

Design and Development of a Solar Powered Automatic Grass Cutting Machine

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ABSTRACT

Due to the constant rise in fuel prices and the impact of gas emissions from burned fuel into the atmosphere, it became necessary to use the sun's plentiful solar energy as a source of electricity to operate a lawn cutter. Based on the fundamental idea of mowing, a solar-powered lawn cutter was created. Direct current (DC) motor, rechargeable battery, solar panel and control switch make up the solar-powered lawn cutter's design. The DC motor, which is directly connected to the shaft of the DC motor and provides the necessary torque to drive the nylon wire, is used to move the lawn. The switch on the board, which shuts the circuit and permits electricity to pass to the motor, which in turn drives the blade used for mowing, is used to operate the solar-powered lawn cutter. The system will use some automation for obstacle identification and direction. A solar panel will be fixed to the top of the mbot and serve as the system's power source in addition to a battery. Nobody like moving the lawn cutters when they are driven by a normal motor since it is a hassle. A motor-powered engine also needs routine maintenance, including changing the oil. Despite being ecologically beneficial, electrified solar grass may still be a pain. Electric grass cutters, like motor-powered ones, are dangerous and difficult for everyone to use. Additionally, if the electric lawn cutter is tethered, cutting might be difficult and dangerous. The prototype will also use solar panels to charge from the sun.

Keywords: Solar Power, Battery, Grass Cutter, Mowing, Emission, DC Motor.

CHAPTER NO.1

INTRODUCTION

1.1 Background of Project

Renewable Energy is generally defined as energy that comes from long lasting resources. The sun is the most abundant and unlimited source of energy. Solar panel is used to store electric energy or charge the battery from the solar energy. And the battery charged is used to operate grass cutter grass cutter are popular today as it does more work in less time interval. But due to much use of IC engine it leads to cause Pollution. In order to minimize this will work on Solar Grass Cutter Manual grass cutting requires man power, time and it may create non-uniform structure of grass height. Hence to avoid all these issues it is essential to create a system which can cut the grass without any human involvement. This research implements the grass cutting robot which has battery which can be charged by solar energy. This robot can be operated using androidphone. This system can be created with minimum cost as compared to other existing systems. This is rugged, durable and maintenance free. This system is pollution free dueto the use of solar energy to charge the battery.

Due to the continuous increase in the cost of fuel and the effect of emission of gases from the burnt fuel into the atmosphere, this necessitated the use of the abundant solar energy from the sun as a source of power to drive a lawn mower. A solar powered lawn mower was designed and developed, based on the general principle of mowing. The designed solar powered lawnmower comprises of direct current (D.C) motor, a rechargeable battery, solar panel, a stainless-steel blade and control switch. Mowing is achieved by the D.C motor which provides the required torque needed to drive the nylon wire which is directly coupled to the shaft of the D.C motor. The solar powered lawnmower is operated by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for mowing. The battery recharges through the solar charging controller. Performance

evaluation of the developed machine was carried out with different types of grasses. The sun provides sustainable amount of the energy used for various purposes on earth for atmospheric system.

The difference is just the application of the energy source. It is assumed that a lawnmower using solar as the energy source will address a number of issues that the standard internal combustion engine and electric motors lawn mowers do not. A lawnmower with solar energy will be easier to use, it eliminates down time by frequent trips to the gas station for fill-ups and danger associated with gasoline spillage. The dangerous emissions generated by the gasoline spillage and that of the internal combustion engine into the atmosphere are eliminated. The solar powered lawnmower will help to reduce air pollution. Thus, solar grass cutter is used.

1.2 History

The first lawn mower was invented by Edwin Budding in 1830 just outside Stroud, in Gloucestershire, England. Bedding's mower was designed primarily to cut the grass on sports grounds and extensive gardens, as a superior alternative to the scythe, and was granted a British patent on August 31, 1830. Cast iron gear wheels transmitted power from the rear roller to the cutting cylinder, allowing the rear roller to drive the knives on the cutting cylinder, the ratio was 16:1. Another roller placed between the cutting cylinder and the main or land roller could be raised or lowered to alter the height of cut. The grass clippings were hurled forward into a tray-like box. It was soon realized, however, that an extra handle was needed in front to help null the machine along. Overall, these machines were remarkably similar to modern mowers. From the late nineteenth century through the middle of the twentieth century, DC-to-AC power conversion was accomplished using rotary converters or motor-generator sets (M-G sets). In the early twentieth century, vacuum tubes and gas filled tubes began to be used as switches in inverter circuits. The most widely used type of tube was the thyatron. The origins electromechanically inverters explain the source of the term inverter. Early AC-to-DC converters used an induction or synchronous AC motor direct-connected to a generator (dynamo) so that the generator's commutator reversed its connections at exactly the right moments to produce DC. A later development is the synchronous converter, in which the motor and generator windings are combined into one armature, with slip rings at one end and a commutator at the other and only one field frame. The result with either is AC-in, DC-out. With an M-G set, the DC can be considered to be separately generated from the AC; with a synchronous converter, in a certain sense it can be considered to be "mechanically rectified AC". Given the right auxiliary and control equipment, an M-G set or rotary converter can be "run backwards", converting DC to AC. Hence an inverter is an inverted converter.

1.3 Overview of Grass Cutting

Grass cutting equipment uses single or multiple blades to cut a grass surface up to a uniform height. Here, the height of the grass you should cut remains fixed. However, operators may adjust the grass-cutting device by using a single master lever or by the combination of a nut and bolt on each machine wheel. Regardless of the adjustment feature, a grass cutter trims the lawn grass more easily than other equipment in the agricultural industry. Here, you will know a few benefits and types of grass cutting equipment.

