

SOLAR POWERED WEED CUTTING ROBOT

Er.Manmehak¹, Er.Sabina Chawla²

¹Lecturer,EE DEPTT BFCET,BATHINDA

²AP,EE DEPTT BFCET,BATHINDA

Abstract : The project aims at designing of weed cutting robot which tends the unwanted plant cutter motor running through solar energy mechanism. The “Solar Powered Weed Cutting Machine” is a robotic vehicle powered by solar energy that acts as a barrier and is capable of automated weed cutting. This system includes 12V battery to power the vehicle movement motors as well as the grass cutter motor and is advantageous as it reduces the manpower and usage of electricity. Solar plate is used to provide the source to the battery charging. The source is drive from the solar energy by using solar plate. Wheels and cutting operations are done using dc motors. DC battery is utilized for powering and standby mode operation of the system and the whole supply is provided through the battery and to charge the battery charger circuit is used to provide the charging for the battery.

This archetype is robotic, user friendly, cost efficient, safe to use, efficient to use, and environmentally friendly. It can save significantly on labour costs.

1.1 BLOCK DIAGRAM

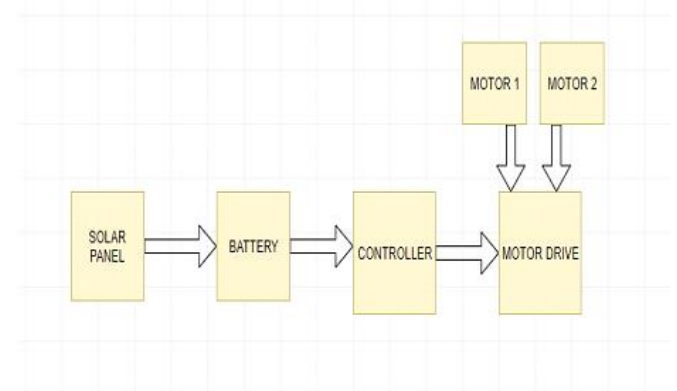


Fig:1 Block Diagram of solar powered weed cutting robot

1. INTRODUCTION

Weed cutter machines now days have become very user friendly. The main components of the Grass cutting machines are DC motor, relay switch for controlling motor, Battery for charging it through solar panel. It is placed in a suitable machine structure. The DC motors are connected to the electric supply by the use of a roll of wire. The linear blades are attached in this machine. Working principle of this robot cutter is providing a high speed rotation to the blade, which helps to cut the grass. The blade will get kinetic energy while increasing the rpm. The cutting edges are very smooth and accurate. Also electric grass cutting machines are much easier to be used in garden, lawn and grass fields. In order to enhance the beauty of home-lawns and gardens, Grass cutting machines are the best available option in the industry. With the help of a lawn mower which is a machine with revolving blades to help us cutting lawns at even length, people can easily maintain and beautify their lawns and gardens without any inconvenience. To avoid extinction of natural resources it is better to use alternative sources to avoid energy crisis in the nearby future which as a consequence leads to introduction of solar energy for the machine process to work. A solar panel is a large flat rectangle. The cells, each of which is about the size of an adult's palm, are usually octagonal and colour bluish black. Just like the cells in a battery, the cells in a solar panel are designed to generate electricity; but where a battery cells make electricity from chemicals, a solar panel cells generate power by capturing sunlight instead. Solar grass cutters have no moving parts and hence require little maintenance and work quite satisfactorily without any focusing device. It does not cause any environmental pollution like the fossil fuels and nuclear power. Solar cells last a longer time and have low running cost.

1.2 CONSTRUCTION

1.2.1 SOLAR PANEL

It is a photovoltaic (PV) module is a packaged; connect assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 Watts (W). The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 W module will have twice the area of a 16% efficient 230 W module. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for storage, interconnection wires and optionally a solar tracking mechanism.



Fig 2: Solar Panel

1.2.2 DC Battery

Solar power can be stored in the rechargeable battery and can be further used for the grass cutting machine to run. A rechargeable battery, storage battery, or accumulator is a type of electrical battery. It consists of one or more electrochemical cells, and is a type of energy accumulator. It is famous as a secondary cell because its electrochemical reactions are electrically reversible. Rechargeable batteries come in various shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. The batteries are used as a storage device for solar energy which can be further changed into electrical energy. Batteries seem to be the only technically and economically available storage resources. Since both the photo-voltaic system and batteries are high in capital costs, it is obligatory that the overall system be optimized with respect to available energy and local demand pattern.

