SafeNet: Rapid Response System

Approved by - Shreya Jaiswal

Group 37

Sanskruti Vinod Mahajan	**002055776**
Ishaan Pradeep Samel	**002301229**
Shruti Sen	**002057639**

Objective:

To design and implement an innovative Rapid Response system that significantly reduces response time during emergencies by delivering medical aid and providing real-time guidance to on-site responders before the ambulance arrives.

Problem Statement

During emergencies, timely medical intervention is critical. The average response time for ambulances—approximately 15-30 minutes—can be fatal for conditions like cardiac arrest, where immediate aid is required within 5-10 minutes. This project aims to bridge this time gap and enhance survival chances by deploying an Ambulance Drone equipped with essential life-saving tools and remote medical guidance.

Proposed Solution

- **Ambulance Drone:** A fast-deploying drone triggered by a 911 call, carrying a medical kit with an Automated External Defibrillator (AED), CPR aids, oxygen masks, medications, and other emergency supplies.
- **Efficient Coordination:** Automated routing to the nearest appropriate hospital, real-time alerts to doctors, and optimized ambulance dispatch pathways.
- **Police Collaboration:** In case of accidents, the drone can scan license plates to identify victims and notify their emergency contacts.

Core Components

1. Emergency System

- A centralized system that manages and categorizes emergencies, ensuring quick routing and responses.
- Types of emergencies handled:
    - **Accident Emergency**: Responds to vehicle accidents or other physical injuries.

    - **Fire Emergency**: Addresses fire outbreaks and related hazards.
    - **Medical Emergency**: Handles health-related emergencies such as heart attacks, trauma, etc.

2. Emergency Directory

- Repository of all emergency-related data.
    - **Emergency Address Location Directory**: Tracks real-time locations and provides precise details for responders.

3. Enterprise Directory

- Central directory managing all critical enterprises involved in emergency response:
    - **Emergency 911 Enterprise**:
        - Handles incoming emergency calls.
        - Manages initial routing of resources and emergency escalation.
    - **Police Enterprise**:
        - Engages in accident investigation and identification of victims.
        - Coordinates with the License Plate Directory to identify vehicles and notify emergency contacts.
    - **Hospital Enterprise**:
        - Ensures hospital readiness for incoming emergencies.
        - Connects with doctors for remote or on-site medical assistance.
    - **Drone Enterprise**:
        - Manages drones equipped with medical kits and communication systems.
        - Deploys drones to emergency sites for rapid response.

5. Person Directory

- Contains information about individuals involved in emergencies:
    - Victims: Details for identification and emergency response.
    - Emergency Responders: Doctors, paramedics, and firefighters.
    - Witnesses: Details for follow-up and incident reporting.

6. License Plate Directory

- Database of vehicle information used in accident-related emergencies.
- Scans and identifies license plates to retrieve registered owner details and notify emergency contacts.

7. Roles and User Accounts

- **Enterprise Admin Role**: Manages operations at the enterprise level.
- **Doctor Role**: Provides remote or on-site medical assistance.
- **Ambulance Role**: Handles ambulance dispatch and coordination.
- **Drone Manager Role**: Oversees drone operations and ensures deployment efficiency.

- **Hospital Admin Role**: Manages hospital readiness and resource allocation.
- **Public Safety/Dispatch Admin Role**: Coordinates between police, fire departments, and medical responders.
- **Police Role**: Investigates accidents and ensures law enforcement collaboration.
- **Emergency 911 Role**: Monitors emergency calls and triggers the appropriate responses.

8. Drone System

- **Drone Directory**:
    - Database of all drones, tracking their availability and status.
- **Drone Stations**:
    - Physical locations where drones are maintained and deployed for emergencies.

Summary of Organizations

- **Drone Organization**: Responsible for drone maintenance and deployment.
- **Ambulance Organization**: Manages ambulance dispatch and tracking.
- **Doctor Organization**: Provides medical expertise and remote guidance.
- **Hospital Organization**: Handles Hospital readiness
- **Emergency 911 Department**: Coordinates initial emergency handling and response routing.
- **Police Organization**: Focuses on victim identification and accident investigation

Use Cases

1. Emergency Detection and Response

- **Scenario**:
    - A witness or victim calls 911 for an emergency (accident, fire, or medical).
    - The **Emergency 911 Operator** receives the call, categorizes it, and creates a work request.
    - Based on location and type of emergency:
        - A **drone** is deployed to the site with emergency supplies (AED, oxygen mask, etc.).
        - An **ambulance** is dispatched to transport the victim to the nearest hospital.
    - The **hospital admin** is notified in real-time, and a doctor is assigned to prepare for the patient's arrival.

