# Alert Aura - Women Safety Application

A Major PROJECT REPORT

SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE AWARD OF DEGREE OF

**BACHELOR OF ENGINEERING**

**in**

**INFORMATION TECHNOLOGY**


BY

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## CERTIFICATE FROM PROJECT GUIDE

This is to certify that the project report entitled "**Alert Aura** " submitted by **N.Sushanth** bearing H.T. No**: 1608-21-737-002, D SHANMUKHADITYA** bearing H.T. No**: 1608-21-737-036, R.venkata Anirudh** bearing H.T. No: **1608-21-737-054**, in the partial fulfilment of the requirement for the award of the degree of Bachelor of Engineering in Information Technology is a Bonafide work carried by them. The results of the investigations enclosed in this report have been verified and found satisfactory.

| | |
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# 1.Abstract

Our proposal is to create an AI-driven mobile application designed to autonomously respond to emergencies, specifically aimed at enhancing women's safety. This application integrates advanced machine learning models to process real-time data from diverse sources, including sensors, video feeds, speech samples, and location-specific crime history. By analyzing these inputs, the app identifies potential threats and initiates automated actions, such as sending SOS alerts to emergency contacts, notifying local authorities, and capturing evidence. Our proposed AI-powered mobile application aims to revolutionize personal safety, particularly for women. By leveraging cutting-edge machine learning techniques, the app proactively detects and responds to potential threats, empowering users to feel secure in their daily lives. This innovative solution is designed to bridge the gap between traditional emergency response systems and real-time, personalized protection. The system relies on the following components working in unison:

**1. Speech Emotion Analysis** : Detects distress or panic through real-time voice analysis.
**2. Video Surveillance :** Employs computer vision to identify suspicious activities or potential threats in the user's surroundings.
**3. Sensor-Based Monitoring** : Analyzes data from accelerometers, GPS, and gyroscopes to recognize sudden movements or unsafe environments.
**4. Crime Risk Assessment :** Utilizes crime statistics of the user’s location to gauge risk and enhance situational awareness.

This application delivers a comprehensive and proactive emergency response system, combining real-time monitoring with historical data insights. Its context-aware functionality ensures users in high-risk scenarios receive immediate assistance and peace of mind, offering an innovative solution to safety challenges in vulnerable situations.

# 2.Software Requirements

**1. Programming Languages and Frameworks**

- Frontend :Flutter or React Native for cross-platform development
- Backend : 1. Python (for AI and ML models).
  2. Node.js or Django for server-side development.

**2. Libraries and Tools**

- **Speech Emotion Analysis:**
  1. Google Speech-to-Text API or open-source libraries like Librosa for audio feature extraction.
  2. Pre-trained models like Wav2Vec2 or custom emotion detection models.
- **Video Analytics**
  1. OpenCV for video processing.
  2. TensorFlow or PyTorch for computer vision models.
- **Sensor Data Integration**
  1. Android Sensor API and iOS Core Motion framework for accelerometer and gyroscope data.
- Crime Data Insights
  1. Google Places API or a custom database for crime history records.
  2. Data visualization tools like D3.js for risk mapping.
- Cloud Services
  1. Firebase or AWS for cloud storage and real-time database management
  2. Twilio API for sending SMS and making emergency calls.

**3. AI/ML Model Deployment**

- TensorFlow Lite or PyTorch Mobile for on-device inference.
- AWS SageMaker or Google AI Platform for backend model training and deployment.

# 3.Hardware Requirements

## 1. Mobile Device :

- **Smartphone with accelerometer, gyroscope, microphone, GPS, and camera sensors.**
- **Minimum specifications** :

1. RAM : 3GB
2. Storage : 32GB
3. Processor : Qualcomm Snapdragon 845 or equivalent.

## 2. Backend Server :

- **Cloud Hosting Provider**：AWS, Google Cloud, or Azure.
- **Specifications :**

1. CPU : Minimum 4 vCPUs.
2. RAM : Minimum 16GB.
3. Storage : Minimum 100GB SSD.
4. Bandwidth : 100 Mbps or higher for real-time data handling.

