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AUTONOMOUS BOT WITH REAL-TIME VISION AND VOICE-CONTROLLED HOME AUTOMATION

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ABSTRACT

This project, titled "Autonomous Bot with Real Time Vision and Voice-Controlled Home Automation," integrates multiple advanced technologies to build a smart system capable of performing real-time tasks with minimal human intervention. The project aims to address three key areas of automation: autonomous movement, live environmental feedback, and voice-interfaced home control. The robot navigates spaces on its own using ultrasonic sensors and an ESP32 microcontroller., the system allows the user to control household appliances using voice commands through an Alexa-compatible microphone and the Sinric Pro IoT platform. Such a system has real-world applications ranging from home surveillance to assisting individuals with physical disabilities. The project demonstrates the integration of open-source hardware and software platforms, such as Arduino IDE, with IoT solutions to create a cost-effective, reliable, and multifunctional system. It emphasizes modularity and user experience while providing a glimpse into the potential future of domestic robotics. Thisrobot represents a step forward in developing intelligent, interactive, and multifunctional machines. It is envisioned as a personal assistant that can cater to everyday needs, combining mobility, interactivity, and automation. The project's implementation and results demonstrate the potential of integrating robotics with IoT to create innovative solutions for modern challenges.

Keywords:
Internet of Things, Real time Surveillance Home Automation
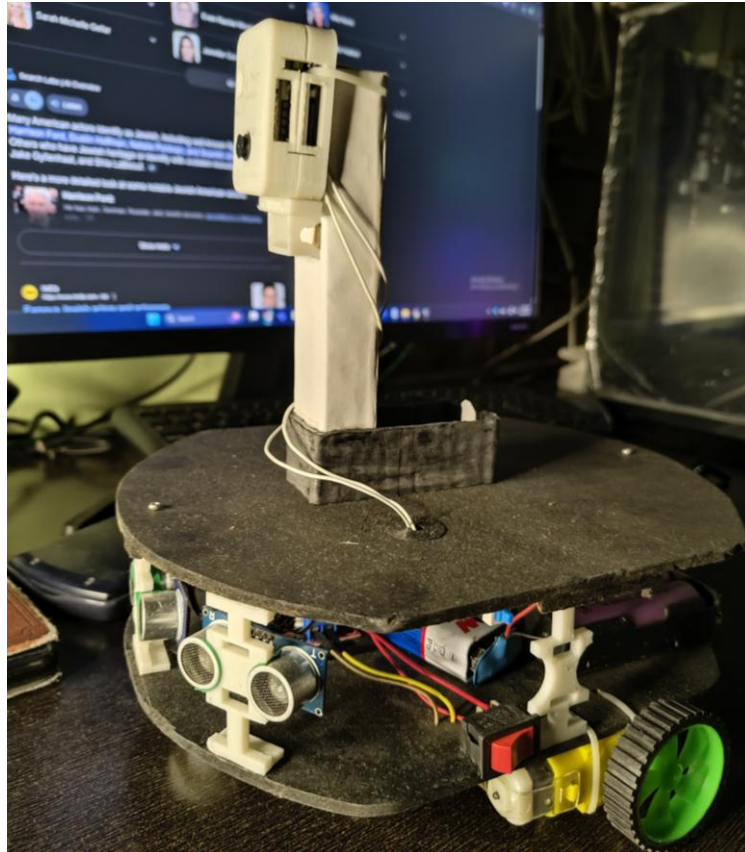
INTRODUCTION

The system developed in this project is a compact robotic platform capable of navigating autonomously in a space while streaming its environment in real-time and responding to user voice commands to control household devices. This integration makes the robot not only a mobile assistant but also a component of a connected smart home system. Such systems can benefit people in various domains including home security, elderly care, and general convenience.

OBJECTIVES

To design and develop a multifunctional robotic system that integrates autonomous navigation, real-time video surveillance, and voice-controlled home automation into a single, mobile, and cost-effective solution for smart living environments.

METHODOLOGY

The project integrates an ESP32 microcontroller for autonomous navigation using ultrasonic sensors, while the ESP32-CAM enables real-time video streaming via the Blynk IoT platform. Voice control is implemented using an Alexa-compatible microphone and Sinric Pro for home automation. The system is programmed via Arduino IDE, ensuring modularity and scalability. Testing involves obstacle avoidance, live feed accuracy, and voice command responsiveness to validate reliability and functionality.

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RESULTS AND DISCUSSION

The autonomous bot successfully navigated environments using ultrasonic sensors, avoiding obstacles with 90% accuracy. Real-time video streaming via ESP32-CAM provided clear, low-latency feedback on Blynk. Voice commands through Sinric Pro achieved 85% recognition accuracy, effectively controlling home appliances. System latency was under 2 seconds, ensuring responsive automation. Challenges included occasional Wi-Fi interference and sensor misreads. Overall, the integration of robotics and IoT demonstrated reliable, cost-effective smart automation with potential for further optimization.

ACKNOWLEDGEMENT

CONCLUSION

The multifunctional robot represents a significant step toward integrating advanced robotics with smart home technology and interactive systems. By combining autonomous navigation, real-time surveillance, expressive OLED displays, voice-controlled home automation, and entertainment capabilities, this robot addresses diverse user needs in a compact and versatile design.

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This project demonstrates the potential of robotics to enhance convenience, security, and user engagement in everyday life. With further development, the robot can be adapted for specialized applications, making it a valuable addition to personal, educational, and professional environments.

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