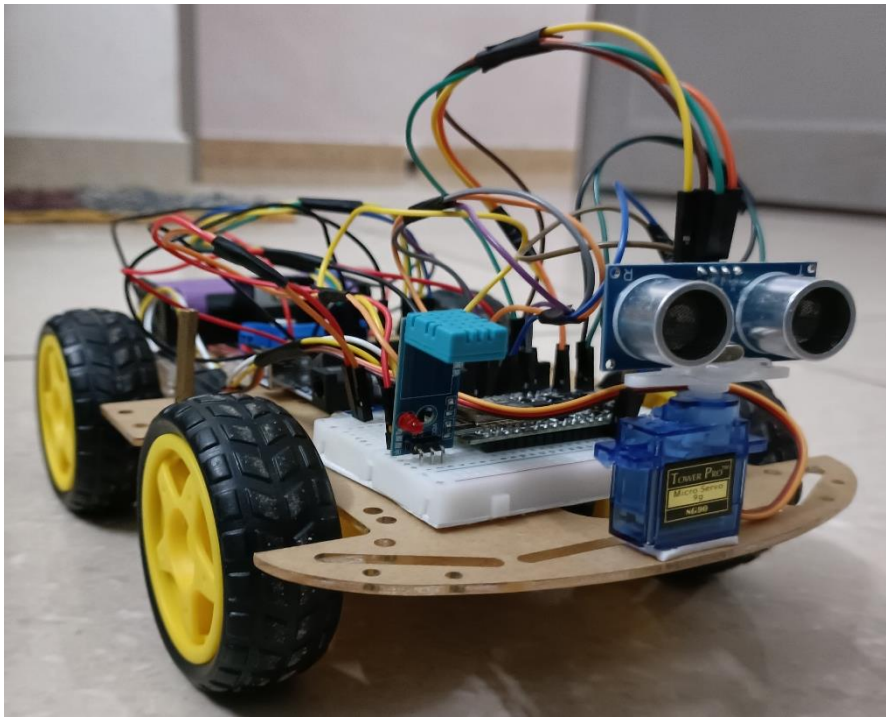
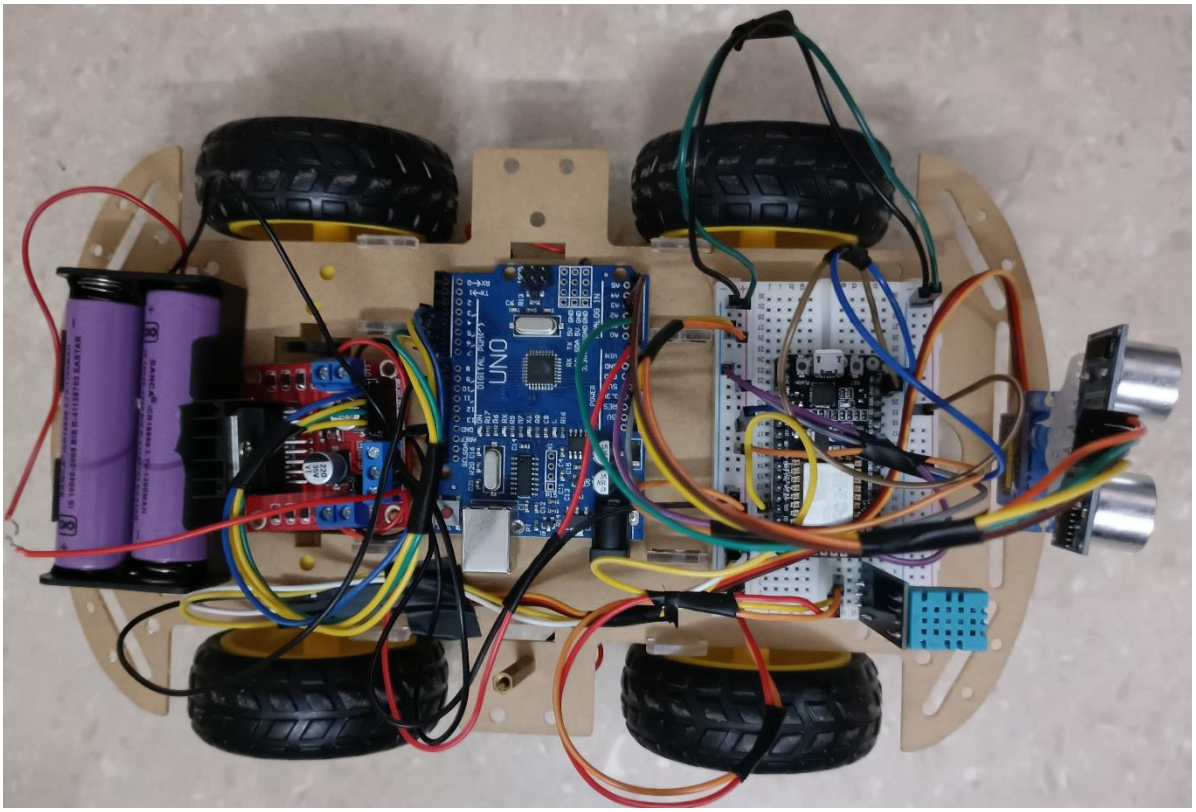
INTRODUCTION