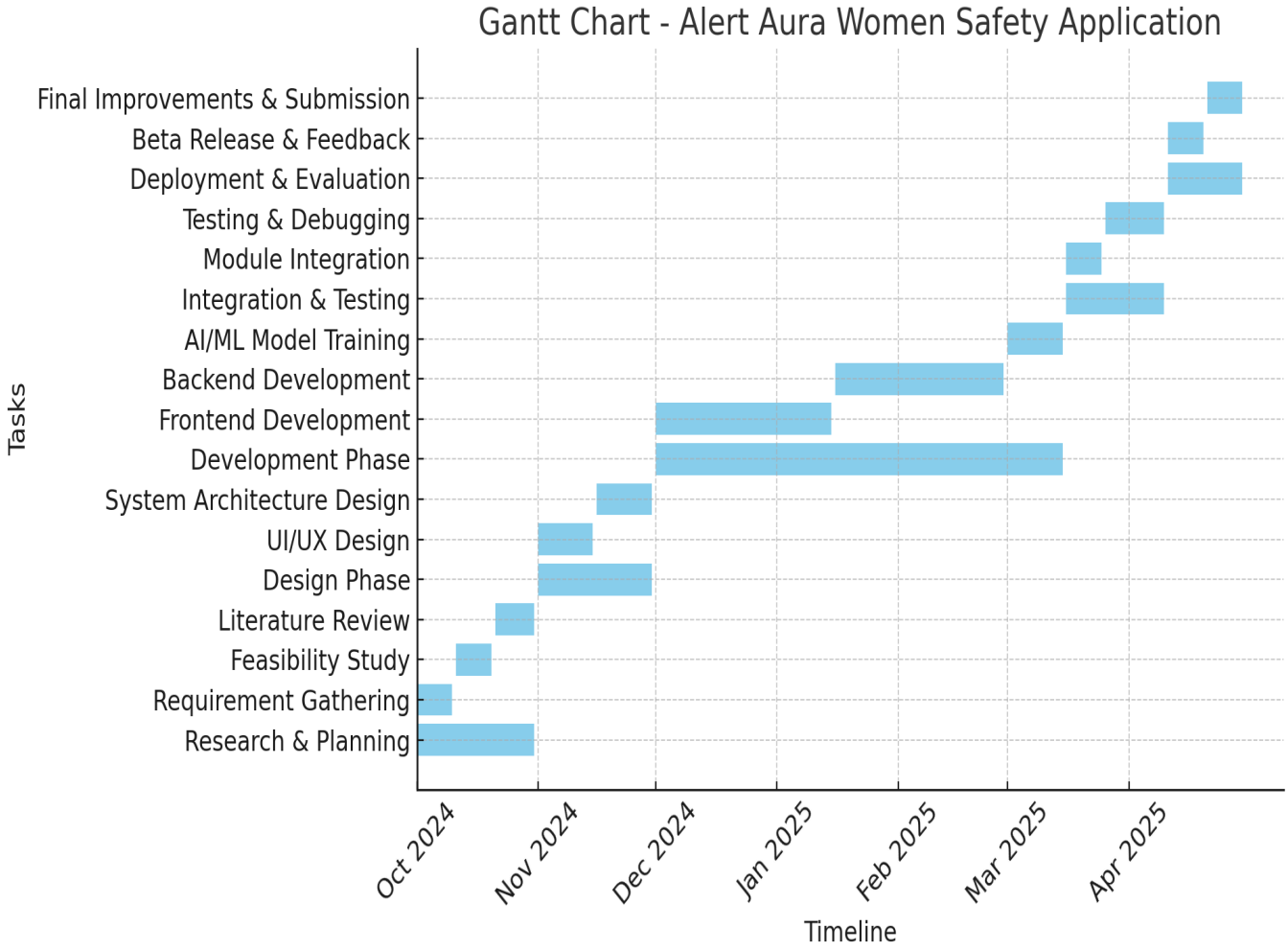
## 3. Development and Testing Hardware

- **Laptops or desktops with the following specifications:**

1. Processor : Intel Core i7 or AMD Ryzen 7.
2. RAM : 16GB.
3. Storage : 512GB SSD.
4. GPU : NVIDIA GTX 1660 or equivalent for ML model training.