CHAPTER NO.2

LITERATURE SURVEY

1. Fabrication of Solar Grass Cutter by Pankaj Malviya, Dr. Pradeep Kumar Patil, Prof. Prabodh Bhise in this paper it states that, the present technology commonly used for cutting the grass is by using the manually handle device. The project aims to fabricate a grass cutting machine system which runs with the help of motor by using the solar energy. The battery can be charge by using power supply and solar panel. Power plays a great role wherever man lives and works. The living standard and prosperity of a nation vary directly with the increase in the use of power. The electricity requirement of the world is increasing at an alarming rate due to industrial growth, increased and extensive use of electrical gadgets. The best alternative source is solar energy.

2. "IOT Based Grass Cutter Using Solar Energy" by Niveditha T.R., Bhuvaneshwari

S. M. in this project Green is the color of beauty of nature, same goes for the grasses. The beauty of the grasses can be enhanced by the proper cutting and adjusting their length. In traditional method of grass cutter IC engines is used which uses fossil fuels to run and thus causing environment pollution. This conventional engine also requires man power to handle. This problem can be overcome by using IOT based grass cutter using solar energy. The proposed grass cutter is totally based on IOT and robotics. The special feature of the proposed model is that it can be controlled from any part of

the world by using Cell Phone. It is also capable of fully automated grasscutting without the need of any human involvement.

3. Literature Review of Grass Cutter Machine by Kartik R. Khodke Student, Mechanical Department This paper summarizes and reviews technological development for making efficient and cost-effective grass cutter. Our aim is to study the various developments in the grass cutter machines and their performance. Current technology commonly used for cutting the grass by the manually handled device from the survey we found that various types of grass cutter available in market which are run by means of solar, electric and internal combustion engine. Grass cutters are available in market having some limit to cut grass at some height. We are trying to make the new innovative concept mainly used in agricultural field. We are

going to fabricate the grass cutting machine for the use of agricultural field, to cut the crops in the field as well as to cut the grass.

4. Modification of Solar Grass Cutting Machine by Praful P. Ulhe in this paper solar grass cutter is a machine that uses spiral roller blades to cut a lawn at a faster rate. Solar grass cutter can operate manually and motor driven. Reel cutter of the grass cutter is given adjustable height. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep lawns in gardens schools, college's etc. We have made some changes in the existing Machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. we added remote control for unskilled person can operate easily and maintain the lawn very fine and uniform surface look. In our project, solar grass cutter is used to cut the different grasses for the different application.

5. Sun Based Grass Cutter: A Review by "Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil", in the paper named "Sun Based Grass Cutter: A Review" states that regular grass shaper consumes non-sustainable wellsprings of energy. So, to be another green grass shaper can be controlled by utilizing sun-oriented energy.

CHAPTER NO.3

SCOPE OF THE PROJECT

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3.1 Problem Statement:

- Manual grass cutting requires man power, time and it may create non-uniform structure of grass height.
- In the school, colleges and gardens to cut grass at a length there is more electricity is consumed.
- Due to engine combustion, traditional lawn cutters with powerful engines produce noise pollution and localized air pollution.
- Engines that are powered by motors need routine maintenance, such as changing the engine oil. Traditional grass-cutting equipment also uses fossil fuels, making it unfriendly to the environment.

3.2 Objective of the Project:

- To reduce consumption of fossil fuels by using solar power.
- The devices will be controlled by android application.
- It helps to reduce human efforts for cutting grass.

- Its helps to reduce pollution.
- This project gives accuracy for grass cutting.
- This project has very less cost.
- The purpose is to avoid energy crisis in India and
- Reduces the human efforts, operating cost and maintenance cost.
- Also, solar based grass cutter keeps the environment clean and healthy.
- It is used for cutting different types of grasses for various applications.

Before selection of the project, discussion has to be between the team members and their requirement in routing activities. We think on a similar product whether it is available I marked or not thinking by different kinds of it features. We can make modified product having more advantages at economics cost. Also, we have to consider the feasibility as well as suitability for available resources and Facilities to carry out the project work.

