

Automated Solar Grass Cutter

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ABSTRACT

Nowadays the automation plays very important role in the field of inventions and also automation is growing very rapidly. So, it plays very important role in the life of humans. Before, the grass cutter was handled manually that is by human contact and also, they require fuel or energy for working, Due to this there is lot of loss of fuel and energy and it causes pollution as fuel is used for running the device The requirement of electrical energy is growing at very faster rate as the use of electrical devices is increasing and the large amount of industries and the machineries. Solar energy is a best free source of the energy, we are also running out of fuels. the conventional grass cutter is very costly and its maintenance cost is very high. So, we need to replace the conventional grass cutter to the new automated solar power-based grass cutter to avoid the above drawbacks. This model is economical as compare to the conventional one. The main motto of this device is to create a grass cutter that runs on solar power energy, thus to save the electrical energy and to reduce the human interface. In this project we use Arduino UNO microcontroller for controlling the operations of a grass cutter, the grass cutter has provided with Ultrasonic sensor for obstacle detection, a blade for cutting the grass, and DC motors for the wheels of the Robot. It is fully automated and renewable energy-based project. Grass cutter operates automatically thus it does not require any skilled person to operate the device.

Keyword : - Solar power, Arduino UNO, Solar energy, Ultrasonic Sensors, Blade, DC Motors

1. INTRODUCTION

Solar energy is a renewable source of energy. Its sources are divided into two types they are passive solar source and active solar source. These sources are completely depending upon how the solar energy is captured and it is distributed and also on how it is converted to the solar power. As we know the solar energy is free energy and it can be utilized easily. By using this solar energy, we operate solar grass cutter. In the market there are many different grass cutters are available such as gasoline-based grass cutter, electrical energy-based grass cutter. The electrical grass cutter depends upon electricity and the gasoline-based grass cutter requires fuel to work. The burning of fuel in gasoline grass cutter cause air pollution as well as noise pollution. For the cutter machine large cable wire is required for cutting the grass of large area and the weight of motor is also heavy. So, as the technology is improving, we also need to replace the traditional conventional grass cutter to the new automated solar based grass cutter.

So, from the above difficulties, tried to make an automated solar based grass cutter which having battery of 12V and a solar panel which used to store the solar energy in the battery. There are total 5 DC motors are used in the device from which 4 are used for moving device from one place to another and one big motor is used for cutting of the grass. These motors are connected to the motor driver and handled by Arduino UNO. For the obstacle detection purpose ultrasonic sensor is used. There is on need of wire and fuel to operate device. So, the device is pollution less and eco-friendly. The device has given with two modes to operate within they are automatic and also one can operate the device with phone by connecting the device with Bluetooth as Bluetooth module is provided in the device.

This project provides the designing steps for automated solar grass cutter, whose aim is to cut the grass of the specified area which is specified to the device without any human interaction. The output is achieved by using the sensors and various components. The ultimate goal of this device is to create a similar device as traditional grass cutter with better efficiency and of low cost.

2. METHODOLOGY

The device consists of Arduino UNO microcontroller, Ultrasonic sensor, Bluetooth Module and a Solar powered system. Connecting these elements in required format we get our desired system structure. The Ultrasonic sensors works as the eyes of the device, To provide the required power to the device we use the battery and to charge the battery we mount solar panel at the top of the device, The battery supplies the energy to the components and according to the commands the motor moves. And this machine will also remove the hurdles on its way. The system does not require any human interaction for the operation of the system. Once the input is provided it will all work by itself and as the area is covered it will stop by its own.

