

DESIGN & FABRICATION OF SOLAR OPERATED GRASS CUTTING MACHINE

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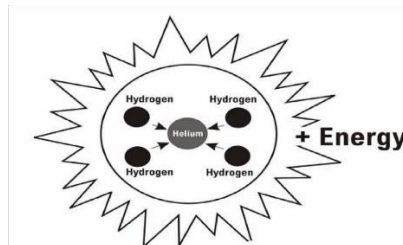
ABSTRACT

The Solar Grass Cutting Machine is a mechanical device used for cutting grass with the help of solar energy instead of electricity. Solar grass cutter is a machine that uses sliding blades to cut a lawn at an even length. Even more sophisticated devices are there in every field. Power consumption becomes essential for future. Solar grass cutter is a very useful device which is very simple in construction. It is used to maintain and upkeep lawns in gardens, schools, college's etc. We have made some changes in the existing machine to make its application easier at reduced cost. Our main aim in pollution control is attained through this. Unskilled operation can operate easily and maintain the lawn very fine and uniform surface look. In our project, Solar grass cutting machine is used to cut the different grasses for the different application.

1.1 INTRODUCTION

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. Moving the grass cutters with a standard motor powered grass cutters is an inconvenience, and no one takes pleasure in it. Cutting grass cannot be easily accomplished by elderly, younger, grass cutter moving with engine create noise pollution due to the loud engine, and local air pollution due to the combustion in the engine. Also, a motor powered engine requires periodic maintenance such as changing the engine oil. Even though electric solar grass is environmentally friendly, they too can be an inconvenience. Along with motor powered grass cutter, electric grass cutters are also hazardous and cannot be easily used by all. Also, if the electric grass cutter is corded, mowing could prove to be problematic and dangerous. The prototype will also be will be charged from sun by using solar panels.

Solar energy is radiant energy that is produced by sun. Every day the sun radiates, or sends out, an enormous amount of energy.



The sun radiates more energy in one second than people have used since the beginning of time! Where does the energy come from that constantly is being radiated from the sun? It comes from within the sun itself. Like other stars, the sun is a big ball of gases- mostly hydrogen and helium atoms. The hydrogen atoms in the sun's core combine to form helium and generate energy in a process called nuclear fusion.

During nuclear fusion, the sun's extremely high pressure and temperature causes hydrogen atoms to come apart and their nuclei (the central cores of the atoms) to fuse to become one helium atom. But the helium atom contains less mass than the four hydrogen atoms that fused. Some matter is lost during nuclear fusion. The lost matter is emitted into space as radiant energy.

The lawn mower or grass cutter is made up of an induction motor, a battery, an alternator, three collapsible blades, and a link mechanism. The power and charging system comprises of an alternator which charges the battery while in operation. 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 induction 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 is altered. The heat, light received from the sun supports the environment on the earth through the following well known natural effects.

- Temperature balance on the earth
- Photo-synthesis by biological plants production of oxygen and organic materials, production of organic chemicals and bio-mass.

- Wind due to unequal heating of water, land surfaces.
- Heating of ocean water: ocean thermal energy (OTEC)
- Waves in ocean: ocean wave energy
- Tides in ocean: ocean tidal energy (due to gravitational forces)

The sun produces enormous amount of energy of heat and light through stained nuclear fusion reactions. The solar energy received on the earth in the form of aviation is used for heating and producing an electrical energy. Among the non-conventional sources of energy solar energy is the most promising. Hence our project is based on the solar energy conversion to mechanical energy to run a normal grass cutter.

2 WORKING PRINCIPLE

Coming to the working of solar powered grass cutter, it has panels mounted in a particular arrangement at an angle of 45 degrees in such a way that it can receive solar radiation with high intensity easily from the sun.

These solar panels convert solar energy into electrical energy as studied earlier. Now this electrical energy is stored in batteries by using a solar charger. The main function of the solar charger is to increase the current from the panels while batteries are charging, it also disconnects the solar panels from the batteries when they are fully charged and also connects to the panels when the charging in batteries is low.

The motor is connected to the batteries through connecting wires. Between these two mechanical circuit breaker switch is provided. The working principle of solar grass cutter is it has panels mounted in a particular arrangement at an in such a way that it can receive solar radiation with high intensity easily from the sun.

