

# SOLAR POWERED WIRELESS CONTROLLED LAWNMOWER

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**Abstract:** Presently, manually handled device is commonly used for cutting the grass over the field which creates pollution and loss of energy. Automatic solar grass cutter 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. Solar energy is the heat and light radiations received from the Sun. It is one of the most abundant forms of non-conventional, renewable energy source found on the Earth. It is readily available, free of cost and is pollution free. Solar energy can be harnessed to be changed into electricity and power by the use of devices like solar panels which consists of photovoltaic cells. Photovoltaic cell is an electrical device which convert sun's light into electricity by the property of photoelectric effect. By the use of solar panels we can harness sunlight to generate the electricity free of cost. In this project we have used solar energy in the process of grass cutting of lawns, fields etc. The lawn mower controlled the Bluetooth module. The solar lawn mower when Bluetooth controlled can be operated from anywhere within the Bluetooth signal range by the mobile phone of the owner.

**Index Terms - Solar power, Lawn mower, Bluetooth control, Photovoltaic cells**

## I.INTRODUCTION

Nowadays, pollution is the major issue in the universe. In case Gas power lawn mowers due to the emission of gases it is responsible for pollution. Also the cost of fuel is increasing so it is not efficient. Traditionally, lawn mowers are often clunky pieces of machinery that involves a lot of strength and energy to use. These present and high-tech grass cutters however, have been creatively designed to make the whole landscaping process much simpler and easier for the user. From robotic lawn mowers that can incredibly cut the grass for you to those that are cleverly powered by solar energy, these convenient and easy-to-use grass-cutting devices make straightening up your lawn more pleasing. The Grass Cutters use cordless electric mowers, trimmers and blowers powered by clean renewable energy generated by solar panels mounted on our trucks and trailers. We also use reel push mowers for smaller hard to access areas like pathways and parks. There's no oil, and no pollution. Just clean air, less noise, and green grass [1][3].

Other objective is that automatic lawn cutter has differentiate between grass & concrete while monitoring its surrounding continuously. We wanted an ultrasonic sensor to sense if the lawn cutter was heading into an object. Safety is main concern while designing the lawn cutter. As it has blades we want our lawn cutter not to be in operating mode if it was being held in the air by the user. Knowing that the user would be randomly holding the lawn cutter we need a sensor to detect orientation. Accelerometer was hence use in lawn cutter so that it will not operate when user hold it. An automatic lawn cutter will relieve the consumer from mowing their own lawns and will reduce both environmental and noise pollution [2].

The technological advancement is mostly designed to reduce to reduce the manual work and save time and labor power. The conventional grass cutting, lawn cleaning equipment's are manually handled [3][10]. This project is designed to reduce the labor power required in grass cutting at residences, corporates, agricultural fields etc. The project is developed to automatically operate without any human need saving labor power and time. The lawn mower is powered by the solar energy. Solar energy is one of the most abundant forms of energy present on Earth whose efficient utilization can reduce the burden of the fossil fuels. Solar energy is pollution free thus it has no negative effect on the solar system [4][9].

Photovoltaic cells or solar cells are used to convert sun's heat and light into electricity. Solar cells work on principle of photoelectric effect. The photovoltaic cells are made of semiconductor materials like Silicon. These semiconductor materials emit electrons when hit by the solar light consisting of protons. These free electrons when captured result into electricity [5][11]. Here the solar energy is stored in the batteries and at the same time used to drive the controlling unit used that is Arduino. The Arduino is interfaced with the driver motors for the cutting operation. Arduino is also interfaced with the Bluetooth module.

## II.RELATED WORK

The first lawn mower was invented by Edwin Budd in 1830 to just outside Surround, in Gloucestershire, England Bedding mower was designed primarily to cut the grass on sports grounds and extensive gardens are superior alternative to scythe and was granted a British patent on August 31, 1830. Bedding's first machine was 19 inches (480 mm) wide with a frame made of wrought iron. The mower was pushed from behind.

A Solar grass cutter is a machine that use sliding blade to cut the lawn at even length. Even more sophisticated devices there in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful devices which is very simple in

construction and use. It is used to maintained and upkeep lawn in gardens, schools, etc. Rapid growth of the various high-tech tools and equipment's make our job done comfortable and sophisticated. The research work aims at fabricating a grass cutting machine system which makes the grass cutter-based motor running through solar energy. Power plays a great role whenever man live and work. The cutting mechanism is made of a flat blade rigidly fixed to the frame behind the spiral arrangement which is configured to contact at least one-reel bar of the spiral blade during the rotation of spiral mechanism [6].

