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Automatic Lawn Mower

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Abstract: In current days, grass cutter machines are operated by fuel and electrical energy which are costly and requires high maintenance. Hence, in this study, a hand-held operated machine for grass cutting was designed and fabricated by using locally available materials. Important aspects such as durability, strength, and light weight were taken into design considerations for better performance characteristics. The lawn mower was powered by a12V/1.35A rechargeable battery which drives the DC motor up to a rotational speed of 19,300 RPM. As a result, the generated torque will be transferred to the cutting head mechanism for efficient grass cutting. The entire configuration set up was mounted on a wooden base which attached together with a bicycle frame and a set of wheel arrangement. This portable lawn mower can be used to maintain and trim grass in gardens, home, schools or yards.

Keywords: Grass cutter, bicycle frame, lawn mower, hand-held, battery ,portable

INTRODUCTION

An automatic lawn mower represents a modern innovation in landscaping and home maintenance, designed to simplify the task of keeping lawns neat and tidy. Unlike traditional manual or ride-on mowers, these devices operate autonomously, requiring minimal user effort. Using advanced technologies such as sensors, GPS navigation, and programmable settings, they can efficiently cover specific areas while avoiding obstacles and uneven terrain. Automatic lawn mowers are powered by rechargeable batteries, making them eco-friendly and quieter than gas-powered alternatives. With increasing integration of smart features, such as mobile app control and AI-assisted navigation, these mowers are becoming an integral part of smart home ecosystems, catering to the growing demand for convenience and efficiency in everyday tasks.

A lawn mower is a machine that uses cutting blades or strings which is used to cut the grass in gardens or yard sat an even length. The working principle of the lawn mower is to provide a high speed rotation to the blades, which aid sin cutting the grass through generated kinetic energy. The main parts of this prototype lawn mower consist of a DC motor, a pulse width modulation (PWM) device for controlling the motor, bicycle frame and wheels as the body structure, and a rechargeable battery. For safety operation, the motor will be controlled by a PWM device as since the motor has a high rotational speed of 19,300 RPM. As for the cutting head, nylon strings will be used as the trimmer instead of traditional cutting blades due to cost effectiveness, safety, and flexibility. Besides that, since the motor delivers a minimum torque value, hence nylon strings are much more suitable since it is lighter in weight

I. LITERATURE PAPER

[1] Thiruchelvam T; Nimal D A D; Upali S (2007) would provide a foundational overview of the advancements in automated lawn maintenance systems. It would highlight the increasing need for efficient, cost-effective, and environmentally friendly solutions for grass cutting, driven by the growing demand for labor-saving devices in landscaping and lawn care.

[2] Shanmugam V; Natagrajan E (2006) with a focus on the use of sensors, microcontrollers, and energy-efficient power sources in developing automatic grass cutters. The introduction would outline the significance of such devices in reducing human effort, ensuring uniform grass cutting, and promoting eco-friendly solutions through the use of battery-powered mechanisms or solar energy.

[3] Chr.Lamnatou, E .Papanicolaou,V. Belessiotis and N.kyriakis (2012) the integration of sustainable technologies with automation for efficient lawn maintenance. It might start by discussing the increasing importance of eco-friendly solutions in everyday tasks, especially in the context of environmental concerns and energy conservation. The authors

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would highlight the drawbacks of conventional grass-cutting methods, such as high energy consumption, labor intensity, and environmental impact from fuel-powered mowers, setting the stage for the need for innovative and automated solutions

[4] Ahmed Abed Gatea (2011) addressing the growing need for automated solutions in everyday tasks, particularly in the realm of landscaping and lawn care. It might highlight the inefficiencies and environmental concerns associated with traditional lawn mowers, such as the high labor demands, time consumption, and the carbon footprint of gas-powered models. The introduction would emphasize how automation in grass cutting is not only a solution to these problems but also a step towards more sustainable, energy-efficient, and user-friendly lawn care systems.

[5] M. Mohanraj P. Chandrashekar (2009) begin by emphasizing the increasing demand for automated systems in various aspects of daily life, particularly in lawn care and landscaping. The authors would introduce the concept of automatic grass cutters as an innovative solution to address common challenges associated with traditional lawn mowers, such as the labor-intensive nature of mowing, time consumption, and the environmental impact of gas-powered machines.

