

Secure Voice-Activated Wireless Control System Using Raspberry Pi and Speech-to-Text

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Abstract:

This proposal outlines the development of a secure voice-input wireless control system utilizing Raspberry Pi, speech-to-text technology, and encryption techniques. The goal of the system is to allow users to securely and wirelessly interact with an API via voice input and output. By implementing secure communication protocols and encryption mechanisms, the system will ensure the confidentiality, integrity, and authenticity of voice commands transmitted over the wireless network. The project combines voice recognition with wireless security concepts, offering an opportunity to explore both fields while developing practical skills in Raspberry Pi programming and system design.

Objectives:

1. Develop a voice-input wireless control system using Raspberry Pi and speech-to-text.
2. Implement secure communication protocols and encryption mechanisms to protect the transmitted commands.
3. Evaluate the system's performance, accuracy, and security in various environments and scenarios.

Steps:

Hardware setup:

- Integrate a microphone with the Raspberry Pi to capture voice commands from the user.

Speech-to-text implementation:

- Utilize a cloud-based service like Google's Speech-to-Text API to convert voice commands into text.

Command parser development:

- Create a parser that interprets text commands and translates them into actions for controlling target devices within the wireless network.

Secure communication protocol implementation:

- Establish a secure communication channel between the Raspberry Pi and the target devices using a LAN.

Encryption and security enhancements:

- Implement AES cryptographic techniques to encrypt commands, ensuring data confidentiality.
- Implement hashed message authentication codes (HMACs) to maintain data integrity and authenticity.
- Implement Diffie-Hellman or public key infrastructure secure key exchange to establish and maintain secure communication channels.

User interface design:

- Develop a user interface for the Raspberry Pi system that provides visual feedback on the recognized voice commands and the status of the target devices.

Testing and evaluation:

- Assess the system's performance, accuracy, and **security** by simulating various environments.



Rough prototype of microphone ported to wireless PI