

Solar Grass Cutter using Arduino UNO

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Abstract: *This system was fully automated based on solar applied in grass cutter is a fully automated grass cutting vehicle powered by solar energy that also avoids obstacles and is capable of fully automated grass cutting without the need for any human interaction. The system used 12V batteries to power the vehicle movement motors as well as the grass cutter motor. We also use a solar panel to charge the battery so that there is no need for charging it externally. The grass cutter and vehicle motors are interfaced to an Arduino family microcontroller that controls the working of all the motors. Here we have interfaced an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in forwarding direction in case no obstacle is detected. On obstacle detection the ultrasonic sensor monitors it and the microcontroller thus stops the grass cutter motor to avoid any damage to the object/human/animal whatever it is. The microcontroller then turns the robotic as long as it gets clear of the object and then moves the grass cutter in forwarding direction again*

Keywords: Arduino ATmega328p, Ultrasonic sensors, motor driver circuit, obstacles etc.

I. INTRODUCTION

There is a lot of progress work has been pending but there is still some labour-power which requires lots of income allocation for a small work. So, this is required that some exertion should have some other substitute so that the labour power surplus can be avoided. So, in our project we are trying to make a daily purpose machine which is capable to cut the grasses in lawns.

The project work will be done according to the appropriate application-based production. The system will have a power source that is battery as well as solar panel will be attached on the top of the machine. Usually for adjusting the height of grass cutter according to lawns, it requires two types of grass cutting machines, to avoid this use of two respective machines this individual machine has been designed with ability to adjust the height of blades according to its use on lawns.

Also, this machine has two blades to cover more area by which work will be done in less time with less effort. This project's main objective is of fabricating a grass cutting machine system that makes use of solar energy which is available without any cost.

As there is a continuous increase in the cost of fuel and the effect of emission of gases from the burnt fuel in the atmosphere, we decided to make an environmentally friendly grass cutting system which uses solar energy as well as Safety is the major priority while designing the grass cutter.

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.

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.

Due to the continuous increase in the cost of fuel and the effect of emission of gases from the burnt fuel into the atmosphere, this necessitated the use of the abundant solar energy from the sun as a source of power to drive a lawn mower. A solar powered lawn mower was designed and developed, based on the general principle of mowing.

II. METHODOLOGY

Grass cutter, which has been developed in this work, is a fully automated robotic vehicle without any human intervention, which uses solar energy to operate. The main advantage of this vehicle is, it detects obstacles and takes the deviation with the help of ultrasonic range sensors and microcontrollers. The working process of the grass cutter consists of a motor, which provides high rotational speed to the blades.

Due to the high speed of blades the grass gets trimmed by shearing action. In the current situation manually handled devices are used for trimming the grass, which desires an operator to move the vehicle yourself. By using Arduino uno based solar grass cutter the labour cost, maintenance cost can be eliminated to a certain extent compared to manually operated machine.

Based on a literature survey, it is found that, currently almost all the grass cutter devices work with conventional fuel and electricity, which causes pollution. In order to overwhelm these problems, a completely automated solar grass cutter has been established, which supports the green technology initiative, by dropping the pollution.

The major components of Arduino uno based solar grass cutter model are solar panel, batteries, microcontroller, sensors, motor driver, Bluetooth, DC motors and cutter. The abundant solar energy is collected, with the help of a solar panel which is used as a source of energy. The battery is used to store the electrical energy produced by the solar panel. The design contains a microcontroller, multiple sensors, and a solar charging system. Adding these elements together, we get our robotic lawn mower. The sensors are the eyes of our Robot Initially, we had an idea what type of sensors we wanted to use. We used only an ultrasonic sensor to detect if the robot was heading into an object.

Safety is the main concern when designing a robot with blades. We wanted our robot not to start operating if it was being held in the air by the user. Knowing that the user would be randomly holding the robot we needed a sensor to detect orientation. The power the system there are many options.

With recharging batteries, there are various chemistries but we decided to go with the one that work best with solar charging. The nickel-metal hydride (NiMH) was found to be the best because given a low charging current, it will not overcharge. Sizing the battery will depend on what we are powering, specifically the motors.