- **Envirobot** project aims to design and develop a versatile monitoring robot capable of both autonomous and manual control via Wi-Fi connectivity. It integrates various sensors like ultrasonic, humidity, and potentially LDR, gas, and IR sensors for environmental data collection and enhanced autonomous control. This report details the functionalities, algorithms, control mechanisms, and components employed in the creation of this sophisticated monitoring system.



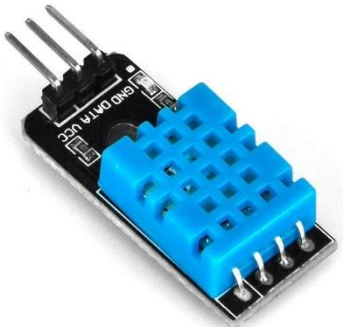
- A Multifunctional robotics system that capable of venturing into harsh, inaccessible environments like dense forests, and hazardous areas to collect crucial environmental data. This data aims to ensure human safety and provide insights for potential exploration, research, and risk assessment without human presence.

- The need for advanced environmental monitoring has led to the development of the Envirobot. This report highlights its objectives, key components, and the significance of autonomous and manual control through Wi-Fi connectivity.

KEY COMPONENTS AND SENSORS

The Envirobot is equipped with a set of sensors essential for its functionalities:

Ultrasonic Sensor: Primarily used for autonomous obstacle avoidance.

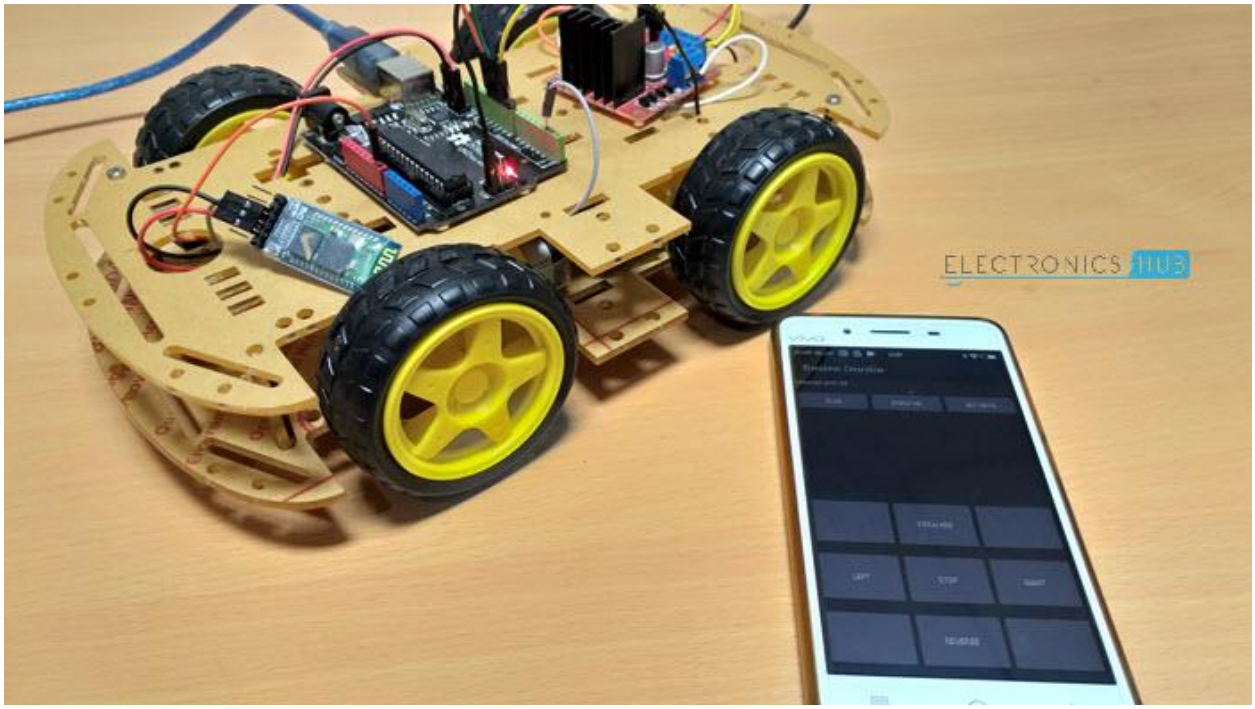


Humidity Sensor: Collects environmental data for monitoring purposes.

