



# Design of Multitasking Robot

<sup>1</sup>Dhruv Kumar Jha, <sup>2</sup>Manish Kumar, <sup>3</sup>Rahul Nandan, <sup>4</sup>Sunil Kumar, <sup>5</sup>Dhananjay Singh

<sup>1,2,3,4</sup>Student, <sup>5</sup>Assistant Professor

<sup>1</sup>Department of Electronics and Communication,

<sup>1</sup>Noida Institute of Engineering and Technology, Greater Noida, India

**Abstract:** This paper explains the design of a four wheeled multitasking robot using widely available materials. A robot has been developed with the ability to perform various tasks, employing principles and advanced technology of Arduino and Wi-Fi Module. The robot is constructed to traverse or travel over Wi-Fi and voice commands given over the android app and processed by the Wi-Fi module. The robot is equipped with a storage unit which can be opened and locked using radio frequency identification scanning chip and reader. The next task is to identify the temperature and humidity in the surroundings using temperature sensors and arranging the head of the robot with a surveillance camera that can be utilized as a security measure in different fields.

**IndexTerms** – Arduino Uno, DHT11 Sensor, Node Mcu Wi-Fi Module, RFID, Robotics.

## INTRODUCTION

Throughout history, we have observed that human beings possessed the intellect and ingenuity to create inventions and technologies in accordance with their necessities and desires, dating back to ancient times. Whether it was crafting tools from stone for hunting or utilizing it to ignite fire during the early days of humanity, or even the creation of light bulbs and numerous other technologies designed to enhance people's daily lives, humans have consistently demonstrated a remarkable ability to innovate and improve their way of life. Likewise, robots are extensively employed across various industries to enhance the capabilities of devices, enabling them to perform tasks with heightened efficiency and precision. They can even accomplish tasks that pose significant risks to human lives, making them indispensable in such scenarios.

Multitasking refers to the capacity of an individual or a machine to execute multiple tasks simultaneously or sequentially. Multitasking robots are designed to tackle and accomplish a wide array of tasks simultaneously or in a well-coordinated manner, showcasing their ability to handle diverse responsibilities effectively. Multitasking robots are equipped with advanced algorithms and sophisticated hardware that enable them to switch between different tasks seamlessly and with minimal human intervention, resulting in greater productivity and efficiency. Considering this aspect, we have created a versatile robot capable of multitasking. This robot utilizes a Node Mcu ESP8266 Wi-Fi module in conjunction with an L298 motor driver to control four gear motors, enabling it to maneuver on four wheels, this innovative design allows the wheels to respond to voice commands and Wi-Fi instructions, enabling them to move in various directions as per the user's control. By leveraging the capabilities of Arduino technology, we have integrated additional functionalities into the robot. These include a door lock system based on RFID technology and the ability to measure temperature and humidity using DHT11 sensors. Furthermore, for enhanced surveillance and security purposes, we have incorporated a camera into the robot's design. This camera, equipped with an ESP32 CAM module, is mounted on top of the robot and works in conjunction with an Arduino Uno, allowing for monitoring and safeguarding of the surrounding area where the robot is deployed. Hence, these features collectively form the foundation of our multitasking robot design. The robot can be effortlessly controlled through voice commands or by manually inputting commands through the dedicated Android application installed on a smartphone. The inclusion of an RFID Door Lock feature enables users to securely store important documents or files. Additionally, with the voice and Wi-Fi controlled functionality of the robot, it can be directed to deliver these items to specific individuals or locations by granting access only to the designated RFID cards. This ensures that unauthorized individuals are unable to access the contents. Moreover, the integrated security camera enables real-time monitoring of the robot's surroundings via an Android application, allowing users to keep a close eye on the activities happening in the robot's vicinity directly from their mobile phones.

## NEED OF THE STUDY

The study of multitasking robots holds the potential to greatly improve efficiency across diverse industries. These robots, capable of simultaneously executing multiple tasks, can streamline processes, minimize downtime, and boost productivity. The study of multitasking robots involves optimizing resource utilization, including both human and material resources. These robots have the ability to assume multiple roles or tasks, eliminating the necessity for dedicated robots or human operators for each specific task. The presence of multitasking robots enables the simultaneous execution of time-consuming tasks, resulting in a reduction in the overall time required for completion. This capability proves particularly advantageous in time-sensitive operations or industries where swift turnaround is of utmost importance.

