

AUTOMATIC GRASSCUTTER WITH PHOTOVOLTAICS AND IOT

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Abstract: *This paper describes about the development of 150W automatic solar powered grass cutter. Solar power is used to provide the driving force for the cutter and various sensors were used to detect and avoid the unnecessary objects in the field during the operation. We need an ultrasonic sensor to sense where the lawn cutter was heading an object. Safety is the main concern while designing the lawn cutter. As it has blades we need our lawn cutter not to be in operating mode if it is being held in the air by the user. Automatic grass cutting machine is a machine which performs the grass cutting operation on its own. Pollution is manmade, which we can see in our daily life. In old model of grass cutter IC engine was use, Because of its environmental impact pollution level rises IC engine driven cutter is more costly. Maintenance of such conventional machine is high. To avoid these drawbacks we plan to develop new type of grass cutter which runs on solar energy and this model is economical. The aim of our project is to make the grass cutter which operates on solar energy hence save the electricity and reduces man power.*

Keywords: *Solar panel, Battery, DC motor, Microcontroller.*

I. INTRODUCTION

Now a day's pollution is the major issue for the whole world. Pollution is manmade and can be seen in our day to day life. In case gas powered lawn mowers due to the emission of the gases it is responsible for pollution. Also the cost of the fuel is increasing. Hence it is not efficient. So the solar powered lawn cutters were introduced. Fully automated solar grass cutting device is a device which cuts the grass by its own through. This device reduces both environment and noise pollution. It can be made with the help of blades, ultrasonic sensors, vehicle motors, robotic body and high quality crystalline panels and are interfaced to an Atmega8 microcontroller.

It is an automated grass cutting vehicle powered by solar energy. It is designed such that it can avoid the obstacles automatically, while carrying out its operation of grass cutting. The system uses 12V battery to power the device. A solar panel is used to charge batteries. An Atmega8 controller is the brain of the system. The grass cutter motors and the wheel motors are interfaced to the Atmega8 controller that controls the working of all motors.

The grass cutter provides a high speed rotation to the blade, which helps to cut the grass. The blade will get kinetic energy while increasing the rpm. The cutting edges are very smooth and accurate. Also electric grass cutting machines are much easier to be used in garden, lawn and grass fields. Grass cutter contain a collecting box to collect cut grass so cut grass is put outside the lawn, ground etc. There is no need for fuel and extension wires to run the cutter. Therefore it keeps the environment pollution free and Eco-friendly.

II. LITERATURE REVIEW

[1] The grass cutter is having collecting box to collect cut grass so cut grass is put outside the lawn, ground etc. Reducing air pollution from lawn and garden equipment [2] it is pollution free. There is no need for fuel and any extension wires for run the cutter. So there is no pollution on environment. In this lawn mower uses a solar based energy source, which is easier to use, easy to move from one place to another.

[3] It is eco-friendly. The self-powered design objective is to come up with a mower that is portable, durable, easy to operate and maintain. The heart of the machine is a battery-powered dc electric motor. So there is no need of any external supply. The present technology [4] commonly used for trimming the

grass is by using the manually handled device. In this project we have automated the machine for trimming the grass. So the man power will be reduced.

It is less maintenance. The aim of the project is to make the grass cutter which operates on solar energy hence no harmful emission. It can be used indoors and outdoors. [6]It is safe to use, as well as efficient because it electric powered and cordless. There is no need any fuel and any extension wires for run the cutter.. So there is no pollution to environment. So it is pollution free or Eco-friendly.

[7] There is no need of man to operate. Safety is the main concern while designing the lawn cutter. As it has blades we wanted our lawn cutter not to be in operating mode if it was being held in the air by the user. Automatic grass cutting machine is a machine which is going to perform the grass cutting operation on its own. In old model of grass cutter [8] IC engine was used and hence because of its environmental impact pollution level rises IC engine driven cutter is more costly. Maintenance of such conventional machine is more. To avoid these drawbacks we plan to build new type of grass cutter which runs on solar energy and this model is also economical.

[9]Fully automated solar grass cutting device is a device which is cutting the grass by its own through. This device reduces both environment and noise pollution. It can be made with the help of grass cutter, ultrasonic sensors, vehicle motors, robotic body and high quality crystalline panels are interfaced to an Atmega8 microcontroller. [10] There is no need any fuel and any extension wires for run the cutter. So there is no pollution to environment. So it is pollution free or Eco-friendly.

