

# Solar based Smart Grass cutter

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**Abstract**— Solar grass cutter is a machine that use blades to cut grass at garden, school field and collage and other places.

Today's, Power consumption is very essential for future So Solar grass cutter is a very useful device that used to cut the grass. We have made a lot of changes in the in previous machine which is also solar based to make its application easier at minimum chance in its cost.

At that time pollution is also a big problem so our aim to minimise the pollution. Diseal based grass cutter makes air pollutants as well as noise. It has high maintenance and also get servicing after six month .So we think to made this project.

We use changing system to charge the battery by solar panel as well as by power circuit because solar power depend on weather condition.

People who has not technical knowledge can also operate it easily and maintain the lawn very fine and uniform surface look. The solar based grass cutter used for varies applications

## 1. INTRODUCTION

The solar grass cutter made with d.c. Motor and it's easy to handle and used. The Cutting with power engine is not a easy task and not used easy by elder younger with sounds and air pollutants. Motor Power engine with motor required maintenance like to change engine oil and oiling the bearing but In Electrical grass cutter has low maintenance and also environmental friendly. There is very low noise and no air pollutants at all. As compare to power engine it easy to handle and has less weight. Using solar Pannel as well as the electrical power source to start and run the motor. Solar based smart grass cutter has low running cost as Compare to power engine .it's made to uniform grass cutting with good looking surface area. It has large application. It work in schools field collage field and other lawn.

It is smart and safe machine also used renewable resources to which make it environment friendly.

Here we do alot of change in solar based smart grass

cutter from previous grass cutter. We use mppt to track maximum Power from solar panel. We also use power grid to get power where electric circuit is available whenever weather is not in our favours.

From these technologies solar based smart grass cutter is totally different from previous one by minimum change in its cost.

We use changing system to charge the battery by solar panel as well as by power circuit because solar power depend on weather condition.

Whenever weather is not in favourable condition we use it throught the power circuit

And also charge the battery by electrical power source and use it.

In this ways we have a lot of availability to use it in any condition. After all it take low maintenance.

## Solar energy

Solar energy is very large and renewable sources of energy. The power from the sun is vary large approximately 1.8-10MW that is vary large energy used on the earth. The quantam energy in our country land area received from sun is 150000 time consumption need as projected for 2004.

The solar energy has two factor in its favour. First, unlike non renewal energy like fossil fuels and nuclear power, it is eco friendly and clean source of energy. Secondly, it is free and available in large amount in all parts of World where people live.

But there is some challenge like in utilization of solar energy and its economic concern. A large amount of sun radiation fall on India and most of the other country has very few days are sun radiation not available. India situated at latitude 7N to 37N with in average intensity of solar energy .India has an average 7.5 wh/m/day. Solar energy is an important, clean, cheap and renewable energy. The sun radiate heat and light the heat and light received from sun radiation support the environment by many natural effects. Temperature balance on earth surface by biological plants products and oxygen and organic material. It's all depend. Upon the solar



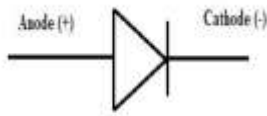


Fig. 2. Diode

### Inverter

Inverter is a electrical devices that use to convert direct current into alternate current to charge the battery.

The output of inverter is equal to the grid supply voltage like 240 voltages as we prefer. The inverter will be made of standalone equipment for application such as solar power or to back up power supply from battery which are charged separately.

### Mppt charge controller

The maximum power point tracking is to control the charging system in solar panel.

The maximum power point tracking (mppt) is an electronic device used to convert Dc to

DC and maximise the output of solar array.

Mppt check output of the solar modules and compare it's voltages to the battery than after it fixed the PV modules voltage.

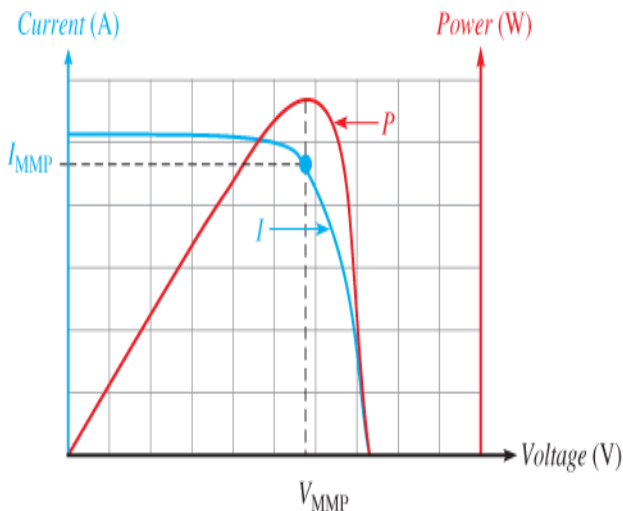


Fig.3.MPPT GRAPH

### Bridge Rectifier

A bridge rectifier is a electrical devices which convert alternate current into direct current only the current flow through it.

In bridge rectifier there is four diode in a bridge circuit that provides same polarity of input.

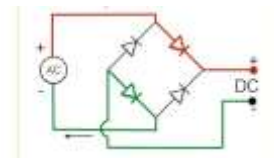


Fig.4. Rectifier

### Blade

A blade is the part of machine that used to cut the grass .it make with edgetjhat design to cut the grass chop slice scrape surface or material. A blade made up of flanking stone like flint ,metal and steel and other materials .Here in this project Blade has an edge that is designed in this way to cut the grass We used two blade and sliding.

