

Design of Automatic Solar Based Grass Cutter: A Review

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Abstract—The present technology commonly used manually operated device to cut the grass. In this project we introduce the automatic grass cutter for cutting grass. The machine consist of rotating blades which is operated with the help of the motor and supply of power is done by battery. The main objective of automatic grass cutter is that user can specify that area that is to be mower and also the height of the grass requirement by the user. A grass cutter machine is a machine that uses a rotating blade or blade to cut a grass at an even height. Grass cutter employing a blade that rotates about a vertical axis are known as rotary mower. 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.

1. INTRODUCTION

In present years, pollution is a major issue for whole world. Pollution is manmade and can be seen own homes [1]. The emission of the gases from the gas powered grass cutter is responsible for the air pollution. Also the cost of the fuel is increasing day by day. Therefore, it is not efficient. Hence solar powered grass cutter are introduced. Solar powered grass cutter can be described as the application of solar energy to power an electric motor which in turn rotates a blade which does the moving of a lawn [2]. Solar energy is the renewable source of energy. In our project grass cutter machine, we are aim to developed for operation and construction. This is placed any suitable machine structure. The motor have 10000 RPM and it is connected to the electric supply by the use of a role of wire. The electric switch is used to control motor for easy operation. The raw material mainly used as GI sheet, motor, switch, wheel, wire, aluminum sheet, square pipe, paint, insulating material and other standard items like nuts, bolts and reverts. The machine required for manufacturing includes grinding machine, welding machine etc. Providing a high speed rotation to the blade is the working principle of grass cutter. The electric grass cutter is much easier to be used in gardens, lawns, and grass fields. Grass cutting machine are the best available operation in order to enhance the beauty of home lawns and grass field. According to world energy report, we get around 80% of our energy from conventional fossil fuels like oil (36%), natural gas (21%) and coal (23%) [3]. It is

well known that the time is not still when all these source should be used to avoid energy confrontation in the nearby future. So solar energy is introduction for machine process to work. A solar panel is a large flat rectangle, normally somewhere between the size of convector and the size of a door, made up of many individual solar energy collectors called solar cells covered with a protective sheet of glass. An electric grass cutter with a solar hanger will be easier to use. It will illumine the emission of an internal combustion mover which is mostly responsible for which is mostly responsibility for environmental pollution and causes green gases effect [4]. Different design have been made to suit each particular need and convenient. The solar power grass cutter is an improvement of wireless electric grass cutter.

2. SYSTEM DESCRIPTION

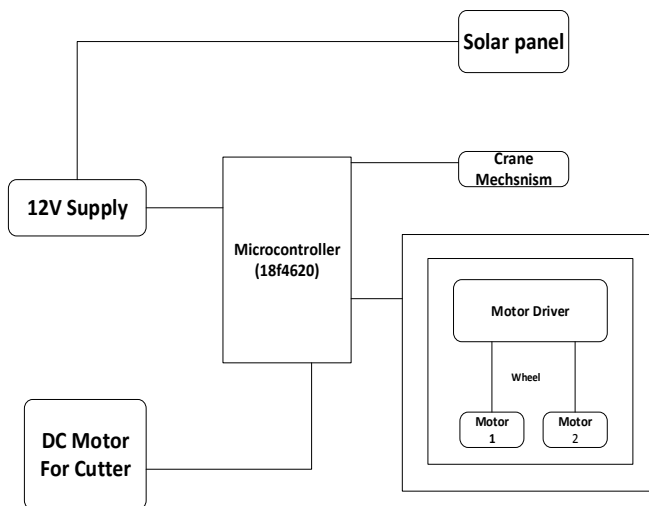


Fig 1. Block Diagram

2.1. Dc Motor

A dc motor is a machine which converted the electrical energy into mechanical energy. The most common types expect on the forces produce by magnetic fields. Nearly all types of DC motors have some internal structure, either electromechanical or electronic, to regularly change the direction of current flow in part of the motor.

2.1.1 Battery

A battery is consist of one or more electrochemical cells which provided power to an electrical devices like laptop, electric bike. Batteries are available in many shapes and sizes, from miniature cells used to power hearing aids and wristwatches to small, thin cells in smartphone, to large lead acid battery used in cars and bus and large extreme huge battery used in telephone exchanges and computer data centers.

2.1.2 Solar Panel

These electrons are combining with holes in semiconductor and generated electron hole pairs and hence the external conductor compose electrical current. We are using polycrystalline type solar panel. The grass cutter operates on the photovoltaic principle. When photons falls on the solar panel it get retention in a semiconductor device that produces free electrons. Solar energy is clean, cheap and generously available.

