

## AUTOMATIC SOLAR GRASS CUTTER

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### ABSTRACT

Rapid growth of various high-tech tools and equipment's makes our jobs done comfortable and sophisticated. The project aims at fabricating a grass cutting machine which makes the grass cutter based motor run through solar energy. Power plays a great role wherever man lives and works. The living standard and prosperity of a nation vary directly with the increase in the use of power. The electricity requirement of the world is increasing at an alarming rate due to industrial growth, increased and extensive use of electrical gadgets. The best alternative source is solar energy. Grass cutter machines have become very popular today. Most common machines are used for soft grass furnishing. In this project we aim to design and develop a proto type automated solar powered grass cutting machine for demonstration purpose. The main parts of the grass cutting machine are IR sensor, DC motors, relay switch for controlling grass cutting motor, battery for

charging it through solar panel and this entire mechanism is placed in a suitable machine structure. The grass cutting motor has high rpm and it is connected to the electric supply from the battery through the relay controlled by the controller. Motor controlled by an electric switch for easy operation. The tempered blades are attached in this machine to the motor shaft parallel to the ground surface. The machine required for manufacturing includes welding machine, grinding machine etc.

### I. INTRODUCTION

Nowadays pollution is a major issue for whole world. Pollution is manmade and can be seen in own homes. In case of gas lawn mowers due to emission of gases it is responsible for pollution. Also the cost of fuel is increasing hence it is not sufficient. So the solar powered lawn cutters are introduced. There are worked using natural source of energy (solar power). Grass cutter or lawn mowing with a standard motor powered lawn mower is inconvenience, and no one takes pleasure in it. They are

inconvenience to use due to the noise produced and the pollution of it. Even though the electronic grass cutters are environmentally friendly, they too can be inconvenient. Along with the motor powered lawn mower, electric lawn mowers are hazardous and cannot be easily used by all. Hence we design to make a grass without any power source due to reduce the power consumption. Design solar powered domestic lawnmowers that utilize solar power as energy source as an energy source is meant to address a number of issues that standard internal combustion engine mowers do not. Electric lawn mowers with solar power can be used easily. It will eliminate the pollution caused due to gas and the noise is reduced along with the cost.

## **II.OBJECTIVE OF PROJECT**

The solar lawn mower is a fully automated grass cutting robotic vehicle powered by solar energy that also avoid obstacles and is capable of fully automated grass cutting without the need for human intervention. The heart of the project is the microcontroller which decides the various actions. The motor driver executes these orders by changing the power and polarity of the motors. The IR sensor detects the obstacles such as stones/animals etc. The sensor detects the fences and boundaries of

the lawn. The system uses 12v batteries to power the vehicle movement motors as well as grass cutting motor. We 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 interface to 8051 family microcontroller that controls the working of all the motors.

It is also interfaced to an IR sensor for object detection. The microcontroller moves the vehicle motors in forward direction in case no obstacle detected. On obstacle detection, IR sensor monitors it and the microcontroller thus stops the grass cutter motor so as to avoid any damage to the object/human/animal. Microcontroller then turns the robotic vehicle off until it gets clear of the object and then moves the grass cutter in forward direction again.

## **III.EXISTING TECHNOLOGY**

Existing automated lawn mowers each have a distinct working principle, for instance the Robo mow from Friendly Robotics (2011) requires the user to perform a certain setup where the garden perimeter is set. The perimeter is set using a battery powered wire that is laid around the outer edges of the garden and any area where the robot is not to cover. Special sensors inside Robots mow enable the wires to be recognized and the robot is therefore kept within the designated

area. The robot travels on the garden in a systematic crisscross pattern shown in figure. Several times from side to side to ensure that the entire area is covered and that the grass is cut from different angles.

### **Disadvantages of existing system**

The existing systems have many

Disadvantages like as follows:

- The size and shape of the garden- as wires have to be placed in the garden area to be covered by the robot, the cost of the entire system may be considerably higher depending on the size. In the case of many plants being in the middle of the garden area, the setup can become cumbersome.
- Damage or faults- the wires are set on the grass and although the company mentions the fact that they would typically be covered by grass and become unnoticeable in a matter of 2-3 weeks the wires are prone to damage. The damage can be from any origin for example, pets can dig up and damage the wire, over time due to weather, it can wear

off, amongst the others.