Additional Sensors (Optional):

- LDR Sensor: Measures light intensity.
- Gas Sensor: Detects gas levels in the environment.
- IR Sensor: Provides additional obstacle detection capabilities.

CONTROL MECHANISMS

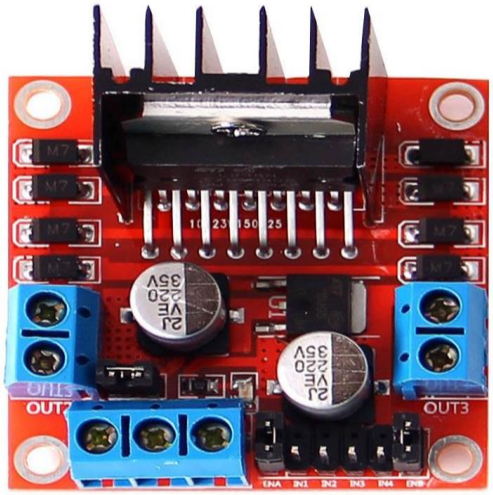


Autonomous Mode: Relies on ultrasonic sensors for obstacle detection and avoidance, employing an algorithm to ensure safe navigation.

Manual Mode: Enabled via a web interface and Wi-Fi connectivity, providing direct control of the robot.

MAIN MODULES AND COMPONENTS

The core components of the Envirobot include:



L298N Driver

NodeMCU ESP8222

Arduino UNO

ALGORITHM FOR OBSTACLE AVOIDANCE

The obstacle avoidance algorithm comprises continuous scanning and reaction protocols:

Initialization:
Set up ultrasonic sensors and establish safe navigation parameters.

Continuous Loop:
Regularly measures distances using ultrasonic sensors.

Obstacle Detection:
Activates avoidance protocols if an obstacle is detected,

- Adjusts movement.
- Computes alternative routes.
- Executes maneuvers to avoid collisions.

Continued Navigation:
Resumes autonomous movement once obstacles are cleared.

DATA TRANSMISSION VIA ESP USING WI-FI

- Collects environmental data (e.g., humidity, potentially other sensor data).

- Formats and transmits data wirelessly via the ESP module using Wi-Fi connectivity to a web server/cloud service for remote access and analysis.

CONCLUSION

The Envirobot project presents a sophisticated solution for environmental monitoring, combining autonomous capabilities with manual control through Wi-Fi connectivity. Its multi-sensor integration and robust control mechanisms position it as a versatile tool for various domains.

To improve the "**EnviroBot**"

Additional Sensors:

- Gas Sensors: Add gas sensors to detect specific gases in the environment, such as carbon monoxide, methane, or volatile organic compounds (VOCs).
- Air Quality Sensor: Incorporate an air quality sensor to measure particulate matter (PM2.5 and PM10) levels.
- Pressure Sensor: Include a pressure sensor to monitor atmospheric pressure.
- Light Sensor: Measure ambient light levels to provide information about the lighting conditions.

Wireless Communication:

- Wi-Fi/Bluetooth Module: Enable the robot to communicate wirelessly, allowing it to send data to a remote server or receive commands remotely.
- IoT Integration: Connect the robot to the Internet of Things (IoT) platforms for real-time data monitoring and analysis.

Data Logging and Storage:

- SD Card Module: Add an SD card module for local data storage, allowing the robot to store historical environmental data.

Power Management:

- Battery Monitoring System: Implement a system to monitor the battery level and provide alerts or return-to-base functionality when the battery is low.
- Solar Panels: If applicable, integrate solar panels to extend the robot's operating time.

Mobility and Navigation:

- Improved Suspension: Enhance the robot's ability to traverse different terrains by improving its suspension system.

User Interface:

- LCD Display: Incorporate an LCD screen to display real-time environmental data or system status.
- Mobile App Control: Develop a mobile application to control the robot and receive live updates.