2.1 Block Diagram of Solar Grass Cutter using Arduino UNO

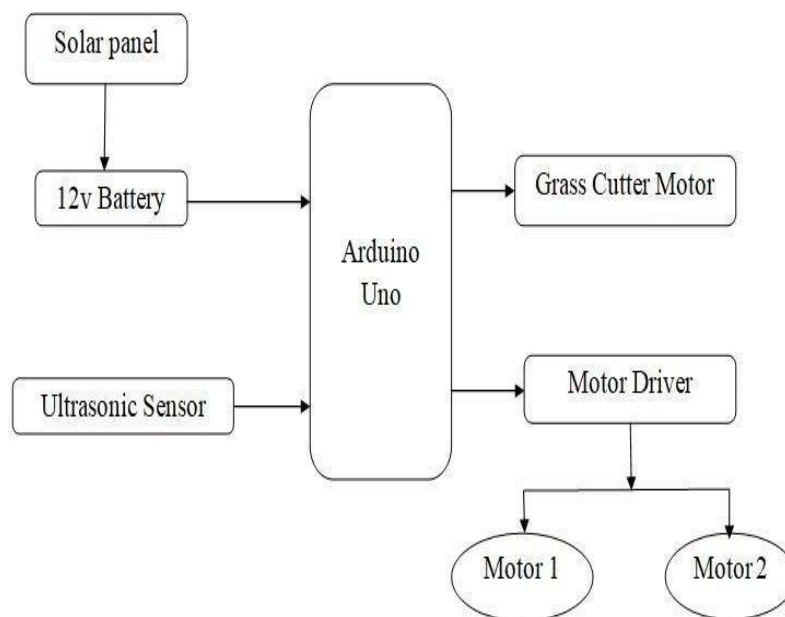


Fig. Block diagram of Solar Grass Cutter Using Arduino UNO

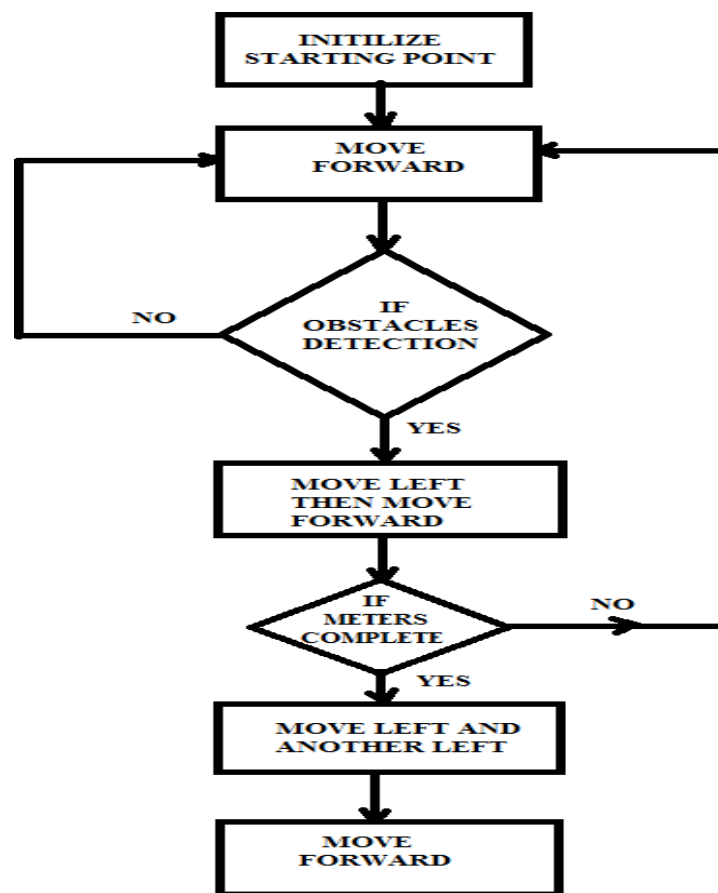
We use solar panel to charge the battery. We use Arduino UNO microcontrollers for making this system that controls the working of all the motors. Battery provides supply to the system. Arduino UNO is connected between battery and motor which is used to control the motor.

We are also using here an ultrasonic sensor for object detection. The microcontroller Arduino uno moves the motors in forward direction in case no obstacle detected in front of the vehicle.

When obstacle is get detected then an ultrasonic sensor monitors it and microcontroller stops the grass cutter motor for safety of the vehicle. Then microcontroller Arduino uno turns to the different direction to the clear area and then moves the grass cutter again in forward direction.

The solar grass cutter works in such a way that it takes solar radiation from sunlight through solar panels and convert it electrical energy into mechanical energy which causes blades to spin.

2.2 Flow chart



2.3 Model Implementation

The automatic solar grass cutter is an automatic grass cutting machine powered by solar energy that avoids obstacle and saves the vehicle from colliding. This system is capable of cutting the grass automatically. In this system we use 6V battery for generating the power to the motors for the movement of the system.

