

# Hardware Implementation of Fully Automated Solar Grass Cutter

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**Abstract :** *This paper s a hardware model of the automatic grass cutting machine by using the non-renewable energy (i.e. solar energy). Solar energy is the renewable energy. Grass cutter with a standard motor is an conventional control strategy is inconvenient . A normal grass cutter will run based upon the conventional energy sources. The major drawbacks of this technology are high running cost. Create noise pollution and air pollution. Also, an IC engine requires periodic maintenance such as changing the engine oil, mechanical maintenance. It is an innovative technology of cutting grass without any pollution, electric solar grass cutter are environmentally friendly. The technology can help the people who are living in rural areas. This paper is mainly proposed to reduce the manpower and usage of electricity. The system control is done by the Schmitt trigger circuit. The grass cutter and vehicle motors are interfaced to a Schmitt trigger circuit that controls the working of all the motors. A Solar grass cutter is a machine that uses sliding blades to cut a lawn at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep lawns in gardens, schools, college's etc.*

**Keywords:** *Solar Panel, Batteries, High Speed DC Motor, Blades, Electronic components.*

## I.INTRODUCTION

Grass cutter machines have suit incredibly trendy today. Most of the times, grass cutter machines are used for soft grass furnishing. In a time where technology is merging with environmental awareness, consumers are looking for ways to contribute to the relief of their own carbon footprints. Pollution is man-made and can be seen in our own daily lives, more specifically in our homes. Here with thereby, we are avoiding the carbon foot print and the complete operation can be automated by interfacing the suitable sensor with our control circuit

Automatic grass cutting machine is a machine which is departing to perform the grass cutting progression on its own. This model reduces both environment and noise pollution. This new design will help both customer and the environment and also reduce the environmental impact as well as noise pollution . This paper on a solar powered automatic grass cutter will lessen the consumer from mow their own lawns and will reduce both environmental and noise pollution. This design is

meant to be an alternate green option to the popular and environmentally unsafe fuel powered lawn power.

## II SYSTEM MODEL

Automated solar grass cutter is a fully automated grass cutting robotic vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting, without the need of any human interaction. The system uses 12V batteries to power the vehicle movement motors as well as the grass cutter motor. It 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 L293D motor driver that controls the working of all the motors. It is also interfaced to an proximity sensor for object detection. The driver circuit moves the vehicle motors in forward direction in case no obstacle is detected. On obstacle detection, proximity sensor monitors it and the driver circuit thus stops the grass cuter motor so as to avoid any damage to the object/human/animal. Driver circuit then turns the robotic vehicle off until it gets clear of the object and then moves the grass cutter in forward direction again.

By using fuel grass cutter there will be a lot of environmental pollution which mainly effects the living beings. So, in this solar grass cutter there will not be any kind of pollution damaging the environment. There will be no noise pollution therefore it will not disturb any neighbors residing in our surroundings.

## BLOCK AND CIRCUIT DIAGRAM

In this Paper the proposed model of the automatic solar grass cutting machine by using the non renewable energy (i.e solar energy). Solar energy is the renewable energy which is abundant in the nature and available at free of cost. The energy coming from the solar panel is stored in the battery. So we can use the power whenever we are using the grass cutter machine. This consists a sensor of photo electric type and whenever a sensor detects an obstacle it is connected to a transistor where the relay n/o to the monostable pulse timer and in this pulse timer we connected a variac and with that we can adjust the delay time for the output. The 3<sup>rd</sup> pin of the timer is connected to the timer relay and it is connected to the motor driver circuit.

Motor driver circuit is the major component in the automatic solar grass cutter .It controls the four motors to make them start and stop with respect the input given to it. The 12v supply is given to the 8<sup>th</sup> pin of the LM293D and it goes to the motors for proper functioning and 5v is given to the driver circuit. With this motor driver circuit we can change the direction of the grass cutting machine. In this circuit , rectifier circuit is also used so that the grass cutter can also be operated by ac supply. This will be very useful when the solar energy is not possible during rainy season. Through this ac and dc supply we can operate the fully automated solar grass cutter without any labor charges.

