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CLEAN SWEEP: The Floor Cleaning Robot

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***Abstract*: Modern household are getting increasingly automated and intelligent. We implemented a human-friendly cleaning robot system for the domestic ubiquitous environment. Though conventional automatic cleaning robots already exist, these robots do not work in sync with humans. In our system, a robot can identify where humans a reactive by receiving the usage status of home appliances via a network. The usage status of home appliances changes the robot's running pattern and consequently the robot avoids humans and cleans without causing obstruction. Through the manual modes, autonomous and phone application are available to control the device. The final goal of this project is to make and put into an action a vacuum robot with two cleaning modes: manual and autonomous, the latter of which may be accessed via a phone application.**

***Keywords:* Semi-automated, Floor cleaning machine, Dry and Wet cleaning, Reduction in cost and efforts, Electricity, Simple Fabrication.**

I. INTRODUCTION

Robots are intelligent devices that manage their own neural networks using laptop principles, so they can perform task in accordance with calculation. Robots have a significant role in every aspect of life. It is employed by families and foundations. The design includes manual operation via remote control and a self-drive mode which allowed the machine to clean autonomously without human control. Some design use spinning brushes to reach tight corners, and some include a number of cleaning features along with the clean sweeping feature. It simultaneously executes sweeping and scouring jobs, detects obstacles, and also includes an automated water spray.

II. OBJECTIVE

1. Wi-Fi accessibility.
2. Establish a cleaning schedule.
3. To reduce human effort.
4. Remove stain and dirt.
5. To prevent injuries due to tripping or slipping.

III. LITERATURE SURVEY

Present the design, development and fabrication of prototype Clean Sweep Floor Cleaning Robot. This robot operates in manual mode as well as autonomous mode with additional features like scheduling for specific auto-dirt disposal mechanism. This robot is specially made on the basis of modern technology. Clean Sweep has many competitors who are selling same product with high price.

- SAHIL BHARTI, S.R. SANDHAVE(2016)

"To develop and automated cleaning assistance this help in cleaning the flat surface with the ease of remote control with greater efficiency at work. The surface cleaning machine that is proposed in this project is the device that helps in cleaning of surface. There are many functions that have to co-ordinate for the motion control".

- Dr. J. HAMEED HUSSAIN(2017)

"This module of automatic floor cleaning machine by Arduino-UNO (micro controller) is run to clean the floor and sweeps the dust away. In this the module has gear motor is attached at front axis in between the front wheels, this motor is attached with a cleaning mops at front, and the gear motor is connected to 12volts battery and the machine is attached with 12volts battery. The machine is controlled by the Arduino-UNO".

- S. ISLAM(2018)

"Fuzzy logic is used to navigate and clean floors. This paper presents a simulation based evaluation of a floor cleaning robot's performance. The robot is designed to adapt to changing environments and floor types, and uses a combination of sensors and algorithms to clean floor efficiently".

- M. IQBAL and S.S. GAJBHIYE(2020)

"This paper presents the development of a self-contained floor cleaning robot that can clean floors without requiring human intervention. The robot uses a combination of sensors, actuators and a microcontroller (Arduino-UNO) to navigate and clean the floors most efficiently".

- P. KIRUTHIKA and S.P. ARUN PRASAD(2021)

"This paper presents a navigation and control system for an autonomous floor cleaning robot. The robot uses a combination of sensors and algorithm to map an clean floor efficiently, while avoiding obstacles and navigating around furniture".

III. PROPOSED WORK

Clean-Sweep Cleaner Robot is designed to make cleaning process become easier rather than by using manual Clean-Sweep. The main purpose of this project is to design and implement a Clean-Sweep robot prototype by using Arduino-UNO, Ultrasonic sensor, Motor driver board L298N, Servo motor are used to achieve the goal of this project. Clean-Sweep Robot will have several criteria that are user-friendly.

