

# AI-Driven Mobile Crime Reporting and Safety Map System for Barangay 649, Baseco Port Area

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## Abstract

This study presents the development of an AI-driven mobile crime reporting and safety map system designed to improve crime reporting, emergency response, and public safety management in Barangay 649, Baseco Port Area, Manila. Traditional crime reporting methods within the community remain largely manual, resulting in delayed response, underreporting, and limited community participation. To address these issues, the researchers designed a mobile-based platform that enables residents to submit incident reports, upload multimedia evidence, send emergency SOS alerts, and anonymously report crimes using smartphones. The proposed system integrates GPS-based location tagging and real-time notification features to support faster coordination between residents, barangay officials, and police authorities. The study utilized a developmental research design following the Waterfall Software Development Life Cycle model. The system framework incorporates React Native for mobile development, Node.js and Express.js for backend services, MySQL for database management, TensorFlow.js for machine learning integration, and Google Maps Platform API for interactive mapping and safety visualization. A machine learning-based prediction module analyzes historical and real-time crime data to classify areas into low, medium, and high-risk categories displayed through an interactive safety heatmap. The proposed system aims to strengthen community engagement, improve reporting accessibility, support proactive crime prevention, and assist local authorities in making data-driven decisions for effective barangay-level public safety management.

**Keywords:** Artificial Intelligence, Crime Reporting System, Mobile Application, Safety Heatmap, Machine Learning, Barangay Safety

## 1. Introduction

Crime prevention and public safety remain major concerns in densely populated urban communities in the Philippines. Barangay 649, Baseco Port Area, City of Manila, experiences challenges related to crime monitoring, incident reporting, and emergency response due to the limitations of traditional reporting systems. Existing processes rely heavily on manual and walk-in reporting procedures, resulting in delayed response times, underreporting of incidents, and inefficient coordination between residents and local authorities.

The increasing availability of mobile technology and artificial intelligence has created opportunities for improving public safety systems through digital transformation. Mobile-based reporting platforms allow

residents to submit reports conveniently and in real time, while machine learning techniques support predictive analysis and crime trend identification. Geographic Information Systems (GIS) and interactive mapping technologies further enhance situational awareness by visualizing incident locations and identifying high-risk areas.

Several studies have demonstrated the effectiveness of integrating mobile applications, crime mapping, and predictive analytics into public safety systems. Villarica et al. (2022) developed a crime reporting system capable of identifying crime patterns using machine learning and geo-mapping technologies [1]. Brillo et al. (2022) proposed an Android-based incident reporting system integrated with web mapping to improve communication between civilians and police authorities [2]. Hong et al. (2023) also demonstrated the effectiveness of safety-map applications in providing real-time safety information through heatmap and geofence technologies [3].

Despite these technological advancements, many barangays in the Philippines still lack accessible and intelligent crime reporting systems capable of supporting both community participation and data-driven decision-making. Most existing systems focus primarily on incident recording and monitoring without integrating predictive analysis and AI-based risk assessment.

To address these limitations, this study proposes the development of an AI and Mobile Application-Based Barangay and Police Crime Reporting and Safety Map System. The system enables residents to submit reports through a mobile application while allowing barangay officials and police authorities to monitor incidents through a centralized dashboard. The proposed system also integrates machine learning-based risk prediction and an interactive safety heatmap to support proactive crime prevention and resource allocation.

The study specifically aims to:

1. Develop an accessible and anonymous mobile-based crime reporting platform.
2. Enhance community engagement and coordination between residents and authorities.
3. Implement a machine learning-based safety heatmap and crime risk prediction module.

## 2. Review of Related Literature and Studies

Artificial intelligence, mobile technology, and geographic information systems have significantly transformed modern approaches to crime prevention and public safety monitoring. Recent studies highlight the importance of integrating digital reporting platforms with predictive analytics to support proactive law enforcement and community participation.

Crime mapping has become an essential tool in modern policing and public safety management. According to the National Institute of Justice (2005), geographic information systems enable authorities to identify crime hotspots, allocate patrol resources effectively, and improve evidence-based decision-making [4]. Through spatial visualization, law enforcement agencies can transition from reactive approaches to preventive policing strategies.

Artificial intelligence has also been increasingly utilized in crime prediction and analysis. A systematic literature review published by ScienceDirect (2022) emphasized that machine learning and predictive analytics improve the identification of crime patterns and support strategic resource deployment [5]. AI-driven systems are capable of analyzing large datasets to estimate the probability of future incidents within specific locations and time periods.

Mobile applications have likewise enhanced public safety and emergency response systems. Bowen-Forbes et al. (2024) explained that mobile-based safety applications improve accessibility,

communication, and emergency coordination through real-time alerts and GPS-enabled features [6]. In the Philippines, the Department of Information and Communications Technology and the Philippine National Police introduced a mobile crime reporting platform that enables citizens to submit incident reports directly through their smartphones [7].

Several local studies support the integration of mobile applications, AI, and GIS technologies in crime monitoring systems. Villarica et al. (2022) developed an online crime reporting system that utilized machine learning and geo-mapping technologies to identify crime trends in Laguna [1]. Their study demonstrated that predictive analytics could effectively support crime prevention and monitoring activities.

Brillo et al. (2022) proposed REPORTIT, an Android-based crime incident reporting system integrated with web mapping technologies [2]. The system improved communication between civilians and authorities while reducing delays in incident reporting and response.

Pacot (2017) also emphasized the importance of mobile-based crime mapping systems in improving situational awareness and promoting community participation in crime prevention [8]. The study demonstrated that integrating mobile reporting and geographic analysis can support proactive safety monitoring.

The reviewed literature and studies collectively establish the relevance of integrating artificial intelligence, mobile technology, and safety mapping into barangay-level crime reporting systems. These technologies support efficient communication, improve data management, and enhance proactive decision-making in community safety initiatives.

### 3. Methodology

This section presents the research methodology used in the development of the AI-driven mobile application-based barangay crime reporting and risk prediction system. The study follows a developmental research design and adopts the Waterfall Model to ensure a structured and systematic software development process. It also describes the system architecture, methods, tools, and techniques used in building, testing, and implementing the proposed system.

#### 3.1 Research Design

This study employed a developmental research design focused on the design and development of an AI and Mobile Application-Based Barangay and Police Crime Reporting and Safety Map System. The study adopted the Waterfall Model of the Software Development Life Cycle as the primary framework for system development.

**Figure 1 Waterfall Model**



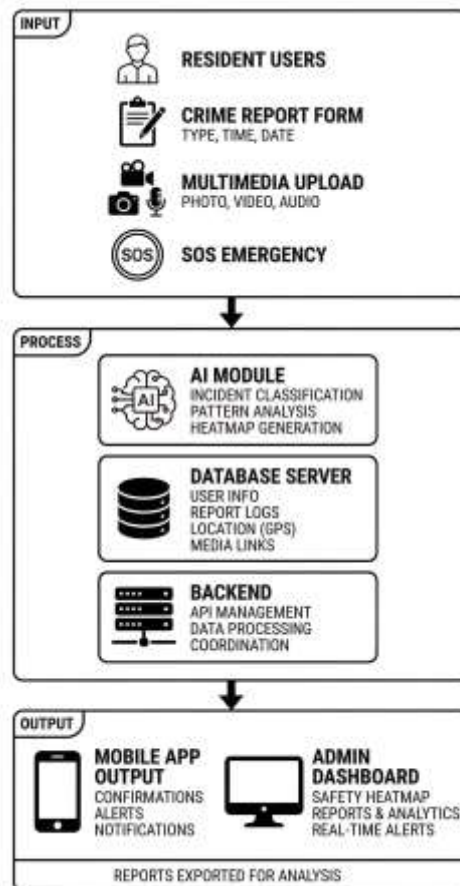
The Waterfall Model consists of sequential phases including requirements gathering, system design, development, testing, deployment, and maintenance. This approach was selected because the objectives, features, and system requirements were clearly identified prior to implementation.

The proposed system integrates mobile technology, database management, machine learning, and geographic information systems to support efficient crime reporting and predictive safety monitoring.

### 3.2 System Architecture

The proposed system follows an Input-Process-Output architecture.

**Figure 2 System Architecture**



In the input stage, residents submit crime reports, multimedia evidence, and SOS alerts through the mobile application. GPS coordinates, incident descriptions, and timestamps are collected and transmitted securely to the centralized database.

During the processing stage, the backend server validates and stores the submitted data. The machine learning module analyzes historical and incoming reports to identify crime patterns and estimate risk levels. TensorFlow.js is utilized to process crime-related variables including location, incident type, date, and frequency of occurrence.

