CERTIFICATE

This to certify that the content of this SOLAR PROJECT submitted by SAGAR RAJ is the bonafide work of his submitted to ORGANIZATION NAME

for consideration in the partial accomplishment of the provision of SBTE , Bihar for the award of Minor Project in 4th Semester of Mechanical Engineering.

The original project work has been carried out by the student under guidance of the following Professors in the academic year 2020-2023. On the basis of the declaration made by the student . Hence , the project report is recommended for evaluation .

Submitted By :-

Name – X

Roll –

Board Reg. no. –

Branch – Mechanical Engg.

Semester –

Under the Guidance of :-

Mr. x [H.O.D. Of Mechanical Engineering Department]

STUDENT'S DECLARATION

I hereby declare that the project entitled SOLAR PROJECT REPORT submitted by me to ORGANIZATION NAME in partial fulfilment of the requirement for the award of the degree of Diploma in Mechanical Engg. Department is a record of bonafide project work carried out by me under the guidance of Mr. X .

Yours truly,

X

(ROLL)

PARTICIPANTS

1. X - [ROLL]
2. X - [ROLL]
3. X - [ROLL]
4. X - [ROLL]

ACKNOWLEDGEMENT

It is often said that life is a mixture of achievements, failures, experiences, Exposures and efforts to make your dream come true . There are people around you who help you realize your dream. I acquire this opportunity with much pleasure to acknowledge the invaluable assistance of our Professors and all the people who have helped me through the course of my journey in successful completion of this progress report .

I wish to express my sincere gratitude to our Guide , Mr. X Sir (HOD of Mechanical Engg. Dep.) for his guidance, help and motivation.

Apart from the subject of my study, I learnt a lot from him which I am sure , will be useful in different stages of my life .I would like to thank our principal Dr.X Kumar Singh for giving us the opportunity and environment for successful completion of this project.

Lastly I would like to express gratitude towards my teammates who supported me and helped me equally to complete this project.

Regards,

X

(ROLL)

CONTENTS

INTRODUCTION

Solar energy, radiation from the Sun capable of producing heat, causing chemical reactions, or generating electricity. The total amount of solar energy incident on Earth is vastly in excess of the world's current and anticipated energy requirements. If suitably harnessed, this highly diffused source has the potential to satisfy all future energy needs. In the 21st century solar energy is expected to become increasingly attractive as a renewable energy source because of its inexhaustible supply and its nonpolluting character, in stark contrast to the finite fossil fuels coal, petroleum, and Natural Gas.

The Sun is an extremely powerful energy source, and sunlight is by far the largest source of energy received by Earth, but its intensity at Earth's surface is actually quite low. This is essentially because of the enormous radial spreading of radiation from the distant Sun. A relatively minor additional loss is due to Earth's atmosphere and clouds, which absorb or scatter as much as 54 percent

of the incoming sunlight. The sunlight that reaches the ground consists of nearly 50 percent visible light, 45 percent infrared radiation, and smaller amounts of ultraviolet and other forms of electromagnetic radiation.

The potential for solar energy is enormous, since about 200,000 times the world's total daily electric-generating capacity is received by Earth every day in the form of solar energy. Unfortunately, though solar energy itself is free, the high cost of its collection, conversion, and storage still limits its exploitation in many places. Solar radiation can be converted either into thermal energy (heat) or into electrical energy, though the former is easier to accomplish.

THEORY

The Solar Grass Cutter is a mechanical device used for cutting grass with the help of solar energy instead of electricity.

First of all its body is made with the help of hollow plastic water pipes, then wheels are placed below the body made of water pipes. Then inclined solar plate is kept on the body with the help of a support pipe towards the Sun. This Solar plate converts the Solar radiations coming from the Sun to Electrical Energy and then this Electrical Energy is stored with the help of a DC battery. This stored Electrical Energy is then converted into Mechanical Energy with the help of a DC Motor . Cutting Blades are attached to the DC Motor which cut the grass to a certain length.

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 mover.

A solar powered lawn mover was designed and developed, based on the general principle of mowing. The designed solar powered lawn mover comprises of direct current (D.C) motor, a rechargeable battery, solar panel, a stainless steel blade and control switch.

Moving is achieved by the D.C motor which provides the required torque needed to drive the stainless steel blade which is directly coupled to the shaft of the D.C motor. The solar powered lawn mover is operated by the switch on the board which closes the circuit and allows the flow of current to the motor which in turn drive the blade used for moving. The battery recharges through the solar charging controller.

