Software Requirement Specification Document for Alert application

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Table 1: Document version history

Version	Date	Reason for Change
1.0	8-jan-2024	SRS First version's specifications are defined.

GitHub: `https://github.com/MalakMaged/Alert`

Contents

Abstract

The Alert Mobile Application transforms safety reporting by enabling users to submit witnessed crimes. Leveraging advanced image processing, the app validates and categorizes incidents, populating a dynamic dashboard and interactive map. Stored in a secure database, reported crimes fuel comprehensive analytics. Beyond reporting, the app enhances user safety by recommending safer routes based on historical crime data analysis. This Software Requirements Specification (SRS) document outlines meticulous requirements, covering image processing algorithms, database management, and seamless incident integration into a user-friendly interface. With its innovative features, the app aims to empower users in contributing to community safety while making informed decisions about secure routes.

1 Introduction

1.1 Purpose of this document

The purpose of this Software Requirements Specification document is to outline the functional and non-functional requirements for the development of an alert mobile app. This document serves as a comprehensive guide for the development team, ensuring clear understanding and successful implementation of key features, user interactions, and system behavior, ultimately delivering a reliable and effective alert application.

1.2 Scope of this document

This SRS document outlines the creation of a robust alert mobile application, emphasizing the incorporation of UML diagrams, including use case diagrams and context diagrams. The scope encompasses detailing both functional and non-functional requirements, elucidating user interfaces, and delineating system behavior. Furthermore, it will showcase the app's capabilities, features, and constraints. In addition to providing a comprehensive guide for developers, it will draw comparisons with similar apps, offering insights into our app's unique value proposition. The document will also succinctly elucidate how users can efficiently navigate and leverage our application.

1.3 Business Context

Our goal to build reliable mobile application that is easy for users to use it anywhere,users can easily check the nearby crimes also submit any car accidents that they witnessed,we aim to build accurate algorithm that provide safe routes for users so the application can be integrated with uber and Careem so this applications can get the safest route for users to increase the user safety percentage.also it can be integrated with the police to get notified with the crimes that happens at the moment and know the exact locations of the crimes or fires easily through our application.

2 Similar Systems

2.1 Academic

CitiSafe – Interactive Crime Reporting This paper addresses the inadequacies in crime reporting systems, it presents CitiSafe as their solution. Citisafe produces an interactive application for real-time reporting for citizens, intending to streamline communication between the public, police, and response units. The app categorizes users into three groups: citizens, authorities, and response units. The paper does not mention their used dataset, but it shows the implementation of the architecture of CitiSafe, emphasizing real-time tracking and a main dashboard for authorities. This paper lacks security measures information and user feedback validation. The paper authors would benefit from doing comparative analysis with existing systems to show their own improvements[1]

Route-The Safe: A Robust Model for Safest Route Prediction Using Crime and Accidental Data The paper addresses the increasing safety concerns in urban areas, particularly for individuals unfamiliar with a city, by proposing "Route-The Safe," a model for predicting the safest travel routes using crime and accident data. The researchers contribute by integrating nested K Means clustering and K Nearest Neighbor Regress, emphasizing the significance of considering smaller crime areas. The dataset utilized comprises updated crime and accident data from New York City, with a focus on the Manhattan Borough. Results indicate successful clustering, high R2 scores (0.910 for accidents, 0.974 for crimes), and the model effectively suggesting safer routes. While the paper offers valuable contributions, potential criticisms include the need for additional factors influencing safety, the absence of an Android version, and scope for improving user experience.[2]

Image and video-based crime prediction using object detection and deep learning The paper addresses the rising interest in utilizing artificial intelligence for image and video-based crime detection, particularly focusing on handheld firearms and bladed weapons. The researchers contribute by proposing a deep learning-based surveillance system, selecting YOLOv5 for its optimal balance of mean average precision and real-time inference speed. The Open Images Dataset V6 is employed for data collection, consisting of over nine million images, and six weapon categories are extracted and grouped into firearms and bladed weapons. Results reveal that YOLOv5 achieves a mean average precision of 56.92 percent and an impressive real-time inference speed of 61 frames per second. The paper effectively introduces a practical solution for law enforcement, emphasizing the importance of accuracy and speed in object detection algorithms. A potential critique could address the limitations of the dataset used or the ethical considerations surrounding AI in crime detection.[3]

A Proposed Solution for Crime Reporting and Crime Updates on Maps in Android Mobile Application The paper proposes an Android mobile application developed at SEGi University to enhance public awareness of crime situations. The app aims to provide real-time crime updates, map crime locations, and facilitate crime reporting to law enforcement agencies. However, the paper lacks details on the dataset used, diminishing transparency. It emphasizes the importance of public awareness for community safety, citing the role of police in securing lives and property. The application, designed for specific areas with police database integration, targets public use. The methodology involves Android development tools, Java, Android SDK, MySQL, PHP, JSON, XAMPP, and Google Maps Android API. Future recommendations include integration with traffic police databases, facial expression algorithms, live video streaming, and improved fake evidence prevention. The paper is appreciative of those who contributed, but its effectiveness is hindered by insufficient technical details, algorithm explanations, and evaluation metrics.[4]

Crime reporting and police controlling: Mobile and web-based approach for information-sharing in Iraq The paper addresses underreporting of crimes in Iraq due to a lack of trust, proposing a multi-approach solution involving a mobile app for exclusive witness reporting. Using a mixed-methods approach with 200 participants, the study demonstrates the app's effectiveness in monitoring and tracking criminals through a cloud-based database. However, limitations include a lack of real-time testing and insufficient discussion of relevant mobile technology theories. The paper calls for more quantitative studies to understand Iraq's interaction barriers between citizens and law enforcement. Overall, it emphasizes the potential of technology to improve crime reporting but acknowledges the need for further exploration and testing to enhance its applicability.[5]

Feasible Criminal Identification using Image Recognition This paper presents a facial recognition system to identify criminals and aims to enhance the accuracy and efficiency of law enforcement. It discusses using datasets such as FERET and LFW for training and evaluation. The system's steps are detecting faces, extracting features, and matching them for identification. This system's benefits are improving crime detection and real-time monitoring. However, It lacks a lot of detailed exploration of biases and ethical concerns tied to this technology. Despite its potential advantages, the disadvantages might outweigh them.[6]

Warning Apps for Road Safety: A Technological and Economical Perspective for Autonomous Driving – The Warning Task in the Transition from Human Driver to Automated Driving This research's main focus is on warning apps for road safety during the transition to autonomous driving. The study examines existing warning apps in German-speaking regions, finding that many are still in development or have operational issues. It emphasizes the potential of warning apps to improve road safety, especially with driving assistance and full autonomous driving. The paper mentions the need for adjustments in business models but the paper has more issues. It doesn't explain its methods well, doesn't provide enough real-world data, and doesn't have a complete economic model. Also, it forgets to talk about important ethical and regulatory matters needed for real-life use.[7]