The output stage presents processed information through a web-based administrative dashboard. Authorities are provided with report summaries, notifications, and an AI-generated safety heatmap displaying Low, Medium, and High risk areas.

### 3.3 Software and Hardware Requirements

**Table 1 Software Requirements of the Proposed System**

Software / Tool	Description
HTML (HyperText Markup Language)	Used to structure the web-based administrative dashboard, including forms, input fields, and navigation elements for user interaction.
CSS (Cascading Style Sheets)	Applied to design and enhance the visual layout of the system, ensuring responsiveness, consistency, and accessibility across devices.
JavaScript	Serves as the primary scripting language for implementing dynamic features such as real-time updates, client-side validation, and asynchronous communication.
React Native	Used to develop the mobile application, allowing residents to submit reports, upload media, trigger SOS alerts, and receive notifications.
Node.js	Enables server-side execution of JavaScript, handling backend processes, user requests, and system logic efficiently.
Express.js	A web framework for Node.js used to manage routing, middleware, and API communication between the frontend, database, and AI module.
MySQL	A relational database used to store and manage structured data such as user accounts, crime reports, timestamps, and geolocation data.
TensorFlow.js	A machine learning framework used to analyze crime data, detect patterns, and generate risk predictions for the safety heatmap.
Google Maps Platform API	Integrated to display interactive maps, plot crime locations, and generate real-time safety heatmaps using GPS coordinates.
Visual Studio Code	The primary development environment used for coding, debugging, and managing system files efficiently.
GitHub	A version control platform used for tracking changes, collaboration, and managing the project repository during development.
Railway	A cloud-based deployment platform used to host the backend server and database, ensuring system availability and scalability.

**Table 2 Hardware Requirements of the Proposed System**

Hardware / Equipment	Description
Personal Computer / Laptop (Development & Server)	Used for system development, backend processing, AI integration, and database management. The device should have at least an Intel Core i5 processor or equivalent, 8 GB RAM, and 512 GB SSD to ensure smooth performance during coding, testing, and deployment.
Android Smartphones	Serve as the primary client devices for residents to access the mobile application. These devices allow users to submit crime reports, upload multimedia evidence, trigger SOS alerts, and receive notifications. Minimum requirements include Android 10 or higher, 4 GB RAM, and GPS capability.
Administrative	Desktop computers used by barangay officials and police personnel to

Workstations	access the web-based dashboard. These devices should have at least an Intel Core i5 processor, 8 GB RAM, and a high-definition display for monitoring reports and safety heatmaps.
Wi-Fi Router / Internet Connection	Provides network connectivity required for real-time data synchronization between the mobile application, backend server, and administrative dashboard. A stable internet connection is essential for system reliability.
Networking Equipment (Modems, Access Points)	Supports internal connectivity within the barangay office, ensuring stable communication between administrative devices and the system server.
Peripheral Devices (Printer, External Storage)	Optional devices used for printing reports, documentation, and backing up system data. External storage devices help in maintaining data redundancy and recovery.
Uninterruptible Power Supply (UPS)	Provides backup power to prevent data loss and system interruption during unexpected power outages, ensuring continuous operation of administrative workstations and network devices.

The proposed system utilizes React Native for mobile application development, Node.js and Express.js for backend services, MySQL for database management, TensorFlow.js for machine learning integration, and Google Maps Platform API for geographic visualization.

Android smartphones are utilized as client devices for residents, while administrative workstations support dashboard access for barangay officials and police authorities. Stable internet connectivity is required for real-time synchronization and communication between system components.

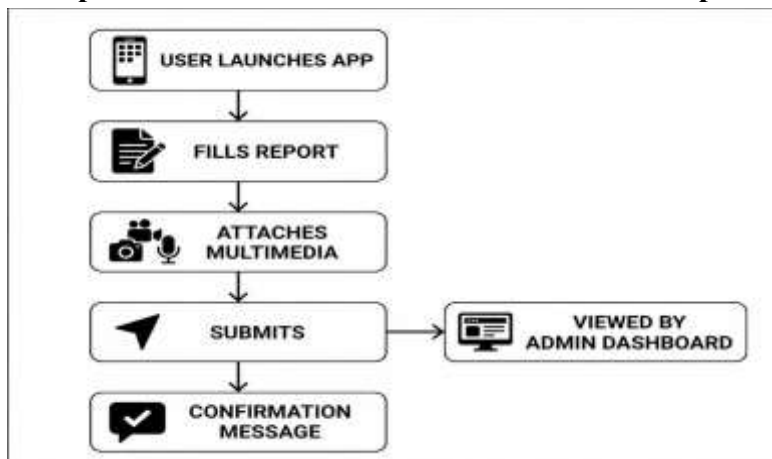
### 3.4 Methods and Tools

The methods applied in developing the AI and Mobile Application-Based Barangay and Police Crime Reporting and Safety Map System are aligned with the objectives of the study and guided by the structured principles of the Waterfall Model. The development process follows a sequential approach consisting of requirements analysis, system design, implementation, testing, and deployment. Each method corresponds to a specific system component designed to address the identified problems in crime reporting, community engagement, and crime risk prediction within Barangay 649.

#### 3.4.1 Methods

##### A. Method for Developing the Mobile-Based Crime Reporting Platform

**Figure 3 Development Process of the Mobile-Based Crime Reporting Platform**



As shown in Figure 3, to achieve the first objective of developing an accessible and anonymous digital crime reporting system, the proponents will design a mobile-based platform that enables residents to conveniently submit incident reports using their smartphones. The user interface of the mobile application will be designed through codes created using React Native, which guide the layout, navigation, and interaction elements of the application.

The mobile interface will allow users to input incident details, attach multimedia evidence such as photos, videos, or audio recordings, and enable GPS tagging for accurate location identification. These inputs will be processed by the application and transmitted securely to the backend server using HTTP requests handled through Node.js and Express.js.

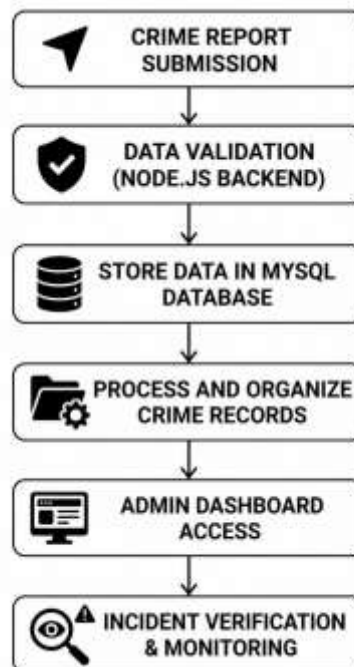
To support anonymity and confidentiality, the system will allow users to submit reports without revealing their personal identity if they choose to remain anonymous. All submitted data will be transmitted through secure communication channels and validated before being stored in the centralized database to ensure accuracy and data integrity.

The system will also incorporate an SOS emergency feature that enables residents to send immediate alerts along with their current GPS location to barangay authorities. Additionally, the platform will support push notifications that deliver safety alerts, advisories, and updates directly to residents.

Testing will be conducted using various Android devices to evaluate system responsiveness, compatibility, and reliability under different network conditions.

## B. Method for Enhancing Community Engagement and Digital Crime Data Management

**Figure 4 Development Process of the Digital Crime Recording and Data Management System**



As shown in Figure 4, to support the second objective of enhancing community engagement and collaboration in crime prevention, the proponents will develop a centralized digital crime recording and communication system that allows residents and authorities to interact through a shared reporting platform.

