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Solar Powered Fully Automated Grass Cutting Machine

Bincy Abraham¹, Darsana P S², Isabella Sebastian³, Sisy N Joseph⁴ Prof. George John P⁵

B.Tech Student, Department of Electrical and Electronics Engineering, Mar Athanasius College of Engineering,
Kothamangalam, Kerala, India ¹

B.Tech Student, Department of Electrical and Electronics Engineering, Mar Athanasius College of Engineering,
Kothamangalam, Kerala, India ²

B.Tech Student, Department of Electrical and Electronics Engineering, Mar Athanasius College of Engineering,
Kothamangalam, Kerala, India ³

B.Tech Student, Department of Electrical and Electronics Engineering, Mar Athanasius College of Engineering,
Kothamangalam, Kerala, India ⁴

Professor, Department of Electrical and Electronics Engineering, Mar Athanasius College Of Engineering,
Kothamangalam, Kerala, India ⁵

ABSTRACT: The project aims at fabricating a grass cutting machine system which makes the grass cutter motor running through solar energy. The “Solar Powered Grass Cutting Machine” is a robotic vehicle powered by solar energy that also avoids obstacles and is capable of automated grass cutting. The system uses 12V battery to power the vehicle movement motors as well as the grass cutter motor. A solar panel is used to charge the battery so that there is no need of charging it externally. The grass cutter and vehicle motors are interfaced to pic microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for obstacle detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected. On obstacle detection the ultrasonic sensor monitors it and the microcontroller thus stops the grass cutter motor to avoid any damage to the object/human/animal whatever it is and it also provides an alarm. Microcontroller then turns the vehicle as long as it gets clear of the object and then moves the grass cutter in forward direction again otherwise it changes the direction.

KEYWORDS: Solar Panel, Relay, DC motor, Blades, Ultra sonic sensor, Micro controller Battery.

I. INTRODUCTION

Grass cutter machines have become very popular today. Most common machines are used for soft grass furnishing. The main parts of the Grass cutting machines are DC motor, relay switch for controlling motor, Battery for charging it through solar panel. It is placed in a suitable machine structure. The motors having 350rpm and 35rpm are connected to the electric supply by the use of a roll of wire. The linear blades are attached in this machine. Working principle of the grass cutter is providing 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. In order to enhance the beauty of home-lawns and gardens, Grass cutting machines are the best available option in the industry. With the help of a lawn mower which is a machine with revolving blades to help us cutting lawns at even length, people can easily maintain and beautify their lawns and gardens without any hassle.

Now a day, there are plenty of options starting from the simplest push along mower to the most advanced electric grass cutting machine. According to world energy report, we get around 80% of our energy from conventional fossil fuels like oil (36%), natural gas (21%) and coal (23%). It is well known that the time is not so far when all these sources will be completely exhausted. So, alternative sources should be used to avoid energy crisis in the nearby future. So



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introduce solar energy for the machine process to work. A solar panel is a large flat rectangle. The cells, each of which is about the size of an adults palm, are usually octagonal and colored bluish black. Just like the cells in a battery, the cells in a solar panel are designed to generate electricity; but where a battery cells make electricity from chemicals, a solar panel cells generate power by capturing sunlight instead. Solar grass cutter have no moving parts and hence require little maintenance and work quite satisfactorily without any focusing device. It does not cause any environmental pollution like the fossil fuels and nuclear power. Solar cells last a longer time and have low running costs.

II. RELATED WORK

Sivarao, T.J.S.Anand, Hambali, Minhat, Faizul[1] presented a review of researches done on the subject of automated tractor. An autonomous tractor is a vehicle that can operate without or with minimal human control, self-propelled and guided automatically along a desired path. The benefits from such a system are useful for agriculture industry by reducing labour cost and time, as well as improving output efficiency by eliminating human errors. Many researches and inventions have been made, with the results ranging from successful, encouraging to some that are impractical for commercial implementation for certain reasons. These implements include sensor, global navigation satellite system, machine vision, laser triangulation, ultrasonic transmitter and geomagnetic controller, as well as actuator and servo motor.