CHAPTER NO.4

METHODOLOGY

4.1 Block Diagram:

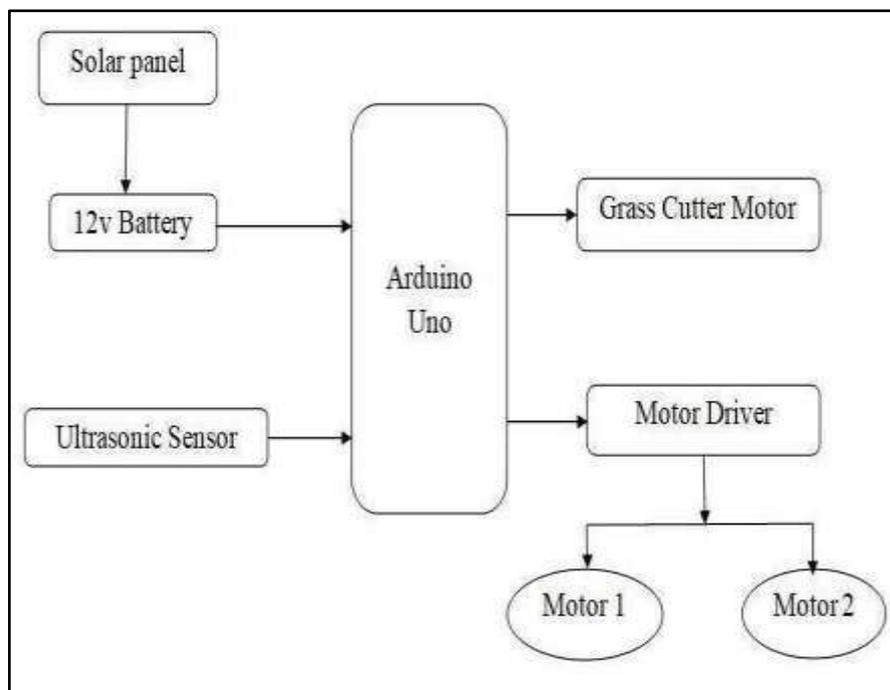


Fig 4.1 Block Diagram

The working of fully automated solar grass cutter, it has panels mounted in a particular arrangement at an angle of degrees in such a way that it can receive solar radiation with high intensity from the sun. This electrical energy is stored in batteries by using a solar charger. The main function of the solar charger is to increase the current from the panels while batteries are charging. It also disconnects the solar panels from the batteries when they are fully charged and also connects to the panels when the charging of batteries is low. The motor is connected through the motor driver IC

which is controlled the motor performance. The power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass at an even height. The cutter and vehicle motor are controlled by Arduino. It is moving the vehicle in forward direction. By using Bluetooth module which is connected through Bluetooth on mobile, to control the moment of grass cutter wheels. The Bluetooth module is connected to mobile by

Arduino Bluetooth control. To avoid and protect the device from any human interaction or any large and/or small obstacles the ultrasonic sensor is used.

4.2 Function

- Mower will have the ability to be controlled remotely
- It will be able to store the desired mowing path in memory
- It will have wheels that control forward and backward movement as well as turning
- Wireless interaction between mower, base station, and control
- Solar power to large battery to mower batteries
- Micro-controller to interact with and control other components
- (Motors for blades/wheels, wireless component, compass, and power management)

CHAPTER NO.5

DESIGN, COMPONENT AND PROCESSES

5.1 Circuit Diagram:

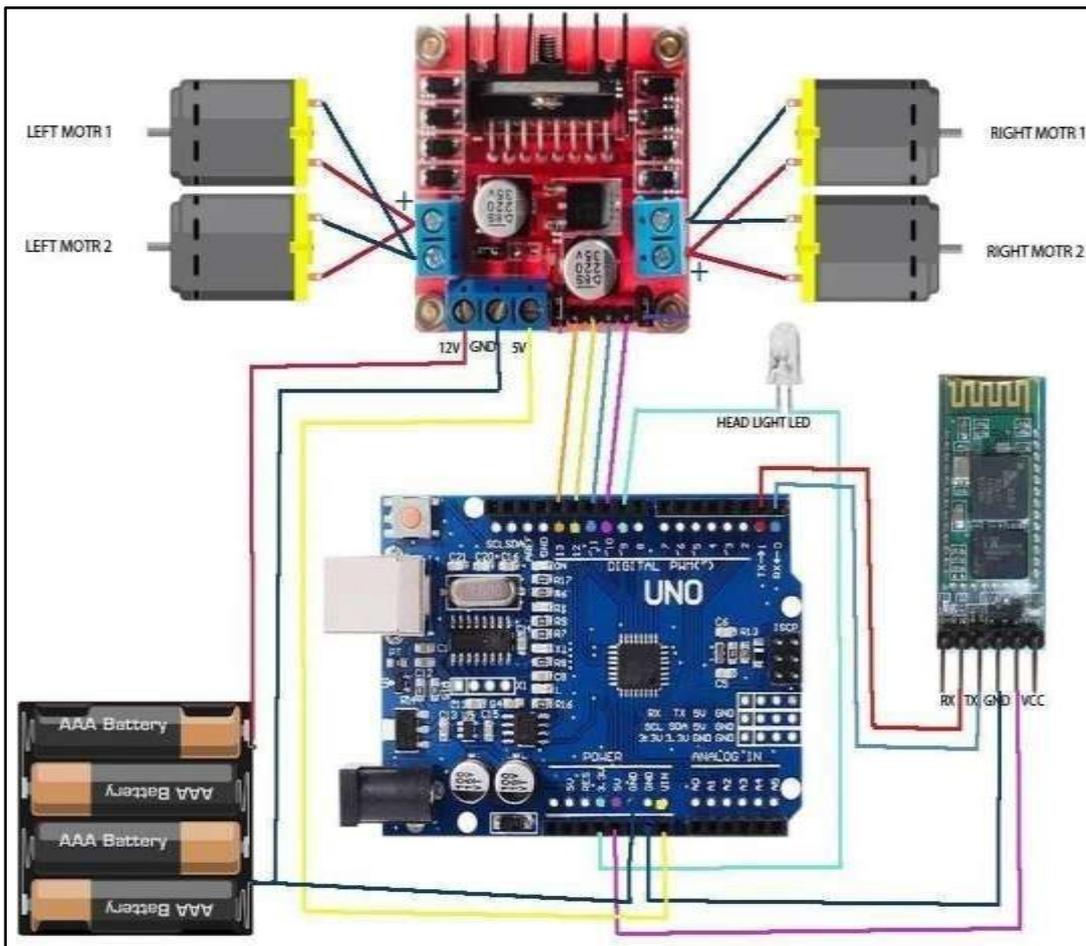


Fig. 5.1 Circuit Diagram

5.2 Component Used:

5.2.1 Solar Panel

The solar panel to be used for the solar lawn mower is a 12V, 10 Watts panel which consists of 24 high efficiency solar cells resulting to high efficiency per space. A solar panel is a device that collects photons of sunlight, which are very small packets of electromagnetic radiation energy, and converts them into electrical current that can be used to power electrical loads. Using solar panels is a very practical way to produce electricity for many applications. There solar panels consist of three basic types; monocrystalline, polycrystalline and amorphous solar cells. For the development of this project monocrystalline is used because it is more space efficient as it consists of lesser silicon crystals. The maximum output voltage produced by a silicon cell is approximately 0.5Volts when there is bright sunlight. Solar panels need direct sunlight to produce greater solar output. Although in situations whereby the weather is cloudy, the solar panel can absorb solar energy but the rate will be significantly reduced to about 25 to 40% when compared to sunny days. The panels will only produce maximum output to charge the battery during the peak sun hours per day.



