Design & Construction Of Automatic Wood Cutter

Supervised By:

Shuvo Biswas Topu

Lecturer

Department Of Mechanical Engineering

SONARGAON UNIVERSITY

Submitted By:

Arjun Kundu
Id:1602009306

Md. Riaj-Ul-Haque
Id:1602009320

Md. Parvez Hossain
Id:1602009328

Md. Ariful Islam
Id: 1602009324

SONARGAON UNIVERSITY

147/1, Green Road, Tejgaon, Dhaka-1215

Course Title: Project and Thesis

Course code: ME 400

February 2020

Declaration

We hereby, declare that the work presented in this project is the outcome of the investigation and research work performed by us under the supervision of Mr. Shuvo Biswas Topu, Lecturer, Department of Mechanical Engineering, Sonargaon University (SU). We also declare that no part of this project and thereof has been or is being submitted elsewhere for the award of any degree.

Mr. Shuvo Biswas Topu
Lecturer
Department of mechanical Engineering
Sonargoan University (SU).

Approval

This is to certify that the project on "Design & Construction Of Automatic Wood cutter" by (Arjun Kundu, Id:1602009306, Md. Riaj-Ul-Haque, Id:1602009320, Md. Parvez Hossain, Id:1602009328, Md. Ariful Islam, Id: 1602009324) has been carried out under our supervisor. The project has been carried out in partial fulfillment of the requirement for the degree of Bachelor of Science (BSc) in Mechanical Engineering of the year 2020 and has been approved as to its style and contents.

Mr. Shuvo Biswas Topu
Lecturer
Department of mechanical Engineering
Sonargoan University (SU).

Abstract

A sawmill or lumber mill is a facility where logs are cut into lumber. Modern sawmills use a motorized saw too cut logs lengthwise to make long pieces, and crosswise too length depending on standard or custom sizes (dimensional lumber). The "portable" sawmill is iconic and of simple operation the logs lay flat on a steel bed and the motorized saw cuts the log horizontally along the length of the bed, by the operator manually pushing the saw then it cut the wood . In this theory we made a microcontroller based wood cutting machine, here we add automatic system and cut the wood a minimum size . In this system we add some electric machine and electric component. Some of the parts need control from microcontroller . Here we use dc motor ,blade ,relay, switch, servo motor,push button and leaser module.In this process a convener belt move and carry the wood then microcontroller on the relay module and motor of blade move, in other part wood can predefine how long size wood will cutting it measurement cant fixed by leaser module,after cutting the wood convener belt will go same away and he do same work . So all will be control from microcontroller Arduino .

……………………

Arjun Kundu

1602009306

……………………

Md. Riaj-Ul-Haque

1602009320

……………………

Md. Parvez Hossain

1602009328

……………………

Md. Ariful Islam

1602009324

ACKNOWLEDGEMENT

Firstly we give thanks to almighty Allah from the bottom of our hearts. We would like to express our sincere gratitude to our honorable supervisor **Mr. Shuvo Biswas Topu** ,Lecturer, Department of Mechanical Engineering, SU who inspired us in every moment. We are thankful to him for his continuous encouragement, kind co-operation, and scholastic guidance all along the project work. He has always been extremely generous with his time, knowledge and ideas and allowed us great freedom in this thesis. We also want to convey our thankfulness to **Dean, Prof. Dr. Mohammed A Mabud** Department of Mechanical Engineering, also thanks to **Md Mostofa Hossain,Associate Professor and Head** of Department of Mechanical Engineering, for his help, support and constant encouragement. We express our humble gratitude to all teachers of Department of Mechanical Engineering for their support in numerous ways throughout this project work. We are also grateful to the authors whose valuable thesis papers and books we have considered as reference in this project paper. Apart from that, we would like to thank our entire friends for sharing knowledge; information and helping us in making this project a success. Also thanks for lending us some tools and equipment. Finally we would like to thank our parents who have given us tremendous inspirations and supports. Without their mental and financial supports, we would not able to complete our project.

Table of Contents

LIST OF TABLES AND FIGURES

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

A sawmill or lumber mill is a facility where logs are cut into lumber. Modern sawmills use a motorized saw too cut logs lengthwise to make long pieces, and crosswise too length depending on standard or custom sizes (dimensional lumber). The "portable" sawmill is iconic and of simple operation the logs lay flat on a steel bed and the motorized saw cuts the log horizontally along the length of the bed, by the operator manually pushing the saw. In this theory we made a microcontroller based wood cutting machine, here we add atomatic system and cut the wood a minimum size . In this system we add some electric machine and electric component. Some of the parts need control from microcontroller.

1.2 ADVANTAGES:

- This is an automated cutting machine.
- It can be easily transferred from one place to another place.
- It is capable of cutting wood of different sizes.
- With cutting blade, the machine can cut wood perfectly.
- Only one man can be controlled this wood cutting machine.
- It saves time and reduces labour cost.
- It has no harmful effect on the environment.

1.3 DISADVANTAGES:

- High risk of damages because of the higher speed of the cutting machine.
- In the case of around blade cutting machine, sometimes deflecting may occur due too the weight of the motor.
- After a definite period, the blade needed to replace.
- Around blade deflection is at high risk here when the layer height is too, high.
- The operator is in risk here for physical damage.

1.4 OBJECTIVES OF PROJECT

1. To design an automatic cutting wood by size which user want.
2. To develop the algorithms to control size operation.
3. To minimize human effort,time consumption,labour cost.

CHAPTER 2

LITERATURE AND HISTORY REVIEW

2.1 HISTORY BACKGROUND

The researcher did an experiment in the wood cutter workshop to determine the cutting force and hence the choice of the motor as drive power for the saw blade. The emphasis of the experiment was to select a specific motor that could supply enough power for any type of wood therefore the hardest wood Mopane was used for the experiment.The target parameters were the cutting force and the spindle rotational speed VC. The cutting force, feed force and the spindle rotational speed were calculated. The mechanical process of cutting using saw blade is referred to as an orthogonal process (two-dimensional deformation. Using the Ernst and Marchant's force circle the forces acting during sawing can be calculated. The following parameters are key consideration in the procedure of finding the cutting force

A sawmill or lumber mill is a facility where logs are cut into lumber. Modern sawmills use a motorized saw too cut logs lengthwise to make long pieces, and crosswise too length depending on standard or custom sizes (dimensional lumber). The "portable" sawmill is iconic and of simple operation—the logs lay flat on a steel bed and the motorized saw cuts the log horizontally along the length of the bed, by the operator manually pushing the saw. The most basic kind of sawmill consists of a chainsaw and a customized jig ("Alaskan sawmill"), with a similar horizontal operation.

Before the invention of the sawmill, boards were made in various manual ways, either rived (split) and planed, hewn, or more often hand sawn by two men with a whipsaw, one above and another in a saw pit below. The earliest known mechanical mill are the Hierapolis sawmill, a Roman water-powered stone mill at Hierapolis, Asia Minor dating back too the 3rd century AD. Other water-powered mills followed and by the 11th century they were widespread in Spain and North Africa, the Middle East and Central Asia, and in the next few centuries, spread across Europe. The circular motion of the wheel was converted too a reciprocating motion at the saw blade. Generally, only the saw was powered, and the logs

had too be loaded and moved by hand. An early improvement was the development of a movable carriage, also water powered, too move the log steadily through the saw blade.

