

Designing and Working of Semi- Automated Grass Cutter

A Minor Project report submitted

In partial fulfillment of the requirement for the award of the degree

of

Bachelor of Technology

IN

MECHANICAL ENGINEERING

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DECLARATION

I certify that

- a) The work contained in the minor project report is original and has been done by myself under the general supervision of my Guide.
- b) The work has not been submitted to any other Institute for any degree or diploma.
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Signature :-

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APPROVAL OF THE GUIDE(S)

Recommended that the minor project report entitled “**DESIGNING AND WORKING OF SEMI-AUTOMATED GRASS CUTTER**” prepared by Mr. **Pranav Kumar** under my supervision and guidance be accepted as fulfilling this part of the requirements for the degree of Bachelor of Technology in Mechanical Engineering.

To the best of my knowledge, the contents of this report did not form a basis for the award of any previous degree to anyone else.

Date:

Signature

(Prof. Pranav Kumar)

(Guide)

Asst. Professor

Department of Mechanical Engineering

Government Engineering College, Banka



CERTIFICATE OF APPROVAL

This is to certify that minor project work embodied in this report entitled “DESIGNING AND WORKING OF SEMI-AUTOMATED GRASS CUTTER “is carried out by Aman Kumar (18102134052) is approved for the degree of Bachelor of Technology (7th Semester) in Mechanical Engineering of Government Engineering College, Banka.

Date:

Place:

**Internal Examiner
Name& Signature**

**External Examiners
Name& Signature**

**Head of the Department
(Mechanical Engineering)**

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ABSTRACT

This project is based on the grass cutting in agriculture field, garden etc. Currently in India farmers used a conventional method for the grass cutting purpose.

In fields generally farmers use manually grass cutter, this method is not easy and time consuming. This project's aim is to design a comfortable and easy to use grass cutter, for small fields.

Grass cutter machines have become very prevalent currently. Most of the times, grass cutter machines are used for soft grass cutting. In a time where technology is integrating with environmental science, consumers are considering for ways to provide to the relief of their own carbon footprints. Pollution is man-made and can be seen in our own daily lives, more precisely in our own homes. Herein, we recommend a model of the automatic grass cutting machine powered through battery. Automatic grass cutting machine is a machine which is going to accomplish the grass cutting operation on its own. This model reduces both environment and noise pollution. As world is moving towards automation, conventional systems are transformed into automated systems. So, having an automated grass cutter is need of the hour. In this project a conventional push grass cutter is modified into Semi- Automatic, RC controlled, battery powered, video surveillance grass cutter. Micro- controller is used to interface ultra-sonic sensors and Remote control with cutter motor and vehicle motors. If an obstacle is detected that is any living or non-living thing micro controller stops all motors and cutter moves backward so that operator can guide it away from obstacle.

CONTENTS

1. Introduction

1.1 Grass cutter

2. Methodology

2.1 Designing of Grass Cutter

2.2 Layout of Grass Cutter

3. Components required

3.1 Blade

3.2 Push Handle

3.3 Body Frame

3.4 Wheel

3.5 Shaft

3.6 Pulley

3.7 DC Motor

3.8 Battery

4 Advantages

5 Disadvantages

6 Conclusion

7 Reference

1.INTRODUCTION

Agriculture is the backbone of India. In India agriculture has facing serious challenges like scarcity of agricultural labor, in peak working seasons but also in normal time.

This is mainly for increased nonfarm job opportunities having higher wage, migration of labor force to cities and low status of agricultural labors in the society.

In India two type of grass cutting like as manual method (conventional method) and mechanized type of grass cutter.

In 18th century the concept of grass cutter was just a mechanical machine which was manually operated. With the invention of engines, petrol engines were used to power cutters [1]. Now a days there are many types of grass cutters with various feature's like solar powered, Petrol engine RC operated but they do not provide the ease to its user [2].

User has to go outside regardless of the weather condition or has to remain insight in order to move it properly. Semi-Automatic provide this ease to its user, he/she can remain in his room and through video surveillance and help of long range Rc [3].

It consists of DC motors, micro controller [4],

Relays, 12v DC battery, obstacle sensor, camera. The cutter motor has 3000rpm and the vehicle motors have 180rpm in order to attain 3-5miles/hr. speed[5].

Cutter is provided a high rotational speed to provide enough momentum to grass so that it stores in its back chamber. Semi-Automatic grass cutter is a feasible product for home lawns and sports grounds. It has a user-friendly interface to minimize the work load [6].

It is a very handy product which can be operated from a long range approximately 600m. It comes with variable cutting height options, depending upon the size of grass or terrain in which cutter is operated its cutting height can be changed to ensure smooth cutting and save the cutter from any damage. After cutting waste grass can be removed from the chamber by simple unhooking the chamber from its position manually. Storage facility ensures that lawn does not require any cleaning.