### III.EXPERIMENTATION

#### A. Block Diagram

The block diagram below outlays the components used in the project. Arduino is main controlling unit of the system. A Bluetooth module, Solar cells, Battery, driver motor (L298N) and motors are the other components required in this lawn mower project. Solar panel is connected with battery to charge the battery by the sunlight. This in turn powers the Arduino. Thus, Arduino gets the power supply from sunlight. The Bluetooth module is use to control the Arduino based on the mower through the mobile phone [7][8].

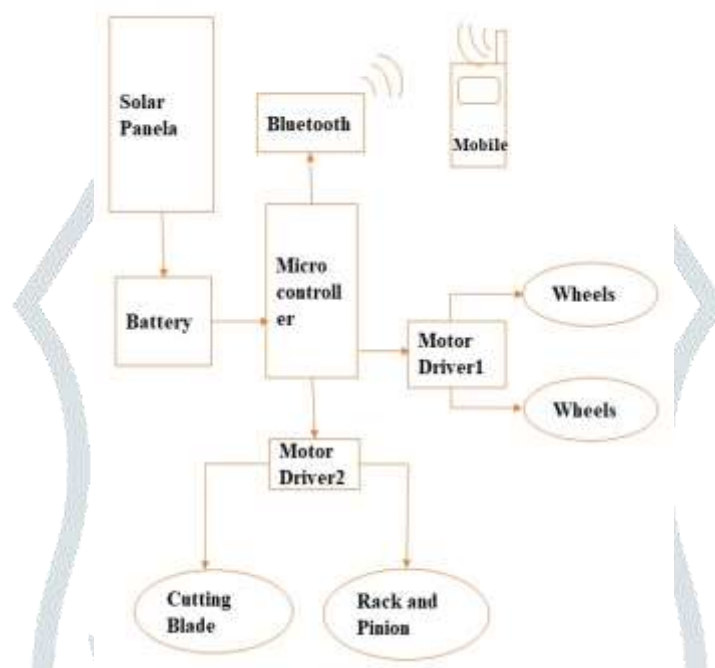


Fig 1. Block diagram

This Project is the combination of 2 different areas i.e. Mechanical and Electronics. This combination leads to an Automated Model which uses Solar Panel, Battery[12V], Arduino (UNO-R3), Motor driver Module (L293D), DC Motors, Bluetooth (Hc 05), Rack and Pinion, Cutter

#### B. Principle and Working

Basic principle used for this project is the 'Conversion of Energy', since Solar Energy is converted into Electrical Energy with the help of solar panel. Electrical Energy is stored in the battery and then supplied to the components. To supply this energy in the proper manner, Arduino (UNO-R3) is used, which will be programmed on the basis of functionality of all the components which are to be controlled with the help of Arduino. Motors are controlled with Motor driver IC module. Front wheels are driven by 2 DC motors of 65RPM. Rear wheels of the vehicle are belt driven from front wheels. Cutter blade is also driven with a motor of 1000 RPM. Blade is lifted up and taken down with the help of 'Scissor-Lift Mechanism'. Rack and Pinion is used for the working of scissor mechanism. Pinion is also rotated with the help of DC Motor having 3.5 RPM.

### IV.DESIGN PARAMETERS

1. Selection of electric motors
  - A. DC Motors SPEED=65,3.5,1000(RPM)
  - B. Voltage=12 V
  - C. Current (Load)=0.9A
2. Solar Panel:
  - A. Wattage=10W
  - B.  $V_{max}=17.7V$
  - C.  $I_{max}=0.57A$
3. Battery:
  - A. 12 V 7.6 Ampere Hour

Charging time: -

(when battery is 50% discharge) =  $0.5 \times 12 \times 7.6 / 10 = 4.56$  hrs.

Discharging time (Load): -

(when battery is 50% discharge) =  $0.5 \times 7.6 \text{Ah} / 0.9 \text{A} = 4.2$  hrs.

## V.CONCLUSION

From above model, we can conclude that this lawn mower can be used for more than one field for grass cutting. The adjustable cutter height is the main mechanism that brings improvements in the existing models. This model of lawn mower is pollution free as it uses Solar power. There is no need of presence of person near the mowing site as the controlling is done through mobile wirelessly. Further we also concluded that waste collecting is difficult while operating this lawn mower. So, we have to provide vacuum cleaner for auto collecting waste which will also reduce the operating time.

## VI.ACKNOWLEDGMENT

We wish to express our gratitude to Prof. (Dr.) R. Jalnekar Sir Director, VIT Pune for providing the facilities of the Institute and for his encouragement during the course of this work. We also express our deep gratitude to Prof. (Dr.) Vijay Gaikwad Sir, the Head of the Department of Electronics Engineering, VIT Pune for his guidance and support. We would like to thank our Project Guide Prof. V. P. Parkhi Mam for providing us with guidance and help on every step of the way during the course and for imparting us with invaluable knowledge. Also, we would like to thank our family and friends for their constant support.

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