- A fault on the wire can provide incorrect information to the device and as consequence to device will not work as expected, Cutting patterns inefficiency- the crisscross pattern for Robo mow and the random one used by LawBott and Husqvarna are all not very efficient due to the fact that it was required that the robot crosses the same location more than once, consequently more energy is dissipated and the overall completion time is extended.

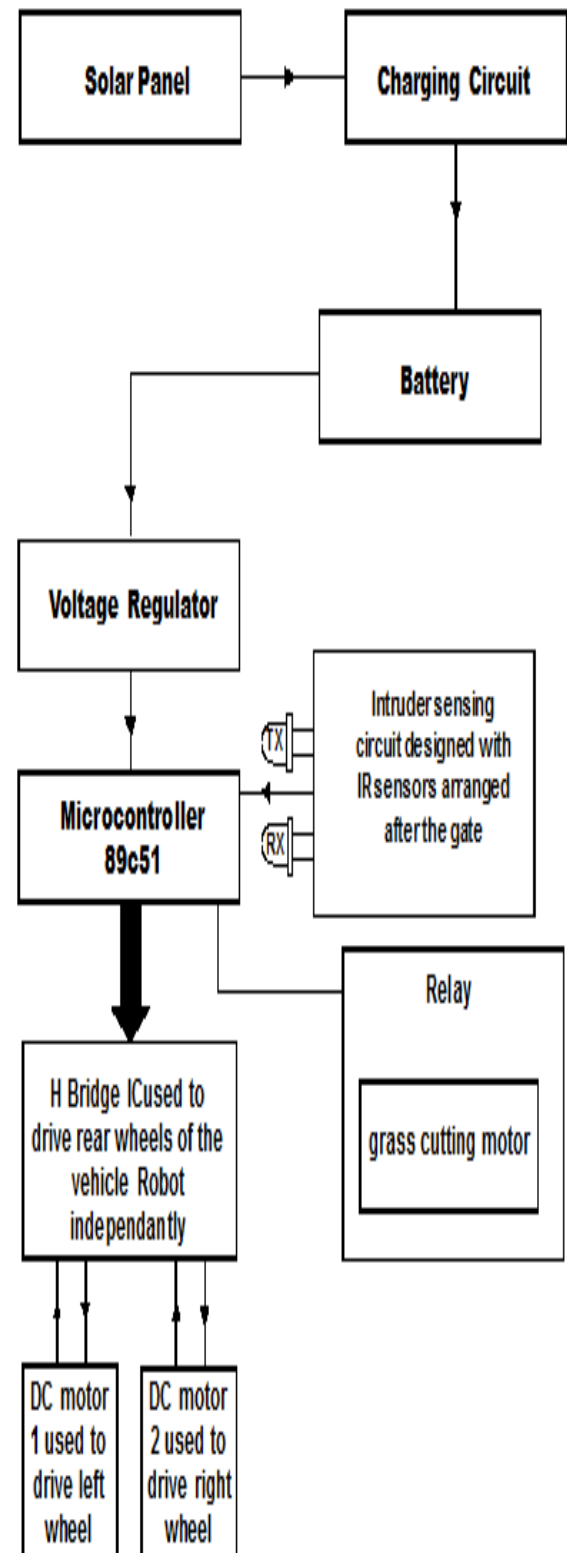
### **IV.PROPOSED SYSTEM**

In this project, the solar panel is mounted on the grass cutter machine receives the solar power from the sun. This solar power stored in the battery. The battery provides power supply by using the solar charge controller. The main function of the solar charge controller is to increase the current from panels while batteries are charging. It also disconnect the solar panels from the batteries when they are fully charged and also connects to the panels when the charging in the batteries is low.

The solar grass cutting machine is start operation by the switch connected on the board which allows the flow of current to the motor which turn drive the blades used for moving. In the solar grass cutting machine the four dc 12v motors are connected to the both sides of the machine, per side two motors are connected in parallel connection so they works as a single unit on both sides. Other additional motors are connected at the front of the frame; these motors have connected the blades on the motor shaft so that the grass is cut by turn on this motor. These motors are operated by the microcontroller; it gives the forward moving command to the motors during the operation of this grass cutter if the obstacle comes in front of the machine the microcontroller gives the command to the ultrasonic sensor and the sensor detects that obstacles and avoid them and change the direction of grass cutter machine. The component used in this project are 12v, 10w solar panel, 18v battery, voltage regulator, micro controller, IR sensor, Dc motors, Blades.