By the time of the Industrial Revolution in the 18th century, the circular saw blade had been invented, and with the development of steam power in the 19th century, a much greater degree of mechanisation was possible. Scrap lumber from the mill provided a source of fuel for firing the boiler. The arrival of railroads meant that logs could be transported too mills rather than mills being built besides navigable waterways. By 1900, the largest sawmill in the world was operated by the Atlantic Lumber Company in Georgetown, South Carolina, using logs floated down the Pee Dee River from the Appalachian Mountains. In the 20th century the introduction of electricity and high technology furthered this process, and now most sawmills are massive and expensive facilities in which most aspects of the work are computerized. Besides the sawn timber, use is made of all the by-products including sawdust, bark, woodchips, and wood pellets, creating a diverse offering of forest products.[1]

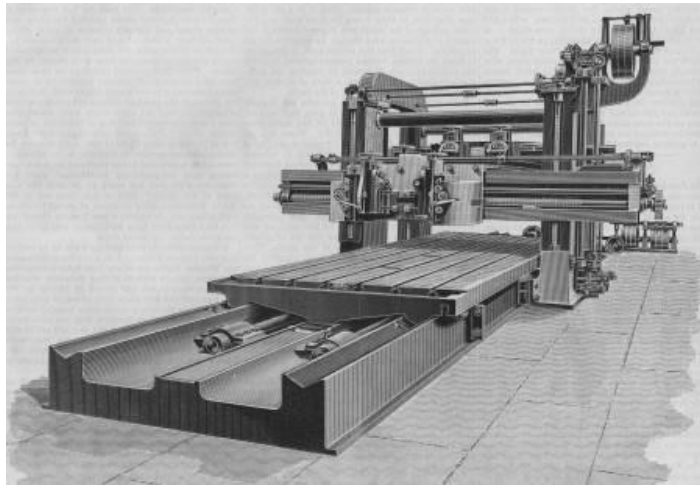Fig.2.1: Old Wood Cutter

2.2 Pre-Industrial Revolution

The Hierapolis sawmill, a water-powered stone saw mill at Hierapolis, Asia Minor (modern-day Turkey, then part of the Roman Empire), dating to the second half of the 3rd century, is the earliest known sawmill. It also incorporates a crank and connecting rod mechanism. Water-powered stone sawmills working with cranks and connecting rods,

but without gear train, are archaeologically attested for the 6th century at the Byzantine cities Gerasa (in Asia Minor) and Ephesus (in Syria). The earliest literary reference to a working sawmill comes from a Roman poet, Ausonius, who wrote a topographical poem about the river Moselle in Germany in the late 4th century AD. At one point in the poem, he describes the shrieking sound of a watermill cutting marble. Marble sawmills also seem to be indicated by the Christian saint Gregory of Nyssa from Anatolia around 370/390 AD, demonstrating a diversified use of water-power in many parts of the Roman Empire.[1]

2.3 FIRST MOTORIZED OF WOOD CUTTER

Lumberjacks are mostly North American workers in the logging industry who perform the initial harvesting and transport of trees for ultimate processing into forest products. The term usually refers to a bygone era (before 1945 in the United States) when hand tools were used in harvesting trees. Because of its historical ties, the term lumberjack has become ingrained in popular culture through folklore, mass media and spectator sports. The actual work was difficult, dangerous, intermittent, low-paying, and primitive in living conditions. However, the men built a traditional culture that celebrated strength, masculinity, confrontation with danger, and resistance too modernization. [1]

Fig.2.2: First motorized wood cutter

CHAPTER 3

DESIGN AND CIRCUIT DIAGRAM

3.1 PROPOSED STRUCTURE OF WOOD CUTTER

Modify the safety mechanism without damaging the brake shoe possibly by an increased D.C voltage applied to the stator. This mechanism proposed in this paper damages the brake cartridge and sometimes the blade, so having a stopping mechanism which doesn't damage any of the components the design will be considerably cheap in the long run of using the machine, possibly using only the D.C injection baking . This machine is designed not to release the safety brake when the motor is not running, but it would be more effective if the machine can be modified not to start without the safety mechanism correctly installed.
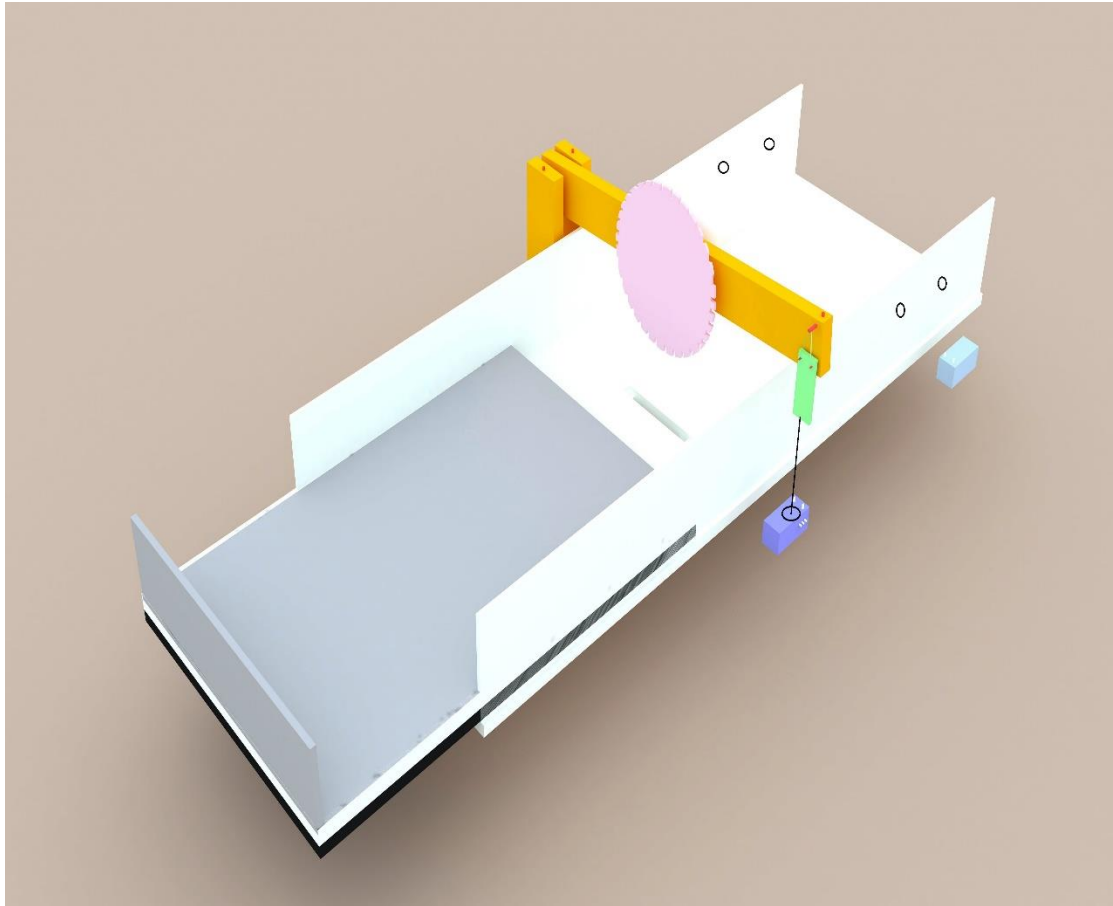
Figure 3.1 :Proposed structure of wood cutter

3.2 SCOPE AND APPLICATIONS

This project primarily focuses on three parts; which are the type of automatic control system. In this project, the system designed is a stand-alone. This project performs only on the implementation of hardware. The circuit of hardware is designed by using the Arduino IDE. The algorithms developed for automatic cutting will be determined based on the size demand for wood. Furthermore, this project uses the number of laser for measurement. This project will also cover the AC loads. This project is implemented as a prototype of a wood cutter. Only operations during islanded microgrid operation after a power failure is covered.

