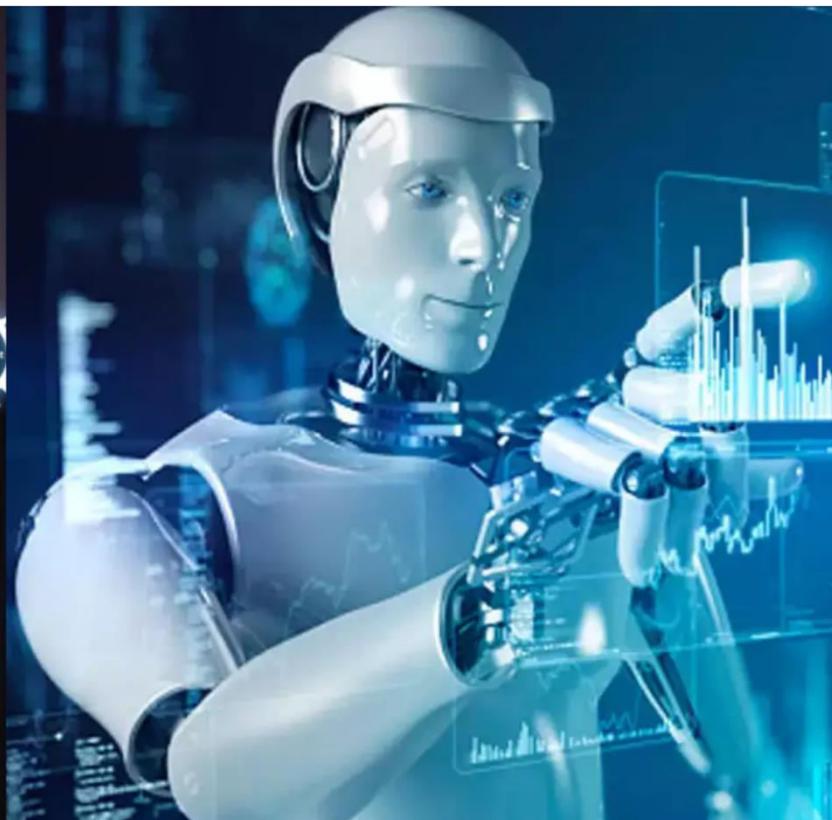




International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 15, Issue 3, March 2026

Dust Buster: Smart Vacuum and Grass Cutter

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ABSTRACT: The Smart Vacuum Floor and Grass Cutter is an automatic cleaning system designed for both indoor and outdoor environments. It helps reduce human effort and saves time by performing multiple cleaning tasks efficiently. The device can vacuum dust from floors, mop surfaces, and trim garden grass evenly using its built-in mechanisms. It uses Ultrasonic sensor technology to detect obstacles and avoid collisions while moving. An Arduino microcontroller controls the movement and overall functions of the system. The machine can operate automatically or be controlled manually through a remote or IoT-based system. It moves smoothly and automatically changes direction when an object is detected in its path. Rechargeable batteries provide efficient power to the motors and sensors, making the system energy-efficient and portable. This project supports eco-friendly automation and helps maintain clean surroundings. It is useful for homes, offices, gardens, and public places, offering a smart, cost-effective, and user-friendly cleaning solution..

KEYWORDS: .Smart Cleaning, Vacuum Cleaner, Grass Cutter, Automation, Arduino, Ultrasonic Sensor, IoT Control, Obstacle Detection, Rechargeable Battery, Eco-Friendly Device

I. INTRODUCTION

The Smart Vacuum, Floor and Grass Cutter project is designed to make cleaning tasks easier and more efficient. It combines three main functions — vacuum cleaning, floor mopping, and grass cutting — into a single automatic system. This smart device can clean floors, remove dust, and cut grass without much human effort. It uses sensors like ultrasonic and IR sensors to detect obstacles and move safely in any direction. The system is powered by a microcontroller, which controls the motors, sensors, and movement of the device.

This project aims to help people save time and energy in their daily cleaning routines. It can work automatically or with remote control, making it suitable for homes, offices, and gardens. The smart cleaner ensures neat and clean surroundings while reducing manual work. It is an eco-friendly and cost-effective solution for modern households and smart cities. By using this system, regular cleaning and maintenance become simple, efficient, and convenient.

