Solar Grass Cutter Using Bluetooth

Sachin Aralwad[1], Janmenjay Chitade[2], Chinmay Hire[3], Unmesh Kamble[4]

[1]*Student- Department of Electronics & Telecommunication Engineering, Sinhgad Institute of Technology & Science, Narhe, Pune*

[2] *Student- Department of Electronics & Telecommunication Engineering, Sinhgad Institute of Technology & Science, Narhe, Pune*

[3] *Student- Department of Electronics & Telecommunication Engineering, Sinhgad Institute of Technology & Science, Narhe, Pune*

[4] *Student- Department of Electronics & Telecommunication Engineering, Sinhgad Institute of Technology & Science, Narhe, Pune*
[1]*sachinaralwad420@gmail.com*
[2]*jayjchitade@gmail.com*
[3]*chinmay.hire27@gmail.com*
[4]*kambleunmesh33@gmail.com*

Abstract

The automated grass cutter is a robotic vehicle powered by solar energy that also avoids obstacle and is capable of grass cutting with minimum human interaction. The grass cutter and vehicle motors are interfaced to an Atmega 328 microcontroller that controls the working of all motors. 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 the IR sensor monitors it and microcontroller thus stops the grass cutter motor to avoid any damage to the object\human\animal or whatever it is. This whole system is powered by solar energy. The designed robot gets energy from battery and solar panels and is operated using Bluetooth\ Android App which sends the signals to the robot for required mechanisms and movement of the robot. This increases the efficiency of the device for grass trimming and also reduces the problems encountered in grass cutting.
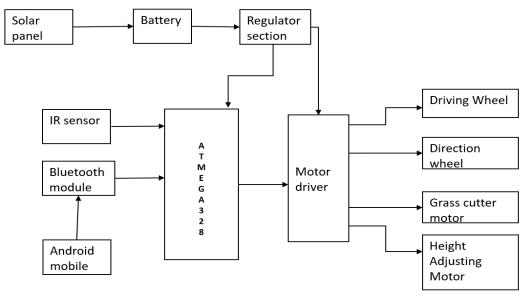*Keywords*: *grass cutter, solar energy, Bluetooth*

I.   INTRODUCTION

India is a developing country and most of the part of our country depends upon the agriculture fields. So, the development in our technology is very important role in our life and the rural development is a very important sector to look into which has high scope and which will also be beneficial for the society. In fast growing world the development of our country is very important role and as well as to improve the technology with renewable energy. Due to automation, manual will be replaced by Semi-automatic reliable device. another important concern us the use of renewable energy to reduce pollution and make device represent technology used in agricultural field for cutting the grass us generally manual and time consuming which should be replaced by recent techniques like automation. On the other hand, by considering demand of the energy we should use renewable energy source for application.

After studying previous research papers, we came to know that this system is still not fully automatic. Second observation came out that we can renewable energy in proposed system. The majority of robots today are used in factories, warehouses and labs. In future they might show up in the schools, homes or even in our bodies. The possibilities are endless. Industrial automation gives Robotics a considerable momentum to explore newer avenues of applications. Robotics is being used for industrial automation to extent that the terms robotics and industrial automation have become synonyms in the industrial world.

668

II.   METHODOLOGY

Figure 2.1

To design an Autonomous Grass Cutter powered by Renewable energy/solar power controlled remotely by smartphone using Bluetooth is recovered by a project named "Solar Powered autonomous grass cutter" which is an embedded system, meaning something that is attached to another thing. An embedded system can be thought of as a computer hardware system having software embedded in it. An embedded system can be an independent system, or it can be a part of a large system. An embedded system is a microcontroller or microprocessor-based system which is designed to perform a specific task. An embedded system has three components –

- It has hardware.
- It has application software.
- It has Real Time Operating system (RTOS).

