GRADIENT AI - HACKATHON

NOVEMBER 2024

DOMAIN - SURVEILLANCE AND SECURITY SYSTEMS

AI-POWERED SOUND ALERT SYSTEM FOR HOME SECURITY

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PROBLEM STATEMENT

AI-Powered Sound Alert System for Home Security

- Ensuring home security is a growing concern as traditional systems often fall short in providing real-time, intelligent responses to potential threats.
- Conventional measures like basic alarms or camera systems lack the ability to proactively detect and classify unusual sounds, leaving significant gaps in threat detection and response.
- This creates a critical need for a smarter, more efficient solution that not only identifies suspicious activities but also provides actionable insights and alerts in real-time.

OUR APPROACH

- **Sound Detection & Classification**: Uses AI to identify specific suspicious sounds like glass breaking, screams or cries.
- **Panic Mode**: A panic button to immediately trigger the security system is also present.
- **User Interface for Monitoring:**
  - Dashboard: Displays current sound events with their threat levels and a historical log of detected sounds with timestamps and types of sounds detected.
  - Notifications: Provides real-time notifications or pop-ups for each detected suspicious sound, keeping users informed immediately.
- **Multi-User Notifications**: Notifies all users within the same household in real-time when a threat is detected, ensuring everyone is informed.

OUR APPROACH 

- **Threat Level Classification**
  - Classifies detected sounds into three threat levels:
  - Low (Green): Minor disturbances.
  - Medium (Orange): Potentially concerning noises.
  - High (Red): Urgent threats requiring immediate action.

EXAMPLES 

1: Intruder Breaks In When No One Is Home

- A Robber breaks through the glass window of a house. The AI-powered home security system detects the distinct sound of glass breaking and immediately classifies it as a high-level threat. The system sends real-time alerts to all users associated with the house, notifying them of the break-in.

2: Woman Attacked by Intruder at Home

- A woman is alone at home when an intruder breaks into the house and attempts to attack her. The system detects her loud scream, classifies it as a high-level threat, and triggers real-time alerts to all users of the household. These alerts are sent to their devices, including mobile phones and laptops. This ensures that the other household members are aware of the situation and can act accordingly, even if they are not physically present at home.

STEPS

1. **Dataset Collection**

- Various audio files have been collected for training and testing purposes.
- The collected audio samples are categorized into two main groups:
  a. Danger: Audio samples representing suspicious or threatening sounds such as glass breaking, screams, or crashes.
  b. Normal: Audio samples representing everyday sounds that are considered non-threatening, such as background noise, conversations, and typical household sounds.

