



SOLAR POWERED LAWN MANAGING MOVABLE DEVICE

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Abstract

Automation gets its way rapidly taking place in the present technology and no field makes an exception from it. This plays an important role in modern industry, manufacturing, household and many more applications. High tech devices which gets developed makes the job more comfortable and sophisticated. This project aims at fully automated grass cutter device powered from solar energy, capable of performing combined action of trimming the grass and accumulating the trimmed grass waste at the edges of the lawn. Conventional grass cutter operates manually, making use of fossil fuels causing noise and air pollutions. An eco-friendly, portable device using renewable energy as power source through a solar panel. Autonomous device does its work itself according to predefined instructions with reduced human efforts and labor cost. As the system accumulates the waste grass on sides of the lawn they also give an even look to the ground. Controller controls the function of motor movement, blade rotation and shield that drags the trimmed grass. System is designed in such a manner to cover the entire lawn in a defined pattern with the help of sensors. Path tracing takes place based on obstacle detection, if at all an obstacle is present they trace alternate path by the help of ultrasonic sensor to cover the entire lawn area.

Index Terms: Solar panel, Ultrasonic sensor, DC motor, Shield, Microcontroller.

I. INTRODUCTION

Maintaining lawns has become necessary in our daily life, using a grass cutter in order to

enhance beauty of lawn for better habitat. Nowadays, environment awareness has got a great impact among people. The need to develop an environment friendly device becomes essential [1]. In 1830 Edwin budding formulated lawn mower for first time in Gloucestershire, England. Initially was designed only to trim grass on grounds, but still the system can be developed ergonomically and economically. Major problems faced by environment are pollution and power cut related issues. Previous systems proposed are conventional systems that operate on fossil fuels like petrol, diesel and require regular maintenance like change of oil, to check for fuel level each time before use, so that it works efficiently [3]. This may lead to a variable cost as fuel cost varies. In order to overcome this, usage of abundantly available renewable solar energy, a boon for future generation is made to supply power to the entire device. This eventually reduces cost for fuel and emission of pollution is limited. Battery helps storing the solar power that aids using anytime required. Microcontroller controls the entire system. The supply is obtained from the battery, the ultrasonic sensor acts as a vision for system which helps navigating direction and predicting obstacles. They function by emitting and receiving ultrasonic waves. Wheels for the movable device is connected to controller through a driver circuit. A blade is fixed to motor accordingly that is efficient enough to trim the grass. A shield model is done behind, which collects the grass waste and accumulates on the sides of the lawn [2],

when shield motor rotates as the device makes a turn. A boundary is fixed assuming walls and ridges present in lands around the lawn or ground Brushless dc motor is generally an DC motor

turned in and out, which the stator with windings and rotor is permanent magnet. It has less inertia so that we can start and stop very easily and disabling the motor becomes simple. The solid state switches replaces the working of brushes and commutator so that it is called maintenance free motor. The motor is operated by switching of poles excitations in the stator which creates back EMF that rotates rotor of BLDC motor.

In recent years various types of control mechanism are developed for BLDC motor. An eco-friendly portable and efficient device that can be easily portable to any place for their applications. Previously proposed systems require a labor for maintaining the device, not easily portable and cannot be used both day and night as well. Present system is free from labor to monitor and can operate anytime. solar powered grass cutting system is fully automated from switched ON to OFF [8]. Even an unskilled person can efficiently handle device for proper functioning. GO switch in controller along with a SPDT switch is present. When both switch inputs are high, the system is set to operate, that ensures a kind of safety before functioning. Trimming grass cannot be performed by elderly, disabled people this system is a boon as an application.

II. PROBLEM STATEMENT

Grass cutting devices are employed in many areas, yet manually operated conventional grass cutters are unable to use in some applications where human supervision is not possible. Traditional grass trimmers are powered by fossil fuels resulting in variable cost, labor requirement, difficulty in carry over places. Also, collection of mow waste require labor or models contain vacuum setup require heavy design and regular maintenance. Altogether the conventional grass cutter has many flaws which will overcome by this proposed system, thereby reducing cost and making use of renewable solar energy as a power source. Also drags trimmed waste at edges of the yard that makes easy to collect the waste. Ultimately beautifying the yard.