# 4.Project Planning

The **Alert Aura** project follows a structured timeline, ensuring efficient execution from research to deployment. The Gantt chart outlines key phases, tracking progress and resource allocation for timely completion.



# 5.UML Diagrams

- UML is a graphical notation used to visualize, specify, construct and document the artifact of software intensive. UML is appropriate for modelling systems ranging from Enterprise Information Systems to Distributed Web-based Application and even to Hard Real-time Embedded systems. UML effectively starts with forming a conceptual modelling of the language. UML is a standard language for specifying, visualizing, constructing, and documenting the artifacts of software systems. UML was created by the Object Management Group (OMG) and UML 1.0 specification draft was proposed to the OMG in January 1997. OMG is continuously making efforts to create a truly industry standard.
- UML Standard for Unified Modelling Language.
- UML is different from the other common programming languages such as C++, Java, COBOL, etc.
- UML is a pictorial language used to make software blueprints. UML can be described as a general-purpose visual modelling language to visualize, specify, construct, and document software system.

Although UML is generally used to model software systems, it is not limited within this boundary. It is also used to model non-software systems as well. For example, the process flow in a manufacturing unit, etc. UML is not a programming language but tools can be used to generate code in various languages using UML diagrams. UML has a direct relation with object-oriented analysis and design. After some standardization, UML has become an OMG standard.

UML diagrams are not only made for developers but also for business users, common people, and anybody interested to understand the system. The system can be a software or non-software system. Thus, it must be clear that UML is not a development method rather it accompanies with processes to make it a successful system. In

conclusion, the goal of UML can be defined as a simple modelling mechanism to model all possible practical systems in today's complex environment.