**RESEARCH METHODOLOGY**

1. The initial objective in robot design is to establish a foundation that allows for voice and Wi-Fi control as the primary means of commanding and operating the robot.
2. Once the foundation is established and the robot is capable of maneuvering in desired directions and locations, the subsequent step involves incorporating a storage unit that can be opened and locked using an RFID Door Lock System.
3. The body of the robot is equipped with temperature and humidity sensing capabilities.
4. The head section of the robot, positioned at the top, houses a camera that serves the purpose of surveillance and security.

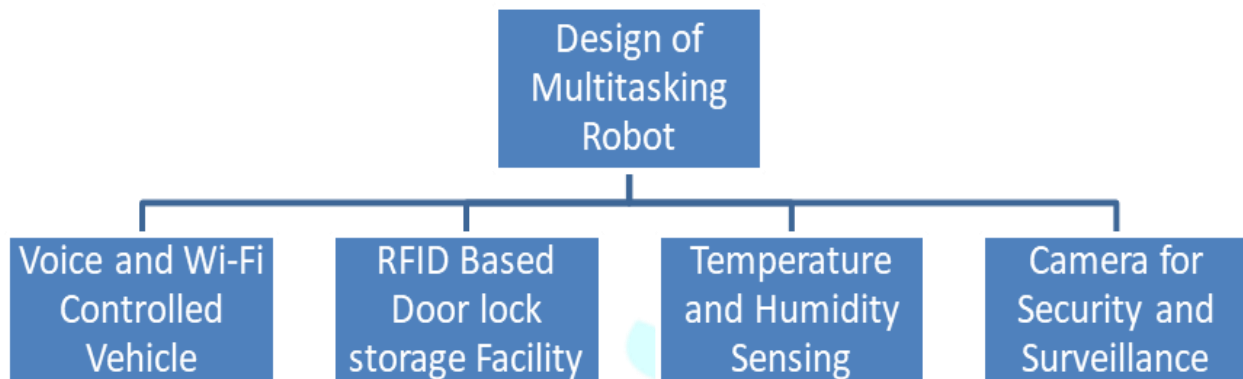


Fig.1.block diagram representation of multitasking robot

**RESULTS AND DISCUSSION**

The robot that has been developed has the ability to move in four directions: forward, backward, left, and right. These movements are executed based on voice commands and manual inputs received through the Android Application. Regarding the Temperature/Humidity sensing and RFID door lock system, when an authorized RFID tag is brought near the RFID scanner, the door automatically unlocks. Simultaneously, the LCD Panel displays the status of "Door Locked and Unlocked." Additionally, the LCD Panel also showcases the temperature and humidity measurements obtained from the sensors. To validate the accuracy of temperature measurement, the DHT11 Sensor demonstrates an increase in temperature when a hot object is brought in close proximity. This serves as evidence of the correct measurement of both temperature and humidity values. Regarding the security camera positioned atop the robot, it reliably displays images on the Android application, ensuring seamless monitoring and surveillance.



