SOLAR -POWERED LAWN CARE : REVOLUTIONIZING YARD MAINTAINANCE WITH AUTOMATED GRASS CUTTING

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ABSTRACT

The introduction of paper adeptly articulates the significance of solar energy as a clean, abundant, and renewable resource. The emphasis on its non-polluting nature distinguishes it as a pivotal player in addressing environmental concerns, particularly the reduction of greenhouse gas emissions. By drawing attention to the environmental impact of traditional grass cutters reliant on fuel, it highlights a critical issue – their contribution to both the greenhouse effect and air pollution. Additionally, The acknowledgment of the manual labor involved in operating electric-powered grass cutters underscores the multifaceted challenges associated with conventional methods. This succinctly sets the stage for a solution-oriented exploration, suggesting that an automatic grass cutter powered by renewable energy could provide a promising resolution. The subsequent transition in your discourse towards the central theme of the paper - technological progress in automatic solar grass cutters - adds depth and specificity to the argument. This direction allows for a comprehensive examination of how advancements in technology can directly address the identified problems. The mention of keywords such as"Fully Automated Grass Cutter," "Solar Panel," "Internet of Things," and "Fire Detection Mechanism in Grass Cutter" hints at a investigation into cutting edge development

I.INTRODUCTION

Nowadays, pollution is one of the major factors of global warming as the usage of non-renewable resources is too excessive. Due to the emission of unwanted gases caused by global warming, an alternative was electricity and the best alternative (renewable resource) to derive electricity is solar energy. Solar powered automatic grass cutter is an automatic system that is powered by solar energy obtained from sunlight. The devices use a solar panel, which is the best usage of solar energy due to which we generate electricity. Solar powered automatic grass cutters are designed to cut grass in public places like hotels, parks, and colleges and also in private properties like homes, gardens, and lawns.In today’s world as technology is increasing day by day traditional grass cutters are replaced with solar powered grass cutters.
This solar-powered grass cutter is equipped with an ultrasonic sensor that works as an

obstacle detection, and an ultrasonic sensor in the device is planned to avoid the system from colliding with obstacles while in motion in real-time grass cutter. As the system does not require any human interaction.Apart from that, in one of the papers, it is interesting to know that infrared sensors are used in the grass cutter to make comparison of cut grass with uncut grass. Moreover, safety considerations also have been given attention to the device not being in operation when it is lifted by a human in the air, using a collapsible blade.

II.LITERATURE REVIEW

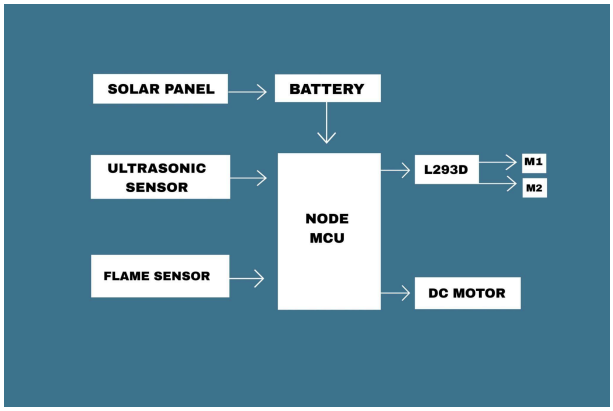
``Design and Implementation of Automatic Solar Lawn grass cutter´´ by Ahsan Niazi, M.Zoraiz Hafeez, Attis Abbas, Sana Khan, Ijaz Husnain:Presently, manually grass cutter machines are commonly used for cutting the grass over the lawn which creates pollution like air pollution and loss of energy. This project is to design and implement an automatic solar grass cutter. The proposed system design eliminates the human effort in the grass cutting field and reduces the pollution by using solar energy. Automatic solar grass cutter is that machine which uses solar energy to charge the battery and sonar sensor will be used to detect and avoid the unnecessary objects in the lawn during operation. The robot consists of a microcontroller Arduino Mega 2560 and cutting blades which are operated with the aid of a geared DC motor; the battery is also used to supply power to the motors. The battery can be charged with solar energy using a solar panel. For detection of the obstacles in the path sonar sensors are used.

