

Solar Based Grass Cutter

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Abstract - A solar-based grass cutter is a sustainable machine that trims grass using energy from sunlight. Solar panels capture sunlight and convert it into electricity, which is stored in a rechargeable battery. This stored energy powers a DC motor that rotates a cutting blade to trim grass effectively. The system helps reduce the use of fuel and conventional electricity, making it environmentally friendly and economical. It is suitable for lawns, gardens, parks, and small farms where regular grass cutting is needed. The design usually includes a solar panel, battery, charge controller, motor, blade, and frame. This project highlights how renewable energy can support practical agricultural and household tools.

Key Words: Solar Grass Cutter, Photovoltaic Panel , Renewable Energy, Sustainable Agriculture

1. INTRODUCTION

Grass cutting is an important activity in agriculture, gardens, parks, and playgrounds to maintain cleanliness and healthy plant growth. Traditional grass cutting methods use manual tools or petrol-powered machines, which require high physical effort, produce noise, and cause air pollution. To overcome these problems, solar energy can be used to operate grass cutting machines. Solar power is renewable, eco-friendly, and easily available. In this system, a solar panel converts sunlight into electrical energy, which is stored in a battery and used to run a motor that rotates the cutting blade. This method reduces fuel consumption, lowers pollution, and provides an efficient and sustainable solution for grass cutting.

2. Body of Paper

Grass maintenance plays an important role in landscaping, gardening, and agricultural fields. Traditionally, grass is cut either by using manual tools such as sickles and scythes or by using engine-driven grass cutters powered by petrol or diesel. Although these methods have been widely adopted, they present several limitations related to efficiency, environmental impact, and operational cost

Manual grass cutting requires considerable human effort and time. For small areas this method may be manageable, but it becomes highly inefficient when used for large spaces such as parks, playgrounds, gardens, and farmland. Continuous manual labour can also lead to fatigue and physical strain for workers, making the process difficult for long working hours or for elderly individuals.

Motorized grass cutters powered by fossil fuels provide faster operation, but they introduce environmental concerns. The use of petrol or diesel engines produces harmful emissions such as carbon dioxide and nitrogen oxides, which contribute to air pollution and global climate change. These machines also generate significant noise, which can be disturbing in residential areas and public spaces.

Another challenge associated with conventional grass cutters is the high operating and maintenance cost. Regular fuel consumption, engine servicing, lubrication, and replacement of mechanical parts increase the long-term expense of using such machines. In addition, dependence on fossil fuels makes the operation sensitive to fuel availability and rising fuel prices.

Accessibility is also a concern in rural or remote areas where fuel stations and service centres may not be easily available. This makes it difficult for farmers or landowners in such locations to maintain grass and vegetation regularly using conventional machines.

Considering these issues, there is a need for an alternative grass cutting solution that is efficient, economical, and environmentally sustainable. A solar-powered grass cutter provides a promising approach by utilizing renewable solar energy to operate the cutting mechanism. This system can reduce dependence on fossil fuels, lower operational costs, minimize noise, and provide a cleaner method of grass maintenance.

However, developing an effective solar-based grass cutter requires careful design and optimization. Factors such as solar panel efficiency, battery storage capacity, motor power, and system portability must be properly balanced to ensure reliable performance. Without appropriate design considerations, the system may face limitations in terms of power output, cutting efficiency, and operating duration.

Therefore, research is required to design and develop a solar-powered grass cutter that is efficient, portable, cost-effective, and environmentally friendly while maintaining adequate cutting performance for practical applications.



Fig -1: Figure

The solar-based grass cutter works by using solar energy to power a cutting mechanism. A photovoltaic solar panel absorbs sunlight and converts it into direct current (DC) electrical energy. This electrical energy is regulated through a charge controller to ensure safe charging of the battery and to prevent overcharging.

The rechargeable battery stores the electrical energy so that the system can operate even when sunlight is weak or unavailable. The stored power is supplied to a motor driver and controlled by a microcontroller, which manages the overall operation of the system.

When the system is activated, the motor driver provides sufficient current to the DC motor. The motor rotates at high speed and drives the cutting blade attached to its shaft. As the blade spins, it cuts the grass while the machine moves across the surface.

Thus, the system utilizes solar energy as a renewable power source to operate the grass cutting mechanism efficiently while reducing fuel consumption, noise, and environmental pollution.

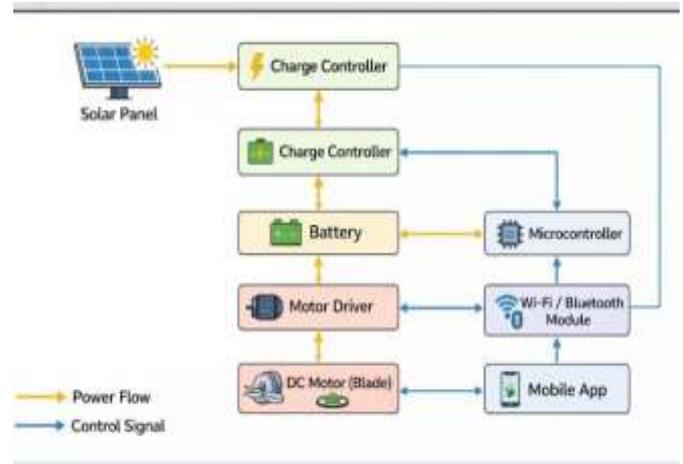


Fig -2: Block diagram of solar based grass cutter

3. CONCLUSIONS

The solar-based grass cutter was designed as an eco-friendly alternative for lawn maintenance. It uses a photovoltaic solar panel to convert sunlight into electrical energy, which is stored in a rechargeable battery and used to power a DC motor that rotates the cutting blade. The prototype successfully demonstrated its ability to cut grass while reducing dependence on fuel-powered machines. This system helps lower operating costs, noise levels, and environmental pollution. Although its performance depends on sunlight availability and battery capacity, the results show that solar technology can be effectively used for small-scale grass cutting. Future improvements can enhance efficiency, automation, and overall system performance.

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