

# Solar Grass Cutting Robot

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**Abstract - Now a day's grass cutter machines are becoming very popular today. Pollution is manmade, which we can be seen in our daily life. In old model of grass cutter IC engine was used and hence because of its environmental impact pollution level rises IC engine driven cutter is more costly. Maintenance of such conventional machine is more. To avoid these drawbacks we plan to built new type of grass cutter which runs on solar energy and this model is also economical.**

**The project aims at fabricating a grass cutting machine system which makes the grass cutter motor running through solar energy. The "Solar Powered Grass Cutting Machine" is a robotic vehicle powered by solar energy that also avoids obstacles and checks the moisture of soil. The system uses 12V battery to power the vehicle movement motors as well as the grass cutter motor. A solar panel is used to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for obstacle detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected and there is moisture less than 50%. On obstacle detection the ultrasonic sensor monitors it and the microcontroller thus stops the grass cutter motor to avoid any damage to the object/human/animal whatever it is and it also provides an alarm. Microcontroller then turns the vehicle as long as it gets clear of the object and then moves the grass cutter in forward direction again.**

## I. INTRODUCTION

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. The whole machine operates on the solar energy stored in battery. The Ultrasonic sensor and moisture sensor is used for the obstacle and moisture detection to avoid any damage of the human, object and animal. The sun has been the primary source of energy for human lifestyles since the beginning of time. Solar energy was immediately put to use for things like drying clothing, curing agricultural produce, and preserving meals ,among other things. Even today, we derive our strength from fuels such as wood, petroleum, paraffin, hydroelectricity, and even our food ,which is derived obliquely from the sun. Solar power is nearly limitless. The total amount of electricity we get from the sun far outweighs our needs .

Humans have relied on fuels, electricity ,and wind power since the industrial revolutions .Many countries are researching and testing solar and wind energy for human growth, so we created our new concept sun powered grass cutting machine, in which we cut grass at agricultural products or on small plants in lawns and gardens .The fully automated solar grass cutter is a fully automatic grass cutting robotic automobile powered by solar energy that avoids obstacles by using ultrasonic sensors and is capable of automatic grass cutting without the need for human intervention.

## II. LITERATURE SURVEY

Nowadays grass cutter machines are becoming very popular today. Pollution is manmade, which we can be seen in our daily life. The aim of our project is to make the grass cutter which operates on solar energy hence save the electricity and reduces manpower. Some of the papers from peer reviewed journal are studied. The conclusions and key points from those papers are described below.

From the paper "SOLAR BASED GRASS CUTTER" which was published in "2<sup>nd</sup> International Conference on Latest Trends in Engineering, Science and management, New Delhi, 2017." This paper describes the design and automatic lawn mower which operates on solar energy and avoids the drawback of old lawn mowers. 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. The whole machine operates on the solar energy stored in battery. The IR sensor is used for the obstacle detection to avoid any damage of the human, object and animal. Also we are using relay to control the motor connected to blades as a switch. The prototype is charged from sun by using solar panel.

From the paper "Solar Powered Fully Automated Grass Cutting Machine" which was published in "International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, April-2017" In this paper, the project aims at fabricating a grass cutting machine system which makes the grass cutter motor running through solar energy. The "Solar Powered Grass Cutting Machine" is a robotic vehicle powered by solar energy that also avoids obstacles and is capable of automated grass cutting. The system uses 12V



battery to power the vehicle movement motors as well as the grass cutter motor. The grass cutter and vehicle motors are interfaced to microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for obstacle detection. The microcontroller moves the vehicle motors in

Forward direction in case no obstacle is detected. On obstacle detection the ultrasonic sensor monitors it and the microcontroller thus stops the grass cutter motor to avoid any damage to the object/human/animal whatever it is and it also provides an alarm. Microcontroller then turns the vehicle as long as it gets clear of the object and then moves the grass cutter in forward direction again otherwise it changes the direction.

From the paper “A Fully Automated Lawn Cutter using Solar Panel” the objective of this paper is to design and automatic lawn mower which operates on solar energy and avoids the drawback of old lawn mowers. The main objective is to reduce human efforts by using fully automatic lawn cutter. The project is powered by solar energy hence the consumption of fossil fuel is reduced. The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. The combination of moisture sensor and pump motor is used in order to monitor the soil moisture. Vacuum will be used to collect the grass residue.

### III. BLOCK DIAGRAM

In this project we are fabricating a prototype of the solar powered grass cutter. The methodologies of these attachments are explained in few subheadings.

The Block Diagram of Solar power Grass Cutter is as shown:

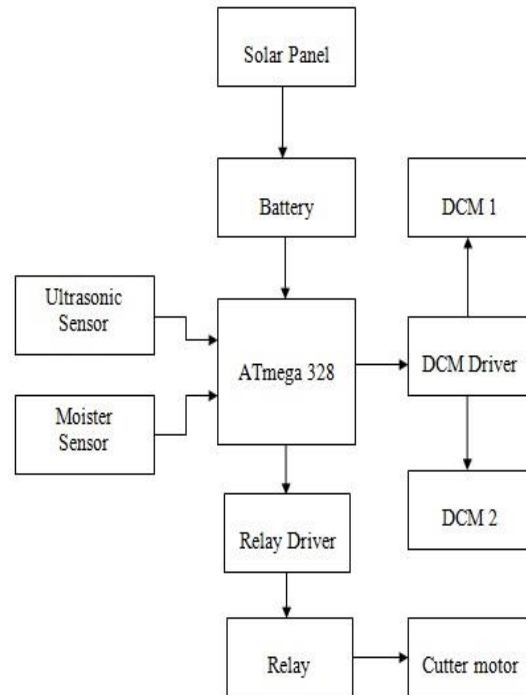


Figure No. 1 Block Diagram of project

### IV. WORKING

Coming to the working of solar powered grass cutter, 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. It has panels mounted in a particular arrangement 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. Now this electrical energy is stored in batteries by using a solar charger. The motor is connected to the Microcontroller through connecting wires. Between these a two motor and microcontroller 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.