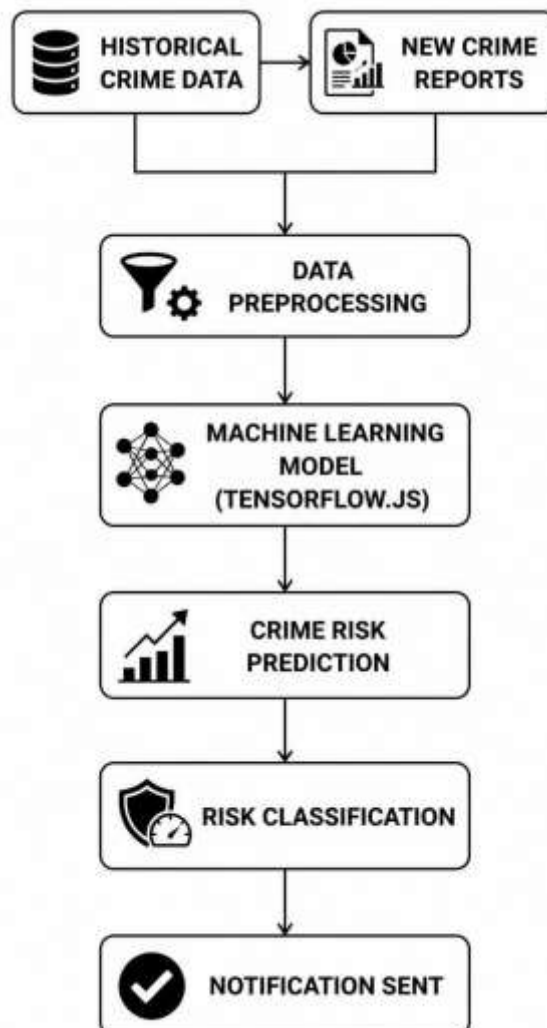
The system will utilize MySQL to store and organize structured data including user accounts, crime reports, multimedia attachments, timestamps, and location coordinates. This centralized database ensures that all submitted reports are properly recorded and can be accessed efficiently by authorized personnel. The backend application will be developed using Node.js, which will manage data processing, validation, and communication between the mobile application and the database. Through a web-based administrative dashboard, barangay officials and police authorities will be able to review submitted reports, verify incidents, and monitor safety concerns within the community.

To strengthen transparency and collaboration, the system will allow authorities to provide updates and notifications regarding reported incidents, safety advisories, and emergency alerts. These notifications will be delivered to residents through the mobile application, helping increase public awareness and encouraging community participation in maintaining safety.

By providing real-time access to crime reports and enabling communication between residents and authorities, the system promotes greater trust, transparency, and coordination in addressing safety concerns within Barangay 649.

### C. Method for Implementing the AI-Based Safety Heatmap and Risk Prediction System

Figure 5 Process of the AI-Based Crime Risk Prediction and Safety Heatmap Generation



As shown in Figure 5, to achieve the third objective of implementing a machine learning–based crime risk prediction model, the proponents will develop an AI module capable of analyzing historical crime records together with newly submitted incident reports. The AI component will be implemented using TensorFlow.js, integrated within the backend environment of the system.

The machine learning model will be trained using historical crime datasets obtained from barangay records. These datasets will contain variables such as incident location, date, time, and type of crime. Through pattern analysis, the model will learn relationships between these variables and use them to estimate the probability of crime occurrence in specific areas within a given time period.

After training, the model will process both historical data and newly submitted reports from the mobile application to generate predicted crime risk levels. Each location will be classified into categories such as Low, Medium, or High risk based on the model’s calculated probability values.

To present these insights visually, the system will integrate the Google Maps Platform API to generate an interactive safety heatmap. Crime incidents and predicted risk levels will be plotted on the map using GPS coordinates, allowing the system to highlight high-risk areas and emerging crime hotspots.

The safety heatmap will be displayed through the administrative dashboard, which automatically updates as new reports are submitted and processed. This feature enables barangay officials and law enforcement authorities to monitor crime patterns, identify vulnerable locations, and make informed decisions regarding patrol planning and resource allocation.

Testing of the AI component will be conducted by simulating multiple incident reports and evaluating the system’s response time, data synchronization, and the accuracy of the generated risk predictions and heatmap visualizations.

### 3.4.2 Tools

#### 3.4.2.1 Flowchart of the Proposed System

Figure 6 Flowchart of the Proposed System

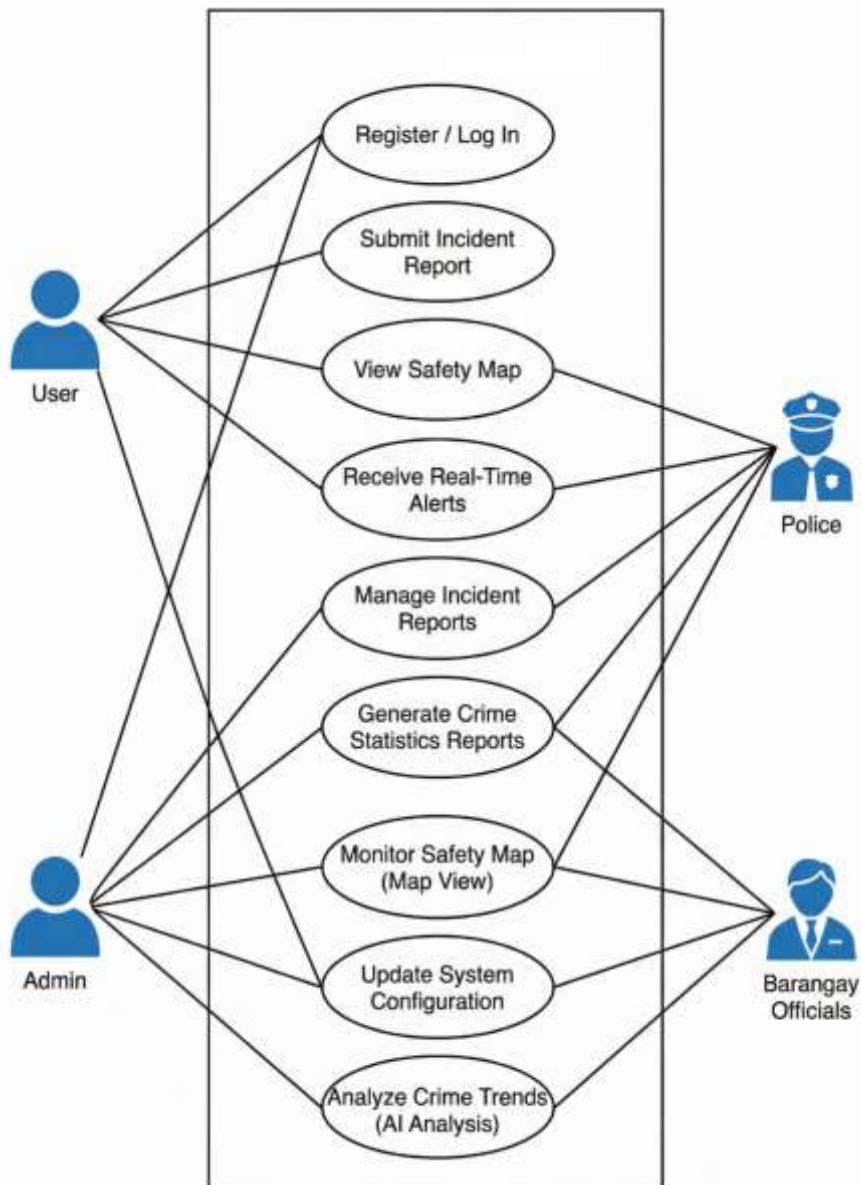


In Figure 6, the flowchart of the proposed system illustrates the overall process and workflow of the AI and Mobile Application-Based Barangay Crime Reporting and Safety Map System. The process begins when the user accesses the mobile application and logs into the system. After successful authentication, the user is directed to the main dashboard where different functionalities such as submitting a crime report, triggering an SOS alert, or viewing the safety map are available.

When a user submits a report, the system collects relevant details including incident type, description, multimedia evidence, and geographic location before storing the data in the database and notifying the barangay and police authorities. In the case of an SOS alert, the system immediately sends an emergency notification along with the user’s location to authorities for rapid response. On the administrative side, authorized personnel can access the web-based dashboard to monitor incoming reports, update their status, and manage notifications. The flowchart demonstrates how the system ensures a structured and efficient process for real-time crime reporting, emergency response, and community safety monitoring.

### 3.4.2.2 Use Case Diagram of the Proposed System

Figure 7 Use Case Diagram of the Proposed System



In Figure 7, the Use Case Diagram of the proposed system illustrates the interactions between users and the AI and Mobile Application-Based Barangay Crime Reporting and Safety Map System. The diagram identifies the primary actors involved in the system, namely residents, barangay officials, and police officers, and shows how each interacts with the system’s functionalities.

