Available online: www.ijsrmes.com

International Journal for Scientific Research in Modern Engineering and Science

Published in: Vol. 1, Issue 1, pp. 58-62, March-April 2026

A SMART, COST-EFFECTIVE BLUETOOTH-CONTROLLED FLOOR CLEANING SYSTEM FOR EFFICIENT SURFACE MAINTENANCE

Priyanshu Mahobia[1]*, Priyanshu Rajput[2], Prishiv Gupta[3], R. Yogesh[4]

[1234]*Department of Mechanical Engineering, DR CV Raman University, Bilaspur (CG)*

Abstract

The project focuses on developing floor-cleaning devices equipped with Bluetooth functionality. This project aims to develop and evaluate a model designed to clean both wet and dry floor surfaces. It's useful for scrubbing damp floors. Keeping floors clean is vital for our health, and this cleaning equipment reduces the labor required. Therefore, this project holds significant value in our everyday lives. It's easy to assemble and use. This equipment is easy to use. This floor cleaning equipment includes a sponge mop, swiping brushes, and a fan designed to accelerate the cleaning process. This machine also has a comparably low overall cost. These machines are often used for this purpose, though they function on distinct principles and come at a high cost. Floor cleaning machines have grown more popular in recent years for cleaning huge floor surfaces in a short amount oftime. However, in India, a growing country, large-scale cleaning equipment are necessary to meet the country's cleaning requirements.

Keywords: *Bluetooth Control, Floor Cleaning Machine, Wet and Dry Cleaning.*

* *Corresponding author*

1. Introduction

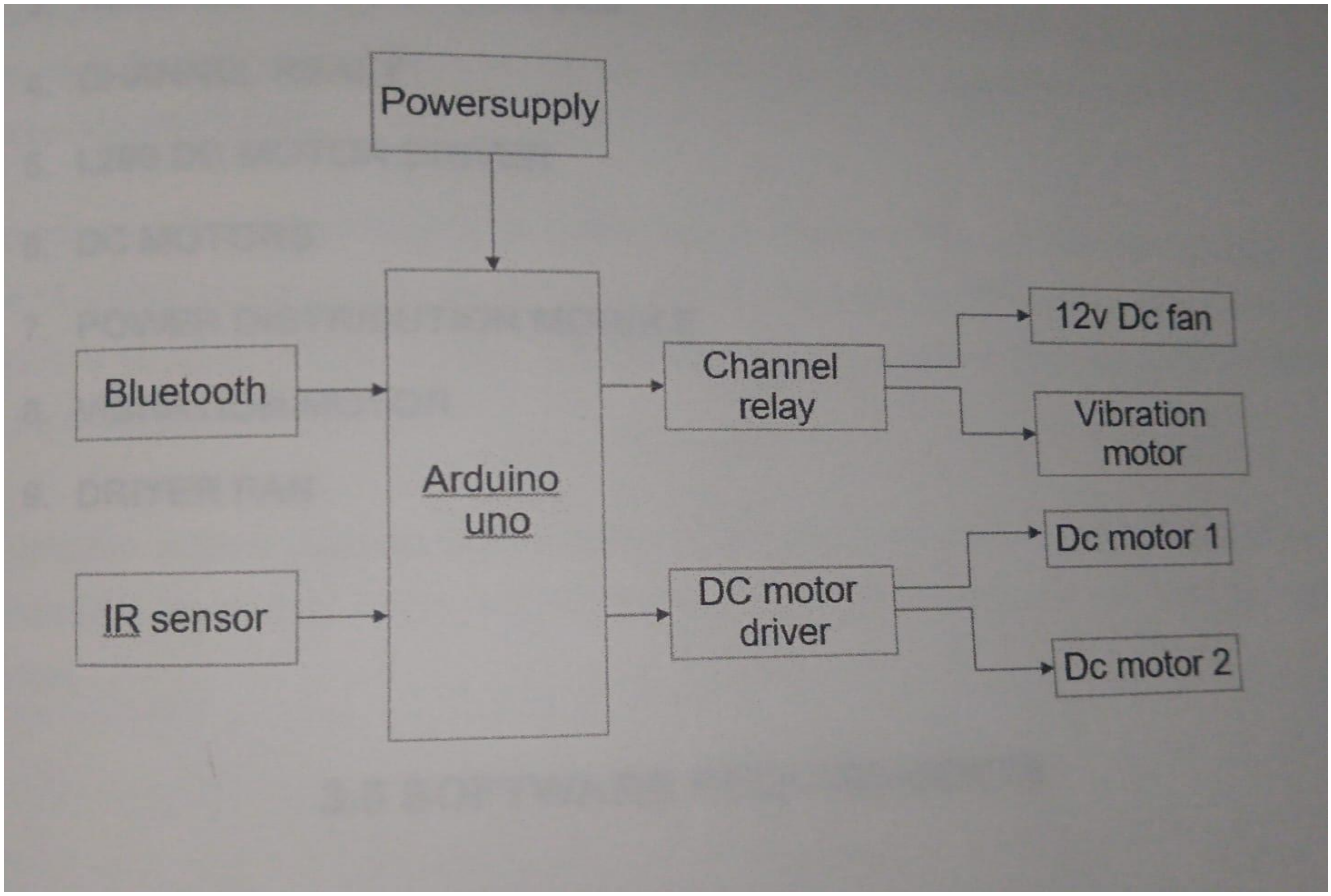
In today's world, cleanliness holds great importance. Cleanliness means the absence of dirt, dust, stains, and unpleasant odors. The objectives of cleanliness include promoting health, enhancing beauty, eliminating unpleasant odors, and preventing the transfer of dirt and contaminants to oneself and others. By maintaining cleanliness, we can preserve both our physical and mental well-being, leading to a greater sense of comfort and positivity. Cleanliness fosters good character by maintaining a clear and tranquil body, mind, and spirit. Keeping clean is a vital component of healthy living, as it's cleanliness alone that enhances our personalityboth outwardly and inwardly. Everyone has a responsibility to maintain cleanliness and hygiene for themselves and their surroundings. It also fosters uplifting thoughts that help reduce the likelihood of illness. Numerous floor cleaning options are available. You can choose between manual and semi-automatic cleaning options. Manual cleaning demands human involvement and consumes a significant amount of time. Besides this, many kinds of machines are commonly