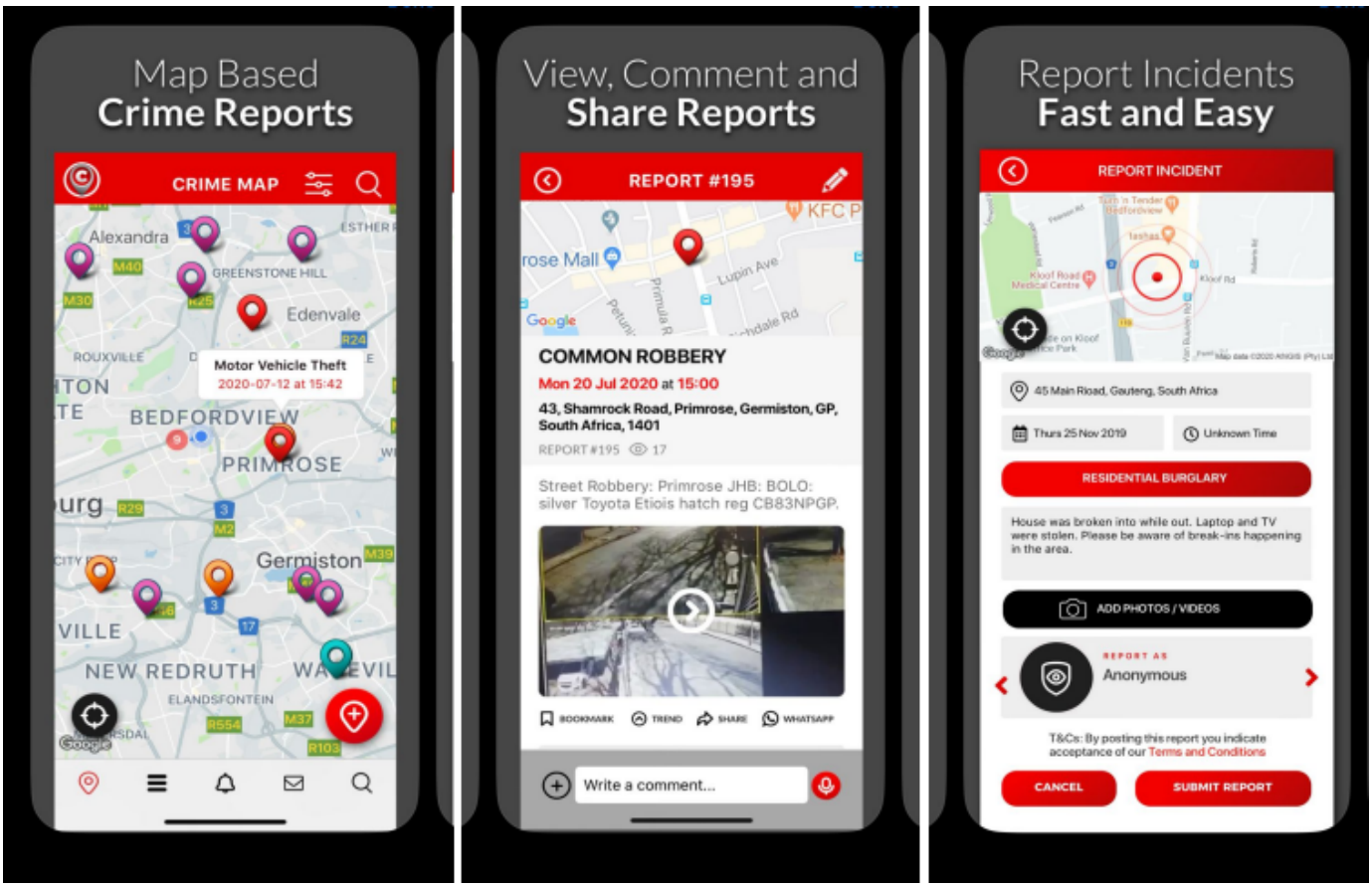
SafeShe (A Women's Safety Mobile App) The paper introduces SafeShe, a mobile app aimed at enhancing women's safety by offering features like emergency alerts, GPS tracking, and self-defense tutorials. Developed using Flutter, the app harnesses mobile device technologies to detect

and respond to risky situations. The researchers rigorously tested SafeShe to ensure its reliability and efficiency. While the paper lacks explicit details about datasets used, it highlights the app's user-friendly design, accessibility, and potential to empower women by providing a dependable tool during emergencies. However, it could benefit from more concrete real-world testing scenarios or user feedback to further validate its effectiveness beyond technical development.[8]

2.2 Business Applications

First similar business application:(Crime Spotter App)

- user can view map and navigate through crimes.
- user can add new crime with pictures only for validation.
- collect the crimes and find the common crimes.
- alert for all users nearby the crime.



Second similar business application:(QLD crime)

- user can view heat map of the crimes.
- user can check even if there is any nearby crimes in the area surrounded.

3 System Description

3.1 Problem Statement

Crime poses a threat to societies worldwide, impacting the safety, well-being, and trust within communities. This multifaceted challenge necessitates comprehensive and innovative solutions. Increasing rates of traditional crimes, coupled with the emergence of sophisticated cybercrimes, demand a dynamic approach to law enforcement and public safety. In urban areas, the concentration of diverse criminal activities requires targeted strategies for prevention and intervention. Trust-building between law enforcement and communities is crucial, emphasizing the importance of community policing initiatives. The pervasive issue of human trafficking and exploitation further underscores the need for global cooperation and robust legal frameworks. Addressing crime requires not only reactive measures but also proactive efforts, such as predictive analytics to anticipate criminal patterns and enhance resource allocation. Special attention must be given to vulnerable populations, including at-risk youth, as part of a holistic approach to breaking the cycle of criminal behavior. Initiatives combating drug abuse and related crimes, as well as violence in specific geographic areas, contribute to the overarching goal of fostering safer and more secure

societies. In navigating the complex landscape of crime, the integration of technology, community engagement, and evidence-based interventions becomes paramount in creating a resilient and just societal framework.

3.2 System Overview

As shown in figure 1, This is a mobile based application. The user must start by signing up using email, password, name, and phone number(optional).Then the user can view the map and navigate through it or check the Dashboard news as well for latest reports by other users. Then user can choose to report an incident on a certain location on the map by specifying the incident type, and adding a description on the report , and he/she can also add image to support his/her cause, lastly the user can submit the report with his account username or choose to submit it anonymously. Then the images submitted must be processed to check their validity and that they are not fake or out of context images. Afterwards if the images are validated the report is stored on our database and a pinpoint is added on the map where the report was made for. Then users are alerted after each incident report and the dashboard will be updated. Also User will have the ability to search for any location on the map, and our app will provide an algorithm for getting the safest route to this destination.