Fig.5.2.1. Solar Panel

Function

- collect energy from the Sun in the form of sunlight and convert it into electricity.

5.2.2 Battery

Solar cell module produces electricity only when the sun is shining. They do not store energy. It is necessary to store some of the energy produced. So we use battery to store electrical energy generated by the solar panel. It is also used for the powering operation system. The battery is of 12V DC Batteries are available in different voltages and ampere hour range. To determine the battery selection, consideration was given to the rating of the voltage and current. Since the solar panel is 12V, then a 12V battery was selected. The ampere hour is used to measure the time the battery will take to discharge while it's not charging. A 7 Ampere battery was selected and will give 7 amps of current of battery for one hour before it fully discharges.



Fig. 5.2.2. Group of cell

Function

- A battery is a device that stores chemical energy and converts it to electrical energy. The chemical reactions in a battery involve the flow of electrons from one material (electrode) to another, through an external circuit. The flow of electrons provides an electric current that can be used to do work.

5.2.3 Arduino UNO

Arduino is an open-source platform used for building electronics projects. It consists of both a physical programmable circuit board and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board. The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino UNO uses a simplified design, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.



Fig 5.2.3 Arduino UNO

Function

- This board can be interfaced with other Arduino boards, Arduino shields, and Raspberry Pi boards and can control relays, LEDs, servos, and motors as an output.

5.2.4 DC Gear Motor

There are 4 DC motors are used for movement of the wheel. These motors are brushless DC motors. These Motors are driven by the driver IC ULN2003. The speed of the motor is 60 rpm. The ULN2003 is used for the current boosting. Motors require more current for work properly so these IC is used. It increases current up to 200mA DC motors were the first form of motor widely used, as they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills.



Fig. 5.2.4 DC Gear Motor

Function

- The function of a DC geared motor is to move or rotate the final required shaft at a required RPM slower than the motor.
- With this reduced RPM, the DC motor will become a high-torque geared DC motor, which can apply higher torque to the shaft or to the object being rotated.

5.2.5 DC Motor

In the presented idea for grass cutter model, we used DC motor interfaced with blades for cutting grass when operated. A dc motor uses electrical energy to produce mechanical energy, very typically through the interaction of magnetic fields and current carrying conductors. The input of a DC motor is current/voltage and its output is torque (speed).



Fig. 5.2.5 DC Motor

Function

- To rotate at high speed of cutter and to cut the grass on the lawn.

5.2.6 Solar Charger

Solar Charger is a charger that employs solar energy to supply electricity to devices or batteries. Most portable chargers can obtain energy from the sun only. They are generally portable. Solar chargers can charge lead acid or Ni-Cd battery banks up to 48 V and hundreds of ampere-hours (up to 4000 Ah) capacity. Such type of solar charger setups generally uses an intelligent charge controller. A series of solar cells are installed in a stationary location (i.e.: rooftops of homes, base-station locations on the ground etc.) and can be connected to a battery bank to store energy for off-peak usage. They can also be used in addition to mains-supply chargers for energy saving during the daytime.



Fig. 5.2.6 Solar Charger

Function

- To keep the battery from overcharging by regulating the voltage and current coming from the solar panel to the battery.

5.2.7 Motor Driver

The motor driver in a solar grass cutter is responsible for controlling the movement of the cutting blades. It receives commands from the control system and regulates the power supplied to the motor, allowing the grass cutter to move forward, backward, or turn. It ensures precise and efficient operation of the cutting mechanism, making it easier to navigate and trim the grass effectively.

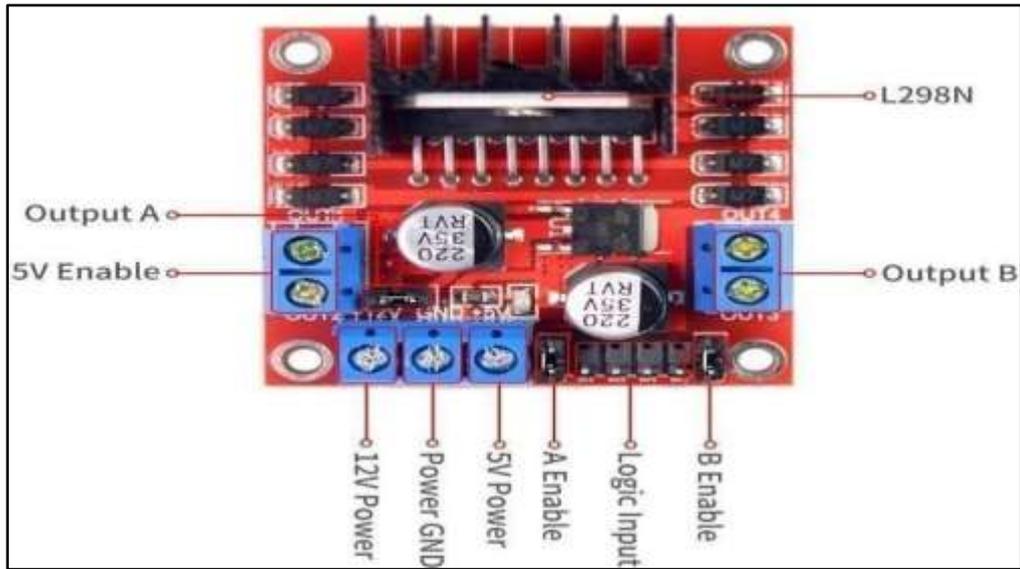


Fig. 5.2.7 Motor Driver

Function

- The function of the motor drive is to draw electrical energy from the electrical source and supply electrical energy to the motor, such that the desired mechanical output is achieved. Typically, this is the speed of the motor, torque, and the position of the motor shaft.

