

SOLAR BASED GRASS CUTTER MACHINE

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ABSTRACT

Nowadays grass cutter machines are becoming very popular today. Pollution is man-made, which we can see in our daily lives. IC engines were used in older models of grass cutters and therefore its environmental impact increases pollution levels making IC engine cutters more expensive. Maintenance of such traditional machines is high. To address this shortfall, we plan to build a new type of solar-powered grass cutter, and this model is also cost-effective. The goal of our project is to make solar powered grass cutters, which will save electricity and reduce manpower. In our project we use microcontrollers to control the various operations of the grass cutter. Also the grass cutter has a barrier sensor to detect the barrier. The grass cutter works automatically so it does not require a skilled person to operate it.

Keyword : - Battery, Blades, DC Motor, Obstacle Sensor, Solar Panel etc....

1. INTRODUCTION

Grass cutter machines have become very popular today. Most common machines are used to equip soft grass. The main parts of grass cutting machine are DC motor, relay switch to control the motor, battery to charge through solar panel. It is housed in a proper machine structure. Motors with R 35050 rpm and r 35 rp are connected to the power supply using wire rolls. Linear blades are attached to this machine. The working principle of the grass cutter provides to rotate the blade at high speed, which helps to cut the grass. The blade will receive kinetic energy while increasing the rpm. The cutting edges are very smooth and precise. It is also very easy to use electric grass cutting machine in garden, lawn and grass area. To enhance the beauty of home-lawns and gardens, the grass cutting machine is the best option in the industry. With the help of a lawn mower which is a machine with a rotating blade that helps us cut long waves, people can easily and beautifully decorate their lawn and garden without any difficulty.

2. LITERATURE SURVEY

Sivarao, T J S Anand, Hambali, Minhat, Faizul , "Review of Automated Machines towards Devising A New Approach in Developing SemiAutomated Grass Cutter "[1], Presented a review of research done on the subject of automatic tractors. An autonomous tractor is a vehicle that can operate with or without minimal human control, self-driving and will automatically guide you to the desired path. The advantages of such a system are improved productivity by reducing labor costs and time for the agricultural industry as well as eliminating human errors. A lot

of research and discovery has been made, the results of which have been successful and some have been encouraged which are impractical for commercial implementation for some specific reason. These tools include sensors, global navigation satellite systems, machine vision, laser triangulation, ultrasonic transmitters and geomagnetic controllers, as well as actuators and servo motors.

Pratik Patil, Ashwini Bhosale, Prof. Sheetal Jagtap , “Design and Implementation of Automatic Lawn Cutter ”[2], Automatic lawn cutters are described which will help the user to mow the grass in their lawn with less effort. Different sensors are used that will detect and avoid objects and humans while moving. The main purpose of this automatic lawn cutter is to use the keypad the user can specify the area to be sown and also the grass height as required. The design includes microcontrollers like Atmega 16, multiple sensors, LCD display, keypad.

Ernest L. Hall, “ A Survey of Robot Lawn Mowers”[3], Another example of an autonomous lawn cutting system is the Weed Eater developed by the Weed Eater Corporation. This system is a solar energy emission free mower that uses enough power to operate on its own. The robot is equipped with 34 rainbow solar cells embedded at the top of the system platform and has the capacity to handle assets up to 13,500 square feet. This arrangement works on the same principle as a lawn ranger but without it a cable is used below the surface of a person’s lawn. The mower uses these wires with sensors to arouse curiosity around the robot while keeping the system on track. As long as there is energy in the soil from the sun, the soil will continue to work. The robot is equipped with a flexible boom mower that supports the mover when activated and keeps the robot moving in a different direction. The use of weeds has the advantage of cutting the grass in the form of wet grass so that the use of grass catching or racking is not necessary.

3. PROBLEM STATEMENT

The earlier technology of hay cutting was carried out by hand with hand tools like scissors, resulting in human effort and taking longer to complete the work. The rest of the grass is not the same in the old methods. Also the use of engine driven machines also increases air and noise pollution. This grass cutter also needs maintenance.