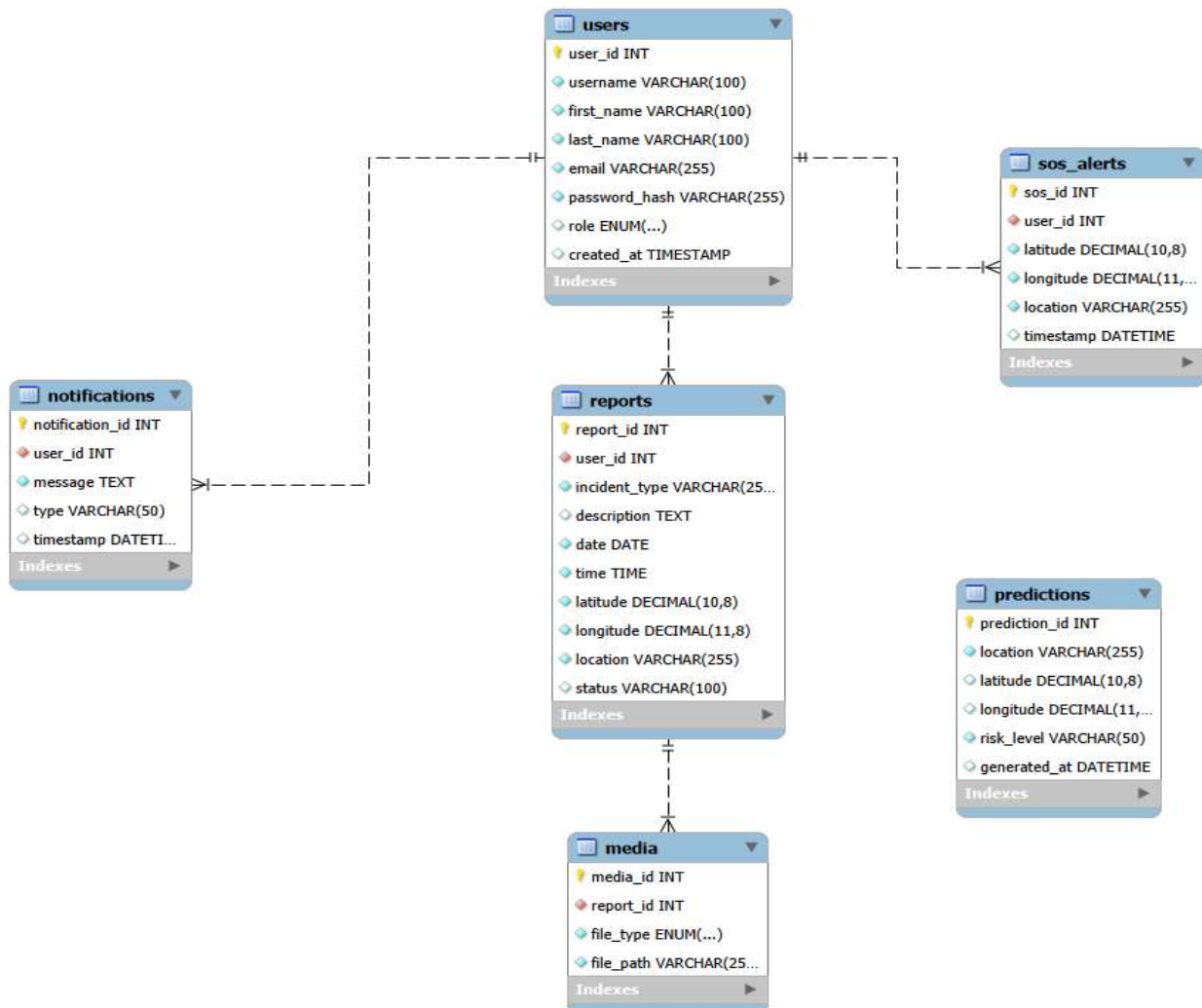
Residents act as the primary users of the mobile application, where they can register and log into the system, submit crime reports, upload multimedia evidence, and choose to report incidents anonymously. They can also trigger SOS alerts during emergencies, view the safety map displaying crime hotspots, and receive notifications regarding alerts and updates from authorities.

On the other hand, barangay officials and police officers interact with the system through the administrative dashboard. Their functions include viewing submitted reports, updating report statuses, monitoring the AI-generated safety heatmap, receiving SOS alerts, and sending notifications or advisories to residents. These interactions enable authorities to respond efficiently and maintain real-time communication with the community.

Overall, the Use Case Diagram demonstrates how different users engage with the system and highlights the system’s role in facilitating crime reporting, emergency response, and proactive safety monitoring within Barangay 649.

### 3.4.2.3 Entity-Relationship Diagram of the Proposed System

Figure 8 Entity-Relationship Diagram of the Proposed System



In Figure 8, the Entity-Relationship Diagram (ERD) of the proposed system illustrates the database structure and relationships between the key data entities of the AI and Mobile Application-Based Barangay Crime Reporting and Safety Map System. The diagram defines how data is organized, stored, and interconnected to support system functionality.

The Users entity stores information about residents, barangay officials, and police personnel who interact with the system. Each user can submit multiple crime reports, establishing a one-to-many relationship between the Users and Reports entities. The Reports entity contains detailed information about each incident, including type, description, location, date, and status. Each report may also include multiple multimedia attachments, which are managed through the Media entity, forming another one-to-many relationship.

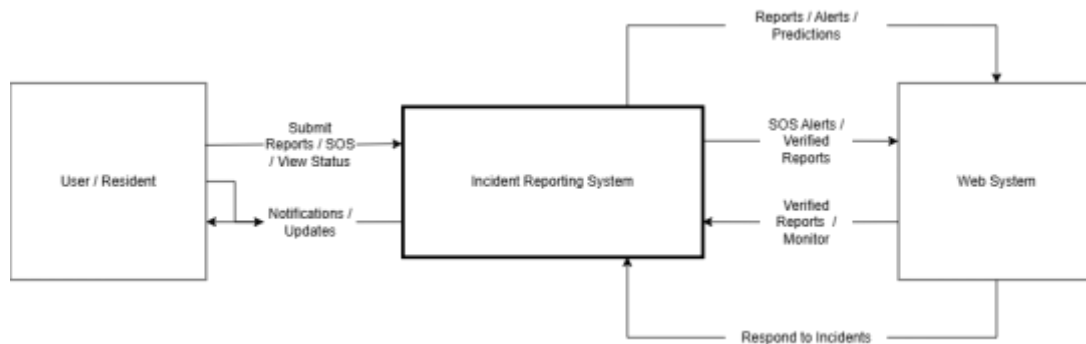
Additionally, the SOS Alerts entity records emergency alerts triggered by users, capturing real-time location and timestamp data. The Notifications entity manages system-generated and admin-generated messages sent to users, supporting communication and awareness within the system. The Predictions entity stores the results of the machine learning model, including risk levels associated with specific locations, which are used to generate the safety heatmap.

Overall, the ERD demonstrates a well-structured relational database design that supports efficient data storage, retrieval, and analysis. It ensures that the system can handle multiple user interactions, maintain data integrity, and support AI-driven crime risk prediction and visualization.

### 3.4.2.4 Data Flow Diagram of the Proposed System

Figure 9 Level 0 Data Flow Diagram of the Proposed System

#### Level 0 DFD



In Figure 9, the Level 0 Data Flow Diagram (DFD), also known as the context diagram, presents a high-level overview of the proposed system and its interaction with external entities. The system is represented as a single process labeled Incident Reporting System, which serves as the central hub for all data transactions.

