

# Fully Automated Solar Grass Cutter

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**Abstract**— Fully automatic solar cutting grass powered by solar energy and is able to operate only with clean energy from the sun is a big difference from commercial projects having a robot in need of a charging station is connected to the mains. The fully automated solar cutting grass is double checked first by the ultrasonic avoiding obstacles without the need for any human interaction other than the Bluetooth module. The engines cut grass and the vehicle interfaced with a microcontroller ATmega328 that controls the operation of all the engines. This project used the H-bridge MOSFET circuit for the motor controller and Pulse Width Modulation (PWM) to control speed. This system consists of three DC motors, solar panels for charging purposes. A DC motor is placed vertically and a blade connected to the motor to cut grass far right.

**Key words:** Solar Panel, Bluetooth Module, Ultrasonic Sensor, Atmega8, H- Bridge MOSFET

## I. INTRODUCTION

Technological developments are mostly designed to reduce manual labor, operating time and manpower. This program is designed to reduce the labor force required to cut grass in residential, companies, fields etc engine powered lawn mowers impetus and lawn riding mowers generate noise due to the loud engine, and local air pollution due to combustion in the engine and cutting grass, cannot be easily achieved by the elderly, the young, or disabled. Also, an engine powered engine requires periodic maintenance, such as changing the engine oil. Even though electric mowers are environmentally friendly, and they can be a hassle. Together with lawn motor powered engines, electric lawn mowers are also dangerous and cannot be easily used by everyone. Also, if the electric lawn mower is wired, clipped could prove problematic and dangerous.

## II. METHODOLOGY

This project shows a conversion technique of solar energy into electrical energy using solar panel charging the 12V battery. For checking the battery level it consists battery level indicator. The indicator uses the LM3914 IC for battery voltage level. This level is adjusted according to the battery voltage. This level indicate the solar intensity level. Fully automatic solar grass cutter works on two modes first by using ultrasonic sensor and other by Bluetooth. To switch the mode of operation DPDT relay and DPDT switch are used. Bluetooth controlled system have been controlled by using Android mobile phone instead of any other method like buttons, gesture etc. Here, touch panel has been provided in android phone to control the car movement direction (forward, backward, left, and right). So here android phone is used as transmitting device and Bluetooth module placed in it. Android phone will transmit command

using its in-built Bluetooth so that it can move in the required direction like forward, reverse, to and fro.

For other mode we will use the ultrasonic sensor. If the grass cutter observe any obstacle in front of it, it automatically shift into another direction. For interfacing the Bluetooth and ultrasonic sensor, Atmega8 microcontroller is used. Also a speed control for motor such as cutter and wheel motor PWM technique has been. PWM signal is provided to gate terminal of MOSFET.

Drive motor is a high power motor so for this motor, H-bridge MOSFET circuit is used. H-bridge circuit consists of P type and N type MOSFET that has a high current capability.

## III. PRIOR APPROACH

A grass cutter is a machine utilizing one or more revolving blades to cut a grass surface to an even height. The height of the cut grass may be fixed by the design of the mower, but generally is adjustable by the operator, typically by a single master lever, or by a lever or nut and bolt on each of the machine's wheels. The blades may be powered by muscle, with wheels mechanically connected to the cutting blades so that when the mower is pushed forward, the blades spin, or the machine may have a battery-powered or in electric motor.

The first lawn mower was invented by Edwin Budding in 1830 in Throop, just outside Stroud, in Gloucestershire, England. Budding's mower was designed primarily to cut the grass on sports grounds and extensive gardens, as a superior alternative to the scythe, and was granted a British patent on August 31, 1830.

