

DESIGN AND DEVELOPMENT OF BUSH CUTTER

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Abstract

All good products are based on good ideas; similarly it is utmost to effectively convert such ideas into functional and durable machines. Bush cutter is a cutter which is used to cut the inessential bushes. It helps to cut the inessential bushes. The Hybrid Bush cutter can cut both ways i.e. horizontal and vertical. The estimated budget is less around available cutters. Work on the model contains different mechanisms and parts. Sliding mechanism and 360-degree rotation are the most important part of the model which provides versatile moment and height adjustment as per the bush's height. To reduce the human effort by repeating the same process, thus uses the horizontal and vertical movement of cutter. Power source is the battery for make it much convenient and efficient. Whole setup is placed on four wheels trolley which makes it user-friendly and aborts the tradition of carrying heavy bush cutters on hand.

Keywords: *Electric Bush Cutter, Battery Bush Cutter, Petrol Bush Cutter, Vertical Oriented Blade, Horizontal Oriented Blade.*

1. Introduction

The bush cutting may be particular action to an advanced garden, also ground settling on strategies. The principle reason for existing of bush cutting is uniform stature of the bush on the territory alternately ground. For example, garden, play-ground, home lawn, golf course. Bush cutter machines need ended up exceptionally prevalent today. The greater part normal machines need aid utilized for delicate bush furnishing. For the undertaking Hybrid Bush cutter machine we are pointed on operation and development. The primary parts of the Bush cutting machines are DC motor relay switch to controlling motor. Battery for powering it. It is put in a suitability machine structure. Motor can be regulated by an electric switch for not difficult operation. The cutting blades need to join in

this machine. Further crude materials basically utilized are motor, battery, bearings, switch, wheel, wire, Iron sheet, square pipe, paint, insulating material and other standard item like nuts, and bolts are also present. The manufacturing of machine includes welding machine, grinding machine, drilling machine, and so on. As the principle of the bush cutter describes high revolution of the motor shaft converting in the sliding to and fro motion of the blade, which results in slicing of the bush. The sharpened steel will chops the bushes on high rpm and key rod mechanism supports the height adjustments of the machine. The cutting edges would altogether smooth and exact trimmed. Eventually Hybrid Bush cutting Machines would be a great deal to be utilized in the garden, yard and bush fields. With those efficiency of cutting horizontally and vertically makes it more user friendly.

2. Problem Statement

Currently there are different kinds of bush cutters available in the market but there are certain problems in every model. There are mainly two types of bush cutters which are heavy duty bush cutters and light duty bush cutters. The major problems of heavy duty bush cutter is that they are highly expensive and not affordable by the local farmers. The problems in the light duty bush cutters are, we always need to carry them and there are heavy bushes around the grounds and farms which need to be cut by the farmers. As per the current condition of farmers and gardeners they cannot afford expensive bush cutter and they do not operate light duty bush cutter for a long period of time. So we find an intermediate way between both the options to cut the bushes by giving electric supply to the cutter. The farmers are going to afford this type of cutter

and they have rid of by light duty bush cutter. Hedge cutter plays a very important role in all agricultural applications for the proper cutting of bushes in agricultural and household is still a challenging task. We are going to make a bush cutter in which it cuts both way i.e. horizontal and vertical. Our estimated budget is around Rs18000 but we will try to make it less. To treat problems like more human effort and heavy weight.

3. Literature Review

Literature review is a text of research papers, which include the current knowledge including substantive findings, as well as theoretical and methodological solution to aParticular topic.

Hui Guo [2] in this paper, the structure of this robot established the fourth degrees of freedom robot arm forward and inverse kinematics equations, which was based on the coordinate system. From the kinematic point of view, in this paper analyzed the position parameters and speed parameters, providing kinematic parameters for the institutional control [2].

Song Liu [3] as the increasing green area in our city, the more requirements of people in hedge trimmers shape, flatness and trim speeding. Currently, the products in existence were not enough .The four freedom degree trimming operation actually, was automated trimming equipment, which was based on the current hedge trimming field to break through the traditional manual pruning mode, and reduced the labor intensity[3].

M.S Ramaiah [5] this research paper focus on the vibration as we know vibration is the main issue in this. Vibration occurs due to bush trimmers are sufficient to present a risk of physical injury choosing between models of bush trimmer on the basis of vibration. It can help to minimize the vibration risk [5].

Ryan Howard [7] an electric hedge trimmer is a commonly used piece of machinery used by homeowners to cut hedges in their gardens. The electric powered trimmer is easily powered using an extendable lead plug which connects to a power source. This is ideal for amateur users that want to cut or shape hedges in the garden. Petrol hedge trimmers are most commonly used by maintenance works, council workers and landscape contractors for heavy duty and long duration hedge cutting. Petrol hedge cutter was originally designed to make it easier for homeowners to cut hedges without trailing wires or cables that could only reach so far. Battery powered hedge trimmers are the most

commonly used devices for homeowners to cut hedges in their gardens. This is because the battery powered trimmer is lightweight easy to hold and does not require any cables, leads or fuels to operate it. [7]

4. Methodology

Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. These bush cutter works under electrical vitality in the form of battery. As the motor gets the power through the battery, it starts rotating shaft which is directly attached to the oscillating stainless steel blades.

