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SOLAR BASED ROBOTIC GRASS CUTTER

YOGINI NAMJOSHI¹, MONALI PATEL², NILIMA SINGH³ & NEETA KARHADKAR⁴

¹²³⁴ Department of Electronics and Telecommunication Engineering, Nutan Maharashtra Institute of Engineering and Technology, Talegaon, India

ABSTRACT— The solar grass cutter is a grass cutting robotic vehicle powered by solar energy that also avoid obstacles and is capable of automated grass cutting without the need of any human interaction. 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 object 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. Microcontroller then turns the robot as long as it gets clear of the object and then moves the grass cutter in forward direction again.

Keywords: Solar panel, Battery, Ultrasonic sensor, PIC.

I. INTRODUCTION

Human activity is overloading atmosphere with carbon dioxide and other global warming emissions, which trap heat, steadily drive up the planet's temperature, and create significant and harmful impacts on health, environment, and climate. The advantage of using solar energy is that it does not produce harmful emissions. Most of the devices used in day to day life are based on electric supply or non renewable sources such as diesel, petrol, coal. These non renewable sources are responsible for

environmental pollution due to emission of harmful gases in our environment. Also there will be possibility that one day these non renewable sources are going to extinct. Now it has become essential that world should switch to renewable sources.

To reduce the consumption of energy generated from fossil fuels, and help protect the environment, automated solar grass cutter is introduced. It is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of grass cutting without the need of any human interaction. It uses 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 microcontroller that controls the working of all the motors. The microcontroller moves the vehicle motors in forward direction in case no obstacle is detected.

II. LITERATURE REVIEW

To design Automatic grass Cutter we have referred various literature and papers .The review of previous method used given below: Robotic grass cutter using solar based energy source, which is easier to use and more advantageous comparing to other energy source especially for gas based source of power . We observed various problems with available grass cutter. The available mowers are petrochemical powered or electrical powered which consumes large amount of conventional energy Source. The present technology commonly used for trimming the grass is by using the manually operated. In this

project we have automated the machine for cutting the grass.

III. SYSTEM DESIGN

3.1 Description

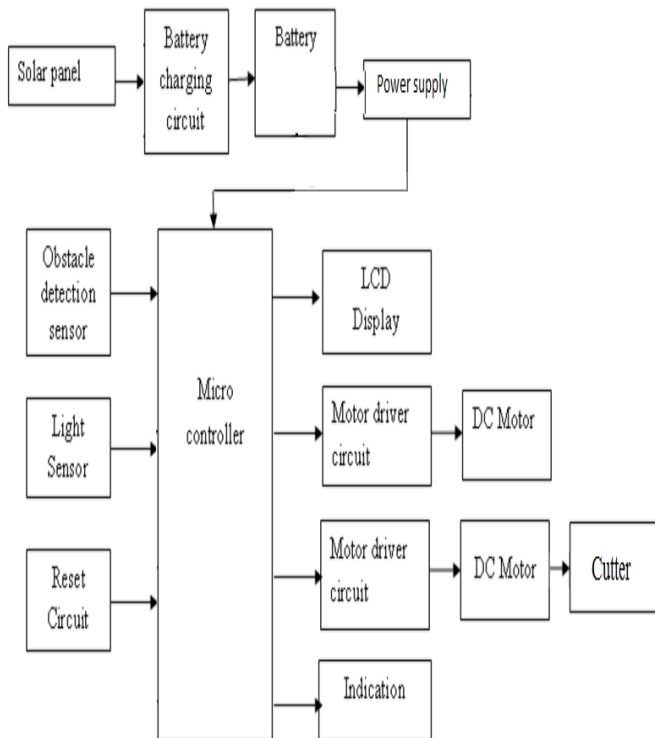


Figure 1. Block diagram

To design “Automatic solar based robotic Grass cutter” in which light sensor is used to detect dark condition across the robot. LCD display along with keypad is to provide general information (owner name, security code). We are using PIC microcontroller as it having advanced features as compared to 8051 series including inbuilt ADC, FLASH memory, large input/output ports etc. Two motor drivers are used as there are three dc motors (two for wheels, one for cutter). Obstacle sensor is used to detect object in front of robotic vehicle. Lead acid, rechargeable battery, to store the

energy being produced by given generating source and when its source is unavailable this energy can be used by loads. Solar panel consist of photovoltaic material that convert the radiant energy coming from sun to electrical energy.

