

Review on Fully Automated Solar Grass Cutter

Tushar Baingane¹, Sweta Nagrale², Suraksha Gumgaonkar³, Girish Langade⁴, Shaila Ramteke⁵
Prof.V.M.Dhumal⁶

¹²³⁴⁵ Student, Department of Electronics and Telecommunication Engineering, Priyadarshini J L College of Engineering, Nagpur, Maharashtra, India

⁶Assistant Professor, Department of Electronic and Telecommunication Engineering, Priyadarshini J L College of Engineering, Nagpur, Maharashtra, India

Abstract - This paper describes the different features and technologies present in Automated Solar Grass Cutter by overviewing multiple research done over time. In today's world, Automation is a very important part of invention. Presently, manually handled devices are commonly used for cutting the grass over the lawn. Because of this, there is pollution and loss of energy. The old grass cutters need to be replaced by automated one where system will work for guidance and obstacle detection using battery as a power source. A solar panel will be attached on the top of the robot this will reduce the problem of more power consumption. In this paper we are trying to review different daily purpose robot which are using different technologies and is able to cut the grass in lawn using IR sensors, ultrasonic sensors, etc. for obstacle detection.

Key Words: Solar panel, Battery, Pollution, Robot, Sensors

1. INTRODUCTION

Nowadays, pollution is the major issue in the universe. In case of Gas powered lawn mowers due to emission of gases it is responsible for pollution. From time immemorial, the sun has been the major source of energy for life on earth. We can use the solar energy for giving power to the new high tech robotic grass cutters. Traditionally, lawn mowers are often clunky pieces of machinery that involves a lot of strength and energy to use. Man power is also required to look after them. As technology is improving day by day these traditional grass cutters should be replaced by the efficient, power saving and smart ones.

Automated Solar Grass Cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of cutting grass without the need of any human interaction. So the traditional grass cutters are to be replaced by daily purpose robot which will be capable of cutting the grass in lawn without human intervention. The system will have some automation work for assistance and other obstacle recognition. The system will have a power source that is battery and a solar panel will be attached on the top of the robot. Cutting grass cannot be effortlessly accomplished by elderly, younger, grass cutter moving with engine which creates noise pollution due to the loud engine, and local air pollution due to the combustion in

the engine. Along with motor powered grass cutter, electric grass cutters are also risky and cannot be easily used by all. Also, if the electric grass cutter is corded, moving could demonstrate to be challenging and unsafe.

So it is more efficient to use a solar power grass cutter which will be smart and which consumes less power. The trial product will be charged from sun by using solar panels. The design of solar powered agricultural equipment (e.g. grass cutter) will include direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is mandatory. This will be better because man power is not essential in managing cutter on those hot summer days, where you will prefer not to be out in the sun. The remote will permit the user to control the speed and direction of the grass cutter.

2. LITERATURE SURVEY

2.1 Self-Efficient and Sustainable Solar Powered Robotic Lawn Mower. (December 2015)

Srishti Jain, Amar Khalore and Shashikant Patil

This paper proposes a solar powered vision based robotic lawn mower which is an autonomous lawn mower that will allow the user the ability to cut the grass with minimum effort. Unlike other robotic lawn mowers in the market, this design requires no perimeter wires to maintain the robot within the lawn and also with less human effort in the manual mode operation. Through an array of sensors safety takes major consideration in the device, this robot will not only stay on the lawn, it will avoid and detect objects and humans. Here they used a 12v 310mA solar panel in their project. There are 24 solar cells on the solar panel, each contributing to 0.5v each. They could attach a battery but as the lead acid rechargeable battery used is rated 12v 1.2Ah, it won't be overcharged due to the small output of solar panel. To detect the obstacles, they used IR sensors which has 1m 555 IC. There are two sensors, one on each side. This is because in case the obstacle is on the left then it will move in right direction and if the right sensor detects the obstacle then it goes towards the left.[1]

But disadvantage is that sometimes response of the system is too slow so in real time high end DSP processors is recommended that can process much faster.