[6] Vicky Jain, Sagar patil, Prashant Bagane, Prof. Mrs. S. S. Patil, (2016) by discussing the growing need for automation in everyday tasks, particularly in the maintenance of lawns and gardens. The authors would highlight the limitations of traditional grass-cutting methods, such as the time-consuming nature of manual mowing, the physical effort required, and the environmental concerns associated with the use of fuel-powered mowers. METHODOLOGY

A. BLOCK DIAGRAM

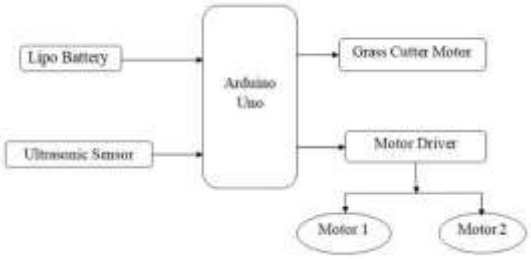

Figure 1 represents a Autmatic Lawn Mower. Arduino is an open-source electronics platform based on easy-to-use hardware and software. It consists of a microcontroller, which acts as the brain of a project, and a development environment that allows users to write and upload code to the board

B. WORKING

An automatic grass cutter, or robotic lawn mower, works autonomously to trim grass without human intervention. It features several sensors such as ultrasonic and bump sensors to detect obstacles and navigate around the lawn. The mower moves using motors that drive its wheels or tracks, allowing it to follow a random or predetermined cutting pattern. It uses rotating blades to cut the grass, with the cutting height adjustable depending on the model. Most robotic mowers are battery-powered, and they return to a charging station when their power is low. To define the cutting area, some models rely on boundary wires, while others use GPS or onboard sensors. The mower can be programmed via an app or onboard controls to set schedules and adjust settings. With its ability to operate independently, it provides a convenient and efficient solution for lawn care, cutting grass while avoiding obstacles and returning to charge when needed.

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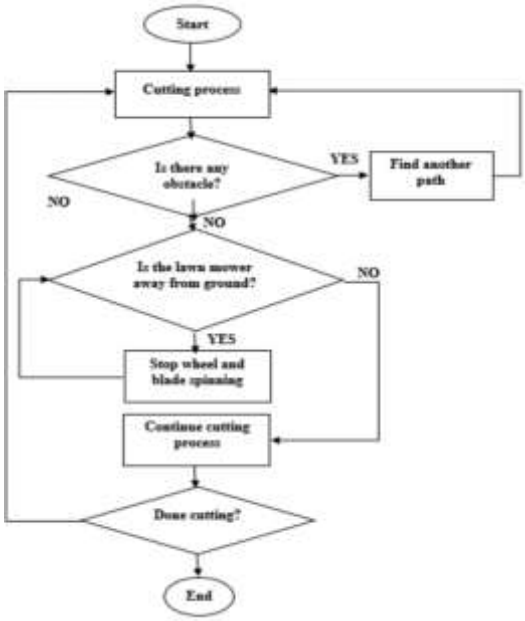
C. FLOWCHART



The working of an automatic grass cutter begins with the system initializing and checking the battery level. If the battery is low, the mower will return to the charging station. If the battery is sufficient, the mower begins operation. As it moves across the lawn, it uses sensors to detect obstacles. If an obstacle is detected, the mower adjusts its direction to avoid it and continues cutting. The mower keeps cutting grass until it completes its scheduled task or the designated area. Once the task is finished, or the schedule is complete, the mower will return to the charging station to recharge or finish its operation.

II. RESULTS

The prototype of the proposed system is shown in Figure 3

Case 1: Start.
When the system is powered ultrasonic sensor it detects the obstacle avoiding and start robot.

Case 2: Based on the grass,it starts cutting the grass,if it detects any obstacle like stone or any hard material ,the robot starts to change the postion using the ultrasonic sensor and continue to statt the grass cutting

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Case 3: Based on the grass it. Starts to cut the grass using the blades that are connected to the DC motor

III. APPLICATIONS

1 . **Residential Lawn Care**: Automates grass cutting in homes, saving time and effort for homeowners.
2. Commercial Properties: Used in businesses or office complexes to maintain lawns efficiently.
3. Public Parks: Helps in maintaining large public green spaces with minimal human intervention.
4. **Golf Courses**: Ensures even and consistent grass trimming across vast and intricate landscapes.
5. Sports Fields: Used for maintaining sports fields, ensuring uniform grass height for gameplay.
6. **Challenging Terrains**: Effectively navigates around obstacles like trees, flower beds, and benches, making it ideal for complex landscapes.
7. Sustainable Gardening: Reduces reliance on gas-powered mowers, lowering carbon emissions and noise pollution.
8. Eco-Friendly: Operates on electric power, contributing to more sustainable lawn care practices.
9. **Weather Adaptability**: Some models feature rain sensors that allow the mower to return to the charging station when weather conditions are unfavorable.

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