ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Grass Cutting Machine by Solar Energy Power

E.Naresh
B.Tech (Mechanical Engineering), Hyderabad Institute of Technology and Management y, Hyderabad, Telangana, India.

Boss Babu
B.Tech (Mechanical Engineering), Hyderabad Institute of Technology and Management y, Hyderabad, Telangana, India.

G.Rahul
Assistant Professor, Dept of Mechanical Engineering, Hyderabad Institute of Technology and Management y, Hyderabad, Telangana, India.

Abstract:
The paper describes about the implementation of grass cutting machine by using the application of Manufacturing and Assembly (MA) methodology. The scope based on the existing grass cutting machine and the appropriate of MA methodology. The method used for gaining the data is from the reassembled the existing grass cutting machine. Here to modify the existing grass cutting machine to introduce the sliding arrangement at one end of the vehicle chassis near to the cutting blade. Eventually, the improvement of redesign grass cutting machine finally will be able to meet user requirements and satisfactions. A lawn mower/ Grass cutting machine is a machine that uses a revolving blade or blades to cut a lawn at an even height. Lawn mowers employing a blade that rotates about a vertical axis are known as rotary mowers, while those employing a blade assembly that rotates about a horizontal axis are known as cylinder or reel mowers.

I. INTRODUCTION:

Now a day's pollution is a major issue for whole world. Pollution is manmade and can be seen in own homes. In case gas powered lawn movers due to the emission of the gases it is responsible for pollution. Also the cost of the fuel is increasing. Hence it is not efficient. So the solar powered lawn cutters are introduced. Solar powered lawn mower 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.

Solar energy is the renewable energy. Motor power push lawn mowers create noise pollution due to the sound of 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 lawn mowers are environmentally friendly, they too can be an in convenience .Along with motor powered lawn mowers, electric lawn mowers also hazardous and cannot be used by all. The project is an autonomous solar grass cutter that will allow the user to the ability to their grass with minimal effort. Hence we design to make a grass cutter without any power source due to reduce the power consumption.

Design a solar powered domestic lawn mower that utilizes solar power as an energy source is meant to address a number of issues that standard internal combustion engine mowers do not. An electrical lawn mower with a solar charger will by easier to use it. It will eliminate the emissions of an internal combustion mower which is mostly responsible for environmental pollution and causes the green gases effect. This is so because solar energy is green, renewable energy. Different designs have been made, each to suit a particular need or convenience. Making the power of cutting grass cutter over the years, many individuals have added modification to the original design speed, efficiency, and power of a mowing machine. The solar powered lawn mower is an improvement on cordless electric lawn mower.

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

Objective:

For the manufacturing of a solar grass cutter we referred various literature, papers etc. The review of previous method used given below. In this lawn mower uses an solar based energy source, which is easier to use more advantageous comparing to other energy sources. Which is easier to use, more advantageous comparing to other energy source especially for gas based source of power? But our lawn cutter is based on solar because this energy is a renewable energy and it is easy to work. So we made solar powered lawn cutter. Alternatives to the use of non renewable and polluting fossil fuels to be investigated one such alternative is solar energy. In this solar based grass cutter the advantage of powering a mower by solar energy rather than by gasoline is mainly ecological. We manufactured this grass cutter because it is very easy method and many overcome produced from this type of grass cutter.

II. SOLAR GRASS CUTTER:

The grass cutter is made up of an electrical motor, a battery, an alternator, linear blade, and a link mechanism .the power and charging system comprise of an alternator which charges the battery while in operation. The electric motor forms the heart of machine and provides the driving force for the driving 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 comprise the electrical motor and the battery. Solar power as an energy source will address a number of issues that slandered internal combustion engines do not. An electric grass cutter with a solar charger will be easier to use. There is no messy dangerous gasoline to deal with most importantly it eliminates the emissions of an internal combustion mower. A grass cutter is a device which by mean of one or more revolving blades issued to grass cut or other plants. Grass cutter employing a blade that rotates about a vertical axis are rotary mowers. While employing blade assembly that rotates about a horizontal axis are known as cylinder or reel mowers.

The main components of the solar powered grass cutter are

- Solar panels
- Electrical motor
- Mechanism used
- Blade
- Batteries

Frame:

The mild steel rod was used in the construction of the frame due to its workability, availability and cost effectiveness. The frame supports for the electric motor, battery as well the handle frame. The length of the frame is 130 cms and is also made up of two handles. The first handle supports at the hand and the second handle is for hands to move the arrangement. The frame supports for the electric motor, battery as well as the handle frame. The physical bumper is made up of an inner square created by PVC pipe. The handle is allowed to handle the equipment and the blade is move to the grass.

