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# Automatic Solar Grass Cutter

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**ABSTRACT:** These days we are facing the problems like pollutions, power cut problem etc. In order to overcome these problems, we have thought about the device, which can be performing its functions without causing any of these problems. So we have thought of doing the project on cutting grass, this uses the renewable source of energy for its operation like solar energy. This project aims at developing a portable solar operated grass cutting device, as there is power shortage. So we have decided to make a solar energy operated device. Solar panel is connected to the battery. Then by connecting inverter to battery DC current is converted to AC current. This will run the AC motor. This motor is connected to blade shaft by the help of belt drive. This will rotate the blade in high speed, cut the grass. This device will help in building of eco-friendly system.

**KEYWORDS:** Arduino UNO, Ultrasonic Sensor, L298N Motor Driver, DC Motor

## I. INTRODUCTION

The fully automated solar grass cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without the need of any human interaction. We 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 Arduino that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection.

## II. COMPONENT REQUIRED

### ➤ Arduino:-

The ArduinoUno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable.

### ➤ Motor Driver IC:-

The motor driver IC is an integrated circuit chip used as a motor controlling device in autonomous robots and embedded circuits. L293D and ULN2003 are the most commonly used motor Driver IC that is used in simple robots and RC cars. A motor driver is undoubtedly something that makes the motor move as per the given instructions or the inputs (high and low). It listens to the low voltage from the controller/processor and control an actual motor which needs high input voltage.

### ➤ Solar Panel:-

Photovoltaic modules use light energy from the Sun to generate electricity through the photovoltaic effect. Most modules use wafer-based crystalline silicon cells or thin-film cells. The structural (load carrying)

member of a module can be either the top layer or the back layer. Cells must be protected from mechanical damage and moisture. Most modules are rigid, but semi-flexible ones based on thin-film cells are also available. The cells are connected electrically in series, one to another to the desired voltage, and then in parallel to increase amperage.

➤ DC Motors:-

DC motor is a device that converts direct current (electrical energy) into mechanical energy. In the presented idea for grass cutter model we have used two different type of DC motor one is low torque and the other one is high torque. The low torque DC motor is interfaced with the rotating blade for cutting the grass and the high torque DC motor is interfaced with the wheels for moving the grass cutter.

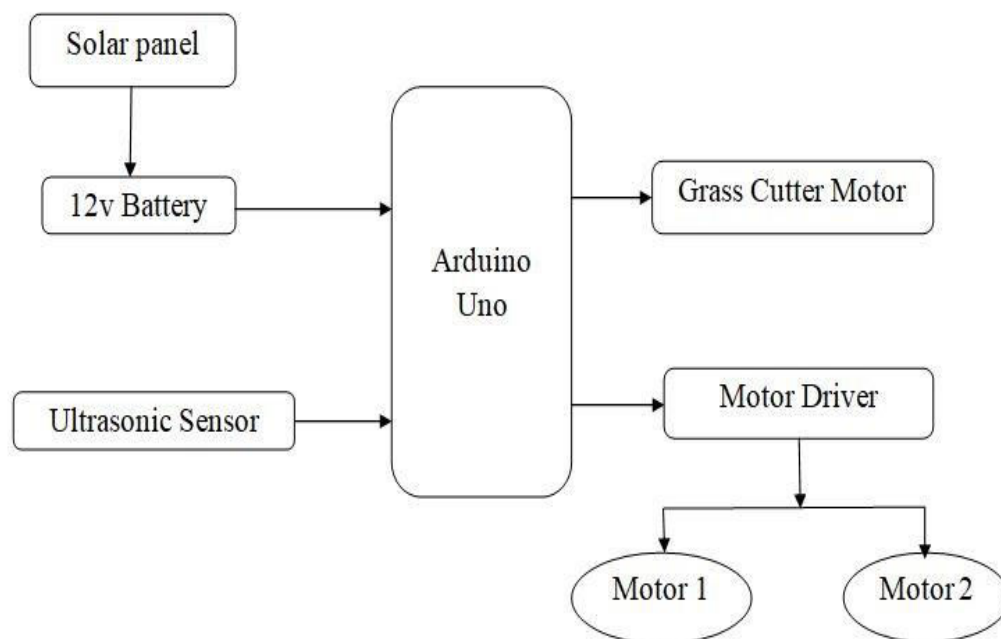
➤ Ultrasonic Sensor:-

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

➤ Batteries:-

The objectives of the proposed work is to the design and construct the automated grass cutting robotic vehicle powered by solar energy which avoids obstacles without the need of human interaction. The system uses 12V batteries to power the vehicle movement motors as well as the grass cutter motor.

