

Solar Based Grass Cutter

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ABSTRACT

Nowadays grass cutter machines are becoming very popular today. Pollution is manmade, which we can see in our daily life. In old model of grass cutter IC engine was used and hence because of its environmental impact pollution level rises IC engine driven cutter is more costly. Maintenance of such conventional machine is more.

The aim of our project is to make the grass cutter which operates on solar energy hence save the electricity and reduces manpower. In our project we use microcontroller for controlling various operation of grass cutter. Also the grass cutter has obstacle sensor for obstacle detection. Grass cutter operates automatically hence it does not require skill person to operate.

Key Words: 89C51 Microcontroller, Solar Panel, Ultrasonic Sensor, Motor, Relay, Battery, Motor drive, Blades

1. INTRODUCTION

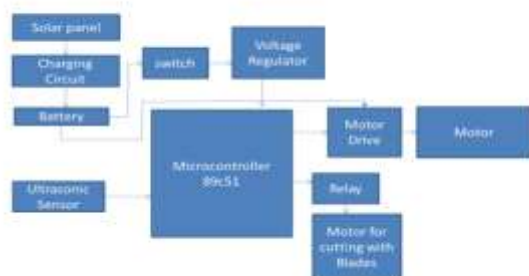
1.1 Problem Identification

The past technology of grass cutting is manually operated by the use of hand devices like scissor, these results into more human effort and more time required accomplishing the work. Also in old methods lack of uniformity of the remaining grass. Also due to the use of engine powered machines increases the air and noise pollution also this grass cutter require maintenance.

1.2 Purpose

The objective of our project is to design and automatic lawn mower which operates on solar energy and avoids the drawback of old lawn mowers. The purpose is to avoid energy crisis in India and reduces the human efforts, operating cost and maintenance cost. Also solar based grass cutter keeps the environment clean and healthy. It is used for cutting different types of grasses for various applications. The whole machine operates on the solar energy stored in battery. The IR sensor is used for the obstacle detection to avoid any damage of the human, object and animal. Also we are using relay to control the motor connected to blades as a switch. The prototype is charged from sun by using solar panel.

2 BLOCK DIAGRAM:

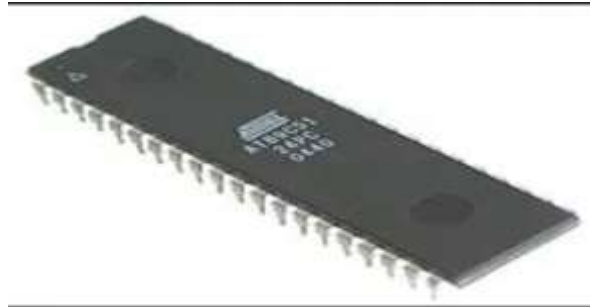


Fig(2.1): Block Diagram for Solar Based Grass Cutter

2.1 DESCRIPTION OF BLOCK DIAGRAM

2.2.1: 89C51 Microcontroller

A microcontroller is a small computer used in one IC containing a processor core, memory and programmable input output peripherals. the microcontroller is low power high performance COMS 8bit microcontroller.4k bytes of flash programmable and read only memory.



Fig(2.2.1): 89c51 microcontroller

Features: -

- 8 bit data bus and 8 bit ALU.
- 16 bit address bus-64KB of RAM and ROM.
- Onchip RAM-128 byte(data memory)
- Onchip ROM-4KB(Program memory)
- Four 8-bit bidirectional input/output ports.
- Programmable serial port i.e. one UART(serial port)

2.2.2 Solar Panel:

Photovoltaic solar panels absorb sunlight as a source of energy to generate electricity. A photovoltaic(PV) module is a packaged, connected assembly of typically 6x10 photovoltaic solar cells.

The most common application of solar panels is solar water heating system.