3.3 GENERAL BLOCK DIAGRAM
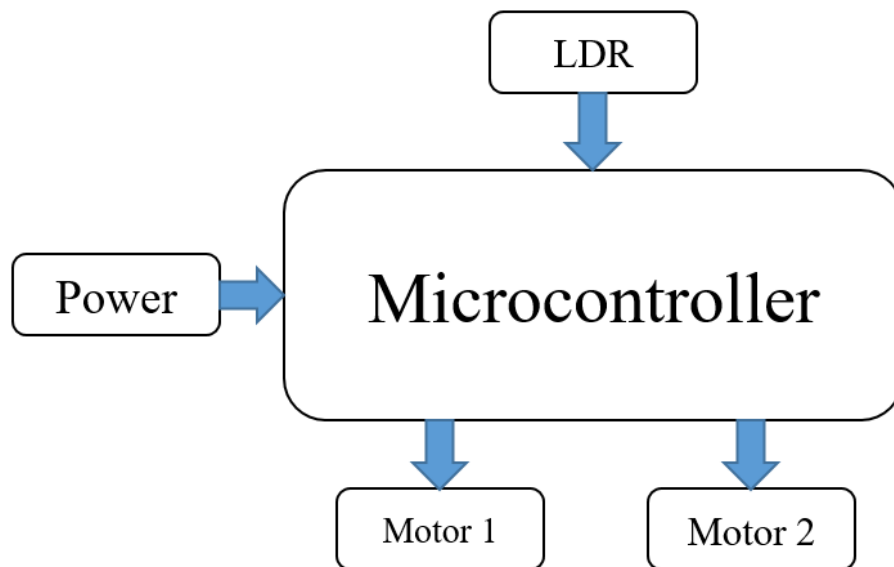
Figure 3.1 General Block Diagram

3.4 CIRCUIT DIAGRAM
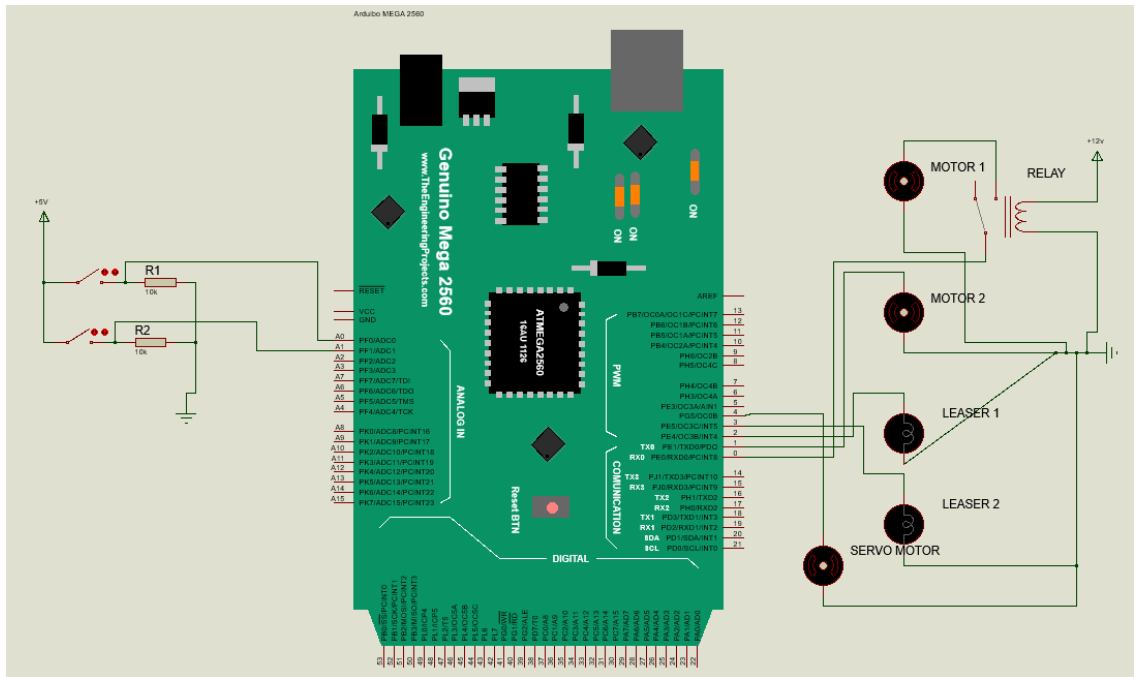
Figure 3.3 circuit diagram

3.5 WORKING PROCESS OF CIRCUIT DIAGRAM

Here connect 3 motors. One 12v Dc motor, one dc motor and another one is servo motor. 12V dc motor rotate the saw blade. Dc motor push the saw. The Dc motor connect with a relay. Which is normally close condition. It will open after button press. Ldr receive the of saw, which depend on input value from user. When the wood will come on it's shape then servo pull the blade and push after cut the wood. The push Button will rread the input value from user.

CHAPTER 4

CONSTRUCTION ANALYSIS

4.1 PRINCIPLE PARTS OF WOOD CUTTER

The wood cutter consists of following principle parts

4.1.1 ON THE BASIS OF MECHANICAL COMBINATION

- ❖ PVC board
- ❖ Glue gam
- ❖ Hot gun
- ❖ Scale
- ❖ Cutter
- ❖ Body
- ❖ Nuts and bolts
- ❖ Screws

4.1.2 ON THE BASIS OF ELECTRICAL COMBINATION

- ❖ DC motor
- ❖ Motor driver
- ❖ Ac to Dc Converter

4.1.3 ON THE BASIS OF MICRO-CONTROLLING COMBINATION

- ❖ Arduino microcontroller
- ❖ Wire clips
- ❖ Connectors and so on

4.2 DESCRIPTION OF PRINCIPLE PARTS

The overall principle parts description of the touch control wood cutter are given below.

4.2.1 PVC BOARD

PVC board we use for building the project chassis which is 5mm and 10mm pvc board the board we found in local market which also reliable for making prototype project chassis. [2]

Figure 4.1 pvc board for chassis

4.2.2 GLUE GUN AND GLUE STICK

The glue gun and glue stick is used for attaching the pvc board for making chassis.

Figure 4.2 glue gun and stick

4.2.3 Motor

The wheel we get it from local electronics shop where the wheel is easily getting with motor choice.

Figure 4.4 Motor

Usage:

  Boat, Car, Electric Bicycle, Fan, Home Appliance, toy

Type: Gear Motor   Torque: 10~35Nm

Commutation: Brush   Speed(RPM): 110~250rpm

In conclusion other necessary tools we collect form local market because of its flexibility. In case of mechanical design.[3]

4.2.4 DC GEAR MOTOR

A DC motor is designed to run on DC electric power. Two examples of pure DC designs are Michael Faraday's homopolar motor (which is uncommon), and the ball bear in motor, which is (so far) a novelty. By far the most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source so they are not purely DC machines in a strict

Fig 4.5: DC Motor.

