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AUTOMATIC BUSH TRIMMING MACHINE

Akash B. Patil [1], Ajay Y. Pawar[2], Sohail B. Inamdar [3], Prajakta B. Khairnar[4] , Prof.V. L. Kadlag

[1,2,3,4]Students, Department of Mechanical Engineering, SVIT, Nasik, Maharashtra, India.
[5]Professor,Department of Mechanical Engineering, SVIT, Nasik, Maharashtra, India

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Abstract - *Rapid growth of various high-tech tools and equipment's makes our jobs done comfortable and sophisticated. The project aims at fabricating a grass cutting machine system which makes the grass cutter based Motor running through solar energy. 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 is the Sun as a source of power to drive a grass cutter. A solar powered grass cutter was designed and developed, based on the general principle of mowing .This seminar is deal with designer of solar powered grass cutter comprises of direct current (D.C) motor, are chargeable battery, solar panel, a stainless steel blade and control switch. The solar powered grass cutter is switch operated 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 various types of grasses.*

Key Words: Solar Grass Cutter, Solar panel, Dc motor and Cutter blade.

1. INTRODUCTION

1.1 General

Bush cutter or lawn mowing with a standard motor powered lawn mower is an inconvenience, and no one takes pleasure in it. Cutting grass is not easy to accomplish by elderly, younger, or disabled people. Motor powered push lawn mowers and riding lawn mowers create noise pollution due to the loud engine, and local air pollution due to the combustion in the engine. The 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 inconvenience. Along with motor powered lawn mowers, electric lawn mowers are also hazardous not use easily used by all. Also, if the electric lawn mower is corded, moving could prove can be dangerous. The self-propelling electric remote control lawn mower is a lawn mower having its own remote control capability.

Working principle of the grass cutter is moved at a high speed rotation to the blade, which helps to cut the grass. The cutting edges are very smooth and ac-curate. Also Electric Bush Cutting Machines are much easier to be used in garden, lawn and grass fields. In order to enhance the beauty of home-lawns and gardens, With the help of a lawn mower which is a Machine with revolving blades to help us cutting lawns at even length, people can easily maintain and beautify Their lawns and gardens without any hassle.

1.1 Necessity

Many Countries like India may not have the chance to use petroleum products upcoming days by the end of 2025, Fuel deposit will soon deplete. Fuel scarcity will be maximum.if, the continuous use of fuel does not ignore. The creation of new source of constantly recurring environmentally acceptable Resort to measure beginning of coal in thermal electric stations to serve the population would result in global elemental change in leading to worldwide drought and decertification. Solar energy is cheap; clean an important and plentifully available source of non-conventional energy. The sun radiates heat and light continuously.

2. LITERATURE REVIEW

For the manufacturing of a solar grass cutter we refer various literature, papers etc. The review of previous method used given below: In this lawn mower uses an solar based energy source, which is more advantageous comparing to other energy source especially for gas based source of power . But our lawn cutter is based on solar energy is a renewable energy source and it is easy to work. So we made solar powered lawn mower. For designing of Automatic Lawn Cutter we refer 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 and more advantageous comparing to other energy source especially for gas based source of power .But our lawn cutter is not based on solar because of its cost and create some complexity during working. So we avoided solar powered lawn mower. In this hydrogen based lawn mower, the advantage of powering a lawn mower by hydrogen rather than by gaseous material is mainly ecological. We don't use this for our lawn cutter because it is very old method and many overcome produced from this type lawn cutter.

3. PROJECT METHODOLOGY

3.1 Block Diagram

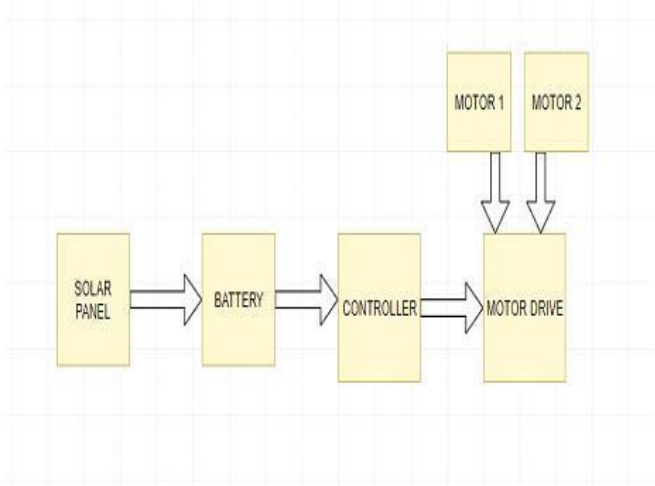

Fig.1: Processing Steps

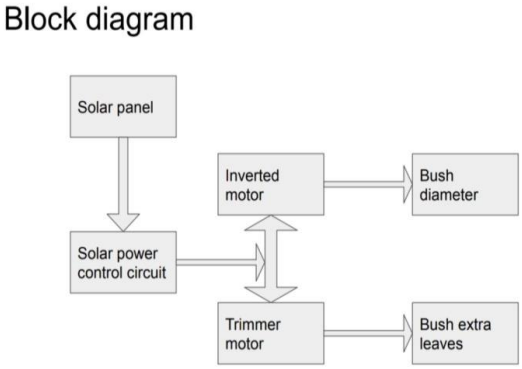

Fig 2: Mechanism of trimming machine.