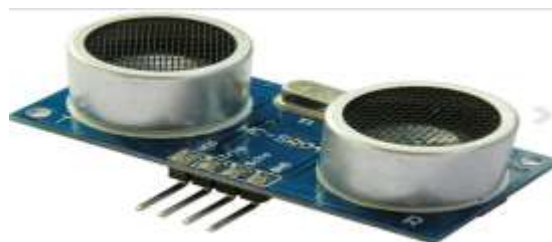


Fig(2.2.2): Solar panel

2.2.3 Ultrasonic Sensor:

Ultrasonic transducers or ultrasonic sensors are a type of acoustic sensor divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound.

In a similar way to radar and sonar, ultrasonic transducers are used in systems which evaluate targets by interpreting the reflected signals.



Fig(2.2.3): Ultrasonic Sensor

Features:

- Supply voltage:5v(DC)
- Supply current:15mAmp.
- Modulation frequency:40Hz.
- Distance:2cm-400cm.
- Accuracy:0.3cm.
- Output:0-5v.

2.2.4 Battery:

Battery is used for solar energy which can be further converted into electrical energy .The battery should requires following properties: 1) Long life

2)High reliability



Fig(2.2.4): Battery

2.2.5 Relay:

A relay is an electrical operated switch.Many relay use an electromagnet to mechanically operate a switch.Relay are used where it is necessary to control a circuit by a separate low-power signal.



Fig(2.2.5): Relay

2.2.6 Motor:

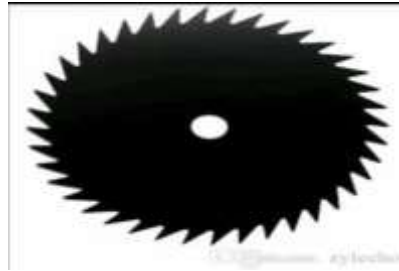
A dc motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy.



Fig(2.2.6): Motor

2.2.7 Blades:

A lawn mower is a machine utilizing one or more revolving to cut a grass surface to an even height. The height of the cut grass may be fixed by the design of the mower.



Fig(2.2.7): Blades

3. WORKING PRINCIPLE OF THE SYSTEM:

It has panel mounted on top of model in a particular arrangement such that angle of inclination is 45 degree hence it can receive intensity solar radiation easily. Solar panel convert solar energy into electrical energy. this electrical energy is stored in the battery .

The battery is directly connected to the motor through switch and regulator. The switch is because whenever we want the supply then the battery is ON and whenever there is no need then the battery will be turned OFF through the switch. The regulator is connected to the motor to give the particular range of voltage. Motor drive is connected to the motor to protect the motor from exceed voltage. The cutting blades tap the power from DC motor which is turned actuates the blades and hence rotating blades cut the grass.

Photovoltaic effect:

The photovoltaic effect can be observed in nature in a variety of materials that have shown that the best performance in a sunlight is the semiconductors. when photons from the sun are absorbed in a semiconductor, that creates free electrons with higher energies than the created there must be an electric field to induce these higher energy electrons to flow out of the semiconductor to do useful work. A junction of materials, which have different electric properties, provides the electric field in most solar cells for the photon interaction in the semiconductor.

Solar photovoltaic cells are essentially semiconductors which have electrical transmission properties like metal or salt water and insulators like rubber. Panels are constructed with sheets of doped silicon, primary element in beach sand with impurities added like allows electron to flow.

Table 1: Comparison between solar and IC engine cutter.

Sr..No	Particular	Solar Based Grass Cutter	IC Engine Grass Cutter
1	Pollution	No	Pollution is great factor
2	Fuel	No fuel used	Fuel is used
3	Cost	Low	High
4	Maintenance	Low	High
5	Load Carrying Capacity	Low	High
6	Friction	Low	High

4.Result:

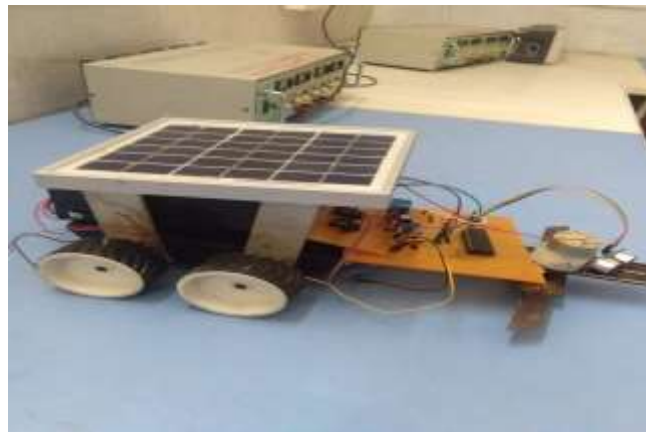


Fig3 :Solar Based Grass cutter

The fig Shows a pictorial representation of Solar based grass cutter .This cutter will be the replacement of human effort .

