PROJECT OVERVIEW

Touchless Simon Says game with sound recognition, using MATLAB and ESP32 to detect snap, clap, and knock sounds as user inputs and provide real-time LED feedback, showcasing advanced audio processing and interactive gameplay.

AIM: To create a fun, interactive game that challenges you to use sound, demonstrating real-world audio recognition in a playful way.

OBJECTIVES

- Design and implement a sound classification system
- Integrate MATLAB with an ESP32 microcontroller
- Develop game logic that increases difficulty at each round
- Give users instant and accurate feedback

SOUND RECOGNITION

- **Snap:** High-frequency transient detection
- **Clap:** Broadband impulse recognition
- **Knock:** Low-frequency impact analysis

SOUND CLASSIFICATION SYSTEM ARCHITECTURE

Hardware

MAX4466 Microphone
↓
High Pass Filter(Fc=106Hz)
↓
ESP32 MicrocontrollerADC Sampling
↓

Signal Processing

MATLABSound Processing → Feature Extraction
- Zero Crossing Rate
- Energy
- Spectral Centroid
- Spectral Spread
- Spectral Entropy

→ Sound ClassificationAlgorithm

Game Interface

LED Feedback
↓
Game Logic