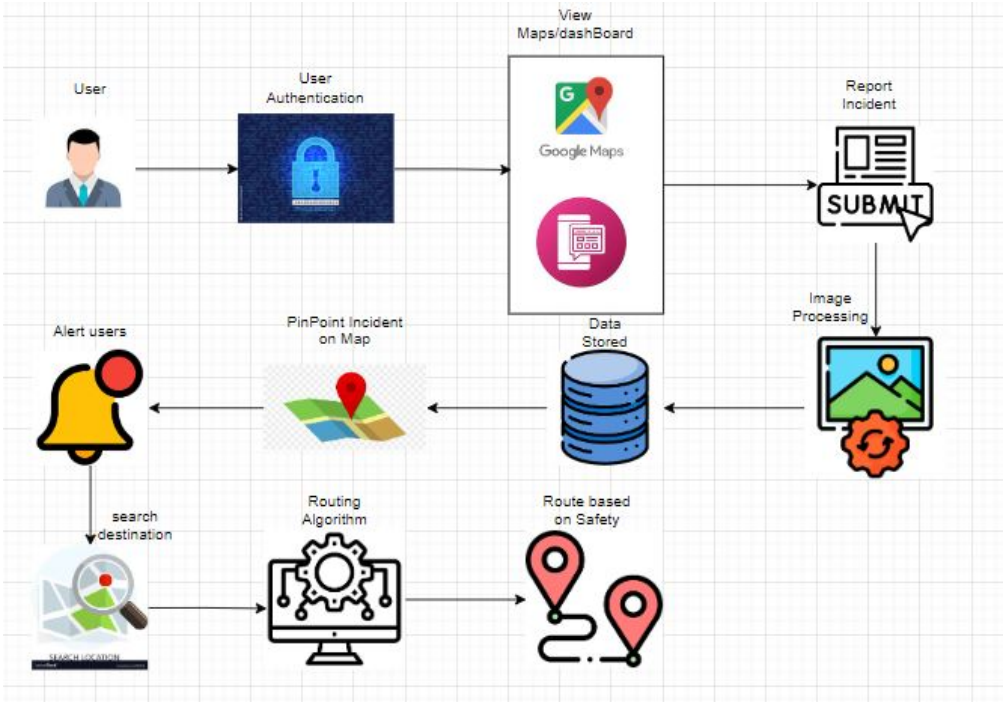


Figure 1: System Overview Diagram

3.3 System Scope

The proposed system aims to provide a user-friendly and efficient platform for the public to report and communicate incidents,and reroute users to safer areas based on their destinations, enhancing community safety and awareness.The scope encompasses the following key features and functionalities:

User Registration and Authentication:

- Users can create accounts securely and log in to the app to access reporting functionalities.

Incident Reporting:

- The app allows users to report various types of incidents, including but not limited to theft, vandalism, assault, and suspicious activities.
- Users can provide detailed information such as the location, time, and a description of the incident.

Media Upload:

- Users have the option to attach photos to supplement their incident reports.

Real-time Location Services:

- The app utilizes GPS technology to capture and include the user's real-time location when reporting an incident.

Anonymous Reporting:

- To encourage widespread participation, the app supports anonymous reporting, ensuring user privacy and safety.

Push Notifications:

- Users receive timely notifications about relevant safety alerts, updates on reported incidents.

Customized Routing:

- app routes users to their specified destination based on the safest route.

3.4 System Context

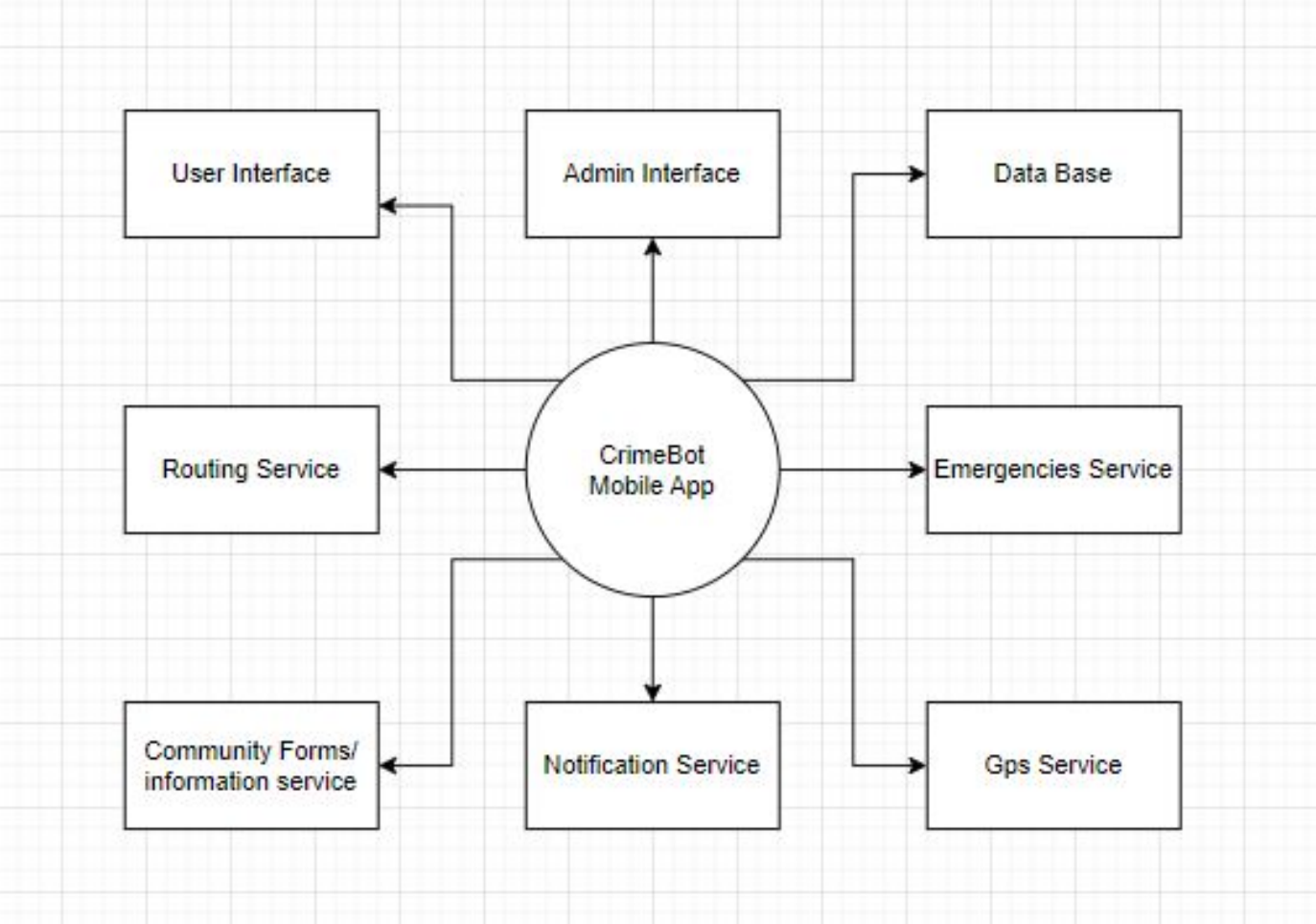


Figure 2: System Context Diagram

3.5 Objectives

1. improving safety
2. decreasing crime rates
3. Quick Incident Reporting
4. User Positive contribution to community
5. Anonymous Reporting without having fear
6. media proof for enhancing the understanding of reported incidents
7. providing statistics for authorities
8. Emergency Services Integration
9. Data Analytics for Crime Trends
10. Public Awareness and Education