Performance evaluation of the developed machine was carried out with different types of grasses. The sun provides sustainable amount of the energy used for various purposes on earth for atmospheric system. The difference is

just the application of the energy source. It is assumed that a lawn mower using solar as the energy source will address a number of issues that the standard internal combustion engine and electric motors lawn movers do not. A lawnmower with solar energy will be easier to use, it eliminates down time by frequent trips to the gas station for fill-ups and danger associated with gasoline spillage. The dangerous emissions generated by the gasoline spillage and that of the internal combustion engine into the atmosphere are eliminated. The solar powered lawnmower will help to reduce air pollution. Thus solar grass cutter is used.

MATERIALS REQUIRED

1. **PVC Water Supply Pipe [1 inch] – 20 ft**. :

    - PVC [Polyvinyl Chloride] Pipes are used to make the whole frame of the grass cutter.
    - This provides good strength and durability to the whole frame to support the other components .

2. PVC Pipe 1 inch T- joint – 13 pc. :

- To join the PVC pipes joints of suitable size are used .
- T – joints provide us with three sockets which help us to join the pipes from three different directions .

3. PVC Pipe 1 inch Elbow joint – 12 pc. :

- L – joints help to join the pipes at the bends .

4. Solar Panel (12 Volt) :

- First the solar cells are joined with help of wires and and a switch
- Then according to use of solar panel, series and parallel connection are given to the point .
- Solar panel is used to save the electric energy .It is also use store the energy with the help of battery.

5. DC Motor (12 Volt , 1.5 Ampere) :

- This motor is used for the rotating the blade and when the blade is rotated the grass is cut.
- The motor is rotated at 2000 RPM. The motor is also used to rotate the wheel which move the body .

6. DC Battery (12 Volt) :

- Solar power can be store in the rechargeable battery and can be further used for the grass cutting machine to run .

7. Plastic wheels :

- We used the plastic wheels for moving the body.
- Plastic wheel are used to move high load object. With the help of wheels body moves easily.

8. Battery Clips (Alligators) :

- They are used to connect the wires to the battery. Clips are better from the normal connection and soldering .
- Red is used for live wire connection and Black is used for neutral wire connection .

9. Wires for electrical connections :

- Red wire is used for connecting the live connection and Black wire is used for neutral connection .

10. Nuts and Bolts for tightening the wheels :

- 4 inch Bolt and Nuts are used for tightening the wheels to the legs of the body of the Grass Cutter .
- The nuts and bolts are sealed with the help of an adhesive such M-seal or by using any other adhesive .

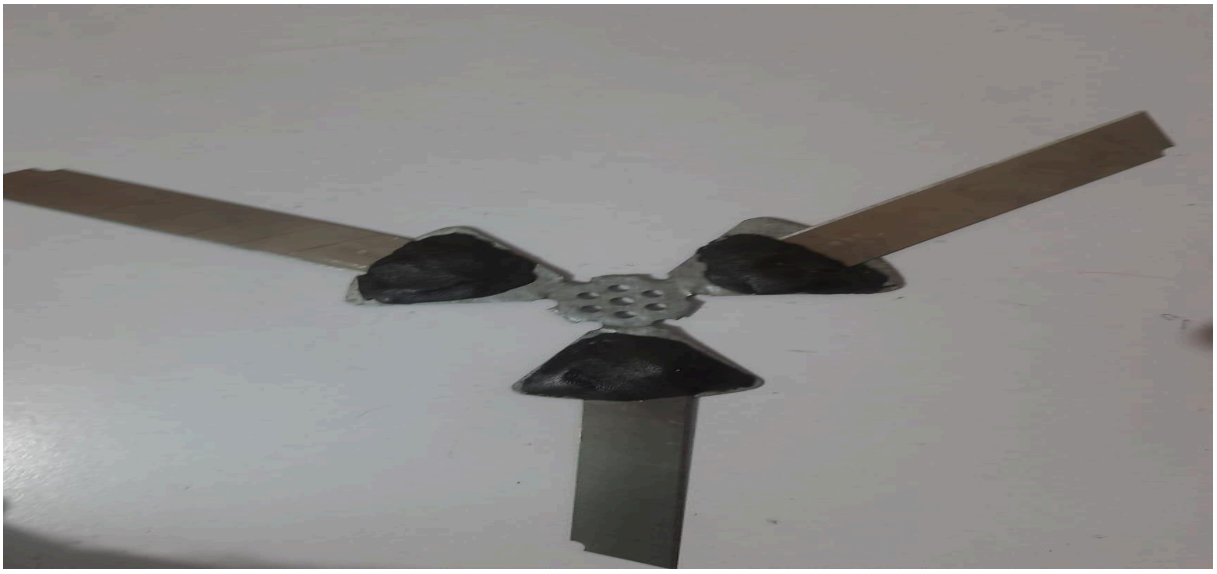
11. DPDT [Double Pole Double Throw] switch :

