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## Design and Development of Portable Solar Crop Cutter

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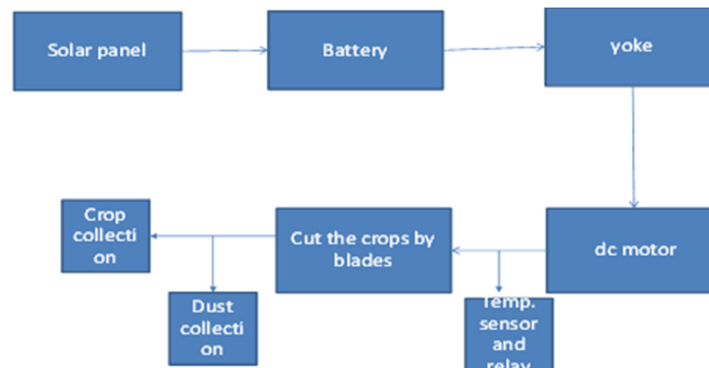
**Abstract:** *The project aims at fabricating a grass cutting machine system which makes the grass cutter based motor running through solar energy. By implementing this project we can eliminate a lot of difficulties in agriculture sector. Power plays a great role wherever man lives and works. The living standard and prosperity of a nation vary directly with the increase in the use of power. The electricity requirement of the world is increasing at an alarming rate due to industrial growth, increased and extensive use of electrical gadgets. The best alternative source is solar energy.*

### INTRODUCTION

Grass cutter machines have become very popular today. Most common machines are used for soft grass furnishing. In our project Grass cutter machine we are aimed to develop for operation and construction. The main parts 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 motor has 1000 RPM and it is connected to the electric supply by the use of a roll of wire. The motor rpm increased by the help of gears. Motor controlled by an electric switch for easy operation. The tempered blades are attached in this machine. The raw materials mainly used are GI sheet, motor, switch, wheel, wire, aluminium sheet, square pipe, paint, insulating material and other standard item like nuts, bolts and reverts. The machines required for manufacturing includes welding machine, grinding machine etc.

### Principle

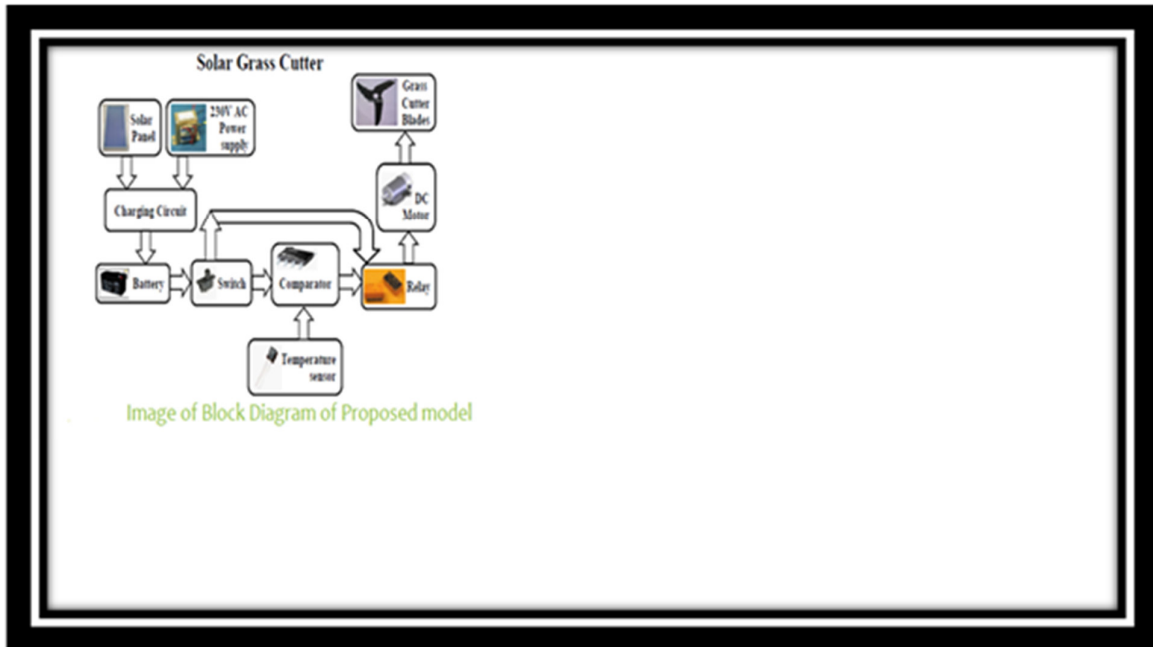
Photovoltaic principle is used to charge the battery from the power produced from the solar panel. basic pictorial and block diagram representation of the project is given below.