In current time earth is facing severe environmental issues causing severe weather conditions due to excessive burning of fossil fuels and are depleting with passage of time, so it was necessary to

develop a product which is environment friendly and ensures the safety its user by saving him from extreme weather conditions

To design and analysis the grass cutter machine which is help to the Indian former which is in ruler side and small farm.

It will reduce the cost of grass cutting in field.

It will help to increase economical standard in Indian former.

The design of the grass cutting machine will be presented by using CATIA drawing software.



2. Methodology

Semi-automatic grass cutter is a RC control device used to cut the grass at variable heights using rechargeable batteries [8].

Two 12V DC batteries are used along with two vehicle motors for forward movement of the cutter as well as for steering and a high-speed high torque DC motor for cutter. Figure 2 shows the methodology block diagram of the cutter.

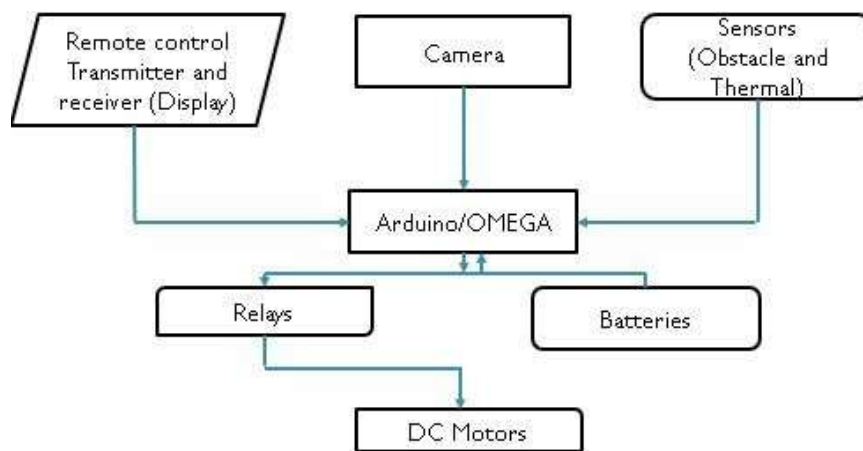


Figure. 2. Blocked diagram of semi-automatic grass cutter

Following are the components that are being used in this product:

- RC controller 6-channel
- Relays
- Aurdino mega
- Camera
- Ultrasonic sensors
- Batteries
- DC motors

The above-mentioned blocked diagram working is described as the signal from the RC remote goes into the microcontroller that interprets it and pass it further to the relays that drives the motors [9]. If an obstacle is detected the signal goes into the microcontroller and pass it to the

relays to stop the motors. The main aspect of Semi-Automatic, RC controlled, battery powered, video surveillance grass cutter is to ensure the safety [10]. The batteries are used to power the Aurdino as well as the motors the camera gives us a video feedback to control the cutter [11]. Programming for this project is done on Aurdino.