### III. BLOCK DIAGRAM



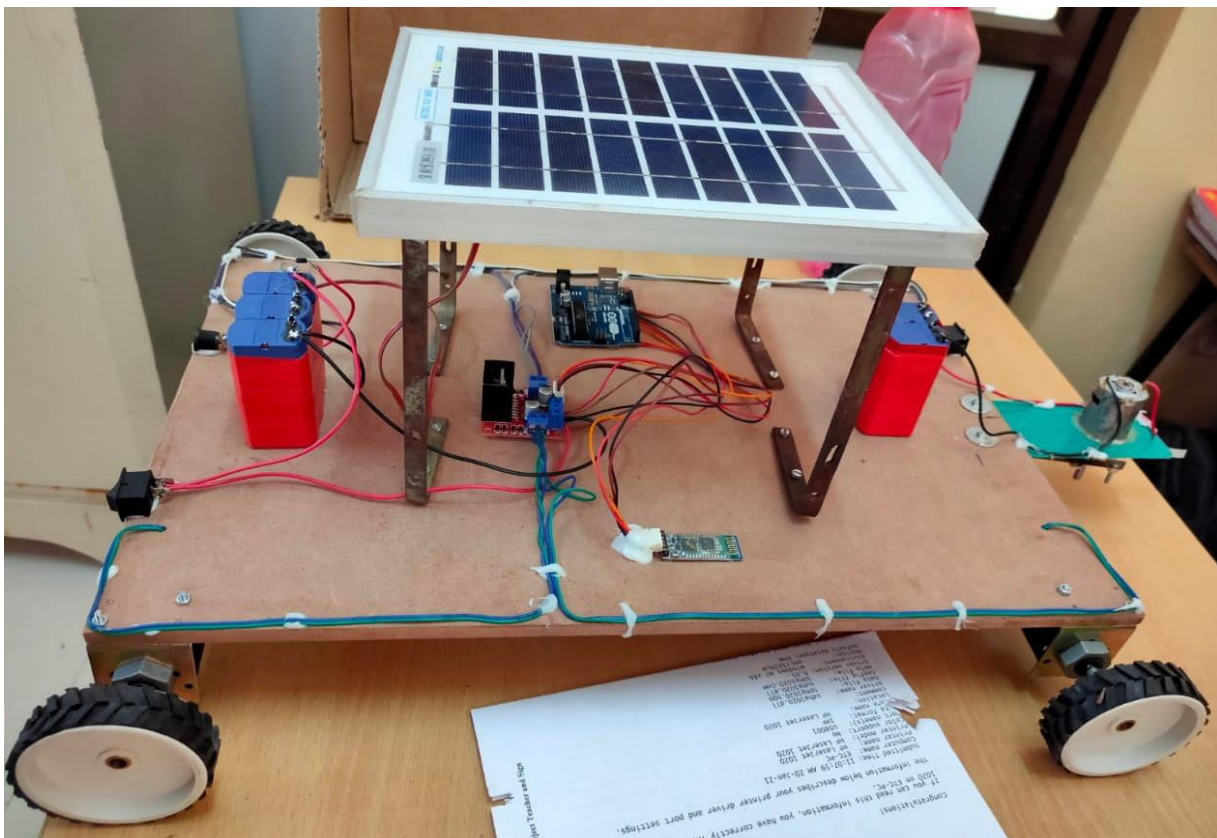
➤ Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangement at an angle of 45 degrees in such a way that it can receive solar radiation with high intensity easily from the sun.



- 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.
- 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.
- 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.
- 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.

#### IV. RESULT

A solar based automated grass cutter has been manufactured successfully and can be used for cutting the grass Thus the project has been successfully designed and tested. This lawn mower will meet the requirement of environmental production and low cost of operation as there is no cost for fueling. The grass cutter work automatically because of controlling mechanism. By the ultrasonic sensor the obstacle is also detected.



#### SOFTWARE REQUIREMENTS:-

- Arduino UNO
- Embedded C



**ADVANTAGES:-**

- Compact Design and easily Moveable
- No Fuel required
- Less maintenance
- Very economical
- Anyone can operate
- Eco-friendly

**APPLICATIONS:-**

- Farms
- Gardens
- Stadiums
- College grounds
- Lawns and many more

**FUTURE SCOPE:-**

- In future we connect blade with flexible spring so that if any obstacle comes below the blade, the spring can prevent the blade.
- In future we make it portable .so that it cut the crop.
- In future, it can cut the crop which is maximum dense.
- We can increase the size of machine so that it cut maximum grass at a time.
- We attached belt drive system on wheel so that we can cut the grass in rainy season also.
- The machine will drive at whole day at one time charging

**IV. CONCLUSION**

A workable smart solar grass cutter prototype is focusing on the renewable energy as the primary sources of energy has been successfully fabricated with high working efficiency. Therefore, it can be concluded that the developed design of the proposed Smart Solar Grass Cutter has achieved the main objectives and it can be further developed by industry. Smart Solar Grass Cutter is able to reduce the air pollution and also it is a user-friendly device. The grass cutter is suitable to be used for small application due to the shortest operating time, but it is not suitable for tall height grasses. For future work, there are few recommendations can be made to develop a better device.



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