

Automatic Customised Solar Grass Cutter

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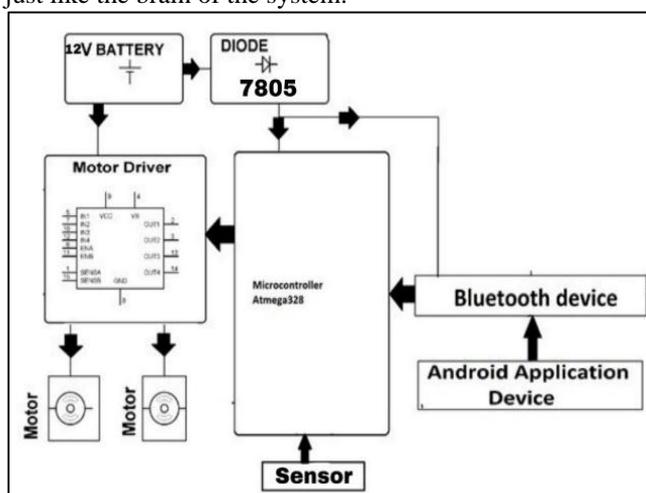
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Abstract— This paper describes about how technology goes too far as this Solar Grass Cutter will cut the grass according to the design you have given through mobile. In today's era, Automation is very important part of invention. In past days, there is use of manually operated grass lawn movers to cut the grass. This will damage our environment by air pollution as they use petrol and also there is loss of energy too. Due to the continuous increase in the cost of fuel and 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 grass cutter. This machine is deal with design of solar powered grass cutter comprises of D.C. geared motor, a rechargeable battery, a stainless steel blade, solar panel, and a control switch. The main thing in this is ATMEGA 328PU Controller. After the one process or in between the process of cutting the battery recharges through the solar charging controller. There are different types of sensors are been used in this such as IR sensor, UV sensor etc.

Keywords: Solar Panel, Battery, Microprocessor, Pollution, Sensors

I. INTRODUCTION

This project is based on mechanical as well as on electrical so we can called this Mechatronics project. Today's era condition will be damaging from pollution problem and this project is pollution free. These days, in our area various types of grass cutter are available like electrical, gasoline, manual grass cutters. A fuel is used in gasoline grass cutters for their working (cutting) and it produces gas that's why it increases pollution and also damages the grass or soil condition if the fuel leakages. And electric grass cutter works on electricity and various electric motor. In solar grass cutter we use 12V battery, solar pannel for charging the battery, Arduino and we can also use different types of sensors according to our requirement to decrease the annual cost of the grass cutter. In this we use Atmega-328PU (Arduino) is the main component just like the brain of the system.



There is no use of any kind of fuel and its pollution free and eco-friendly to nature or environment. It will cut the grass in design which will be given by us using android bluetooth application by using HC-05 bluetooth controller by already implemented the coding from arduino software to microcontroller.

II. LITERATURE SURVEY

A. *Self-Efficient and Sustainable Solar Powered Robotic Lawn Mower. (December 2015)*

Srishti Jain, Amar Khalore and Shashikant Patil:

This paper describe manually handled device is commonly used for cutting the grass over the field which creates pollution and loss of energy. Automatic solar grass cutter which will reduce the effort required for cutting grass in the lawns. Also solar power will be used to provide the driving force for the cutter and various sensors will be used to detect and avoid the unnecessary objects in the field during operation. It consist of microcontroller arduino ATmega328p, IR sensors, LCD display for better response and understanding to the user. This paper will analyze the operation and working principle of the Automatic Grass Cutter. The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. They wanted an ultrasonic sensor to sense if the lawn cutter was heading into an object. Safety is the main concern while designing the lawn cutter. As it has blades they wanted there lawn cutter not to be in operating mode if it was being held in the air by the user. The design contains a microcontroller, multiple sensors and a solar charging system. Adding these elements together, they got there robotic lawn mower. Knowing that the user would be randomly holding the robot they needed a sensor to detect orientation. They 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.^[3] as the lead acid rechargeable battery used is rated 12v 1.2Ah, it won't be overcharged due to the small output of solar panel. To detect the obstacles, they used IR sensors which has 1m 555 IC. There are two sensors, one on each side. This is because in case the obstacle is on the left then it will move in right direction and if the right sensor detects the obstacle then it goes towards the left.^[2]

But 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.

B. *Design and Implementation of Automatic Solar Grass Cutter (April 2017)*

Bidgar Pravin Dilip, Nikhil Babu Pagar, Vickey S. Ugale, Sandip Wani, Prof. Sharmila M.

This paper describe manually handled device is commonly used for cutting the grass over the field which creates pollution and loss of energy. Automatic solar grass

cutter which will reduce the effort required for cutting grass in the lawns. Also solar power will be used to provide the driving force for the cutter and various sensors will be used to detect and avoid the unnecessary objects in the field during operation. It consist of microcontroller arduino ATmega328pu, IR sensors, LCD display for better response and understanding to the user. This paper will analyze the operation and working principle of the Automatic Grass Cutter. The other objective is that the automatic lawn cutter has to differentiate between grass and concrete while monitoring its surroundings continuously. They wanted an ultrasonic sensor to sense if the lawn cutter was heading into an object. Safety is the main concern while designing the lawn cutter. As it has blades they wanted there lawn cutter not to be in operating mode if it was being held in the air by the user. The design contains a microcontroller, multiple sensors and a solar charging system. Adding these elements together, they got there robotic lawn mower. Knowing that the user would be randomly holding the robot they needed a sensor to detect orientation. They 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.

