International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 03 | March - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

# SweepTech-The Multifunctional Floor Cleaning Robot with Live Streaming

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## Abstract

In an era of technological innovation and smart living, the need for efficient and intelligent solutions to everyday challenges is paramount. "SweepTech," the Floor Cleaning Robot, emerges as a pioneering response to the ever-present demand for effective and convenient floor maintenance. Leveraging advanced technology and a blend of innovative components, this robot revolutionizes the way we approach floor cleaning tasks.

At its core, SweepTech is powered by the ESP8266 and ESP32 controllers, integrating the Internet of Things (IoT) to offer remote control and real-time monitoring via the Blynk platform. This connectivity not only provides ease of operation but also enhances user experience and control over the cleaning process

**KEYWORDS:** Vacuum, Moping, Water Pumping, Dryer, Live Stream.

## 1. INTRODUCTION:

In the pursuit of creating smarter and more efficient solutions for everyday tasks, technology continues to redefine the way we live and work. The "SweepTech" Floor Cleaning Robot, with its combination of cutting-edge components and advanced controls, stands at the forefront of this technological evolution. This innovative robot offers a revolutionary approach to floor maintenance, simplifying the often tedious and time-consuming task of keeping floors clean. SweepTech is not just another cleaning device, it represents a leap forward in smart cleaning technology. At its heart, it is powered by the ESP8266 and ESP32 controllers, connecting it to the Internet of Things (IoT) and enabling remote control and real-time monitoring through the Blynk platform. This connectivity not only ensures convenient operation but also offers users unprecedented control and insight into their cleaning routines.

## 2.Working of Sweep tech cleaning Robot:

The user initiates the robot by connecting to the system through the Blynk application on their smartphone or computer.

The user sends commands through the Blynk app to start, stop, or adjust the cleaning process.

Once activated, SweepTech uses sensors, algorithms, and navigation systems to move across the floor.

The vacuum pump is activated to collect dust, dirt, and debris from the floor.

If wet cleaning is required, the water pump sprays a fine mist of water or a cleaning solution onto the floor.

The mopping motor engages, and mop or cleaning pads come into contact with the floor.

After cleaning or mopping, the dryer fan may be activated to dry the floor quickly.

The integrated ESP32 Cam provides live video streaming during the cleaning process.

**3.Research Method:**

The creation of a floor cleaning robot employing the research and development (R&D) approach, as delineated by Pressman, involves distinct phases: analysis, design, implementation, and testing. In the analysis phase, the focus lies on identifying and gathering pertinent data regarding the requisite functionalities for the system.

User needs analysis entails discerning the requirements essential for users, such as the integration of features akin to a vacuum cleaner or motor polish components into the robot system under development. Concurrently, data analysis entails scrutinizing the data to be processed, whether as input or output.

Additionally, a thorough examination of the technology to be employed in the system's design is conducted in the technology analysis phase. This encompasses evaluating various technologies to determine their suitability for integration into the system.

**3. Hardware:**

ESP8266 (Wi-Fi connectivity and communication with the Blynk platform for remote control)

Wheels or Tracks (Use wheels or tracks for locomotion)

Vacuum Pump (Creates suction to collect dust, dirt, and debris)

Water Pump (Responsible for precise water spraying)

Mopping Motor (Drives mop or cleaning pads for effective cleaning)

Dryer Fan (expedites the drying process after mopping, ensuring that the cleaned area dries quickly)

Camera (ESP32 Cam provides real-time video streaming)

Power Source (Lead-Acid Battery)

User Interface (Blynk App)

Housing and Chassis (Housing and chassis are constructed from durable and lightweight materials)

Controls and Navigation System (Algorithms are used for controlling the robot's movements & Navigation algorithms ensure the robot covers the entire cleaning area efficiently).

**4.Result and Discussion:**

The analysis outcomes for the floor cleaning robot system development encompass several crucial aspects:

- The robot must exhibit omnidirectional maneuverability to effectively navigate through rooms of diverse shapes and sizes.
- Integral components of the robot system include both polishing machines and vacuum cleaners to ensure comprehensive cleaning capabilities.
- Optimal performance of the robot motor necessitates operation at a 12V DC voltage level.
- To sustain uninterrupted operation, the robot requires a power source comprising a battery with a minimum voltage rating of 12V and a capacity of 20Ah.

The hardware and software architecture crafted for the floor cleaning robot encompasses intricate designs for the placement and integration of key components. This includes meticulous positioning of the drive wheel, vacuum cleaner motor, and floor polish mechanism to optimize functionality and efficiency.

The propulsion system of the robot incorporates three motors arranged in a triangular configuration to drive its wheels. These motors are strategically positioned at the vertices of the triangle to manipulate the angles of the omniwheel, facilitating ease of movement. The arrangement of the motors is depicted in Figure 1, showcasing the meticulous design considerations for optimal functionality and maneuverability of the robot.