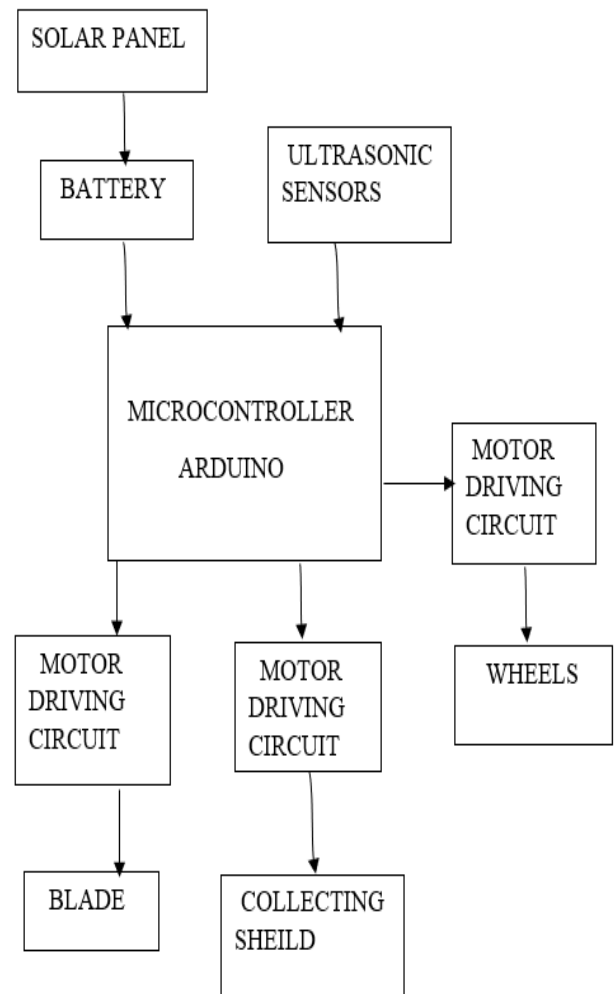


Fig.1 Block Diagram

III. PROPOSED SYSTEM

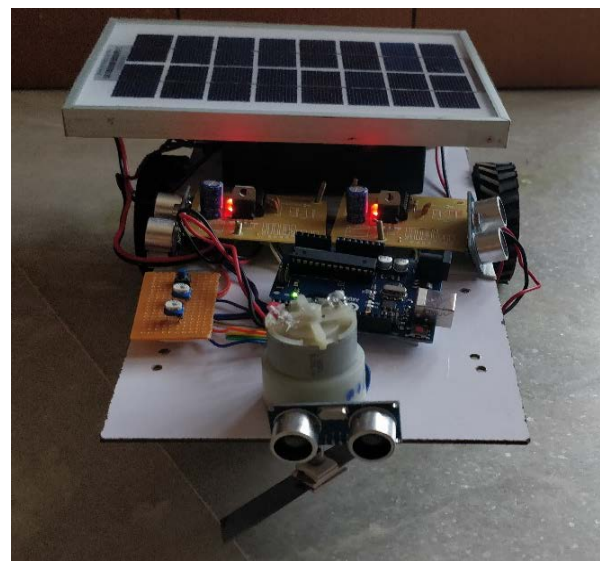


Fig.2 Hardware setup

An absolutely automated solar powered grass cutter system requires limited human supervision for its functioning. The system structure has

three main components like Arduino, sensor and wheels. Initially, we assume there are no standing and moving obstacles other than the borders of the yard/ lawn. When the SPDT is ON, the system component are powered and only after when the GO switch is pressed the device is set into action. Device entire operation is to trim the grass grown in excess and collecting the trimmed grass waste at the corners of the lawn is predefined in the form of code in the controller Arduino. Power source for the device is obtained from solar energy which is a renewable energy. Solar panels help in absorbing light energy directly from surrounding.

The working of solar panels is based on photovoltaic effect, which outgrowths in producing electricity using light energy. Battery stores this electrical energy straight from the panel since direct current. Ultrasonic sensor transmits and receives ultrasonic waves to identify the presence of obstacles preventing device from getting damaged. These sensors also help in navigation which covers the entire lawn using boundaries. Presence of obstacle leads to change in direction before 10 centimeters. Wheels set the device in movement through a motor driving circuit. A balance wheel is placed at the front to balance the system. DC motor is used to rotate the blades which results in trimming grass, placed at front. A collecting shield is designed behind the system to collect the trimmed grass left at the bottom to the edge of the lawn using a DC motor that operates once the system rotates. Finally, the entire actions of the components are controlled accordingly using a microcontroller Arduino.



Fig.3 Proposed shield model

IV. FUTURE SCOPE

Immense opportunity are present to have expandability, in solar powered grass cutting system like fertilizer spraying, irrigating the lawn, plough the land and many more methods. The grass can be completely removed by

adjusting the height of the blade up and down accordingly. Path tracing and algorithms can be developed in much convener manner safeguarding the system.

V. ADVANTAGES

1. Environment friendly device causing zero pollution to surrounding and renewable energy is made used for every action.
2. Portable device easy to carry anywhere anytime.
3. Cost efficient as manual labour and fossil fuels are eliminated.
4. Vibration free system
5. Maintenance of the device is very easy compared to traditional lawn mower.
6. Entire lawn gets covered in an efficient manner.
7. Weight of the machine is reduced.
8. Compact and easy to park the machine.
9. Efficiency is more than normal mowers.

VI. APPLICATIONS

1. Household gardens.
2. Playgrounds.
3. Nursery applications.
4. Beautifying lawn.
5. Agriculture yard.

VII. CONCLUSION

In present world all high tech devices are designed to reduce or completely eliminate greenhouse gases, which is a major cause of climatic changes taking place. This design of solar powered grass cutter will reduce some such problems like pollution and manual work drastically, the vibrations caused by the conventional system is eliminated. System with renewable source operates both day and night without human monitoring. Improvements can be carried out as this proposal is a boon to future generations.

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