IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 8.414 ⁜ Peer-reviewed & Refereed journal ⁜ Vol. 13, Issue 11, November 2025

DOI: 10.17148/IJIREEICE.2025.131137

SMART FLOOR CLEANING ROBOT BY IoT

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Abstract: The floor cleaning robot aims to create an autonomous robot that can clean floors without human intervention. Households of today are becoming smarter and more automated cleaning of floor is very important role in our health and this robot reduces man power requirement. This project is used for domestic purpose to clean the surface automatically. Cleaning the dust from the floor is one of the daily tasks that must be completed. This is a common practice not only at home, but also at companies and shopping malls. Due to the fact that dust cleaning operations take a long time, other activities are sometimes disregarded. To eradicate this problem, we came up with this project based on cleaning mechanism, our robot can reach out to places where human access is not possible. Taking the advantage of advancements achieved in mechanical technology innovation have made human life much easier and more pleasant.

Keywords: Smart Cleaning Robot, IoT-based Floor Cleaner, Home Automation, Smart Home Robotics, IoT for Domestic Automation.

1.INTODUCTION

We know the importance of cleanliness. Cleanliness is not only means the cleaning of everything but also means the maintaining of the green and comfortable environment. What is the importance of cleanliness se have come to learn this from the time of Covid-19 has started. At that time the who always made us aware of the significance of cleanliness. At that time, we became busy cleaning our everything's more and more time, Floor cleaning was included in that cleaning process.

At the Covid-19 time we know that minimum one or two members became affected to covid, so the cleaning of room's floor was not possible perfectly. Our floor cleaning robot could help them to do the work perfectly. By putting this in our brain we have designed this robot. This Robot is totally dedicated to the people who can't clean their place perfectly for many valid reasons. Cleanliness of course is not only in one place, but also the cleanliness of the school, where we study and so on. The Job of a cleaner is seemed to be very easy. Here a lot of energy is wasted. If we provide a low-cost cleaning robot to every commercial place it will help the institute to be cleaned without the help of cleaner. Therefore, researchers are innovating to make simple tools that will help the cleaners to tom clean floors simply. To make these types of cleaning robot we are using Arduino as a microcontroller, The De motors are being used as driving force. This electronics device is computable for our project. Our automatic floor cleaning robot will reduce much time.

It will work vacuuming and moping at a same time. The popularity of service robots operating partially or fully autonomously to perform services that contribute to the health of people and equipment has increased in recent times, by Raveena. We using a "Node MCU" controller for remote controlling. To detect the obstacles, are using ultrasonic sensor. This will give us the data of ultrasonic and gives us data of how much area is being cleaned by it.

2. PROPOSED SYSTEM

The model was designed with the Arduino uno and 293D motor shield. We have attached the motor shield with Arduino and connected the four motors with the motor shield. The system will work in different layers. The first layer is the running of robot wheels and the second is detecting the obstacle. The cleaning mop and the vacuum will work, simultaneously with the cat.

The proposed system is fully depending on the Arduino uno board. The system will run over an obstacle detecting car. We are placing our vacuum and cleaning mop over it. Our system is also connected with a Node MCU. This product will connect with ultrasonic sensor. This will give us the data of ultrasonic. This data will be stored in the cloud. We are supposed to use thing speak website for the data collection. Dur robot will run over the entire floor and clean the floor and gives us the data of ultrasonic when the sensor will find any obstacle.

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3. EXISTING SYSTEM

The existing system of floor cleaning robots primarily consists of autonomous vacuum cleaners that operate using basic sensor technology and pre-programmed movement patterns. These robots typically rely on infrared or ultrasonic sensors to detect obstacles and avoid collisions, but their navigation is often random or based on simple wallfollowing algorithms, which can lead to inefficient cleaning coverage. Most models lack advanced connectivity features and do not support real-time monitoring or remote control. While some newer versions offer limited Wi-Fi or Bluetooth functionality, their interaction is restricted to basic commands like start, stop, or scheduling via mobile apps. Additionally, these systems do not provide feedback on cleaning performance, battery status, or environmental conditions.

4. LITERATURE SURVEY

[1]. B. Sonia and P. Ganesh (2021)

- Title: Design and Implementation of Floor Cleaning Robot Using IoT
- Key Points: Dual wet and dry cleaning, controlled via Blynk app; uses NodeMCU and vacuum compressors; video streaming and IoT- enabled manual control.