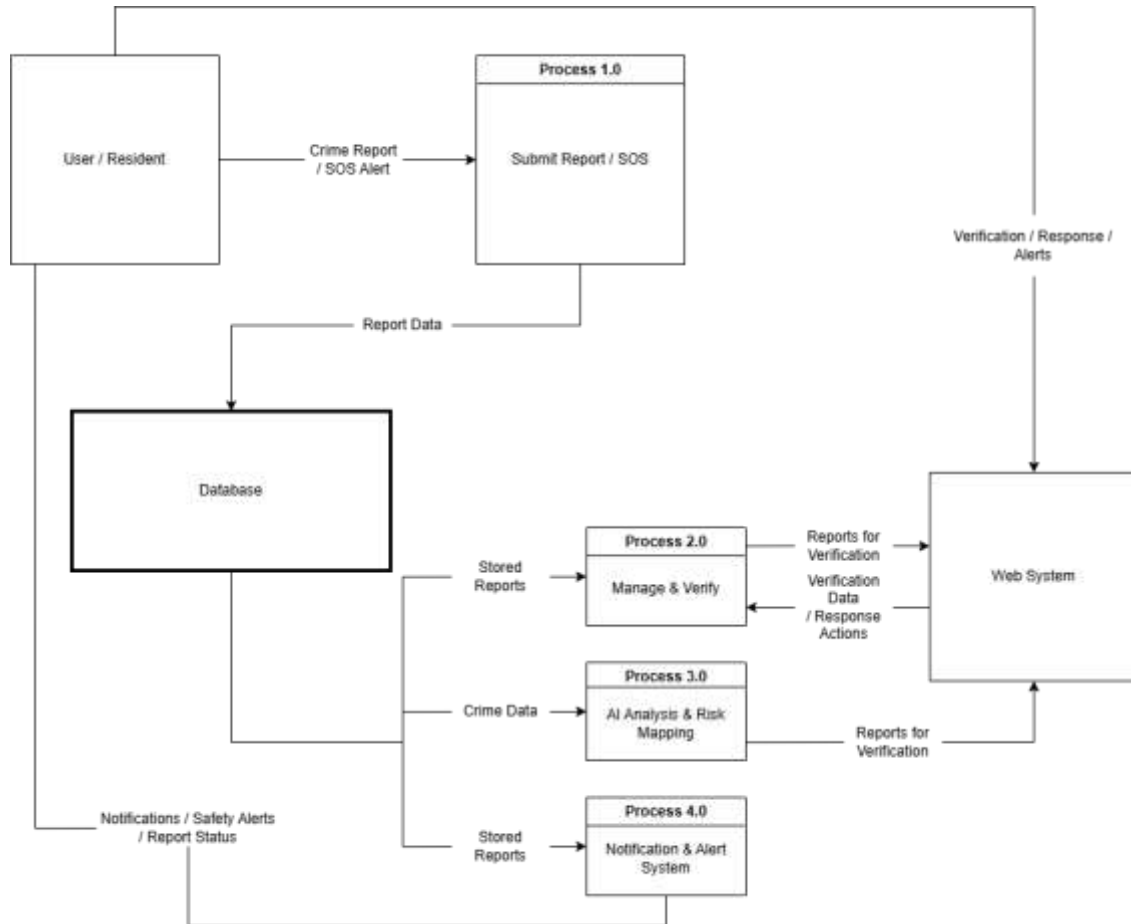
The primary external entities interacting with the system are the users (residents), barangay administrators, and police authorities. Residents submit crime reports, send SOS alerts, and view report statuses through the system. In return, they receive notifications and updates related to their reports and community safety alerts.

On the administrative side, barangay officials and police officers receive reports, alerts, and AI-generated predictions from the system. They are also able to verify reports, monitor incidents, and respond to emergencies. The diagram illustrates the bidirectional flow of information, emphasizing real-time communication and coordination between residents and authorities.

Overall, the Level 0 DFD demonstrates the system’s role as an integrated platform that connects users and authorities while facilitating efficient crime reporting, emergency response, and safety monitoring.

**Figure 10 Level 1 Data Flow Diagram of the Proposed System**

**Level 1 DFD**



In Figure 10, the Level 1 Data Flow Diagram provides a more detailed representation of the internal processes of the proposed system by decomposing the main system into major functional components. The diagram highlights several key processes, including Report Management, Media Handling, SOS Alert Processing, Notification System, and the Prediction Engine. When users submit reports, the data is processed through the Report Management module and stored in the Reports Database, while uploaded media files are handled separately through the Media Handling process and stored in the Media Database.

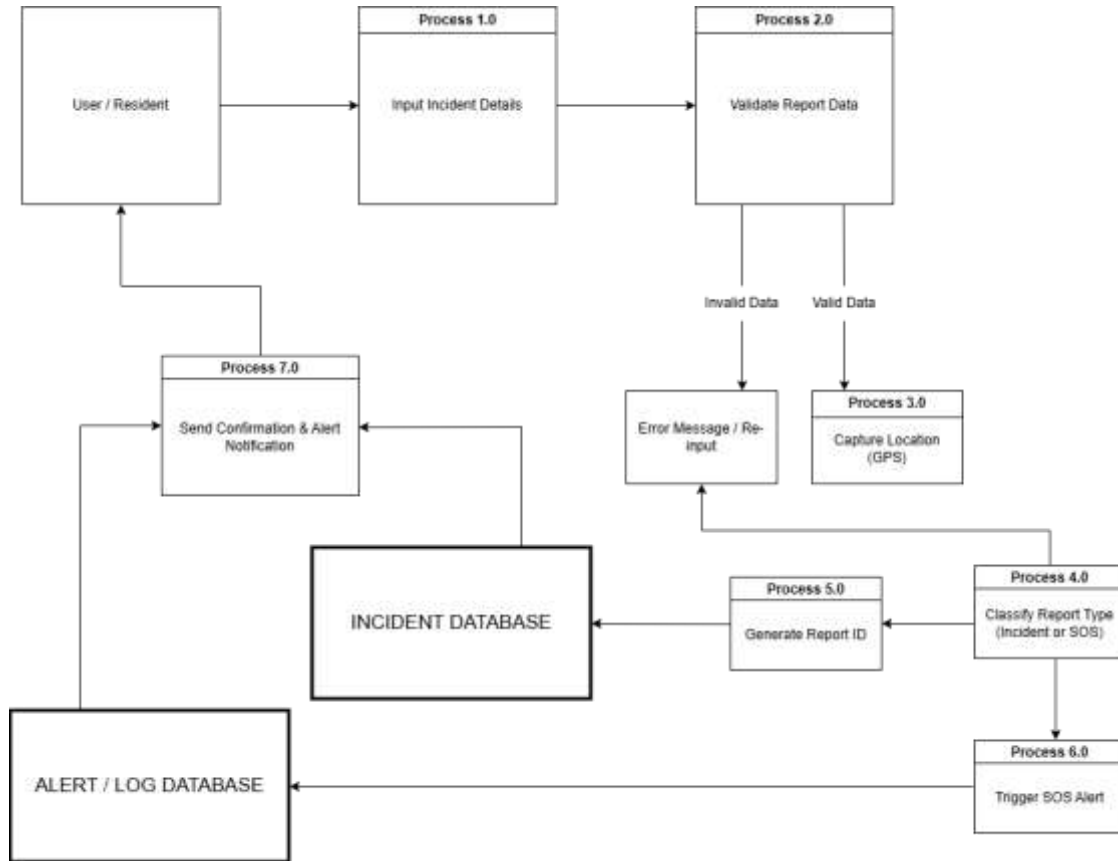
The SOS Alert Processing module handles emergency alerts triggered by users, capturing location data and storing it in the SOS Alerts Database while simultaneously notifying authorities. The Notification System acts as a central communication component that distributes alerts and updates to users, barangay officials, and police personnel, ensuring real-time information flow.

Additionally, the Prediction Engine processes stored data to generate crime risk predictions, which are stored in the Predictions Database and accessed by administrators for monitoring and decision-making. The diagram also shows how administrators verify reports and interact with the system to manage incidents effectively.

Overall, the Level 1 DFD illustrates how the system’s major components interact with one another and with various data stores to support real-time reporting, communication, and AI-driven analysis.

**Figure 11 Level 2 Data Flow Diagram of the Proposed System**

**Level 2 DFD**



In Figure 11, the Level 2 Data Flow Diagram further expands the internal processes of the system by providing a detailed breakdown of key functional modules, particularly report handling, SOS processing, notification management, and prediction generation.

The report management process is divided into multiple steps, including capturing report details, validating inputs, and storing verified reports in the database. Similarly, media handling follows a structured flow of uploading, validating, and storing multimedia files in the Media Database.

For emergency situations, the SOS module consists of processes such as triggering the SOS alert, capturing the user’s location, and sending the alert, which is then stored in the SOS Alerts Database. These alerts are forwarded to authorities for immediate response.

The Notification System is also broken down into subprocesses, including generating notifications, storing notification data, and sending notifications to users, barangay officials, and police officers. This ensures that all stakeholders receive timely updates and alerts.

Furthermore, the AI component is represented through processes such as collecting location data, analyzing risk patterns, and generating predictions, which are stored in the Predictions Database. These outputs are then used by administrators to monitor crime trends and support decision-making.

Overall, the Level 2 DFD provides a comprehensive view of the system’s internal workflows, demonstrating how data is processed step-by-step to ensure accuracy, efficiency, and real-time system

functionality.

#### **4. Proposed System Features**

The proposed system contains several major features intended to improve crime reporting and public safety management.

##### **4.1 Mobile Crime Reporting**

Residents can submit incident reports through the mobile application using text descriptions, GPS location tagging, and multimedia attachments. Reports are transmitted directly to the centralized server for monitoring and verification.

##### **4.2 Anonymous Reporting**

The system supports anonymous reporting to encourage residents to report incidents without fear of retaliation. Users may choose whether to disclose their identities during report submission.

##### **4.3 Emergency SOS Alert**

The Emergency SOS feature allows users to send urgent alerts together with their geographic location during emergencies. This feature supports faster response coordination between residents and authorities.