employed for this purpose. However, they operate under different principles, and the cost involved is also quite high. This project deals with the designing and fabrication of Floor cleaning Machine by using Bluetooth. The aim of this work is to develop and modernized process for cleaning the wet & dry surface floors. The machine is very simple in construction and easy to operate. It consists of moisture cotton brush; the brush cleans the floor and dried with Fan. Hence it is very useful in houses, colleges, hospitals, auditoriums, malls and workshops. The time taken for cleaning is very less and the cost is also very less. Maintenance cost is less. In this project a very simple drive mechanism is used. The size of the machine is also compact and it is portable, so we can transfer from one place to another place very easily. The floor cleaning machine is simple & modern house holding device, as even children can also operate it easily with safety.

2. Methodology

1. System Architecture

The foundation of the proposed system relies on a modular architecture designed to facilitate remote control and autonomous sensing. The Block Diagram defines the data flow between the central controller—the Arduino

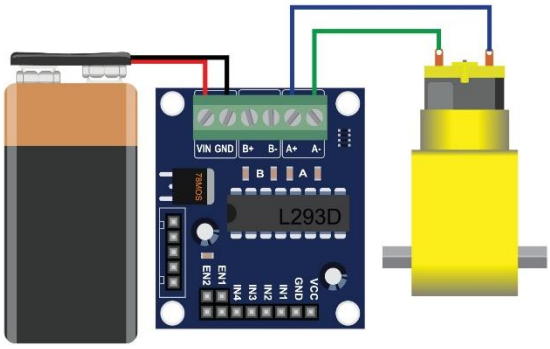


Unoand its peripheral devices. The architecture is built to manage asynchronous user inputs from the HC-05 Bluetooth module alongside real-time environmental data collected via IR sensors.