## 5.1Architecture diagram:

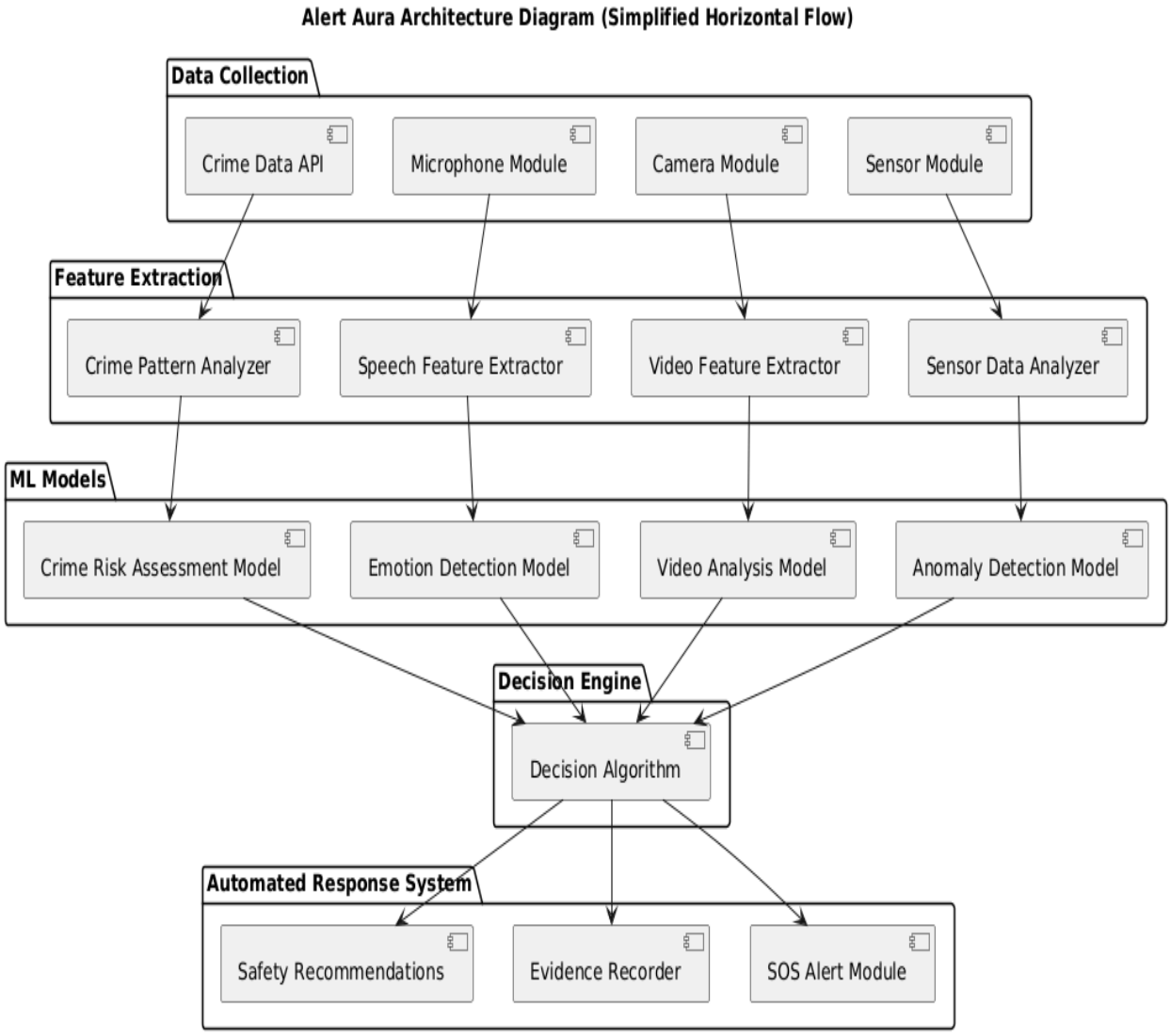



**Figure 5.1**

## 5.2 Usecase diagram

A use case diagram describes a set of sequences in which each sequence indicates the relation with outside things. A use case involves the interaction of actor and system. In below figure 6.2. describes a high level functions and scope of system. It also shows the interaction between the system and the users. Here the user acts like actor and python IDE acts like a system.