Technical Specifications:

Model No.: IND-GM-2264R

Operating voltage: 3.0~12.0V DC

Gear ratio: (1:48,1:120,1:180, 1:220,1:256,1:288)

Without loading: 40~120mA

Output torque: 1~5 kgf.cm [4]

4.2.5 MOTOR DRIVER

L298N is a dual H-bridge motor driver. Motor drivers act as current amplifiers since they take a low-current control signal and supply a higher-current signal. This higher current signal is employed to drive the motors. L2938 contains 2 inherent H-bridge driver circuits. In its common mode of operation, 2 DC motors can be driven at the same time, each in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.[5]
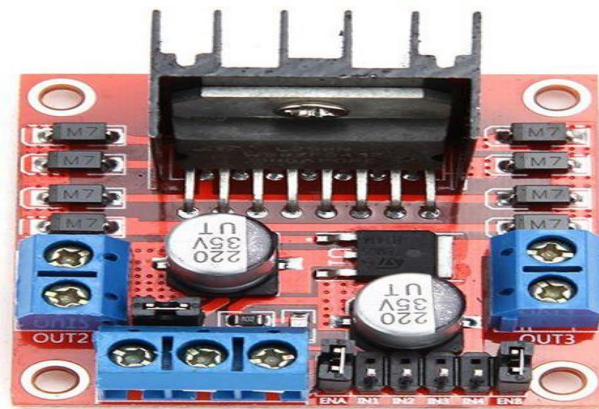

Fig 4.6: L298N Motor Driver

Key Specifications/Special Features:

Model: Customized

Minimum aperture: 0.004"

Working mode: H Bridge (double lines)

Driving voltage: 5V-35V

Driving current: 2A (MAX single bridge)

Maximum power: 25W

Periphery dimension: 43 x 43 x 27mm(L x W x H)

Plate thickness: 0.005"-0.250"

Main Chip: L298N

Logical voltage: 5V

Logical current: 0mA-36mA

Storage temperature: (-20)-(+135 °C)

Weight: 30g

4.2.6 AC To Dc Converter

In the modern era, almost every household electronics works on Direct Current (DC) but we get Alternating Current (AC) from power generation plants via transmission lines because AC can be transmitted more efficiently than DC at a lower cost. So every appliance which works on DC has and AC to DC converter circuit. We previously built a 5v cell phone charger which also has an AC-DC converter circuit in it. There are mainly two types of converters widely used for AC-DC conversation purposes.One is the traditional transformer-based linear converter which uses a simple diode bridge, capacitor, voltage regulator. Simple Diode Bridge can be constructed either with a single semiconductor device like DB107 or with 4 independent diodes like 1N4007. The other type of converter is SMPS or Switch mode power supply which uses a high-frequency small transformer and a switching regulator to provide DC output.[6]

Fig 4.7: 12v Power supply.

4.2.7 ARDUINO MICROCONTROLLER

In the controller unit, we are using the Arduino hardware board (with AVR microcontroller). With the help of the Arduino1.6.8 software plate form, we can easily program AVR IC, as our requirement. Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing). The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started.

4.2.8 TECHNICAL SPECIFICATION ARDUINO MEGA:

Fig 4.8: Arduino Mega.

Microcontroller	ATmega2560
Operating Voltage	5V
Supply Voltage (recommended)	7-12V
Maximum supply voltage (not recommended)	20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 Ma
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by boot loader
SRAM	2 KB (ATmega2560)

Table 4.1 Arduino Short Description

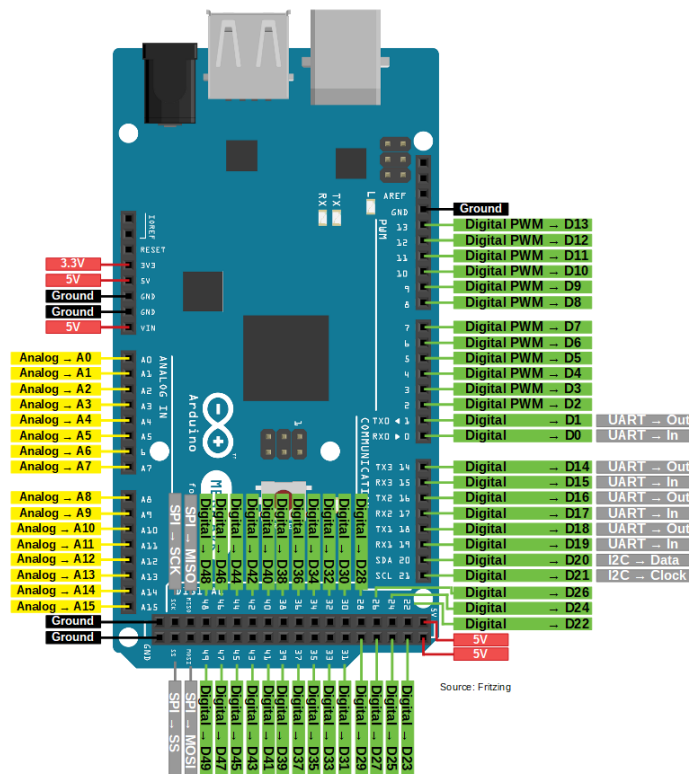## 4.2.10 DESCRIPTION OF MICROCONTROLLER: ATMEGA2560:

Fig 4.9 Arduino Mega.

The Arduino mega is a microcontroller board based on the ATmega2560 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means "One" in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

4.2.11 BLOCK DIAGRAM OF MICROCONTROLLER – (ATMEGA2560):

4.2.12 PIN CONFIGURATIONS OF MICROCONTROLLER – (ATMEGA2560):
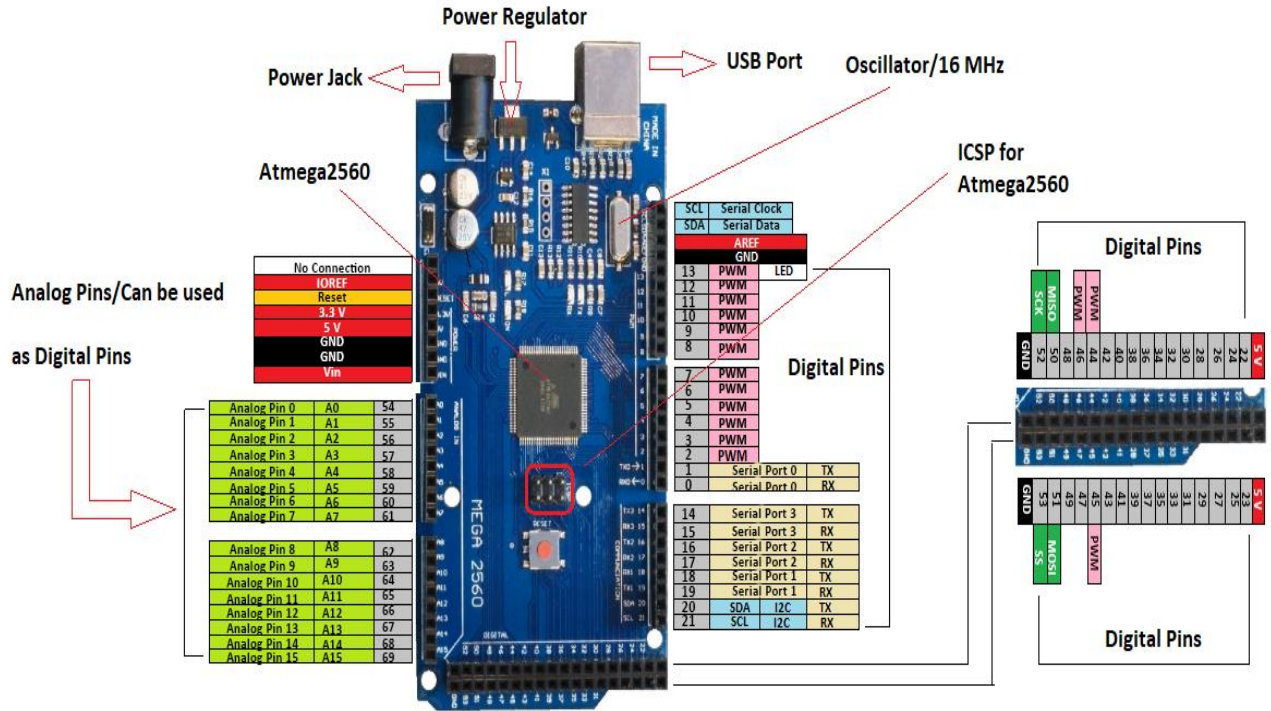
Fig. 4.11 Pin Configurations Of Microcontroller –(Atmega2560)

PIN DESCRIPTIONS:

The below gives a description for each of the pins, along with their function:-

THE POWER PINS ARE AS FOLLOWS:

• **Input voltage:** The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). We can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

 • **5V:** The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

• **3V3:** A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

 • **GND:** Ground pins.