5.2.8 Bluetooth Module

This research uses an Arduino, HC-06 Bluetooth module to transfer the commands from android smart phone to the system. This HC-06 Bluetooth module is mounted on the system along with some relays. Initially user connects its smart phone with this module. After a successful connection user can provide the desired direction change command to the system from maximum 10-meter distance. Also, user can switch ON and OFF the grass cutter through its mobile using the android application. HC-06 Bluetooth module is mainly used for short-range wireless connectivity. This is economical and durable module as compared to other existing Bluetooth modules. The Bluetooth module acts as a communication interface, allowing the grass cutter to connect with other devices like smartphones or tablets. This enables you to control the grass cutter wirelessly, making it more convenient to operate. You can use a dedicated app on your device to start or stop the grass cutter, adjust cutting settings, or even monitor its battery level. It's a handy feature that adds flexibility and ease of use to the grass cutter.

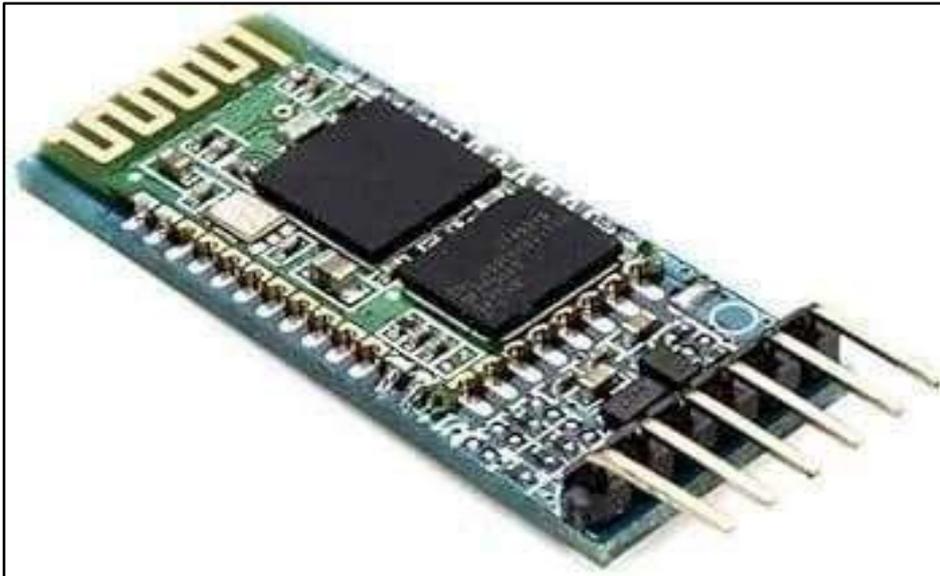


Fig. 5.2.8 Bluetooth Module

Function

- They utilize radio waves to establish connections and enable communication between devices such as smartphones, computers, IoT device.

5.2.9 Wheels

The wheels in a solar grass cutter serve an important function. They help the grass cutter move smoothly and efficiently across the lawn, allowing it to cover a larger area. The wheels provide stability and traction, making it easier to navigate different terrains while cutting the grass. So, they play a crucial role in the overall mobility and effectiveness of the solar grass cutter. The wheels are typically designed to be sturdy and durable, capable of withstanding the outdoor conditions. They are often made of materials like rubber or plastic, which provide good traction and grip on various surfaces. The size and tread pattern of the wheels can vary depending on the specific model of the grass cutter. Additionally, some solar grass cutters may have adjustable wheels, allowing you to set the cutting height according to your preference. Overall, the wheels are an essential component that enables the grass cutter to move smoothly and efficiently while maintaining stability and control.



Fig. 5.2.9 Wheel

Function

- The wheels in a solar grass cutter serve an important function. They provide mobility and allow the grass cutter to move smoothly across the lawn.

5.2.10 Nylon Wire

The nylon wire in a solar grass cutter serves as the cutting component. It is attached to the cutting mechanism and rotates rapidly to trim the grass. The nylon wire is durable and flexible, allowing it to effectively cut through the grass while minimizing damage to the surrounding vegetation. It's a key part of the grass cutter's functionality, ensuring a neat and even cut. The nylon wire, also known as a trimmer line or cutting line, is a strong and flexible material that is specifically designed for cutting grass and weeds. It is usually made of nylon because nylon is durable, resistant to wear, and can withstand the high-speed rotation of the cutting mechanism. The nylon wire is attached to the cutting head of the grass cutter, and when the machine is turned on, the wire spins rapidly, slicing through the grass with ease. It's a reliable and efficient way to maintain a well-manicured lawn.



Fig. 5.2.10 Nylon Wire

5.2.11.Cutting machine:-

Grass cutting machines, commonly known as lawn mowers, vary significantly based on the size of your lawn, the terrain, and how much manual effort you want to put in.