Cutting Patterns:

The grass cutters have two types of cutting styles spiral and random. The user will place the robot. In the center of their lawn and let it cut. To achieve this cutting pattern both.

Handle:

- Handle (grip) attached to an object for using or moving the object
- Handle, a unique arrangement for grass cutting

Advantages:

Precise torque and speed control without sophisticated electronics

Several Limitations:

Expensive
Speed limitations

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

III. EXPERIMENTAL INVESTIGATION:

Solar Energy

Solar energy is radiant light and heat from the sun using a range of ever technologies such as solar heating, solar photo voltaic, solar thermal energy, solar architecture and artificial photosynthesis.It is an important source of renewable energy and it is technologies are broadly as either passive solar or active solar depending on the way they capture and distribute solar energy or convert in to solar power. Active solar techniques include the use of photo voltaic systems. Passive solar techniques include orienting a building to the sun, selecting materials with favorable thermal mass or light dispensing properties and designing spaces that naturally circulate air.

Solar Panel:

A solar panel is a set of solar photovoltaic module electrically connected. A photovoltaic module is packaged, connected assembly of solar cells. The solar panel can be used as component of a larger photovoltaic system to generate and supply electricity in commercial and residential applications. Each module is rated by its dc output power under standard test conditions (etc) and typically ranges from 100 to 320 watts. The efficiency of a module determines the area of a module.

Fig 1: solar panel

A single solar module can produce only a limited amount of power, most installations contain multiple modules. A photovoltaic system typically includes a panel or an array of solar modules, an inverter, and sometimes a battery and/or solar track and sometimes a battery and/ or solar tracked and interconnection wiring.

Photovoltaic Principles:

The photo voltaic effect can be observed in nature in variety of materials that have shown best performance in sun light is the semi conductors as stated above. When the photons from the sun absorbed in a semiconductor, that creates free electron with higher energies then the created there must be an electric field to induce these higher energy electrons to flow out of the semi-conductor to do useful work. A junction of materials, which have different electrical properties, provides the electric field in most solar cells for the photo interaction in a semi conductor.

Blades:

A blade is that portion of a tool, weapon or machine with an edge that is designed to cut materials. The blade is seldom sharp enough to give a neat cutting; the blade simply tears the grass resulting in brown tips. However the horizontal blades are easy to remove and sharpen or replacing existing trimmer suffers from high power consumption. Mower blades are the cutting components of lawn mowers. They are usually made of sturdy metals as they must be able to withstand high- speed contact with averity of objects in addition to grass. The blade may be made from ceramic or other materials. Here we use rotating blade.

Mounting the Blade:

This is the most important part and when designing for this safety as a major factor was put in to consideration as the blade when in operation can be hazard. Also the weight of the blade and how to mount it on the motor shaft is also a key consideration. More over the sharpness of the blade is another important aspect and this will depend on the power and the rpm of the motor used.

The Mower Blade:

The blade is to be designed in such away with high accuracy because it is essentially the cutting tool of the mower, a picture of the ordinary gas mower blade. Various factors governed by the motor speed were considered in choosing the blade material, they include:

The weight of the blade material
The strength of the blade material
The blade size in length

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

The blade size in thickness
Safety to the user

Materials and Methods:

The cutting blade, the force required to cut the lawn as well as the force acting on the blade was considered. The force required by any sharp object to have impact on the grass is less than 10 Newton. It is also depend on the height, density and the area covered by the object. Therefore in designing the blade of the solar powered lawn mower, the force required for effective moving should be greater than 10 Newton. A stainless steel was used in the construction of the cutting blade because of its strength and weight which can transmit same speed as that of the dc motor or a little less cause of friction.

IV. WORKING PRINCIPLE:

Working Principle of Solar Powered Grass Cutter:

The working principle of solar grass cutter is it has a panel arrangement at an in such a way that can receive solar radiation with high intensity easily from the sun. The solar panel converts solar energy into electrical energy. 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 panel while batteries are charging. The motor is connected To batteries through connecting wires. Between these mechanical circuit breaker switch is provided. It starts and stops the working of the motor. From this motor, power transmits to the mechanism and this makes the blade to rotate on the shaft this makes to cut the grass.

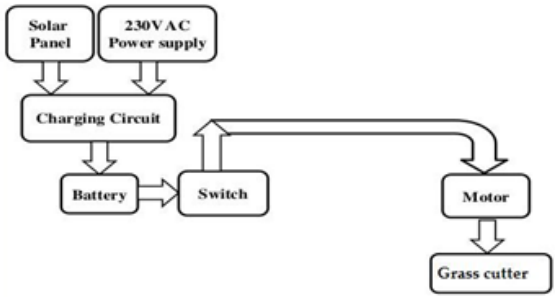

Fig 2: Circuit diagram Proposed

The designed solar powered lawn mower comprises of direct current (d.c motor), a rechargeable battery, solar panel, a stainless steel blade and control switch. Rotation is achieved by the electrical motor which provides the required torque needed to drive the stainless steel blade which is coupled to the shaft and to the gears to the motor. Gears are to increase the rpm and to reduce the power consumption. The solar powered lawn mower is a 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 mowing. The battery recharges through the solar charging controller, performance evaluation of the developed machine was carried out with different types of grasses.

