

# Portable Electric Grass Cutter

Raj Kargutkar<sup>1\*</sup>; Dev Patil<sup>2</sup>; Ajay Sharma<sup>3</sup>; Pratik Raut<sup>4</sup>

Department of Mechanical Engineering, VIVA Institute of Technology, Virar, India

\*Corresponding Author

**Abstract**— The Portable Electric Grass Cutter is an innovative and eco-friendly gardening tool designed to simplify lawn maintenance while addressing the drawbacks of traditional gas-powered and bulky lawnmowers. Conventional grass cutters often produce excessive noise, emit harmful fumes, and require frequent refueling, making them inconvenient and costly for many users. This project aims to develop a lightweight, rechargeable, and user-friendly electric grass cutter that offers an efficient and sustainable alternative. The design focuses on portability, ease of handling, and safety, making it suitable for small to medium-sized lawns and hard-to-reach areas. By replacing fuel with a rechargeable battery-powered motor, the grass cutter reduces environmental pollution and lowers operational costs for homeowners.

**Keywords**— Portable Electric Grass Cutter, Electric Grass Cutter, Lawn Mower, Garden Tool, Battery Operated Cutter, Cordless Grass Cutter.

## I. INTRODUCTION

Grass cutting is an important activity for keeping gardens, lawns, and agricultural fields clean and healthy. If grass is not cut regularly, it can grow too much and affect plant growth, appearance, and hygiene. In many rural and urban areas, people still use manual tools like sickles or hand cutters, which require a lot of physical effort and time.

To overcome this problem, machines like petrol grass cutters are used. These machines can cut grass faster, but they have several disadvantages. They produce noise, air pollution, and require fuel, which increases the running cost. They are also heavier and may not be easy for everyone to handle.

A **portable electric grass cutter** is a modern solution to these problems. It operates on electricity or rechargeable batteries, which makes it eco-friendly and easy to operate. It is lightweight, produces less noise, and does not release harmful gases into the environment. This makes it suitable for home gardens as well as small farms.

Another advantage of this machine is that it reduces human effort and saves time. Even a single person can easily carry and use it without much training. It is designed to provide efficient cutting with minimum energy consumption.

## II. MATERIAL AND METHODS

A portable electric grass cutter is made using simple and useful materials to make it lightweight, strong, and easy to use.

### 2.1 Materials

The following components were integral to the creation of the portable electric grass cutter:

Component	Description
<b>Frame/Body</b>	Plastic or light metals (aluminum) for lightweight strength
<b>Cutting Blade</b>	Stainless steel or hardened steel for sharp, efficient cutting (nylon string alternative for safety)
<b>Motor</b>	Copper windings and iron core for smooth operation
<b>Handle</b>	Plastic with rubber coating for comfortable, non-slip grip
<b>Shaft</b>	Steel or aluminum for durability and power transmission
<b>Battery</b>	Lithium-ion (lightweight, rechargeable, good power backup)
<b>Protective Guard</b>	Strong plastic to prevent grass and particles from flying toward user

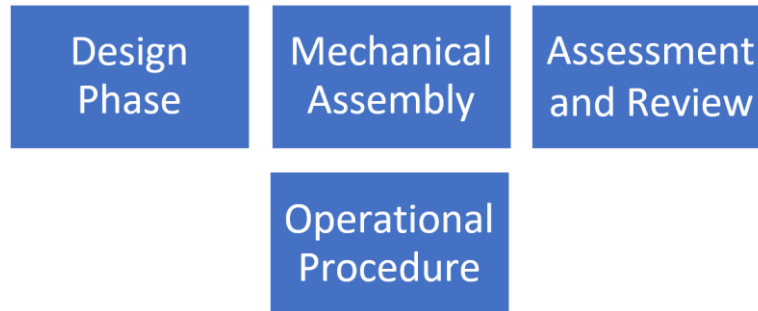
**Battery:** Acts as the main power source. A rechargeable battery is used for multiple uses without replacement.

**Motor:** Converts electrical energy into mechanical energy. When switched on, the motor rotates at high speed to drive the cutting blade.

**Blade:** Connected directly to the motor shaft, rotates at high speed to cut grass quickly and evenly. Made of strong steel to resist wear.