#### V.BLOCK DIAGRAM WORKING

The lawn mower or grass cutter is made up of two in built reduction gear mechanism motors for driving the vehicle, one high RPM DC motor For grass cutting to which a fan with sharp blades is connected, a



Rechargeable battery, solar panel, a control unit with microcontroller, drivers for the motors and a link mechanism. The power and charging system comprises of a solar panel which charges the battery while

exposed to sunlight. The D.C. motor forms the heart of the machine and provides the driving force for the collapsible blades. This is achieved by the combined effect of mechanical action of the cutting blades and the forward thrust of the mower. The system is powered by an electrical switch which completes the circuit comprising the DC motor and the battery. The IR sensor is finding the path to avoid the obstacles and machine damage. The shaft fitting mechanism with which the height of cut can be altered depending on the requirement. The program in microcontroller is written in a way that when IR sensor senses an obstacle the device changes its path.

#### **VI.EXPERIMENTAL RESULTS**

The 10 watts solar panel is used to charge the batteries which are rechargeable. the solar panel gives maximum 18v and 580mA current .we need charging circuit between solar panel and batteries .The charging circuit has voltage regulator which regulates voltage to 15v and one transistor to amplify the maximum current to circuit and diode is used .we use 12 voltage battery for entire circuit and another 12v volts for cutting blade. The microcontroller 8051 takes the input from the ultrasonic sensors, when any

interrupt or obstacle occurs the ultrasonic sensor senses the obstacle and gives feedback to microcontroller then according to the program which was given to microcontroller its turns left or right .It waits up to some delay and senses again and same procedure works if no detection occurs to ultra sonic range then it moves forward until it finds some detection. B The movement of bot is done by using the two DC motors of 100 rpm .The motors are driven by using motor driver (L293D) .It is aslo known as H-Bridge .The main purpose of using motor driver is because that DC motors require the minimum voltage as 9v as input. But the microcontroller gives output as only 5v so we require 9v to 12v for driving the motors. So we use motor driver which takes 5v as input and gives the 12v for motors .The L293D motor driver drives only two motors which can move in both directions. And the cutting blade is used to cut the grass to cut any type grass we need high rpm motor, so we used 1400 rpm motor for cutting blade .The motors runs directly by 12v rechargeable battery .The DPDT switches are used for movement of bot and cutting blade separately.



**Fig.6.10 Battery charging through solar panel**



**Fig.6.2 movement of machine through battery**

**Advantages**

- No fuel cost
- Pollution free
- Compact in size
- Easy to move from place to place

**Applications**

- For garden.
- For small farm.
- For playground.

**Conclusion**

The project work is designed and developed successfully. For demonstration purpose, a prototype module is constructed and the results are found to be satisfactory. While designing and developing this proto type module, we have consulted few experts those who are having knowledge in the field of Mechatronics and these professionals working at different organizations belong to Hyderabad helped us while fabricating this project work. Since it is a prototype module, much amount is not invested. The whole machine is constructed with locally available components, especially the mechanical components used in this project work are procured from mechanical fabricators and they are not exactly up to the requirement. Some of the modifications must be carried out in the design to make it as real working system depending on the requirement. It will be easier for the people

who are going to take the project for the further modifications. This project is more suitable for a common man as it is having much more advantages i.e, no fuel cost, no pollution and no fuel residue, less wear and tear because of less number of moving components and this can be operated by using solar energy.

**VI.REFERENCES**

- 1) LINEAR INTERGRATED CIRCUITS – By: D. Roy Choudhury, Shail Jain
- 2) Mechatronics and measurement systems - By: DAVID G. ALCIATORE And MICHAEL B. HISTAND
- 3) Digital and Analog communication systems - By: K. Sam Shanmugam
- 4) Electronic Devices & Circuits – ALLEN MOTTERSHEAD
- 5) Electronic Instrumentation and Measurement Techniques By: William David Cooper
- 6) Mechatronics – Electronic Control Systems in Mechanical and electrical Engineering – By: W. Bolton
- 7) Practical transistor circuit design and analysis By: GERALD E. WILLIAMS
- 8) The 8051 Micro-controller Architecture, programming & Applications - By: Kenneth J. Ayala
- 9) Programming and Customizing the 8051 Micro-controller - By: Myke Predko
- 10) The concepts and Features of Micro-controllers - By: Raj Kamal