

Solar Grass Cutting Robot

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Abstract - Grass cutting machines are becoming increasingly popular these days. Pollution is a result of human activity, as evidenced by our daily lives. IC engines were employed in older models of lawn cutters, and as a result of their increased environmental effect, IC engine propelled cutters are more expensive. The cost of maintaining a traditional machine is higher. To overcome such drawbacks we want to build a new type of autonomous lawn cutter that works on solar energy and is also cost-effective to avoid these problems.

The project's goal is to build a grass-cutting machine system that uses solar energy to power the grass-cutting machine. The "Solar Powered Grass Cutting Machine" is a solar-powered robotic vehicle that avoids obstructions and monitors soil moisture. The vehicle movement motors and the lawn cutter motor are both powered by a 12V battery. The battery is charged by a solar panel, eliminating the need for external charging. The grass cutter and vehicle motors are connected to a microcontroller, which regulates the operation of all the motors. It's also connected to an ultrasonic sensor that detects obstacles. If no barrier is identified and the moisture level is less than 50%, the microcontroller drives the vehicle motors forward. The ultrasonic sensor detects an obstruction, and the microcontroller shuts down the grass cutter motor to prevent any damage to the object/human/animal, and it also sounds an alarm. The microcontroller then rotates the vehicle till it is clear of the item, after which it moves the grass cutter ahead again.

I. INTRODUCTION

The goal is to avoid India's energy problem while also lowering human labour, operational costs, and maintenance costs. The use of a solar-powered grass cutter also helps to maintain the environment clean and healthy. It's used to chop a variety of grasses for a variety of purposes. The entire gadget is powered by solar energy stored in a battery.

The ultrasonic sensor is used to detect obstacles protect humans, objects, and animals from harm and moisture in order to prevent internal parts of machine to get damage from excessive water. Since the dawn

of time, the sun has been the primary source of energy for human lifestyles. Solar energy was quickly put to use for a variety of purposes, including drying clothes, curing agricultural produce, and storing meals, and several others. Even to this day, we get our energy from fuels like wood, petroleum, paraffin, hydroelectricity, and even our food, which comes from the sun directly. Solar energy is almost unlimited. The overall amount of energy we receive from the sun considerably outranks our need. Since the technological age, humans have relied on fuels, electricity, and wind power. We developed our novel idea sun powered grass cutting machine, in which we cut grass at agricultural products or on small plants in lawns and gardens. Many countries are investigating and evaluating solar and wind energy for human growth, thus we created our new concept sun powered grass cutting machine. The completely automated solar lawn cutter is a solar-powered grass-cutting robotic mower that uses ultrasonic sensors to avoid obstacles and is capable of automatic grass cutting without the need for human interaction.

II. LITERATURE SURVEY

Grass cutting machines are becoming increasingly popular these days. Pollution is a result of human activity, as evidenced by our daily lives. The goal of our project is to develop a solar-powered grass cutter that saves electricity and reduces labour. Some student journal papers are investigated. The important points and findings from those papers are outlined below.

The work "SOLAR BASED GRASS CUTTER" was published in the "2nd International Conference on Latest Trends in Engineering, Science, and Management, New Delhi, 2017." This paper explains the design of a solar-powered automatic lawn mower that eliminates the disadvantages of traditional lawn mowers. The goal is to minimize India's energy crisis by decreasing overall labour, operational costs, and

maintenance costs. The use of a solar-powered grass cutter also helps to maintain the environment clean and healthy. It's used to chop a variety of grasses for a variety of purposes. The entire equipment is powered by solar energy stored in a battery. The ultrasound sensor is used to identify obstacles in order to protect humans, objects, and animals from harm. We're also utilising a relay as a switch to control the motor attached to the blades. The prototype is powered by the sun via a solar panel.

From the work "Solar Powered Fully Automated Grass Cutting Machine" which was published in "International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, April-2017" The goal of this article is to design a grass-cutting machine system that uses solar energy to power the grass-cutting machine. The scope of this study is to build a lawn cutting machine system that uses solar energy to power the grass cutter motor. The "Solar Powered Grass Cutting Machine" is a solar-powered robotic vehicle that can also avoid obstacles and cut grass automatically. The vehicle movement motors and the lawn cutter motor are both powered by a 12V battery. The grass mower and vehicle motors are controlled by a microcontroller, which regulates the operation of all the motors. It's also connected to an ultrasonic sensor that detects obstacles. In the event that no obstruction is identified, the microcontroller sends the vehicle motors forward. When an obstruction is detected, the ultrasonic sensor alerts the microcontroller, which then turns off the grass cutter motor to prevent any damage to the object/human/animal/whatever. The car is then turned by the microcontroller until it is clear of the item, at which point it is turned off. Otherwise, the lawn cutter will shift course.

From the paper "A Fully Automated Lawn Cutter using Solar Panel" The goal of this study is to create a solar-powered autonomous lawn mower that overcomes the drawbacks of traditional lawn mowers. The main goal of employing a completely autonomous lawn cutter is to reduce human labour. Because the project is powered by solar energy, the amount of fossil fuel used is minimised. Another goal is for the automatic lawn mower to distinguish between grass and concrete while continuously monitoring its surroundings. The soil moisture is monitored using a combination of moisture sensor and pump motor. The grass residue will be collected using a vacuum.

III. BLOCK DIAGRAM

In this project we are fabricating a prototype of the solar powered grass cutter. In a few subheadings, the techniques of these attachments are outlined.