3.6 User Characteristics

- User must own a mobile phone
- User must know how to deal with technology
- user can download the app either from Android mobile or iOS
- User must have basic English knowledge since it will be the user interface's default language
- User can be of any age
- User can be any one (student, graduate, worker, ...etc)

4 Functional Requirements

4.1 System Functions

The use case diagrams for this project are shown in the following figures.

Admin Use Case Diagram:

figureAdmin Use Case Diagram

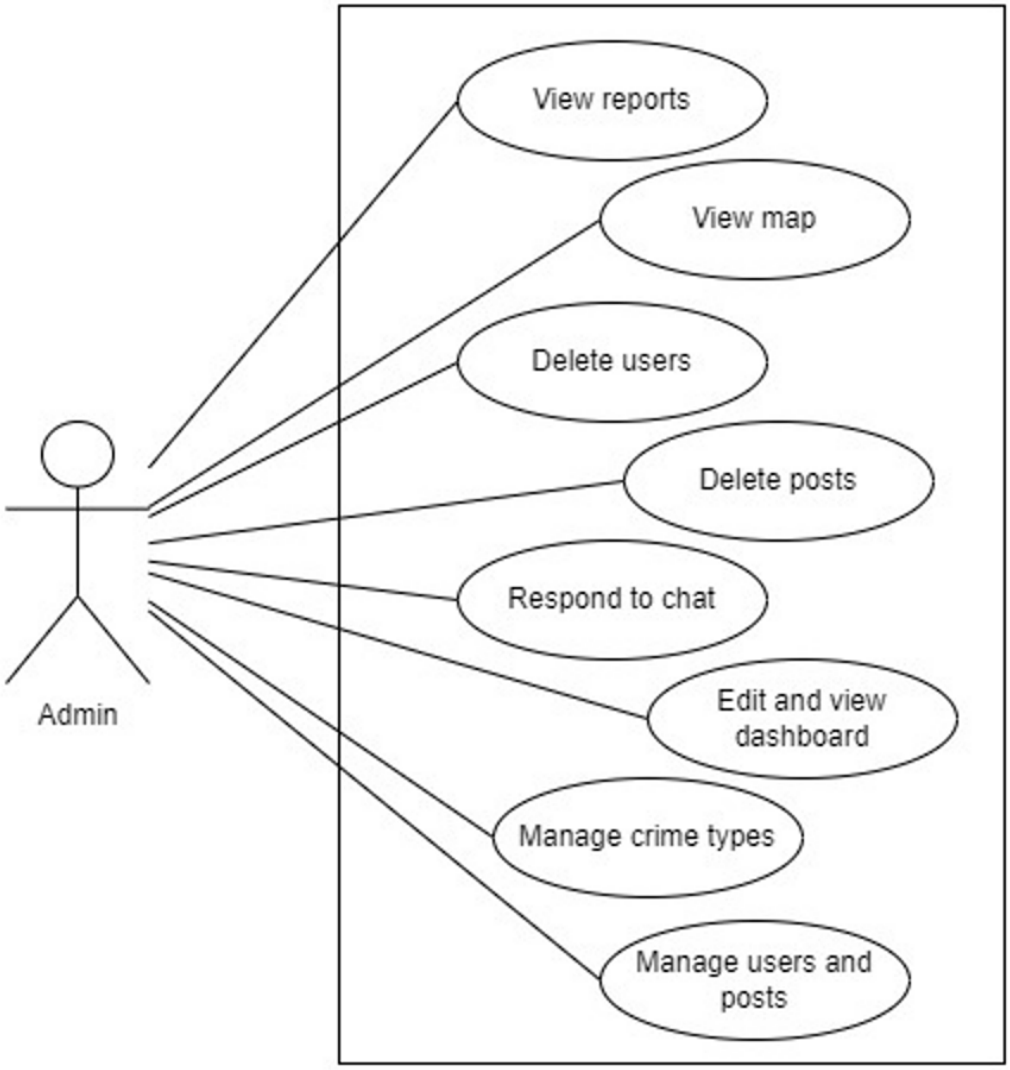


Figure 3: User Use Case Diagram

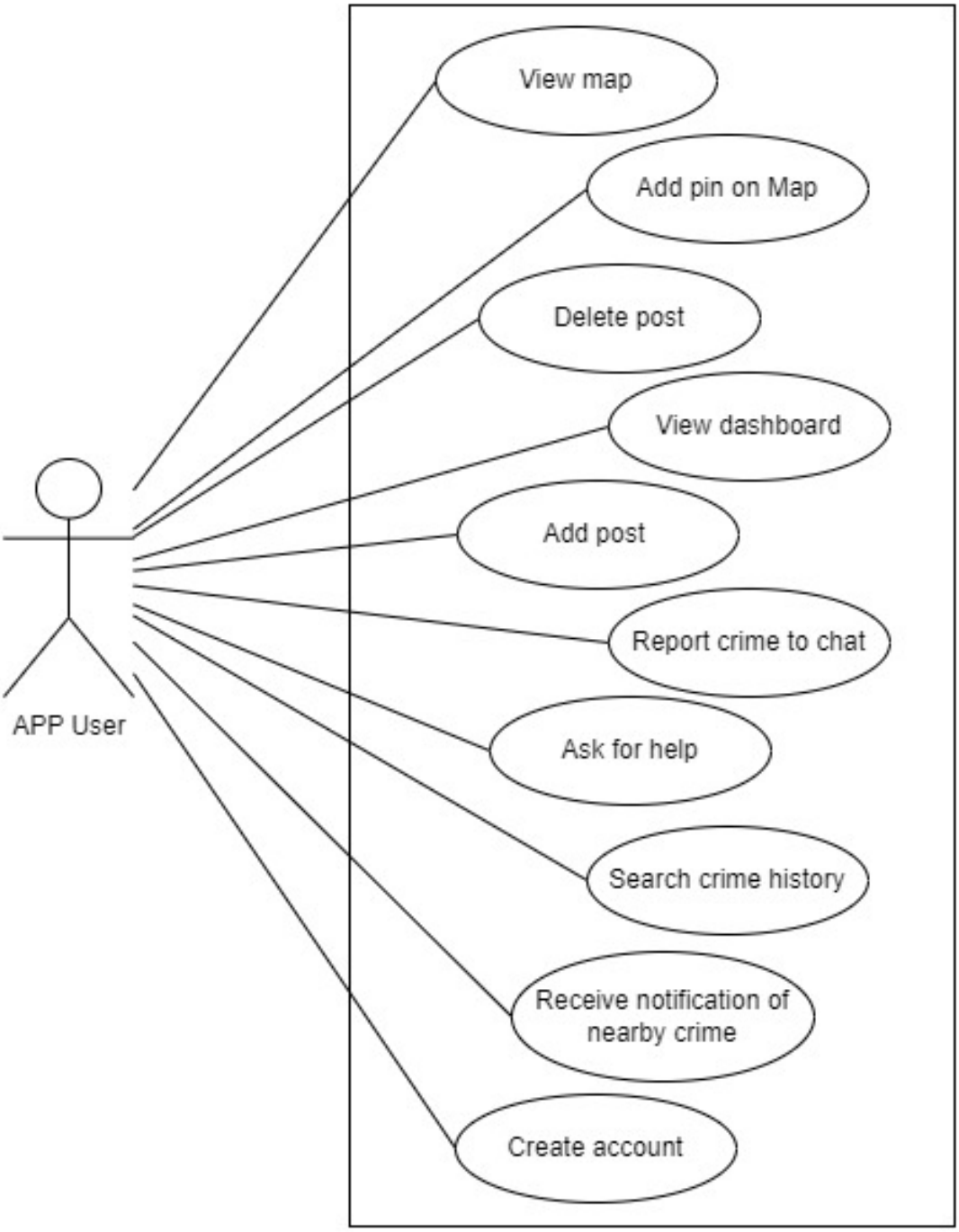
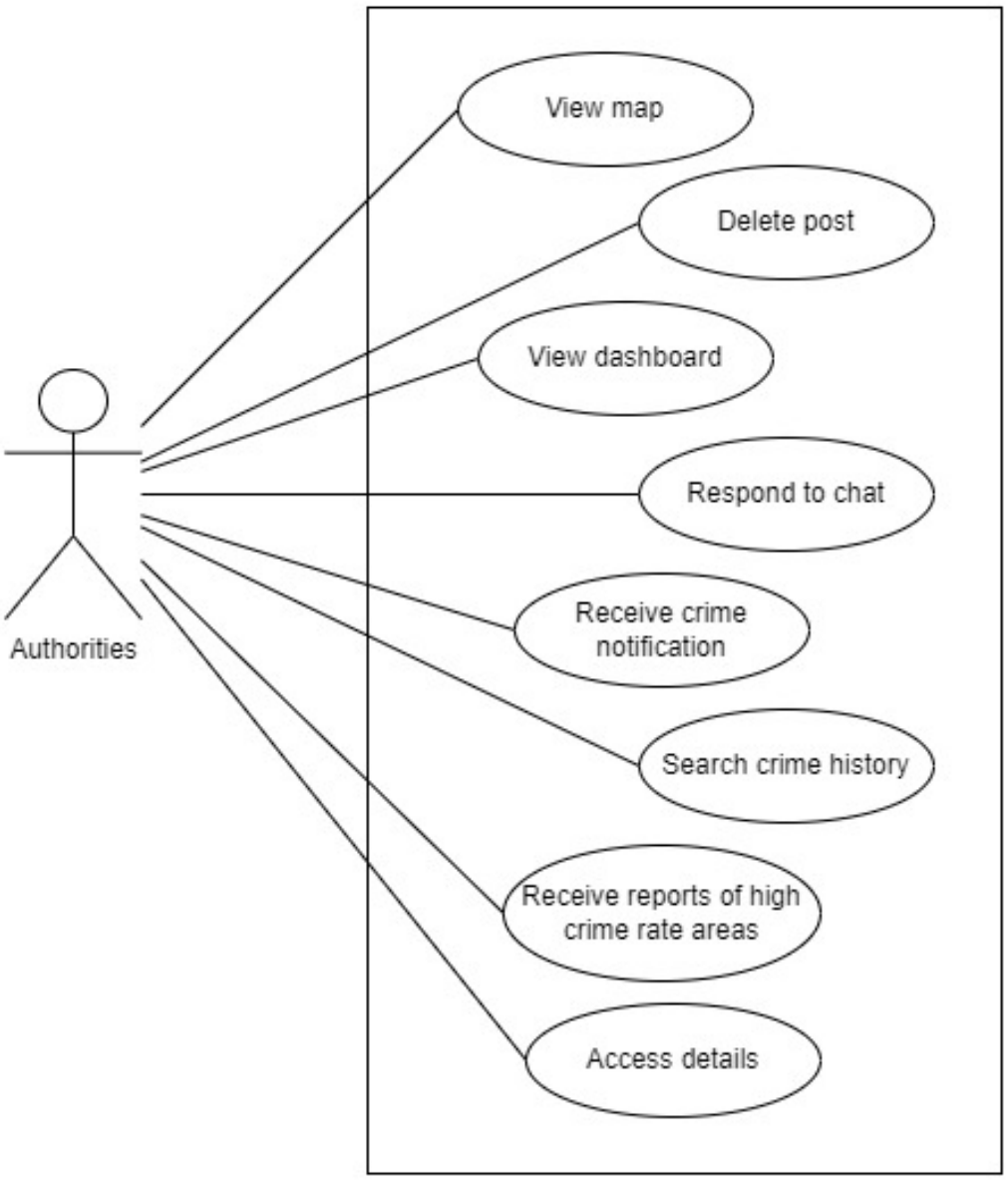


Figure 4: Authorities Use Case Diagram



- user shall sign-up an account.(F00)
- User shall Login with an account.(F01)
- User shall Edit account information.(F02)
- User shall Delete account.(F03)
- User shall Register a new account.(F04)
- user shall view the dash board.(F05)
- user shall view the map.(F06)
- user shall submit any witnessed crime.(F07)
- user shall upload picture of the crime.(F08)
- user shall delete his crime.(F09)
- user shall edit his crime.(F10)
- user shall post his crime anonymously.(F11)
- user shall chat with the admins for an emergency contact.(F12)
- user shall choose area to get its safe direction.(F13)
- system shall transfer all the crimes to dashboard.(F14)
- system shall pin the crimes in map.(F15)
- system shall generate safer route to users.(F16)
- system shall validate the crimes by image processing.(F17)
- The system acknowledges that the user's photos are uploaded.(F18)
- System shall ask users to re-upload photos if an error happens.(F19)
- The system acknowledges that the user's photos are uploaded.(F20)
- system shall update the dashboard day by day.(F21)
- system shall the crimes in dashboard and map for a period of time depend on the emergency of the crime.(F22)
- admins shall view all crime details.(F23)
- admin shall delete any crime.(F24)
- admin shall delete profiles.(F25)