[2]. S Monika, K Aruna, S V S Prasad, B Naresh (2019)

- Title: Design and Implementation o f Smart Floor Cleaning Robot Using Android App (IJITEE)
- Key Points: Robot operates via mobile application; autonomous and manual modes; L298N motor drive r and ultrasonic sensor integration.

[3]. Manya Jain, Pankaj Singh Rawat, Jyoti Morbale (2017)

- Title: Automatic Floor Cleaner (IR JET)
- Key Points: Introduced automatic floor cleaning with both sweeping and mopping functionalities; Arduin o-based control system.

[4]. Manreet Kaur and Preeti Abrol (2 014)

- Title: Design and Development of Floor Cleaner Robot (Automatic and Manual) (International Journal of Computer Applications)
- Key Points: Semi-automatic robot with obstacle avoidance and wet cleaning; autonomous/manual operation; IR sensors for obstacle detection.

5.INTERNET OF THINGS

IoT, or the Internet of Things, refers to a network of interconnected physical devices, vehicles, appliances, and other objects embedded with sensors, actuators, software, and connectivity capabilities that enable them to collect, exchange, and act on data. The fundamental idea behind IoT is to create a vast ecosystem where everyday objects can communicate with each other, share information, and make intelligent decisions without human intervention.

The Internet of Things (IoT) refers to the interconnection of everyday objects, devices, machines to the internet, allowing them to collect, exchange, and share data. This interconnected network enables devices to communicate and collaborate seamlessly, leading to increased efficiency, automation, and convenience in various industries and sectors. IoT devices can include everything from household appliances like smart thermostats and refrigerators to industrial machinery, vehicles, and wearable devices. These devices are equipped with sensors, actuators, and software that enable them to gather and transmit data, often in real-time. This data can then be analyzed and used to make informed decisions, improve processes, and enhance user experiences.

The IoT has numerous applications, such as smart cities, where sensors monitor traffic, energy usage, and waste management to improve urban planning and sustainability. In healthcare, IoT devices can track patient's vital signs remotely and alert healthcare providers of any abnormalities. In agriculture, sensors can monitor soil conditions and weather patterns to optimize crop yield and reduce water usage. Despite its many benefits, the IoT also raises concerns about privacy, security, and data breaches, as the sheer number of connected devices increases the potential attack surface for hackers. As the IoT continues to evolve, it has the potential to revolutionize how we interact with technology and the world around.

6. ANALYSIS & DESIGN

Methodology for an IoT based surveillance robot:

1.Connectivity: The robot is equipped with communication modules, such as Wi- Fi or cellular connectivity, allowing it to establish a connection to the internet. This connectivity enables seamless communication between the robot and the control system.

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2.Sensors: The robot is equipped with a sensor to capture and collect data about its environment. The data collected by the sensor is crucial for surveillance purposes.

3.Data Acquisition: The sensor on the robot continuously gather data from the environment. For example, the camera captures live video feeds. All this data is processed and transmitted to the control system.

4. **Data Transmission:** The collected data is transmitted from the robot to the control system through the internet connection. This transmission can occur in real-time, ensuring that the control system receives up-to date information about the robot's surroundings.
5. **Control System:** The control system serves as the central hub for monitoring and controlling the surveillance robot. It can be accessed through a smartphone, computer, or any other device with internet connectivity. The control system provides a user interface where users can view the live video feed from the robot's cameras and control its movements.
6. **Remote Control:** Users can remotely control the surveillance robot through the control system. They can command the robot to move in different directions. This remote-control capability allows users to navigate the robot to specific areas of interest and gather more detailed surveillance information.
7. **Data Analysis and Storage:** The control system can analyse and process the collected data from the robot's sensor. The processed data can be stored for future reference or used to trigger alerts or notifications based on predefined criteria.
8. **User Interaction:** Users can interact with the control system to receive real-time updates, set surveillance schedules, configure alert.

7. SOFTWARE USED

Arduino is a prototype platform based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed and a ready-made software called Arduino IDE, which issued to write and upload the computer code to the physical board.

Key Features:

- Arduino boards are able to read analog or digital input signals from different Sensors and turn it into an output such as activating a motor, turning LEDon/off, connect to the cloud and many other actions.
- It can control the board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE.
- Most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the microcontroller into a more accessible package.

