

# Automated Solar Powered Lawn Mower using IoT

Animesh Takpere<sup>1</sup>, Gauri Bansode<sup>2</sup>, Janhavi Borle<sup>3</sup>, Chinmay Joshi<sup>4</sup>, Namrata Lade<sup>5</sup>

<sup>1,2,3,4</sup>Student, Atharva College of Engineering, Mumbai, Maharashtra, India.

<sup>5</sup>Professor, Atharva College of Engineering, Mumbai, Maharashtra, India.

\*\*\*

**Abstract** - Presently, manually handled devices are commonly used for grass cutting. These devices are generally fuel based or nowadays, a few use electrical power. Also, grass cutting is a very tedious and a time consuming task. Thus, conventional grass cutters create pollution, consume a lot of energy, electrical or fuel, both derived from depleting natural resources and also consume a lot of human effort and time.

In order to use renewable energy resources and to reduce the effort needed for grass cutting we are proposing a Solar Powered Automated Lawn Mower using IoT. This will help contribute to lowering pollution and also reduce the carbon footprint. The robotic vehicle is equipped with a grass cutter blade that allows grass cutting at high RPM. The primary energy source for this will be the sunrays which will be converted into electrical energy using the solar panels and charging system on this device. The system also has a smart functionality that allows it to cover the complete area of the lawn on its own and detect obstacles using an ultrasonic sensor. This efficient system will use a NODE MCU microcontroller in order to achieve this functionality. It will also control the movement of the motors used for rotating blades and movement of this device. This device can be remote operated using IoT. The lawn mower can be turned on with the help of a web based application and being automated, it does rest of the job on its own.

**Keywords:** IoT, Node MCU, DC Motor, Ultrasonic Sensor, Solar panel.

**Key Words:** (Size 10 & Bold) Key word1, Key word2, Key word3, etc (Minimum 5 to 8 key words)...

## I. INTRODUCTION

Grass cutter machines have become very popular today. 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. The motors having 350rpm and 35rpm are connected to the electric supply by the use of a roll of wire. The linear blades are attached in this machine. Working principle of the grass cutter is providing a high speed rotation to the blade, which helps to cut the grass. The blade will get kinetic energy while increasing the rpm. The cutting edges are very smooth and accurate. Also electric grass cutting machines are much easier to be used in garden, lawn and grass fields. In order to enhance the beauty of home-lawns and gardens, Grass cutting machines are the best available option in the industry. With the help of a lawn

mower 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 without any hassle. Now a day, there are plenty of options starting from the simplest push along mower to the most advanced electric grass cutting machine. According to world energy report, we get around 80% of our energy from conventional fossil fuels like oil (36%), natural gas (21%) and coal (23%). It is well known that the time is not so far when all these sources will be completely exhausted. So, alternative sources should be used to avoid energy crisis in the nearby future. So introduce solar energy for the machine process to work. A solar panel is a large flat rectangle. The cells, each of which is about the size of an adults palm, are usually octagonal and colored bluish black. Just like the cells in a battery, the cells in a solar panel are designed to generate electricity; but where a battery cells make electricity from chemicals, a solar panel cells generate power by capturing sunlight instead. Solar grass cutter have no moving parts and hence require little maintenance and work quite satisfactorily without any focusing device. It does not cause any environmental pollution like the fossil fuels and nuclear power. Solar cells last a longer time and have low running costs.

## II. LITERATURE REVIEW

In today's busy world where time is the most precious thing, spending time on lawn mowing should be avoided and for this to happen we have to make the lawn mowers autonomous, easy to operate, more efficient and environment friendly. Earlier the grass would be cut using cutting blades and then came the manual mowers, but they did not have any engine to it. Later on, lawn mower having a motor which runs on gasoline came into the markets which are manually operated, causes pollution and they have several severe health effects. As they run on gasoline they require regular maintenance or else there would be wear and tear in the equipment and the lawn mower would break down. These lawn mowers are also large in size and are difficult to operate and are not easily portable. In the recent past gasoline lawn mowers were replaced by electric lawn mowers which are eco-friendly compared to the lawn mowers which run on gasoline but they should be charged at a charging station and run manually. Lead acid batteries are used in these electrical lawn mowers which have lower depth of discharge (DoD) and round trip efficiency. Apart from this the weight of these lawn mowers are more than 25 kilograms and are bulky in size which would make them difficult to operate and transport from one place to another. The proposed system would overcome all the problems mentioned above as it runs on a battery which is powered by

solar energy. This would not only be eco-friendly causing no harm to one's health but also would save the time of humans as very less human interference is required. The batteries would charge using the solar energy and one does not have to charge the bot separately for this purpose. In order to make the bot more eco-friendly and efficient we are using lithium ion batteries. Also, since we wanted to make this fully automated we have introduced remote operation using IoT so that than these other automated lawn mowers, this one will be completely automated. The user will only have to give start command after which the bot will start working.