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The controlling device of the whole system is provided using LM358 Comparator which takes the input from the user through switch and switches ON the DC motor interfaced with grass cutting blades. The entire model consists of two sections one controlling section and another designing section of the model. The controlling section consists of Rechargeable battery, LM358 comparator, Relays switches, temperature sensor, and Solar panel. The system depending on the charging circuit the motor can be controlled using relay switch. The solar power stores the energy to a battery and then runs the motor through the relay switch. The system also includes comparator circuit for checking the temperature of the motor and when it goes beyond the limit the motor gets switched off automatically using relay switch.

### Proposed Methodology

The portable Electric Grass cutter machine with solar power is used To fulfil the objectives of the proposed idea we need to understand the basic elements of few electronics like LM358 comparator, relay, solar panel, charging circuit, rechargeable battery, temperature sensor, geared DC motor, cutting blades etc.

**LM358 Comparator:** In the proposed fabricated model we use comparator for controlling the relay switch of the motor when the user switches the supply unit. Also it compares the temperature of the motor and when it exceeds beyond the threshold limit it switches off the motor and protects from over heat in its continuous usage. The LM358 comparator is a great, easy-to-use dual-channel op-amp. Op-amps have many applications include transducer amplifiers, DC gain blocks and all the conventional op-amp circuits. It can handle a supply of 3-32VDC and source up to 20mA per channel. This op-amp is great to operate two individual op-amps from a single power supply. Comes in an 8-pin DIP package.

**Rechargeable 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 comprises of one or more electrochemical cells, and is a type of energy accumulator. It is known as a secondary cell because its electrochemical reactions are electrically reversible. Rechargeable batteries come in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of chemicals are commonly used, including: lead-acid, nickel cadmium (Ni-Cd), nickel metal hydride (NiMH), lithium ion (Li-ion), and lithium ion polymer (Li-ion polymer).

**Relay:** A relay is an electrically operated switch. We use it in the grass cutting machine model for controlling the motor connected to blades as a switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays found extensive use in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly drive an electric motor is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device triggered by light to perform switching. Relays with

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calibrated operating characteristics and some-times multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called “protection relays”.

### Advantages

- They 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 costs
- Low power consumption.
- Conservation of energy.
- Utilization of free available source of energy from sun
- Storage of energy into rechargeable battery.
- Stored energy is used for grass cutter.
- Motor automation.
- High efficiency can be achieved with relay switch.
- By using this project we can save more power. That is we can reduce the wastage of power.
- Here no need of man. The circuit itself checks the presence of vehicle and also checks weather it is day or night time. Once we switch on the circuit it automatically performs all this actions without manual operation.
- At night time also whenever vehicle comes at that time only light brightness increases after few seconds it will come to normal position that is decreases light brightness.
- It is the most advantage of this project. For these all reasons in future this project may be used in all streets to save power.

### Conclusion

This paper provides the information about the “Fabrication of Solar grass Cutting Machine” which was designed such that the solar plate generates solar energy and utilizing this energy for running the grass cutter motor. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC’s with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested. The idea can be extended by adding more features like displaying the solar voltage generated on LCD display unit, also alerting when the battery voltage level goes low below threshold limit. We can add an interfacing of automatic power bank to charge the battery instantly. It can also be extended using driver circuits for controlling intensities, speed levels of the motor. Extensions using Wireless remote controls like RF, zigbee, Wi-Fi networks through which the grass cutter model can be operated from a distance by the user.