



Remote controlled floor cleaner machine

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ABSTRACT :

Relying on Bluetooth or WiFi, the Remote Floor Cleaning Machine the usage of Arduino is an automated cleaning answer combining rotating brushes, a vacuum system, and a water pump. Arduino manages movement and cleaning chores, subsequently lowering human attempt and boosting efficiency. It runs off a 12V rechargeable battery using DC motors pushed by way of an L298N motive force module. Ultrasonic sensors' impediment detection guarantees protection.

The portable, light-weight layout works for places of work, houses, malls, and groups. Self-charging, IoT integration, and synthetic intelligence navigation are destiny tendencies. This work offers a clever and moderately priced cleaning answer, consequently underlining the role embedded systems play in automation.

Keywords: Remote controlled floor cleaner , Automated floor cleaning machine ,Wireless floor cleaning device ,Robot vacuum cleaner. :

1. Introduction

Cleaning determines hygiene in houses, workplaces, hospitals, agencies, public areas, and all different environments. Given its inefficiency and trouble, traditional ground cleansing makes automation a logical solution. This mission develops a faraway floor cleansing device primarily based on Arduino combining rotating brushes, a vacuum, and a water dispenser. It scrubs, vacuums, and absorbs dirt controlled by means of Bluetooth or WiFi, so enhancing performance and reducing manual effort. Automated cleaning hurries up cleaning, consistency, and cleanliness. The Arduino microcontroller manages vacuum operation, brush rotation, and motion even as vehicles and sensors ensure smooth strolling. The system suits numerous settings consisting of homes, offices, hospitals, department shops, and businesses and offers a bendy and efficient cleaning answer. Automating cleaning obligations enables this device to beautify convenience, hygiene, and performance. Future updates may add artificial intelligence navigation, obstacle detection, and self-charging, therefore boosting its autonomy. The programme offers a reasonably priced and realistic cleaning tool for clever houses and industrial automation.

2. Need for remote floor cleaner

Floor cleaning is truly vital for cleanliness in homes, offices, hospitals, agencies, public areas, and far off ground cleanser use. Especially in big areas, traditional techniques along with manual sweeping and mopping require great effort and time but may not offer steady and efficient cleaning. As generation advances, automation has turn out to be a sensible method to address these troubles. Among computerized floor cleaning structures, robot vacuums and remote-controlled cleaning machines lower human attempt to ensure consistent and thorough cleansing, consequently enhancing performance. These structures boost up and beautify cleansing supposed to operate with minimum human involvement. The need for automation in cleansing is being driven via the preference for smarter, greater sensible answers that enhance hygiene and reduce attempt. By incorporating advanced technology together with sensors and faraway manage competencies, modern cleansing machines offer a more systematic and efficient technique to ground preservation.

3. System design

By combining mechanical, digital, and software components, the gadget design of the Remote Floor Cleaning Machine the usage of Arduino automates and enhances the floor cleansing technique. Equipping the system are motorised wheels, a vacuum device, rotating brushes, a water dispenser, and all other components operating together to ensure green and complete cleaning. At the center of the system, an Arduino microcontroller controls and coordinates the operations of several components, so guaranteeing clean operation. The rotating brushes efficaciously clean the surface, releasing dust and stains; the vacuum device collects dust and particles to hold cleanliness. A water dispenser sprays a managed amount of water or cleansing solution to help remove tenacious stains, consequently enhancing the overall efficiency of the cleansing system.

Users can run the cleaning device with a telephone or faraway tool for the reason that machine has Bluetooth or WiFi modules to allow far off operation. The motorised wheels provide easy and precise movement over several surfaces controlled through an Arduino-primarily based motor driver circuit. This

layout ensures an automated and methodical cleansing method, consequently lowering human effort in addition to making it a practical alternative for residential and commercial enterprise use.

3.1 Mechanical design

The mechanical structure of the cleaning gadget is made from a chassis, spinning brushes, a vacuum gadget, water dispensers, and motorised wheels. The chassis is the premise; it tightly holds all additives and lets easy movement run under them. Made of sturdy but lightweight fabric, it guarantees balance and enables the cleaning units and motors. To remove stains, dirt, and dirt off the ground, motor-pushed rotating brushes are hooked up at the the front of the gadget. Operating at a managed speed, those brushes make sure effective cleansing and beautify the overall machine overall performance.

3.2 Software design

The software program thing is honestly crucial in controlling the motion of the system, cleansing sports, and faraway communication all managed thru Arduino programming. The Arduino successfully controls the cars, sensors, and communique modules the usage of C/C++ inside the Arduino IDE. A Bluetooth or WiFi-based totally cellular app we could customers run the functions of the system, so permitting far off operation. Commands to the Arduino allow for forward, backwards, left, and right motion in numerous guidelines. The programme additionally helps you to permit spinning brushes, vacuum gadget, and water dispenser. The gadget can also be stopped as soon as the cleansing procedure is finished, therefore making sure easy and consumer-pleasant operation.