As of 2026, the industry has seen a massive shift toward smart automation (LiDAR/AI) and high-capacity battery power, making gas-powered mowers less common for residential use. Grass cutting machines, commonly known as lawn mowers, vary significantly based on the size of your lawn, the terrain, and how much manual effort you want to put in.

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Fig.5.2.11.Cutting machine

5.3 Programing:

```
int val;
```

```
int nb;
```

```
Void setup () {
```

```
// put your setup code here, to run once:
```

```
Serial.begin(9600); pinMode(9,OUTPUT); pinMode(8,OUTPUT); pinMode(7,OUTPUT); pinMode(6,INPUT);  
}
```

```
// put your main code here, to run repeatedly: void loop()
```

```
{
```

```
if(Serial.available(>0)

{

int data= Serial.read();

Stop();

if(data=='R')

{

digitalWrite(9,HIGH); digitalWrite(8,LOW); digitalWrite(6,HIGH); digitalWrite(7,LOW);
}

else if(data=='L')

{

digitalWrite(9,LOW); digitalWrite(8,HIGH); digitalWrite(6,LOW); digitalWrite(7,HIGH);
} else if(data=='F'){ digitalWrite(9,LOW); digitalWrite(8,HIGH);

digitalWrite(6,HIGH); digitalWrite(7,LOW);
} else if(data=='B'){ digitalWrite(9,HIGH); digitalWrite(8,LOW); digitalWrite(6,LOW); digitalWrite(7,HIGH);
}

}

}

void Stop()

{

digitalWrite(9,LOW); digitalWrite(8,LOW); digitalWrite(6,LOW); digitalWrite(7,LOW);
}
```

5.4 Program Explanation:

This code is for controlling a simple robot using Arduino.

1. Variables:

1. int val: This variable is declared but not used in the code.
2. int nb: This variable is declared but not used in the code.

2. Setup Function:

- 1) “Void setup ()”: This function runs once when the Arduino board is powered up or reset.
- 2) Inside the setup function, it initializes the serial communication at a baud rate of 9600 (bits per second), and sets pin modes for pins 9, 8, 7 as OUTPUT, and pin 6 as INPUT. This means pin 9, 8, and 7 will be used to send signals to control motors (probably), and pin 6 might be used to receive signals from external sensors (not used in this code).

3. Loop Function:

- 1) `void loop ()`: This function runs repeatedly as long as the Arduino has power.
- 2) Inside the loop function, it checks if there is any data available to read from the serial communication. If data is available, it reads the data.
- 3) If the received data is 'R', it sets one pair of motor pins to make the robot move right.
- 4) If the received data is 'L', it sets another pair of motor pins to make the robot move left.
- 5) If the received data is 'F', it sets one pair of motor pins to make the robot move forward.
- 6) If the received data is 'B', it sets one pair of motor pins to make the robot move backward.

4. Stop Function:

- 1) void Stop (): This is a custom function defined to stop the robot. It sets all motor pins to LOW, effectively stopping the robot.

Explanation:

- 1) This code is meant to control a simple robot that can move forward, backward, left, and right based on the commands received from a serial communication interface (like a computer or another microcontroller).
- 2) It initializes communication, sets up pin modes, and continuously checks for incoming commands to control the movement of the robot.

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CHAPTER NO.6**RESULTS AND APPLICATIONS****6.1 Results:****Table 6.1 Results**

Sr. No.	Condition	Working time	Area covered
1.	When battery is fully charged	50 min	1000 sq. feet
2.	When battery is fully charged and solar panel is connected	65 min	1200 sq. feet

The result of using a solar grass cutter is a well-maintained lawn with the added benefit of being environmentally friendly. By harnessing solar power, the grass cutter eliminates the need for traditional fuel sources, reducing carbon emissions and minimizing noise pollution. Solar grass cutters are also cost-effective in the long run, as they rely on renewable energy and require minimal maintenance. With advancements in technology, we can expect even better performance and efficiency from solar grass cutters in the future. It's a win-win for both your lawn and the planet.

6.2 Advantages:

- The use of solar power saves the non-renewable energy.
- No need of human interface.
- Non skilled person can also operate.
- No required any external supply.
- It is economical.
- Compact in size and portable.
- No any fuel cost.
- Easy to move from one place to another place.
- Freedom from long extension wires.

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- No fuel consumption.
- No. of reciprocating parts are less.

- Operating principle is simple.

6.3 Disadvantages:

- It difficult to operate in Rainy season.
- It cannot use manually because gear motor is used

6.4 Applications:

- For Playgrounds (cricket ground, football ground etc.)
 - For House gardens.
 - For small farms, nurseries.
 - Solar operated Grass Cutter has proved to be a possible replacement for the gasoline powered Lawn cutter.
- CHAPTER NO.7**

CONCLUSION AND FUTURE SCOPE

CHAPTER NO: 7

CONCLUSION AND FUTURE SCOPE

7.1 Conclusion:

- It helps to reduce human efforts for cutting grass.
- We can also decrease various forms of pollutions such as air pollution and noise pollution.
- This project gives accuracy for grass cutting.
- By using solar operated Grass Cutter, we can conserve the nonrenewable sources of energy such as electricity is saved as we use solar energy. That is renewable source of energy and is present in affluence petrol, gasoline s etc.

7.2 Future Scope:

In future we would work on these following things to make our project more effective and smarter.

