

## **Manufacturing of Solar Grass Cutter**

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### **Abstract-**

Rapid growth of various high-tech tools and equipments makes our jobs done comfortable and sophisticated. The project aims at fabricating a grass cutting machine system which makes the grass cutter based motor running through solar energy. 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 grass cutter. A solar powered grass cutter was designed and developed, based on the general principle of mowing. This seminar is deal with designed of solar powered grass cutter comprises of direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The solar powered grass cutter 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 mowing. The battery recharges through the solar charging controller. Performance evaluation of the developed machine was carried out with different types of grasses.

**Keywords**– Solar, Grass, Cutter, Motor, Rotor etc.

### **1. INTRODUCTION**

Grass cutter or lawn mowing with a standard motor powered lawn mower is an inconvenience, and no one takes pleasure in it. Cutting grass cannot be easily accomplished by elderly, younger, or disabled people. Motor powered push lawn mowers and riding lawn mowers create noise pollution due to the loud engine, and local air pollution due to the combustion in the engine. Also, a motor powered engine requires periodic maintenance such as changing the engine oil. Even though electric lawn mowers are environmentally friendly, they too can be an inconvenience. Along with motor powered lawn mowers, electric lawn mowers are also hazardous and cannot be easily used by all. Also, if the electric lawn mower is corded, mowing could prove to be problematic and dangerous. The self-propelling electric remote control lawn mower is a lawn mower that has remote control capability. This prototype is robotic user friendly, cost efficient,

safe to use, efficient to use, and environmentally friendly. It can save significantly on labor costs.

Hence we design to make a grass cutter without any power source due to reduce the power consumption. Design a solar powered domestic lawnmower that utilizes solar power as an energy source is meant to address a number of issues that standard internal combustion engine mowers do not. An electric lawnmower with a solar charger will be easier to use. It will eliminate those unnecessary trips to the gas station for fill-ups. The unskilled gardener is enough to operate the grass cutter. Most importantly it eliminates the emissions of an internal combustion mower which are mostly responsible for environmental pollution and causes the green house gases effect believed to be responsible for the worsening global warming of our planet. This is so because solar energy is green/renewable energy.

source and it is easy to work. So we made solar powered lawnmower.

In today's climate of growing energy needs and increasing environmental concern, alternatives to the use of non-renewable and polluting fossil fuels have to be investigated. One such alternative is solar energy. In this solar based lawn mower, the advantage of powering a lawn mower by solar rather than by gasoline is mainly ecological. We manufactured this lawn cutter because it is very

### **2. LITERATURE SURVEY**

For the manufacturing of a solar grass cutter we referred various literature, papers etc. The review of previous method used given below: In this lawn mower uses an solar based energy source, which is easier to use, more advantageous comparing to other energy source especially for gas based source of power. But our lawn cutter is based on solar because this energy is a renewable energy

easy method and many overcome produced from this type lawn cutter.

The self powered objective is to come up with a mower that is portable, durable, easy to operate and maintain. It also aims to design a self powered mower of electrical source; a cordless electric lawn mower. The heart of the machine is a battery powered dc electric motor. It is also useful method for our lawn mower. It is similar to our lawn cutter using display and keypad.

The present technology commonly used for trimming the grass is by using the manually handle device. In this project we have automated the machine for trimming the grass. The device consists of linear blade which is operated with the help of the motor the power supply for the motor is by using battery. The battery can be charge by using power supply and solar panel.

### 3. WORKING PRINCIPLES

The working principle of solar grass cutter is it has panels mounted in a particular arrangement at an 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. 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 mechanical circuit breaker switch is provided. It starts and stops the working of the motor. From this motor, the power transmits to the mechanism and this makes the blade to slide on the fixed blade and this makes to cut the grass.

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 mowing. The battery recharges through the solar charging controller. Performance evaluation of the developed machine was carried out with different types of grasses



Fig: 3.1 Working Model

### 4. COMPONENTS USED

#### 4.1 Solar Panel

A solar panel is a set of solar photovoltaic modules electrically connected and mounted on a supporting structure. A photovoltaic module is a packaged, connected assembly of solar cells. The solar panel can be used as a component of a larger photovoltaic system to generate and supply 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 320 watts. The efficiency of a module determines the area of a module given the same rated output - an 8% efficient 230 watt module will have twice the area of a 16% efficient 230 watt module. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes a panel or an array of solar modules, an inverter, and sometimes a battery and/or solar tracker and interconnection wiring.

