosophically coherent collection of theories, concepts or ideas as they relate to a particular discipline or field of inquiry. Methodology refers to more than a simple set of methods, rather it refers to the rationale and the philosophical assumptions that underlie a particular study relative to the scientific method. This is why scholarly literature often includes a section on the methodology of the researchers.

Each step of project is a process to complete the project. Every step must be followed one by one and must be done carefully. If some error occurs it can make a project probably could not operate or do not look neat and perfect.

Before the project finish, various process needs to be done according to proper procedures to ensure that projects do not have any problems. Among the measures the work done in preparing this project are.

- Process of designing circuit.
- Circuit board trace
- Soldering process in circuit board.

1.1 Flow Chart Plan Of Project

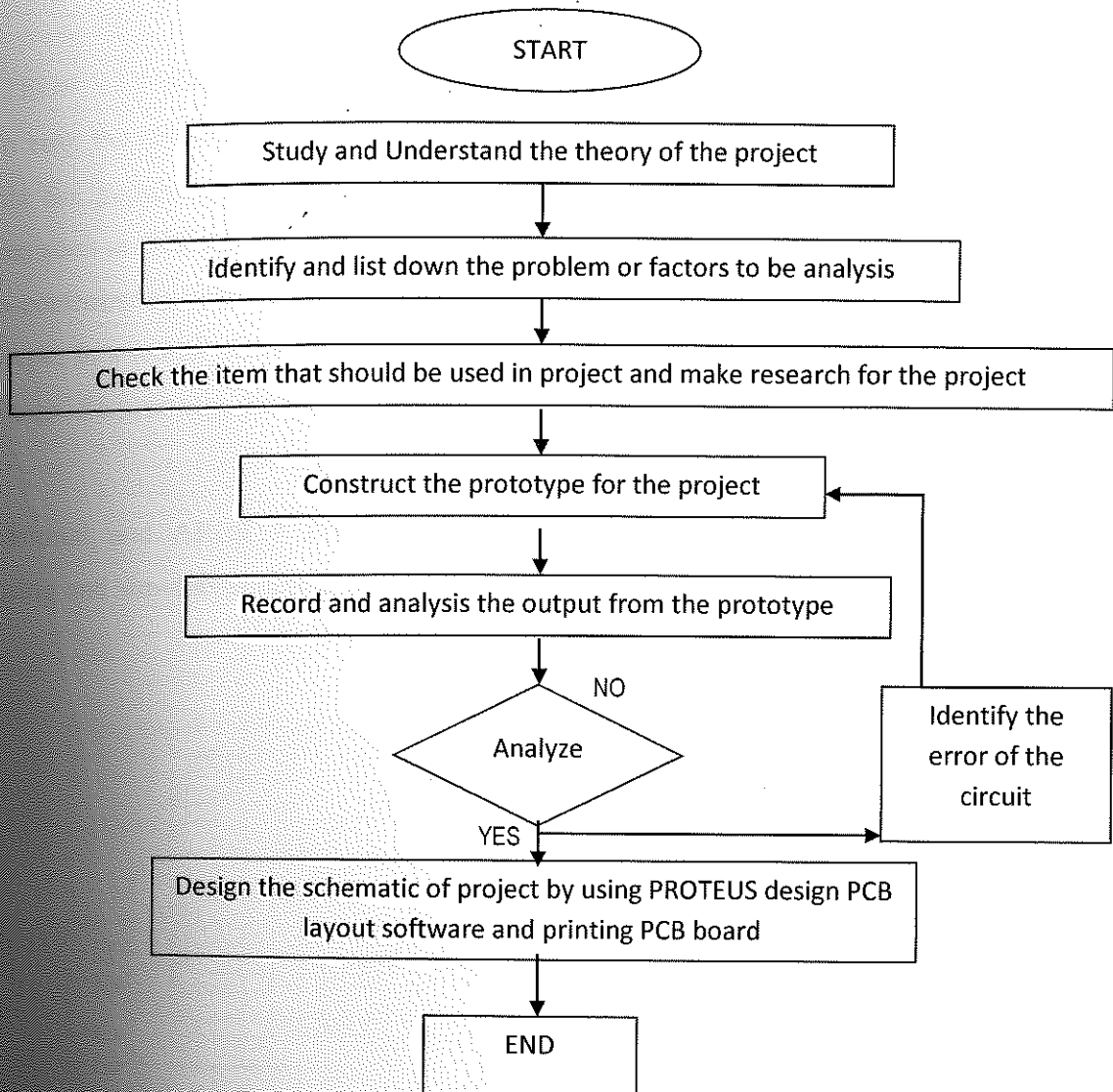


Figure 3: Flow Chart Of Project

2 Draw Schematic Diagram of circuit using proteus

PROTEUS V7.5 allows professional engineers to run interactive simulations of real designs, and to reap the rewards of this approach to circuit simulation. And then, a range of simulator models for popular micro-controllers and a set of animated models for related peripheral devices such as PIC and LCD displays, resistor, and more. It is possible to simulate complete micro-controller systems and thus to develop the software for them without access to a physical prototype. In a world where time to market is becoming more and more important this is a real advantage. Structurally, Proteus 6 Professional separated into two main components, which are 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.