##### **4.4 Administrative Dashboard**

Barangay officials and police authorities access a web-based dashboard used for reviewing reports, monitoring incidents, analyzing crime trends, and visualizing safety heatmaps.

##### **4.5 AI-Based Safety Heatmap**

The AI-based heatmap visualizes predicted risk levels using color-coded geographic mapping. The feature assists authorities in identifying vulnerable areas and implementing preventive strategies.

#### **5. Results and Discussion**

This section presents the developed features and interfaces of the proposed AI and Mobile Application-Based Barangay and Police Crime Reporting and Safety Map System. The discussion is organized according to the objectives of the study and highlights the functionalities implemented in both the mobile and web-based platforms.

##### **5.1 Development of an Accessible and Anonymous Mobile-Based Crime Reporting Platform**

The developed mobile application provides residents with an accessible platform for submitting crime reports using smartphones. The system was designed with a user-friendly interface to simplify report submission and improve accessibility for community users.

The application includes several major interfaces and functionalities such as welcome page, user login, registration, report submission, multimedia uploading, and anonymous reporting.

Figure 12 Welcome Page



Figure 13 Dashboard Page

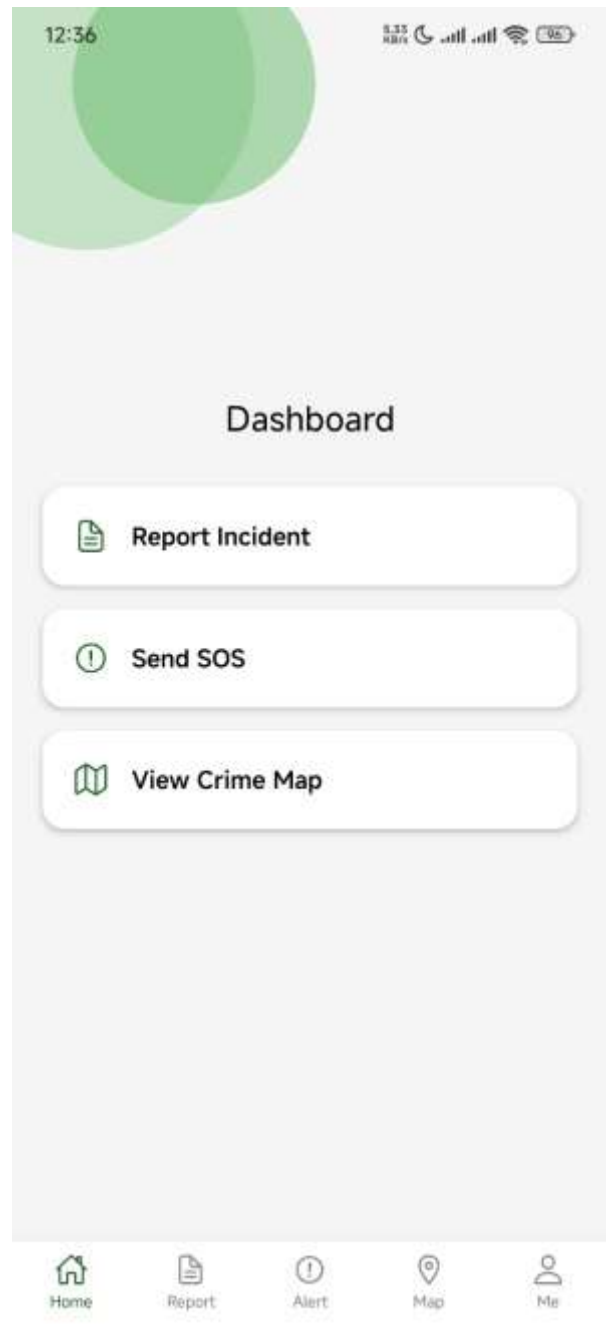


Figure 12 presents the Welcome Page of the mobile application. The interface displays the official barangay logo, the project title, and a “Get Started” button that redirects users to the Login Interface.

Figure 13 presents the Dashboard Page of the mobile application. The interface provides users with navigation options such as Report Incident, Send SOS, and View Crime Map.

Figure 14 Login Interface

Figure 15 Registration Interface

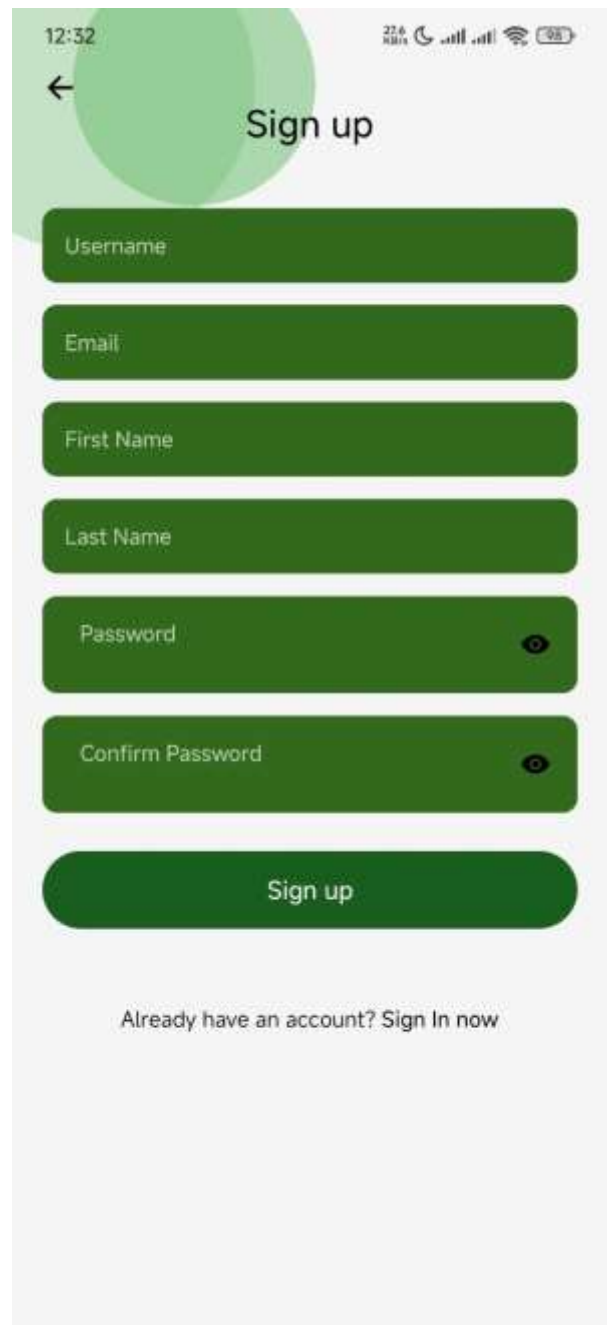
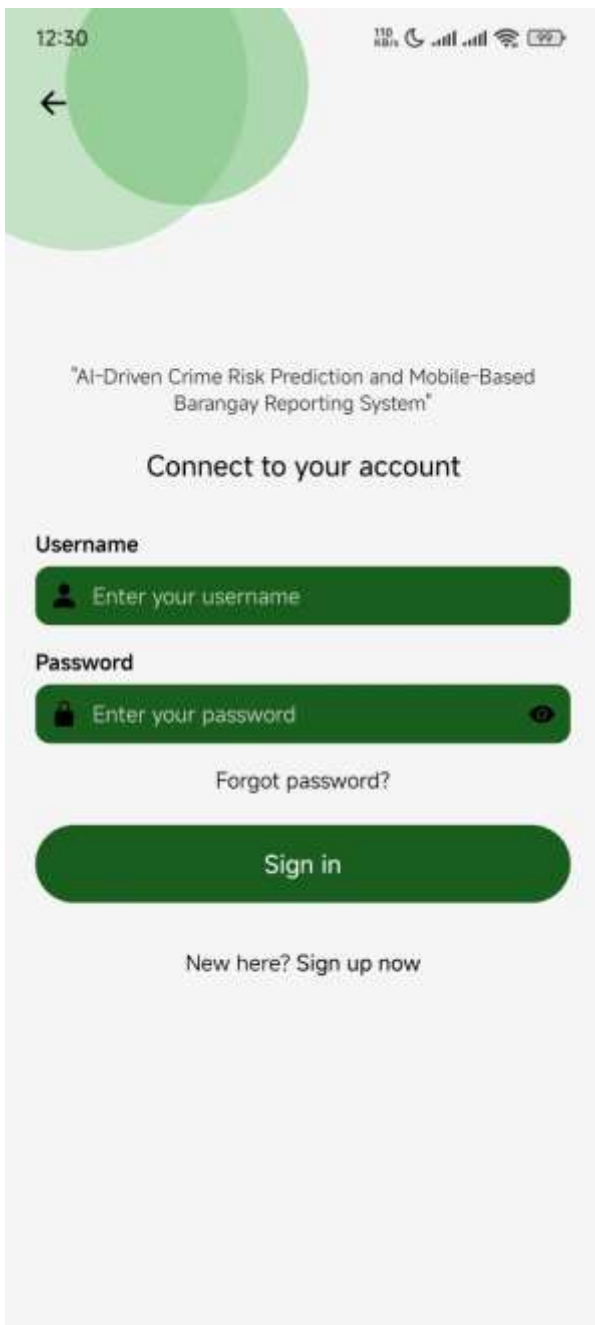


Figure 14 presents the Login Interface of the mobile application. The interface allows users to securely access the system using registered credentials.

