



## SOLAR BASED GRASS CUTTER

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### ABSTRACT

*Nowadays grass cutter machines are becoming very popular today. Pollution is manmade, which we can see in our daily life. In old model of grass cutter IC engine was used and hence because of its environmental impact pollution level rises IC engine driven cutter is more costly. Maintenance of such conventional machine is more. To avoid these drawbacks we plan to built new type of grass cutter which runs on solar energy and this model is also economical.*

*The aim of our project is to make the grass cutter which operates on solar energy hence save the electricity and reduces manpower. In our project we use microcontroller for controlling various operation of grass cutter. Also the grass cutter has obstacle sensor for obstacle detection. Grass cutter operates automatically hence it does not require skill person to operate.*

**Keywords: Battery, Blades, DC Motor, Obstacle Sensor, Solar Panel.**

### 1. INTRODUCTION

#### 1.1 Problem Identification

The past technology of grass cutting is manually operated by the use of hand devices like scissor, these results into more human effort and more time required accomplishing the work. Also in old methods lack of uniformity of the remaining grass. Also due to the use of engine powered machines increases the air and noise pollution also this grass cutter require maintenance.

#### 1.2 Purpose

The objective of our project is to design and automatic lawn mower which operates on solar energy and avoids the drawback of old lawn mowers. The purpose is to avoid energy crisis in India and reduces the human efforts, operating cost and maintenance cost. Also solar based grass cutter keeps the environment clean and healthy. It is used for cutting different types of grasses for various applications. The whole machine operates on the solar energy



stored in battery. The IR sensor is used for the obstacle detection to avoid any damage of the human, object and animal. Also we are using relay to control the motor connected to blades as a switch. The prototype is charged from sun by using solar panel.

### 1.3 Main component

1. Solar panel
2. Battery
3. DC motor
4. Microcontroller 89C51
5. IR sensor
6. Relay
7. Blades

## II EQUATIONS

Force required by cutting blade to shear the grass is given by;

$$F = T/R \quad (1)$$

Where,

T = Shaft torque

R = Radius of cutting blade

But shaft torque is given by;

$$T = P/2\pi N \quad (2)$$

Electrical Power is given by;

$$P = I * V \quad (3)$$

Torque of motor is given by;

$$P = 2\pi NT / 60 \quad (4)$$

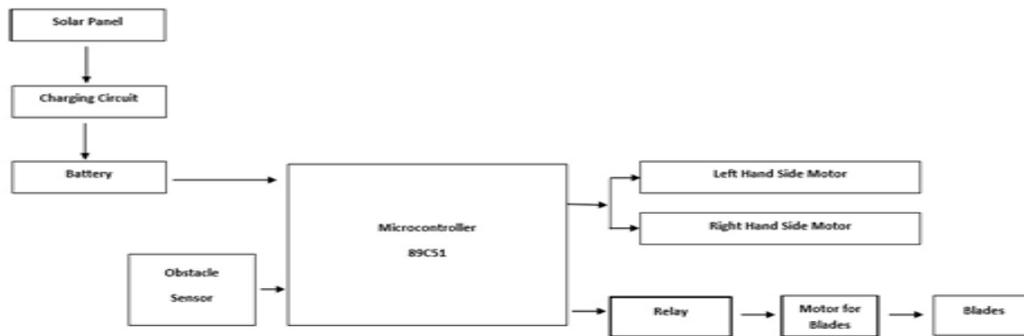
$$T = (P*60) / (2\pi N)$$

## III COMPARISION

**Table 1: Comparison between solar and IC engine cutter**

Sr. No.	Particular	Solar Based Grass Cutter	IC Engine Grass cutter
1	Pollution	No	Pollution is great factor
2	Fuel	No fuel consumption	Fuel is major factor
3	Friction	Greatly reduced	High
4	Cost	Low	High
5	Maintenance	Low	High
6	Load carrying capacity	Low	High

## IV BLOCK DIAGRAM



**Fig: Block Diagram of Solar Based Grass Cutter**



## 4.1 Block diagram description

### 4.1.1 Solar Panel

Solar energy is clean, cheap and abundantly available. Here we are using polycrystalline type solar panel. The grass cutter works on the photovoltaic principle. When photons from sun are absorbed in a semiconductor that produces free electrons with higher. These electrons are combining with holes in semiconductor and produces electron hole pairs and hence the external conductor constitutes electrical current.

### 4.1.2 Battery

Battery is used for store the solar energy which can be further converted into electrical energy. The battery should requires following properties,

- (1) Long life
- (2) High reliability
- (3) Low cost
- (4) High overall efficiency

### 4.1.3 DC motor

The speed control of dc motor is achieved easily hence we are using dc motor for mowing the grass cutter and cutting the grass. Here we are using separate motor for mowing and cutting the grass. The speed of motor used for blades is greater than motor used for mowing the cutter.

### 4.1.4 Microcontroller 89C51

Here we are using microcontroller belongs to 8051 family. It is the heart of the system.89C51 has 40 pin and has 4 ports. It has 128 byte RAM and 4K field programmable and programmable erasable ROM. It is used to control the overall functions of the grass cutter.

### 4.1.5 IR sensor

Grass cutter is interfaced with the IR sensor for obstacle detection. On obstacle detection IR sensor monitors it and the microcontroller thus stop the grass cutter motors to avoid any damage.

### 4.1.6 Relay

Relay is used for controlling the grass cutter blades motor by acting as a switch.



## 4.1.7 Blades

The blades should have high mechanical strength and great sharpness. Here we are using linear blades to cut the grass.

## 4.2 Working of grass cutter

Coming to the working of solar grass cutter, it has panel mounted on top of model in a particular arrangement such that angle of inclination is 45 degree hence it can be receive high intensity solar radiation easily. Solar panel converts solar energy into electrical energy. This electrical energy is stored in the battery. The motor is connected to the battery through connecting wires. The cutting blades tap the power from dc motor and which in turn actuates the blades and hence rotating blades cut the grass.

## V CONCLUSION

Our project entitled solar based grass cutter is successfully completed. It will be easier for the people who are going to use project for further modification. This grass cutter occupy less space 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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