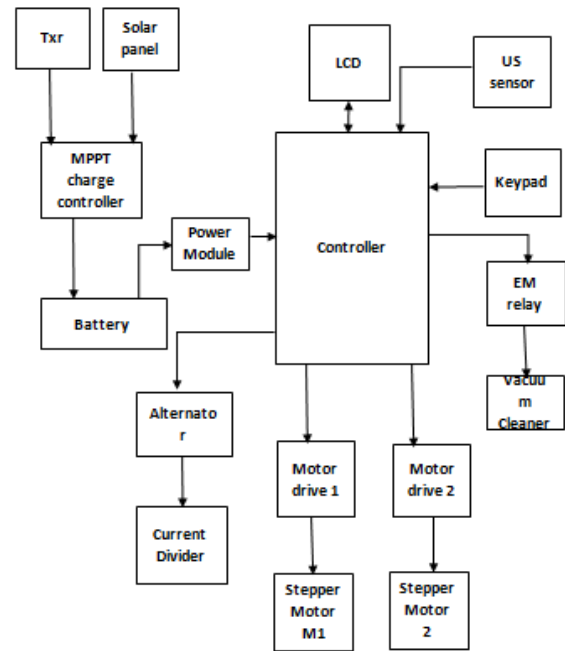


Figure 3.1 Block diagram

Solar panel



Figure 3.2 Solar panel

A solar panel is a set of solar photovoltaic module electrically connected. The source is driven from the solar energy using solar panel which receives energy and convert it into electric energy. Solar panel generates energy up to 12v.

III.METHODOLOGY

Block diagram

Battery

Solar cell module produces electricity only when the sun is shining. They do not store energy. It is necessary to store some of the energy produced. So we use battery to store electrical energy generated by the solar panel. The battery is of 12V DC.



Figure 3.3 Battery

LCD



Figure 3.4 LCD

It is used to show various messages on LCD. Although LCD does not have much use in actual application but still it is very useful for testing purpose and while developing this project, because we show various messages like obstacle detected immediate stop the system.

Keypad



Figure 3.5 Keypad

A keypad is a set of buttons arranged in a block or” pad” which bear digits, symbols or alphabetical letters.

US Sensor



Figure 3.6 US sensor

Ultrasonic sensor measure the distance of target objects or materials through the air using “non contact” technology. They measure distance without damage and are easy to use and reliable.

Microcontroller

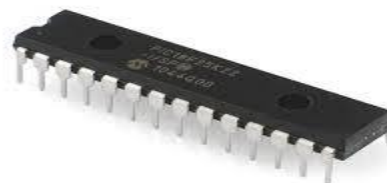


Figure 3.7 Microcontroller

It has a low power Atmel 8-bit AVR RISC based microcontroller combines 8KB of programmable flash memory, 1KB of SRAM, 512B EEPROM, and a 6-8 channel a0-bit A/D converter. The device supports throughput of 16MIPS at 16-MHz and operate between 4.5-5.5 volts. In this controller 23 I/O programmable lines are available.

Vacuum cleaner

A vacuum cleaner is also known as a sweeper, is a device that uses an air pump to create a partial vacuum to suck up dust and dirt.



Figure 3.8 Vacuum cleaner

Transformer



Figure 3.9 Transformer

A transformer is a static electrical device that transfers electrical energy between two or more circuits.

MPPT charge controller



Figure 3.10 MPPT charge controller

MPPT solar charge controller reduces complexity of system while output of system is high efficiency. Additionally, it can be applied to use with more energy sources.

Power Module



Figure 3.11 Power module

When it comes to the rapid prototyping of power electronics, one of the simplest ways to start working is to rely on pre-manufactured and pre-tested power modules. Independently from the desired topology, such modules can be assembled to form a working power converter system in a blink of an eye.

EM relay**Figure 3.12 EM relay**

This relay is used as a protecting device and also as a controlling device for various circuits, equipments and electrical networks in a power system.

Actuator

An actuator is a component of a machine that is responsible for moving and controlling a mechanism or a system, for example by opening a valve. In simple terms it is a “mover”

**Figure 3.13 actuator****DC Motor****Figure 3.14 DC Motor**

There are 4 DC motors are used for movement of the wheel. These motors are 12V brushless DC motors. 2 Motors are used to move the device in forward direction, per side one motor is used. So they work as a single unit. Another additional motor is placed at the front of the frame; this motor has blades as its propeller so that grass is cut when this motor turns on.

IV.CONCLUSION

This paper has presented the design and development of fully automated solar grass cutter. Any object or obstacle detect by ultrasonic sensor and also cutting a grass by the blade which is connected with dc motor. This paper shows how Atmega8microcontroller controlled all action of DC motors and drives this device through a power which is generated by solar plate. A solar powered lawn mower has been developed for the use of residences and establishments that have lawns where tractor driven mowers could not be used.

V.Reference

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