2.2 Layout of grass cutter:-

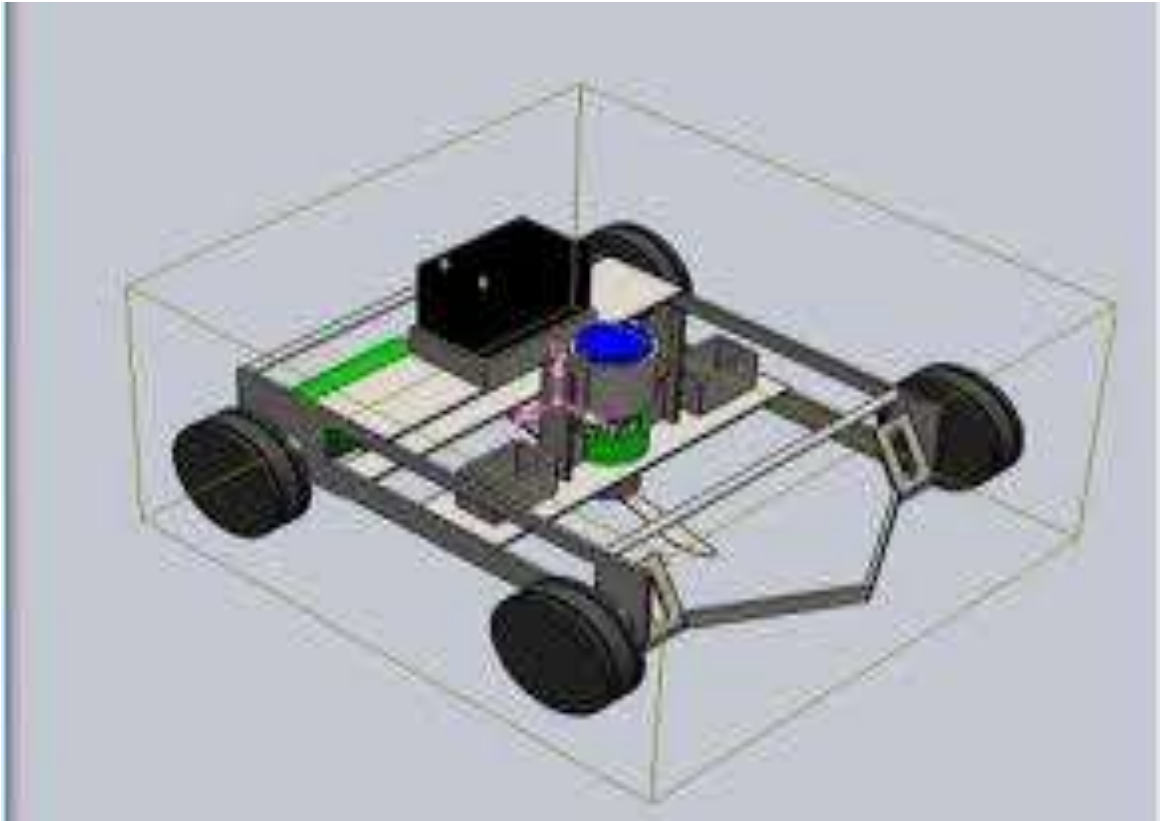


Fig 2. Design of grass cutter

4. Components required

4.2 Blade

4.2 PushHandle

4.3 BodyFrame

4.4 Wheel

4.5 Shaft

4.6 Pulley

4.7 DC Motor

4.8 Battery

4.1 BLADE:- It Consist of blades that are attached to a vertically rotating shaft, to the downward direction. The blades rotate, creating a cutting motion. It's important to cut grass, with a sharp blade as blunt blades can rip or tear grass from the roots, damaging our greenery and causing our lawn to become patchy over time.

Size:-390mm,

Metal:-The blade is made of Steel

4.2 PUSH HANDLE:- The power source of a manually operated cutter .This is a sturdy U-shaped handle that is connected to the frame, wheels and blade chamber.

The hollow Iron piped push handle will be designed to provide adequate sectioning for the separate subsystems.

4.3 BODY FRAME:- The frame is that provides a base unit that all of the components are mounted on it. The hollow Iron piped frame will be designed to provide adequate sectioning for the separate subsystems.

The rear wheel motors are mounted to the rear exterior section of the frame. The Batteries will have a separate compartment for mounting and secured safely. The Frame is to be composed of 45mmX75mm Hollow Iron pipe was chosen due to its strength and availability.

4.4 Design and analysis of automatic Grass cutter :-

An Automatic grass cutter (AGC) has ability to continue its tasks if any obstacle exists in front of its way of moving in another direction to achieve its goal. The movement of AGC is in order to perimeter (2.5(L)*1.5M (W)). this project is aim to design a small and portable automatic grass cutter that can perform their tasks efficiently while avoiding the obstacle. The system of AGC(Automatic Gain control) is control by using PIC(peripheral interface controller) microcontroller and the simulation of selected design

4.5 WHEEL:- These help propel the cutter in action. Generally, our grass cutters have four wheels. The diameter of the wheel is 8 inches. A base frame with Four Wheels of the grass cutter. The wheels having rubber gripped, for better moving on grass.

4.7 MOTOR:- The power source of a grass cutter that is powered by electricity. The electric motors for grass cutters are typically 36V, 1¼hp (932.5 W) DC motor. The benefits of the electric motors are that they run very quietly and they do not take up too much space on the cutter chassis. For smooth grass cutting, a motor power of not less than 628.3W (0.84hp) having a rotational speed of not less than 3,000 rev/min and producing Shear Force of about 10.5N is recommended. However, due to nonavailability of wide range of DC motors in the market, a 1¼ HP (932.5 W) having a rotational speed of 2,500 RPM was used. Though this gives a sufficient torque with a high cutting force, using an average blade radius of 210 mm, the speed is still not sufficient enough for easy grass cutting.

Hence a speed multiplication pulley system is used.

4.8 BATTERY:- For this project, batteries will be needed to provide 12V to the electric motors in order to run these systems.

Features:- Voltage – 12V, 100 Amp.

5. ADVANTAGES

- It is 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 minimum compared to the high cost of gasoline, oil, air filters, & sparkplugs.

6. DISADVANTAGES

- It is Costly.
- The eventual disposal of worn-out batteries is problematic & the motors in cordless Cutter tend to be less powerful than gasoline motors of the same total weight (including batteries).
- Recharging of Grass Cutter batteries can take from 8 to 16 hours with only an hour of operation. We need to replace the batteries after so many hours of operation.
- As a result of incorrect use, fluid can leak from the rechargeable battery. Avoid contact with the fluid.

7. CONCLUSION

Semi-Automatic grass cutter is a modern-day tool which eases life of its user by saving his time, saving

him from extreme weather conditions and providing an interface which is easy to use. The project

has opened a gateway for variants like semi-Automatic multiple Crop cutter. which will bring revolution in agriculture field. As prices of fuel are rising and world is moving towards renewable energy a cutter which is semi-automatic and after further improvements whose energy sources (batteries) would be charged from solar energy will be need of the hour .

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