



SOLAR GRASS CUTTER WITH BATTERY

Mr. Pranavraj sachin Shelar¹, Mr. Suyash Santosh Karande², Mr. Aditya Jalindar Mankar³

Mr. Rutvik Mohan Katkar⁴, Ms. Swapnali Sampat Ghokale⁵

Students, Electrical Engineering Department, AITRC, VITA.¹⁻⁴

Project Guide, Electrical Engineering Department, AITRC, VITA.⁵

Abstract: The Solar Grass Cutter is a mechanical device used for cutting grass with the help of solar energy instead of electricity. First of all its body is made with the help of hollow square bar, then caster wheel is placed below the body of square bar. Then incline fiber plate is kept on a body, then on incline fiber plate solar panel is kept. Which transmit solar energy & then solar energy is converted into electrical energy & electrical energy is converted in to mechanical energy. This electrical energy is transmitted to electric motor. On the shaft of the electric motor a blade is connected having cutting edge which cut's the grass.

Keywords: Lawn mover, Grass Cutter, Solar Panel, Battery.

I. INTRODUCTION

Due to the continuous increase in the cost of fuel and the effect of emission of gases from the burnt fuel into the atmosphere, this necessitated the use of the abundant solar energy from the sun as a source of power to drive a lawn mower. A solar powered lawn mower was designed and developed, based on the general principle of moving. The designed solar powered lawnmower comprises of direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. Mowing is achieved by the D.C motor which provides the required torque needed to drive the stainless steel blade which is directly coupled to the shaft of the D.C motor. The solar powered lawnmower is operated by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for moving. The battery recharges through the solar charging controller. Performance evaluation of the developed machine was carried out with different types of grasses. The sun provides sustainable amount of the energy used for various purposes on earth for atmospheric system. The difference is just the application of the energy source. It is assumed that a lawnmower using solar as the energy source will address a number of issues that the standard internal combustion engine and electric motors lawn mowers do not. A lawnmower with solar energy will be easier to use, it eliminates down time by frequent trips to the gas station for fill-ups and danger associated with gasoline spillage. The dangerous emissions generated by the gasoline spillage and that of the internal combustion engine into the atmosphere are eliminated. The solar powered lawnmower will help to reduce air pollution. Thus solar grass cutter is used.

II. METHODOLOGY

As electric vehicles are going to replace the existing IC engine vehicles, existing IC engine vehicles cannot be completely demolished. We can make use of these scrap vehicles by converting conventional gasoline powered vehicle into electric vehicles. A lot of vehicle scrap is collected every year which is creating pollution, so basically this is the problem identified in problem identification stage. Then in literature review stage, the patents, journals, online references were collected, studied in detail and the literature review was summarized. Based on the problem identification and literature review, the conversion of gasoline powered vehicles to electric vehicles was designed. Then the calculations were made to select the required components. After the fabrication work of our vehicle with proposed design, the performance, efficiency, speed of the vehicle and also the load carrying capacity of the vehicle will be tested.

III. COMPONENTS USED

1. Solar panel.
2. DC Gear motor.
3. Lithium-ion battery.
4. Arduino uno.
5. Grass cutter motor.



3.1 Solar Panel:-

Solar technologies convert sunlight into electrical energy either through photovoltaic (PV) panels or through mirrors that concentrate solar radiation. This energy can be used to generate electricity or be stored in batteries or thermal storage..



3.2DC Gear Motor:-

A DC geared motor is to move or rotate the final required shaft at a required RPM slower than the motor. With this reduced RPM, the DC motor will become a high-torque geared DC motor, which can apply higher torque to the shaft or to the object being rotated.



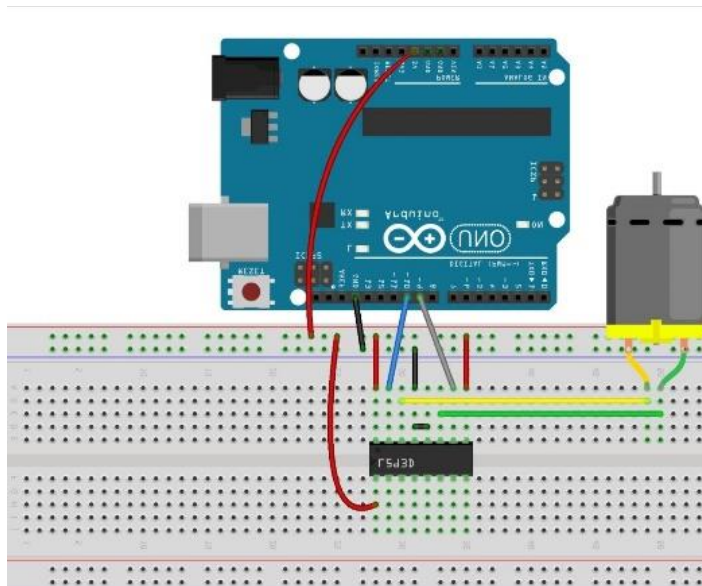
3.3 Lithium-Ion Battery



The battery is the source of power supply to the motor. Selection of battery pack is an important part of an solar grass cutter. I have done several calculations then I selected 48 V & 15 Ah NMC battery pack. The lithium-ion battery has less weight compared to the lead acid battery and has high energy density and low self-discharge rate. Thus, the efficient battery that is required for driving the motor is to be used. Major consideration is weight of the battery and its power output for the rated speed.



3.4 Arduino uno.



Control the speed and rotational direction of DC motor using Arduino Uno. Here, a potentiometer is used as a means for speed control and an input from a tactile switch is used to change the direction of the motor. L293D motor driver IC is used for controlling the direction of the motor.

3.5 Grass Cutter Motor.



Normally grass cutter machines are axial type. We will cut grass with radial method. We will use HSS – High speed steel or CS-carbon steel for cutting grass. We are using high torque PM -permanent magnet type motor for driving blades.

IV. WORKING

It has panel mounted on top of model in a particular arrangement such that angle of inclination is 45 degree hence it can receive intensity solar radiation easily. Solar panel convert solar energy into electrical energy. this electrical energy is stored in the battery, The battery is directly connected to the motor through switch and regulator. The switch is because whenever we want the supply then the battery is ON and whenever there is no need then the battery will be turned OFF through the switch. The regulator is connected to the motor to give the particular range of voltage. Motor drive is connected to the motor to protect the motor from exceed voltage. The cutting blades tap the power from DC motor which is turned actuates the blades and hence rotating blades cut the grass.

**V. RESULTS AND DISCUSSION**

In a framework of metal rolls, the complete structure is supported. The solar panel is attached to the structure and charges if the system does not run, transferring charges to the battery through the circuit. During the day and night, the solar grass cutter uses both.

VI. CONCLUSIONS

Our project entitled solar based grass cutter is successfully completed. It will be easier for the people who are going to use for further modification but this grass cutter occupy less place and light in weight and as it uses nonconventional source of energy hence running cost is zero. It has facility of charging battery while grass cutter is in the working condition. The cost of solar based grass cutter is less than the market grass cutter. Grass cutter is used to keep the lawn clean and uniform in schools, gardens and playgrounds.

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