II. LITERATURE SURVEY

The literature survey includes several research works related to automated cleaning and grass-cutting systems. In 2022, Priyadarshini et al. designed an Arduino-based smart floor cleaning robot that used sensors for automation; however, their system focused only on indoor cleaning applications. In 2021, Julide Toprak proposed an autonomous vacuum cleaning robot that used sensor-based navigation and obstacle detection, but the system was limited strictly to cleaning purposes. More recently, in 2023, Mallikarjun Mudda et al. developed a solar-powered automatic grass-cutting machine using ESP32, which efficiently operated on renewable energy but did not include any floor-cleaning features. These studies highlight advancements in automated cleaning and grass-cutting technologies, while also showing that most existing systems focus on single-purpose applications rather than combining multiple functions

III. METHODOLOGY

The system development began with planning the concept of a smart vacuum cleaner that can perform floor cleaning and grass cutting efficiently. Required components such as the Arduino Uno, Ultrasonic sensor, relay module, DC motors, gear motors, wheels, and vacuum motor were carefully selected. Next, the circuit diagram was designed to properly interface the Arduino Uno with the motor driver, ultrasonic sensor, and relay module to ensure smooth

operation. During hardware implementation, all components including motors, wheels, vacuum motor, and grass-cutting blade were mounted on a chassis to construct the robotic structure. The system was then programmed by writing and uploading control code to the Arduino Uno to manage robot movement, obstacle detection, and cleaning mechanisms. After assembly and programming, the system was tested to verify motor performance, obstacle detection capability, vacuum cleaning efficiency, and grass-cutting operation. Finally, performance evaluation was conducted to observe and confirm that the system operates correctly and effectively for both cleaning and grass-cutting tasks.

IV. EXPERIMENTAL RESULTS

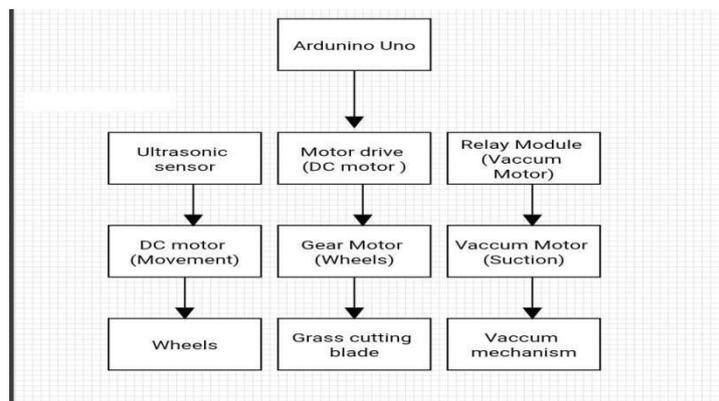
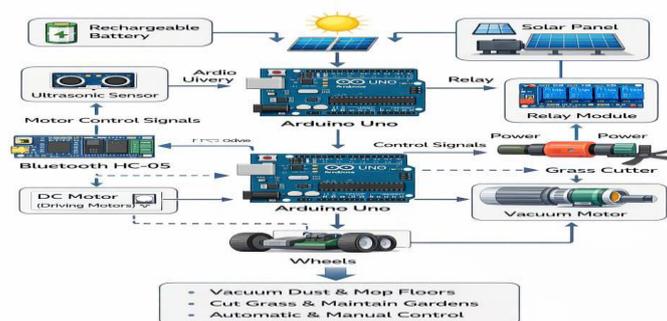


Figure 1

The block diagram shows a smart vacuum cleaner that also cuts grass, controlled by an Arduino Uno. It uses sensors for obstacle detection and has motors for movement, vacuum cleaning, and grass cutting. The system integrates multiple functions for efficient cleaning. Arduino manages all operations. 😊



The diagram shows a solar-powered robotic system that uses two Arduino Unos to control a grass-cutting & vacuum-cleaning vehicle. It switches power from solar panels or a rechargeable battery through a relay to run motors and sensors for automatic & manual operation. The system integrates Bluetooth (HC-05) for remote control and ultrasonic sensors for obstacle detection.

V. CONCLUSION

The Smart Vacuum Floor Cleaner and Grass Cutter project successfully demonstrates an efficient multi-purpose automation system for both indoor and outdoor cleaning. The integration of the Arduino Uno, sensors, and motorized mechanisms enables smooth navigation, obstacle detection, and effective cleaning performance. The system reduces human effort, saves time, and operates using rechargeable batteries, making it energy-efficient and eco-friendly. Its

ability to perform vacuum cleaning, mopping, and grass cutting in a single device makes it cost-effective and versatile. Overall, the project provides a practical, user-friendly, and innovative solution for maintaining clean surroundings in homes, gardens, and public spaces.

REFERENCES

- [1] K. M. Priyadarshini, B. Bhanuprasad, K. Vamsi Krishna, and K. Manikanta, "Design and Development of Arduino Based Smart Floor Cleaning Robot," International Journal of Management, Technology and Engineering (IJMTE), vol. 11, issue 7.
- [2] Julide Toprak and Aysenur Kamiloglu, "Autonomous Vacuum Cleaning Robot Using Sensor-Based Navigation," Bursa Uludag University, Turkey.
- [3] N. Prashanth, K. Vivek, A. Vamshi Krishna, T. Abhijeet Singh, and P. Sai Prasad, "Design and Implementation of Smart Cleaning Robot," International Research Journal of Engineering and Technology (IRJET), 2024.
- [4] Humayun Rashid, Akash Mahmood, Sarjahan Shekha, S. M. Taslim Reza, and Md. Rasheduzzaman, "Design and Development of a DTMF Controlled Room Cleaning Robot with Two Path-Following Method," published on ResearchGate.



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