The system uses 12V batteries to power the vehicle movement motors as well as the grass cutter motor. The Blade is kept at the Angle of 180 Deg for flexible operation. 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 ATmega328

microcontroller that controls the working of all the motors. The miccontroller moves the vehicle motors in forward direction in case no obstacle is detected. Ultrasonic sensor monitors the obstacle, if obstacle is within a range of 50cm the microcontroller thus stops vehicle and stop grass cutting. It Also detect the moister of soil, if moister is greater than 50% then microcontroller stop the operation of robot to avoid any damage to the object/human/animal. Microcontroller then turns the vehicle until it gets clear of the object and then moves the grass cutter in forward direction again.

1 SOLAR POWER

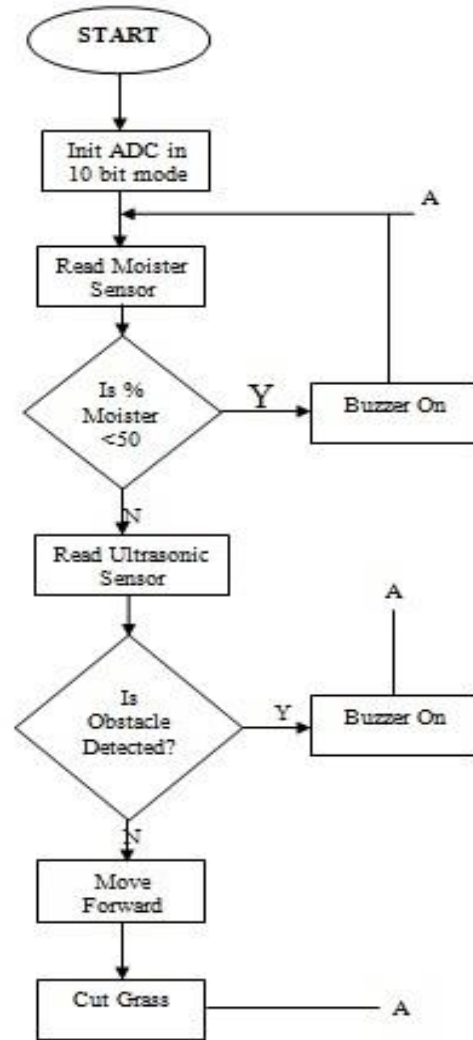
In this system our mower is powered by electric energy. The energy required to run our autonomous rover is obtained from the sun which is harnessed using photovoltaic cell. As we know solar power is not continuous in nature and not available throughout the day. The energy obtained from the sun is stored in the battery pack which is mounted on rover. The solar panel used here is to be placed in the direct sunlight for the greater efficiency. A power supply unit dissipates power to various unit as per the requirements.

2 SENSING SYSTEM

In this system input from various sensors is taken Robotic lawn mowers who have collision sensors detect the edge of perimeters using sensors or a boundary wire. The latter is placed around the edge of the lawn, as well as any obstacles, to instruct the lawn mower to remain within that area. So if they hit something, the robotic lawn mower would turn around and go in a different direction. Input from Humidity is also taken in case of too much moisture content inlawn mowing will be stopped, which will prevent damage to system.

3. Rover:

It's a simple 3 wheel platform. On this the cutter blade which is the working element of the lawn mower, motors, solar panel, sensors, power supply unit will be mounted.



V. FLOW CHART

VI. PROPOSED WORK

1. 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.
2. The system uses 12V batteries to power the vehicle movement motors as well as the grass cutter motor.
- 3.The Blade is kept at the Angle of 180 Deg for flexible operation.
4. We also use a solar panel to charge the battery so that there is no need of charging it externally.
5. The grass cutter and vehicle motors are interfaced to an ATmega 328 microcontroller that controls the working of all the motors.
6. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected. On obstacle detection, ultrasonic sensor monitors it and the



microcontroller thus stops within 3sec to avoid any damage to the object/human/animal.

7. Assembling is easy.

## VII. RESULT

The following results have made from this project:

The set of motors are used for the movement of the grass cutter. An ultrasonic sensor avoids obstacles and provides safety to the cutter. An moisture sensor observe the moister of soil to reduce the damage of robot. Solar panel takes the energy from sun and charge the battery which is connected to the grass cutter machine.

## VIII. CONCLUSION

In the world today, all machines are designed with the aim of reducing or eliminating green house gas emissions which is the major causes of climate change. This solar powered grass cutter will meet the challenge of environmental production and low cost of operation since there is no cost for fuelling. A solar powered lawn mower has been developed for the use of residences and establishments that have lawns where tractor driven mowers could not be used. The machine's capacity is adequate for its purpose. The machine has proved to be a possible replacement for the gasoline powered grass cutter. In the presented paper provides the fabricated information about the "Fabrication of Solar grass Cutting Machine" which was designed such that the solar plate generates solar energy and utilizing this energy for running the grass cutter motor. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

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