Figure 15 presents the Registration Interface used for creating new user accounts within the system.

Figure 16 Crime Report Submission Interface

Figure 17 Location Reporting Interface

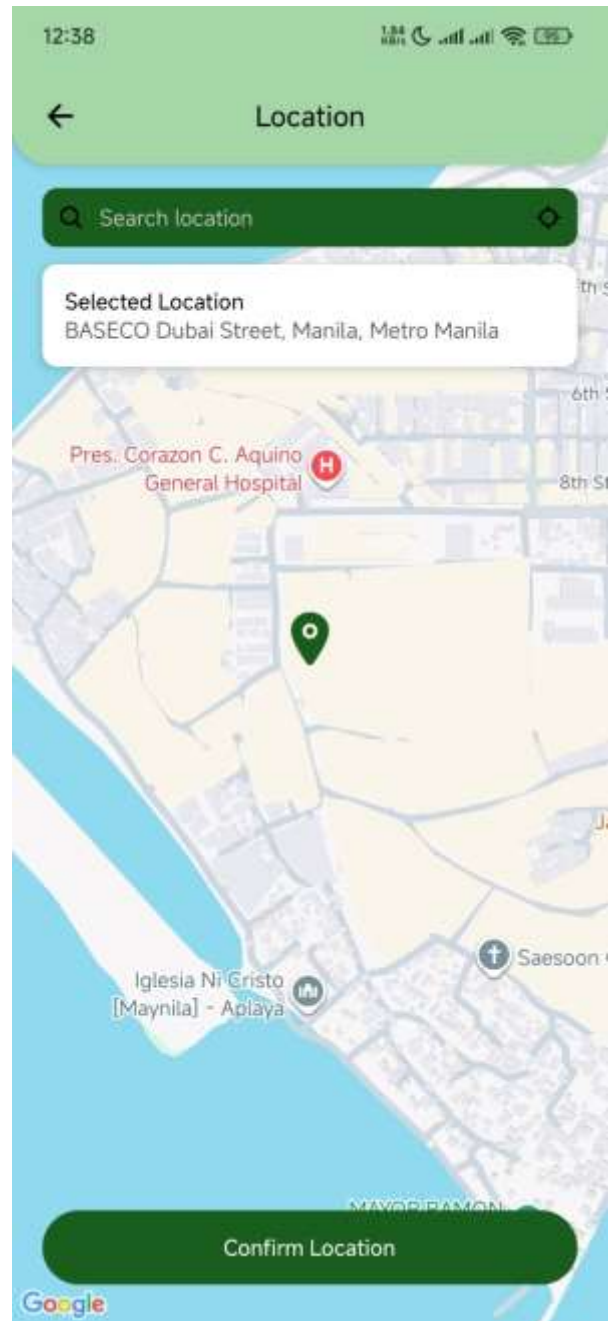
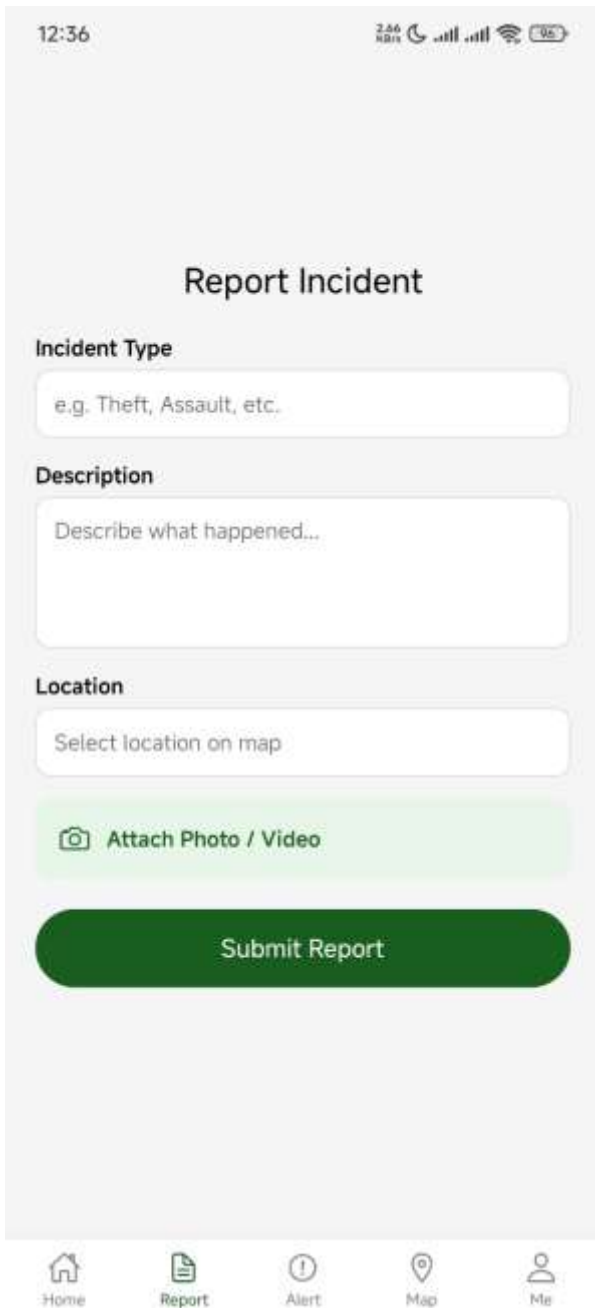


Figure 16 presents the Crime Report Submission Interface. The interface allows users to enter incident details, attach multimedia evidence, and submit reports directly to authorities.

Figure 17 presents the Location Reporting Interface, which is part of the Crime Report Submission feature. The interface enables users to identify and pin the exact incident location using an integrated Google Map.

**Figure 18 Crime Map Interface**

**Figure 19 Profile Page Interface**

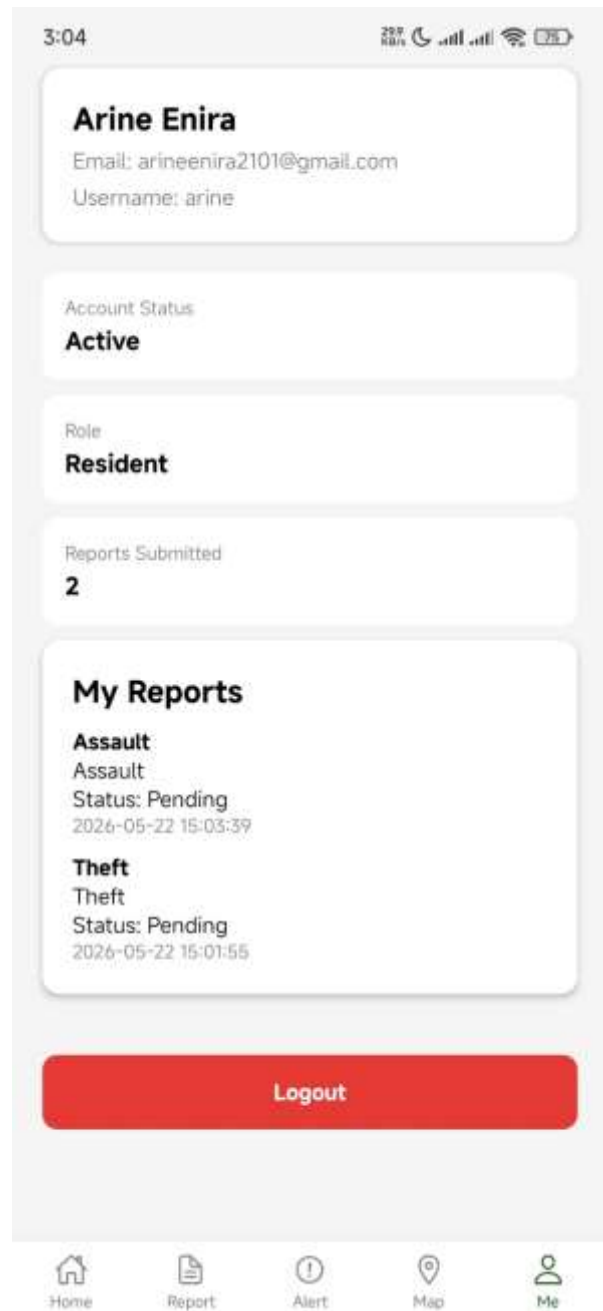


Figure 18 presents the Crime Map Interface of the mobile application. The interface allows residents to view mapped crime incidents within the barangay, promoting public awareness and supporting community safety initiatives.