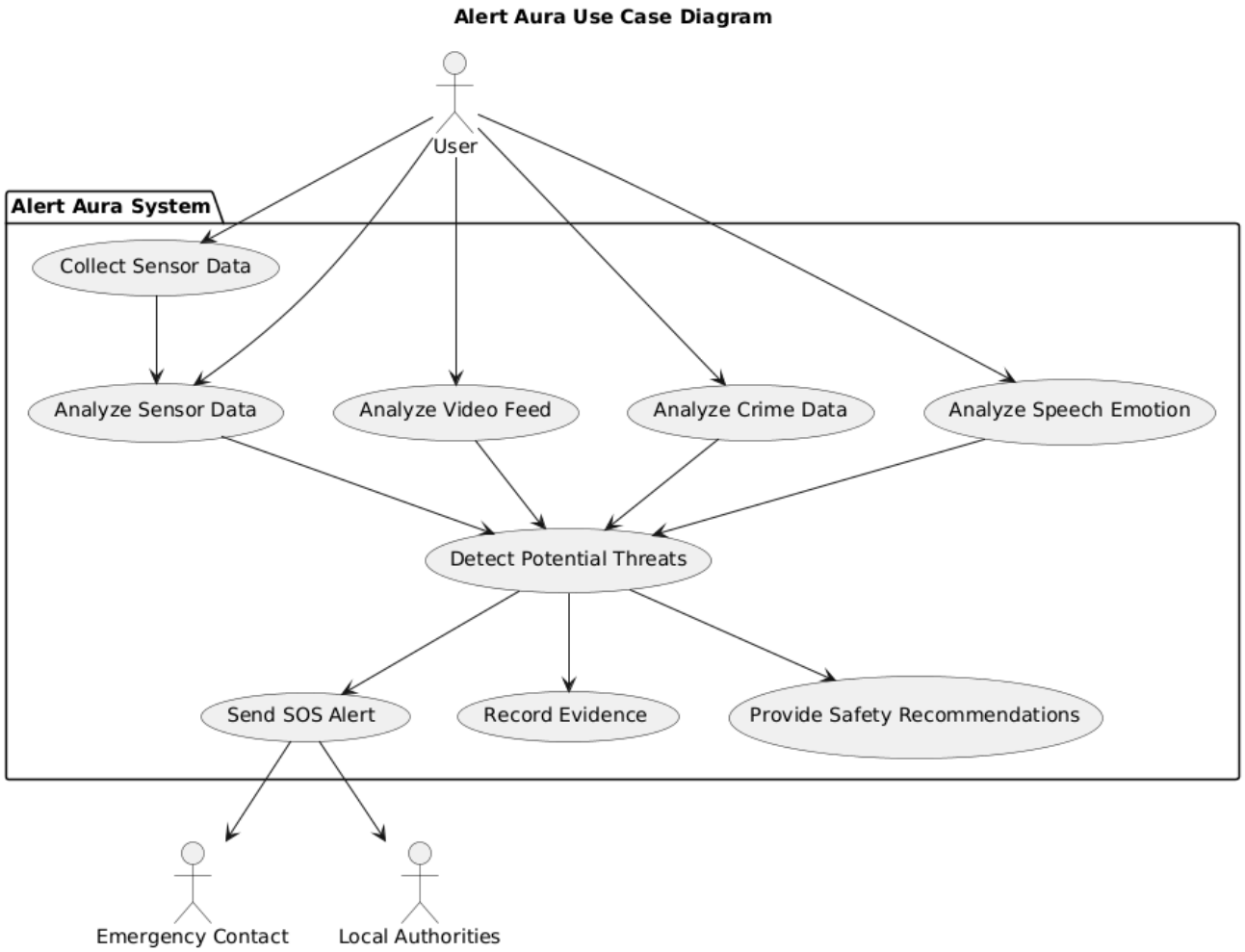



**Figure 5.2**

## 5.3 Activity Diagram

An activity diagram is a specialized type of state diagram used to visually represent the flow of control from one activity to another within a system. It functions similarly to a flowchart, providing a graphical depiction of the sequence and coordination of actions or tasks within a process. However, unlike a typical flowchart, an activity diagram is designed to model the dynamic aspects of a system, making it particularly valuable for understanding how different activities interact and transition over time. In essence, an activity diagram illustrates the workflow or the overall behavior of a system by mapping out the flow of activities and their interconnections. It shows how one activity leads to another, including the conditions or events that trigger transitions between states. This makes activity diagrams especially useful in scenarios where it is important to capture and analyze the dynamic behavior of a system, such as in software development, business process modeling, or system design.

Activity diagrams are often employed to describe complex workflows or business processes, highlighting the interactions between various elements within a system. They provide a clear and structured way to visualize how different components or actors collaborate to achieve specific objectives. By representing the flow of activities, decisions, and parallel processes, activity diagrams help stakeholders gain a better understanding of the system's functionality and behavior over time.