2.2 Automated Solar Grass Cutter (February 2017)

Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V.A. Mane

In this paper they are trying to make a daily purpose robot which is able to cut the grasses in lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem. Automated solar grass cutter are increasingly sophisticated, are self-docking and some contain rain sensors if necessary, nearly eliminating human interaction. It works much the same as the Robomow with a boundary wire implanted at the border of your lawn. The system is switched to automatic mode in which the robot's infrared sensors make a comparison between, cut and uncut grass. The mower continues this process until it completes the job. The system uses 12v batteries to power the vehicle movement motors as well as the grass cutter motor. They also use 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 an 8051 family 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 the forward direction in case no obstacle is detected. If in case obstacle is detected by the sensor then the microcontroller stops the grass cutter motor so as to avoid any damage to the object/human/animal coming. [2]

2.3 Design and Implementation of Automatic Solar Grass Cutter (April 2017)

Bidgar Pravin Dilip, Nikhil Babu Pagar, Vickey S. Ugale, Sandip Wani, Prof. Sharmila M.

This paper describe manually handled device is commonly used for cutting the grass over the field which creates pollution and loss of energy. Automatic solar grass cutter which will reduce the effort required for cutting grass in the lawns. Also solar power will be used to provide the driving force for the cutter and various sensors will be used to detect and avoid the unnecessary objects in the field during operation. It consist of microcontroller arduino ATmega328p, IR sensors, LCD display for better response and understanding to the user. This paper will analyze the operation and working principle of the Automatic Grass Cutter. The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. They wanted an ultrasonic sensor to sense if the lawn cutter was heading into an object. Safety is the main concern while designing the lawn cutter. As it has blades they wanted there lawn

cutter not to be in operating mode if it was being held in the air by the user. The design contains a microcontroller, multiple sensors and a solar charging system. Adding these elements together, they got there robotic lawn mower. Knowing that the user would be randomly holding the robot they needed a sensor to detect orientation. They decided to go with the one that work best with solar charging. The nickel-metal hydride (NiMH) was found to be the best because given a low charging current, it will not overcharge.[3]

2.4 Solar Based Grass Cutting (January-June 2017)

Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil

For human enlargement in many countries there are studies and trials going on the solar energy and the wind energy, so they made their new concept solar power grass cutting machine. In this concept they cut the grass on the agricultural land or small plants in lawns and gardens. The design of solar powered agricultural equipment will include direct current (DC) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is mandatory. The purpose of the project here is to design and build a remote controlled grass cutter. The device consist of linear blades and it does not affected by climatic conditions. They have used many components for preparing grass cutter like DC Motor(3) for rotating the wheels and blade, wheels(4), battery, Solar panel, IR sensor, Collapsible blade. There are two main components such as transmitter and receiver. Transmitter continuously transmits the rays if any obstacle come in front of grass cutter then the rays are reflected back towards the receiver. The receiver receives the signal in the serial form from encoder but microcontroller requires parallel data for communication so receiver sends data to decoder to convert data in the parallel form and then it is passed to microcontroller.[4]

3. CONCLUSIONS

This paper review wide range of technologies involved in Automated solar grass cutter. As the technology is getting advanced features of grass cutter are also enhanced. It is highly efficient and accurate because it detects the obstacle and changes the direction or stop functioning as per the instruction given. Every technology discuss above has its own advantages and disadvantages and by using them we can design a more efficient automated solar grass cutter. Each benefit of the previously design lawn mowers can be incorporated into a new design of the mower that integrates a software and hardware for the use of a remote control.

REFERENCES

- [1] Srishti Jain, Amar Khalore, Shashikant Patil. Self-Efficient and Sustainable Solar Powered Robotic Lawn Mower in International Journal of Trend in Research and Development(IJTRD). Vol.2(6), December 2015.
- [2] Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V .A. Mane. Automated Solar Grass Cutter in International Journal of Scientific Development and Research(IJSDR). Vol.2, February 2017.
- [3] Bidgar Pravin Dilip, Nikhil Bapu Pagar, Vicky S. Ugale, Sandip Wani, Prof. Sharmila M. Design and Implementation of Automatic Solar Grass Cutter in International Journal of Advanced Research in Electrical(IJARE). Vol.6, April 2017.
- [4] Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil. Solar Based Grass Cutting in International Journal of Electrical and Electronics Engineers (IJEEE). January-June 2017.