

Solar Based Grass Cutter Using Remote Control Technique

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ABSTRACT

The main aim of the paper at developing a grass cutting machine which is operated on natural source of energy, the reason behind it is constantly increase in cost of fuel. The solar energy is plentifully available in nature. In present the manually handed grass cutter is commonly used. In this paper we try to make automatic grass cutter including obstacle detection unit. Due to the above features the damage to the hardware of the device is avoided. Our main objective is pollution control and the consumption of fuel or non-renewable energy source.

Keywords: Grass cutter, Motor, Obstacle, Solar energy

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I. INTRODUCTION

The solar based grass cutter is based on the same principle that other early gadget lawn mower work on, the difference is only that the energy source used. In our project solar grass cutter machine we are aimed to build up for operation and construction.

The main parts of the grass cutting machine are dc motor, relay switch for controlling motor, battery for charging it through solar panel. The motor having 1000 rpm and it is connected to battery which is connected to solar panel. Motor controlled by an electric switch for easy operation. Along with motor powered grass cutter and electric grass cutter are also hazardous and cannot hold easily by all. The aim of this paper is at fabricating a grass cutter machine system which is running on solar energy. It uses sliding blades to cut a lawn at even length. It is more primitive device because power consumption becomes essential for future.

For designing of Automatic Grass Cutter we referred various literature, papers etc. The review of previous method used given below: In this grass cutter 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 . We not used this for our grass cutter because it is very old method and many overcome produced from this type grass cutter. The self-powered design goal is to come up with a cutter that is portable, durable, easy to operate and maintain. The

commercial model was originally running on gasoline and was adapted to hydrogen by making small adjustments to the carburetor and by installing a hydrogen reservoir containing solid-state metal hydrides. During the evaluation period the only maintenance work was changing the lubricating oil of the engine once a year, and reactivating the metal hydride powder by external heating after an accidental inlet of air into the reservoir. And also it will be the alternative for solar powered automatic grass cutter because its cost is more. So automatic grass cutter using rechargeable battery is economically helpful for user. By using this automatic grass cutter user can the cut the grass of the required area by giving input by using wireless keys. The main intention of this grass mower is that the grass in the grass must be mown with less effort. Also to cut the grass of particular area as per user requirement.

II. PROBLEM IDENTIFICATION

1. The conventional grass cutter will consume large amount of non renewable energy sources.
2. By using engine and motor based grass cutter large human efforts are required for proper mowing.
3. The electric grass cutter is having heavy expenses and labor charge.
4. Previously majority of work is done by manually, the time is passed away many equipments are developed to ease human activities.

5. Now a day's technology is developed in another side, skilled person with conventional grass cutter were decreases.
6. Educational environment of Indian youth is improving, so many of people are uncertain to use conventional grass cutter.

III. METHODOLOGY

The design idea is to come up with the principle of solar power grass cutting machine. Since manual grass cutting machines are very confused to operate and electric mowers are subject to accessibility of electricity and thus limited working range. This project demonstrates the concept of automatic grass cutting machine which can be operated using the remote control.

Components of Attachment



Fig.1 Proposed Hardware

1. Solar panel
2. Battery
3. Relay
4. DC motor
5. RF module
6. Blade

Solar Panel

Solar panel is basically designed to absorb the sun's rays as a source of energy for producing electricity. A photovoltaic system typically includes an array of photovoltaic modules, battery pack storage, interconnection wiring and optionally a solar tracking mechanism. The nonstop conversion of solar energy to electricity occurs without any composite and moving parts.



Fig.2 Solar Panel

Photovoltaic principle

The photovoltaic effect can be observed in a variety of materials that have shown that the best performance in sunlight is the semiconductors as stated above. When photons from the sun are absorbed in a semiconductor, that creates free electrons with higher energies than the created there must be an electric field to induce these higher energy electrons to flow out the semiconductor to do useful work. Solar photovoltaic cells are essentially semiconductors, which have electric transmission property.

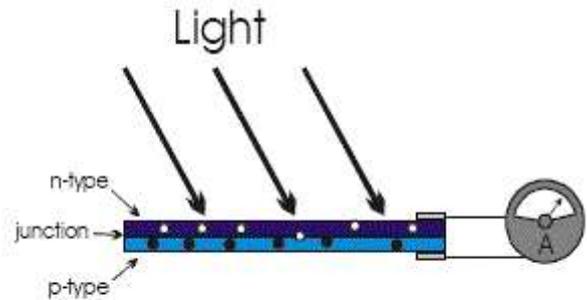


Fig.3 Photovoltaic Effect

Battery

Here we used +6V and +5V dc power supply. The function of this block is to provide the enough amount of voltage to necessary circuits. To give +5V dc supply for controller and +6V is given to motor via relay. The obstacle sensor which we have placed on grass cutter i.e. IC 7805 it requires +5V dc power supply. Battery seems to be the only practical and inexpensively available storage device, which can further converted into electrical energy. The battery can even charge when grass cutter is in working at a constant voltage.