C. Solar Based Grass Cutting (January-June 2017)

Ms. Bhagyashri R. Patil, Mr. Sagar S. Patil

For human enlargement in many countries there are studies and trials going on the solar energy and the wind energy, so they made their new concept solar power grass cutting machine. In this concept they cut the grass on the agricultural land or small plants in lawns and gardens. The design of solar powered agricultural equipment will include direct current (DC) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch. The automatic grass cutting machine is going to perform the grass cutting operation by its own which means no manpower is mandatory. The purpose of the project here is to design and build a remote controlled grass cutter. The device consist of linear blades and it does not affected by climatic conditions. They have used many components for preparing grass cutter like DC Motor(3) for rotating the wheels and blade, wheels(4), battery, Solar panel, IR sensor, Collapsible blade. There are two main components such as transmitter and receiver. Transmitter continuously transmits the rays if any obstacle come in front of grass cutter then the rays are reflected back towards the receiver. The receiver receives the signal in the serial form from encoder but microcontroller requires parallel data for communication so receiver sends data to decoder to convert data in the parallel form and then it is passed to microcontroller.

D. Solar Powered Automatic Grass Cutter (February 2018)

Ms. Rutuja A. Yadav, Ms. Nayana V. Chavan, Ms. Monika B. Patil, Prof. V .A. Mane

In this paper they are trying to make a daily purpose robot which is able to cut the grasses in lawn. The system will have some automation work for guidance and other obstacle detection and the power source that is battery and a solar panel will be attached on the top of the robot because of this reduces the power problem. Automated solar grass cutter are increasingly sophisticated, are self -docking and some

contain rain sensors if necessary, nearly eliminating human interaction. It works much the same as the Robomow with a boundary wire implanted at the border of your lawn. The system is switched to automatic mode in which the robot's infrared sensors make a comparison between, cut and uncut grass. The mower continues this process until it completes the job. The system uses 12v batteries to power the vehicle movement motors as well as the grass cutter motor. They 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 8051 family microcontroller that controls the working of all the motors. It is also interfaced to an ultrasonic sensor for object detection. The microcontroller moves the vehicle motors in the forward direction in case no obstacle is detected. If in case obstacle is detected by the sensor then the microcontroller stops the grass cutter motor so as to avoid any damage to the object/human/animal coming.

III. PROPOSED METHODOLOGY

Path planning is a term whereby describe the motion of a robot which is planed accordingly. Sometime path planning also defined as motion planning as it main function is to plan a robot motion. Many robots produce nowadays and this technique still use by every industry that build robots. Path planning can be say as the basic motion algorithms that allow the robot to move around at a specific workspace with predefined path. With predefined path, the robot will not get lost or go out of their workspace. With the guided path, the robot knows the way they should go.

A. Hardware Requirements:

- Solar panel
- Battery
- DC motor
- Arduino
- Android app
- Relay
- Blades
- Bluetooth HC-05
- Medium Density Fibre (MDF)

B. Software Requirements:

- Arduino (IDE)
- Embedded C

C. Future Work:

- Size can be reduced to make it compact.
- Efficiency can be improved by increasing the battery capacity.
- sensors can be incorporated for accurate results and improved automation.
- Programming can be enhanced to make the device perform different operations.

D. Advantages:

- There is no fuel requirement that's why fuel cost is neglected.
- No pollution or Eco-friendly.
- Less wear and tear.

- Easy to move from one place to another (Flexibility).

E. Disadvantages:

- Blade failure problem occurs.
- Difficult to operate in rainy season.

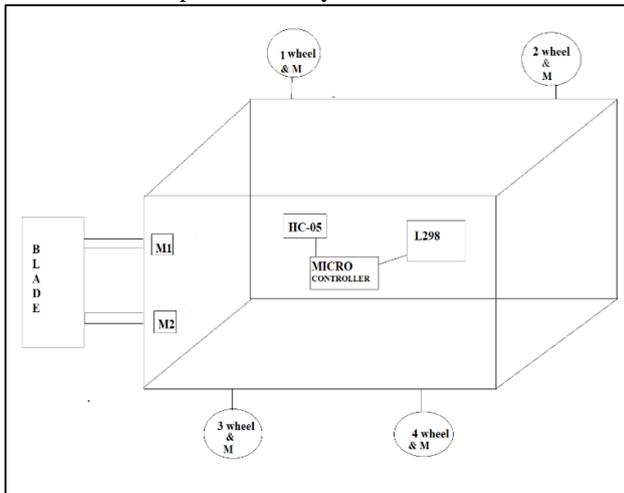


Fig. 1: Structure of model

IV. CONCLUSION

Our project entitled Fabrication of solar powered grass cutter is successfully completed and the results obtained are satisfactory. 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. This will give much more physical exercise to the people and can be easily handled. As we are nearer to Equator, the solar energy (non-conventional energy) is vastly available, so it is easy to charge the battery and is also pollution free. But the initial investments of the solar powered grass cutter is high. At present in order to curtail global warming and ozone depletion, the Government of India is offering subsidy for the solar equipments. The industries are producing these components in mass productions, so the cost of the system may come down. So in future it is expected to run all equipments by using solar energy. This system is having facility of charging the batteries while the solar powered grass cutter is in motion. So it is much more suitable for grass cutting also. The same thing can be operated in night time also, as there is a facility to charge these batteries in day light.

ACKNOWLEDGEMENT

It gives us immense pleasure to present this project of our work on the project entitled as "AUTOMATIC CUSTOMISED SOLAR AUTOMATIC GRASS CUTTER". We are highly grateful to our guide Mr. ABHISHEK SAXENA for his keen interest, invaluable guidance and constant encouragement and perpetual support which were instrumental in making this project successful. He has been constant source of inspiration to us was extremely patient in solving our numerous problems. Without his help and guidance this project could not have been successful.

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