3. BLOCK DIAGRAM

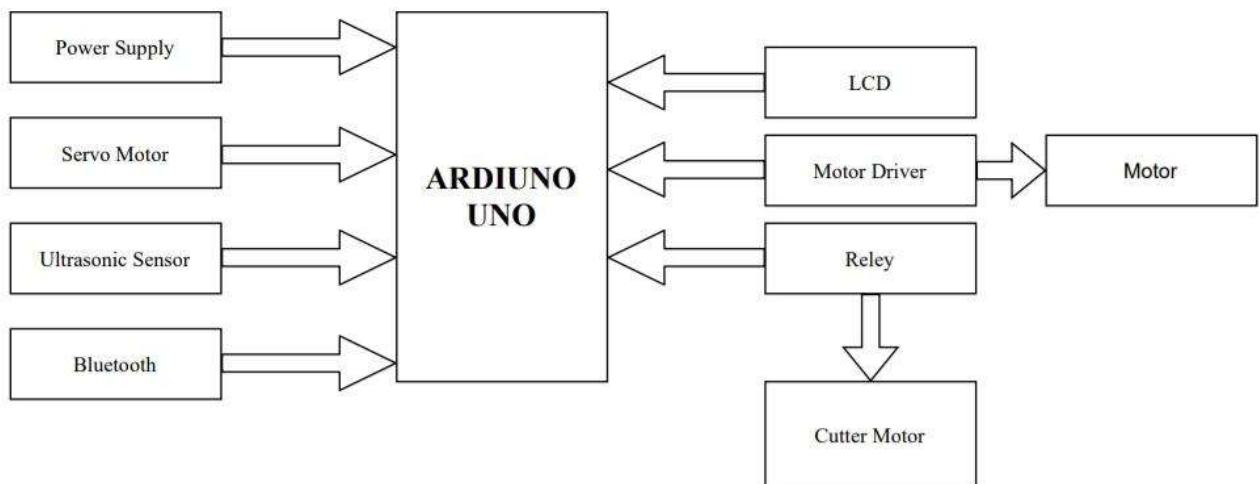


Fig 2.1: block Diagram of Automated solar Grass Cutter

3.1. COMPONENTS

- Solar panels
- Batteries
- DC motor
- Motor Driver
- Ultrasonic Sensor
- Relay
- Bluetooth Module
- Blades

