

Smart Solar Grass Cutter

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ABSTRACT: Rapid growth of various high-tech tools and equipment's makes our day to day activity done comfortable and sophisticated. Our 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 moving.

Keywords: Solar Grass Cutter, machine and high tech tools

1 Introduction

The first lawn mower was invented by Edwin Budding in 1830, just outside Stroud, in Gloucestershire, England. Budding's mower was designed primarily to cut the grass on sports grounds and extensive gardens, as a superior alternative to the scythe, and was granted a British patent on August 31, 1830. In 1995, the first fully solar powered robotic mower became available. The mower can find its charging station via radio frequency emissions, by following a boundary wire, or by following an optional guide wire. This can eliminate wear patterns in the lawn caused by the mower only being able to follow one wire back to the station. A robotic lawn mower is an autonomous robot used to cut lawn grass. A typical robotic lawn mower requires the user to set up a border wire around the lawn that defines the area to be mowed. The robot uses this wire to locate the boundary of the area to be trimmed and in some cases to locate a recharging dock. Robotic mowers are capable of maintaining up to 20,000 m to 220,000 sq.ft of grass. Automated solar grass cutters are increasingly sophisticated, are self-docking and some contain rain sensors if necessary, nearly eliminating human interaction. Robotic lawn mowers represented the second largest category of domestic robots used by the end of 2010, Possibly the first commercial robotic lawn mower was the MowBot, introduced and patented in 1969 and already showing many features of today's most popular products.

In 2012, the growth of robotic lawn mower sales was 15 times that of the traditional styles with the emergence of smart phones. Some robotic mowers have integrated features within custom apps to adjust settings or scheduled mowing times and frequency as well as manually control the mower with a digital joystick.

2 Literature Survey

[1] E.Naresh (2016) provide switch between the mechanical circuit breaker. It starts and stops the working of the motor. From this motor, power transmits to the mechanism and this makes the blade to rotate on the shaft this makes to cut the grass.

[2] Vicky Jain (2016) have prepared wireless grass cutter. They have used solar panel so it is not required to charge battery externally and battery is continuously charged at constant voltage when grass cutter is in working. The battery is getting charged by using day light and we can use it as per our convenience, Because of two DC motor both forward and backward motion of grass cutter can simultaneously possible.

[3]Prabhat Kumar (2015) explained that solar plate which is placed above the grass cutter generates solar energy and use this energy for working the grass cutter. Also,using driver circuit forcontrolling speed of motor as per the requirement. For preventing battery from overcharging and over discharging regulator is placed into the system and it should be placed in series. They have provided LCD display unit which displays voltage generated during solar rays trapping. Due to seasonal conditions if battery is not charged they can provide the power bank to charge the battery instantly

[4] PrafulUlhe (2016) prepared manually operated grass cutter with spiral roller blades due to spiral blades increases the efficiency of cutting. For adjusting the height reel cutter is component placed on grass cutter. The battery can be charged during working conditions and it also having AC charging. For collection of cut grass a box is placed over grass cutter so the cut grass put outside the lawn. It is having light in weight and compact in design.

[5] T. KarthicK (2015) fabricated grass cutting machine with rotary blades by using solar energy. The solar energy is trapped in the photovoltaic cell to generate electricity. The cells may be grouped in the form of panels or arrays. Solar panel is placed such that to absorb high intensity from sun and it will incline at 45°. The main function of solar charger is increased current during batteries are charging and also disconnect when they are fully charged. By considering ground clearance they can adjust the height of grass.

3. Photovoltaic Effect

The working principle of all today solar cells is essentially the same. It is based on the photovoltaic effect. In general, the photovoltaic effect means the generation of a potential difference at the junction of two different materials in response to visible or other radiation.

3.1. Basic Process behind the Photovaltic Effects

1. Generation of the charge carriers due to the absorption of photons in the materials that form a junction.
2. Subsequent separation of the photo-generated charge carriers in the junction.
3. Collection of the photo-generated charge carriers at the terminals of the junction.

4. Working Principle



Fig.1. Smart Solar Grass Cutter

From the above diagram it is easy to understand that 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. 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.

5.Components Used

The basic components that used in our project are

- solar panel
- Battery
- Inverter
- Relay
- Wiper motor
- AT89C51micro controller
- Blades

6.Solar Panel Specifications

The specification of solar panel that we used in our project was

- Typical Power: 15 W
- Optimum operating voltage (V_{mp}): 17.6
- Optimum operating current (I_{mp}): 0.82
- Short circuit current: 3.65
- Dimensions: 12 x 15x 1 inch
- Weight: 1.5Kg
- Dimensions: 12x15x1 in.
- Frame Material: Aluminum with plastic edge caps

7. Result

In our project solar based grass cutter is successfully completed. 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.

8.Conclusion

It will be easier for the people who are going to use our project for further modification. It is reliable and good for environment because it doesn't cause much pollution. we can use this in school and college playground etc.

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