SMART HOME SYSTEM



Final Year Project Report

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# 1. PROJECT OVERVIEW

The Smart Home System is a Python-based application that integrates multiple computer vision and audio recognition modules to enable gesture and voice-controlled home automation features. It includes gesture-based music control, intruder detection with email alerts, and fall detection for elderly monitoring with audio alerts and email notifications.

# 2. TECHNOLOGIES USED

• Python 3.8+

• OpenCV

• MediaPipe

• Pygame

• SpeechRecognition

• PyAudio (voice input)

• smtplib (for email alerts)

• Google Speech-to-Text API

# 3. PROJECT STRUCTURE

smart\_home\_system/  
├── music\_control.py # Gesture-based music control using both hands  
├── intruder\_detection.py # Motion-based intruder detection with email alert  
├── fall\_detection.py # Pose-based fall detection using MediaPipe  
├── voice\_command.py # Main entry point with voice-based feature switching  
├── songs/ # MP3 files for music playback  
├── captured/ # Intruder snapshot storage  
└── README.md # Project documentation

# 4. FEATURES

• 🎵 Gesture-based Music Control using MediaPipe Hands.

• 🚨 Intruder Detection using motion differencing with email alerts.

• 🧍 Fall Detection using MediaPipe Pose and alert system.

• 🗣️ Voice Control for selecting features with alternatives like 'help' or 'emergency' for fall.

• 📢 Voice responses using pyttsx3 for system feedback.

# 5. HOW TO RUN

1. Install required modules:

pip install opencv-python mediapipe pygame SpeechRecognition pyttsx3

2. Ensure you have a microphone and camera connected.

3. Run the main control file: voice\_command.py

4. Say one of the commands: 'music', 'intruder', 'help', 'emergency', or 'exit'.

# 6. FUTURE ENHANCEMENTS

• Integration with face recognition for intruder identification.

• GUI-based control for fallback option to voice.

• Offline speech recognition using Vosk.

• Cloud integration for alerts and logs.

• Mobile app control interface via Flask or Flutter.

# 7. CREDITS

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