

DESIGN AND FABRICATION OF SOLAR OPERATED LAWN MOWER

¹Karthick R, ²Sooraj S, ³Tamilmani M, ⁴Tamizharasan R,
¹Assistant professor, Department of Mechanical Engineering,
Prathyusha Engineering College, Tiruvallur, India
Email- ¹karthick.industrial@gmail.com

Abstract: This project deals with the design and fabrication of a solar operated lawn mower, i.e. a device used for grass cutting in lawns. This device reduces manual labour in cutting the grass in lawns. This device is fabricated by assembly of certain components. It is also a pollution free device without emission of any gases. It also reduces the human effort of pushing the device across the field as it is controlled by wired (remote control) and wireless (wifi control). A lawn mower/ Grass cutting machine is a machine that uses a revolving blade or blades to cut a lawn at an even height. Lawn mowers employing a blade that rotates about a vertical axis are known as rotary mowers, while those employing a blade assembly that rotates about a horizontal axis are known as cylinder or reel mowers. 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.

Keywords: Solar panel, high speed motor, batteries, ESP arduino wifi board, remote control, relay board

1. INTRODUCTION:

Lawn mowers are of many types including gas powered mower, electric mower, solar etc. Lawn mowers are devices employed for grass cutting in lawns. Manual cutting of grass is a tedious process for people of all age groups. There are certain disadvantages in simple motor operated lawn mowers. These are overcome by modern electric lawn mowers. But there are dangers in using these electric lawn mowers too if there are some wrong connections in the device or due to lose contact. Solar lawn mowers overcome the problems caused by electric lawn mowers. The main disadvantage in motor powered lawn mowers is that these motors have to be periodically maintained by changing the oil etc. A solar lawn mower can be described as the application of solar energy to power an electric motor which in turn rotates a blade which does the mowing of lawn. 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.

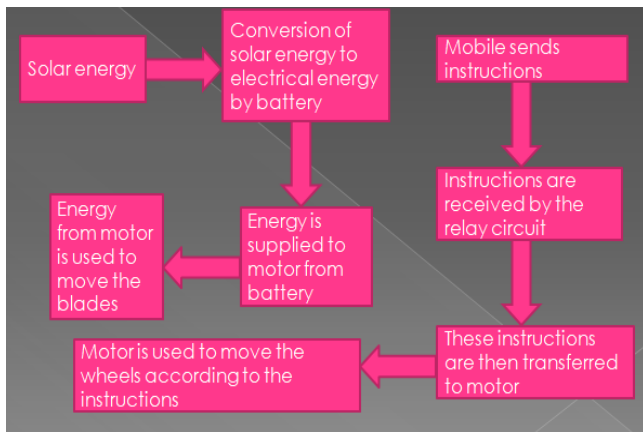
2. MATERIALS:

S.NO	MATERIAL	SPECIFICATION	QUANTITY
1.	Solar panel	5 watt	1
2.	Batteries	12V	2
3.	Sheet metal	0.3mm thickness	As required
4.	Remote control setup	-	1
5.	Spray paint	-	As required
6.	Motors	500rpm,1500rpm	2,2

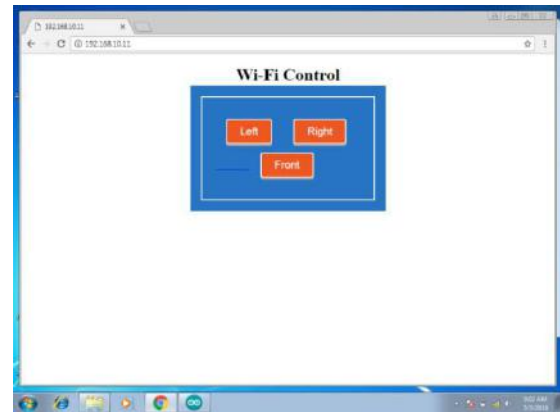
TABLE 1.1

3. METHOD:

The solar energy is generated due to the solar panel and the energy is stored in the battery, which converts the solar energy into electrical energy. The blade with DC motor is connected to the battery. This solar grass cutter is used to cut all types of grass. The extra feature of remote control helps the motion of the device as required by the user. An ESP Wi-Fi board is used to connect the motor to the instructions given by the user through a mobile. The ESP wifi board is connected to the relay board which is used for motion. This motion is transferred to the wheels by using motors.



