

Fully Automated Solar Grass Cutter

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Abstract

A Fully Automated Solar Grass Cutter is a device that uses blades to cut a grass at an even length. It is a very useful device which is very simple in construction. In this device power is delivered by the Solar Plate. Battery is used for storage the solar energy. We also use a solar panel to charge the battery so that there is no need of charging it externally. This device can be operated by Atmega8 microcontroller which is drives all the motors of wheel. For avoid any human or a obstacles sensed by the Sensors. This device shows that how technology can be used to reduce human efforts as well as to efficiently utilize renewable sources of energy.

Keywords: Out-Door Localization, Solar Plates, DC Motors, DC Motor Drive IC, Voltage Regulator, Blades, Battery, Atmega8 Microcontroller, Sensors

I. INTRODUCTION

The different types of grass cutters are available in market like, electrical grass cutter and gasoline grass cutter. In a gasoline grass cutter there is required a fuel for running a cutter and due to the engine it's produced gases so it increases pollution and also it has noisy operation. And electrical grass cutter is working on electricity though electrical motor. In electrical grass cutter used a single phase induction motor so it is required AC power. This cutter has supply through long wires so it is difficult to operate. Also due single phase induction motor the weight of the device is more so it is more difficult to operate.

To solve this entire problem try to design a solar power based fully automated solar grass cutter so it is capable of mowing a lawn by itself after having been programmed.

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 help of grass cutter, ultrasonic sensors, vehicle motors, robotic body and high quality crystalline panels 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 operations of grass cutting. The system uses 12V batteries to power the device. A Solar Panel is used to charge batteries.

An Atmega8 controller is used as the brain of the system. The grass cutter motors and the wheel motors are interfaced to the Atmega8 microcontroller that controls the working of all the motors. Detection of objects or obstacles is a very important factor for safety of the machine as well as human safety. On detection of object or obstacle a pre-programmed action is taken by the controller as per the conditions sensed by the sensor. 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.

II. BLOCK DIAGRAM

The Fig.-1 shows the block diagram of the "Fully Automated Solar Grass Cutter". As shown in block diagram there are many components are connected with each other. The solar panel is charged through the sun radiations and it generates the power. The power is stored in the battery.

This power is given to the micro-controller which is controlled the whole device and operate automatically. There is used ultrasonic sensor which sense or detect the object and protect against damaged.

The motors are used for moving and cutting. It is controlled by the micro-controller. The blade is used for cutting the grass.

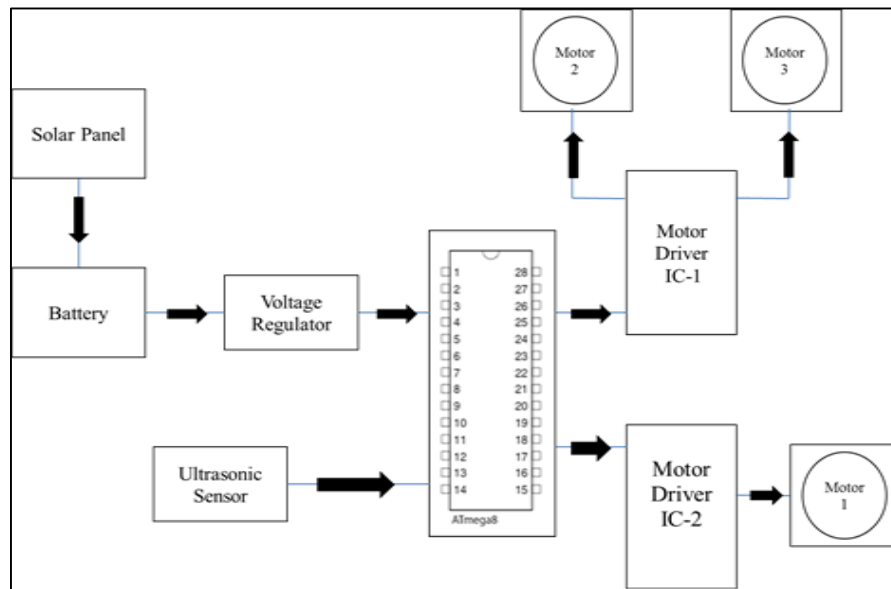


Fig. 1: Block Diagram

III. WORKING

The working of fully automated solar grass cutter, it has panels mounted in a particular arrangement at an angle of degrees in such a way that it can receive solar radiation with high intensity from the sun. 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 of batteries is low.

The motor is connected through the motor driver IC which is controlled the motor performance. The power transmits to the mechanism and this makes the blade to rotate with high speed and this makes to cut the grass at an even height. The cutter and vehicle motor are controlled by Atmega8 microcontroller. It is move the vehicle in forward direction.

To avoid and protect the device from any human interaction or any large and/or small obstacles the ultrasonic sensor is used. The sensor is sensed in some maximum distance for example 1m, 2m, etc it depends on which type sensors are used.

IV. MAIN COMPONENTS

In this device there are main two parts like, solar panel and atmega8 microcontroller.

- Solar Panel
- Atmega8 Microcontroller

A. Solar Panel

The solar panel is charged through the sun radiations and it generates the power. There are mainly three type of solar panels are available in market like, monocrystalline, polycrystalline and thin film. Monocrystalline panel is more efficient than other so here this type of solar panel used. Monocrystalline panels are generally constructed from high quality silicon cell. In this device used solar panel in between ration of 12V and 240mA. This solar panel is connected with the 12V battery through the solar battery charger.

B. ATMEGA8 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 to 8 channel 10-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.

C. DC Motors

Here the dc motors used are 12V brushless DC motors are running at 150RPM. 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. The motors are controlled by the micro controller.

V. ADVANTAGES

- Non skilled person can also operate.
- It is pollution free.
- No required any external supply.
- It is economical.
- Compact in size and portable.
- No any fuel cost.
- Easy to move from one place to another place.
- Freedom from long extension wires.

VI. APPLICATION

- For a garden.
- For hospital.
- For collages.
- For small farms.
- For nurseries.
- Playground like, cricket ground, football ground etc.

VII. 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 that how Atmega8 microcontroller controlled all action of DC motors and drives this device through a power which is generated by solar plate.

REFERENCES

- [1] "Experimental Study Of Solar Power Grass Cutter Robot" by Ashish kumar chaudhari, Yuvraj sahu, Prabhat kumar Dwivedi, Harsh Jain, Mechanical Department, MATS University Raipur , Chhattisgarh, India
- [2] "Solar Grass Cutter With Linear Blades By Using Scotch Yoke Mechanism" by P.Amrutesh, B.Sagar, B.Venu, Mechanical engineering, MeRITS,A.P,India.
- [3] "Design And Implementation Of Automatic Lawn Cutter" by Pratik Patil, Ashwini Bhosale, Prof. Sheetal Jagtap Department of Electronics & Telecommunication Engineering, Brahmdevdada Mane Institute of Technology, Solapur, India