

SOLAR POWER GRASS CUTTER

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Abstract- The project aims at solar power grass cutting machine system which makes the grass cutter based motor running through solar energy. A Solar grass cutter is a machine that uses sliding blades to cut a lawn at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep lawns in gardens, schools, college's etc. which makes the grass cutter based motor running through solar energy. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the lawn very fine and uniform surface look. In our project, Solar grass cutter is used to cut the different grasses for the different application.

Index Terms- cutting Solar Panel, Relay, DC motor, Blades,

1. INTRODUCTION

. Solar powered lawn mower can be described as the application of solar energy to power an electric motor which in turn rotates a blade which does the mowing of a lawn. Solar energy is the renewable energy.

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.

1.1 SOLAR GRASS CUTTER

The lawn mower or grass cutter is made up of an induction motor, a battery, an alternator, three collapsible blades, and a link mechanism. The power and charging system comprises of an alternator which charges the battery while in operation. The D.C. motor forms the heart of the machine and provides the driving force for the collapsible blades. This is achieved by the combined effect of mechanical action of the cutting blades and the forward thrust of the mower.



Solar Grass Cutter

Fig
1.1

1.2 SOLAR ENERGY

Solar energy is radiant light and heat from the sun harnessed using a range of ever-evolving technologies such as solar heating, solar photo voltaics, solar thermal energy, solar architecture and artificial photosynthesis.

It is an important source of renewable energy and its technologies are broadly characterized as either passive solar or active solar depending on the way they capture and distribute solar energy or convert it into solar power. Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulate air. Every minute the sun radiates about 5.68×10^{26} calories of energy and the earth intercepts only 2.55×10^{18} calories (NRF, 2010). This represents only 2000 millionth of the total solar energy sent into the space. The total solar energy is estimated to be 30,000 times greater than the total annual energy of the world. A large amount of solar radiation fall on India and for most

of the country very few days are without sunshine.

India lies within the latitude of 7 N to and 37 N with annual average intensity of solar radiation as 500 to 600 cal/cm/day with more such insulations available in arid and semi arid regions.



Fig. 1.2 Solar Energy

1.3 BLADE

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.

1.3.2 REEL OR CYLINDER BLADES:

Used in reel or cylinder mowers, cylinder blades are composed of three to seven helical blades welded in a horizontally rotating cylindrical reel, creating a scissor-like cutting action. Unlike other types of mower blades, reel/cylinder blades cannot be replaced.

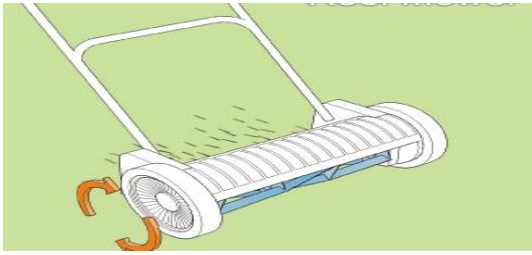


Fig.1.3.1 Reel or cylinder blade

1.3.2 DECK BLADES

Also known as the standard or straight mower blade, this is the most commonly used blade on rotary mowers. the blade of a rotary mower is usually mounted directly to the crankshaft of its engine, but it can be propelled by a hydraulic motor or a belt pulley system.



Fig1.3.2. Deck blades

1.3.3 FIXED BLADE

The blade which has no motion is called Fixed blade. This fixed blade is welded to the frame .



Fig.1.3.3 Fixed Blade

2.D C motor

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 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.

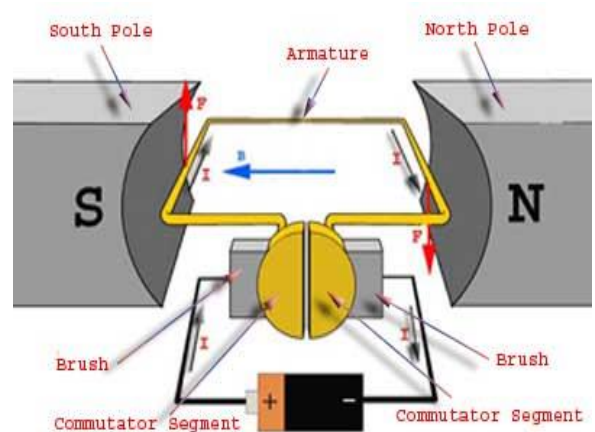


Fig2.DC Motor

3 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.

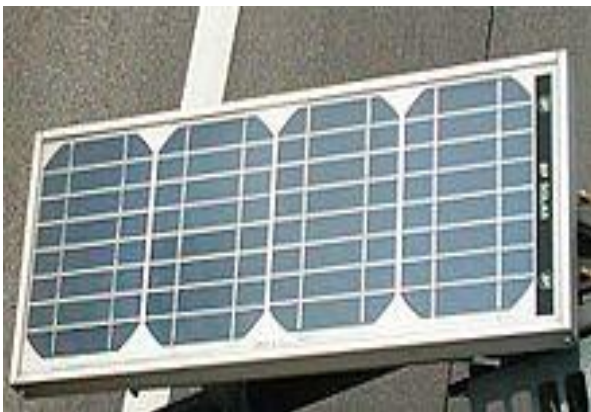


Fig.3 Solar panel

In the first phase we just considered only about the mechanical arrangements, which is responsible for rotating the dynamo. For this the team members divided the work into two divisions. The mechanical arrangement consisting of

- External framework
- Solar frame
- Shaft with free-wheeling bearing
- Wheels with DC motor
- Secondary spring with breaking arrangement
- Blades
- Battery

5 .Working principle

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.

4. MECHANICAL ARRANGEMENTS



Fig.5 Solar power grass cutter

6. SPECIFICATION:-

Array size : 67×60cm

Maximum Power : 50W

Maximum Voltage : 12V

Maximum Current : 2.9A

7. APPLICATION

- For cricket ground.
- The football ground.
- All garden
- All Playground

8. RESULT:-

The solar powered grass cutter was manufactured and developed. The solar energy is generated due to solar panel and the energy is stored in battery, which converts the solar energy into the electrical energy. The blade with dc motor connected to the battery.

9. CONCLUSION:-

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.

REFERENCE:-

- Project Report On Solar Powered Grass Cutter
- Arora, C.P., Fundamentals of renewable energy systems, New Age international limited publishers, New Delhi, 2005.
- Raja, A.K., Non-conventional power engineering, Public printing service, New Delhi, 2007.
- Annual reports and accounts 2007, Kenya Power and Lighting Company Limited.
- Mark Hankins, Small Solar Electric Systems for Africa, Motif Creative Arts Ltd.1991
- Agarwal M.P, Solar Energy, S. Chand & Company Ltd, New