

Portable Solar-Battery Operated Grass Cutter

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ABSTRACT

One reason for the gradual increase in pollution is increased fuel consumption. The solution is to use solar energy as an energy source to power battery powered lawn mowers. Our Portable Solar-Battery Operated Grass Cutter is actually a robotic body which contains a rechargeable battery, Direct Current (D.C) motors, Solar Panel, blade, an on-off switch and a button for area selection. Rechargeable battery is connected to Solar panel and supply is given to the ATMEGA 328 P microcontrollers which controls the further functions. Portable Solar-Battery Operated Grass Cutter Contains 5 DC motors. Where 4 DC motors are connected to four wheels of the robotic body and one DC motor is connected to the cutting blade to cut the grass. One ultrasonic sensor is used in our project which senses the grass and cut it. Button for Area Selection is provided to give the specifications of area to cut the grass and when the area is covered then the Portable Solar-Battery Operated Grass Cutter will stop.

Keywords- Solar Panel, Grass Cutter, Lawn Mower

I. INTRODUCTION

There are many air pollution issues today, and the majority of machines use diesel or gasoline. Carbon dioxide will be released into the environment with ease. Systems that cover the same activity and are nevertheless powered by natural resources must be developed in order to lessen these kinds of problems. The proposed system is referred to as a Portable Solar-Battery Operated GrassCutter and it is built to work on the solar and battery operation premise. The design and development of smart solar-operated lawn mowers are based on the fundamental idea behind robotic lawn mowers.

The sun offers a steady supply of energy for the earth's atmosphere system, among other uses. The only distinction is how the electrical source is used. It is expected that a lawn cutter operated by solar energy will give a variety of specific content that natural

internal combustion engines and lawn cutters with electric motors do not.

It will be simpler to operate a lawnmower powered by solar energy, and it will reduce downtime caused by repeated trips to the gas station for refills and the risk of fuel spills. There are no longer any harmful emissions into the atmosphere from internal combustion engines or gasoline spills. Air pollution will be decreased thanks to the Portable Solar-Battery Operated Grass Cutter. Thus, Portable Solar-Battery Operated Grass Cutter is used.

A. Objectives:

Main Objective of our Project is,

1. The portable solar-battery operated grass cutter is convenient, reliable, easy to use and easy to maintain.
2. It is a cordless grass cutter.
3. The conversion of sun's energy to mechanical energy through the use of solar panels to power a grass cutter that also relies on an electrical supply.
4. To use the smart solar grass cutter in limited area.

B. Basic Idea:

The main area of development for irrigation field appliance control is intelligent information appliances. In addition to solar panels, we created a large and remarkable line of solar grass cutters. Natural energy should always be used to the utmost degree because it is so important in the current circumstances. Even so, in order for these lawn-cutting machines to function properly, they all require a motor, a moving blade, a way to move about, and a mechanism to dispose of the grass clippings.

The switch is used to control the DC motor which is connected to the grass-cutting blades. The regulating section and the designing section are the two parts that make up the entire model. The control component is made up of a solar panel, a lead acid battery, relays, and switches. To control the motor in the system using the charging circuit, relay switches might be employed. A

battery is used to store the solar panel's energy before being used by a relay switch to power the motor.