Budding's first machine was 19 inches (480 mm) wide with a frame made of wrought iron. The mower was pushed from behind. Cast-iron gear wheels transmitted power from the rear roller to the cutting cylinder, allowing the rear roller to drive the knives on the cutting cylinder; the ratio was 16:1. Another roller placed between the cutting cylinder and the main or land roller could be raised or lowered to alter the height of cut. The grass clippings were hurled forward into a tray-like box. It was soon realized, however, that an extra handle was needed in front to help pull the machine along. Overall, these machines were remarkably similar to modern mowers. Two of the earliest Budding machines sold went to Regent's Park Zoological Gardens in London and the Oxford Colleges. In an agreement between John Ferrabee and Edwin Budding dated May 18, 1830, Ferrabee paid the costs of enlarging the small blades, obtained letters of patent and acquired rights to manufacture, sell and license other manufacturers in the production of lawn mowers. Without patent, Budding and Ferrabee were shrewd enough to allow other companies to build copies of their mower under license, the most successful of these being Ransomes of Ipswich, which began making mowers as early as 1832. His machine was

the catalyst for the preparation of modern-style sporting ovals, playing fields (pitches), grass courts, etc. This led to the codification of modern rules for many sports, including for football, lawn bowls, lawn tennis and others.

#### IV. OUR APPROACH

The solar grass cutter is it has a panel arrangement at an in such a way that can receive solar radiation with high intensity easily from the sun. The solar panel converts solar energy into electrical energy. This electrical energy is stored in batteries by using a solar charger. The main function of the solar charger is to increase the current from the panel while batteries are charging. The motor is connected to batteries through connecting wires. Between these mechanical circuit breaker switch is provided. It starts and stops the working of the motor. From this motor, power transmits to the mechanism and this makes the blade to rotate on the shaft this makes to cut the grass.

The designed solar powered grass cutter comprises of direct current (d.c motor), a rechargeable battery, solar panel, a stainless steel blade and control switch. Rotation is achieved by the electrical motor which provides the required torque needed to drive the stainless steel blade which is coupled to the shaft and to the gears to the motor. Gears are to increase the rpm and to reduce the power consumption. The solar powered grass cutter is operated by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for mowing. The battery recharges through the solar charging controller, performance evaluation of the developed machine was carried out with different types of grasses.

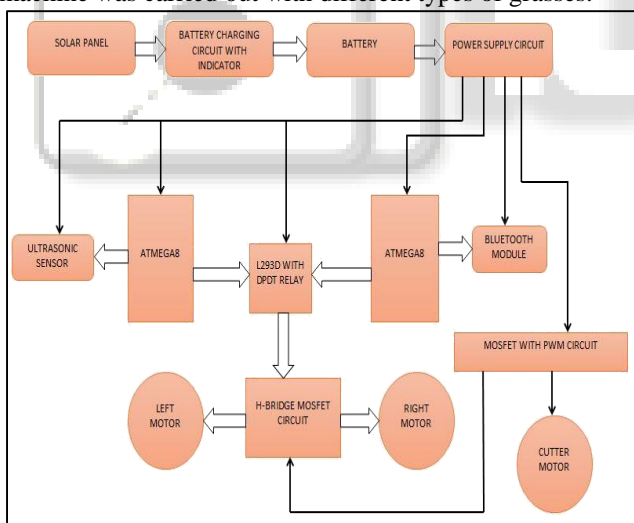


Fig. 1: Block Diagram of Solar Grass Cutter



Fig. 2: Project Picture

#### V. COMPARISON BETWEEN PREVIOUS MODULE AND PRESENT MODULE

- 1) Previous module was able to perform in single mode (Bluetooth or ultrasonic) but an advancement of two module system, (Bluetooth or ultrasonic) both simultaneous working has been incorporated.
- 2) Battery level indicator has also been facilitated in proposed module.
- 3) Speed control was absent in previous module but we have incorporated speed control using PWM in proposed module.
- 4) A new attribute to check solar intensity has also been added in proposed module.

#### VI. CONCLUSION

This system is very simple to use and cost effective, since it is much more advantageous, i.e., without any cost fuel, no pollution and no fuel residue, less wear because of less number of moving parts and may be operated using solar energy. It can easily be addressed. This system is capable of charging the battery while the solar energy cutting grass is moving. So it is much more suitable for cutting grass, too. The output of this project can be improved by increasing reducing costs, increasing the efficiency of the blades and weight reduction. The sensors are not affected to the environment and animals. It is very useful for the user. The DC motor maintains a constant speed in load condition used. The battery is charged by the solar panel on a stable trend. The output of the photovoltaic panels are different but IC LM317 is to act as a voltage regulator and took a different input from the photovoltaic and give the performance stable.

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