Pratik Patil, Ashwini Bhosale, Prof. Sheetal Jagtap[2] described about an automatic lawn cutter that will help the user to cut the grass in their lawn with less efforts. The different sensors are used it will detect and avoid objects and humans while mowing. The main objective of this automatic lawn cutter is that the user can specify the area that is to be mown and also the height of grass as per there requirement by using the keypad. This design contains a microcontroller like ATmega 16,multiple sensors, LCD Display, Keypad.

Ernest L. Hall[3] another example of an autonomous lawn cutting system is called the Weed Eater developed by the Weed Eater Corporation. The system is a solar powered emission free mower that harnesses enough power to operate itself. The robot is equipped with 34 iridescent solar cells embedded on top of the systems platform and has the capability of handling properties up to 13,500 sq-ft. The system operates on the same principle as the Lawn Ranger except it uses a cable beneath the surface of a persons lawn. The mower uses this wire along with its sensors to allow the robot to maneuver around while keeping the system on track. The mower will continue to operate as long as the mower has energy, from the sun. The robot is equipped with a flexible bumper that when activated backs the mower up and continues the robot on a different path. It has the advantage of cutting grass in the form of a mulch so that the use of a grass catcher or raking is not required.

III. PROPOSED METHODOLOGY

We design “Solar Powered Grass Cutting Machine” using LCD Display and Keypad.” in which rechargeable battery used for automatic purpose which is main objective of our grass cutter, also uses 3 DC motor of 5v and for cutting we use 12v and high torque DC motor. The Fig (3.1) shows the block diagram of an “Solar Powered Grass Cutting Machine”.

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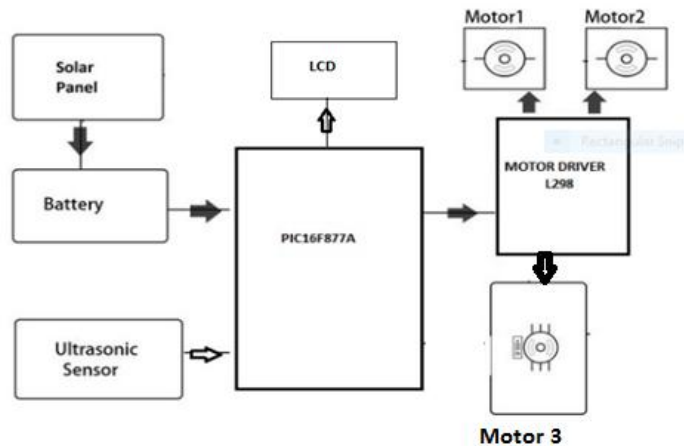


Fig 3.1 Block Diagram of Proposed System

The Hardware components which include,

- . PIC Microcontroller
- . LCD Display
- . Ultrasonic Sensor
- . Driver Circuit
- . Relay
- . Robot Model
- . Dc Motor
- . Zigbee

To give a brief description of the project, The fig (a) shows the block diagram of “Solar Powered Fully Automated Grass Cutting Machine”. This design contains a microcontroller, ultrasonic sensors. Adding these elements together, we get our robotic grass cutter. The goal was to let our robot see the difference between grass and concrete while monitoring its surroundings continuously. Initially, we had an idea what type of sensors we wanted to use. we wanted object detection an ultrasonic sensor to detect if the robot was heading into an object. Safety is the main concern when designing a robot with blades. For inserting input we use Keypad in 16*2 matrix. The programing was done in MP Lab and Proteus by using PIC16F877 IC.