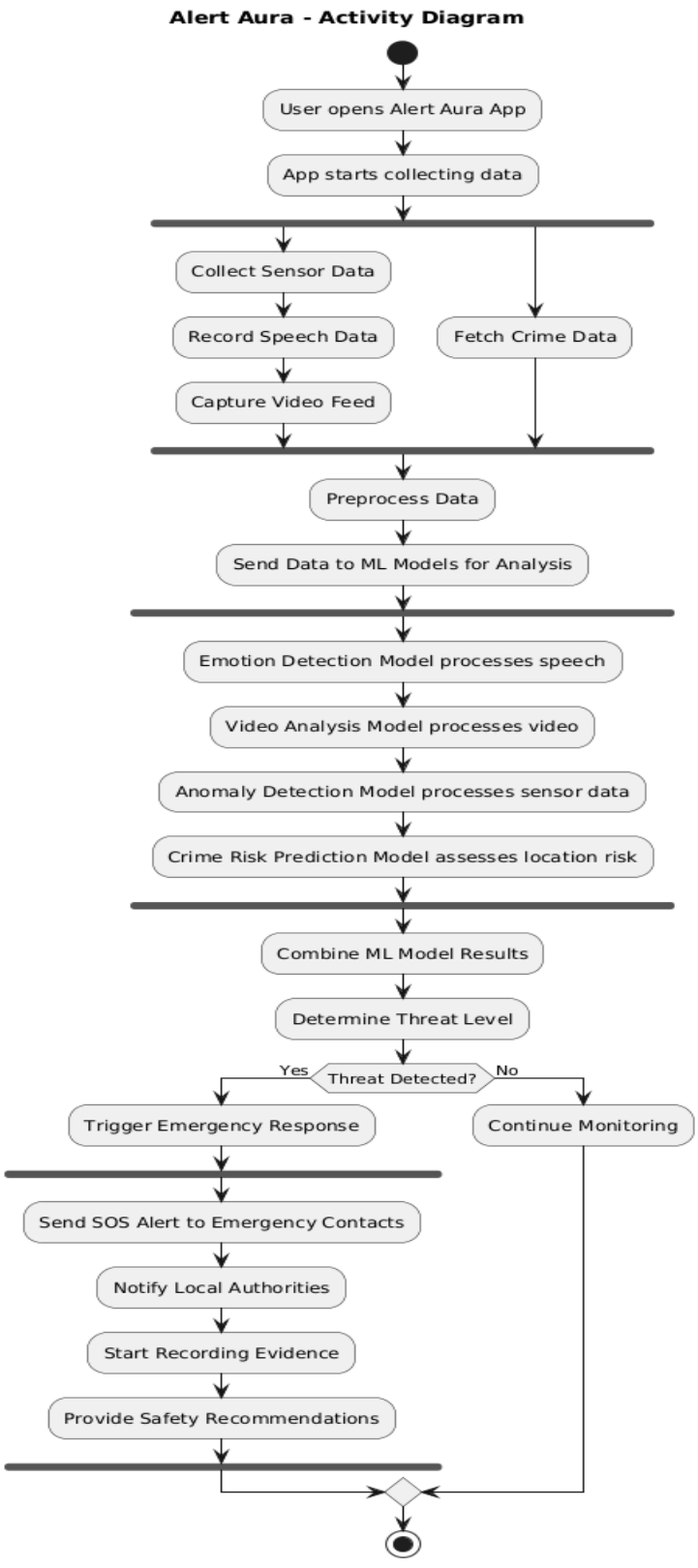

Alert Aura - Activity Diagram
User opens Alert Aura App
App starts collecting data
Collect Sensor Data
Record Speech Data
Capture Video Feed
Fetch Crime Data
Preprocess Data
Send Data to ML Models for Analysis
Emotion Detection Model processes speech
Video Analysis Model processes video
Anomaly Detection Model processes sensor data
Crime Risk Prediction Model assesses location risk
Combine ML Model Results
Determine Threat Level
Threat Detected?
Yes
No
Trigger Emergency Response
Continue Monitoring
Send SOS Alert to Emergency Contacts
Notify Local Authorities
Start Recording Evidence
Provide Safety Recommendations

**Figure 5.3**

## 5.4 Sequence Diagram

A sequence diagram is a graphical view of a scenario that shows object interaction in a time based sequence, what happens first, what happen next.