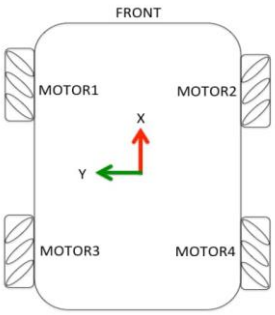



**Figure 1.** The design of robot's wheels placement

The findings regarding the wheel design placement serve as a guiding framework for positioning the vacuum cleaner and motor polish within the robot structure. Specifically, both the vacuum motor and the polishing motor are strategically situated at the rear or base of the triangular configuration, corresponding to the placement of the wheels.

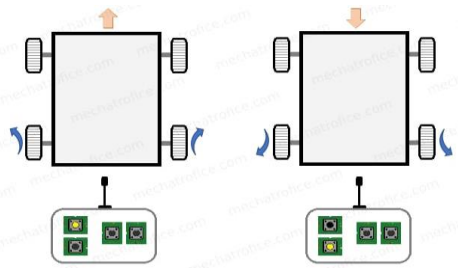


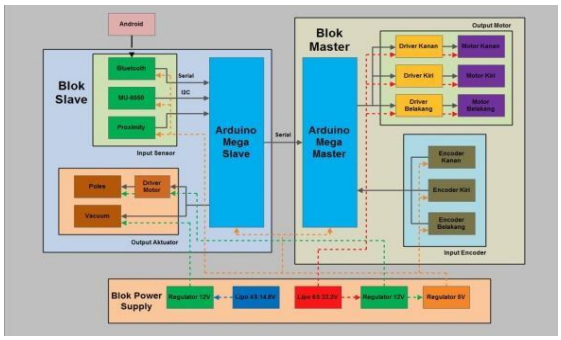
**Figure 2.** The design of the motors and polishes

The hardware placement such as the ESP microcontroller circuit, motor driver, LCD, and power supply are designed so that together the Bluetooth receiver is divided into two sub-systems. The first system is the master block which consists of Node-Mcu control, rotary encoder input and wheel motor. While the second sub-system is a slave block consisting of ESP control, sensors, Bluetooth communication, motor polish and vacuum cleaner. The component placement scheme design can be seen in Figure 3.

**Figure 3.** Design series robotic system

Based on the design findings, the layout for the placement of wheel drive motors, vacuum cleaner, and polisher motor during implementation is depicted in Figure 4. This schematic delineates the precise positioning of each component within the floor cleaning robot, ensuring efficient functionality and optimal performance.

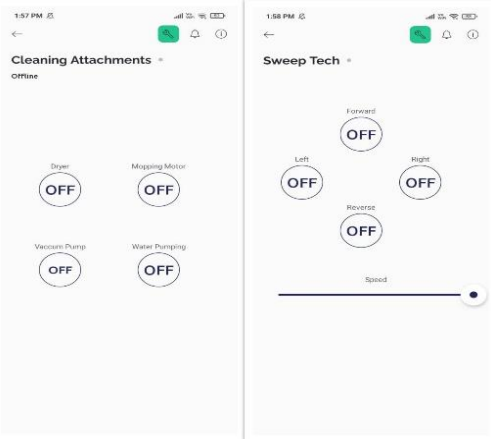
**Figure 4.** Display layout robot motors




The execution of the robot motion control application design involves the utilization of an Android-based application tailored to specific requirements. Two essential system condition settings are imperative for the proper functionality of the application. The initial configuration entails the determination of the dimensions, encompassing both length and area, of the designated cleaning area. Subsequently, the second setting involves defining the interface elements, including buttons, to facilitate directional movement control and activation of vacuuming and polishing functionalities.The manifestation of

the developed Android application's user interface is depicted in Figure 5.

**Figure 5.** Display Android app




## 5.CONCLUSION

The floor cleaning robot is structured with a hardware framework comprising a set of robot control and mechanical components, supplemented by an Android application software serving as the robot motion controller. The hardware component of the robot control is subdivided into two distinct subsystems: master and slave. Each subsystem integrates a Node-MCU control component, sensors for input data acquisition, and motor drivers for controlling the robot's movements and functionalities.

## ACKNOWLEDGMENT

We want to thank Mr. U. S. Shirshetti Sir and Ms. S. U. Kavale Mam who coordinated the project. His guidance and combined efforts in preparing and presenting this paper has brought a good result. We also sincerely thanks to all other faculty members of Information Technology Department and our well-wishers for their support and encouragement received by us.

## REFERENCES

[1] IEEE Paper Of Smart Cleaning Robot.
[2] Anonymous, Built-in Examples, Arduino.cc, 2017
[3] Hari Santoso, Arduino Practical Guide for Beginners, www.elangsakti.com, 2015
[4] Hari Santoso, Monster ESP www.elangsakti.com, 2017
[5] John, Ajay P, Implementation of an Automated Smart Robotic Floor Cleaner, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 6.