After learning about the main parts of the Arduino UNO board, we are ready to learn how to set up the Arduino IDE. Once we learn this, we will be ready to upload our program on the Arduino board.

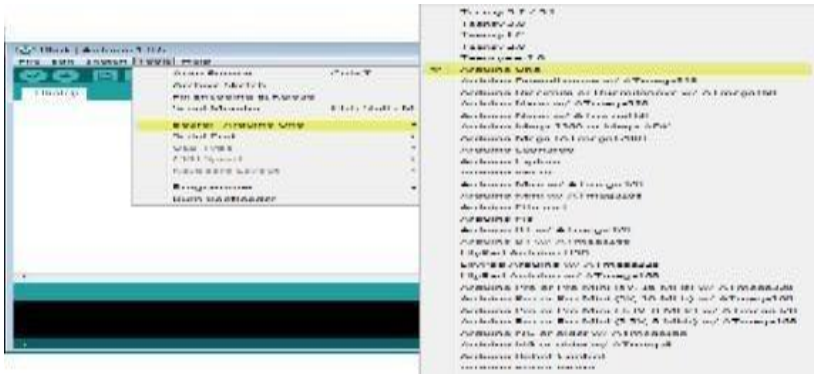

Fig 1: Arduino software

8. RESULTS

In an IoT-based robot, such an LCD display could be used to show navigation status, direction, to operators monitoring the robot remotely. The display can enhance user interaction by providing real-time feedback on robot movements or status in a simple way.

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Fig 2: Moves FRONT

The word “FRONT” implies the robot is indicating a direction of movement in forward path.

Fig 3: Moves RIGHT

The word “RIGHT” implies the robot is indicating a direction of movement in Right Path.

Fig 4: Moves LEFT

The word “LEFT” implies the robot is indicating a direction of movement in Left path.

Fig 5: Moves STOP

The word “STOP” indicates that the movement of the robot will be stopped/it can’t move.
It is a Bluetooth RC Controller app has a directional arrows and other controls, likely for controlling a remote device via Bluetooth.
It is the live streaming of the surroundings through the camera of the robot.

9. CONCLUSION

In conclusion, the Smart Floor Cleaning Robot based on loT revolutionizes cleaning tasks by increasing efficiency, improving accuracy, and enhancing convenience. With its advanced sensors and navigation systems, it optimizes cleaning paths and schedules, reducing Costs and energy consumption. The robot's remote monitoring and control capabilities, scheduling, and notifications make it a valuable asset for smart homes, offices, and cities. Smart Floor Cleaning Robot is poised to transform the cleaning industry, freeing up time for more productive tasks and . As a cost effective and environmentally friendly solution, the paving the way for more automated future.

10. FUTURE SCOPE

We will implement in this floor cleaning robot to add vacuum cleaner that pump the dirt and it store easily and also Battery monitoring, self-charging. lighter body weight and to set alarm on/off time manually are the future scope of this project. In today's era, 95 percent of the cost of cleaning a floor is done by labor, the high cost of this simple task has inspired alternative solutions. We think Floor cleaning Robot will be one of them.

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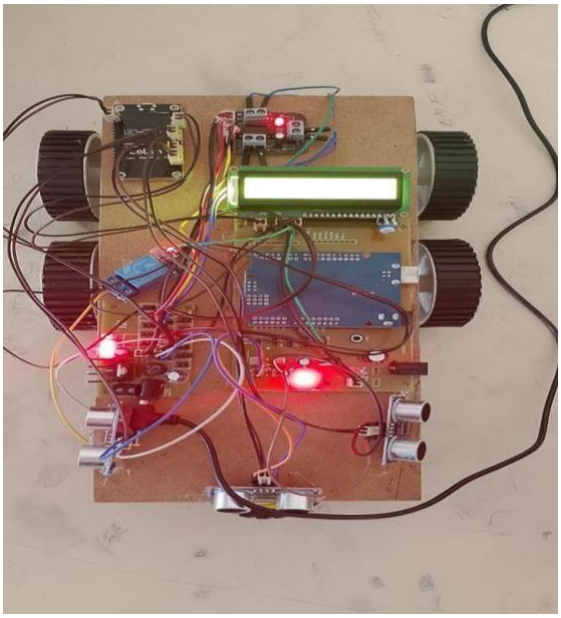

Fig 6: Smart Floor Cleaning Robot System

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