

Arduino Based Grass Cutter Using Bluetooth Module

Sakshi Kannojar¹, Puja Ghubade², Ashwini There³, Rani Shukla⁴,
Rohan Chandekar⁵, Prof. Dhananjay Dumbere⁶

Students, Department of Information Technology^{1,2,3,4,5}

Professor, Department of Information Technology⁶

Rajiv Gandhi College of Engineering, Research and Technology, Chandrapur. Maharashtra, India

Abstract: Nowadays grass cutting is one of important thing to maintain the beauties of any house, garden etc. It requires man power, time and it may create non-uniform structure of grass height. So to avoid all these issues it is important to design a robot which can cut the grass without any human support. So here we are adding solar panel to the battery which charged by solar energy. This robot can be operated using android phone. This robot can be design with minimum cost as compared to other robot. cause of solar energy this robot is pollution free to charge the battery.

Keywords: Android, Bluetooth, Grass Cutter, Solar Energy, sensor

I. INTRODUCTION

Grass cutting increases the beauteousness of any hotel, house garden, park, lawns, meeting hall etc. so structured grass cutting is important to maintain the beautiness of any house or hotel. The cutting of grass is possible through humans. but it takes time and efforts of humans. Also the grass cutting is not similar manner and many time seen in non- structure of grass. so to avoid all these problems it is better to use grass cutting robot machine which is operated through android cell. This device establish connection with android phone using Bluetooth. robots has following motions like forward, backward, left turn, right turn and grass cutter on/off. Ans also it gave the signal where any object has front of this device through IR sensor .these all movements are controlled by android app. our grass cutter is operated using 12V 7.5AH battery for charging there solar panel is connected above the battery. Many researchers have proposed a similar design of solar based grass cutting robot. a design in which the blades of cutter are placed at the middle of four wheels of robot. here IR sensor which can detects the obstacle and objects. Also this system does contain four wheels.

II. LITERATURE REVIEW

For designing of automatic grass cutter we reffered various literature, papers etc. the review of previous method used given below .in this lawn mower uses an solar based energy source, which is easier to use, more advantageous comparing to other energy source especially for gas based source of power. but our cutter is not based on solar because of its cost and may create some complexity during working.so we avoided solar powered lawn mower.

In this hydrogen based lawn mower, the advantage of powering a lawn mower by hydrogen rather than by gasoline is mainly ecological .we not used this for our grass cutter because it is very old method and many overcome produced from this type grass cutter.

The self-powered design objective is to come up with a mower that is portable, durable, easy to operate and maintain.it also aims to design a self-powered mower of electrical source a cordless electric lawn mower.

The heart of the machine is a battery –powered dc electric motor.it is also useful method for our lawn mower.it is similar to our grass cutter using display and keypad. the present technology commonly used for trimming the grass is by using the manually handle device.in this project we have automated the machine for trimming the grass.

The device consists of linear blade which is operated with the help of the motor the power supply for the motor is by using battery. The battery can be charge by using power supply and solar panel.in case of any obstacles in the path is sensed by using an IR sensor.

III. MATERIAL AND METHODS

3.1 Material

Robot uses material and components are as follows

A. Arduino Kit with AT mega 328P Microcontroller

It is an open-source embedded system platform. The grass cutter and vehicle motors are interfaced to an arduino family microcontroller that controls the working of all the motors. The controller has 28 pins and it is cheaper and efficient as compared to other microcontrollers. Any new C++ language code can be first tested in arduino windows software. After this code can be loaded into the Arduino platform using simple USB cable connected between PCe and Arduino kit. The figure 1 below shows the Arduino IDE kit along with ATmega328P microcontroller.

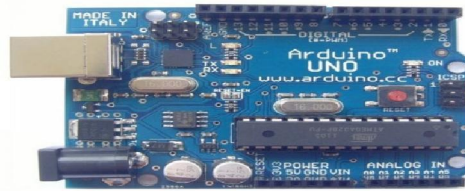


Figure 1: Arduino with ATmega328P microcontroller

B. Bluetooth Module

This system uses an Arduino, HC-05 Bluetooth module to transfer the instructions from android smart phone to the system. Its communication which makes an easy way to interface with controller. This module is mounted on the system along with some relays. Firstly user established the connection between the mobile with this module. After connection user can gave the desired direction change command to the robot from 10-mtr distance. And we can on-OFF of the system through application. this module can used for short distance communication.



Figure 2: HC-05 bluetooth module

C. DC Motor

This system uses 3 DC motors of 12V rating to which 4 wheels are connected. This motor converts DC electrical energy into mechanical energy this energy causes rotational movement the motor. A DC motor is an electric motor that runs on direct current power. It is cheap and requires less electrical voltage as compared to other motors.



Figure 3: DC motor

D. Motor Driver IC

In this system the motor driver is connected with analog output pin of ATmega328P microcontroller. But this microcontroller can produce maximum 5V of DC output voltage. The DC motor connected with this system requires 12V DC input voltage to operate. The motor driver IC is an integrated circuit chip that controls motors in autonomous robot and embedded circuits. L293D motor driver IC is connected between microcontroller output pin and DC motor input. This IC acts as a current amplifier. It takes low current signal from microcontroller and after amplification provides high current signal to DC motor. This high current signal is useful to drive the DC motor. L293D IC consists of 16 pins which are used to control a set of two DC motors instantly in any direction. L293D consists of two inbuilt H-bridge driver circuits. It means by using a L293D IC we can control two DC motors. Input logic at pins 2 and 7 and 10 and 15 controls the operation of two motors. To stop the first motor input logic 00 is used. Logic 11 is used to stop the other motor. Logic 01 and 10 will be the motor clockwise and anticlockwise directions, respectively. Pin 1 and 9 are enable pins for two connected motors. To start these motors the enable pin of this motor must be high.