These solar panels convert solar energy into electrical energy. This electrical energy is stored in batteries by using a solar charger. It starts and stops the working of the motor. From this motor, the power transmits to the mechanism and this makes the blade to slide on the fixed blade

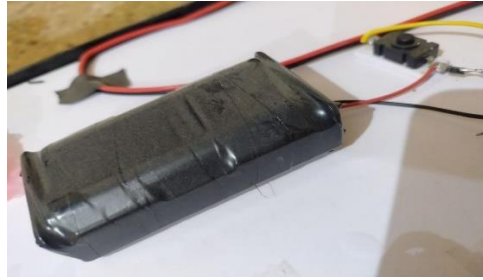


3 COMPONENTS:-

- Solar panels
- Cutter motor
- 12 V Battery
- Blades
- Frame
- Farm shit
- Wheels
- Sprocket

4. BATTERY

6V, 4.5Ah would represent 27Wh ($P = A * I$) of energy at such a load. The capacity of the battery is given for a specific discharge current. With a higher discharge current, you will get less energy from the battery. With a lower discharge current, you will get more energy from the battery. Place the sensor on the end of the black wire on the negative battery terminal. Look at the digital or meter display on the multimeter or voltmeter. It should read 6 volts if the battery is in good condition and is at least 20 percent charged. If it reads less than 5 volts, recharge the battery. A 6V battery is a lead-acid type cell. It is also known as a lantern battery. It usually uses four large. 6V batteries are used in dog training devices, medical instruments, film and digital cameras, and many other devices. Most 6V batteries are deep-cycled. In short, using batteries with extra energy capacity will not harm your device, but would, instead, power the device for a longer time (all other considerations unchanged).



5. SOLAR PANEL

A solar panel is actually a collection of solar (or photovoltaic) cells, which can be used to generate electricity through photovoltaic effect. These cells are arranged in a grid-like pattern on the surface of solar panels. Thus, it may also be described as a set of photovoltaic modules, mounted on a structure supporting it. A photovoltaic (PV) module is a packaged and connected assembly of 6×10 solar cells.

When it comes to wear-and-tear, these panels are very hardy. Solar panels wear out extremely slow. In a year, their effectiveness decreases only about one to two per cent (at times, even lesser).

Most solar panels are made up using crystalline silicon solar cells.



Installation of solar panels in homes helps in combating the harmful emissions of greenhouse gases and thus helps reduce global warming. Solar panels do not lead to any form of pollution and are clean. They also decrease our reliance on fossil fuels (which are limited) and traditional power sources.

These days, solar panels are used in wide-ranging electronic equipments like calculators, which work as long as sunlight is available. However, the only major drawback of solar panels is that they are quite costly. Also, solar panels are installed outdoors as they need sunlight to get charged.

6. ELECTRICAL WIRING

Electrical wiring is an electrical installation of cabling and associated devices such as switches, distribution boards, sockets, and light fittings in a structure. Wiring is subject to safety standards for design and installation.

Allowable wire and cable types and sizes are specified according to the circuit operating voltage and electric current capability, with further restrictions on the environmental conditions, such as ambient temperature range, moisture levels, and exposure to sunlight and chemicals.

Associated circuit protection, control and distribution devices within a building's wiring system are subject to voltage, current and functional specification. Wiring safety codes vary by locality, country or region. The International Electro technical Commission (IEC) is attempting to harmonise wiring standards amongst member countries, but significant variations in design and installation requirements still exist.

7. MOTOR

Features 30 rpm 12v dc motors with gearbox 6mm shaft diameter with internal hole 125gm weight stall torque = 10kgcm torque no-load current = 60 ma(max), load current = 300 ma(max). This motor is used for the rotating the blade and when the blade is rotated the grass is cut. The motor is also used to rotate the wheel which moves the body.

8. WHEELS

Navigation Most wheeled robots use differential steering, which uses separately driven wheels for movement. They can change direction by rotating each wheel at a different speed. There may be additional wheels that are not driven by a motor these extra wheels help keep it balanced. Wheeled robots are robots that navigate around the ground using motorized wheels to propel themselves. This design is simpler than using treads or legs and by using wheels they are easier to design, build, and program for movement. A differential wheeled robot is a mobile robot whose movement is based on two separately driven wheels placed on either side of the robot body. It can thus change its direction by varying the relative rate of rotation of its wheels and hence does not require an additional steering motion.

9. CIRCUIT:

- The brain of the project is the circuit.
- With the help of circuit the whole system of the project



10. BLADE:

- We have used the homemade blade. In which there are two wings.



11. ADVANTAGES

- They can be installed and pulled by hand.
- Low maintenance
- Unattended operation
- Long life
- Compact size and portable
- Easy to move from one place to another place
- Operating principle is simple.
- Non-skilled person also operate this machine

12. DISADVANTAGES

- Solar energy makes use of a renewable natural resource that is readily available.
- Large time required to remove the grass
- Manually operated
- Difficult to operate in rainy seasons

13. APPLICATIONS

- For cricket ground.
- The football ground.
- All garden
- All Playground

CONCLUSION:

In the world today, all machines are designed with the aim of reducing or eliminating green house gas emissions which is the major causes of climate change. This solar powered grass cutter will meet the challenge of environmental production and low cost of operation since there is no cost for fuelling. A solar powered lawn mower has been developed for the use of residences and establishments that have lawns where tractor driven mowers could not be used.

The machine's capacity is adequate for its purpose. The machine has proved to be a possible replacement for the gasoline powered grass cutter. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

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