We use solar panel to charge the battery. We use Arduino UNO microcontrollers for making this system that controls the working of all the motors. We are also using here an ultrasonic sensor for object detection. The microcontroller Arduino uno moves the motors in forward direction in case no obstacle detected in front of the vehicle

When obstacle is get detected then an ultrasonic sensor monitors it and microcontroller stops the grass cutter motor for safety of the vehicle. Then microcontroller Arduino uno turns to the different direction to the clear area and then moves the grass cutter again in forward direction.

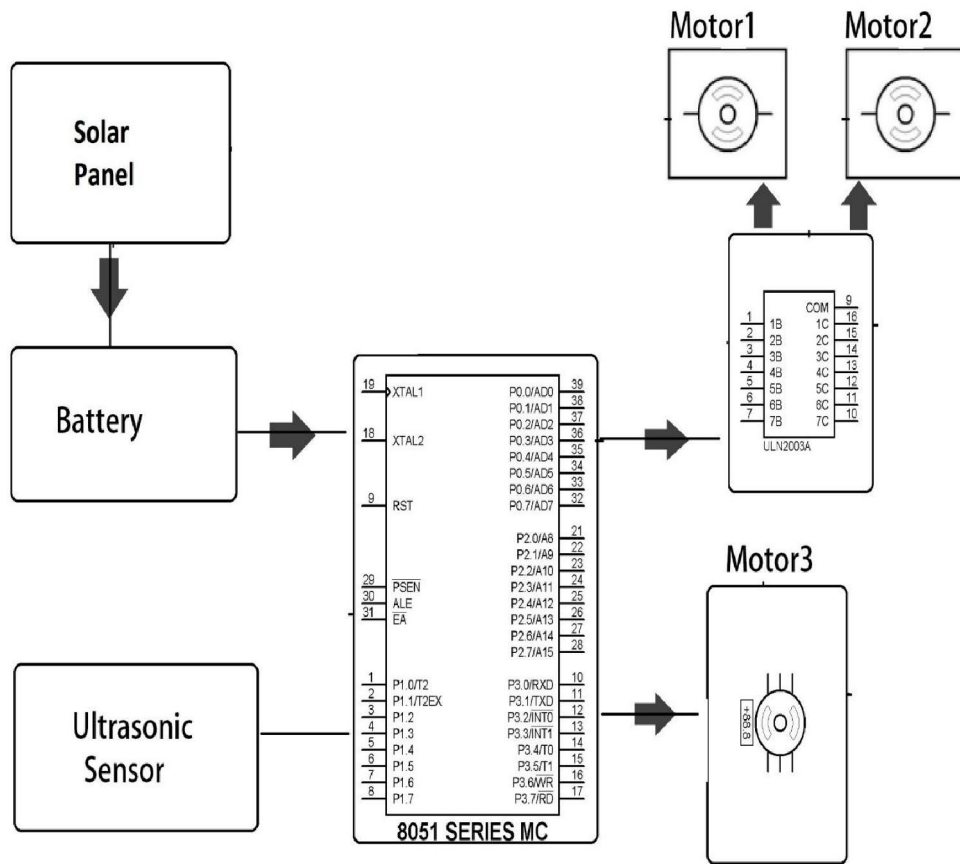


Fig 2. Model implementation of solar grass cutter using Arduino UNO

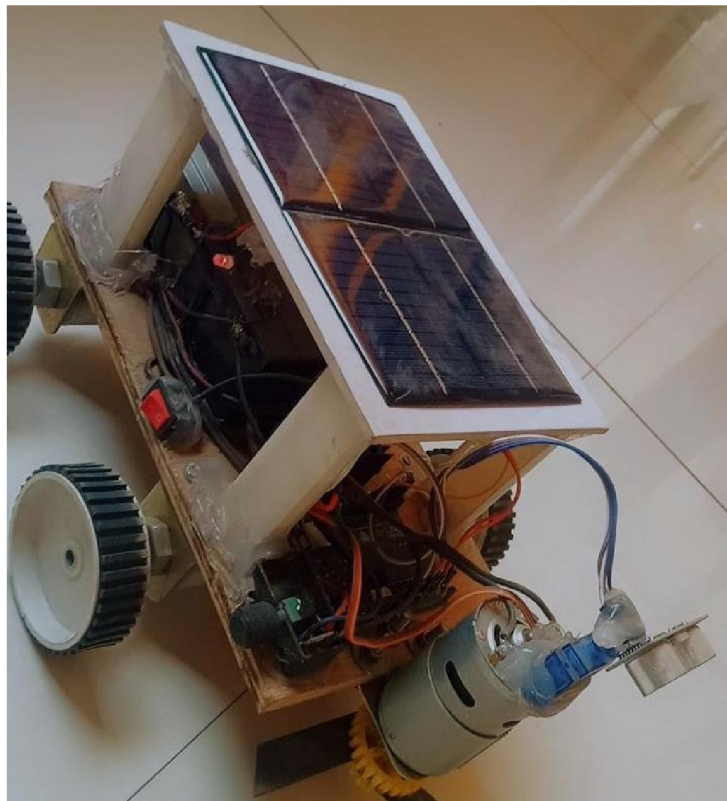


Fig. Real implementation of Solar grass cutter using Arduino UNO

III. LITERATURE REVIEW

For our project of automated solar grass cutter, we referred various literature, papers etc. The history of lawn mowers dates back to 1830 where the first lawn mower was invented by EDWIN BUDDING in England to cut the grass on sports ground, these were manually operated simple mechanism mowers. In today's market we can see many lawn mowers which are powered by IC engines and DC motors etc.

Solar Power Grass cutter

They have created a manually operated equipment that can cut grass in this paper. This gadget is made of linear blades and is not affected by the weather. The following ingredients were used to prepare the lawn cutter

When a barrier appears in front of the grass cutter, the Ultrasonic sensor detects it and sends a signal to the microcontroller telling it to adjust course or halt cutting grass until the barrier is gone. The main goal of this paper is to make numerous designs by moving the grass cutter in different directions based on the needs.

You may change the cut's height by utilising a link technique. This gadget is simply operated by unskilled labour.

Published in 2016

Author: Ashish Kumar Chaudhari, Yuraj Sahu

Solar Powered Grass Cutter Robot

They have a wireless grass trimmer ready. The two primary parts are the transmitter and the receiver. If there is an obstruction in front of the grass cutter, the transmitter constantly sends the rays, which are then reflected back toward the receiver.

The signals are received by the receiver in serial form by the encoder, but the microcontroller needs parallel data to communicate, thus the receiver passes the signals to the decoder, which converts the signals into parallel form before passing them to the microcontroller. Because they employed a solar panel, the battery does not need to be charged externally and is continually charged at a steady voltage while the lawn cutter is operating.