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

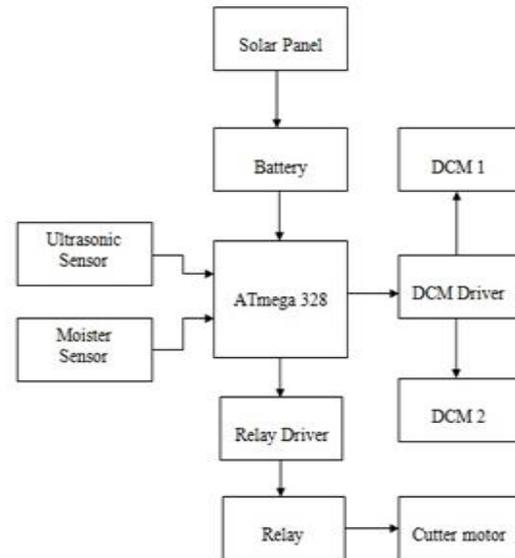


Figure No. 1 Block Diagram of project

IV. WORKING

When it comes to how a solar-powered grass cutter works, an automated solar grass cutter is a fully automated lawn cutting robotic vehicle that is fueled by solar energy and capable of fully automated grass cutting without any need for human contact. It features panels positioned in that certain orientation so that it would easily receive high-intensity solar energy from the sun. Solar panels turn the sun's energy into electricity. Using a solar charger, this electrical energy is now stored in batteries. Through connecting cables, the motor is connected to the Microcontroller. Two motor and microcontroller drivers are included in the package. It starts and stops the motor's operation. The power from this engine is transmitted to the mechanism, which causes the blade to rotate at a faster rate, mowing the grass.

The vehicle movement motors and the lawn cutter motor are both operated by 12V batteries. For flexibility, the Blade is retained at an angle of 180 degrees. We also charge the battery using a solar

panel, eliminating the need for external charging. The grass cutter and vehicle motors are connected to an ATmega328 microprocessor, which is in charge of controlling all of the motors. If no obstruction is identified, the microcontroller directs the vehicle motors onward. The ultrasonic sensor detects the barrier and, if it is within 50 cm of the vehicle, the microcontroller stops the vehicle and cuts the grass. It also detects the moisture content of the soil; if the moisture content is greater than 50%, the microcontroller will stop the robot's operation to prevent any damage to the machine, object, human, or animal. The microcontroller then spins the vehicle till it clears the obstacle, after which it moves the grass cutter forward once more.

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.

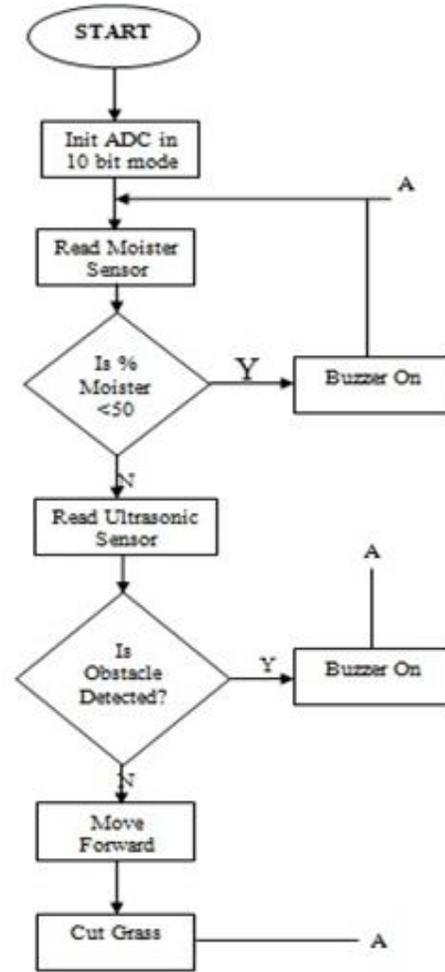
2. Sensing system

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 sensor is also taken in case of too much moisture content in lawn then mowing will be stopped, which will prevent damage to the 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. The automated solar lawn mower is a totally automated grass cutting robotic vehicle fueled by solar energy that can also avoid hurdles and do fully automated grass cutting without the need for human intervention.
2. The vehicle movement motors and the lawn mower motor are both powered by 12V batteries.
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. When an obstruction is detected, an ultrasonic

sensor detects it, and the microcontroller stops the operation within 3 seconds to prevent any damage to the object, person, or 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.

To protect robots from harm, a moisture sensor monitors soil moisture.

The solar panel receives energy from the sun and uses it to charge the battery that powers the lawn cutting machine.

VIII. CONCLUSION

All machines in the world today are created with the goal of lowering or eliminating greenhouse gas emissions, which are one of the major causes of climate change. As there is no need for fuel, this solar powered lawn cutter will meet the challenge of environmental manufacturing and cheap operating costs.

A solar-powered lawn mower has been created for use by homes and businesses with lawns that cannot be serviced by tractor-driven mowers. The capacity of the machine is sufficient for its intended use. The machine has shown to be a viable alternative to a gasoline-powered lawnmower. The provided article contains fabricated information on the "Fabrication of Solar Grass Cutting Machine," which was developed in such a way that the solar panel creates solar energy and uses this energy to power the grass cutter motor. It has been designed with features that integrate all of the hardware components used. Every component's presence has been carefully considered and arranged, ensuring the unit's optimal performance. Second, the project was successfully implemented by utilising extremely advanced integrated circuits and expanding technologies. As a result, the project's design and testing have been completed effectively.

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