ECOSHIELD+

AI- Driven Audio & Video Threat Detection System for Women and Public Safety

Presented by ***Phoenix Pioneers***
(Puneeth AS, Khushan Gowda G H, Dhanush R Kalkur, Sunidhi)

SHESECURE 2025
17-18 May 2025

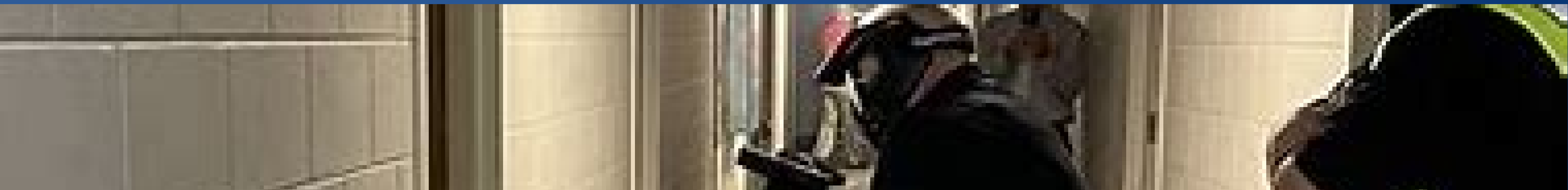
INTRODUCTION

Motivation: Enhance safety for vulnerable groups via real-time threat detection

Dual-layered approach:

- EchoSense: Passive audio threat detection through sound pattern analysis
- VisionGuard: Active video surveillance using deep learning for violent movement detection

Goal: Early threat identification with instant alerts to minimize emergency response time



ECHOSENSE – AUDIO THREAT DETECTION SYSTEM

Overview

- Continuously monitors ambient sound for a fixed time window
- Uses RMS amplitude thresholding to identify suspicious audio patterns
- Upon detection, records audio snippet and dispatches alert email with geolocation and audio evidence

Use Case:Passive detection of screams, shouts, or unusual noises signaling emergencies

Implementation

- Audio captured with Python sounddevice, saved as WAV files
- Location fetched using IP-based geolocation API (ipinfo.io)
- SMTP protocol for sending alert emails with audio attachments
- Adjustable sensitivity threshold to detect faint distress sounds

VISIONGUARD – VIDEO-BASED VIOLENCE DETECTION SYSTEM

Overview

- Employs YOLOv8n model for real-time person detection from video stream
- Detects aggressive interactions using bounding box overlap and proximity heuristics (IOU)
- Automatically records video clips on suspected violence and sends alert emails with video evidence
- Plays a local alert sound to notify nearby responders immediately

Use Case: Active surveillance for fight or violence detection in public and private spaces

Implementation

- YOLOv8n pretrained model optimized for fast inference
- Heuristic detection: overlapping bounding boxes + sudden movement → potential fight
- Saves timestamped video clips for evidence
- Uses multithreading to send email alerts and play alarms without delays

INTEGRATION

- Both EchoSense and VisionGuard use location services for geotagged alerts
- Automated email notifications ensure rapid information flow to authorities
- Multi-modal detection improves threat coverage and reliability

TECH HIGHLIGHTS

- Real-time audio and video processing with low latency
- Lightweight YOLOv8n model for efficient video analysis
- RMS-based audio thresholding for detecting subtle threats
- Threaded alert mechanisms prevent system blocking
- User-configurable parameters: audio sensitivity, recording duration, movement detection thresholds

CHALLENGES, FUTURE SCOPE & IMPACT

CHALLENGES

- False alarms due to ambient noise or benign rapid movements
- Limited datasets for complex violent action detection; current reliance on heuristics
- Privacy and ethical concerns with continuous audio/video monitoring

FUTURE SCOPE

- Integrate advanced audio classification models (e.g., CNN, LSTM) for improved accuracy
- Incorporate deep action recognition models (3D CNN, LSTM) for refined video violence detection
- Develop companion mobile app for instant push notifications
- Enhance location accuracy with GPS integration where possible

IMPACT

- Potential to save lives by enabling faster emergency response
- Applicable in public venues, educational campuses, workplaces to enhance security
- Scalable solution for smart cities aiming for comprehensive public safety monitoring

THANK YOU

123-456-7890

hello@reallygreatsite.com