

Solar based Robot for Garden Grass Cutting and Watering Plants

¹Gokul T S ²Arunkumar C
^{1,2}SNMIMT, Maliankara

Abstract

The main aim of developing this Solar based Robot for garden grass cutting and watering Plants IoT project is to provide an easy way of cutting grass and watering methods to the formers without much manual interaction. 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. We have made some changes in the existing machine to make its application easier at reduced cost. 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.

Keyword- Solar Energy, Grass Cutter, Robot

I. INTRODUCTION

Moving the grass cutters with a standard motor-powered grass cutter is an inconvenience, and no one takes pleasure in it. Cutting grass cannot be easily accomplished by elderly, younger, grass cutter moving with engine 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 solar grass is environmentally friendly, they too can be an inconvenience. Along with motor powered grass cutter, electric grass cutters are also hazardous and cannot be easily used by all. Also, if the electric grass cutter is corded, mowing could prove to be problematic and dangerous. The prototype will also be will be charged from sun by using solar panels.

A. Solar Energy

Solar energy is radiant energy that is produced by sun. Every day the sun radiates, or sends out, an enormous amount of energy. The sun radiates more energy in one second than people have used since the beginning of time! Where does the energy come from that constantly is being radiated from the sun? It comes from within the sun itself. Like other stars, the sun is a big ball of gases- mostly hydrogen and helium atoms.



Fig. 1: Solar Grass Cutter

II. OBJECTIVES

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

A. 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 comprise 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. The system is powered by an electrical switch which completes the circuit comprising the induction motor and the battery. The IR sensor is finding the path to avoid the obstacles and machine damage. The shaft fitting mechanism with which the height of cut is altered.



Fig. 2: Grass Cutter Model

B. Project Description

- 1) Solar Operated Lawnmower
- 2) Our project is a battery powered automatic lawn mower
- 3) The user will wirelessly control the mower along a desired path

C. Function

- 1) Mower will have the ability to be controlled remotely
- 2) It will be able to store the desired mowing path in memory
- 3) It will have wheels that control forward and backward movements well as turning
- 4) Wireless interaction between mower, base station, and control unit
- 5) Solar power to large battery to mower batteries
- 6) Micro-controller to interact with and control other components (motors for blades/wheels, wireless component, compass, and power management)

D. Working

Coming to the working of solar powered grass cutter, it has panels mounted in arrangement at an angle of 45 degrees 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 as studied earlier. Now 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 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 switches 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 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 switches 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.



Fig. 3: Solar Panel

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.



Fig. 4: Blades

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.

E. Main Parts

- 1) Solar panels
- 2) Wiper motor
- 3) 12 V Battery
- 4) 9 V Battery
- 5) Chain drive
- 6) Blades
- 7) Frame
- 8) Wheels
- 9) Sprockets

F. Advantages

- 1) They can be installed and pulled by hand.
- 2) Low maintenance
- 3) Unattended operation
- 4) Long life
- 5) Compact size and portable
- 6) Easy to move from one place to another place
- 7) Operating principle is simple.
- 8) Non-skilled person also operates this machine

G. Disadvantages

- 1) Solar energy makes use of a renewable natural resource that is readily available.

- 2) Large time required to remove the grass
- 3) Manually operated
- 4) Difficult to operate in rainy seasons

H. Applications

- 1) For cricket ground.
- 2) The football ground.
- 3) All garden
- 4) All Playground

III. FUTURE SCOPE

The solar panel can be fixed with light sensors. Thus, depending upon the arrangement of the sun, the panel will be slanting, such that the sun rays are incident normally (at 90deg) to the solar panel. With this the device would be constant capable of trapping the solar energy at times when the strength of the sun light is less. If panel used of high watt, then the machine can be used during night time for garden lighting or room lighting, because we can accumulate more power. And at night time however you keep it apart. So, the power in the battery can be used for this intention. By using one valve in the pipe we can also use it for gardening i.e. pouring water for plants. By connecting one box type transporter we can use it to transport files, books or other stuffs from one place to other in office or any other place. Grass cutting can be made more proficiently used after modifying for small rice harvesting This can be further improved by incorporating the following modifications to obtain better results. The mechanism which we used i.e. scotch yoke mechanism does not given excepted efficiency. This efficiency can be increased by using some other mechanism. And speed of motor is reduced because we have used heavy material and this material can be replaced by using lightweight 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 minimum cost and with minimum time finally this project may give an inspiration to the people who can modify and can obtain better results.

IV. CONCLUSION

It consumes non-renewable sources of energy so total energy received from sun far exceeds our energy demand. It meant to be an alternate green option to the popular and environment hazardous gas-powered lawn mower and reduces human effort.

- Non-skilled person also handle it easily. By using simple switches or by predetermine programming it can be easily handle and control within less time span.
- It is highly efficient and accurate because it detects the obstacle and changes the direction or stop functioning as per the instruction given. Therefore, equipment should be protected from damage and reduces risk on human.

REFERENCES

- [1] The solar entrepreneur's handbook, Wise publications
- [2] A project report on—solar tracking system using hydraulic damper | (MeRITS)
- [3] Non - Conventional Energy sources by G.D.RAI, Khanna Publishers
- [4] A project report on solar powered bicycle| (MeRITS)
- [5] www.solar grass powered grass cutter.com [online]
- [6] www.merits.tech.in