INPUT & OUTPUT OF ARDUINO MEGA:

Each of the 14 digital pins on the Mega can be used as an input or output, using pin Mode, digitalWrite, and digitalRead functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

SERIAL: Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.

 • **EXTERNAL INTERRUPTS:** 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.

 • **PWM:** 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.

• **SPI:** 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.

• **LED:** 13. There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

 • **I 2C: 20 (SDA) AND 21 (SCL).** The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino Software (IDE) includes a Wire library to simplify use of the I2C bus.

There are a couple of other pins on the board:

 • **AREF:** Reference voltage for the analog inputs. Used with analog Reference.

 • **RESET:** Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

MEMORY: The ATmega328 has 32 KB of flash memory for storing code (of which 0.5 KB is used for the bootloader), 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library)

Input voltage. The input voltage to the Arduino board when it's using an external poour source (as opposed to 5 volts from the USB connection or other regulated poour source). We can supply voltage through this pin, or, if supplying voltage via the poour jack, access it through this pin.

5V. This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with poour either from the DC poour jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage our board. We don't advise it.[7]

4.2.13 MALE TO FEMALE CONNECTOR

A male connector is commonly referred to as a plug and has a solid pin for a center conductor. A female connector is commonly referred to as a jack and has a center conductor with a hole in it to accept the male pin.

Fig. 4.12: Male to female connector

4.2.14 Servo Motor

This high-torque standard servo can rotate approximately 180 degrees (90 in each direction). You can use any servo code, hardware or library to control this servo. Good for beginners who want to make stuff move without building a motor controller with feedback & gearbox. It comes with 3 horns, as shown. They aren't the highest quality servo (which are why they are less expensive) and so are not suggested for hobby planes. We now carry the Tower-Pro SG-5010.[8]

Figure 4.13 Servo Motor

Key Specifications/Special Features:

- Power: 4.8V - 6V DC max (5V works well)
- Average Speed: 0.2sec/60degree (@ 4.8V), 0.16sec/60degree (@ 6V)
- Weight: 39g (1.37 oz)
- Torque: At 5V, 5.5kg-cm / 76oz-in, and at 6V 6.5kg-cm / 90oz-in.
- Size mm: (L x W x H) 40 x 20.0 x 38 mm
- Size in: (L x W x H) 1.60x.79x1.50
- Spline Count: 25

4.2.15 DESCRIPTION OF LDR

A Light Dependent Resistor (also known as a photoresistor or LDR) are a device whose resistivity are a function of the incident electromagnetic radiation. Hence, they are light-sensitive devices. They are also called as photoconductors, photoconductive cells or simply photocells.They are made up of semiconductor materials that have high resistance. Theyre are many different symbols used too indicate a photoresistor or LDR, one of the most commonly used symbol are shown in the figure below. The arrow indicates light falling on it.[9]

Figure 4.14 LDR

Feature

- Easy too use on Breadboard or Perf Board
- Easy too use with Microcontrollers or even with normal Digital/Analog IC
- Small, cheap and easily available
- Available in PG5 ,PG5-MP, PG12, PG12-MP, PG20 and PG20-MP series

4.2.16 WORKING PRINCIPAL OF LDR

So how exactly does a photoresistor (i.e. a light dependent resistor or LDR) work? Photoresistors work based off of the principle of photoconductivity. Photoconductivity are an optical phenomenon in which the material's conductivity are increased when light are absorbed by the material.When light falls i.e. when the photons fall on the device, the electrons in the valence band of the semiconductor material are excited too the conduction band. This photons in the incident light should have energy greater than the bandgap of the semiconductor material too make the electrons jump from the valence band too the conduction band.Hence when light having enough energy strikes on the device, more and more electrons are excited too the conduction band which results in a large number of charge carriers. The result of this process are more and more current starts flowing through the device when the circuit are closed and hence it are said that the resistance of the device has been decreased. This are the most common working principle of LDR.

4.2.17 Switch

Figure 4.15 Push Button Switch

A push-button or simply button are a simple switch mechanism too control some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface are usually flat or shaped too accommodate the human finger or hand, so as too be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due too there physical nature) still require a spring too return too there un-pushed state. Terms for the "pushing" of a button include pressing, depressing, mashing, slapping, hitting, and punching.[9]

4.3 Design of Motor

The design of rear wheel with different point of view are given below .Such as

- Motor 1 with outer point of view
- Motor 2 with inner point of view [9]
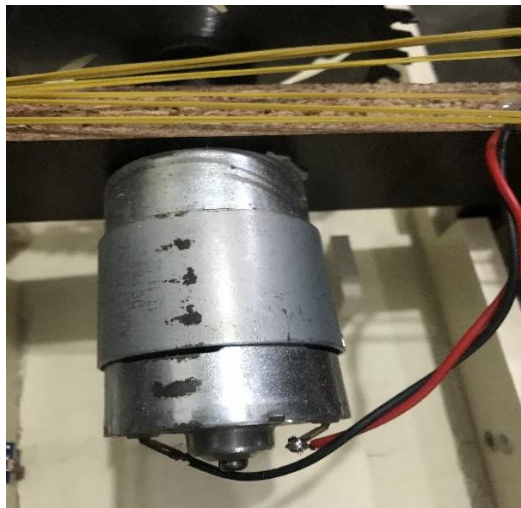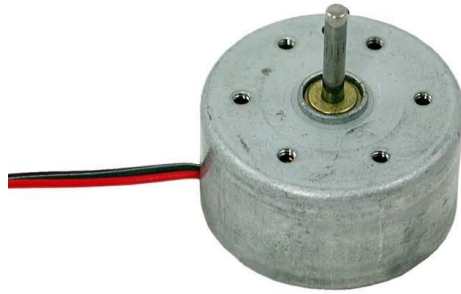