II. LITERATURE REVIEW

Sagar V. Palve et al. [2] have used solar panel for solar powered automated lawn knife machine. Hence no need of charging a battery externally. Battery is continuously charged at constant voltage when lawn knife is in working. P. Amruteshet et al. [3] developed solar lawn knife with direct blades by using Scotch yoke mechanism. Then motor transmits the power to medium makes the blade to slide on the fixed blade and this makes to cut the lawn. A completely automated field knife using solar panel is developed by Ramya P. Et al. [4]. Then the solar panel is used to charge the battery and also they've kept an angle of 90 degree for flexible operation. Design and fabrication of solar grounded lawn knife with malleable bus done by Akene A. Et al. [6]. They've designed an Alternator for reaching the DC battery. Blades are driven by multiple pulleys connected to motor. Completely Automated Solar Lawn knife is designed by Tushar Baingane et al. [1]. They've operated the Grass Cutter by using Solar Energy. Solar provided Lawn knife is explained by Akshay Hariya et al. [5]. In this lawn knife, they used a machine that uses revolving blades to cut a crop. U. L. et al. [7] have enforced Solar grounded smart Lawn knife, operated lawn knife by using an android smart phone through Bluetooth from safe distance which is able of cutting lawn within range of 100m. Fabrication of Solar Grass Cutter is made by Pankaj Malviya et al. [8]. They've designed fabrication of solar lawn knife in which solar plate generates solar energy and exercising this energy for running the lawn knife motor. Environmental Friendly Solar Lawn knife is enforced by Tanmay Bhalodial [9]. They've used an ultrasonic detector to descry if field knife was heading into an object. The blades of field knife shouldn't operate in the air by stoner. Also used a detector to descry exposure and accelerometer so it'll not operate when stoner hold it. Completely Automated Lawn knife using solar power have developed by Shubham R. Khilare et al. [10]. It's mentioned that the design is controlled by victimization Bluetooth cooperation, Arduino IDE employed to transfer law to Arduino Uno. Mechanical section deals with constructing the case and installing wheel, blade and caster bus of lawn knife. Design of solar powered lawn trimmer is developed by M. Pita, P.B. Sob et al. [11], mentioned that the trimmer works up to 10m down

from charging station and the machine can be used to cut different types of Grass. Design and Development of Smart Solar Grass Cutter have carried out by Firas B. Ismail et al. [12]. They used mono crystalline panels instead of polycrystalline solar panels due to their higher efficiency.

Blade and necklace motors at high speed. The extended capacity of the battery may result in longer operating times.

III. PROPOSED SYSTEM

Fig.1 shows block diagram of Portable Solar-Battery Operated Grass Cutter. It consists of Controller AVR ATMEL ATMEGA-328P, Motor Driver L298N, 5V Relay Driver, Wheel Motor, Cutter Motor, Ultrasonic Sensor, Button to area Selection, Power supply.

ATMEGA328P an 8-bit AVR microcontroller with outstanding performance and low power consumption, uses a revolutionary RISC design that enables it to execute 131 powerful instructions in a single clock cycle. It commonly serves as the CPU in AVR boards. The blade is turned by the motor, which then cuts the grass. This motor rotates at a speed of 500RPM. The motor rotates the wheel, which causes the body to move after that, the 100 RPM motor is the one utilized to turn the wheels.

The panels on the solar-powered lawnmower are arranged precisely at a right angle, allowing it to capture the sun's intense solar radiation with ease. These solar panels transform energy from the sun into electricity. This electricity charges the battery and it provides supply to the cutting motor which will cut the grass and two buttons are provided for area selection which will give the direction to cut the grass. In our project we provided straight line and L-shape direction.

IV. SYSTEM DEVELOPMENT

A. Simulation of Proposed System

The Simulation work is carried out using the Proteus 8.1 software as shown in Fig. 2 & 3. The programming work is executed in Proteus software then actual hardware system is executed to get result outputs.