This project the device is going to collect data such as area to be covered and height of cutter required and then it will adjust the height of the blades accordingly. The instructions of operation will be received over the Bluetooth for wireless and long-range communication with low cost option for communication. The microcontroller will then power the driving motors and cutter motor using motor drivers and start cutting the grass. Power will be supplied by the 12V battery which can be recharged using the Solar panels on the system. Microcontroller will sense the obstacle using the IR sensors and change the direction of device by powering the direction motor. We can adjust the height of cutting blades using the height adjusting arm for the cutter. Thus we can get desired height at specific location to get pattern in which the grass can be cut. The system is completely based on Atmega328 microcontroller for various operation. We used the Bluetooth transceiver to communicate with smartphone using Bluetooth. The programming of microcontroller is done using Arduino software.

III.   HARDWARE

The Hardware Platform consists of-

1.   Arduino Board (Atmega328)
2.   Power supply
3.   IR Sensor
4.   DC motor (RS555)
5.   Light Emitting Diodes (LEDs)

6.   Bluetooth module

7.   Motor Driver (L293D)

1. Arduino Board (Atmega328)

The Atmega328 is a very popular microcontroller chip produced by Atmel. It is an 8-bit microcontroller that has 32K of flash memory, 1K of EEPROM, and 2K of internal SRAM. The Atmega328 is one of the microcontroller chips that are used with the popular Arduino Duemilanove boards. The Arduino Duemilanove board comes with either 1 of 2 microcontroller chips, the Atmega168 or the Atmega328. Of these 2, the Atmega328 is the upgraded, more advanced chip. Unlike the Atmega168 which has 16K of flash program memory and 512 bytes of internal SRAM, the Atmega328 has 32K of flash program memory and 2K of Internal SRAM. The Atmega328 has 28 pins .It has 14 digital I/O pins, of which 6 can be used as PWM outputs and 6 analog input pins.
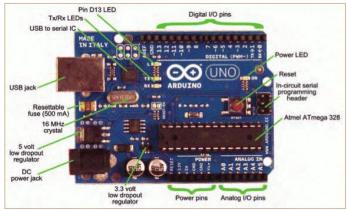

Figure.3.1 Arduino Board

2. Power supply

The whole system is based on solar energy and it is provided by solar panel. We also need a backup power supply for cloudy days. In our system we require +12Vdc, and +5 Vdc supply. Therefore, we are using 12VDC battery. 5 volts is required for microcontroller board and 12 Volts are required for motor driver and motors. 12V is supplied by DC battery but for constant 5V supply we are using 7805 voltage regulator.

3. IR Sensor

An infrared sensor is an electronic device that emits infrared light in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These sensors measure emit Infrared light and detect them when they are reflected back. Thus the system knows when there is obstacle in front of the device. This sensor is interfaced with Arduino and signal is then sent to the app
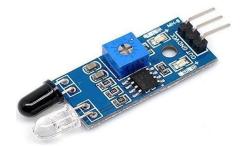

Figure.3.2 IR Sensor

670

4. DC motor (RS555)

This is the RS-555 12V 6100 RPM Brushed DC Motor. This motor will mount to any of manufacturer's stock P60 gearboxes. It has a round shaft connector. Its operating voltage is 9.6V-30V and this motor is 69.4% efficient. Please see specification tab for the specifications of this motor.

Specifications:
1. Nominal Voltage: 12V
2. No Load RPM: 6000
3 .No Load Current: 0.4A
4. Rated RPM: 5300
5. Rated Torque: 3.18 oz-in
6. stall Current: 9A
7. Stall Torque: 23 oz-in

5. Bluetooth module

Bluetooth transreceiver we used here HC-05 is used to transmit the data from android operating smart phone. It can be operated on 3.3V to 6V DC power supply. Any serial stream from 9600 to 115200bps can be passed seamlessly from device. The range of Bluetooth is 15 meters and works on 2.4GHz ISM band.