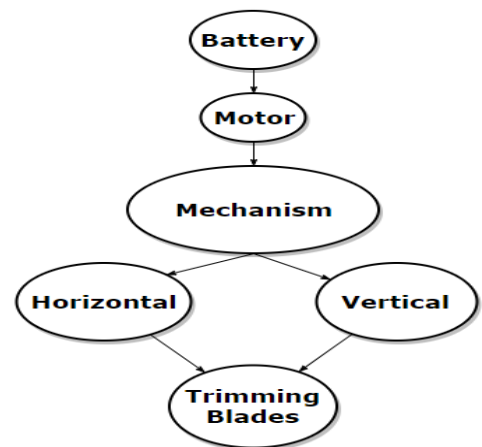


Fig.1 Methodology of Hybrid Bush Cutter

5. For making this model few mechanisms are used:

5.1 Sliding Mechanism

This mechanism has been done for the height adjustment of the cutter and for moving the cutter from one side to another side. Under this two pieces of MS bar of 2ft are used and welded on the frame horizontally but before welding, this two bar putted inside the 1.5inch MS bar so we could get sliding mechanism.



Fig.2. Sliding Mechanism

5.2 Rotating Mechanism

In this mechanism a plate is kept on the two sliding bar and also a bearing is fixed on the plate and above that plate a rectangular plate is welded. The two bar which is used for the height adjustment are welded above this plate.



Fig.3 Rotating Mechanism

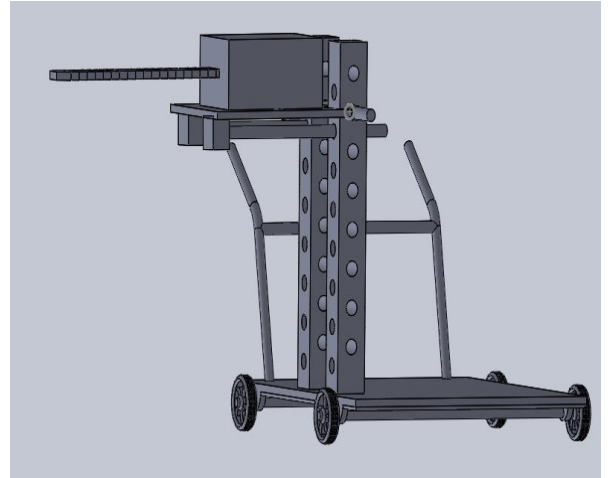


Fig.4 3D view of horizontal mechanism

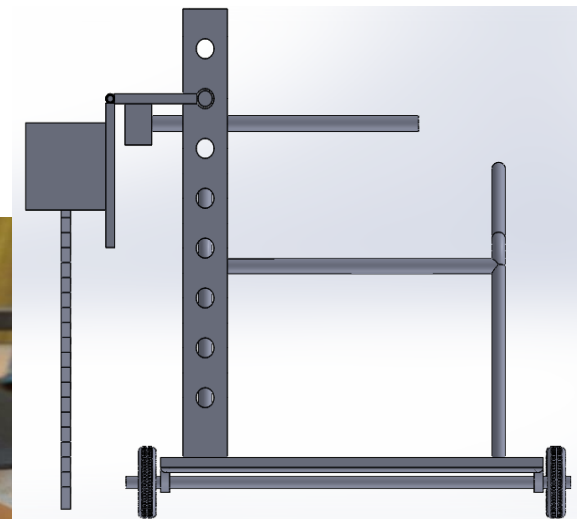


Fig.5 3D view of vertical mechanism

6. Design Proposal

Designed 3-D model of this model on solid works software. To accomplish the objective of the model, the following has been planned for the investigation, preparing a model on SOLID WORKS 2016*64 Edition that need to work on.



Fig.6 Model of Bush cutter

6.1 Dimension of parts

Each and every part is designed on the basis of particular dimensions which makes the frame strong and light weight, therefore table of dimensions are given below.

Table 1 Dimensions of parts

Sr.	NAME OF PART	DIMENSION (mm)
1	TROLLY	760*630
2	STAND	400
3	WIDTH OF STAND	80
4	PLATE	210*110
5	TROLLY PLATE THICKNESS	10
6	HOLE ON STAND	R=10

6.2 Working

Advancement in the working of hybrid bush cutter, it needs battery supply of 12V to run the 765 DC motor, which starts rotating its shaft on 3000-4000 RPM, therefore this rotating motion turns into oscillating motion of stainless steel trimmer blades. The sliding motion of the machine helps to slide the complete cutting setup from one side of the machine to another. As well as rotating mechanism gives freedom to cutting setup that it can turn 360 degrees around its own axis. Finally, height of the machine is adjustable with using key and rod mechanism so that different height of bushes can also be trimmed with the help of this hybrid bush cutting machine.

7. Conclusion

Project work help to explore our knowledge, it provide us an excellent opportunity and experience. While doing this project step by step we explore lot of practical knowledge regarding, planning, purchasing, machining and assembling. The project is the right path to break the walls between the industries and institution. Completing the project with testing in limited span of time are the majors goals that we achieved. The “**Design and Development of Bush Cutter**” is optimised and working under proper conditions. It can help to understand the difficulties in achieving tolerances. The workshop has been perfectly utilized during fabrication of model. Welding machine plays a vital role to join the bars of the mild steel and helps to build a frame of the complete model, use of both TIG welding and arc welding improves the strength of the model. Drill machine is used to drill different holes in the bars for height adjustment. Sheet bending machine helps to bend the sheet for arranging the bearing on it and align the bars with it. The work on the model contains different mechanisms and parts assembly. Sliding mechanism and 360 degree rotation are the most important part of the model which provides versatile moment and height adjustment as per the bushes height. To reduce the human effort by repeating the same process rotation of the complete setup is added. There are different kind of errors occurred during the fabrication of model which was not expected but as far as work proceed we find and optimize it.

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