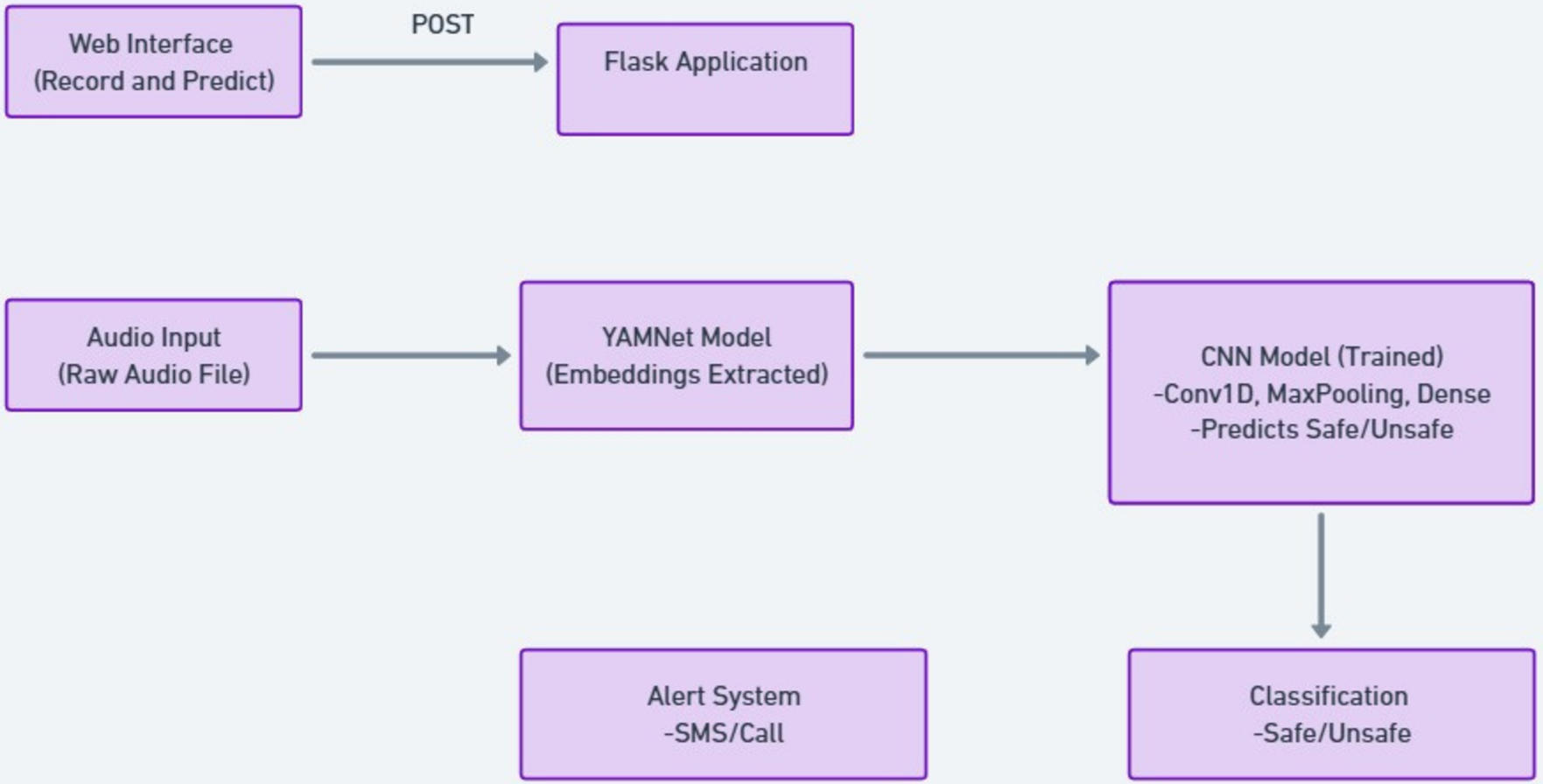
- **Sound Detection**
  - Successfully detects suspicious sounds such as glass breaking, screams, or other unusual noises.

STEPS

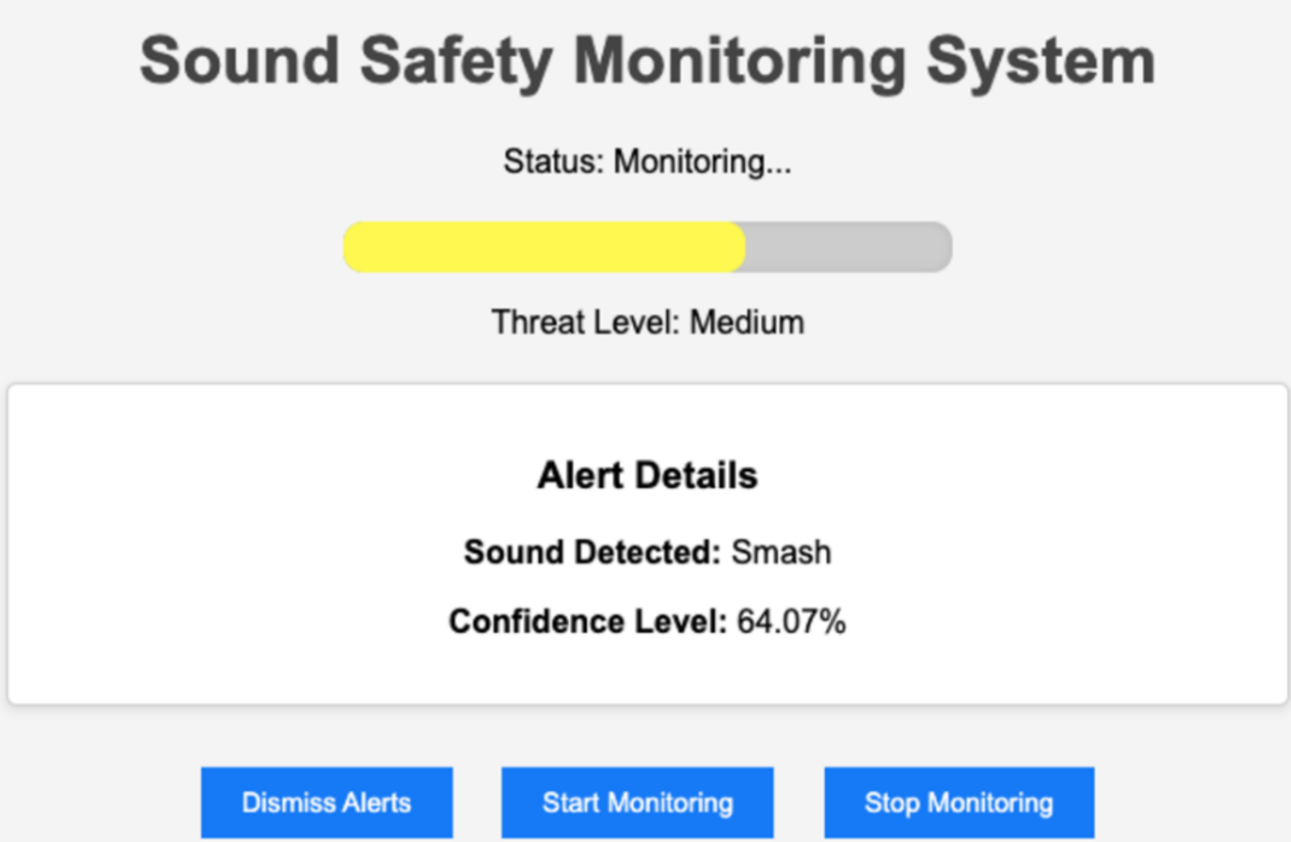
- **User Interface (UI) Design:**
  - Create a simple and intuitive interface for monitoring alerts and system management, incorporating color-coded threat level indicators (green, orange, red)