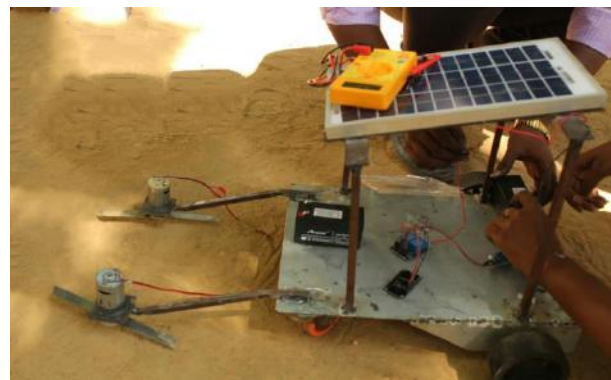
Methodology



Wifi control web page (IP address: 192.168.10.11)



Setup with remote control (wired)



Setup with wifi control (wireless)

4. DISCUSSION:

- The main usage of lawn mower is to cut grass in lawns and gardens.
- It is Less in cost when compare to other lawn mowers.
- It should cut the grass as well as move through remote control
- Compact in size and easy replacement of parts
- Comfortable to control
- Good performance and accuracy
- It is suitable for usage in also sports grounds such as cricket pitch, etc

5. ANALYSIS:

- The force required to cut grass by a sharp object should not be less than 10Newtons
- A slightly bigger force will be required (or selected) for high efficiency.
- Depending on the density of the grass, the minimum power required to move the blade in 1 second is 1.8 watts.
- It can be analysed that human effort is reduced as we are controlling the mower using remote control.
- This can also be controlled by using a wifi module.
- An ESP 8266 arduino Wi-fi board is used as the main control device.

6. FINDINGS:

- Usually lawn mowers are used to cut the grass by manual pushing. It is used to cut all types of grasses and even crops.
- However our lawn mower can be controlled by two methods. Wifi control is a method employed for controlling the motion.
- Another feature is a remote control. The remote controlled method is a wired method unlike wifi controlled method which is wireless method.
- It reduces manual labour. This type of control is a new innovation as we have introduced wifi control to the project.

7. RESULT:

- It eliminates the human effort.
- It is safe to use
- Smooth working and easy handling.
- It does not require frequent maintenance
- It uses solar energy which is a renewable form of energy

8. CONCLUSION:

From the above mentioned project , it can be concluded that the “Solar operated lawn mower ” is a lawn mower which is widely used in fields as well as gardens. It eliminates the human effort twice as it not only cuts the grass but also can be controlled using remote. It is cost efficient and can be afforded easily. Its operation is efficient and it can cut different types of grasses. It is an eco-friendly device as compared to other lawn mowers such as electric lawn mower. A great advantage is that it doesn’t require frequent maintenance. It is a device that can be used for stadiums too.

REFERENCES:

1. Bincy Abraham, Darsana P S ,Isabella Sebastian, Sisy N Joseph , Prof. George John P, Solar Powered Fully Automated Grass Cutting Machine, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, April 2017
2. Tanimola, O. A, Diabana, P. D and Bankole, Y. O., Design and Development of a Solar Powered Lawn Mower, International Journal of Scientific & Engineering Research, Volume 5, Issue 6, June-2014
3. E.Naresh, Boss Babu, G.Rahul, Grass Cutting Machine by Solar Energy Power, International Journal & Magazine of Engineering, Management, Technology and Research, May 2016
4. 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.
5. Pratik Patil, Ashwini Bhosale, Prof. Sheetal Jagtap , “Design and Implementation of Automatic Lawn Cutter ”, International Journal of Emerging Technology and Advanced Engineering , 2014.
6. Technical Solutions, J. Hammond and R. Rafaels, “Build the Lawn Ranger”, Radio Electronics, June 1990, pp. 31-49.
7. 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.
8. Ernest L. Hall, “ A Survey of Robot Lawn Mowers”, Ernest L. Hall ,06 October 2015.
9. Mukherjee, d. Chakrabarti, s., fundamentals of renewable energy systems, new age international publishers, New Delhi, 2005
10. Sharma., p.c., non-conventional power plants, public printing service, New Delhi., 2003
11. Agarwal M.P., solar energy, s.chand company ltd, New Delhi

Web reference:

- http://www.oaijse.com/VolumeArticles/FullTextPDF/94_OAIJSE_FULLY_SOLAR_BASED_GRASS_CUTTER.pdf