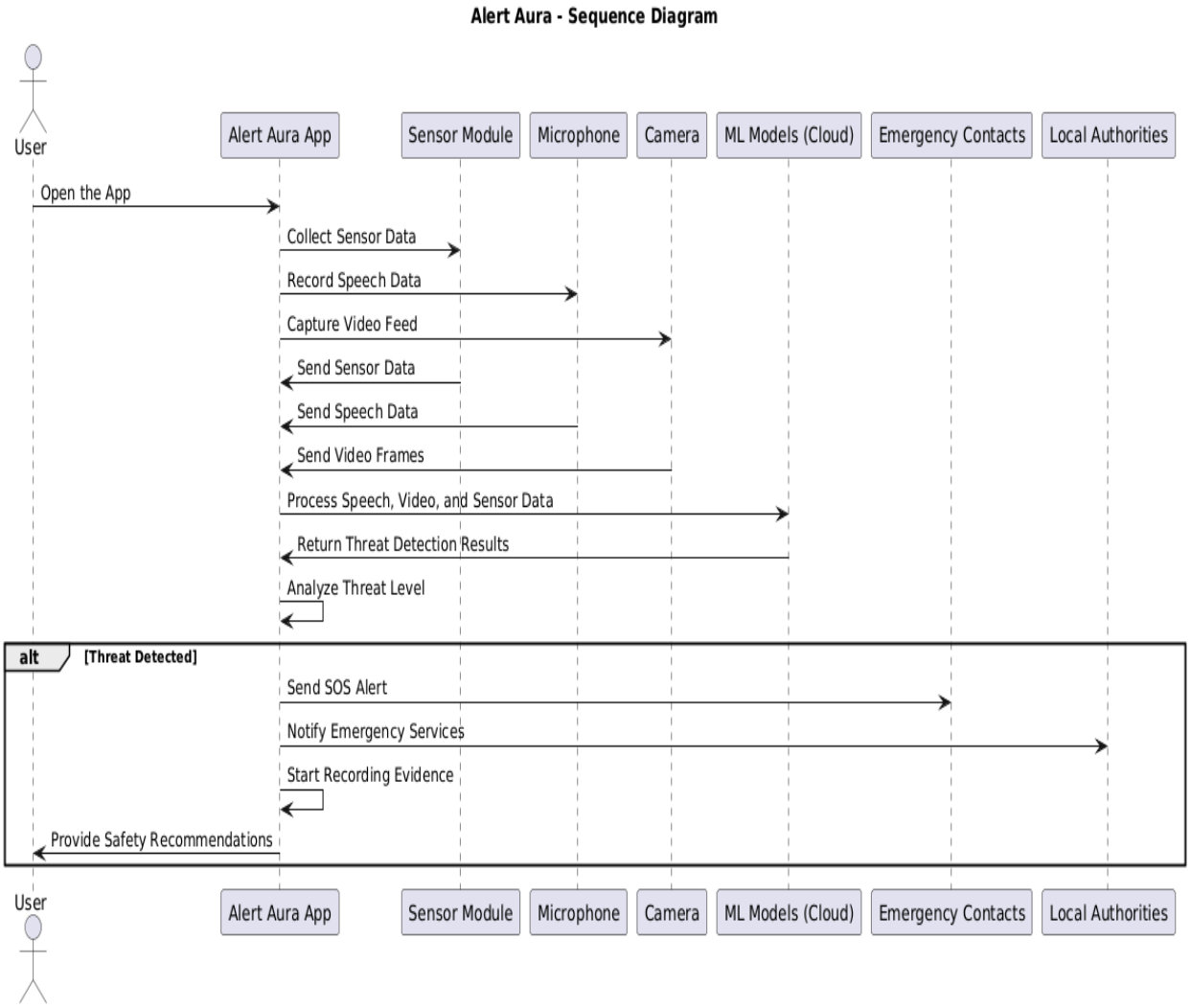



**Figure 5.4**

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