3.3 Electronic design

The electronic design of the cleansing machine automates the cleansing process via together with an Arduino-based manipulate system, motor drivers, sensors, and comms modules. The Arduino Uno crucial controller manages all additives relying on person input. Regulating motor motion, the L298N motor driving force controls both the rate and route of the comb and wheel vehicles. Relays hyperlink the vacuum system and water pump, consequently allowing the Arduino to replace them on and rancid as wanted for satisfactory performance. So making sure consistent overall performance, the power supply is a 12V rechargeable battery riding the vehicles, Arduino, and other digital parts.

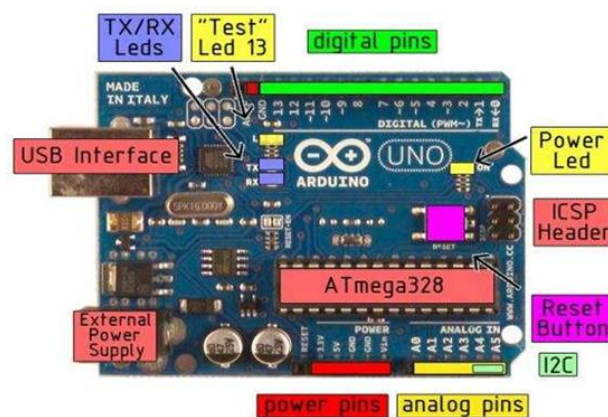


Fig 1. Arduino pin description

4. Working principle

Comprising mechanical, electronic, and software program additives, the Remote Floor Cleaning Machine driven by Arduino is a sophisticated cleansing gadget that automates the floor cleaning manner. Included inside the gadget are rotating brushes, a vacuum machine, and a water dispenser all of which work together to assure efficient and thorough cleaning. These components are controlled remotely the use of Bluetooth or WiFi, therefore allowing users to perform the device easily with out direct physical attempt. The serves, the valuable processing unit handling the diverse cleansing sports and receiving consumer instructions, is the middle of the device. It controls the system motion, brush activation, and vacuum and water meting out machine operation. This automation appreciably reduces the need on manual labour with the aid of making sure a greater green, methodical, and consistent cleansing process than traditional techniques. This gadget offers a smart and consumer-friendly tool for retaining cleanliness in houses, workplaces, hospitals, and business regions and increases cleaning efficiency through modern era.

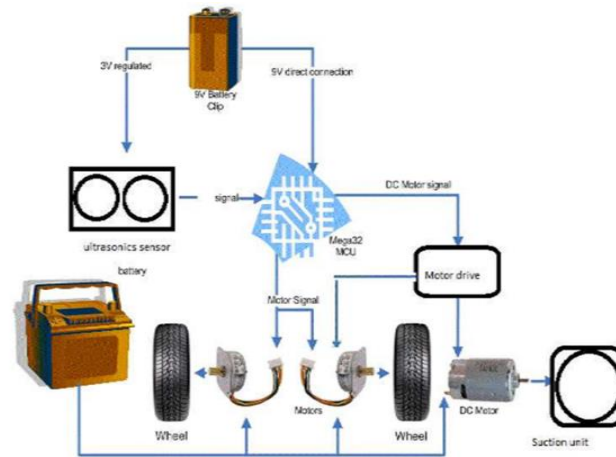


Fig. 2 – Working diagram

5. Circuit diagram and components

The Remote Floor Cleaning Machine creates an automated and green cleansing machine via combining electrical, mechanical, and energy additives the use of Arduino. Among the various required parts within the circuit design are the Arduino microcontroller, motor driving force module, DC vehicles, water pump, vacuum motor, ultrasonic sensors, rechargeable battery, and wireless conversation module. Working collectively, these components make sure easy operation and specific manipulate of the cleaning procedure.

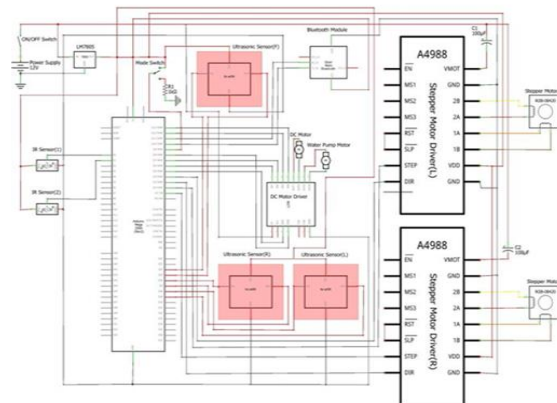


Fig 3- Electrical schematic diagram

The Arduino microcontroller is the gadget's mind, processing user requests and controlling diverse additives. The motor driver module (L298N) controls the velocity and course of the DC cars, which power each the motion of the gadget and the rotation of the cleansing brushes. The vacuum motor collects dust and debris successfully; the water pump distributes a measured amount of liquid for progressed stain elimination. Ultrasonic sensors permit secure navigation and help to save you collisions by way of obstacle identity.

A rechargeable 12V battery powers the whole gadget, continuously energising every mechanical and digital element. A Bluetooth or WiFi conversation module additionally allows customers to run the cleansing machine remotely the usage of a cellphone or other faraway tool. Carefully designed to ensure suitable energy distribution, easy sign processing, and automation, the circuit renders the device dependable and efficient for plenty cleaning programs.