Battery:

Solar cell module produces electricity only when the sun is shining. They do not store energy. It is necessary to store some of the energy produced. The most obvious solution is to use batteries.

Fig 3: Battery

The batteries are used as a storage device for solar energy which can be further converted into electrical energy. The only exceptions are isolated sunshine load such as irrigation pumps or drinking water supplies for storage, for small units with output less than one kilowatt. Batteries seem to be only technically and batteries are high in capital costs. It is necessary that the overall system must be optimized with respect to available energy and local demand pattern. Once the blade is mounted we searched for placing battery to sit. As it is moves attached to the operators back.

V. MECHANICAL ARRENGEMENTS

In this first phase we just considered only about the mechanical arrangement, which is responsible for rotating dynamo. Fir this team members divided the work in to two divisions. The mechanical arrangement consist of

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

- External frame work
- Solar frame
- Shaft with free wheel bearing
- Dc motor
- Blade
- Battery

External Frame Work:

The external frame work is having 135 cm cylindrical hallow pipes are welded. at the end of the pipe we have attached electric motor with gears arrangement and shaft to the blades.

Solar Frame Work:

To avoid weight on the frame the solar panel is separated from the panel. The solar panel is 12 watts which is connected to the battery.

Blades:

The blades are mounted according to the need. After the blade mount was finished being fabricated. i inserted it on the shaft. Then to make sure the mount was supported vertically drilled a small hole completely through the mount and shaft. This allowed me to insert a bolt as an added safety measure. It is easy to cut the grass and the moving the blades will be freely. The blades moves with the help of dc motor which is connected with the blades, due to dc motor blades moves very fast which uses to move the shaft. Motor capacity is 12 watts and there is a blade arrangement in front of the frame.

Battery:

The solar energy was saved in the battery. Batteries that are re-chargeable are called secondary or accumulator batteries. As the battery is being charged, electric energy is stored as chemical energy in the cells. When being discharged the stored chemical energy is being removed from the battery and converted to electrical energy. The battery is 12 volts.

Working of Solar Grass Cutter:

The rechargeable grass cutter was manufactured and developed. The solar energy is generated due to solar panel and the energy is stored in battery. Which convert the solar energy in to the electrical energy? The blades with dc motor connected to the battery. This solar grass cutter cut all types of grass. The test was carried out using the species of grass. The average height is according to the manual arrangement.

Advantages:

- Easy to use, because it is cordless.
- With battery powered grass cutter, there is no more messy oil & smelly gasoline.
- Now we are safety with no pollutants emitted. There are also no air filters & spark plugs to bother it.
- The cost of electricity to recharge the battery is minimal compared to the high cost of gasoline, oil, air filters & spark plugs.
- High conversion efficiency.
- Has less moving parts
- Less space required
- Noise less operations so readily accepted in residential areas.

Disadvantages:

- The eventually disposal of batteries is problematic.
- The motors in cordless cutter lend to be less powerful than gasoline motors of the same total weight.

Applications:

The project work is a very useful tool for

- For cricket ground
- For football ground
- All garden
- For agriculture purpose

VI. CONCLUSION:

It will be easier for the people who are going to take the project for the further modifications. The project is more suitable for 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

ISSN No: 2348-4845
International Journal & Magazine of Engineering, Technology, Management and Research
A Peer Reviewed Open Access International Journal

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. 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.The frame which we use doesn't have height adjustment. This can be overcome by keeping wheels arrangement near the blades. The project which we have done surely reaches the average families because the grass can be trimmed with minimum cost and with minimum time. Finally the project may give an inspiration to the people who can obtain better results.

REFERENCES:

1. IJAEEE, VOLUME1, number 1nor fatimaalIssn 2319-1112 / VINI 9-14 IjAEEE
2. Mukherjee, d. Chakrabarti, s., fundamentals of renewable energy systems, new age international publishers, New Delhi, 2005
3. Sharma., p.c., non-conventional power plants, public printing service, new Delhi., 2003
4. Arora, c.p., fundamentals of renewable energy systems new age international limited publishers, New Delhi, 2005
5. Raja, A.K., non conventional power engineering, public printing service, new Delhi., 2007
6. Agarwal M.P., solar energy, s.chand company ltd, newDelhi.