2. Hardware Interfacing and Integration

The hardware design centered on signal conditioning and power management, enabling high-current actuators to be controlled by a low-voltage microcontroller. The integration methodology included:

- Motor Control: The L293D driver was employed as a dual-channel bridge to manage the bidirectional control and speed regulation of the DC motors.
- Power Management: A dedicated Power Distribution Module was integrated to provide regulated voltage rails for the high-current components (motors, dryer fan) and the low-current digital components (sensors, Bluetooth module).
- Switching Logic: A Channel Relay system was incorporated to isolate high-voltage/high-current peripheral components from the Arduino's logic circuitry, ensuring system stability.



3. Software Development and Control Logic

The software methodology utilized the Arduino IDE environment to translate user requirements into executable machine instructions. The logic development followed a multi-threaded approach:

- Communication Protocol: The system was programmed to parse serial data streams received from the mobile application, ensuring low-latency Bluetooth connectivity.

- Conditional Processing: The control code utilizes interrupt-based programming to prioritize user overrides while maintaining autonomous monitoring via the IR sensors.

- Vibration and Actuator Response: Specific functions were developed to map the relationship between sensor input thresholds and the activation of the vibration motor and dryer fan, ensuring precise response times.

3. Result and Discussions

The experimental validation of the proposed system verifies the smooth integration of Bluetooth-enabled remote control with autonomous sensor-driven functions. Performance testing shows that the Ar-duino Uno sustains a consistent processing loop, accurately reading serial data from the mobile interface with virtually no delay. The Power Distribution Module successfully coordinated the simultaneous operation of the DC motors, vibration motor, and dryer fan, maintaining stable voltage and avoiding data packet loss under heavy load. The IR sensors responded with high precision, activating the correct actuators within milliseconds after detecting proximity. Moreover, the L293D driver and Channel Relay systems performed reliably, delivering the essential isolation and high-current regulation needed for dependable hardware operation. Overall, the system delivered strong operational efficiency, meeting the design goals for remote automation and adaptability to environmental conditions.

4. Conclusion

The finished product is completely functional and performs as expected. It is being tested in a room, which normally yields a positive result. In the event of a power outage, a manually operated floor cleaning machine serves as a practical substitute for automated floor cleaning equipment. The design is simple and easy to construct. Overall, the concept is very useful, and the mechanical components offer considerable flexibility for modification.
They ’ll continue refining until they locate the best possible one. Overall, the project meets its objective and will undoubtedly transform both the robotics and floor cleaning industries. The automation algorithm is designed to reach 90% efficiency, but that level is unrealistic given the current circumstances. Advancements are possible in the field of sensing.

References

[1] V. Kumar, A. Sharma, and R. Singh, "A Low-Cost Arduino-Based Smart Home System," International Journal of Creative Research Thoughts (IJCRT), vol. 13, no. 12, Dec. 2025.

[2] P. S. Warankar and M. Dharmadhikari, "Research paper on Bluetooth based Home Automation using Arduino," International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), vol. 12, no. 6, June 2023.

[3] N. David, A. Chima, A. Ugochukwu, and E. Obinna, "Design of a home automation system using Arduino," International Journal of Scientific & Engineering Research, vol. 6, pp. 795–801, June 2015.

[4] M. T. M. S. Ganesan et al., "Bluetooth and Arduino Uno-Based Voice-Controlled Home Automation System," International Journal of Research and Innovation in Applied Science (IJRIAS), vol. 7, no. 9, Sept. 2022.

[5] Vikramsingh et al., "Design, Modelling and Simulate of DC motor for Robotics to Enhance Speed and Direction," International Journal for Scientific Research, vol. 4, no. 8, Aug. 2025.

[6] T. H. Kaffale and J. Liu, "Speed and Direction Control of DC Motor Using Arduino Uno Microcontroller," Open Access Library Journal, vol. 11, 2025, doi: 10.4236/oalib.1113007.

[7] J. R. Smith and M. Patel, "Wireless Robotic Control Using Arduino and Bluetooth Module," Proceedings of the International Conference on Robotics and Automation, pp. 123–135, 2019.