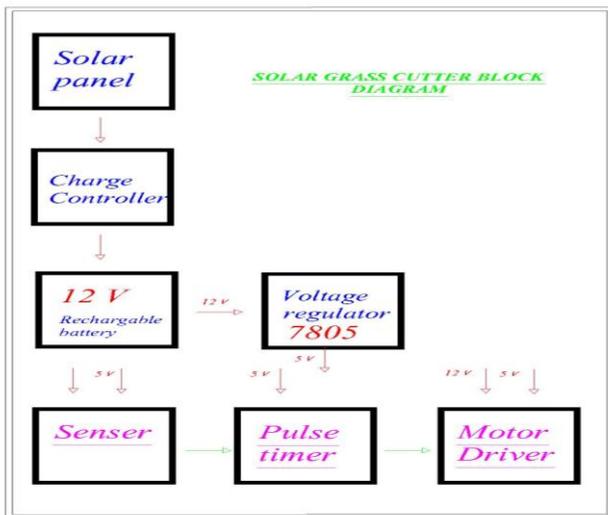


Fig.2.1 Block diagram

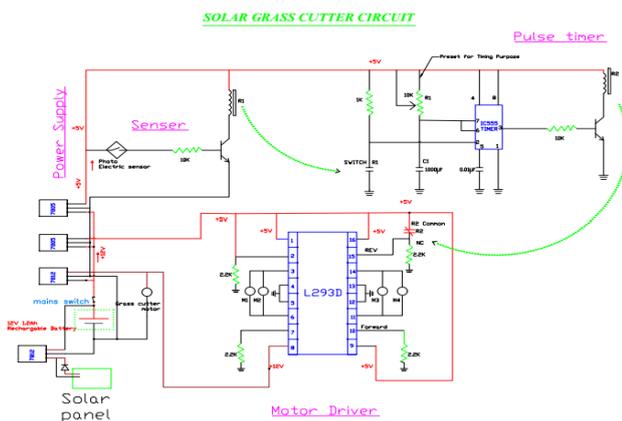


Fig.2.2 Circuit Diagram

IV. HARDWARE IMPLIMENTATION

A solar cell (photovoltaic cell or photoelectric cell) is a solid state electrical device that converts the energy of radiance directly into electricity by the photovoltaic effect. The energy of radiance is transmitted by photons-small packets or quantum of light. Electrical energy is stored in electromagnetic fields, which in turn can make a current of

electrons flow. Assemblies of solar cells are used to make solar modules which are used to capture energy from sunlight. When several modules are assembled together (such as prior to installation on a pole mounted tracker system), the resulting incorporated group of modules all oriented in one plane is referred as a solar panel. The electrical energy generated from solar modules, is an example of solar energy. Photovoltaic is the field of technology and research related to the realistic application of photovoltaic cells in producing electricity from light, though it is often used specifically to refer to the generation of electricity from sunlight. Cells are described as photovoltaic cells when the light source is not essentially sunlight. These are used for detecting light or other electromagnetic radiation near the visible range, for example infrared detectors, or measurement of light intensity.



Fig 4.1 Hardware implementation of Fully automated solar grass cutter.

V. SPECIFICATIONS

SOLAR PANEL

Voltage =12V

Power =5W

BATTERY

Voltage =12V

Current =1.2Ah

BC 547 TRANSISTOR

Maximum collector- base (Vcbo) = 50 V

Maximum collector-emitter voltage (Vceo) =45 V

Maximum emitter- base voltage (Vebo) = 6.0V

555 TIMER

Supply voltage (Vcc) = 4.5 to 15 V

Maximum output current = 200mA  
Maximum power dissipation = 600 mW  
Operating temperature = 0 to 75 degrees

#### 7805 VOLTAGE REGULATOR

Minimum input voltage = 7 V  
Maximum input voltage = 25 V  
Minimum output voltage = 4.8V  
Maximum output voltage = 5.2 V  
Maximum output current = 1.5 A

#### 7812 VOLTAGE REGULATOR

Minimum input voltage = 14.5 V  
Maximum input voltage = 30 V  
Operating temperature = 0-125 deg C  
Maximum output voltage = 12 V  
Maximum output current = 1.5 A

#### RELAY

Rated voltage = 5 V DC  
Type – SPDT  
Rated current = 30 ma  
Coil resistance = 167 ohm  
Power consumption = 150 mW

#### VI. CONCLUSIONS

Robotics is very vast field which comes with different combinations of technology this will helps to reduce the human effort and gives maximum efficient output for the work, Nowadays lot of energy is wasted for mowing lawn in different areas of the world and also takes lots of human effort for the work. The main aim of this paper is to make a solar powered automated robotic lawn mower system which will helps to mows the lawn in different design with lesser human effort. Advantages of this system are used components are of low cost so and in bulk production and adding of few more sensors doesn't makes any difference. Easy to move from one place to another place . Compact size and portable, Operating principle is simple, Non-skilled person also operate this lawn mower ,Easy to use, because it is cordless, With battery power-driven grass cutter, there is no more chaotic oil & smelly gasoline. The cost of electricity to recharge the battery is minimal compared to the high cost of gasoline, oil, air filters & spark plugs, has less moving parts, Less space required, Noise less operations so readily accepted in residential areas .But the 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

#### VII. FUTURE SCOPE

Further the existing model size can be reduced to make it compact. Efficiency can be improved by increasing the battery capacity. More sensors can be incorporated for accurate results and improved automation.

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