- admin shall add new type of crimes if needed.(F26)
- admin shall connect to user who face any crime at the moment.(F27)
- admin shall connect the police to some crimes.(F28)

4.2 Detailed Functional Specification

Table 2: Sign-up

name	**Sign-up**
Code	(F00)
Priority	High
Critical	User should have an account to access the application
Description	The user enters some input to create an account
Input	user name, email, password, phone number, and picture
Output	The user will access the system
Pre-condition	None
Post condition	If data has no errors send them to sign up
Dependency	There is no Dependency in this step
Risk	If the sign-up doesn't work or let the user sign in, then the user won't be able to access the application

Table 3: Login

name	**Login**
Code	(F01)
Priority	High
Critical	User should have an account to access the application
Description	The user enters some input to login
Input	user name and password
Output	The user will view the home page of the application
Pre-condition	user must already have a created account
Post condition	If found go to the homepage if not say that email or password is incorrect
Dependency	(F01)
Risk	If the login doesn't work or let the user login, the user should check that the entered username and password are correct

Table 4: Submit Crime

name	**Submit Crime**
Code	(F07)
Priority	High
Critical	User should have access to the map to post a crime
Description	User should have an account and access the map to post a crime and add a description, upload a picture for validation
Input	Picture with description and location get from the application automatically
Output	The data of the post will be added to the database and validating to be available on the map and dashboard
Pre-condition	User must submit crime description with picture and location
Post condition	If the input of the user have no errors it will be validated and saved in database
Dependency	(F01)
Risk	No risk in this step

Table 5: Chat with Admins

name	**Chat with Admins**
Code	(F12)
Priority	Moderate
Critical	User can chat with admins if the user is facing any emergencies
Description	User should have an account and face any type of crimes and need any support
Input	Only chat and location will be automatically taken from the device of the user
Output	The admins will connect police with the user to support the user
Pre-condition	The user is facing a crime
Post condition	Police connected to the user to solve the problem
Dependency	(F07)
Risk	User is faking the crime

Table 6: Crime Shown in Dashboard

name	**Dashboard Show**
Code	(F14)
Priority	High
Critical	System should show all crimes in the dashboard
Description	After validating the crimes, the system should retrieve all crime details from the database and post it in the dashboard
Input	The crime submitted by the user
Output	The crime appears in the dashboard
Pre-condition	none
Post condition	Dashboard started to be filled with all validated crimes
Dependency	(F07)
Risk	No risk

Table 7: Crime Pin in Map

name	**Map Pin**
Code	(F15)
Priority	High
Critical	System should show all crimes in the map as pins
Description	After validating the crimes, the system should retrieve all crime details from the database and show it in the map as pins
Input	The crime submitted by the user
Output	The crime appears in the map as a pin
Pre-condition	none
Post condition	Map started to be filled with all validated crimes
Dependency	(F07)
Risk	No risk

Table 8: Safe Route Generation

name	**Safe Route Generation**
Code	(F16)
Priority	High
Critical	System should generate a safe route for users
Description	After validating the crimes on the map, the system generates routes with fewer crimes and safer paths
Input	The crime pins on the map
Output	The route with a low percentage of crimes
Pre-condition	The normal route where the user may face any type of crimes
Post condition	Safe route generated for the user with the same destination
Dependency	(F15)
Risk	There are many crimes in many different routes

Table 9: Validate Crimes with Pictures

name	**Image Processing**
Code	(F17)
Priority	High
Critical	Image process the uploaded image
Description	Image processing the uploaded image by the user to validate the crime and detect the type of crime
Input	Image
Output	Validation of the crimes with crime type
Pre-condition	The crime is submitted without the validation
Post condition	Crimes validated with their type
Dependency	(F08)
Risk	Untrained types of images

5 Design Constraints

5.1 Standards Compliance

Alert mobile application can work with iOS and Android operating systems,User must own a smart mobile phone and mobile user should access camera.

5.2 Hardware Limitations

The user needs a smartphone that has a functioning camera to take photos of crimes in order to validate it to get better accuracy of the application

5.3 Network constraints

The user should be connected to internet either wifi or mobile data

6 Non-functional Requirements

6.1 security

- The data must be secured in order for the System to be available everywhere, reliable, secured
- login by email or phone number and receive verification code.
- No one can access the system without having an account.
- No one can know the anonymous posts except admins

6.2 Accessibility

- The app will provide friendly user interface that suitable for all type of people
- The app will be provided with simple interface to make it easy for young people to use also disabilities

6.3 Availability

- The System is permanently available at all times for users or visitors to be accessed.And it need's wifi and location to get Notified by the nearby crimes and get new safe directions.

6.4 Performance

- The application should work fast without any errors or delays or system failure.
- All application should load at least in 3 seconds.
- The application must not cause any error or system failure while the system is being developed.

6.5 usability

- The application is easy to use. You don't need to read instruction in order to be able to use the system,as there is symbols or named buttons.
- The user interface is easy to be used and understandable for anyone.

7 Data Design

We are using Fire store/fire base database, we have 3 current tables:

- first table for the users it is responsible for storing and updating user information's(email, password, phone number, username).
- The second table is for posts submitted by users, it is responsible for handling all reports information (post type, content, timestamp, associated user)submitted and storing them after being validated.
- The last table is the crime markers, it is responsible for representing a pinpoint on the map with the associated post submitted stating info on the map regarding the (crime type, description, image submitted, latitude, longitude, reporter name, reporter time).