Fig: 4.1.1 Solar Panel



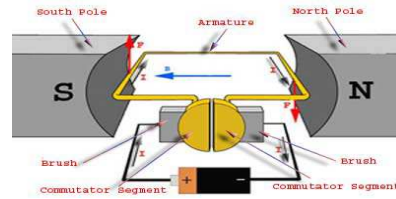
#### 4.2 The Battery:

Solar cell modules produce electricity only when the sun is shining. They do not store energy, therefore to ensure flow of electricity when the sun is not shining, it is necessary to store some of the energy produced. The most obvious solution is to use batteries, which chemically store electric energy. Batteries are groups of electro chemical cells (devices that convert chemical energy to electrical energy) connected in series. Battery cells are composed of two electrodes immersed in electrolyte solution which produce an electric current when a circuit is formed between them. The current is caused by reversible chemical reactions between the electrodes and the electrolyte within the cell. Batteries that are re-chargeable are called secondary or accumulator batteries. As the battery is being charged, electric energy is stored as chemical energy in the cells. When being discharged, the stored chemical energy is being removed from the battery and converted to electrical energy. In East-Africa, the most common type of secondary battery is the Lead-acid battery.

#### 4.3 DC Motors

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 flux is maintained near 90 degrees, which generates the maximum torque.

DC motors have a rotating armature winding (winding in which a voltage is induced) but non-rotating armature magnetic field and a static field winding (winding that produce the main magnetic flux) or permanent magnet. Different connections of the field and armature winding provide different inherent speed/torque regulation characteristics. The speed of a DC motor can be controlled by changing the voltage applied to the armature or by changing the field current. The introduction of variable resistance in the armature circuit or field circuit allowed speed control. Modern DC motors are often controlled by power electronics systems called DC drives.



ig: 4.3.1 D.C. Motor

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#### 4.4 Blades

A blade is that portion of a tool, weapon, or machine with an edge that is designed to cut and/or puncture, stab, slash, chop, slice, thrust, or scrape surfaces or materials. The blade is seldom sharp enough to give a neat cutting. The blade simply tears the grass resulting in brown tips. However, the horizontal blades are easy to remove and sharpen or replace. Existing engine trimmers suffer from high initial cost, high levels of engine noise, high fuel consumption rates and high operator's fatigue in long-run.

Mower blades are the cutting components of lawn mowers. They are usually made of sturdy metals as they must be able to withstand high-speed contact with a variety of objects in addition to grass. The materials used (as well as size, thickness, and design of the blades) vary by manufacturer. A blade may be made from a flaking stone, such as flint, metal (usually steel), ceramic, or other material. Here we used two blades i.e. fixed blade and sliding blade.



Fig: 4.4.1. Blades

- Operating principle is simple.
- Non-skilled person also operate this machine

#### 5.ADVANTAGES

- Compact size and portable
- Easy to move from one place to another place

#### 6.LIMITATIONS

- Large time required to remove the grass
- Manually operated
- Difficult to operate in rainy seasons

minimum cost and with minimum time Finally this project may give an inspiration to the people who can modify and can obtain better results.

## **7.Conclusion**

Our project entitled Fabrication of solar powered grass cutter is successfully completed and the results obtained are satisfactory. It will be easier for the people who are going to take the project for the further modifications. This project is more suitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and 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. As we are nearer to Equator, the solar energy (non-conventional energy) is vastly available, so it is easy to charge the battery and is also pollution free. But the initial investments of the solar powered grass cutter is high. At present in order to curtail global warming and ozone depletion, the Government of India is offering subsidy for the solar equipments. The industries are producing these components in mass productions, so the cost of the system may come down. So in future it is expected to run all equipments by using solar energy. 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.

## **8.Future work**

We completed our project successfully with the available sources. But the results and modifications are not up to the expectations. This can be further improved by incorporating the following modifications to obtain better results. The mechanism which we used ie scotch yoke mechanism does not given excepted efficiency. This efficiency can be increased by using some other mechanism. and speed of motor is reduce because we have used heavy material and this material can be replaced by using light weight material .and design of blades should be done based on types of grass is used to cut. The project which we have done surly reaches the average families because the grass can be trimmed with

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