Figure. 3.3 Bluetooth module

6. Motor driver:

The L293D are quad push-pull drivers capable of delivering output currents to 1A or 600mA per channel respectively. Each channel is controlled by a TTL-compatible logic input and each pair of drivers (a full bridge) is equipped with an inhibit input which turns off all four transistors. A separate supply input is provided for the logic so that it may be run off a lower voltage to reduce dissipation. Additionally, the L293D includes the output clamping diodes within the IC for complete interfacing with inductive loads. Both devices are available in 16-pin Batwing DIP packages. They are also available in Power S0IC and Hermetic DILPackage
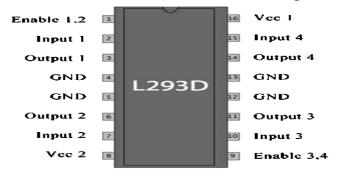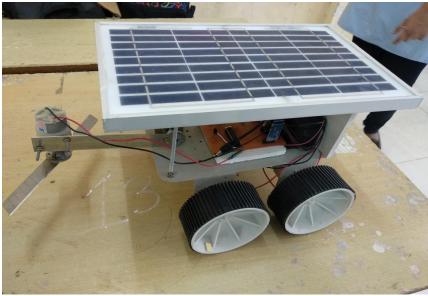

Figure 3.4 Motor Driver

671

IV.   RESULT AND DISCUSSIONS

The energy plays a very important role in everyone's life. The Grass cutting machines are become very popular now days. Conventional motor-powered grass cutters are inconvenient, due to use of engine. Grass cutters moving with engine create noise pollution and local air pollution due to the combustion engine. Also, a motor powered engine requires periodic maintenance. Even though electric solar grass cutter is ecofriendly, because solar is a clean source of the energy. Working principle of the grass cutter is to provide a high speed rotation to the blade, which helps to cut the grass. The cutting edges are very smooth and accurate.

Also, electric grass cutting machines are much easier to use in garden, lawn and grass fields. In order to enhance the beauty of home-lawns and gardens, Grass cutting machines are the best option available in the market. With the help of a grass cutter 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. The proposed solar grass cutter has solar panel, Arduino based charge controller, battery, dc motor for grass cutting, geared dc motor for wheels, infrared obstacle sensor etc. The raw material used are wheels, wires, metal frame, plywood, remote, display etc. Unskilled operation can operate easily and maintain the lawn very fine and uniform surface look.

Complete Setup

Author names and affiliations are to be centered beneath the title and printed in Times New Roman 12-point, non-boldface type. (See example below)

V.   CONCLUSION

By using this project, we can control the grass cutter over 15 meters. This project is very useful for grass cutting purpose. Robotics is very vast field which comes with different combination of technology this will helps to reduce the human effort and gives maximum efficient output for the work. Nowadays lot of energy is wasted for grass cutting in different areas of the world and also takes lots of human effort for the work. The main aim of this project is to make a solar powered automated robotic grass cutter system which wills helps to cut the grass in different design with lesser human effort. Advantages of this system are used components are of low cost so and it is operated on android mobile phone.

The second and following pages should begin 1.0 inch (2.54 cm) from the top edge. On all pages, the bottom margin should be 1-3/16 inches (2.86 cm) from the bottom edge of

the page for 8.5 x 11-inch paper; for A4 paper, approximately 1-5/8 inches (4.13 cm) from the bottom edge of the page.

REFERENCES

11.1. Journal Article Design and Implementation of Autonomous Lawn Mower

[1] VaikundaselvanB. ,Ramkumar.M, Ranjith.P," Design and Implementation of Autonomous Lawn Mower", International journal of recent trends in engineering and research, April **(2016)**, ISSN 2425-1457

[2] Sanjana Arunesh, Rasmika V, Nivetha N "Design and Implementation of Automatic Lawn Cutter", International Journal of Science Technology & Engineering May 2016, ISSN (online): 2349-784X

[3] M.P. Nimkar, S. Sangole, S. Rathod ,HarshalDorsatwar "Design and Fabrication of Wireless Remote Controlled Lawn Mower": March2017 (IRJET) e-ISSN: 2395 -0056.

[4] VaikundaselvanB. ,Ramkumar.M, Ranjith.P"Solar Powered Autonomous Multipurpose Agricultural Robot Using Bluetooth App", April2019, IEEE Xplore ISBN: 978-1-7281-0167-5