Fig.4.16: Motor 1

Fig. 4.17 : Motor 2

4.4 Design of body with motor

The design of motor drive mechanism with the consideration of freewheel and driver component of DC gear motor diameter.
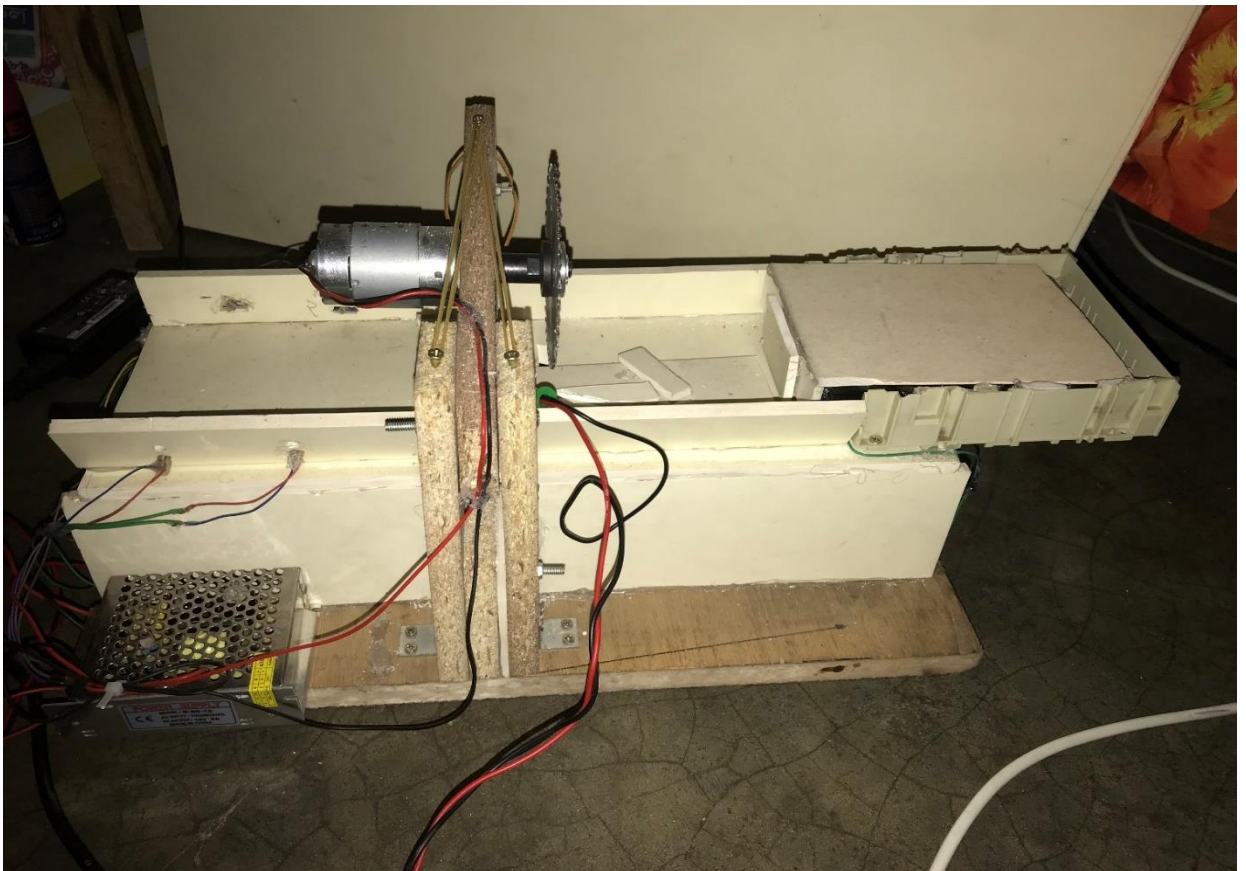
Figure 4.18: Body with motor

4.5 Structure of Wood Cutter

Design solution of the wood cutter is developed in Solid Works. Based on wood cutter dynamics calculated parameters is established the necessary torque and speed of propulsion motors. The model of the wood cutter, designed in Solid Works is presented shown in figure with the side and front view.
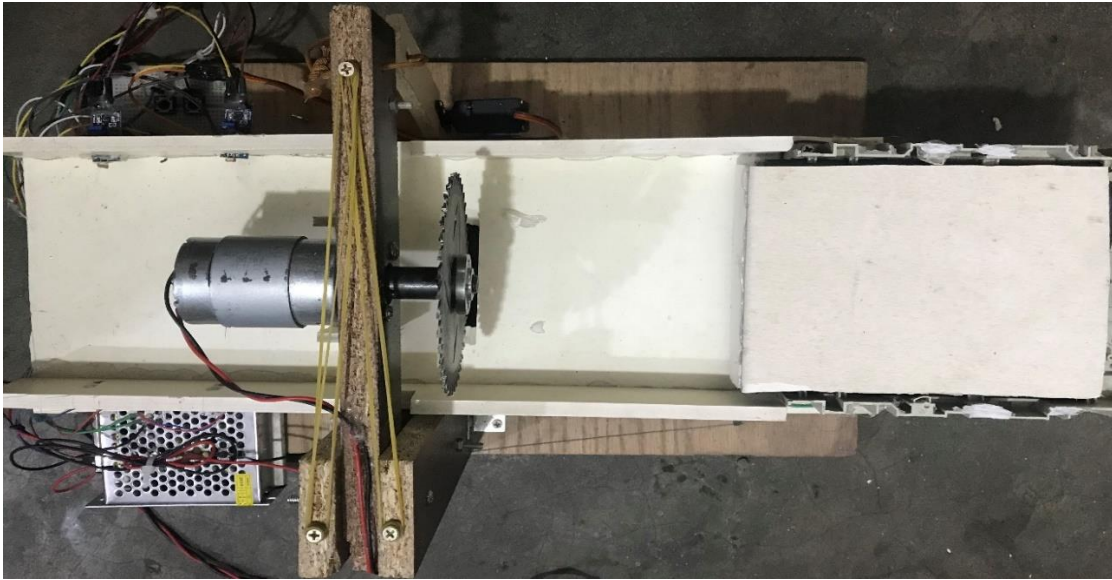
Fig. 4.19: Top view

Such specifications

Height of the wood cutter   :   9.0 inches

Breath of the wood cutter   :   6.0 inches

Length of the wood cutter   :   18.5 inches

Then we control the wood cutter as its application method.

4.6 LIST OF COMPONENT

NO	COMPONENT NAME	QUANTITY	USED
01	Arduino Megs	01	As microcontroller
02	Servo Motor	01	As Controller
03	LDR	02	As Measureing Component
04	Leaser Light	02	For light
05	12 V motor	01	For rotate blade
06	Ac to Dc converter	01	for power Supply
07	Buck Converter	02	To stable current flow
08	Push Button Switch	02	To read measurement
09	Relay	01	To switch the device
10	Resistance	02	To drop voltage
11	Motor Driver	01	To control Motor Speed
12	Saw Blade	01	As cutting machine

Table 4.2 list of component used in project

CHAPTER 5

SOFTWARE ANALYSIS

5.1 INTRODUCTION

In this chapter the software used and the language in which the program code is defined is mentioned and the program code dumping tools are explained. The chapter also documents the development of the program for the application.

Fig:5.1 Software Logo

5.2: DESCRIPTION OF OUR SOFTWARE

Arduino is the world's leading open-source hardware and software ecosystem. The Company offers a range of software tools, hardware platforms and documentation enabling. Arduino is a popular tool for IoT product development as well as one of the most successful tools for STEM / STEAM education. Hundreds of thousands of designers, engineers, students, developers and makers around the world are using Arduino to innovate in music, games, toys, smart homes, farming, autonomous vehicles, robot and more. The open-source Arduino environment makes it easy to write code and upload it to the I/O board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing, avr-gcc, and other open source software. The screen shot of Arduino is shown below…[10]

Fig: 5.2 Arduino Software

It is also capable of compiling and uploading programs to the board with a single click. There is typically no need to edit make files or run programs on command-line interface. Although building on command-line is possible if required with some third-party tools such as Ino.

The Arduino IDE comes with a C/C++ library called "Wiring" (from the project of the same name), which makes many common input/output operations much easier. Arduino programs are written in C/C++, although users only need define two functions to make a runnable program:

Setup () – a function run once at the start of a program that can initialize settings

Loop () – a function called repeatedly until the board powers off

5.2.1 PROGRAM EXPLANATION:

1. IMPORTANT INITIALIZATION & SETUP:-

- Software Serial Communication is used with PWM pin of Arduino.

<SoftwareSerial.h> - Header library is made us of!