6. Limitation

The Remote Floor Cleaning Machine using Arduino provides automated cleaning but has limitations affecting its performance. Battery life is a key issue, as the 12V rechargeable battery powers multiple components, requiring frequent recharging. Without an automatic charging system, users must manually recharge, making it less convenient for large areas.

Cleaning inefficiencies occur in corners and edges, as the rotating brushes and vacuum system are less effective in tight spaces. Without specialized brushes or flexible nozzles, dirt may accumulate in hard-to-reach areas, requiring manual cleaning. Obstacle detection also poses challenges—ultrasonic sensors may struggle with transparent objects like glass or thin wires, leading to potential collisions. Advanced LiDAR or AI-based navigation could enhance detection but would increase costs.

The water control system may not evenly distribute water, leading to excess use or insufficient moisture for effective cleaning. Additionally, the absence of a drying mechanism can leave floors slightly wet, which is problematic for surfaces like wood. The dust and wastewater capacity is also limited, requiring frequent emptying of the collection tank, reducing efficiency in large areas.

Lastly, manual control is required since the system is semi-automatic, operated via remote or a mobile app. AI-based path planning and self-navigation could improve autonomy but would increase hardware complexity. Future enhancements, including better sensors, longer battery life, improved water distribution, and AI integration, could make the system more efficient and user-friendly.

6. Applications

The Remote Floor Cleaning Machine using Arduino offers automated cleaning for residential, commercial, and industrial spaces. Equipped with *rotating brushes, a vacuum system, and water dispensing*, it efficiently maintains cleanliness in various environments.

In *homes and apartments*, it automates daily cleaning, benefiting busy individuals, the elderly, and those with mobility issues. The *remote-control* feature allows effortless operation, reducing manual effort. In *offices and commercial spaces*, it ensures dust-free environments, improving hygiene in high-traffic areas like conference rooms and waiting areas.

Hospitals and healthcare facilities benefit from its dust and allergen removal capabilities, helping maintain sterile conditions. It can be modified to *spray disinfectants*, enhancing sanitation. *Shopping malls, supermarkets, and retail stores* use it to keep floors spotless without constant manual cleaning.

Schools, colleges, and universities automate classroom and hallway cleaning, reducing janitorial workload while maintaining hygiene. *Industrial warehouses and factories* can adapt the system with stronger brushes and vacuum motors to handle dust and debris efficiently.

Overall, the *Remote Floor Cleaning Machine* is a *versatile and user-friendly* solution for maintaining hygiene in *homes, offices, hospitals, malls, schools, and industries*, minimizing manual effort while ensuring clean spaces.

7. Future scope

The *Remote Floor Cleaning Machine using Arduino* has vast potential for future enhancements, improving efficiency, autonomy, and user experience. Integrating *AI, IoT, and advanced sensors* can make it more intelligent and self-sufficient, reducing manual control.

A key improvement is *AI-based navigation and path planning*. Currently, manual control is required, but with *machine learning and computer vision*, the system could map surroundings, detect dirt, and clean autonomously. *LiDAR sensors and smart cameras* would enhance obstacle detection and decision-making.

Self-charging and docking would eliminate manual battery recharging, allowing the machine to return to a *charging station* when power is low, ensuring continuous operation in large areas like malls and airports. *IoT integration* would enable users to control the machine via a *smartphone app*, schedule cleaning, and receive real-time updates on battery status and maintenance.

Cleaning performance could be enhanced with *adjustable brush pressure, water flow sensors, and drying mechanisms*, adapting to different surfaces. *HEPA filters* could improve dust collection, making the system ideal for hospitals and allergy-prone areas. *Voice assistant compatibility with Alexa, Google Assistant, or Siri* would allow hands-free control, increasing accessibility for elderly or disabled users.

Future adaptations for *outdoor cleaning* with stronger motors, wheels, and waterproofing could expand its use to *sidewalks, parking lots, and industrial spaces*. Overall, advancements in *AI, IoT, automation, and cleaning efficiency* would transform this system into a *fully autonomous and intelligent cleaning solution* for homes and commercial spaces.

8. Conclusion

The *Remote Floor Cleaning Machine using Arduino* advances automation in household and industrial cleaning. By combining *rotating brushes, a vacuum system, and water spraying*, it efficiently cleans floors with minimal manual effort. *Arduino* controls the system, enabling *remote operation* and potential future upgrades. This project highlights how *automation and embedded systems* improve daily tasks, reducing labor while enhancing efficiency. It is useful in *homes, offices, hospitals, schools, and malls*, where regular cleaning is crucial. *Ultrasonic sensors* aid obstacle detection, and *motor drivers* ensure smooth movement, preventing collisions. However, limitations exist, including *manual recharging, incomplete edge cleaning, and obstacle detection constraints*. Future advancements like *AI-based navigation, self-charging, IoT integration, stronger suction, and adaptive cleaning* could transform it into a *fully autonomous smart cleaning system*.

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