3.2. FLOW CHART

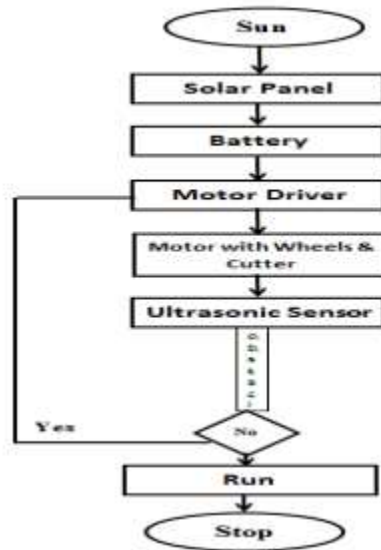


Fig3.1: Flowchart

3.3. CIRCUIT DIAGRAM

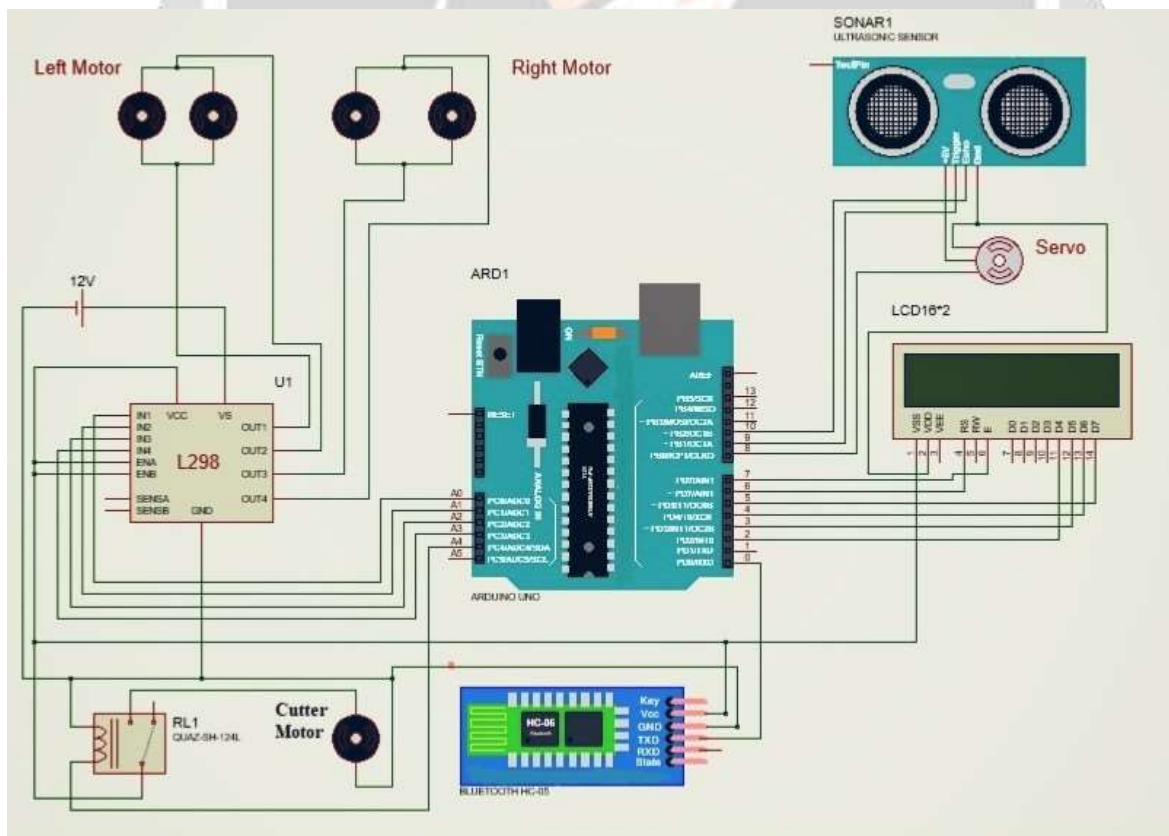


Fig3.2: Circuit Diagram

4. WORKING

1. The solar panel receives solar energy from the sun, then it converts to the electrical energy which it stores to the battery. The solar panel is mounted on the top of the bot so it can easily get contact with the sunrays.
2. Ultrasonic sensor is mounted at the front of the bot which acts like eyes to the bot it is used to determine the obstacles. It detects obstacle then stops and takes turn.
3. In the device motor driver is provided to run the bot in any directions, the motor driver is connected with DC motors.
4. A high rpm DC motor is provided to the device which is used to cut the grass.
5. It can also be handled by Bluetooth device as Bluetooth module is provided in the device.
6. And battery can also be charged using electrical energy so device can be used in any wheather.

5. ADVANTAGES

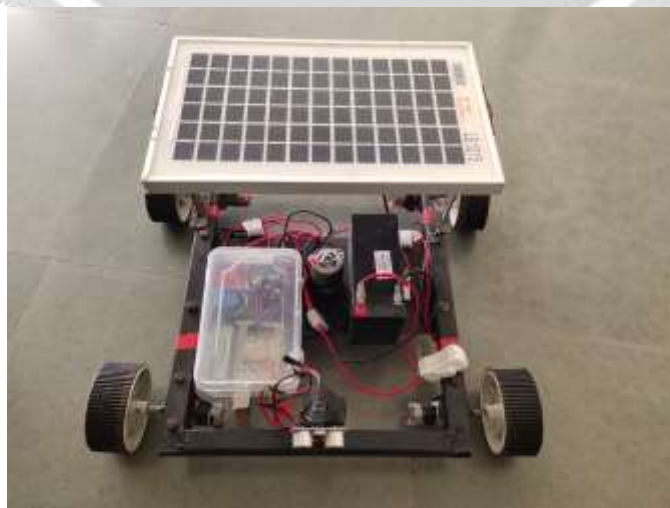
- No long wires required.
- Compact Design and easily Moveable
- No Fuel required
- Less maintenance
- Very economical
- Anyone can operate
- Eco-friendly
- Pollution free

6. APPLICATIONS

- Farms
- Gardens
- Stadiums
- College grounds
- Lawns and many more

7. RESULT

A solar based automated grass cutter has been manufactured successfully and can be used for cutting the grass Thus the project has been successfully designed and tested. This lawn mower will meet the requirement of environmental production and low cost of operation as there is no cost for fueling. The grass cutter work automatically because of controlling mechanism. By the ultrasonic sensor the obstacle is also detected.



8. FUTURE ENHANCEMENTS

In the current situation the robot is able to do its objective with 100% success. But as the trend changes in technology new enhancements has to be made, new features can be added with the conventional components. The precision of grass cutting can be improved and the precision of edges of area to be operated can be also improved. Automatic blade changing functions can also be added and also function to set the size of grass to be cutted can be added.

9. CONCLUSIONS

Our project is successfully completed and the results obtained are satisfactorily. It will be easier for the students or other people who are going to perform similar project for further improvements to the project. This machine is suitable to anyone as it is very easier to use and no skill is required to handle the machine. The machine is having so much advantages such as no fuel cost, no pollution, less maintenance cost and can be operated using solar energy so common can get it easily. As Grass cutting requires so much time; it is believed that human should not be waste their time on such tasks or at least reduce the time to minimum. The cost effectiveness and the ease in handling makes the robot to be a necessity instead of a luxury and finally this project may give inspiration to the people for any future enhancement in this project.

10. ACKNOWLEDGMENT

I have been sincere desire of every individual to get an opportunity to express his views, skills, attitude and talent in which his proficient to give his satisfaction and confidence in his ability to do or produce something useful for humankind. A project is one such avenue through which an engineer gives vent to his feeling and expressions. We wish to thank our project guide **PROF. Ms. Rasika Belsare** for his valuable suggestion and inspiring guidance. We also express deepest thanks to HOD of electronics and telecommunication dept. **Dr. Abhay Kasetwar** & staff members concerned who have meticulous planning created a comfortable co-existence of the projects and college schedule. Last but not least we are also thankful to our friends who gave us their help and great co-operation to make our project successful directly and indirectly.

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