IV .COMPONENTS USED:

Ultrasonic Sensor

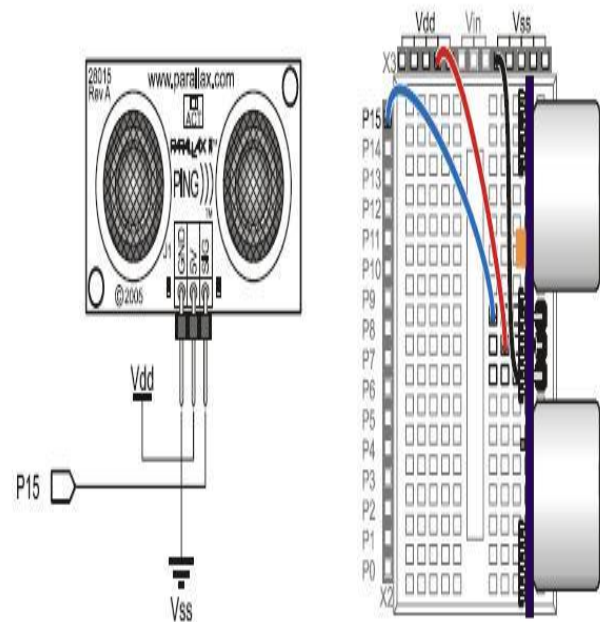


Figure 2: Ultrasonic Sensor

An ultrasonic transducer is a device that converts energy into ultrasound, or sound waves above the normal range of human hearing. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

Why to use Ultrasonic sensor

	Required	Not Required
Sr. No.	Ultrasonic	Infrared
1	Ultrasonic transducer converts electric energy to sound and throw it. Whenever the obstacle is in front the echo is received	IR sensor measure the IR light that is transmitted in the environment to find object by an IR LED
2	Range is in cm upto 15ft.	High range upto several miles.
3	Sensor response is not depends on colour, transparency of object, optical reflection properties	This sensor is very sensitive to IR light and sunlight.
4	Accurate detection even of small objects, also work in critical conditions such as dirt and dust.	It has weakness to darker colours such as black , also cannot made difference between obstacle and surrounding as rely on temperature.

Table 1: Comparison of sensor

PIC Microcontroller



Figure 3: PIC Microcontroller

Microcontroller is the brain of robotic system. PIC16F877 has 10 bit ADC, 8K ×14 Flash, 14 Interrupt, 5 input/output ports, parallel communication PSP. The ADC channels are being used for analog to digital conversion from the sensors. These digital values are processed by microcontroller and then applied to driver circuit.

Driver IC

Driver IC L293D has output Capability of 600mA per channel, over temperature protection, 1.2A peak output current (non repetitive) per channel, 4 input/output (2 output for each dc motor).

DC Motor

A DC motor is any of any class of electrical machines that converts direct current electrical into mechanical power. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in one part of the motor. A dc motor’s speed can be controlled over wide range, using either a variable supply voltage or by changing the strength of current in its field winding. We used one motor with high rpm value (cutter) and other two with low rpm value (two wheels).

Solar Panel



Figure 4: Solar Panel

Photovoltaic (PV) systems convert light energy directly into electricity. Sunlight is composed of

photons, or bundles of radiant energy. When photons strike a PV cell, they may be reflected or absorbed (transmitted through the cell). Only the absorbed photons generate electricity. When the photons are absorbed, the energy of the photons is transferred to electrons in the atoms of the solar cell.

V. FLOW OF PROJECT

1. Battery will get charged through solar panel.
2. Robot will start moving in forward direction and cutter will start spinning.
3. Cutting process will take place.
4. If there is any obstacle robot will stop and change the direction and will continue the cutting process.

VI. CONCLUSION

The solar based robotic grass cutter is designed with aim of reducing green house gas emissions, which effects the environment. Automation in grass cutter will help us to reduce the human effort and will give efficient output. The main aim of this project is to

make a solar powered robotic grass cutter system which will help to cut the grass in lawn with less human effort. The different sensors are used in this project to detect the environmental conditions as well as to avoid the obstacle. This small scale project can be implemented in any public garden with minimum cost and resources.

VII. REFERENCES

- ❖ Darwin Ramos and Jessie Lucero proposed “A solar powered automatic lawn mower”. Sanjose state university, electrical dept In 2009,
- ❖ Guo-shing Huang and Keng-Chih Lin proposed “Intelligent auto-saving energy robotic lawn mower”. IEEE transaction on robotics. Pg 4130 to 4136 In 2010,
- ❖ Muhammad Wasif proposed “Design and implementation of autonomous lawn-mower robot controller” IEEE 2011 transaction paper. In 2011,
- ❖ Junho Yang and Soon-Jo Chung proposed “vision-based localization and mapping for an autonomous mower”. IEEE intelligent robots and systems (IROS) nov 3-7 tokyo, japan. In 2013,

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**Address:- Dr. Ashak Hussain Malik House No-221, Gangoo Pulwama - 192301
Jammu & Kashmir, India
Cell: 09086405302, 09906662570,
Ph No: 01933212815**

**Email:- nairjc5@gmail.com, nairjc@nairjc.com , info@nairjc.com
Website: www.nairjc.com**