- **Real-Time Alerts:**
  - Develop functionality to send external Notifications to the family members mobile.

HIGH LEVEL DESIGN



UI INTERFACE



UI INTERFACE

Historical log of detected sounds with timestamps

Pretty print


```
{
  "logs": [
    {
      "confidence": "0.83",
      "message": "Alert: Explosion detected with confidence 0.83. Threat Level: High",
      "sound_label": "Explosion",
      "threat_level": "High"
    },
    {
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    },
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      "message": "Alert: Chuckle detected with confidence 0.32. Threat Level: Low",
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      "threat_level": "Low"
    },
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      "message": "Alert: Drill detected with confidence 0.77. Threat Level: High",
      "sound_label": "Drill",
      "threat_level": "High"
    },
    {
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      "message": "Alert: Children shouting detected with confidence 0.24. Threat Level: Low",
      "sound_label": "Children shouting",
      "threat_level": "Low"
    },
    {
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      "message": "Alert: Drill detected with confidence 0.87. Threat Level: High",
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      "threat_level": "High"
    },
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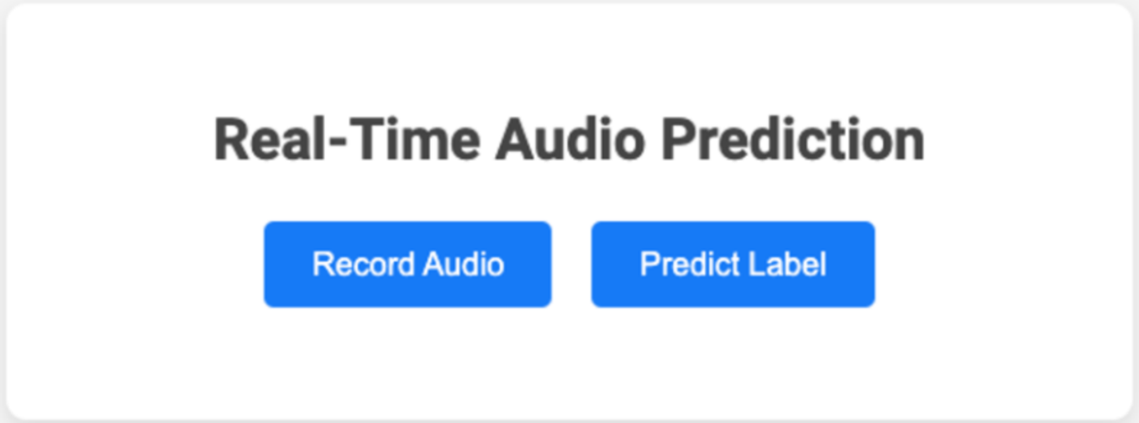
REAL-TIME PREDICTION



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THANK YOU

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