**Handle:** Provides a comfortable grip, helps control movement, reduces user fatigue, and improves safety.

**Safety Guard:** Placed around the blade area to protect the user from injuries and prevent flying debris.



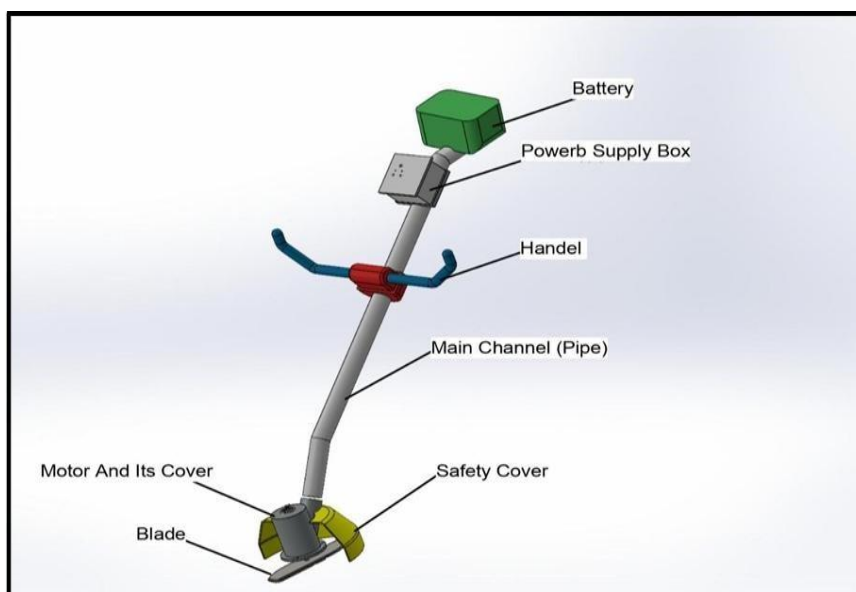
## 2.2 Assembly

All components are connected carefully. The battery is wired to the motor through a switch. The blade is fixed tightly to the motor shaft. The handle and guard are attached securely to the frame. Basic tools such as spanners, welding machines, and screws are used for assembly.

During operation, when the switch is turned on, the battery supplies power to the motor. The motor rotates, and the blade spins at high speed. As the blade contacts grass, it cuts efficiently. The user controls movement using the handle.

## 2.3 Design Phase

The design stage involves planning a lightweight, efficient, and user-friendly machine. Structure, motor placement, cutting mechanism, and battery capacity are determined. Materials such as plastic, aluminum, and steel are selected for strength and durability. Safety features such as a protective guard and comfortable handle are included. The design is simple and ergonomic for ease of use and cost-effectiveness.



**Figure 1: SolidWorks Model of Portable Electric Grass Cutter**

## 2.4 Operational Procedure

Connect the power or battery, switch on the cutter, and gently move it over the grass to cut evenly. After finishing, switch it off, clean the blade, and store the machine in a safe place.

## 2.5 Assessment and Review

The portable electric grass cutter works efficiently for small areas, saving time and reducing manual effort. It is easy to use and affordable, but battery life and cutting power are limited for heavy grass.

### III. RESULTS AND DISCUSSION

The portable electric grass cutter was successfully designed and tested. The machine cut grass smoothly and efficiently, with the blade rotating at high speed to deliver good cutting performance.

#### Observed Performance Parameters:

Parameter	Value
Cutting time for 10 m <sup>2</sup> area	10–12 minutes
Battery runtime (continuous)	45–60 minutes
Noise level	~90 dB
Weight	3–4 kg
Cutting mechanism	Nylon string
Motor type	DC brushed, 500–800W
Battery specification	24V / 4Ah Li-ion

During testing, the machine reduced human effort and saved time compared to manual cutting methods. The lightweight design made it easy to carry and operate. The handle provided good control, and the guard ensured user safety.

#### Advantages over Petrol Grass Cutters:

Aspect	Petrol Cutter	Electric Cutter
Noise	High	Low (~90 dB)
Emissions	Harmful fumes	None
Fuel Cost	Regular refueling	Rechargeable battery
Weight	Heavy	Lightweight (3–4 kg)

#### Limitations:

- May not be suitable for very thick or hard grass
- Battery charging required after use

**Cost:** The estimated cost of the machine is approximately ₹2,500–₹3,000, making it affordable for farmers and household users.

### IV. CONCLUSION

The portable electric grass cutter designed in this project is a simple, lightweight, and effective solution for cutting grass in small areas such as home gardens and lawns. It reduces physical effort and makes grass cutting less tiring compared to manual methods.

#### Key Advantages:

- No petrol required → low noise, no harmful smoke
- Eco-friendly and safe for users and the environment
- Lightweight and portable

- Affordable (₹2,500–₹3,000)

#### **Limitations:**

- Limited battery runtime (45–60 minutes)
- Not suitable for very thick or hard grass

The machine is easy to use, lightweight, and can be carried anywhere, making it suitable for gardens and small farms.

#### **Future Work:**

- Higher capacity battery for extended runtime
- Brushless DC motor for improved efficiency
- Adjustable cutting height mechanism
- Solar charging capability

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#### **CONFLICT OF INTEREST**

The authors declare that there is no conflict of interest regarding the publication of this research paper.

#### **REFERENCES**

- [1] Hassan Al-Mansoori and Ahmed Y. Tan (2025) "Process Optimization and Time Efficiency in Manufacturing: A Case Study Approach" Al-Mansoori and Tan (2025).
- [2] Rajesh Kumar, Priya S. Verma (2024) "Improving Workflow Efficiency with Real-Time Data Analytics in Industrial Settings" Kumar and Verma (2024).
- [3] Maria Gonzalez, John T. MacArthur (2023) "Lean Manufacturing Techniques: Streamlining Process Flows in Industrial Operations, Gonzalez and MacArthur (2023).
- [4] [4 Rahul Sharma, Neha Gupta (2022) "Design and Development of Portable Grass Cutting Machine" Sharma and Gupta (2022).
- [5] Liam O'Connor, Ayesha Z. Khokhar (2021) "Value Stream Mapping for Process Improvement: A Detailed Case Study" O'Connor and Khokhar (2021).
- [6] David Brown, Michael Johnson (2019) "Design and Performance Evaluation of Lawn Cutting Machines" Brown and Johnson (2019).