Fig.2.design of multitasking robot

Research Through Innovation

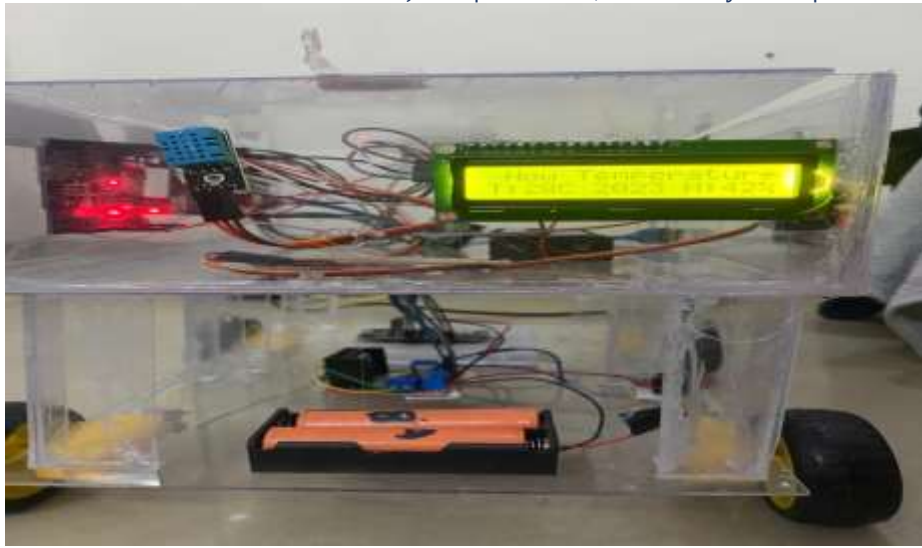


Fig.3. sensing temperature and humidity

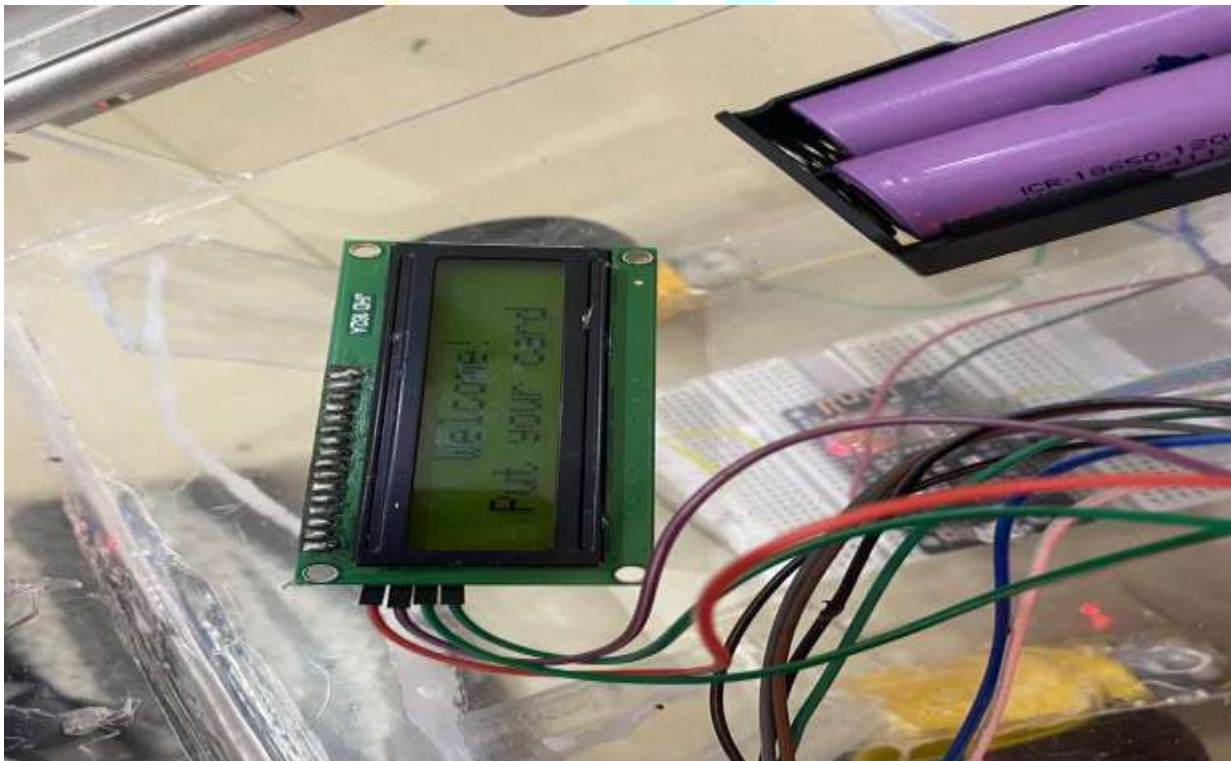


Fig.4. LCD display of rfid lock shows to scan your card



Figure.5. display shows scanning when we put the rfid card

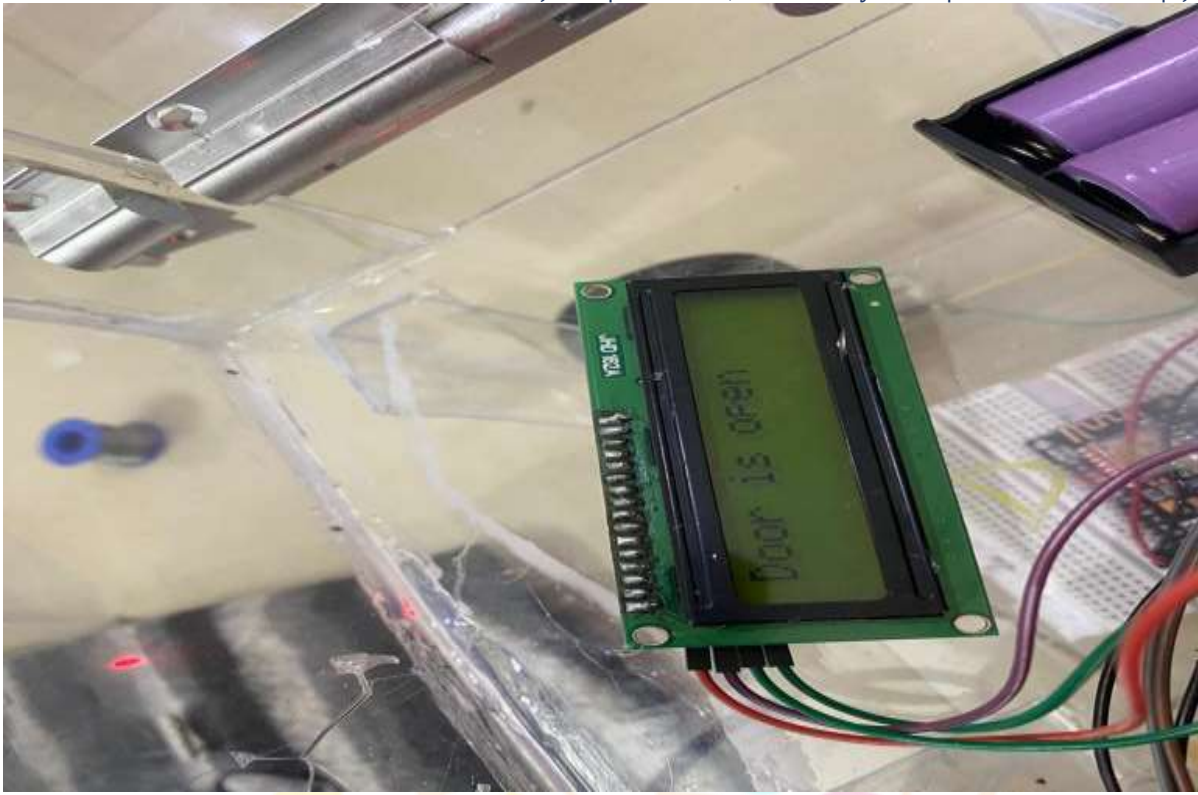


Fig.6.display shows door is open when we scan the card

#### ACKNOWLEDGMENT

We would like to take this moment to extend our heartfelt gratitude to Dr. Dhananjay Singh, the mentor of our project, for his insightful advice and direction during our research as well as the prompt assistance he provided to us in finishing this project. We profoundly thank Prof. Pawan Kumar Shukla, Head of Department Electronics and Communication Engineering who has been an excellent guide and also a great source of inspiration to us under whose kind supervision we accomplished our project. We would also like to thank Dr. Vinod M. Kapse, Principal of Noida Institutes of Engineering and Technology, Greater Noida and entire staff of Electronics and Communication Engineering department for their kind cooperation and help.

#### REFERENCES

- [1] Kannan, K., and J. Selvakumar. "Arduino based voice controlled robot." International Research Journal of Engineering and Technology (IRJET) 2.01 (2015): 49-55.
- [2] Chaudhry, Aditya, et al. "Arduino Based Voice Controlled Robot." 2019 International Conference on Computing, Communication, and Intelligent Systems (ICCCIS). IEEE, 2019.
- [3] Srivastava, Deeksha, Awanish Kesarwani, and Shivani Dubey. "Measurement of Temperature and Humidity by using Arduino Tool and DHT11." International Research Journal of Engineering and Technology (IRJET) 5.12 (2018): 876-878.
- [4] Prity, Sadia Akter, Jannatul Afrose, and Md Mahmudul Hasan. "RFID Based Smart Door Lock Security System." American Journal of Sciences and Engineering Research E-ISSN-2348-703X 4.3 (2021).
- [5] Srivastava, Shubh, and Rajanish Singh. "Voice controlled robot car using Arduino." International Research journal of Engineering and Technology 7.5 (2020): 4033-4037.

Research Through Innovation