

# Automatic Solar Grass cutter

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**ABSTRACT:** Presently, manually handled device is commonly used for cutting the grass over the field which creates pollution and loss of energy. The wireless grass cutter system puts forth an automated lawn mower mechanism. This will reduce the effort required for cutting grass in the lawns and solar power used will help to contribute in lowering pollution. The robotic vehicle is equipped with a grass cutter blade that allows for grass cutting at high RPM. The system has a smart functionality that allows it to cover the complete area of a lawn or garden by detecting corners using ultrasonic sensor and moving in a raster manner in order to cover the entire area. This efficient system uses an Arduino Mega microcontroller in order to achieve this functionality. The Arduino will act as the brain of the project which will send commands to the grass cutter. It also controls the movement of motors which help for the movement of the cutter.

## Keywords:

Arduino Mega, DC Motor, LM2596 ADJ, Grass Cutter and Solar Energy

## 1. INTRODUCTION

In the time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is manmade and can be seen in our own daily lives, more specifically in our own homes. In case gas powered lawn movers due to emission of gases it is responsible for pollution. Also the cost of fuel is increasing hence it is not efficient. So the solar powered grass cutter is introduced. Solar powered grass cutter can be described as the application of solar energy to power an electric motor which in rotates a blades which does the moving on lawn. Solar energy is the renewable energy. It uses the photovoltaic panel to generate the energy needed to power the mover. [1]The first lawn mower was invented by Edwin Budding in 1830 in Throop, 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. [1]in 1995, the first fully solar powered robotic mower became available. A robotic lawn mower is an autonomous robot used to cut lawn grass. A typical robotic lawn mower requires the user to set up a border wire around the lawn that defines the area to be mowed. The robot uses this wire to locate the boundary of the area to be trimmed and in some cases to locate a recharging dock. Robotic mowers are capable of maintaining up to 20,000 m<sup>2</sup> (220,000 sqft) of grass. [2] Automated solar grass cutter are increasingly sophisticated, are self-docking and some contain rain sensors if necessary, nearly eliminating human interaction. Robotic lawn mowers represented the second largest category of domestic robots used by the end of 200Possibly the first commercial robotic lawn mower was the Mow Bot, introduced and patented in 1969 and already showing many features of today's most popular products. In 2012, the growth of robotic lawn mower sales was 15 times that of the traditional styles. With the emergence of smart phones some robotic mowers have integrated features within custom apps to adjust settings or scheduled mowing times and frequency, as well as manually control the mower with a digital joystick.

## 2. LITERATURE SURVEY

- Srishti Jain, Amar Khalore and Shashikant Patil(December 2015):To detect the obstacles, they used IR sensors which has 1m 555 IC. There are two sensors, one on each side. This is because in case the obstacle is on the left then it will move in right direction and if the right sensor detects the obstacle then it goes towards the left. Here they used a 12v 310mA solar panel in their project. There are 24 solar cells on the solar panel, each contributing to 0.5v each.
- Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V .A. Mane (February 2017): The system is switched to automatic mode in which the robot's infrared sensors make a comparison between, cut and uncut grass. The mower continues this process until it completes the job. The system uses 12v batteries to power the vehicle movement motors as well as the grass cutter motor. They also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to an 8051 family microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection.
- Bidgar Pravin Dilip, Nikhil Babu Pagar, Vickey S. Ugale, Sandip Wani, Prof. Sharmila M. (April 2017) :This paper will analyze the operation and working principle of the Automatic Grass Cutter. The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. They wanted an ultrasonic sensor to sense if the lawn cutter was heading into an object.

- **Ms. Bhagyashri R. Patil, Mr. Sagar S. Patilg (January-June 2017):**There are two main components such as transmitter and receiver. Transmitter continuously transmits the rays if any obstacle come in front of grass cutter then the rays are reflected back towards the receiver. The receiver receives the signal in the serial form from encoder but microcontroller requires parallel data for communication so receiver sends data to decoder to convert data in the parallel form and then it is passed to microcontroller.
- **Pankaj Malviya (January-June 2017):**Author prepared manually handle device. The battery can be charged by using solar panel as well as external power supply and DC motor which is controllable is used for changing the direction of grass cutter as per need are used. The most modern regulator is used for preventing overcharging and discharging of battery which saves span of battery. Due to industrialization more electricity is required for various industrial applications and electrical gadgets so solar energy is best alternative for electricity. Solar panel, battery, DC motor, solar charger these components are used for fabrication of grass cutter. They have used less number of moving components so there is less maintenance. This grass cutter will give much more physical exercise to operator and it will easily handle.