4. ARCHITECTURE

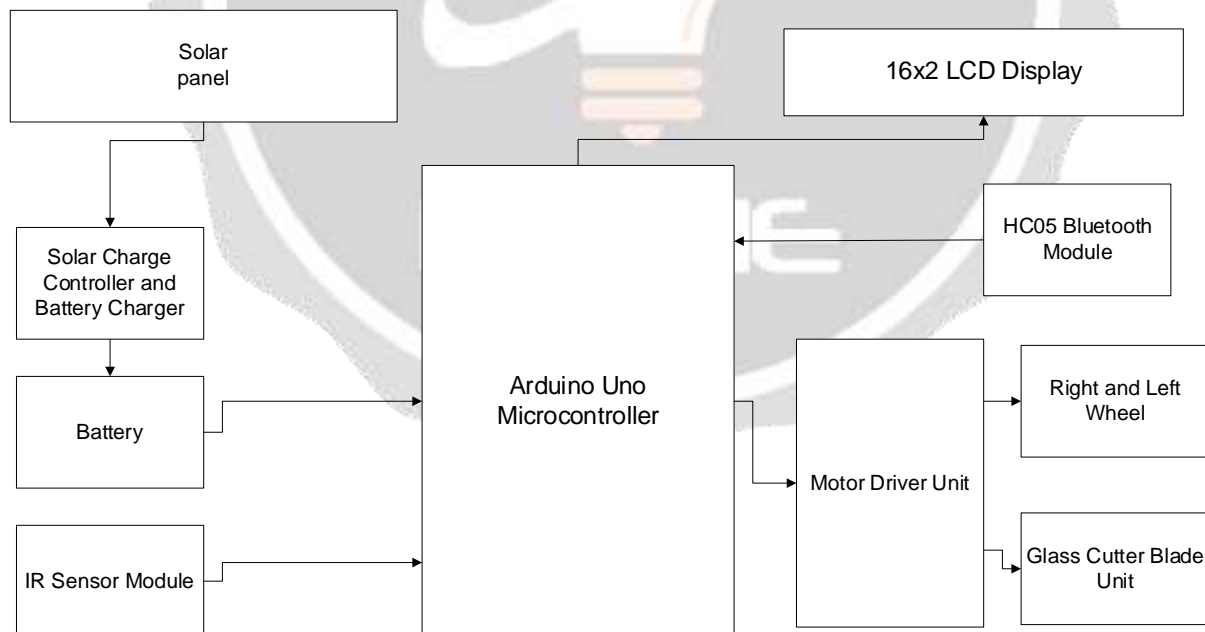


Fig -1: Architecture of Solar Based Grass Cutter Machine

5. MODULE DESCRIPTION

1. Solar Panel:

Solar energy is clean, cheap and abundantly available. Here we are using polycrystalline type solar panel. The grass cutter works on the photovoltaic principle. When photons from sun are absorbed in a semiconductor that produces free electrons with higher. These electrons are combining with holes in semiconductor and produces electron hole pairs and hence the external conductor constitutes electrical current.

2. Battery:

Battery is used for store the solar energy which can be further converted into electrical energy. The battery should requires following properties,

- (1) Long life
- (2) High reliability
- (3) Low cost
- (4) High overall efficiency

3. DC motor:

The speed control of dc motor is achieved easily hence we are using dc motor for mowing the grass cutter and cutting the grass. Here we are using separate motor for mowing and cutting the grass. The speed of motor used for blades is greater than motor used for mowing the cutter.