``Semi-Automatic Solar Powered Grass Cutter´´ by Abhishek Pawar, Anushka Bhalerao, Ruturaj Tagunde, Nikita Undirwade: This system is very simple to operate and advantageous overall because it has fewer moving parts and can be fueled by solar energy, which means there are no fuel costs, no pollution, and no fuel residue. It can be resolved easily. This technology has the capacity to recharge the battery while the solar energy is used to cut the grass. As a result, cutting grass is much easier using it. Reduced costs, better blade efficiency, and less weight can all raise this project's productivity. The sensors are unaffected by the environment or animals. It is really beneficial to the user. The DC motor maintains consistent speed when used in load settings. The solar panel consistently charges the battery. As a voltage regulator, Arduino used a distinct input from the photovoltaic panels to stabilise performance despite the fact that the output of the solar panels varies.

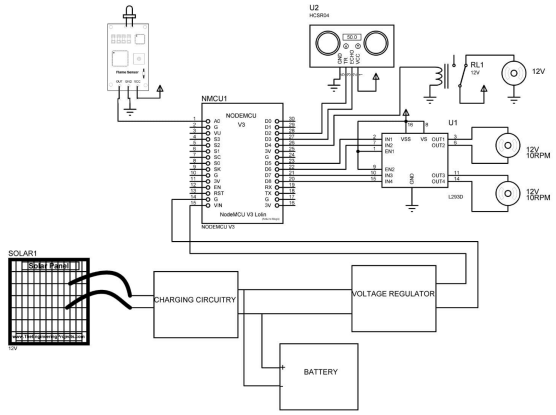
``Design of remote monitored solar powered grass cutter robot with obstacle avoidance using IoT´´ by Balakrishna K, Rajesh N :In this system designed a Grasscutter robot using IoT technology powered by a solar energy power supply to control the movement and mechanism of the prototype. The Grasscutter robot can cut the shear grass with seven signals controlled remotely using a Bluetooth module supported by the Blynk app. The control mechanism and movements such as Forward movement, Backward movement, Right movement, Left movement, On mechanism, Off mechanism and Stop function for the Grasscutter prototype. The component utilization and the power supply through solar panels make the designed Grasscutter

economically cheaper. For future scope, if the designed Grasscutter connectivity from the Bluetooth module has been replaced with cellular connectivity through COAP-SMS (Constrained Application Protocol), COAP-MQ, etc., then the system can be monitored from anywhere in the world.

III.BLOCK DIAGRAM



IV.CIRCUIT DIAGRAM



V.SCOPE

The future of solar-powered fully automatic grass cutters is bright,with advancing technology enhancing precision and efficiency.Integration with smart home systems will allow remote monitoring and customization.Improved battery technology ensures uninterrupted operation, andbeyond homes,agriculture, promoting sustainable outdoor maintenance practices.The scope of a solar grass cutter extends beyond its immediate application as a grass cutting tool. It represents a broader shift towards sustainable agriculture practices, aligning with global efforts to reduce carbon emissions and mitigate climate change. By harnessing solar energy, these cutters offer a clean and renewable alternative to traditional petrol-powered models, reducing the environmental impact of grass cutting operations. Additionally, the adoption of solar grass cutters can lead to long-term cost savings for farmers and gardeners, making them a financially viable and environmentally responsible investment. Furthermore, the development and use of solar-powered agricultural equipment contribute to advancements in renewable energy technology, driving innovation and progress in the field. Overall, the scope of solar grass cutters encompasses environmental, economic, and technological aspects, highlighting their potential to revolutionize the way we approach grass cutting and sustainable agriculture.