- Sensor speaker pin is assigned to pin 2 using Variable "sensor"
- "Sensor " – Configured as Input
- "Motor" – Configured as Output
- "RF " –Configured as input
- "bluetooth" –Configured as input[10]

5.3: Fizzing software:

Fizzing is an open source initiative to develop amateur or hobby CAD software for the design of electronics hardware, to support designers and artists ready to move from experimenting with a prototype to building a more permanent circuit. It was developed at the University Of Applied Sciences Of Potsdam. The software is created in the spirit of the Processing programming language and the Arduino microcontroller and allows a designer, artist, researcher, or hobbyist to document their Arduino-based prototype and create a PCB layout for manufacturing. The associated website helps users share and discuss drafts and experiences as well as to reduce manufacturing costs. By this software we draw our circuit diagram with graphics interfaces.[11]
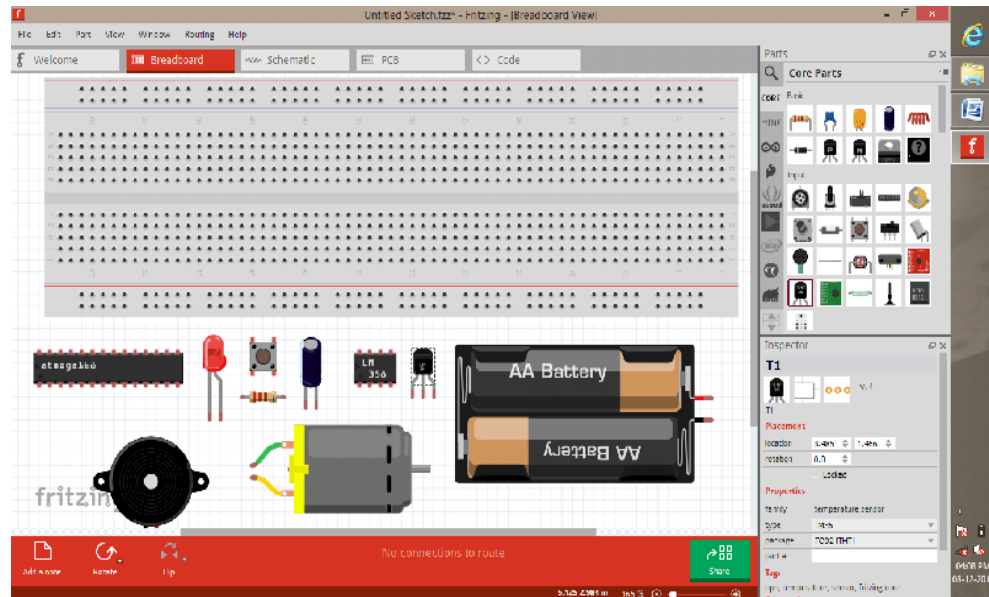
Fig: 5.3 Fizzing software

5.4: CONCLUSION

In this chapter we discussed about the software we use for our smart development of a robot. Here we use couple of software for programming, compiling, executing command for robot response and drawing circuit diagram for our robot and setup wireless communication between robot hardware .thus software are free and open source that's why it's reliable to us for making project or prototypes project. Reliability it is used in other fields. Software analysis is a very important part of our system. A Software analysis makes sure good design. A proper Software analysis and its burn into arduino Uno the project to a smooth end.

CHAPTER 6

RESULTS AND CONCLUSION

6.1 INTRODUCTION

In altering the course of the structure area towards an economical environment and satisfying the real needs without bargaining the following ages' needs, wood and there derivate items are the most reasonable materials, because of sustainability and it is a characteristic asset (Hileras, 2013). Wood happens to be a biological material, it likewise has other amazing characteristics, for example, high erosion opposition, solidness, flexibility and adaptability. These characteristics make the wooden items included among the best references of the living spaces, improvement, development, bundling

6.2 EXPERIMENTAL SETUP

In this project, we experiment with all the Automatic Wood Cutter. The experiment of getting the transmitter section as an input and output of the project is quite low and then we select a built-in communication switch that is bought from the market. The other part is quite good during the experiment. We do all of the parts of the woodcutter is step by step it's become easier for us to reduce the circuit complexity and taking minimum time to stand the experimental setup.

6.2.1 Blade Part

Figure 6.1 project Blade
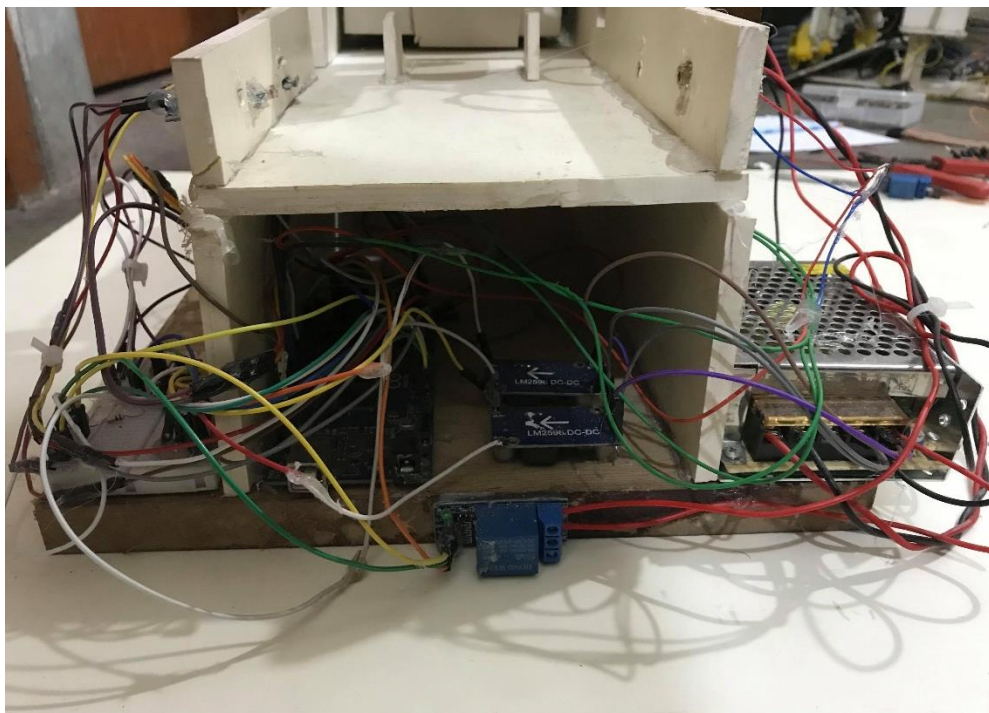
6.2.2 Circuit Part

Figure 6.2 Circuit Part of Wood Cutter

6.3 RESULT

Modify the safety mechanism without damaging the brake shoe possibly by an increased D.C voltage applied to the stator. This mechanism proposed in this paper damages the brake cartridge and sometimes the blade, so having a stopping mechanism that doesn't damage any of the components the design will be considerably cheap in the long run of using the machine, possibly using only the D.C injection baking This machine is designed not to release the safety brake when the motor is not running, but it would be more effective if the machine can be modified not to start without the safety mechanism correctly installed. The safety mechanism should be retrofitted to all circular saw machine (table saw, panel saw and bench saw machine) . At last we able to make automatic system that can be cut only wood if it commanded by microcontroller . But it have not safety and not breaking system . It can be cutting wood by given size and all process is controlled a algorithmic away . This machine is a programmable device so if you want you can change cutting size.

6.4 FUTURE RECOMMENDATION

Wood shares common features and yet they are produced different tree species and differtent type of cutting machine. Different tactics of cutting have been well thought-out in the wood products industry dependent on the use of the wood and purpose of operation. Currently we have made to cut wood and includes saw blade, lasers and LDR. There have a small gap of maximum 0.3 mm between saw blade and board. The circular type power saws which has a round, flat blade that rotates into the work. The project wood cutter used to cut wood by program. User need no man power to use it . The project wait only for input value of shape. When it found any input value then it will start cutting. Here also value laser security. When LDR found low value then it will stop cutting. By using this project efficiency will increase and wasts will decrease. It is easy to use so , anyone can use it easily.But for low budget we made demo project . If we want to install in industry , then we need a full budget for buy component.