### Whell

A wheel is a disc or Circle shaped mechanical device .it main use to allow thing to rotate and move and move object from one place to another place.

A whell is a circular block of hard material at whose center has been broad a circular hole through which an axel bearing which provides torque to rotate the wheel

### Mechanical part

Mechanical part of solar based grass cutter is made up of still and iron. It has four Whell by help of these we used to move the grass cutter .It has front space to seat the

### Solar panel

. A stand to hold the battery.

We made electrical circuit to charge the battery and also to start the grass cutter

In solar based smart grass cutter we used mechanical part for the support of motor and the solar panel. Its design made in this that all equipment should be setup easily and it moves according to our wise.

### Working of solar based smart grass cutter

The work of solar based smart Grass cutter. In these solar panel is seat

Particularly arrangements at 24 degree in a ways that it received high extensive solar radiation. The solar panel convert solar radiation into electrical energy and these electrical energy store in battery. Mppt use to maximise the efficiency of solar Solar panel and increase in its voltage and current output from panel while battery charging. We also used MCB disconnect while battery get full charge. The battery and the motor connected through

Through the wire.

Using circuit breaker to start and stop the working of motor.

Use electrical power source to run the motor when battery has not charge. It directly

Start from the electrical power source. Used bridge rectifier to change alternative current into direct current. Electrical power source also used to charge the battery when weather is not in our favorable conditions.

**Calculation (MOTOR OUTPUT)**

$$P = 2\pi NT = 96 \text{ watt}$$

P = POWER.

N = Speed of motor.

T = TORQUE.

$$P = V * I$$

V = VOLTAGE.

I = CURRENT.

Power and Torque on average load.

$$P = V * I$$

$$= 12 * 3$$

$$= 36 \text{ watt}$$

Power and Torque of motor

$$= 36 \text{ watt}$$

$$N = 1500 \text{ PM}$$

$$P = 2\pi NT$$

$$36 = 2\pi NT$$

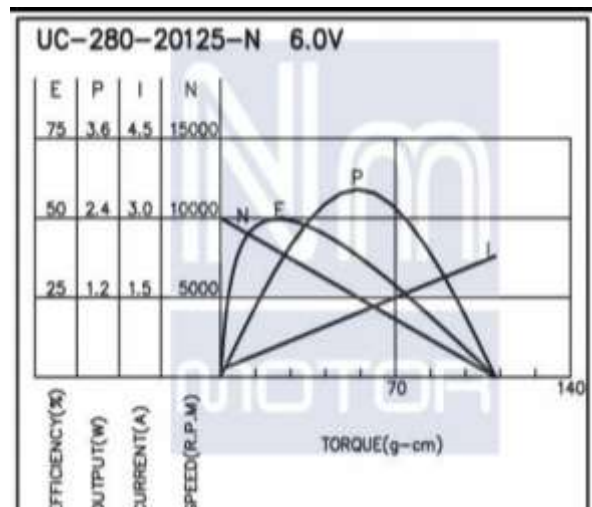
$$T = 229 \text{ (g\_cm)}$$

Results.

Motor	Specification
Current maximum	3.0 A
Voltage maximum	12 Volts
Output power	7.5
Speed	1500
Efficient	90 percent
Torque	220(g _ cm)

Results of Motor at Different voltage

At 6 Volt.



At 12 volt.

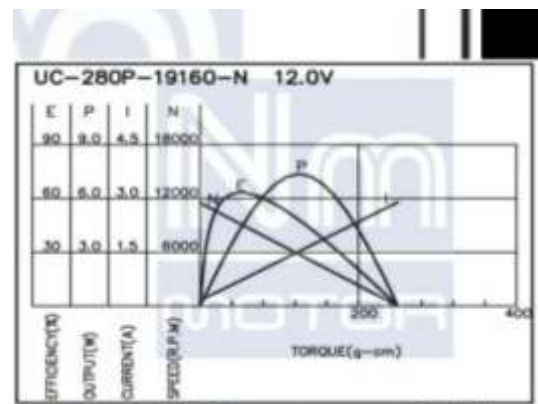


Fig.20 Circuit Diagram of TCSC at Compensation 60%

## PARAMETERS

- D.c brushless motor (12volts)  
Maximum current: 4.5 Ampere  
Maximum Voltage: 12 Voltage  
Maximum output: 9.0
- Solar panel ( 12 volts , 50 watt)
- Battery ( 12 volts,7.2 AH)

## Conference

Our project is fabrication of solar based smart grass cutter is successful completed and results are satisfied. This project will be easily for the people to take it and go for further modifications.

At that time, it is suitable for common person to use it.

It's has a lot of advantage like no. fuel cost, no. Pollutants, less no. Of moving components.

The project of solar based smart grass cutter is depending only on weather conditions to charge it and run. But Due to adding some new components as to the battery of the solar based grass cutter from grid. Also used direct electric power to run the grass cutter.

In this way if Weather conditions is not favorable than also we use it without any problems.

## Appendix

Solar panels (12 volts, 2.9)

Battery (12volts, 7.2 AH)

Motor (9 watt)

Speed (15000)

Torque (229 g cm)

Efficiency (90 %)

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