It holds social relevance by promoting eco-friendly practices,reducing carbon footprint, and minimizing noise pollution.It

aligns with sustainability goals, offering a cleaner alternative for lawn maintenance, contributing to a greener and more environmentally conscious community

PROS

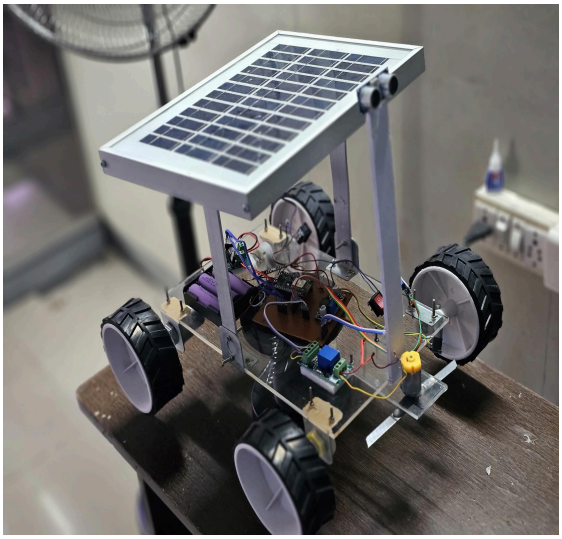
- Environmentally Friendly: Solar-powered grass cutters produce energy without harmful emissions, contributing to a cleaner environment by reducing carbon footprints associated with traditional fuel-powered alternatives
- Renewable Energy Source: Solar energy is a sustainable and renewable resource, ensuring continuous power for the grass cutter without depleting finite fossil fuels, leading to long-term energy security.
- Reduced Operating Costs: Once installed, solar-powered systems have minimal ongoing costs as sunlight is free. This results in long-term savings compared to fuel-powered alternatives, making it a cost-effective choice for users.

CONS

- Limited Operation Time: Solar-powered grass cutters may have restricted operational hours due to sunlight dependency. Inadequate sunlight, especially during cloudy days or at night, can limit their ability to function, leading to potential interruptions in grass cutting schedules.
- Vulnerability to Shading: Partial shading of solar panels can significantly reduce the efficiency of the grass cutter. Trees, buildings, or other obstructions casting shadows on the solar panels may diminish the system's overall performance.

VI.FINAL HARDWARE

The envisioned design integrates a robust chassis with advanced solar panels to power both the cutting mechanism and navigation system efficiently. The cutting mechanism, driven by a motor, employs either a sharp blade or a string trimmer for precise cutting, prioritizing energy conservation. Enhanced by sensors like ultrasonic or infrared, the navigation system detects obstacles, ensuring adaptive and autonomous operation. A Node MCU orchestrates the system, offering user-friendly controls via a smartphone app or a straightforward interface with buttons and LEDs.



VII.CONCLUSION

In conclusion, the development and testing of the solar-powered grass cutter have

demonstrated its feasibility and effectiveness as a sustainable alternative to traditional petrol-powered models. The system's design, which incorporates solar panels, a battery bank, and an electric motor, enables efficient grass cutting operations while minimizing environmental impact.

The performance evaluation of the solar grass cutter revealed promising results, with the system effectively cutting grass in various conditions. The efficiency of solar energy conversion to power the cutter was found to be satisfactory, indicating the system's potential for practical use in agricultural settings.

The economic and environmental benefits of the solar grass cutter are significant. By reducing reliance on fossil fuels and emissions, the system contributes to a greener and more sustainable approach to grass cutting. Furthermore, the long-term cost savings associated with solar energy make the system a viable investment for farmers and gardeners alike.

Looking ahead, further optimization of the solar grass cutter's design and components could enhance its performance and efficiency. Additionally, expanding the use of solar power in agricultural equipment could lead to broader sustainability benefits for the agriculture sector.

In conclusion, the solar grass cutter represents a promising step towards sustainable agriculture practices. Its development and implementation have the potential to contribute to a greener and more environmentally friendly future for grass cutting operations.

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