The battery is stored and charged throughout the day using a solar panel, allowing us to use the lawn cutter at night as well. Due to two DC motors, the grass cutter is capable of moving both forward and backward at once.

Published in 2016 Author: Vicky Jain, Sagar Patil

IV. RESULT

The components were chosen based on the design requirement and considering few of the other parameters in order to meet all the constraints. Based on the revive prototype model of the hardware and software system along with the ultrasonic sensor were demonstrated and required output was obtained.

The blade was designed in such a way that, it can cut the grass 2mm to 70mm. A panel is placed in a position where it can obtain maximum energy of the sunlight. So, among eco-friendly grass cutter this device is the efficient one.

V. CONCLUSION

This system is very simple to operate and advantageous overall because it has fewer moving parts and can be fuelled by solar energy, which means there are no fuel costs, no pollution, and no fuel residue. It can be resolved easily. This technology has the capacity to recharge the battery while the solar energy is used to cut the grass. As a result, cutting grass is much easier using it. Reduced costs, better blade efficiency, and less weight can all raise this project's productivity. The sensors are unaffected by the environment or animals. It is really beneficial to the user. The DC motor maintains consistent speed when used in load settings. The solar panel consistently charges the battery. As a voltage regulator, Arduino used a distinct input from the photovoltaic panels to stabilise performance despite the fact that the output of the solar panels varies.

REFERENCES

[1] Darwin Ramos and Jessie Lucero proposed solar powered automatic lawn mower Sanjose state university, electrical dept la 2009.

- [2] Guo-shing Huang und Keng-Chih Lin proposed "Intelligent auto saving energy robotic lawn mower & quote; IEEE transaction on robotics. Pg. 4130 to 4136 In 2010.
- [3] Tanimola Department of Agricultural & amp; Bio Environmental Engineering Lag State Polytechnic Ikorodu, Nigeria Volume 5, issue 6, June 2014 ISSN 2229-5518.
- [4] Amons (2013) Electricity Generation from Solar Energy, Technology and Economic Woodbank Communication Ltd. South Crescent Road, Chester CH4 TAU United Kingdom.
- [5] Vicky Jain Electronics Department KC College of Engineering & Management Studies & Research Kopri, Thane (E). Maharashtra, India ISSN 2120-8163, Special Issue 39 (KCCEMSR) (March 2016), PP 3943.
- [6] Design and implementation of autonomous Lawn Mower Robot controller"
- [7] Non-Conventional Energy sources by GDRAI, Khanna Publishers