- It is often used to switch mains electricity because it can isolate both the live and neutral connections. A pair of on-on switches which operate together (shown by the dotted line in the circuit symbol). A DPDT switch

can be wired up as a reversing switch .

12. Blade :

- The blade of the Grass Cutter is made from attaching paper cutter blades to trefoil fan of aluminium which is fixed to the motor with the help of M seal.



13. Spray Paint [Black] :

- Black spray paint is used to colour the whole body of cutter . Colouring the body might increase the attractiveness of the cutter.

METHODOLOGY

The Solar Grass Cutter is made using various steps which are discussed as follows :-

1. The PVC pipes are cut into various sizes for making the body of the cutter. Pipes are cut with the help of a hacksaw blade .

- At first we need to cut 4 pieces each of length 10 inches which are used for making the legs of the cutter .

- Then , 4 pieces each of length 1 feet are cut and separated which are used to make the main middle portion of the body and joins and holds the whole structure of the cutter .

- After that 2 pieces of length 9.5 inches , used to make the connectors of the handle which raises the height of the handles of the connector to a good comfortable height .

- Elbow and T joints are used to join these pieces and complete the frame of the cutter .

- 6 pieces of 3 inches are cut to make connector joints which are used to connect the bigger pieces of the frame .

- 6 more connector pieces are cut of length 5 inch which are used to connect the handles of the cutter .

- Lastly , 2 pieces are cut of 8 inches which are used to make the connectors of the handle .

All the cut pieces and joints are now joined with the help of an adhesive . This adhesive holds the pipes strongly and gives enough strength to the frame of the cutter to withstand the load of the Battery , Solar panel and other parts .

2. After joining the pieces of pipe , the wheels are attached to the legs of the frame . To attach the wheels holes need to be made in each of the leg . These holes are made by using a Soldering iron .

Holes of half inch diameter is carefully made on the legs of the cutter . Now the wheels are attached with the help of 4 inch nuts and bolts . The nut is tightened up to a certain limit so that it allows the wheels to rotate freely . The nut is fixed to the bolt with the help of an adhesive such as M-seal . Fixing the nut does not allow the bolt to come out while using the cutter .

3. Now , the solar plate is fixed by using the structure made with the help of PVC pipes . The motor is fixed using a 1.5 inch CPVC pipe which is clipped using steel clips inverted through the body. The blade is fixed using M- seal to the shaft of the motor .

   The battery is fixed up on the frame using two pieces of slit pipes into half which provide good strength and support to the battery.

4. The Solar Panel , the battery and the Motor are given connections using the DPDT switch .

The Solar Panel is connected on one side of the DPDT Switch and the Motor is connected on another side of the DPDT switch . The Battery is then connected to the central pins of the 6 pin DPDT switch .

When the switch is on one side then the Solar Plate is connected to the Battery which helps in charging the battery from solar radiations . And , when the switch is on other side the Battery is connected to the motor which gives power to the motor for rotating the blade .

5. When the connection is completed then the body is painted with spray paint to give a good look to the body.

   While painting , the connections are removed carefully so that no paint gets into the connection. Finally , which leads to the completion of the project .

ADVANTAGES

- As there is very less friction between parts, less maintenance is required.
- It does not cause any environmental pollution.
- As it is working on solar, no fuel cost.
- The life of Solar Panel is great.
- As the battery is used for backup it can be run in night also.
- High efficiency.
- We can reduce the wastage of power.
- Very easy to use.
- Low weight and easy to move anywhere.

APPLICATIONS

- It can be used in gardens at home.
- It can be used in Public Parks .
- It can be used in college.
- It can be used in empty plots for maintenance .

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. In the presented paper provides the fabricated information about the "Fabrication of Solar grass Cutting Machine" which was designed such that the solar plate generates solar energy and utilizing this energy for running the grass cutter motor. Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit.

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.