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Grass Cutter Based on Renewable Energy Source

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Abstract: Grass Cutter is a device that uses blades to cut a grass in a uniform measure. It is very simple in construction and operation, as it uses solar energy which is a renewable energy source. A Rechargeable Battery is used to store the solar energy and charge the battery so there is no need to load it externally. The grass cutter can be operated manually and also by Bluetooth device that is automated. Arduino UNO is used to control the grass cutter robot, which is the brain of the project. BLDC Motor is used to cut the grass at high RPM.

Keywords: Arduino UNO, Solar panel, DC motors, Motor Driver IC, Blade, Ultrasonic Sensor, Battery, Brushless DC Motor (BLDC Motor)

I. INTRODUCTION

The system uses an Arduino Uno microcontroller, Battery, DC motors, Ultrasonic sensor and Solar panel. The main source of power is the solar panel which is used to charge the battery. This project of a solar powered automatic grass cutter will reduce both environmental and noise pollution. The Ultrasonic sensor is an obstacle detection sensor, it detects any obstacle present in that particular range. DC motors are used to move the wheels of the robot and also rotate the cutting blade. Depending on the sensor input, the Arduino controls the grass cutter.

II. PROPOSED DESIGN METHODOLOGY

Presently, manually handled device is commonly used for cutting the grass over the field which creates pollution and loss of energy. The wireless grass cutter system puts forth an automated lawn mower mechanism. This will reduce the effort required for cutting grass in the lawns and solar power used will help to contribute in lowering pollution.

A. Block Diagram

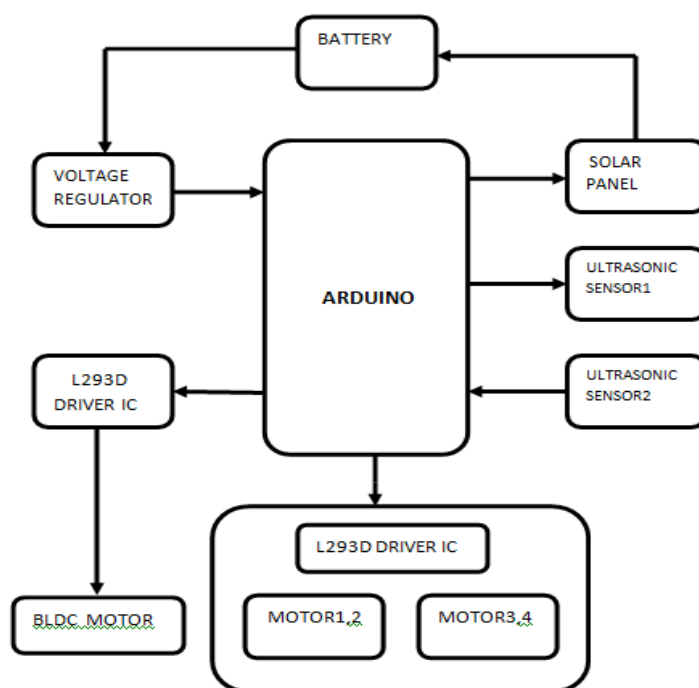


Figure 1 the proposed system for Grass Cutter

III. HARDWARE IMPLEMENTATION

A. Voltage Regulator

A voltage regulator is an electronic circuit that provides a stable DC voltage independent of the load current, temperature and voltage variations of the AC line. 7805 voltage regulator is used.

B. Solar Panel

The power source of this project is solar energy. A 12 volt, 1 ampere solar panel is used.

C. Arduino UNO

Arduino UNO microcontroller have 14 analog pins and 6 analog pins.

D. Battery

A 12 volt rechargeable battery is used to store solar energy.

E. DC Motor

12 volt, 150 RPM DC Motors are used for the vehicle movement of the robot.

F. BLDC Motor

A 12 volt, high RPM brushless DC motor is used to control the cutting blade.

G. Ultrasonic sensor

The HC-SR04 Ultrasonic sensor is used to detect the obstacle.

H. Bluetooth

HC-05 bluetooth device is used to operate the grass cutter wireless.

I. Motor Driver IC

L293D Motor Driver IC is used to control the motors.

IV. EXPERIMENTAL SETUP AND RESULT

Arduino UNO is main part of the grass cutter. It sends commands to the robot. Manually the grass cutter can be operated by using switches while Bluetooth is used to operate the robot automatically. Voltage regulator provides the required 5v supply to the controller. Battery gives the 12 volt voltage to the motors.

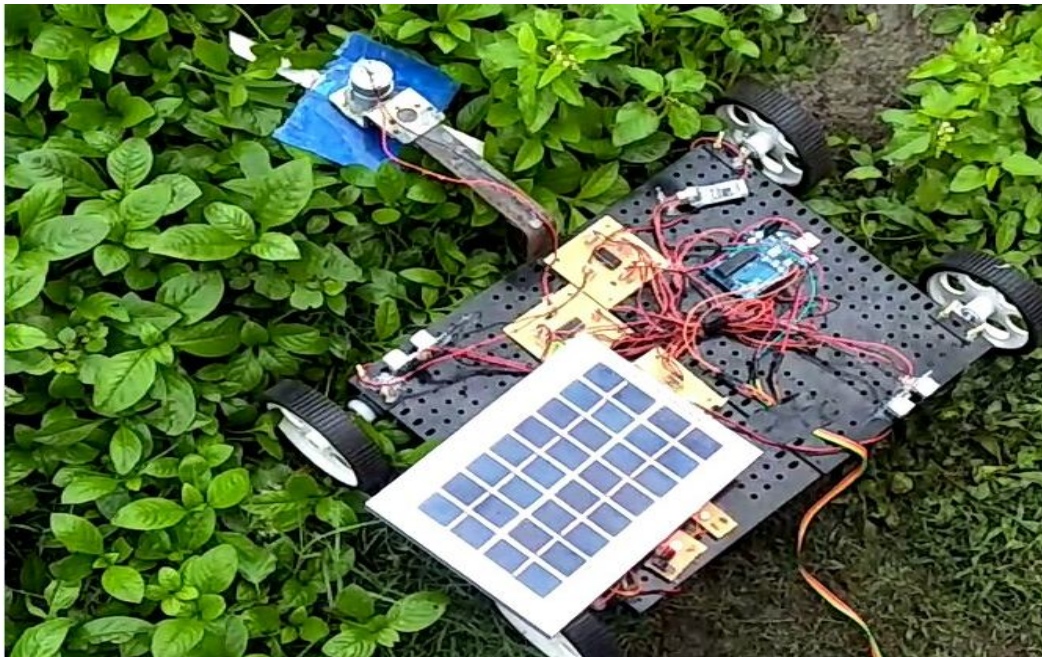


Figure 2 grass cutter robot



Figure 3 grass cutter cutting the grass

This project is more appropriate for an ordinary man, since he has much more advantages, that is, without the cost of fuel, pollution and fuel residue, less wear for less number of moving components and this can be operated through the use of solar energy.

V. CONCLUSIONS

By using this grass cutter robot, we can preserve the non-renewable energy sources like petrol, gasoline, etc. We can also reduce various forms of pollution such as air pollution and noise pollution. Electricity is saved when we use solar energy which is source of renewable energy and is present in abundance.

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