Fig.4 Battery

Relay

Relay is an electrically operated switch. We utilize it in the grass cutting machine for controlling the motor which is connected to blades as a switch. Relays are placed where it is necessary to control a circuit by a low power signal, or where remaining circuits must be controlled by one signal.



Fig.5 Relay

DC motor

DC motor converts electrical energy into mechanical energy through the interaction of magnetic fields and current carrying conductor. DC motor having outstanding torque and speed, higher efficiency. It is having tremendous speed and position control, long life and high torque density. The input to the dc motor is current /voltage and output is taken as speed (torque). In our project total five motors are used apart from which four motors are placed closest to four wheels. By using remote control, we push left/ right button as per the need the corresponding motors will operating, one 1000 rpm motor is connected to blade which actuates blades. The rotational blades uniformly cut the grass.



Fig.6 DC Motor

RF module

The RF module is often used to communicate wirelessly with another device. The RF module includes a complete line of transmitter, receivers and transceivers it provide very simple way to control transmission. The RF signals can travel through large distance for long range application it can be even transmitted when there is an obstacle. HT12D encoder IC wills converter parallel data to serial data and this given to RF transmitter. RF receiver receives the transmitted data. HT12D decoder converts the serial data to parallel data and this given to controller for follow the given command.

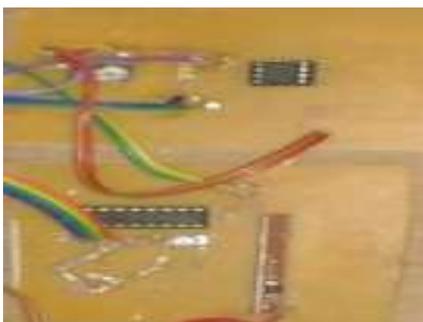


Fig.7 RF Module

Blades

Blades are the cutting components of grass cutter.They are generally made of metals as the must be able to survive high speed contact with a range of objects in addition to grass cutter. Blades are paced beneath the motor.



Fig.8 Blade

Block diagram

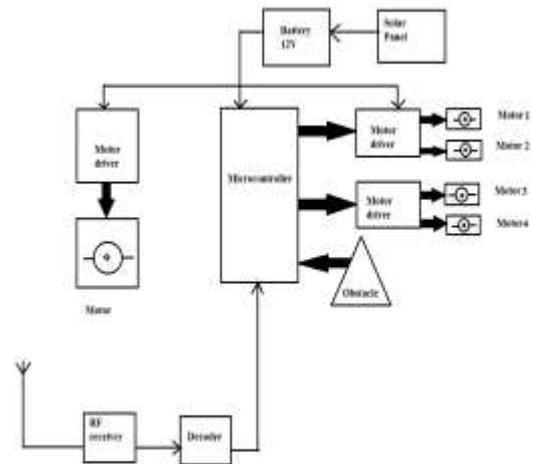


Fig.9 Block Diagram

The mechanism solar grass cutter is it has panel mounted in a particular arrangement at on the way that it can receive solar rays with very high strength. It converts light energy into electrical energy. Battery is continuously charging during grass cutter is in working situation. Battery is placed below the panel, when battery is fully charged then it automatically gets disconnected from panel and opposite to that when battery is low then it connected to panel for charging. After that motors are connected to battery through connecting wires.

The designed solar power grass cutter the raw materials used is DC motor, a rechargeable battery, solar panel, blade and relay for controlling. In our project four motors are used for moving purpose, which follow the right, left, forward, backward commands. The motor have 1000 rpm and is attached to the tempered blades. The grass cutter is providing a high speed rotation to the blades, which helps to cut the grass. The system will have some automation work for regulation and other obstacle detection, so it protects the equipment from hazards situations.

Advantages

- Eco friendly
- Less maintenance
- Can also be charged through AC supply
- No need of skilled person
- Easy to move from one place to another
- Operation is simple
- Does not cause any environmental pollution

Disadvantages

- Difficult to operate in rainy season
- Large time required to remove the grass

IV. CONCLUSION

Our project solar based grass cutter is successfully completed and the results obtained are acceptable. It will be easier for the people who are going to take the project for further modification. This system having capability of charging the batteries while solar power grass cutter is moving. Due to power demand we select renewable energy, so there is no running cost. We gain all the requirements and complete our goals for this project. This project removes the physical power required in pushing the grass cutter without sacrificing safety.

V. FUTURE SCOPE

If large panel is used then it can store huge power in day light which we can be used during night time for room lighting or garden lighting, by adding more motors with blades in front of machine the grass cutting made more resourceful. Also by increasing 2 motors, one for grass cutting, 3 for flower cleaning & 2 for back wheels. Scrubbers are connected to 3 motors. Water used for cleaning purpose is stored in container which is fixed to base. For future point of view this machine can be completely robotic, which makes this absolutely smart.

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