2. Real-Time Medical Assistance Using Drones

- **Scenario**:
    - A **drone** equipped with medical supplies (AED, CPR kit, etc.) is dispatched to the site.

    - The drone's integrated communication system connects the victim or bystanders to a **doctor** for real-time guidance.
    - The doctor instructs the victim or bystanders on using the supplies until professional help arrives.

3. Accident Victim Identification

- **Scenario**:
    - A **drone** scans the accident site for vehicles and uses the **License Plate Directory** to identify the victim.
    - The system retrieves emergency contact information and notifies the victim's family or close relatives.
    - The **police** coordinate follow-up investigations, if necessary.

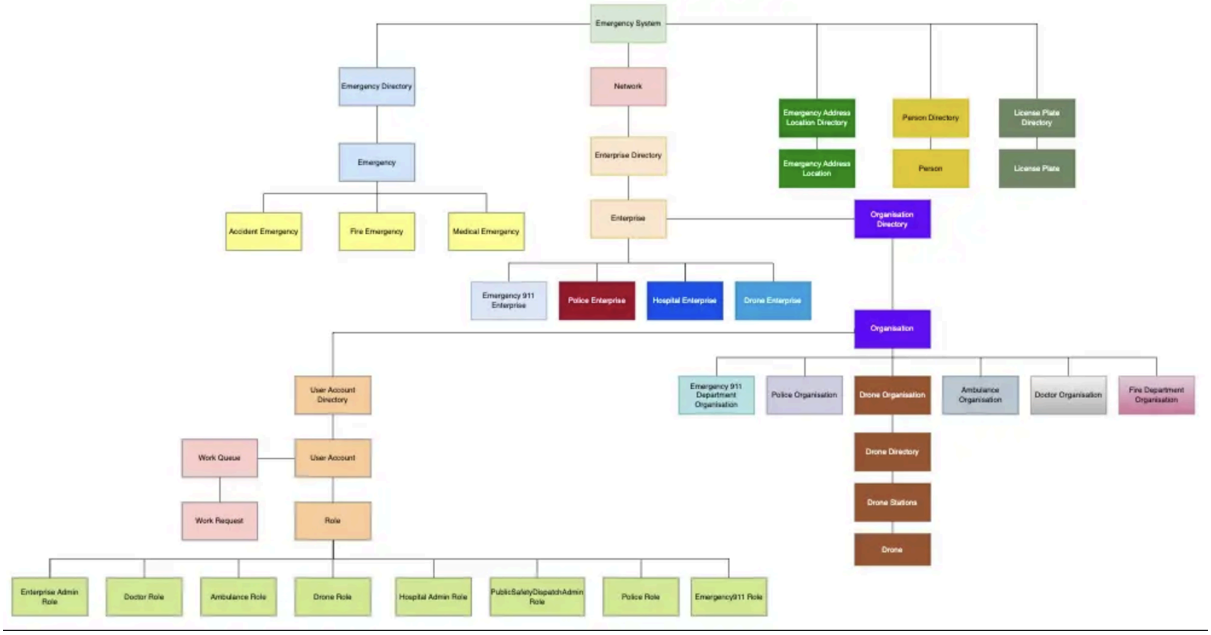
4. Emergency Contact Notification

- **Scenario**:
    - In an accident, the **Police** use the **License Plate Directory** to identify the victim.
    - The system automatically notifies the victim's **emergency contacts** about the incident.

5. Drone Station and Fleet Management

- **Actors**: Drone Admin, Drone Organization.
- **Scenario**:
    - The **Drone Admin** monitors drone availability and assigns tasks based on emergency requests.
    - The **Drone Organization** ensures maintenance of the drone fleet and readiness for deployment.

High-level Component Diagram


Emergency System
Emergency Directory
Network
Emergency Address Location Directory
Person Directory
License Plate Directory
Emergency
Enterprise Directory
Emergency Address Location
Person
License Plate
Accident Emergency
Fire Emergency
Medical Emergency
Enterprise
Organisation Directory
Emergency 911 Enterprise
Police Enterprise
Hospital Enterprise
Drone Enterprise
Organisation
User Account Directory
Emergency 911 Department Organisation
Police Organisation
Drone Organisation
Ambulance Organisation
Doctor Organisation
Fire Department Organisation
Work Queue
User Account
Drone Directory
Work Request
Role
Drone Stations
Drone
Enterprise Admin Role
Doctor Role
Ambulance Role
Drone Role
Hospital Admin Role
PublicSafetyDispatchAdmin Role
Police Role
Emergency911 Role