- Aluminum can be used in place of plastic to lighten lawn mower's weight.
- The blade can be changed from the ground by using the rack and pinion mechanism.
- The solar panel can be turned so that it faces the sun by utilizing the servo motor.
- It may also operate the solar grass cutter in the frame by turning the pointed wheel.
- It can be made smaller and more compact.
- Increasing battery capacity can increase efficiency.
- More sensors can be added to increase automation and result accuracy.
- Programming can be improved to enable the device to carry out additional tasks.

CHAPTER NO.8**COST ESTIMATION AND HARDWARE****CHAPTER NO.8****COST ESTIMATION AND HARDWARE****8.1 Cost Estimation:****Table 8.1 Cost Estimation**

Sr. No.	DISCRIPTIONS	PRICE
1	Arduino Uno	650/-
2	Motor driver	300/-
3	Bluetooth module	550/-
4	Solar panel	1000/-
5	Battery	900/-
6	4 geared motors	3600/-
7	Cutter motor	550/-
8	wheel	240/-
9	wire	50/-
10	Switch	20/-
11	Frame body	251/-
12	Adjustable, motor clips	300/-
13	Cutter [nylon wire]	20/-
	Total	9000/-

CHAPTER NO.9

REFERENCES

CHAPTER NO.9

REFERENCES

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5. International Journal for Research in Applied Science & Engineering Technology (IJRASET) ISSN: 23219653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 10 Issue X Oct 2022- Available at www.ijraset.com 229©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 „Semi- Automatic Solar Powered Grass Cutter“.
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CHAPTER NO.10

APPENDIX

“Design and development of a solar powered automatic grass cutting machine”

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ABSTRACT

This project presents the development of a solar-operated grass cutter using Arduino technology. With increasing environmental concerns and the need for sustainable solutions, solar-powered devices are becoming more popular. The aim of this project is to create an eco- friendly grass cutting machine that utilizes solar energy as its primary power source. The system consists of a solar panel array to harness solar energy, an Arduino microcontroller for control and automation, and a grass cutting mechanism. The solar panel array converts sunlight into electrical energy, which is then stored in batteries for later use. The Arduino microcontroller manages the operation of the grass cutter, including

the activation of the cutting mechanism based on predefined parameters such as time of day or grass length. The cutting mechanism comprises a motorized blade or a nylon wire cutter, which is activated by the Arduino controller. The device can be programmed to operate autonomously, cutting grass at specified intervals or upon command via a remote control. The project aims to provide a sustainable and efficient solution for grass cutting tasks, especially in areas where access to traditional power sources may be limited. By harnessing solar energy and utilizing Arduino technology for automation, the solar-operated grass cutter offers an environmentally friendly alternative to conventional gas-powered or electric lawn mowers.

Keywords: Solar energy, Arduino, Grass cutter, Automation, Sustainability

INTRODUCTION

Nowadays, lots of people use grass cutting machines, mainly for trimming soft grass. We often deal with pollution, especially at home. Here, we introduce a new model of a grass-cutting machine that works on solar power, which is renewable. This machine can cut the grass on its own without needing someone to operate it. Our model reduces both environmental and noise pollution. It's a modern solution to an old problem, benefiting both nature and the user. By using solar power to operate the machine, we can save users from the hassle of mowing their lawns and reduce noise and pollution. The aim is to offer a green alternative to the commonly used fuel-powered lawnmowers, making life easier for users while helping the environment. We hope to continue improving the project until we have a fully functional and efficient product.

PROBLEM STATEMENT:-

- Air pollution due to petrol engines
- Noise pollution
- High electricity consumption
- Manual effort and operator fatigue

LITERATURE SURVEY :-

Fabrication of Solar Grass Cutter by Pankaj Malviya, Dr. Pradeep Kumar Patil, Prof. Prabodh Bhise in this paper it states that, the present technology commonly used for cutting the grass is by using the manually handle device. The project aims to fabricate a grass cutting machine system which runs with the help of motor by using the solar energy. The battery can be charge by using power supply and solar panel. Power plays a great role wherever man lives and works. The living standard and prosperity of a nation vary directly with the increase in the use of power. The electricity requirement of the world is increasing at an alarming rate due to industrial growth, increased and extensive use of electrical gadgets. The best alternative source is solar energy.