A. Module 1- Ultrasonic sensor mode

This economical sensor provides2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach upto 3mm. It can detect the obstacles or walls and automatically turn form there or start beeping.

B. Module 2- Buzzer mode

It will produce a beep sound on sensing the obstacles and if the way is clear then it won't produce any sound.

C. Module 3- Bluetooth module

It has red LED which indicates connection status, whether the Bluetooth is connected or not. Before connecting to bluetooth module this red LED blinks continuously in a periodic manner. When it gets connected to any other Bluetooth device, its blinking slows down to two seconds.

IV. WORKING

An automatic floor cleaning robot typically operates using a combination of sensors, software and mechanical components. It is a Smartphone controlled robot that cleans your house's floor! The rotating mops on the front of the robot along with a foam roller (used to paint walls, not here) at the back can do the job perfectly. There is also a water pump and water reservoir which can be switched on when required to throw water on the floor and make the mops moist for a proper clean. The foam roller is movable, which means you can lift it when not in use. I've also added speed controls for the driver motors. The project uses Bluetooth communication via an HC-05 Bluetooth module to send the commands to the most commonly used microcontroller- Arduino UNO. The robot is powered on a 12V lead acid battery, the ideal voltage for all motors used here. The driver motor pair are 100rpm ones while for the mops I've used 75rpm plastic ones. The best part is that the mops used were homemade, from old CDs and rags and they clean just perfectly. This is a smaller version so might not be suitable for a large area. There can be tons of other features added, like making it completely autonomous. The working of robot consists of:

1. Navigation: The robot uses sensors such as Relay sensor, ultrasonic sensors to detect obstacles and navigate around them.

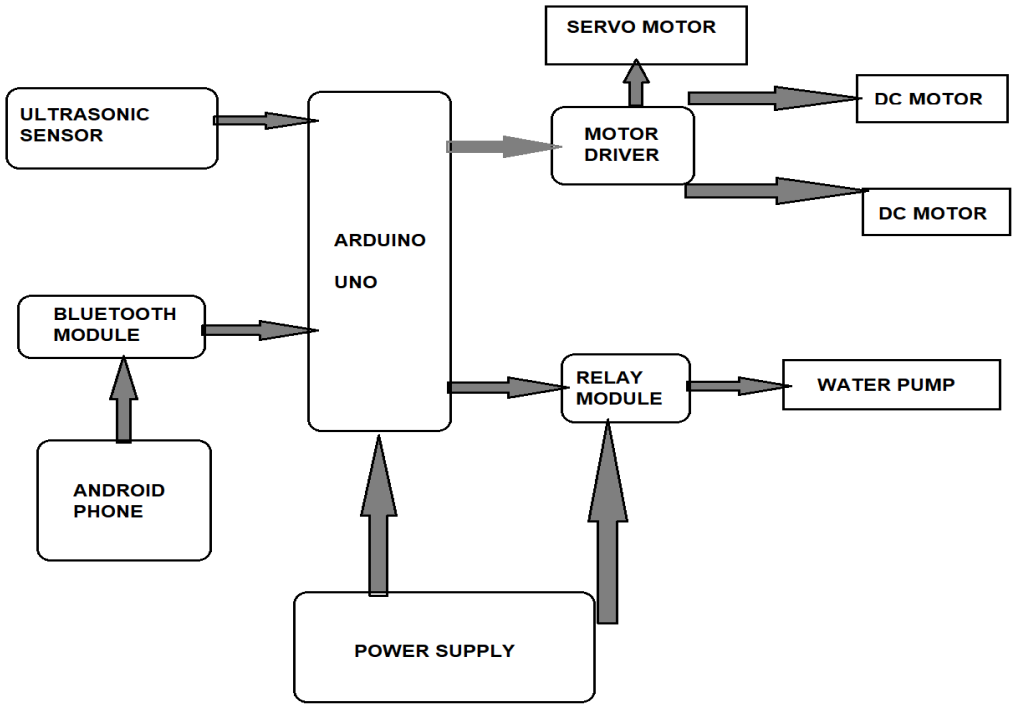
2. Cleaning: The robot typically uses a combination of brushes, suction, and sometimes mopping to clean the floor. Some robots may also use UV light or other technologies to disinfect the floor.