1.2.3 CONTROLLER

A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition and therefore so is its current. The current in the rotor is switched by the commutator to also be stationary in space. This is how the relative angle between the stator and rotor magnetic.

The motor used for the controlling the cutter, the permanent dc motor with 12 v is used having the speed 2000rpm. this single phase motor work on the Fleming hand rule and generate electric current and this electric current converted to mechanical work like to rotate the blade and cut the brush.

1.2.4 CUTTER BLADE

Steel cutter blade with high stiffness is used for cutting purposes the rotation of blade cut the grass.

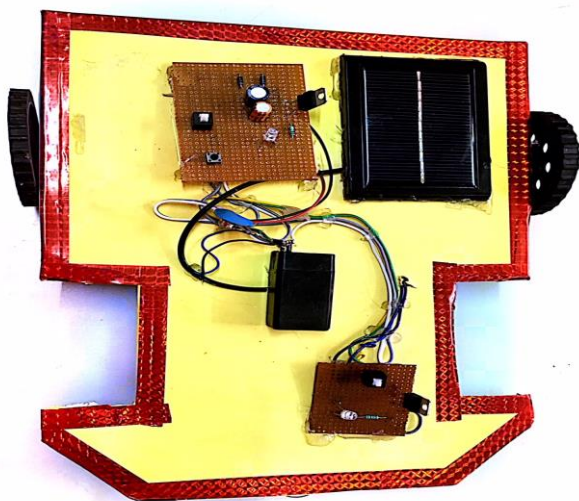


Fig 3: Solar powered weed cutting robot

2. WORKING

The solar grass cutter consist of following components

- 1) Solar panel
- 2) Dc battery
- 3) Dc motor
- 4) Switch button
- 5) Cutter

The operation of solar operated brush cutter is such that, it has panels mounted with some inclination in such a way that it can receive solar radiation with highly from the sun. These solar panels used to convert solar energy into electrical energy by the photovoltaic principle. These charges are used to store in the battery which is used for the energy storage purpose.

The working of solar powered grass cutter is based on Law of Conservation of Energy. It has panels mounted in a particular arrangement at an angle of 45 degrees 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 main function of the solar charger is to increase the current from the panels while batteries are charging, it also disconnects the solar panels from the batteries when they are fully charged and also connects to the panels when the charging in batteries is low. The motor is connected to the batteries through connecting wires. Between these two a mechanical circuit breaker switch is provided. It starts and stops the working of the motor. From this motor, the power transmits to the makes to cut the grass. The method consists of the following parts as solar panel, Dc motor, linear blades, Wheel. The rotary blade is used in this paper to cut the grasses. The height of the grass can be adjusted by adjusting the ground clearance as per the requirement.

3. FUTURE SCOPE

Humans have the tendency always trying to develop more modified techniques with increasing the aesthetical look and economic concern. Therefore, there is an increasing scope towards improvement and advancement in whatever we have created. The robot weed cutter has various applications and future advancements can be done. Some of the future perspectives to reform this robot are mentioned below:

- 1) The weight of the robot can be reduced by using light weight material for the stand the cutter assembly and the product can be modified
- 2) High quality blade cutter with high mechanical strength can make it applicable in agriculture sector like tree cutting, shrubs cutting, cane cutting, maize cutting etc.

3) Can be totally run on solar power in view of energy conservation.

4) The adjustment for the folding of stand can be done for transportation point of view

4. CONCLUSION

Solar powered weed cutting robot is advancement and can be efficiently used for agricultural purpose. Robot weed cutter is a cost friendly robot that reduces man labour, no fuel cost, no pollution, no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy. This will give much more physical exercise to the people and can be easily handled. This system is having facility of charging the batteries while the solar powered grass cutter is in motion. So it is much more suitable for grass cutting also. The same thing can be operated in night time also, as there is a facility to charge these batteries in day light.

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