FLOW CHART

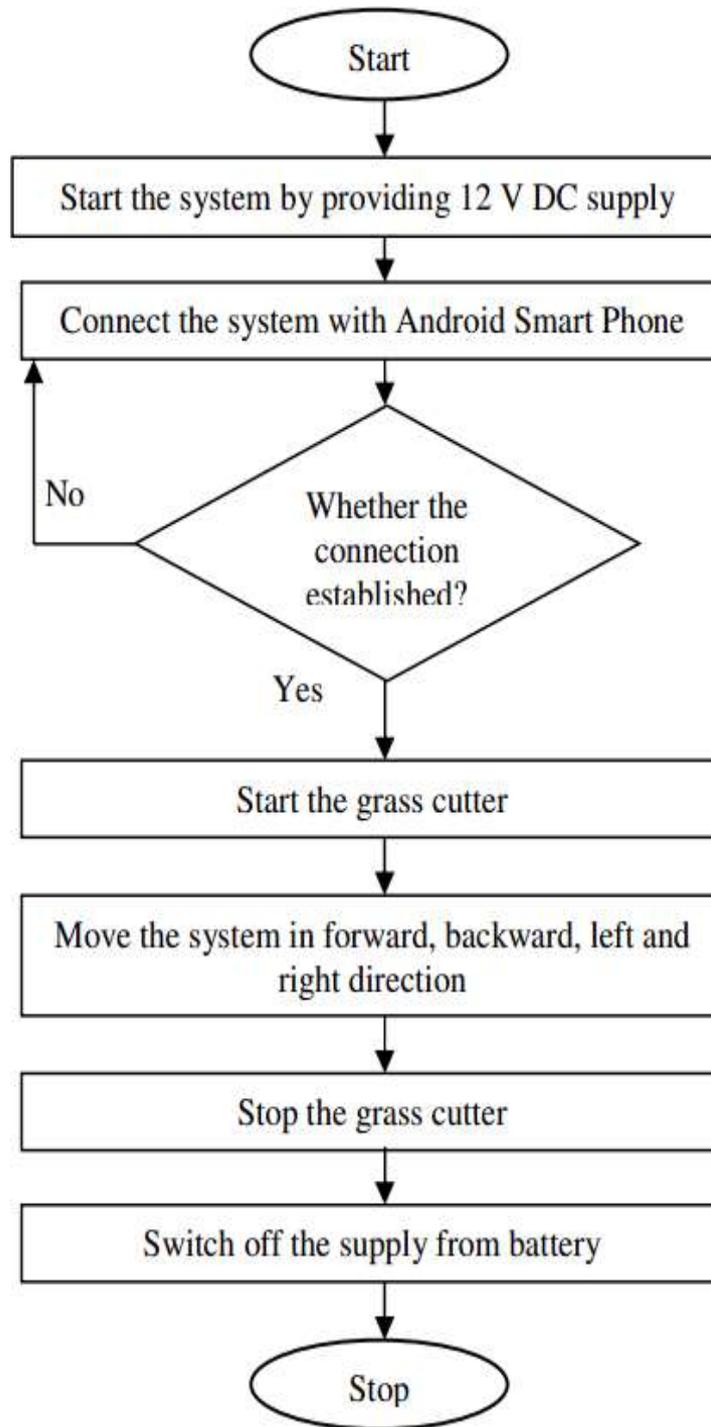


Fig. 1. Flowchart of System

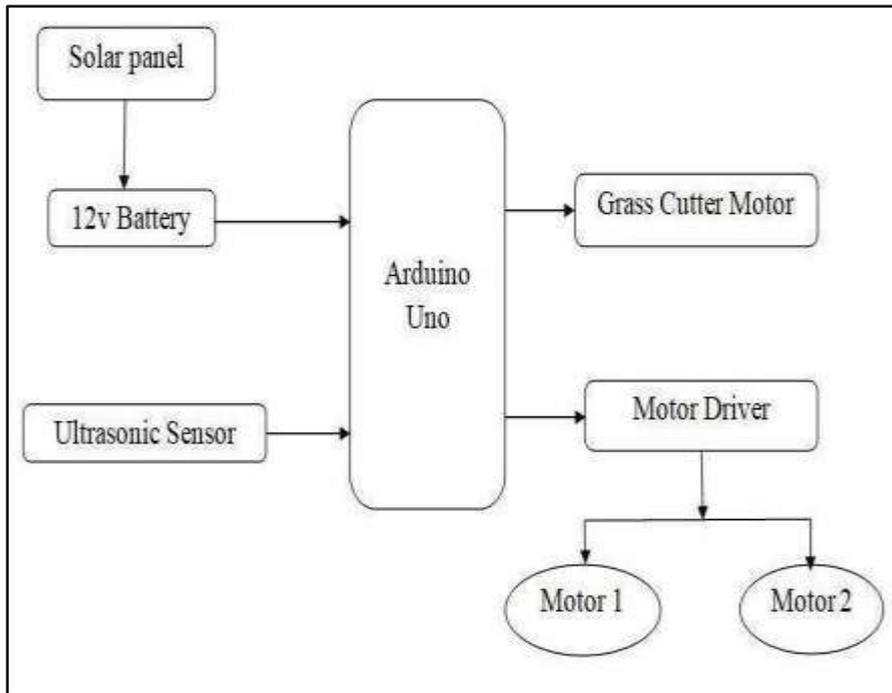


Fig.2.block diagram

Component name: -

1. Arduino
2. DC motor
3. Solar panels
4. Batteries
5. Solar charger
6. Ultrasonic sensor
7. Nylon wire
8. Motor driver
9. Wheel
10. Bluetooth module

METHODOLOGY: -

The working of fully automated solar grass cutter, it has panels mounted in a particular arrangement at an angle of degrees in such a way that it can receive solar radiation with high intensity from the sun. This electrical energy is stored in batteries by using a solar charger. The main function of the solar charger is to increase the current from the panels while batteries are charging. It also disconnects the solar panels from the batteries when they are fully charged and also connects to the panels when the charging of batteries is low. The motor is connected through the motor driver IC which is controlled the motor performance. The power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass at an even height. The cutter and vehicle motor are controlled by Arduino. It is moving the vehicle in forward direction. By using Bluetooth module which is connected through Bluetooth on mobile, to control the moment of grass cutter wheels. The Bluetooth module is connected to mobile by Arduino Bluetooth control.

Function

- Mower will have the ability to be controlled remotely
- It will be able to store the desired mowing path in memory
- It will have wheels that control forward and backward movement as well as turning
- Wireless interaction between mower, base station, and control
- Solar power to large battery to mower batteries
- Micro-controller to interact with and control other components
- (Motors for blades/wheels, wireless component, compass, and power management)

Conclusion: -

This project provides a design method of an automated grass cutter operated on solar power; whose task is to cut grass with no need of user interaction. This task is expected to be made possible by using sensors to provide an Adriano with controlling. here for obstacle avoidance the ultrasonic sensor is used. This will give much more physical exercise to the people and can be easily handled. This system is having facility of charging the batteries while the solar powered grass cutter is in motion. while the solar powered grass cutter is in motion

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