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FULLY AUTOMATED SOLAR GRASS CUTTER

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Abstract

Grass cutter machines have become very popular today. Most of the times, grass cutter machines are used for soft grass furnishing. In a time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is man-made and can be seen in our own daily lives, more specifically in our own homes. Herein, we propose a model of the automatic grass cutting machine powered through solar energy, (nonrenewable energy). Automatic grass cutting machine is a machine which is going to perform the grass cutting operation on its own. This model reduces both environment and noise pollution.

Our new design for an old and outdated habit will help both customer and the environment. This project of a solar powered automatic grass cutter will relieve the consumer from mowing their own lawns and will reduce both environmental and noise pollution. This design is meant to be an alternate green option to the popular and environmentally hazardous fuel powered lawn mower. Ultimately, the consumer will be doing more for the environment while doing less work in their daily lives. The hope is to keep working on this project until a suitable design can be implemented and then be ultimately placed on themarket.

I. Introduction

Automated solar grass cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting, without the need of any human interaction. The system uses 12V batteries to power the vehicle movement motors as well as the grass cutter motor. We also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to an 8051 family microcontroller that controls the working of all themotors.

It is also interfaced to an IR sensor for object detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected. On obstacle detection,IR sensor monitors it and the microcontroller thus stops the grass cuter motor so as to avoid any damage to the object/human/animal. Microcontroller then turns the robotic vehicle offuntil it gets clear of the object and then moves the grass cutter in forward direction again.

II .METHODOLOGY:

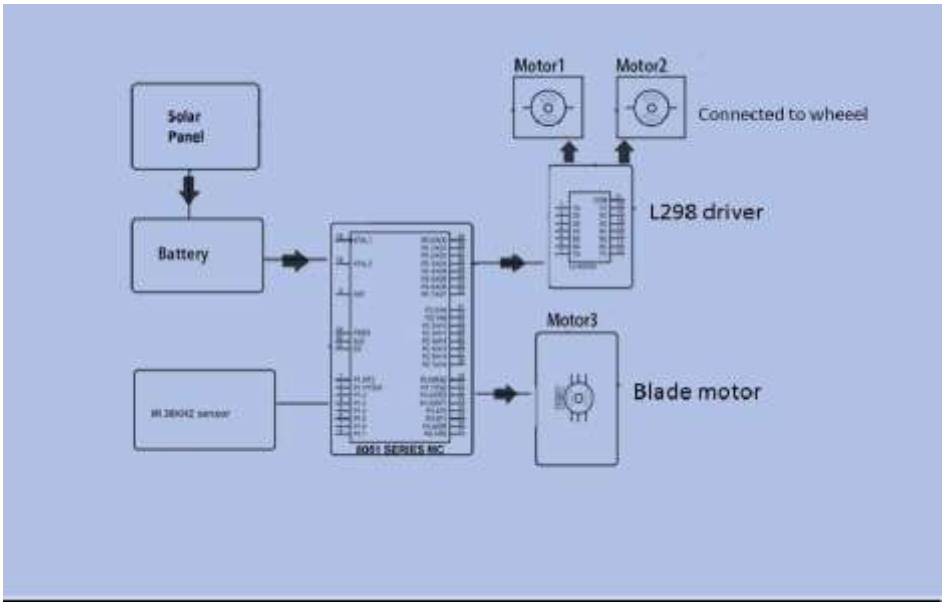

Fig.1 Block diagram

The above block diagram shows a complete view of the final project module

- The source is driven from the solar energy using photovoltaic panel which charges the battery and is utilized for powering operation of thesystem.
- The system's control is done by the P89V51RD2microcontroller.
- Automation for object detection is achieved by using 38 KHz IR sensor and microcontroller.
- Wheel movement and cutting operations are done using DCmotors.
- To achieve compatibility of microcontroller and the motors a L298 driver circuit is used.
- The driver circuit enhances the microcontroller's smalloutput.
- Toggle switch is used to select the mode of operation and DPDT switch for movement operations.
- Wheel chains with 26 links on both sides are attached to a platform which supports the wholemodel.
- Wheels move when two motors of 45rpm aredriven.
- Cutting blade of length 4cm and width 0.3 cm is used for cutting operations.Cutting action of the blade is provided by a motor of18000rpm.

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

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.

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.

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. RESULT

Automated solar grass cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting, without the need of any human interaction. The system uses 12V batteries to power the vehicle movement motors as well as the grass cutter motor. We also use a solar panel to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to an 8051 family microcontroller that controls the working of all themotors.

VIII. CONCLUSION:

Our project entitled Fully Automated solar grass cutter is succesfully completed and results obtained are satisfactory.

IX. FUTUREWORK:

- Size can be reduced to make itcompact
- Efficiency can be improved by increasing the batterycapacity
- More sensors can be incorporated for accurate results and improvedautomation
- Programming can be enhanced to make the device perform differentoperations.

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