### III. PROPOSED SYSTEM

The proposed system will be having NODE MCU microcontroller as its brain. It will also be having 5 motors, out of which 4 will be used for wheels and one will be high RPM motor for grass cutting. We have an ultrasonic sensor mounted on its top which can detect obstacles. When it will detect an obstacle, it will turn and avoid the obstacle to continue its operation. We will be having a lithium ion battery since they are light weight and also are highly efficient. We have provided solar charging so as to reduce the carbon footprint. Also of the main innovations we are having in this project is that we are enabling remote operation for this lawn mower using IoT. This can help the user to get the lawn cut even when they are not at home.

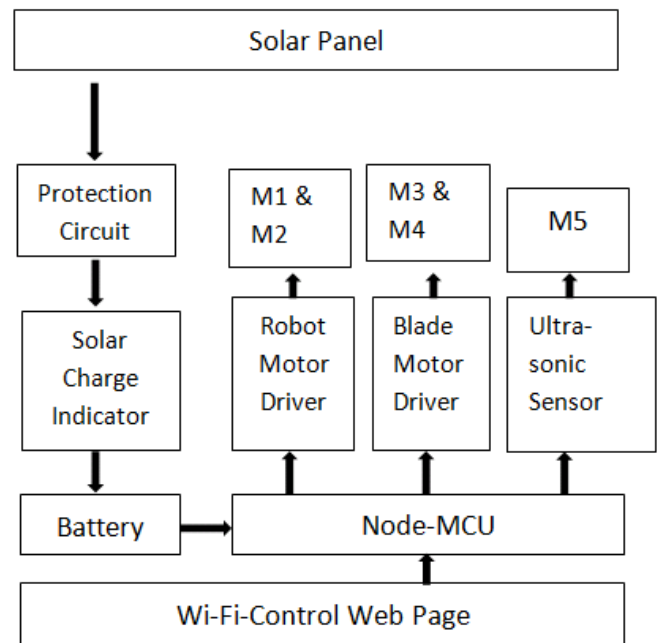
#### Hardware Specifications

- Battery
- Solar Panel
- Cutter Blade
- Ultrasonic Sensor
- NODE MCU
- Motor Driver L293D
- DC Motor
- Resistor
- Capacitor
- LEDs
- Diode
- Connectors

#### Software Specifications

- IOT
- LANGUAGE HTML and CS

#### Block Diagram:



### IV. REFERENCES

[1] P. Amrutesh, B. Sagar and B. Venu, Solar Grass Cutter With Linear Blades By Using Scotch Yoke Mechanism, International Journal of Engineering, Research and Applications, Vol.4,2016,2248-9622.

[2] E. Naresh, Boss Babu and G. Rahul, Grass Cutting Machine By Solar Power, International Journal and Magazine of Engineering, Technology, Management and Research, Vol.3, 2016, 2348-4845.

[3] Sujendran S. and Vanitha p., Smart Lawn Mower for Grass Trimming, International Journal of Science and Research, Vol.3, 2014, 2319-7064.

[4] Praful P. Ulhe, Manish D. Inwate, Fried D. Wankhede and Krushankumar S. Dhakle, Modification of Solar Grass Cutting Machine, International Journal for Innovative Research in Science and Technology, Vol.2,2016,2349-6010.

[5] Vicky Jain, Sagar Patil, Prashant Bagane, Prof. Mrs. S .S. Patil, Solar Based Wireless Grass Cutter, International Journal of Science, Technology and Engineering, Vol.2,2016,2349-784X.

[6] Sultan Mohyuddin, Digesh K D, Vivek T K, Nazeya Khanam F and Vidyashree H V, Automatic Grass Cutter, International Journal of Science, Technology and Engineering, Vol.2,2016,2349-784X