



### AUTOMATED SOLAR GRASS CUTTER FOR LAWN MOWER USING GPS TECHNOLOGY

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Article History: Received: 01.02.2023Revised: 07.03.2023Accepted: 10.04.2023

#### Abstract

In conventional lawn mower gasoline into the atmosphere is stopped. A solar powered lawnmower can help clean the air which is diesel operated need lot of labour and takes a long time to cut the grass. Diesel operated lawn mower release greenhouse gases which affect the environment. Another factor to think about the cost of diesel. A solar-powered automatic lawn cutter is used to reduce the drawbacks of the traditional cutter. Because it is pollution-free, and renewable energy. Additionally in this project GPS tracking system is attached. Every 20sec we get the location of vehicle into mobile by using GSM module. Based on the basic moving idea, a solar powered lawn mower was developed. A DC motor is used for cutting and moving the vehicle, which is directly connected to the shaft of the DC motor and provides the necessary torque to the energy in the stainless-steel blade. A solar charging controller recharges the battery. Using different types of grass, the performance of the designed machine was evaluated. Solar energy is a premium alternative resource. The system uses PV panels to capture from solar radiation, which is then stowed in a 12V restore DC battery.

**Keywords:** Photo-Voltaic (PV),Direct Current(DC),Global Positioning System(GPS),Global System for Mobile Communication(GSM).

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#### DOI:10.31838/ecb/2023.12.s1-B.238

#### 1. INTRODUCTION

It's an important for the ever-increasing price of the petroleum and the impact of releases from burned fuel into the heaven. The sun provides plenty of solar energy, which powers the lawnmower. The wide cutting concept served as the foundation for the design and development of the solar powered lawnmower. A simple current (DC) motor-powered, rechargeable battery, solar board, stainless-steel blade, and control switch make up a solar-powered lawn mower. A DC motor is used for cutting, which is directly connected to the shaft of the DC motor and provides the required torque to drive the stainless- steel blade. An on-board switch activates a lawnmower, which runs on solar energy, by closing the circuit to allow electricity to flow to the motor, which drives the cutting blade. A solar charging controller recharges the battery. Using different types of grass, the performance of the designed machine was evaluated. The atmospheric system receives constant energy from the Sun, which is used for various functions on Earth. The only difference is the energy source used. A solar-powered lawn mower is believed to solve many problems that lawnmowers powered by electric motors and conventional internal combustion engines do not. The time spent making repeated trips to the gas station for recharging and the risk of gasoline spills are all reduced by using a solar powered lawn mower. Both the harmful emissions of the internal combustion engine and the leakage of

#### 2. MATERIAL AND METHODS

A major focus of application control development in irrigated fields is intelligent information devices. A large and impressive solar grass cutter with solar panel has been developed. Energy discourse is very important now and should be conducted as often as possible. But for a lawnmower to function properly, it must have motor, rotating blade, rotating path,

means of the removing grass and trimmings. A switch in this DC motor attached to the mower blades acts as the control component of the computer. The two components that make up the overall model are the control part and the design part of the model. Relay switches, a solar panel and a rechargeable battery are all found in the control area. A computer relay switch can control the motor dependent on the charging circuit. Lunar energy is deposited in a battery and cast-off to operate a relay switch that drives a motor. An orientation motor, battery-operated, alternator. three folding blades and coupling device make up a Solar Grass Robot. An alternator that is part of the power and charging system continuously charges the battery. D.C. The folding blade is driven by the motor, which acts as the brain of the device.

#### SOLAR PANEL

A structurally-mounted array of photovoltaic cells forms a solar plate. Solar plates use daylight as their energy source to produce straight current power. In our project we have used 20W, 12V solar panels to charge the battery. A photovoltaic module is a solar cell assembly that is packaged and connected together. In photovoltaic modules, the photovoltaic effect is used to generate electricity from the sun's light energy as shown in figure 1.



figure-1 solar panel

#### BATTERY

A battery is an electrochemical device that may be used with an electric current to charge and discharge it as needed Batteries are often used to power small electric devices like flashlights, remote controls, and cell phones. The combination of two or more electrochemical cells was previously referred to as a "battery." The battery picture is shown in Figure 2.



figure-2 battery

#### MOTOR

An electrical device called a motor, as shown in figure 3 sometimes called a direct current device, creates a direct current magnetic field to convert electrical power into mechanical power. Motors are selected using the calculations below. There are many different applications for direct current, including battery charging, electronics, massive power sources for motors and other devices, and more.