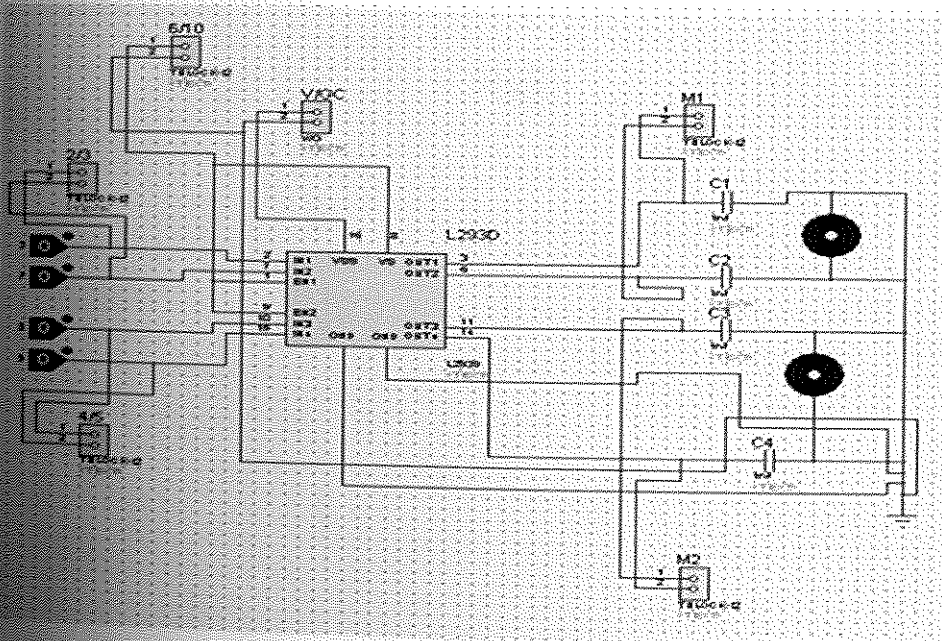


Figure 3.1: SCHEMATIC FOR THE GRASS CUTTER

3.2.2 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 offers a whole lot of variety of virtual devices. In fact, simulation using an oscilloscope and function generator can be done using Proteus. Even a virtual hyperterminal is provided to demonstrate how your code performs in the real world without really doing the hardware section yet.



Figure 3.2 : Toolbar Of Proteus Simulation

3 Process Of The Circuit Designing

3.3.1 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 use 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 special software, namely Proteus ISIS Professional.
- ii. Then, make sure that the connection of the component is correct.

4 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 parts 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 are sometimes called. Buckets, bubble tanks, and spray machines are lots of different ways to etch, but most firms currently use high pressure conveyerised spray equipment. Many different chemical solutions can be used to etch circuit boards. Ranging from 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.

4.1 Risk Of Etching

- i. There is a risk of injuries due to the chemicals involved.
- ii. The quality of the results depends on several factors which you won't be able to master completely the first time. This can be somewhat compensated by using good machinery.
- iii. There is the problem of waste disposal. Toxic chemicals require a proper disposal service.

4.2 Safety

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

- i. Wear safety equipment during the whole process - gloves, protection glasses, 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.