2.1.3 Microcontroller

Microcontroller is a single chip microcomputer made through VLSI fabrication. A microcontroller also called an embedded controller because the microcontroller and its support circuits are often built into, or embedded in, the devices they control. A microcontroller is available in different word lengths like microprocessors (4bit,8bit,16bit,32bit,64bit and 128 bit microcontrollers are available today). You can find microcontrollers in all kinds of electronic devices these days. Any device that measures, stores, controls, calculates, or displays information must have a microcontroller chip inside.

3. PROPOSED WORK

The smart automatic grass cutter robot with solar power is used to fulfil the objective of the proposed idea we need to understand the basic element of electronic base are microcontroller18F4620 ,rechargeable battery , colosensor ,PMDC motor, vacuum cleaner mechanism.

3.1. 18F4620 Microcontroller

This microcontroller has internal oscillator support 31 kHz to 8MHz with4*PLL features. It is fail-safe clock monitor-allow safe shutdown if clock fails. It also has watchdog timer with separate RC oscillator.

3.1.1. Battery

Rechargeable batteries obtain in various shape and size, range from button cell to megawatt system which connect to electrical distribution network. Battery are used to give the power supply to the motor.

- VOLT=12V
- CURRENT=7A
- WATT=84W

3.1.2. Solar Panel

A solar panel is consist a set of solar photovoltaic modules which electrically connected and placed above the structure. The solar panel are used in to give the power supply for batteries.

- VOLT=12V
- CURRENT=4.20A
- WATT=84W

3.1.3. Color sensor

The sensor TCS230 colour light with using of an array of photodiodes an 8*8array.By using a current to frequency converter. The readings that the photodiode are converted into a square wave with a frequency directly proportional to light intensity. The colour sensor performed the operation of sensing the grass and give output to microcontroller.

3.1.4. Vacuum Cleaner

The arrangement is like that the suction of cutting grass and store in trolley at the required pressure.

- VOLT=12V
- CURRENT=8.33A
- WATT=100W

3.1.5. PMDC Motor for Wheel

The two PMDC motor are used for rotating the wheel of robot.

- VOLT=12V
- CURRENT=1.41A
- WATT=17W

3.1.6. PMDC Motor for Cutter

The PMDC motor is used for rotating the cutter at a high speed.

- VOLT=12V
- CURRENT=1A
- WATT=12W
- SPEED=10000RPM

3.1.7. PMDC Motor for Crane Mechanism

The PMDC motor is used to remove a small obstacle which is present in path.

- VOLT=12V
- CURRENT=1A
- WATT=12



Fig 2. Solar Grass Cutter

4. CONCLUSION

This grass cutter will meet the challenge of environmental production. This grass cutter can be used in residences as well as commercial and establishment that have lawns where tractor driven motor could be used. Also this project will be easier for the people who are going to take the project for the further modification. This project give many advantages like no fuel cost, no pollution, and no fuel residue therefore it is more suitable to the common man. Because of less number of moving components there is less wear and tear and this can be operated by using solar energy. This system has facility of charging the battery while solar powered automatic grass cutter is in motion. Therefore it is more suitable for grass cutting also. This project may give an inspiration to the people who can obtain the better result.

REFERENCES

- [1] E.Naresh.Boss Babu, G.Rahul, "Grass Cutting Machine by Solar Energy Power" IJMETMR, May 2016, Vol.no.03
- [2] K.Sravan Kumar,Abdul Sharif,Surya,"Design And Fabrication Of Automated Grass Cutting Machine By Using Solar Energy", IJMETMR, Apr2017, Vol.no.04
- [3] Sangana Arunesh,Shreya Arunesh,"Design and Implementation of Automatic Lawn Cutter", IJSTE, May2016,Vol.no.02
- [4] Mukherjee, d. Chakrabarti fundamentals of renew-able energy system new age international publishers, New Delhi, 2005
- [5] Sharma, p.c., non-conventional power plants, public printing service, New Delhi, 2003
- [6] Agrawal M.P, solar energy,s.chand company l-td, New Delhi.
- [7] Pratik Patil, Ashwini Bhosale, Prof.Sheetal Ja- gtap,"Design and implementation of automat- ic lawn cutter",IJETA,Nov14, V04
- [8] M.V.Deshpande"Design and Testing of Electrical Machine".
- [9] Dave Bonta, Stephen Snyder "The new solar Home".
- [10] Travis Bradford "Solar revolution"
- [11] S.L.Klein"Power to change world Alternative Energy and the Rise of the city.
- [12] Chr.Lamnatou, E. Papanicolaou, V.Belessioti and N. Kyriakis, "Experimental investigation and thermodynamic performance analysis of a solar dryer using an evacuated-tube air collector," Applied Energy, vol. 94, pp.232-243