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IV. RESULTS AND DISCUSSION

A. Hardware Setup

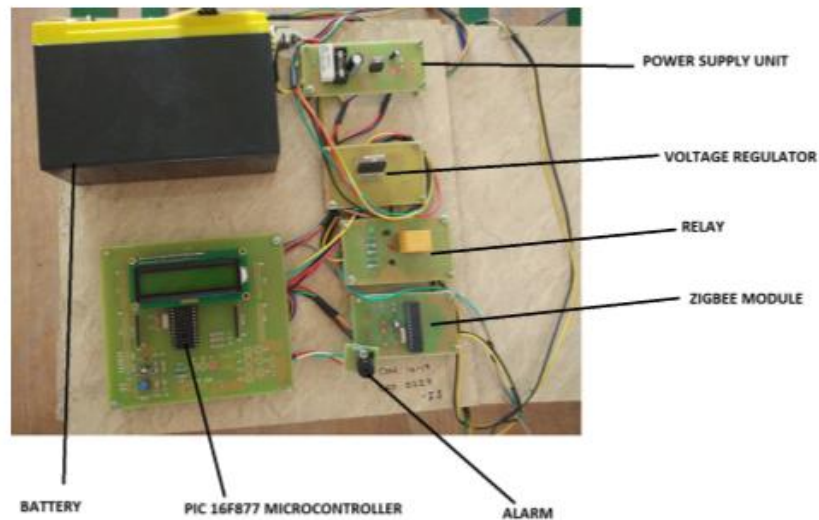


Fig 4(a) Hardware Setup

Fig 4(a) shows the hardware setup consist of seven sections which are power supply unit, zigbee module, voltage regulator, relay, alarm, battery and a PIC16F877 microcontroller

B: Remote Setup

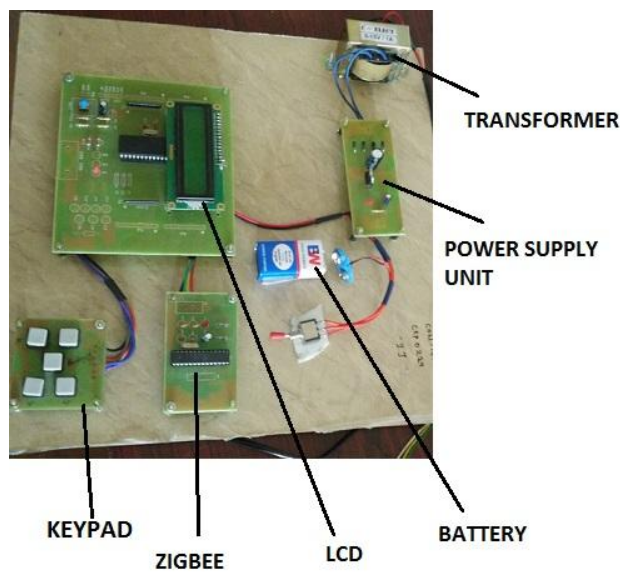


Fig 4(b) Remote Setup

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The figure 4(b) shows the remote setup which consists of six sections which are power supply unit ,transformer ,battery ,keypad, zigbee , LCD .

Fully automated solar grass cutter project was implemented and tested. Ultra sonic sensor is used to detect the obstacle in front of the vehicle. Vehicle is charged by the solar panel and charge is stored in a battery. The project was successfully completed.



Fig 4(c) Over All Hardware Kit

V. CONCLUSION

A Smart waste management system is a step forward to make the manual collection and detection of wastes automated in nature. The developed system integrated by using the smart Vehicle System and the Smart Monitoring and controlling, in which it would pioneer work for solid waste collection, monitoring and management processes. The currently employing method in which concerned municipal employee has to look for the filled waste bins manually across different spots in an area/street for checking regularly whether the waste bin is filled or not, which is complex and time consuming process. This automation of waste also reduces the human effort and consequently the cost of the whole process. Robot model is used for carrying and unloading the solid wastes in dustbin by using DC motor. This Method is most effective in large corporation areas. This method can be implemented practically. In future, some additional features will add to this project to crush and recycling plastics and other materials automatically.

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