6.5 CONCLUSION

This machine will cut wood with minimum human influence. We used to calculate and estimate the bearing type and life, do the deflections and stress analysis to determine the weakest point on the machine.. The fuzzy logic controller was used to monitor moisture content of inserted wood to prevent jamming of the machine. we want to say that we have a lot of experience in making it. We will try to do it better at industry level. And by modifying our project in the future, we will add a safety mechanism and increase the effectiveness.

APPENDIX ONE

```
#include <Servo.h>

Servo myservo;

int pos =0;

int relay1=22;


int in1 = 8,

    in2 = 9,

    in3 =10,

    in4 =11,

    en1 = 3,

    en2 = 2;


const int buttonPin1 = A0;

const int buttonPin2 = A1;

int buttonState1 = 0;

    int buttonState2 = 0;

  int laserA =52;

  int laserB =53;


  const int ldrA=A7;

  const int ldrB=A6;
```

```
    int ldrpower1=21;

    int ldrpower2=20;

void setup() {

  Serial.begin(9600);

  delay(100);


   myservo.attach(7);

   myservo.write(15);

  pinMode (ldrA,INPUT);

  pinMode (ldrB,INPUT);

  pinMode (ldrpower1,OUTPUT);

  digitalWrite(ldrpower1,LOW);

  pinMode (ldrpower2,OUTPUT);

  digitalWrite(ldrpower2,LOW);

pinMode (52,OUTPUT);

 pinMode (53,OUTPUT);


 pinMode(buttonPin1, INPUT);

 pinMode(buttonPin2, INPUT);


pinMode(relay1,OUTPUT);

digitalWrite(relay1,LOW);

 pinMode(in1, OUTPUT);
```

```
  pinMode(in2, OUTPUT);

  pinMode(in3, OUTPUT);

  pinMode(in4, OUTPUT);

  analogWrite(en1,180);

  analogWrite(en2,180);




}


void loop() {

  delay(200);



  cc();

  roko();

  button();

 baltstop();



}


void cc() {
```

```
int ldrStatusA = analogRead(ldrA);

Serial.print("ldrA=");

Serial.println(ldrStatusA);

if (ldrStatusA>100 && ldrStatusA<200 ) {

 baltmover();

}

 if (ldrStatusA >=201) {


 digitalWrite(ldrpower2,LOW);

 //digitalWrite(ldrpower1,LOW);

 Serial.print(" ldrA work");

 delay(100);

 baltstop();

 digitalWrite(relay1,HIGH);

  ser();

  delay(5000);

 digitalWrite(relay1, LOW);

   digitalWrite(ldrpower2,LOW);

 digitalWrite(ldrpower1,LOW);

 digitalWrite(53,LOW);//LEASER

 digitalWrite(52,LOW);
```

```
  baltback();



 }

 else{



 }

}

void roko() {


  int ldrStatusB = analogRead(ldrB);

  Serial.print("ldrB=");

  Serial.println(ldrStatusB);


  if (ldrStatusB>50 && ldrStatusB<100 ){

   baltmover();

 }

 if (ldrStatusB >=100)

 {

   digitalWrite(ldrpower1,LOW);

Serial.print(" ldrB work");
```

```
delay(100);

baltstop();

digitalWrite(relay1, HIGH);

ser();

delay(5000);

digitalWrite(relay1, LOW);

 digitalWrite(ldrpower2,LOW);

  digitalWrite(ldrpower1,LOW);

  digitalWrite(53,LOW);//LEASER

 digitalWrite(52,LOW);

baltback();




          }

 else{



   }



}

void button()
```

```
{

    buttonState1 = digitalRead(buttonPin1);

    buttonState2 = digitalRead(buttonPin2);

            //Serial.print("but1=");

            //Serial.println(buttonState1);

            //Serial.print("but2=");

            //Serial.println(buttonState2);




    if (buttonState1 == HIGH) {

    Serial.println("ami 1 no button");

     digitalWrite(53,HIGH);//LEASER

     digitalWrite(52,LOW);

     digitalWrite(ldrpower1,HIGH);

       digitalWrite(ldrpower2,LOW);




                }
    else if (buttonState2 == HIGH) {

    Serial.println("ami 2 no button ");

    digitalWrite(53,LOW); // LEASER
```

```
digitalWrite(ldrpower1,LOW);

digitalWrite(52,HIGH);

digitalWrite(ldrpower2,HIGH);




}

else {


        }

}


void baltstop()

{

        digitalWrite(in1,LOW);

        digitalWrite(in2,LOW);

        digitalWrite(in3,LOW);

        digitalWrite(in4,LOW);

}


void baltmover(){


//UP
```

```
digitalWrite(in1,HIGH);

digitalWrite(in2,LOW);

digitalWrite(in3,HIGH);

digitalWrite(in4,LOW);

//Serial.println(" bltup");


delay(700);


}


void baltback()

{

digitalWrite(in1,LOW);

digitalWrite(in2,HIGH);

digitalWrite(in3,LOW);

digitalWrite(in4,HIGH);

delay(850);

}



void ser()
```

```
{  myservo.write(15);

   delay(4000); //stops motor for 4 seconds

 for(pos = 15; pos <= 100; pos +=1) // goes from 0 degrees to 180 degrees

  {                              // in steps of 1 degree

   myservo.write(pos);          // tell servo to go to position in variable 'pos'

   delay(15);     // waits 15ms for the servo to reach the position


  }

 myservo.write(100);

   delay(2000); ////stops motor for 8 seconds

 for(pos =100; pos>=15; pos-=1)// goes from 180 degrees to 0 degrees

  {

   myservo.write(pos);          // tell servo to go to position in variable 'pos'

   delay(15); // waits 15ms for the servo to reach the position


  }


}
```

REFERENCE

[1] Rosenblatt & Freeman DC&S Machinery.Lesson 1: Tree Growth and Wood Materials at the University of Minnesota Extension

[2] David Goodman and Arash Edalatnoor, Waste Just Another Resource: A Case for Waste Wood. International Journal of Mechanical Engineering & Technology 6 (3), 2015, pp. 25–33.

[3] Hadley, R. Bruce. (Toe 3) Understanding Wood: A Craftsman's Guide To Wood Technology. Taunton Press. God is 3-5-6-6

[4] "Retnawati, H. (2017). Improvement The Acquisition of Research Methodology and Self Regulated Learning through Blog Project. *Jurnal Cakrawala Pendidikan*, 36(2). Available athttps://www.nextiva.com/blog/what-is-business-communication.html

[5] David Goodman and Arash Edalatnoor, Waste Just Another Resource: A Case for Waste Wood. International Journal of Mechanical Engineering & Technology 6 (3), 2015, pp. 25–33

[6] Kuphaldt, tony R. (2000) - (2006). "Chapter 13 AC MOTORS", lessons in electric circuits-volume ii. Retrieved on 2006 April 11. A.O. Smith: The AC's and DC's of electrical motors. Retrieved on 2006-04-11.

[7] U.S Department of Agriculture, Forest Products Laboratory. The wood handbook: wood as an engineering material. General technical report 113. Madison, WI.

[8] A. MUSHIRO, I. A. 2006. Mechanical properties of wood at low temperatures. BOOTLE, K. R. 2006. Wood in Australia, Sydney, McGraw-Hill Book Company.
D BOUCHER, C. M.-T., K LININGER and S ROQUEMORE 2011. The Root the Problem.

[9] Luis Cristoba also said, "Machining properties Wood ", vol (1), pp. 20-24

[10] Hamid Sripur "Development ofAutomatic Cutting System ", Journal of Agricultural Research, Vol 1 (3), pp: 20-23, May 2012

[11] Ozkan & S.Ayan "Design and application of circular saw machine" Journal of engineering research and applied science , vol(1), pp26-33, June 2012 Available.