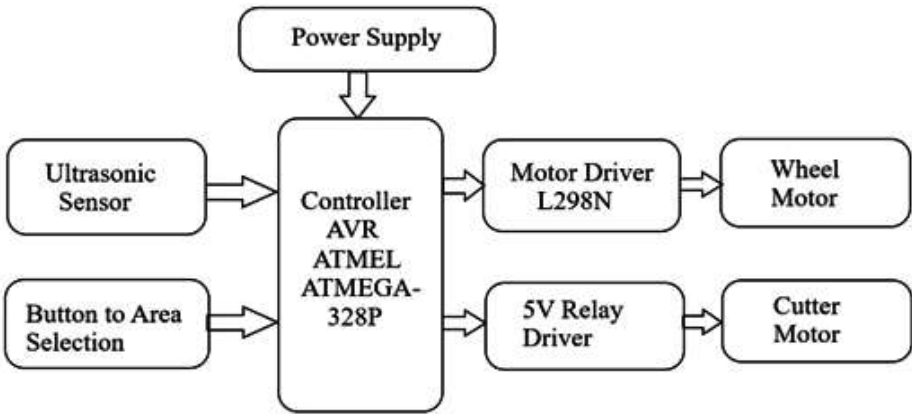


Figure 1: Block Diagram of Portable Solar-Battery Operated Grass Cutter

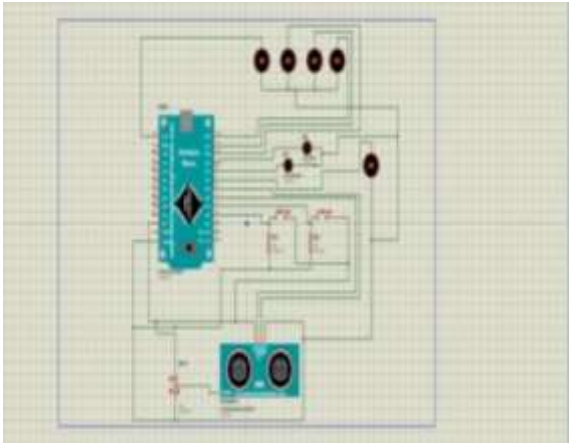


Figure 2: simulation Design of proposed system

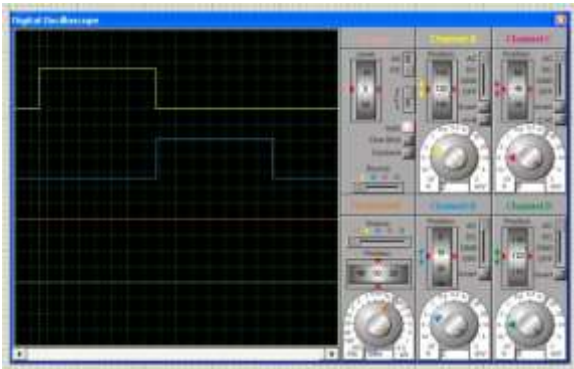


Figure 3: Output of Simulated System (Triggered output)

The Fig.3 shows output parameters of controlling voltage. A channel of oscilloscope is connected to trigger pin of Ultrasonic Sensor and channel B is connected to Echo pin of Ultrasonic Sensor. Trigger pin is working as transmitter and Echo pin is working as receiver. Channel A and B shows the amplitude of voltage up to when there is no any obstacle in front of Ultrasonic Sensor. But when there is an obstacle is in front of sensor then trigger and echo is not available as the signal gets cut and our cutter will start rotating as there will be grass.

For Hardware implementation the components required with specifications as tabulated in table 1.

Table 1: Components Requirement for Hardware System

Components	Specifications
Solar Panel	10 watt, 18 volt 580 mA
Battery	12 volt
DC Motor for cutter	500 rpm
DC Motor for wheels	100 rpm
ATMEGA 328P	5 volt
Motor Driver L298N	5 volt
Relay Driver	5 volt
Blade	
Steel Pipe	
Fibre Sheet	
Switch	
Wire	
Normal Wheel	
Circuit	
Transistor	
Button	

Fig. 4 shows the implemented hardware system.



Figure 4: Implemented Hardware system

V. CONCLUSION

Thus, we implemented and validated simulation results for controlling of motor speed using voltage control in Proteus Simulation Software. This project will find it simpler operation as grass cutter using solar panel. This project is smart solution for cutting grass as lawn mower with the battery powered and solar powered. The cost estimation is also remarkable that can be easily accessible to common people. As per the requirements we can change the battery capacity or we can connect another battery in parallel with the connected battery for better speed of cutting blade. Also we can here add another instructions for area of selection.

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