#### BLADE



figure 3 motor

To cut grass, one uses blades. Because they can sustain high-speed contact with many materials in addition to grass, they are usually made of durable metals. Due to its S shape which increases the surface area of grass and blade contact, grass is cut successfully as shown in the figure 4.



figure 4 blade

#### **ARDUINO BOARD**

An Arduino board consists of several controllers and microprocessors. The ATmega328P microprocessor is used in Arduino Uno microcontroller board. The board has 6 similarity inputs, USB linking, power knave, ICSP heading, 16 MHz stoneware resonant circuit, 14 digital effort/output pins, and a reset button. Arduino board is shown in figure 5.



# figure 5 Arduino board ULTRASONIC SENSOR

The Ultrasonic sensors as shown in figure

6 are often used in automated operations such as distance measurement, position changes, and position measurement, for example, when assessing the purity of a tangible object. They are created on the technique of measurement the spread time of supersonic waves. It is concept guarantees accurate exposure regardless how the object or object is shaped or how its surface looks. The identification of liquids and other bulk materials is also reliable. Crystal clear materials, such as glass



figure 6 ultrasonic sensor

#### 3. METHODOLOGY

An induction motor, a battery, an alternator, three foldable blades and a coupling mechanism make up the Solar Grass Robot. The alternator that charges the battery while running is part of the power and charging system. The folding blades are driven by a DC motor, which acts as the brain of the machine.

This is accomplished by coupling the mechanical action of the cutting blades with the forward motion of the mower. An electrical switch that completes the circuit between the battery and the induction motor operates the system. The path is determined by an ultrasonic sensor to prevent rotation, mechanical damage and obstacles.



#### figure 7

#### 4. WORKING PRINCIPLE

This comes of the operation to the solar powered grass cutter, the positioned a panel at an angle of 45 degrees so they immediately absorb the sun's intense lunar energy. Lunar energy is converted into current by solar plates. Its electrical energy is stored in batteries. Batteries are used to connect a motor to electrical energy stored there. We used three motors in total. The machine is driven by two motors. Grass cutting is done with one motor to which blades are attached. The power from these motors is transmitted to the blade of motor is rotates at high speed and cutting the grass. The motor driver connects the two motors that are attached to the wheels. Its movements are well coordinated due to the assistance of the motor driver. The motors are connected to an Arduino Uno, which regulates their direction of movement. The relay, which is interfaced with Arduino Uno, is attached to the two grass cutting motors that are connected in series.

Our machine running time is = over all battery backup/power required to run the motor for an hour

= 18 wh / 3.24 w Our machine running hours for fully charged = 5.50 hours

Approximately we can use this machine 4 hours because the electronic circuits get power source from the battery.

#### **Solar Panel selection**

We need to charge a battery from solar panel Battery required power to charging = 18wh

Solar hours in India = 6 hours (10.00am to 4.00 pm) Required panel = total watts required to charge the battery / solar hours

- = 18 wh/ 6 hr
- = 3 WATTS

SO 12v 3 watts panel is enough for charge the battery in 6 hours. But we utilizing 24 watts panel

Our panel power production in solar hours

= 24watts\* 6 hours

#### = 144 wh

Approximately this panel charge battery in one hour.

#### RESULT

All of the hardware components used have thoughtfully integrated features that have been thoroughly thought out and organized to help the unit function as much as possible. Secondly, the project has been successfully implemented with the help of developing technology using state-of-theart ICs. As a result, the design and testing of the project was successful. With no refuelling fees, of the lawn mower will successfully see the challenges of ecofriendly manufacture and low operating costs.

The lawnmower is designed for use on lawns in homes and businesses where tractor-driven mowers cannot be used. The outcome of the product is shown in figure 8.



figure 8

## CALCULATION FOR SOLAR GRASS CUTTER

Used motor specification Motor voltage = 12v Motor amps = 0.3amps

Power = VI

= 12\*0.3

= 3.6 watts

#### CONCLUSION

Number of motors = 3 no's Total powerrequired = 3\*3.6

= 10.8 watts

### Total power required to run the motor is = 10.8watts

**Battery capacity** Battery voltage = 4v Ah is = 1.5 Ah

Battery is connected in series so we can produce 12v power supply for run the motors

Battery backup = 12v\*1.5Ah = 18 wh

Power required to run the vehicle or an hour = 3.24 watts

It is scheme very right for common people as it has many advantages like no fuel cost and no pollution. In particular, no skill is required to operate a grass cutter. This machine frequently shares its location to the owner of the vehicle the Mobile SMS by using GSM application. This machine was very useful to maintaining the garden. We can operate the machine by mobile gestures.

Acknowledgement, we would like to

express gratitude to **AICTE – IDEA** lab and **MODROBS** funding for the treasured support which was really influential in shaping my experiment methods and critiquing my results.

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