5. ADVANTAGES:

- Grass cutter operates automatically hence it does not require skill person to operate.
- Save electricity.
- Less maintenance.

6. APPLICATIONS:

- Grass cutter operates automatically hence it does not require skill person to operate.
- Save electricity.
- Less maintenance.

7. Flowchart:

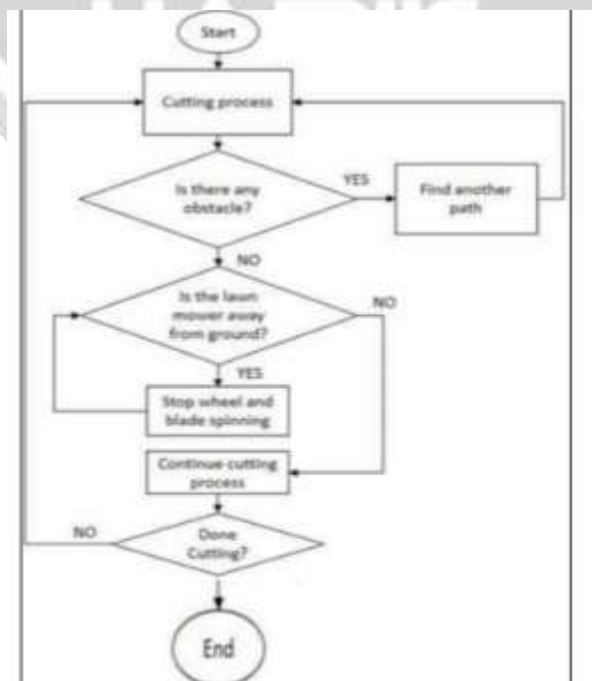


Fig. 4: Algorithm and Flowchart

8. CONCLUSIONS:

Our project entitled solar based grass cutter is successfully completed. It will be easier for the people who are going to use for further modification but this grass cutter occupy less place and light in weight and as it uses nonconventional source of energy hence running cost is zero. It has facility of charging battery while grass cutter is in the working condition. The cost of solar based grass cutter is less than the market grass cutter. Grass cutter is used to keep the lawn clean and uniform in schools, gardens and playgrounds.

9. FUTURE SCOPE:

The solar panel can be fixed with light sensors. Thus depending upon the arrangement of the sun, the panel will be slanting, such that the sun rays are incident normally (at 90deg) to the solar panel. With this the device would be constant capable of trapping the solar energy at times when the strength of the sun light is less. If panel used of high watt, then the machine can be used during night time for garden lighting or room lighting, because we can accumulate more power. And at night time however you keep it apart. So the power in the battery can be used for this intention. By using one valve in the pipe we can also use it for gardening i.e. pouring water for plants. By connecting one box type transporter we can use it to transport files, books or other stuffs from one place to other in office or any other place. Grass cutting can be made more proficiently used after modifying for small rice harvesting.

10. FUTURE WORK:

We completed our project successfully with the available sources. But the results and modifications are not up to the expectations. This can be further improved by incorporating the following modifications to obtain better results. The mechanism which we used i.e. scotch yoke mechanism does not give expected efficiency. This efficiency can be increased by using some other mechanism. and speed of motor is reduce because we have used heavy material and this material can be replaced by using light weight material. and design of blades should be done based on types of grass is used to cut. The project which we have done surely reaches the average families because the grass can be trimmed with minimum cost and with minimum time. Finally this project may give an inspiration to the people who can modify and can obtain better results.

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