

# Smart Solar Based Grass Cutter

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**Abstract:** *This research paper related to the grass cutter machine. The presented work consists two main things as the first thing is related to the movement of vehicle and the second thing is associated with the cutting of grass. The normal grass cutters have been broadly used recently by the workers in gardening of lawn. However, the manual operated grass cutters are absorbing a very large amount of energy and making air pollution, grass cutter also generate so much of noise and vibration. To avoid those problems we are design smart and automatic solar grass cutter. This devised can powered by solar energy and electrical supply also. It is smartly controlled that's why has been named as smart solar grass cutter that has three main systems which are as smart control system, solar system and the grass cutter. In this project, solar energy is used as main power source for smart solar grass cutter.*

**Keywords:** Grass Cutter Machine

## I. INTRODUCTION

Nowadays, pollution is the serious issue in the world. In case Gas powered grass cutter because of the release of hazardous gases it is responsible for pollution. Also the prices of fuel is increasing hence it is inefficient. Normally grass cutters are often heavy parts of machinery that involves a lot of force.

The normal grass cutters have been broadly used recently by the workers in gardening of lawn. However, the manual operated grass cutters are absorbing a very large amount of energy and making air pollution, grass cutter also generate so much of noise and vibration which straight to affect labors health. The normal grass cutter generates high noise and vibration. To avoid those Problems we are design smart and automatic solar grass cutter. This device can powered by solar energy and electrical supply also. It is smartly controlled that's why has been named as smart solar grass cutter that has three main systems which are as smart control system, solar system and the grass cutter. In this project, solar energy is used as main power source for smart solar grass cutter.

This project is fully programmable. It is a fully automated grass cutting machine vehicle powered by solar energy and it is capable to operate without any human interaction. This system uses 12 volt batteries supply for the vehicle motors as well as grass cutter motor. We use a solar panel for charging purpose of the battery, but in case of cloudy season we can use charger to charge battery. The grass cutter motor and the vehicle motors are connected with 4 channel relay which is interfaced to arduino uno microcontroller that control all the movements of motors. First of all the hardware is made with the help of mild steel angle, the wheel is placed down side of the hardware.

The solar panel is placed on the above side of hardware in which solar energy is converted into electrical energy and stored in battery with the help of solar charge controller. Cutting blade is connected which cuts the grass is connected on the shaft of the motor and the shaft of other 4 dc motors wheels are connected for the movement of the vehicle.

Because of the continuous rising in the price of fuel and the effect of release of gasses from the burnt fuel from the machine into the surrounding, this required to use of the ample solar energy from the sun.

## II. LITERATURE REVIEW

For the manufacturing of a solar grass cutter we referred various papers, journals and literature etc. the review of previous works as follow;

The first grass cutter was design by Edwin Budding in 1830 in brimscombe, in Gloucestershire, England Bedding mower was works on primarily to cut the grass on grounds and large gardens, and was permitted a patent on 31<sup>st</sup> of august, 1830. Bedding's first machine was 19 inches wide with a frame made of iron. The grass cutter was force from back side.

In United States of America, gas powered grass cutter were first design in 1914 by “Ideal Power Mower Co. of Lansing, based on patent by Ransom E. Olds. Ideal power mover also design the world’s first able to move without external population (self-propelled), riding tractor in 1922, known as the “Triplex” Te roller grass cutter has changed very little from around 1930.

In this grass cutter we use solar based energy as main source, which is easy to use, it is more advantageous as compare to other energy as gas based source of power, petrol or diesel based energy source. But our grass cutter is based on solar energy which is renewable energy source and not producing any pollution

### III. METHODOLOGY

Movement of smart solar grass cutter by Arduino Uno (Microcontroller):-

We are used arduino uno as microcontroller for the movement of vehicle, as the user enters the area of garden or lawn eg. 20\*30 in meter by mobile application. Arduino recognise the data and send commands to relay so that the motor start rotating and cover the area entered by user. Whenever all area covered by smart solar grass cutter it will automatically get off. The software is Arduino IDE, and the language is “C”.

- **Working principle of Wheels:** There are 4 relay in our project for the movement of wheels as R1, R2, R3 and R4. For forward movement both R1 and R2 will get ON. For the left turn R2 and R4 will get ON. For the right turn R1 and R3 will get ON.
- **Working principle of Cutter:** As the user entered the data by mobile application cutter motor start rotating until the area get covered.
- **Working of Buzzer:** As the area get complete arduino send signal for buzzer. So we can know the work get finished by smart solar grass cutter.

