

Interactive Mini Assistant Robot for Desk Organization and Task Management

Abstract

The AI-Powered Smart Personal Assistant Robot integrates AI, IoT, and web technologies for object detection, voice interaction, air quality monitoring, and task reminders. Using a Raspberry Pi 4 and Arduino Uno, it processes environmental data, detects objects with YOLO, and interacts via OpenAI API and Whisper/Vosk. A web-based dashboard offers remote monitoring and task management, showcasing the potential of intelligent systems for productivity, environmental awareness, and seamless interaction.

Introduction

Modern environments need smart assistant solutions for tasks like object detection, environmental monitoring, and voice-based interaction. This project combines AI models, IoT sensors, and cloud communication to deliver a scalable, multi-functional robot. The YOLO model enables object detection, MQ-135 sensor monitors air quality, and OpenAI API facilitates intelligent conversations. A web-based dashboard serves as the main interface for monitoring and control.

Methodology

The Raspberry Pi 4 acts as the central controller, while Arduino Uno manages motor operations. The USB Camera (YOLO) detects objects in real-time, and the MQ-135 sensor monitors air quality. Voice commands are processed via Whisper/Vosk, and outputs are relayed through a Bluetooth-connected speaker. Real-time data is displayed on an OLED screen and accessed remotely via a web-based dashboard through secure APIs.

Future Work

- Cloud Data Storage: Historical analysis of sensor data.
- Expanded Sensors: temperature monitoring.
- Emotion Recognition: AI-based emotional response.
- Enhanced Web Dashboard: Advanced analytics and insights.

Hardware Components



Raspberry Pi 4



Arduino Uno



USB Camera



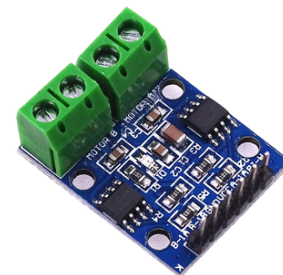
MQ-135 Sensor



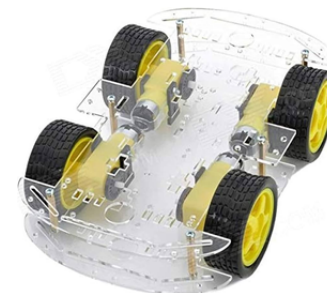
OLED Display



Ultrasonic Sensor



L9110s motor driver



Robot Car Kit



Wireless Speaker

Results

- Accurate Object Detection: Real-time object recognition with YOLO.
- Air Quality Alerts: Instant updates via OLED and voice.
- Voice Interaction: Smooth command execution with OpenAI API.
- Web Dashboard: Remote access and system status updates.

Conclusion

The AI-Powered Smart Personal Assistant Robot merges AI, IoT, and web technologies to deliver a smart solution for object detection, voice commands, environmental monitoring, and task management. Its web dashboard ensures real-time insights and accessibility, demonstrating the robot's potential for practical and scalable applications.