8 Preliminary Object-Oriented Domain Analysis

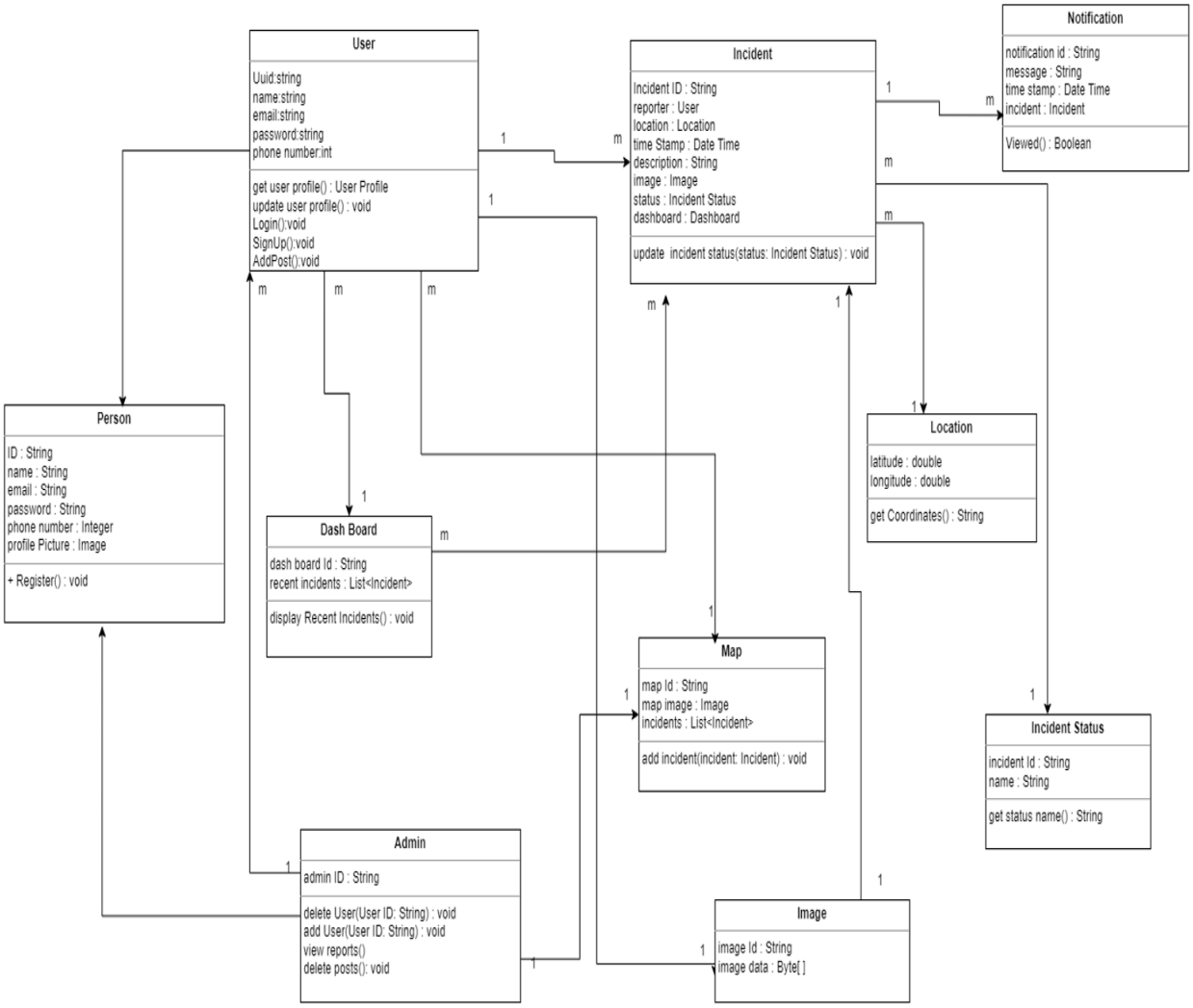


Figure 5: Class Diagram

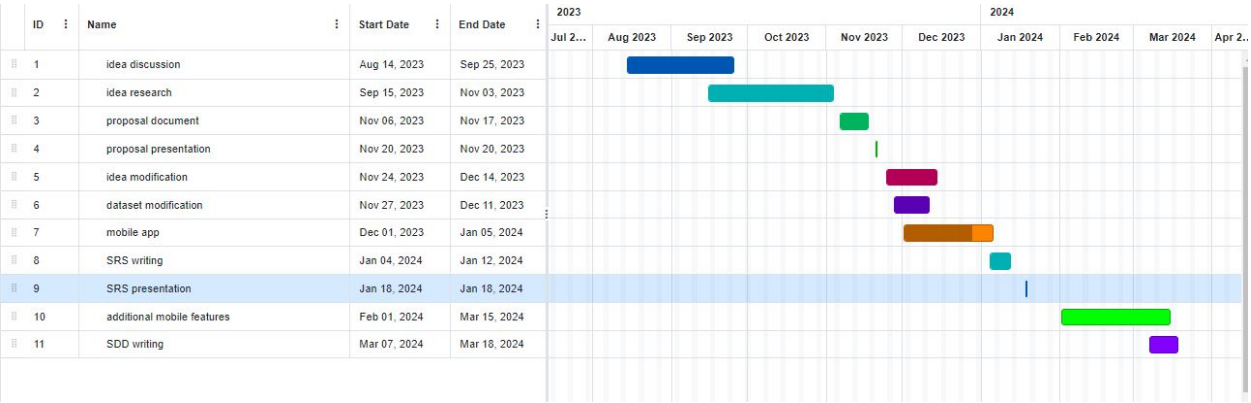
9 Operational Scenarios

1. **User Reporting an Incident Scenario:**
    - A user witnesses a suspicious activity in their neighborhood.
    - The user opens the mobile app and selects the "Report Incident" option.
    - They provide details about the incident, such as location, description, and incident type.
    - Optionally, they attach a photo as evidence.
    - After submitting the report, the system generates a unique incident ID.
2. **Admin Reviewing Reported Incidents Scenario:**
    - An admin logs into the admin portal of the app.
    - They access the "Manage Incidents" section.
    - The admin sees a list of reported incidents, each with details and status.
    - They review incident details, and may contact users for additional information.
3. **User Checking Incident Status Scenario:**
    - A user logs into the app to check the status of a previously reported incident.
    - They navigate to the "My Reports" section.
    - The user selects the specific incident and views its current status (e.g., reported, resolved).
    - If the status changes, the user receives a notification.
4. **Admin Managing User Accounts Scenario:**
    - An admin needs to update a user account.
    - They access the admin portal, navigate to "User Management."
    - The admin can modify user details, reset passwords, or deactivate accounts if necessary.
5. **User Receiving Notifications Scenario:**
    - A user receives a push notification on their mobile device.
    - The notification informs them of updates on a reported incident.
    - The user taps the notification and is directed to the app, where they can see the details of the update.
6. **User Exploring Incident Map Scenario:**
    - A user wants to see the distribution of reported incidents in their area.
    - They open the app and navigate to the "Incident Map" section.

- The map displays markers for different incidents, and users can tap on a marker to view details.

7. **User Accessing Dashboard Scenario:**
   - A user logs in and accesses their personalized dashboard.
   - The dashboard displays recent incidents in their vicinity.
   - The user can tap on an incident to view details or take further actions.