### 3. PROPOSED SYSTEM

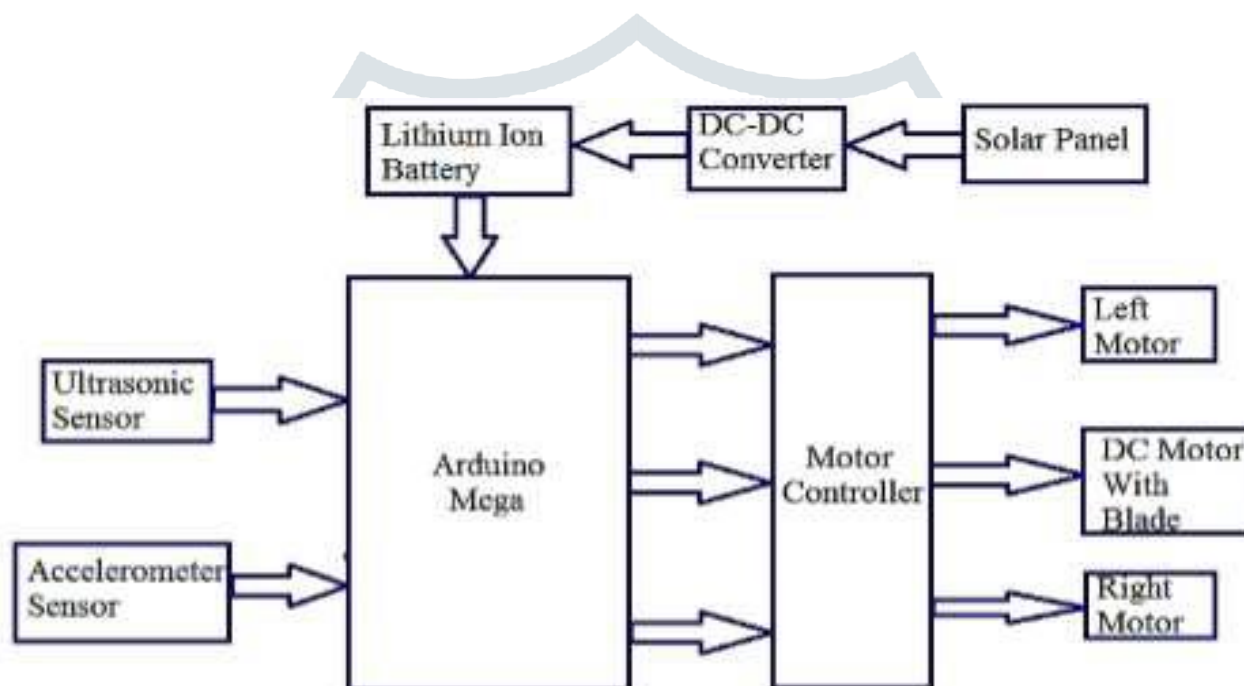


Figure 1: Block diagram of Automatic Solar Grass Cutter

### 4. METHODOLOGY

The methodology for this project is similar to the prototype analysis process. In this project we are fabricating a prototype of the solar powered grass cutter. The methodologies of these attachments are explained in few sub- headings.

1. Components of attachment
2. Working of solar grass cutter

#### 4.1 COMPONENT OF ATTACHMENT:

The main components of the solar powered grass cutter are,

1. Solar panels
2. Batteries
3. DC motor
4. Motor driver
5. Mechanism used
6. Circuitry



Figure 2.Solar Panel

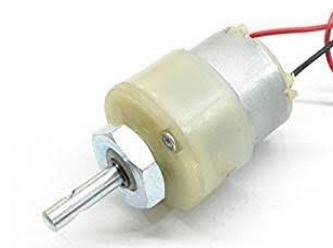


Figure 3.Gear DC motor  
**L298 Motor Controller Pinout**

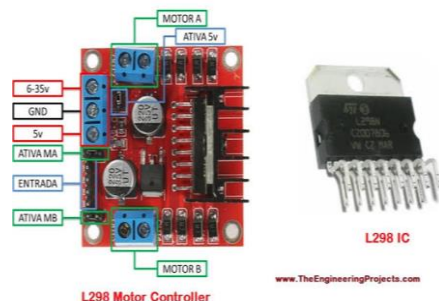


Figure 4.Motor Driver



Figure 5.Batteries

#### 4.2 WORKING OF SOLAR POWERED GRASS CUTTER:

1. Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangement at an angle of 45 degrees in such a way that it can receive solar radiation with high intensity easily from the sun.
2. These solar panels convert solar energy into electrical energy as studied earlier. Now this electrical energy is stored in batteries by using a solar charger.
3. 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 in batteries is low.
4. The motor is connected to the batteries through connecting wires .Between these a two motor driver is provided. It starts and stops the working of the motor.
- 5.From this motor, the power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass

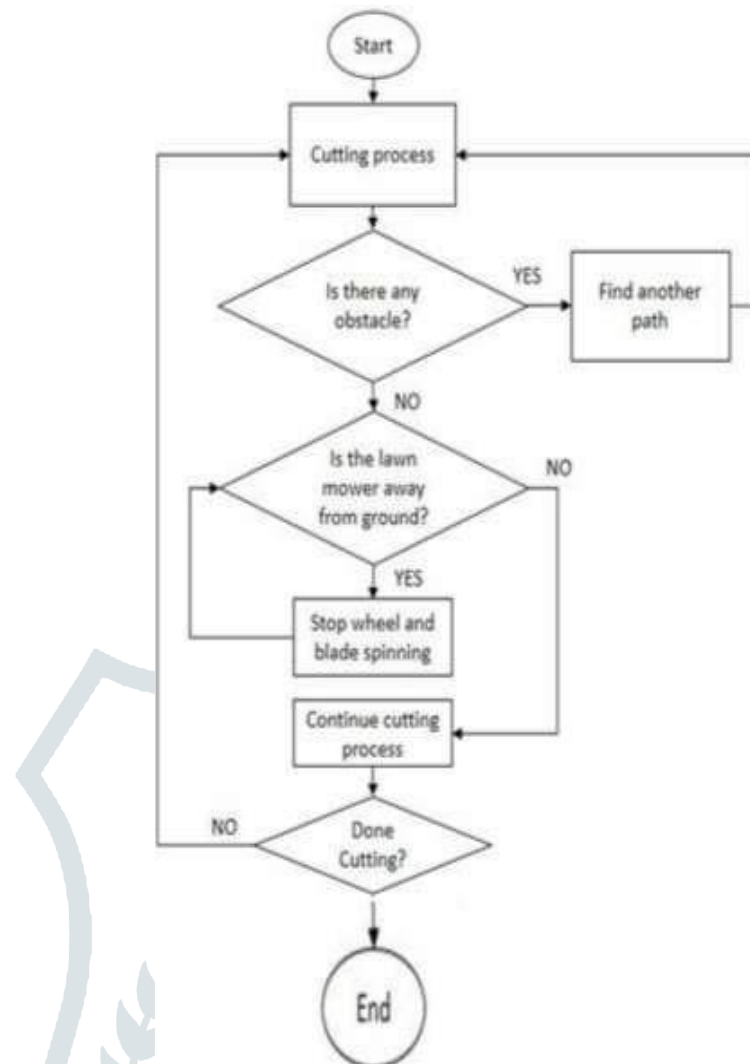


Figure6: Algorithm and Flow chart

- Step 1: Start  
 Step 2: Initialize Arduino.  
 Step 3: Connect the sensors.  
 Step 4: Check for sensor input.  
 Step 5: If there is an obstacle the cutter will take a u turn until there is no obstacle.  
 Step 6: Else continue mowing.  
 Step 7: If cutter is above the ground then stop.  
 Step 8: Else continue.  
 Step 9: If cutting done then stop.  
 Step 10: Else start again.  
 Step 11: End

## 5. APPLICATION

- The football ground.
- All garden
- All Playgrounds For colleges
- For small farms.
- For nurseries

## 6. ADVANTAGES

- NON SKILLED PERSON CAN ALSO OPERATE.
- IT IS POLLUTION FREE.
- 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.

## 7. RESULTS



## 8. CONCLUSION

Our project entitled Manufacturing of solar powered grass cutter is successfully completed and the results obtained are satisfactory. It will be easier for the people who are going to take the project for the further modifications. This project is more suitable for a common man as it is having much more advantages i.e., no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy. 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. So it is much more suitable for grass cutting also. The same thing can be operated in night time also, as there is a facility to charge these batteries in day light. The mechanism which we used ie scotch yoke mechanism does not given excepted efficiency. This efficiency can be increased by using some other mechanism. and speed of motor is reduce because we have used heavy material and this material can be replaced by using light weight material .and design of blades should be done based on types of grass is used to cut. The project which we have done surly reaches the average families because the grass can be trimmed with minimum cost and with minimum time finally this project may give an inspiration to the people who can modify and can obtain better results.

## 9. REFERENCE

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