3. Power: The robot is powered by a battery that is typically rechargeable. Some robots may have docking stations where they can automatically return to recharge.

4. Control: The robot is controlled by software that determines how it should move and clean based on input from the sensors. Some robots may have different cleaning modes and schedules that can be set by the user.

5. Maintenance: The robot may have sensors that detect when it needs maintenance or cleaning, such as emptying the dustbin or replacing the mops.

V. BLOCK DIAGRAM



VI. CONCLUSION

This project describes about the robotic floor cleaning device that can perform sweeping and mopping operations. The robot has two modes of operation: automatic and manual, and can detect obstacles to avoid them while cleaning. It also has an automatic water sprayer for mopping and can be controlled using a smartphone. The robot is designed to save time and reduce labor costs while providing efficient cleaning. Although the current system is functional, there is still room for improvement and the addition of new functionality. Small steps in technological advancement like this will have higher impact in long run in future, making India an innovative country.

VII. FUTURE ENHANCEMENT

There are several potential future enhancements that could be made to automatic floor cleaning robots:

- Improved navigation: While current models use sensors and mapping technology to navigate a space, there is still room for improvement. Future models could incorporate advanced machine learning algorithms that allow robots to quickly adapt to changes in their environment and avoid obstacles more effectively.
- Better battery life: One of the biggest limitations of current cleaning robots is their battery life. Future models could incorporate longer-lasting batteries or even be designed to recharge themselves automatically when they detect low power levels.
- Multi-functional cleaning capabilities: Currently, most cleaning robots are only capable of vacuuming or mopping floors. Future models could be designed to perform additional tasks such as window cleaning or dusting.
- Voice recognition and control: As voice recognition technology continues to improve, cleaning robots could be designed to respond to voice commands. This would allow users to control the robot using natural language and make it easier to operate.
- Integration with smart home systems: Many households already have smart home systems in place, and future cleaning robots could be designed to integrate seamlessly with these systems. This would allow users

to control their cleaning robot from their phone or other smart devices.

Overall, the future of automatic floor cleaning robots is exciting, and we can expect to see many new innovations in the coming years that will make these robots even more useful and efficient.

VIII. REFERENCES

1. D. F. Liao and T. F. Wu, "Navigation and control of a mobile cleaning robot using a laser scanner and vision," Journal of Intelligent and Robotic Systems, vol. 65, no. 1-4, pp. 423-437, 2012.

2. J. A. Al-Kaff and M. A. Al-Jarrah, "Autonomous robot for cleaning floors using fuzzy logic and artificial vision," International Journal of Robotics and Automation, vol. 29, no. 2, pp. 144-154, 2014.

3. Ajaykumar,Madhura, Mahamunkar, Rose Merlin Jose Sahima Khan "Automated Operating Room Cleaning Robot". International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering. Vol-5, Issue 04,April 2016.

4. C. D. Díaz-García, J. M. Gómez-Berbís, and A. García-Sánchez, "A review of perception and decision-making in mobile service robots for cleaning tasks," Robotics and Autonomous Systems, vol. 113, pp. 1-17, 2019.

5. Mukherjee, R. K. Gupta, and R. K. Singh, "Development of an autonomous floor cleaning robot using fuzzy logic controller," Journal of Intelligent and Fuzzy Systems, vol. 38, no. 6, pp. 7041-7051, 2020.

6. V. C. Cunha, R. M. G. Figueiredo, and P. J. Costa Branco, "A comparative study of robotic vacuum cleaners," Robotics and Autonomous Systems, vol. 127, 2020.