4. Construction and mechanism

4.1 Working Principle

The operation of solar operated brush cutter is such that, it has panels mounted with some inclination in such a way that it can receive solar radiation with highly from the sun. These solar panels used to convert solar energy into electrical energy by the photovoltaic principle. These charges are used to store in the battery which is used for the energy storage purpose. The working of solar powered bush cutter is based on Law of Conservation of Energy. It has panels mounted in a particular arrangement at an angle of 45 degrees so that it can receive solar radiation with high intensity easily from the sun. These solar panels convert solar energy into electrical energy. 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 when batteries are charging, it also disconnects the solar panels from the batteries when they are fully charged and connects to the panels when the charging in batteries is low. The motor is connected to the batteries through connecting wires. It starts and stops the working of the motor. From this motor, the power transmits to the makes to cut the grass. The method consists of the following parts as solar panel, Dc motor, linear blades, Wheel. The rotary blade is used in this paper to cut the grasses. The height of the grass can be adjusted by adjusting the ground clearance as per the requirement.

4.2 Innovative Design Mechanism

The virtual prototyping technology to research and develop the electric multi-purpose hedge trimmer, and innovatively designs the trimming mechanisms. The trimming mechanism consists of multiple manipulators, so it lets the trimming tool has six degrees of freedom and can achieve any space track movement. It can trim the shape of flat, wavy surface, cylinder, cone, sphere etc. It has a high-speed real-time online interpolation function, an error compensation function. With the help of developed control software it can control the trimming process automatically. With the ARM visual sensing system it can display and automatically control trimming mechanism's position and space posture in time. The hedge trimmer is a vehicle structure. The trimming mechanism is installed in the front of the dedicated electric vehicle. The dedicated electric vehicle's structure is specially processed, so that it can prevent the rolling caused by the machine's gravity centre offset when trimming. All the power of the vehicle is provided by the battery and all the moving elements are driven by the motor drives. The multifunctional trimming machine's overall structure is shown in Fig. 2 and Fig.3.In Fig.2, the component numbered 1 is the main rotary mechanism,2 is the transverse rail,3 is the angle adjustment mechanism,4 is the trimming motor sideway ,and 5 is the trimmer parts.

4.3 Trimming Mechanism

The trimming mechanism includes the main rotary mechanism, the transverse rail, the angle adjustment mechanism, the trimming motor sideway, and the trimmer parts. The trimming mechanism motor receives the system's instructions by the electrical signal transition component, and the angle adjustment mechanism to achieve the cutting angle adjustment; the moving parts automatically adjust the trimming track. With the help of the trimmer parts to achieve trimming different kinds of trimming shapes, such as sphere, cone, cylinder, flat, bevel, and so on. When trimming the spherical shape, the transverse rail 2 rotates around the main rotary mechanism 1 and the transverse rail 2 stretches and shrinks horizontal, and the trimming motor sideway 4 transforms the inclination angle by the angle adjustment mechanism 3. The three rotary motions constitute a spherical motion. When trimming cylindrical surface, the transverse rail 2 stretches and shrinks horizontal to adjust the trimming radius, the angle adjustment mechanism 3 controls the trimming motor sideway 4 pivoting to the vertical, and the trimmer parts 5 downward moves along with the direction of the trimming motor sideway 4, and the

transverse rail main rail 2 rotates around the main rotary mechanism 1. When trimming conical surface, the angle adjustment mechanism 3 controls the trimming motor sideway 4 pivoting to a fixed tilt angle on the basis of trimming the cylindrical surface. When trimming the flat, it simply placed the trimming motor sideway 4 into a horizontal.