4. Arduino Uno:

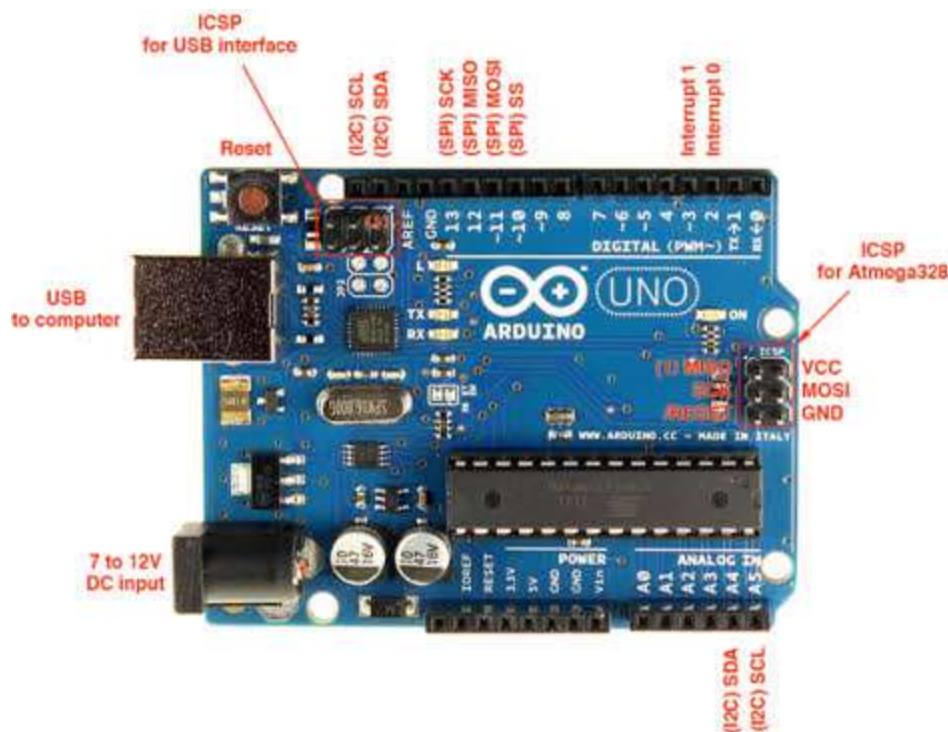
Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button.

Features of Arduino Uno Board

- The features of Arduino Uno ATmega328 includes the following.
- The operating voltage is 5V
- The recommended input voltage will range from 7v to 12V
- The input voltage ranges from 6v to 20V
- Digital input/output pins are 14
- Analog i/p pins are 6
- DC Current for each input/output pin is 40 mA
- DC Current for 3.3V Pin is 50 mA
- Flash Memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK Speed is 16 MHz

5. Arduino Uno Pin Diagram:

The Arduino Uno board can be built with power pins, analog pins, ATmegs328, ICSP header, Reset button, power LED, digital pins, test led 13, TX/RX pins, USB interface, an external power supply. The Arduino UNO board description is discussed below.



6. Power Supply

The Arduino Uno power supply can be done with the help of a USB cable or an external power supply. The external power supplies mainly include AC to DC adapter otherwise a battery. The adapter can be connected to the Arduino Uno by plugging into the power jack of the Arduino board. Similarly, the battery leads can be connected to the Vin pin and the GND pin of the POWER connector. The suggested voltage range will be 7 volts to 12 volts.

7. IR sensor

Grass cutter is interfaced with the IR sensor for obstacle detection. On obstacle detection IR sensor monitors it and the microcontroller thus stop the grass cutter motors to avoid any damage.

8. Relay

Relay is used for controlling the grass cutter blades motor by acting as a switch.

9. L293D Motor Driver Circuit:

Features :

- Can be used to run Two DC motors with the same IC.
- Speed and Direction control is possible
- Motor voltage Vcc2 (Vs): 4.5V to 36V
- Maximum Peak motor current: 1.2A
- Maximum Continuous Motor Current: 600mA
- Supply Voltage to Vcc1(vss): 4.5V to 7V
- Transition time: 300ns (at 5V and 24V)
- Automatic Thermal shutdown is available
- Available in 16-pin DIP, TSSOP, SOIC packages

6. REFERENCES

- [1]. Sivarao, T J S Anand, Hambali, Minhat, Faizul , “Review of Automated Machines towards Devising A New Approach in Developing SemiAutomated Grass Cutter ”, International Journal of Mechanical and Mechatronics Engineering IJMME-IJENS, 2010.
- [2]. Pratik Patil, Ashwini Bhosale, Prof. Sheetal Jagtap , “Design and Implementation of Automatic Lawn Cutter ”, International Journal of Emerging Technology and Advanced Engineering , 2014.
- [3]. Ernest L. Hall, “ A Survey of Robot Lawn Mowers”, Ernest L. Hall ,06 October 2015.
- [4]. Technical Solutions, J. Hammond and R. Rafaels, “Build the Lawn Ranger”, Radio Electronics, June 1990, pp. 31-49.
- [5]. Ms Lanka Priyanka ,Mr Prof J Nagaraju ,Mr Vinod Kumar Reddy, “Fabrication of Solar powered Grass Cutting Machine”, International Journal & Magazine of Engineering, Technology, Management and Research ,2015.