#### 3.1 Block Diagram

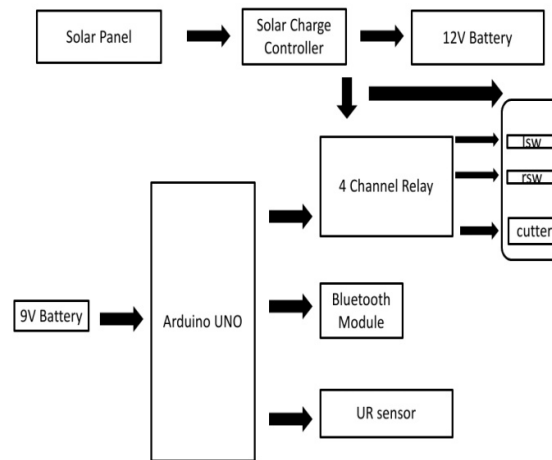


Figure 1: Block Diagram

#### 3.2 Components Used

##### A. DC Gear Motor

There are four DC gear motor are use in our project for the wheels of grass cutter. The speed of the motor is 30 rpm, load current is 0.5a, operating voltage is 12 volt and torque of the motor is 2.94 N.m.

##### B. DC High Speed Motor

One high speed DC motor use for the cutter. The speed of the motor is 14000rpm, full load current is 5a, operating voltage is 12 volt and the torque of the motor



**C. 4 Chanel Relay Module**

We use relay module for the movement of vehicle. All four relay is connected with the DC geared motor for the forward and reverse movement of wheels, and the four channel relay pins is interfaced with microcontroller. The connection of relay with motor and battery as show in fig.2

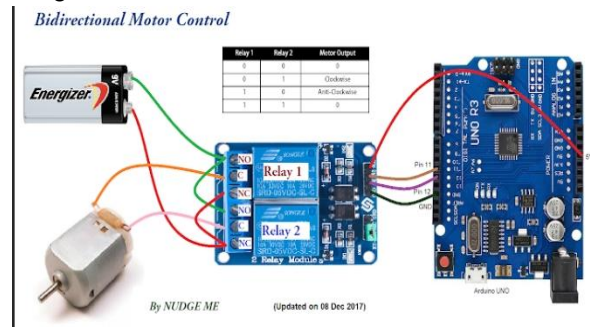


Figure 2

When relay 1 is on motor direction is clockwise and when Relay 2 is on then motor direction is anticlockwise.

**D. Bluetooth Module**

We use bluetooth module to communicate with arduino UNO for entering required data by user through mobile application.

**E. Arduino Uno**

Arduino uno use as microcontroller to comand relay module. It is powered by power bank (5v, 1a) and programmed using computer software Arduino IDE and language is C. Arduino contains a mini/micro or B USB port that can be used to connect to a PC via the regular USB port.

**F. Solar Panel and Battery**

We used 2 batteries of rating 12v 8ah which is charge by solar panel through solar charge controller. We have used 40W solar panel in our project the rating of panel is as; )

1. Maximum power voltage= 19.25 V
2. Maximum power current= 2.08 A
3. Short circuit current= 2.22 A
4. Open circuit voltage= 22.5 V

**G. Hardware**

Hardware made by MS angle, the weight of the hardware is about 8kg.

**IV. CONCLUSION**

Now a day, all machines are manufactured with the aim of decreasing or removing polluted gas production which is the major causes of climate change. This smart solar powered grass cutter having on cost for fueling as it is work on solar energy which is free of coast. This grass cutter having low weight so it can easy to carry from one place to another. This smart solar grass cutter can be a possible replacement for the diesel or petrol powered grass cutter. This grass cutter is fully automatic so there is no need of worker or person behind the grass cutter. Man is needed only for enter the data through mobile Application (Bluetooth terminal HC-05) after that there is no need of human. We tested successfully the working of the smart solar grass cutter it works very efficiently. The battery life is 4 hours. As there is solar charge controller the battery is charge continuously in working also. We use highly advanced ICs in this project this grass cutter is easy to use by any unskilled person.



Figure 3



Figure 4

#### V. FUTURE SCOPE

- The programming part of the project can be improved.
- The battery backup can be increased by using better batteries.
- The load carrying capacity can be increased by using high torque DC motor.
- Good quality of wheels can use for perfect working.
- Ultra Sonic sensor can be added for detection of any obstacle present in the path.
- And it can be more efficient in future.
- Because of the rising in fuel price and shortage of labor, this smart solar grass cutter (which is fully automated) will very helpful to us

#### VI. ACKNOWLEDGEMENT

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