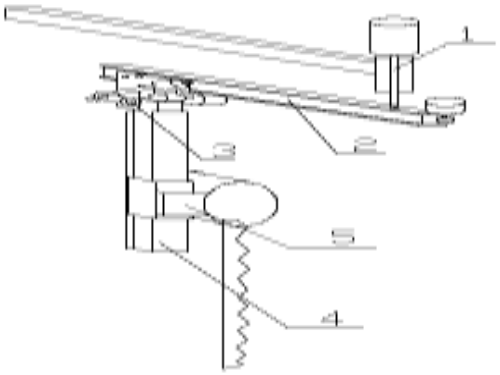

Fig: Trimming Mechanism

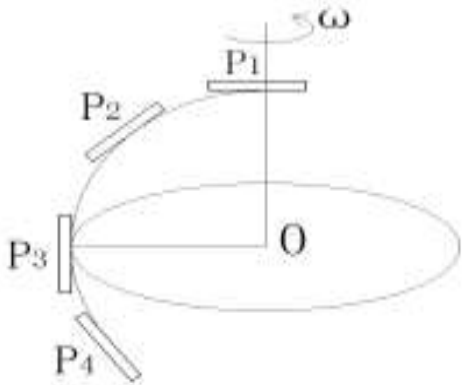

Fig: Principle of Mechanism

5. Machine Components

1. Solar Panel

It is a photovoltaic (PV) module is a packaged; connect assembly of typically 6x10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial also residential applications. Each module is rated by its DC output, and typically ranges from 100 to 365 Watts (W). The efficiency of a module determines the area of a module given the output an 8% efficient 230 W module will have twice the area of a 16% efficient 230 W module. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for storage, interconnection wires and optionally a solar tracking mechanism.

2. DC Battery

Solar power can be stored in the rechargeable battery and further used for the grass cutting machine to run. A rechargeable battery, storage battery, is a type of electrical battery. It consists of of one or more electrochemical cells, and is a type of energy accumulator. It is famous as a secondary cell and its electrochemical reactions are electrically reversible. Rechargeable batteries come in various shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. The batteries are used as a storage device for solar energy which can be use further changed into electrical energy.

3. Controller

A DC motor is a mechanically commutated electric motor powered from the direct current (DC). Because stator is stationary in space by definition and therefore so is its current. The current in the rotor is switched by the commentator to also be stationary in space. This is the relative angle between the stator and rotor magnetic. The motor used for the controlling the cuter, the permanent dc motor with 12 v is used having the speed 2000rpm.this single phase motor work on the Fleming hand rule and generate electric current and this electric current converted to mechanical work and make the rotate the blade and cut the brush.

4. Cutter Blade

Steel cutter blade with high stiffness is used for cutting purposes the rotation of blade cut the branches of trees. The motor used for the controlling the cuter, the permanent dc motor with 12 v is used having the speed 2000rpm.this single phase motor work on the Fleming hand rule use to generate electric current and this electric current converted to mechanical work like to rotate the blade and cut the brush.

6. Product Description

Sr. No.	Parts	Material
1.	Motor Power	12V, 2000rpm
2.	Battery Specification	12V,18Ah
3.	Solar Panel	12V,20w
4.	Power Switch push on type	Plastic
5.	Wheel	Plastic
6.	Cutting Blades	High carbon steel
7.	Battery Type	Li-on Battery

7. Advantages

- Easily manoeuvre. Not required to take in hand.
- Human error free
- Freely powered with the help of solar electricity.
- Pollution free, since no fuel used.
- Less time consuming.
- Non-skilled person also operate this machine.
- Quiet working environment with cutter solar energy
- Zero emissions and zero waste of conventional sources
- By using this project we can save more power. That is we can reduce the wastage of power.

8. Disadvantages

- Heavy initial cost compared to hand held hedge trimmers.
- Large space required compared to other trimmers options.
- Metal parts prone to rusting in moisturized place like gardens and farm.
- The eventually disposal of batteries is problematic.
- Large time required to remove the grass.
- Manually operated.
- Difficult to operate in rainy seasons.
- Low power in dark and cloudy environment.

9. Applications

- For cricket ground
- For agriculture purpose
- All garden

10. CONCLUSIONS AND FUTURE SCOPE

From this we conclude that it is more suitable for a common man as it is having much more advantages i.e. no fuel cost, no pollution, no fuel residue, less wear and tear because of less number of moving components are operated by using solar energy. This will give much more physical exercise to the people and can be easily handled. This system is having charging the batteries while the solar powered grass cutter is in motion. The same thing can be operated in night time also, as there is a facility to charge these batteries in day light.

10.1 Future Scope

- By using light weight material for the stand the cutter assembly weight can be reduced and the product can be modified.

- By using the cutter blade with high strength and the increase in power used, the cutter can be used for many applications in agriculture sector like tree cutting, shrubs cutting, cane cutting, maize cutting etc.
- To avoid the limitations like cloudy and dark environment, the solar charger can use.
- The adjustment for the folding of stand can be done for transportation point of view.

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AUTHORS

Mr. Patil Akash Bajirao
BE Student, Mechanical Dept.,SVIT, Chincholi,Nashik,Maharashtra INDIA.

Mr.Pawar Ajay Yograj
BE Student, Mechanical Dept.,SVIT, Chincholi, Nashik, Maharashtra INDIA

Mr.Inamdar Sohail Balam
BE Student, Mechanical Dept.,SVIT, Chincholi, Nashik, Maharashtra INDIA

Mrs .Khairnar Prajakta Balasaheb
BE Student, Mechanical Dept.,SVIT, Chincholi, Nashik, Maharahstra INDIA