10 Project Plan



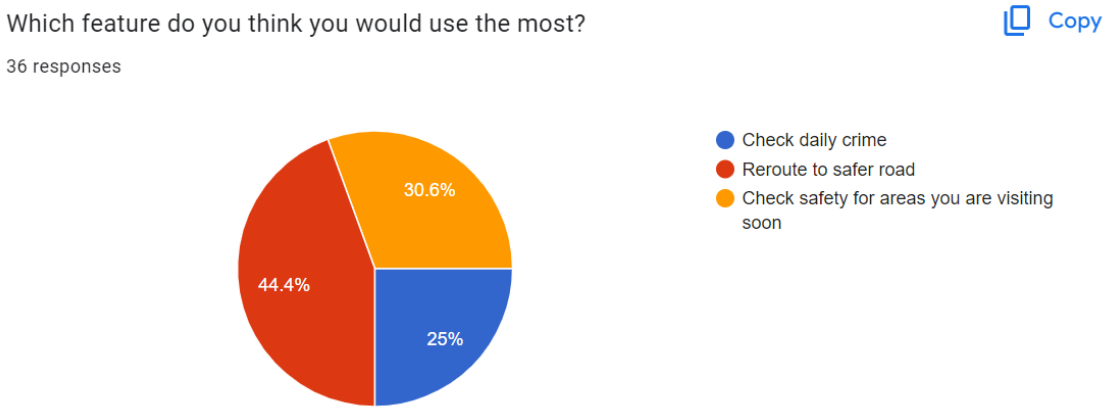
ID	Name	Start Date	End Date
1	idea discussion	Aug 14, 2023	Sep 25, 2023
2	idea research	Sep 15, 2023	Nov 03, 2023
3	proposal document	Nov 06, 2023	Nov 17, 2023
4	proposal presentation	Nov 20, 2023	Nov 20, 2023
5	idea modification	Nov 24, 2023	Dec 14, 2023
6	dataset modification	Nov 27, 2023	Dec 11, 2023
7	mobile app	Dec 01, 2023	Jan 05, 2024
8	SRS writing	Jan 04, 2024	Jan 12, 2024
9	SRS presentation	Jan 18, 2024	Jan 18, 2024
10	additional mobile features	Feb 01, 2024	Mar 15, 2024
11	SDD writing	Mar 07, 2024	Mar 18, 2024

Figure 6: System Plan

11 Appendices

11.1 Supportive Documents

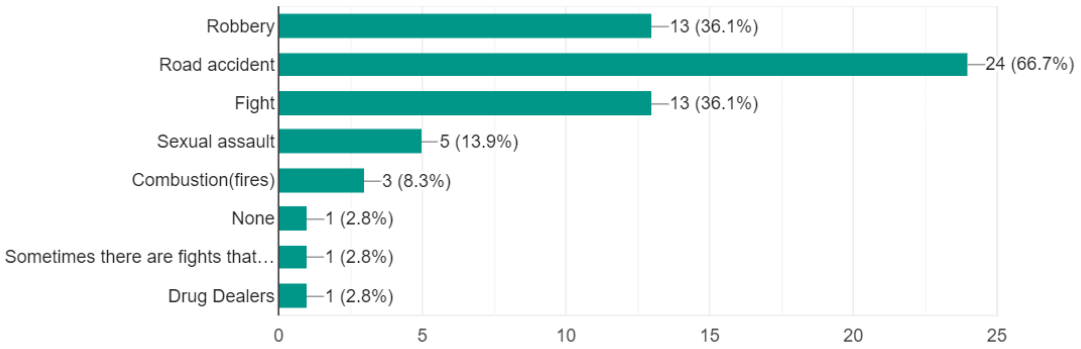
Survey results.



What common crime/accidents do you face in your area

Copy

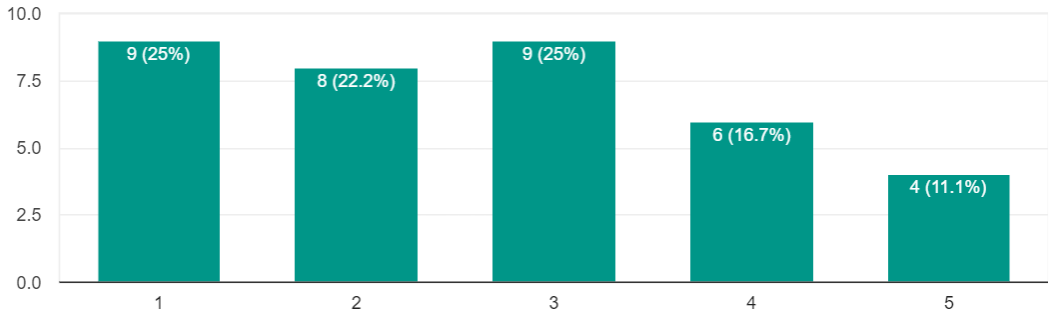
36 responses



How much do you think a Crime reporting/rate application would be useful for avoiding current crimes and preventing them from happening in the future?

Copy

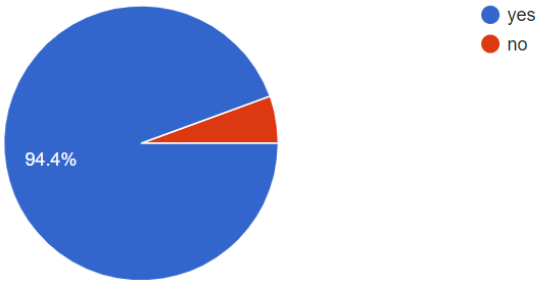
36 responses

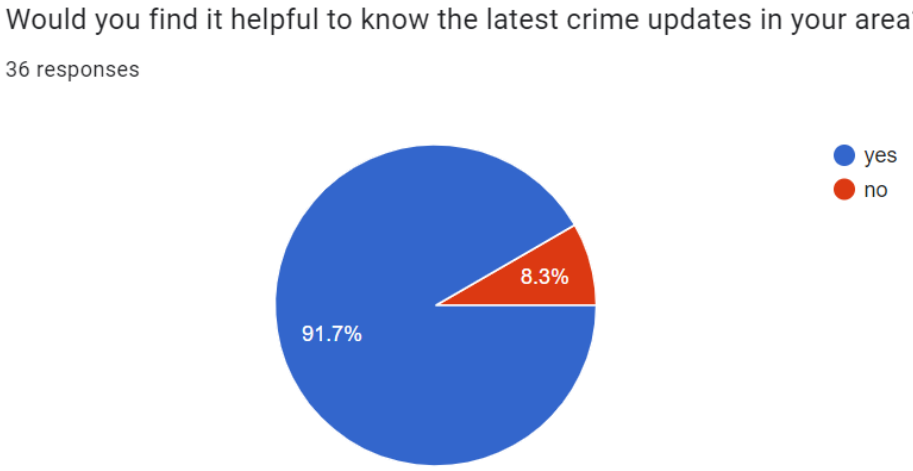


Would you find it helpful to know the criminal history of an area you're going to?

Copy

36 responses





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