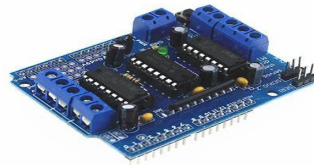


Figure 4: Motor driver IC L293D

E. Solar Panel

This structure uses 12V, 10-Watt solar panel. There are two batteries used in this machine. One is used to run the DC engines and the other one is used to control the engine of the grass cutter. The aluminum frame and its surface is made up with tempered glass material. This panel consists of mono-crystalline silicon contained here. Solar panels are used to charge the batteries which are loaded on the top of the machine. This panel is compact, lightweight, and economical as compared to other panels. This robot is based on a solar panel to develop a grass cutter. We add the IR sensor to find the obstacle. If there is an object in front of the robot, the IR sensor stops the cutter machine and the motors move in the direction of the system. Because of the solar panel, there is no need to charge the system externally.



Figure 5: 12V, 10 W solar panel

3.2 Methods

This system uses DC 12V 7.5AH battery supply to operate the whole system, and the battery is connected to the solar panel. So the battery has been charged using the solar panel. The robot has 3 DC motors to which 4 wheels are connected and the blades for grass cutting are connected at the center side of this robot. To start the grass cutter, first we have established a connection between a smart phone using Bluetooth. After connection, we can handle the robot using an Android app installed on a smart phone. The user can switch ON and OFF the grass cutter and can move the direction in forward or backward position. The figure 6 below shows the complete system.



Figure 6: Proposed system

IV. PROPOSED FRAMEWORK

The figure 6 below shows the block diagram of proposed framework.

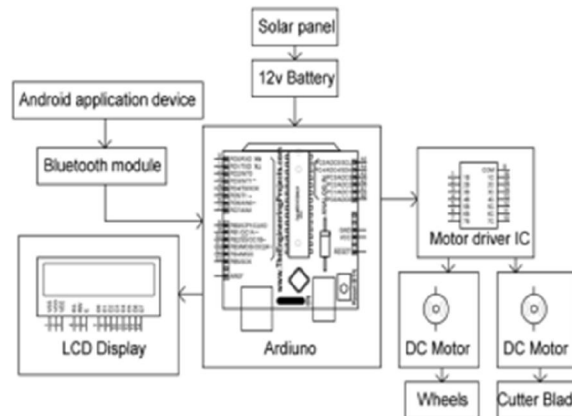


Figure 7: Block Diagram

As shown in fig 7 above, Solar Panel is connected to charge the battery there is no need to give externally charging. we add two cable from battery one is connected two ground and another is to circuit. now the circuit is take 12v input wire and convert in 5V on output. then we are giving 5V supply to multiple devices are relay and arduino circuit. motor driver is directly taking 12VDCsupply power from battery and there is using voltage regulator which is convert the supply for IC to 5v DC. And we are added IR sensor to sense the objects or obstacle in the path of cutter and stop it.

Figure 8 below shows the flowchart of the system.

In this flowchart firstly we providing 12 V battery supply. Solar Panel is connected to charge the battery there is no need to gave externally charging. Here we connect two cables from battery one is connected two ground and another is to circuit. Now the circuit is take 12v input wire and convert in 5V on output. Then we are giving 5V supply to multiple devices are relay and arduino circuit. Motor driver is directly taking 12VDCsupply power from battery and there is using voltage regulator. 5V supply will giving to arduino. Now there is major role of Bluetooth module HC-05 needed to be started and connected to the android smart phone. If the connection is proven between the smart phone and the system, then we can move this robot in forward and backward direction using android application and can cut the grass. Once the cutting is done then we have to remember of the cutter using application on mobile so the main system can be switched OFF by disconnecting the 12V battery supply to the robot.

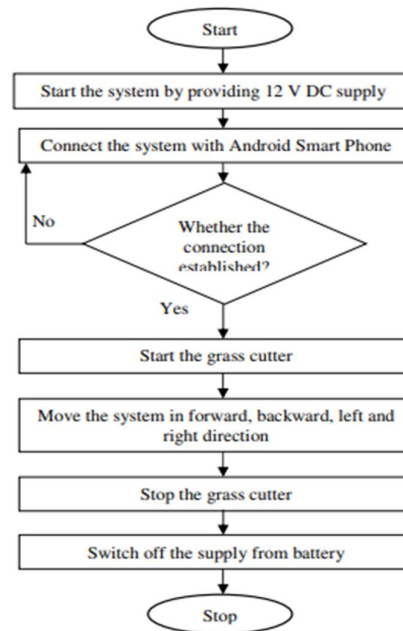


Figure: Flowchart of the system

V. PROS, CONS AND APPLICATIONS

Pros:

- Moveable structure with small size
- Easy of work
- Low cost
- Structured grass cutting is possible using this robot
- Management is in power way for cutting

Cons:

- We can't use this machine in the water level.

Application:

- For cutting the grass of any house, hotel, garden lawns etc.

VI. CONCLUSION

In future we will be only prince and princesses, at least at our homes where the robots will be our servants and will take care of all necessary household tasks. No grass lawn will be unkempt and no human will not have the Stress that predict the tedious task. The conflict between a wire of grass and a robot full of strength will end in only one way-a perfect lawn.

VII. FUNDING

This research is self-funded. The author of this paper invested the complete amount to create this system.

VIII. CONFLICT OF INTEREST

All the authors of this publication declare that they have no any conflict of interest for publication of this research.

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X. DECLARATION

This research have perform experiments on any living thing such as human or animals.

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