Figure 19 presents the Profile Page Interface of the mobile application. The interface displays the resident's account information, including name, email, username, account status, user role, submitted reports, and access to the "My Reports" and logout functionalities.

The implementation of these features supports the first objective of the study by providing a more convenient, secure, and accessible reporting mechanism for residents.

## 5.2 Enhancement of Community Engagement and Coordination Between Residents and Authorities

The proposed system improves communication and coordination between residents, barangay officials, and police authorities through real-time report monitoring and emergency notification functionalities. The system includes an Emergency SOS feature capable of transmitting urgent alerts together with the user's geographic location. This functionality supports faster emergency response and improved situational awareness.

**Figure 20 Emergency SOS Interface**

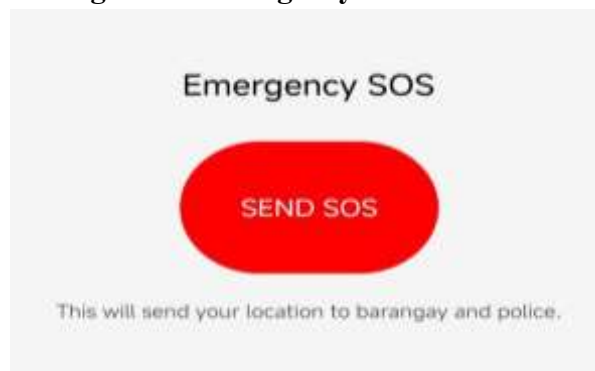


Figure 20 presents the Emergency SOS Interface integrated within the mobile application.

**Figure 21 Administrative Login Interface**



Figure 21 presents the Administrative Login Interface used by authorized barangay officials and authorities to securely access the web-based management system.

Figure 22 Administrative Dashboard Interface

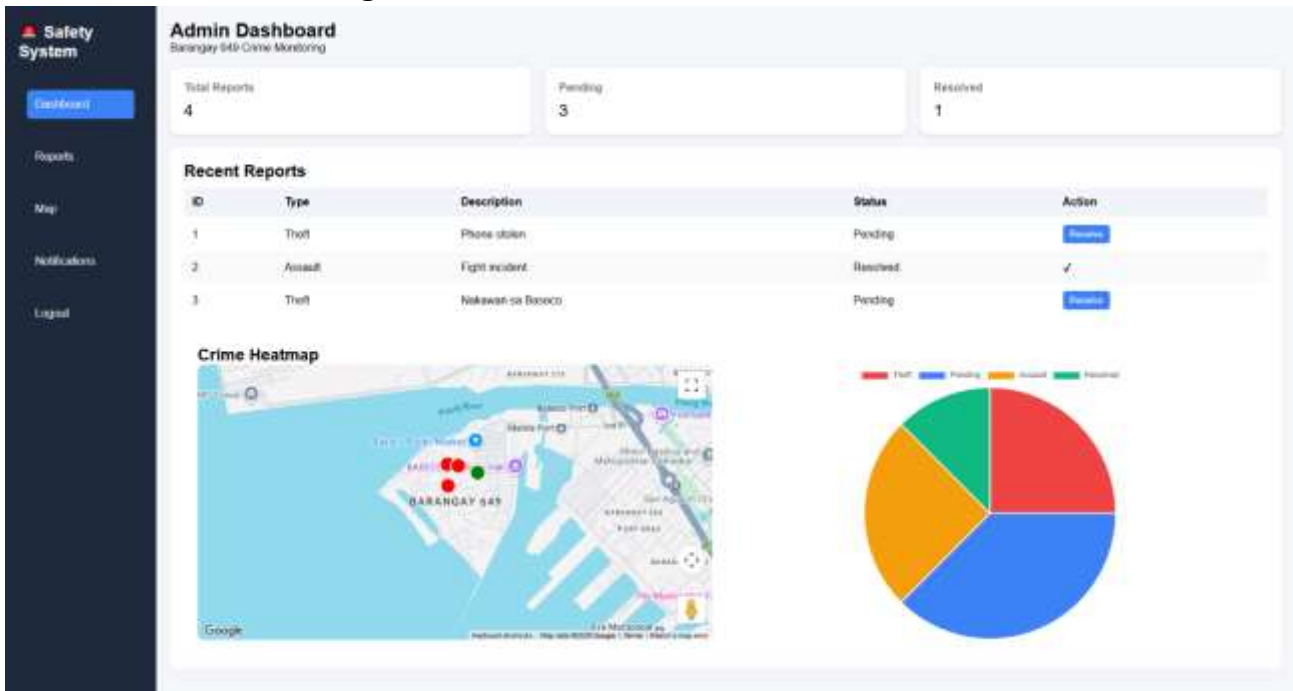


Figure 22 presents the Administrative Dashboard Interface.

Figure 23 Reports Management Interface

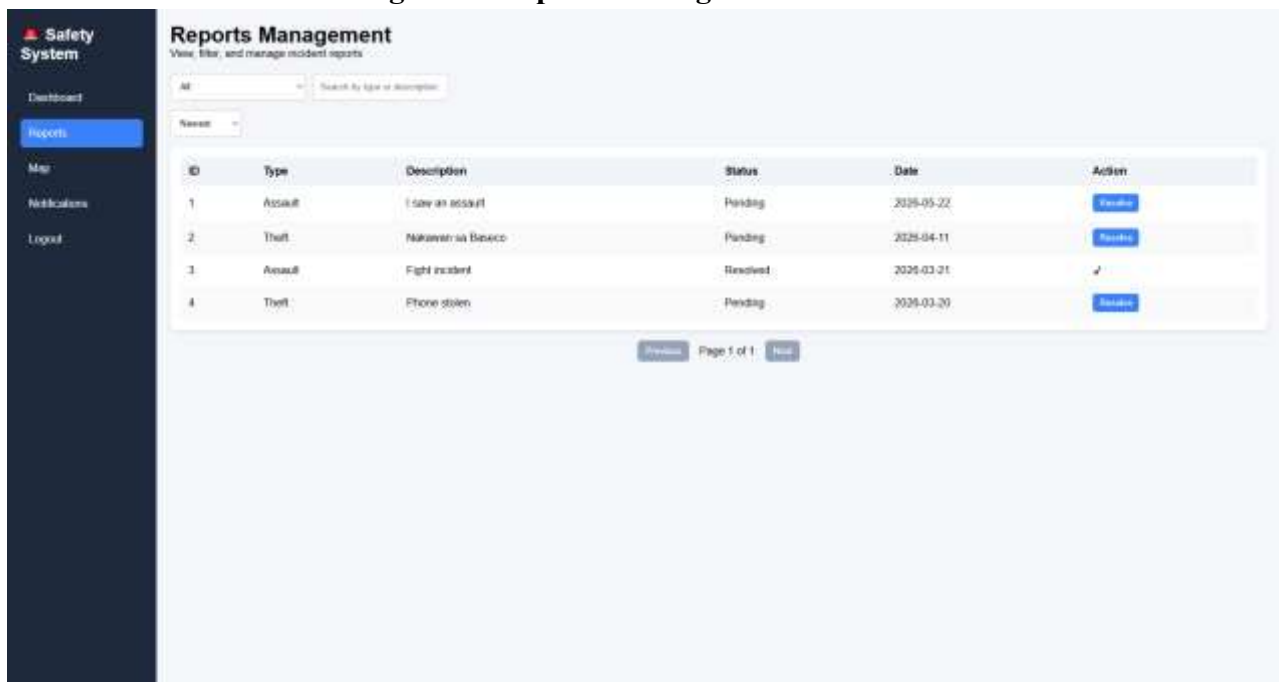


Figure 23 presents the Reports Management Interface used by authorities to view, filter, and manage submitted incident reports. The interface allows administrators to update report statuses, add descriptions, and monitor incident progress from pending to resolved cases.

Figure 24 Notifications Interface

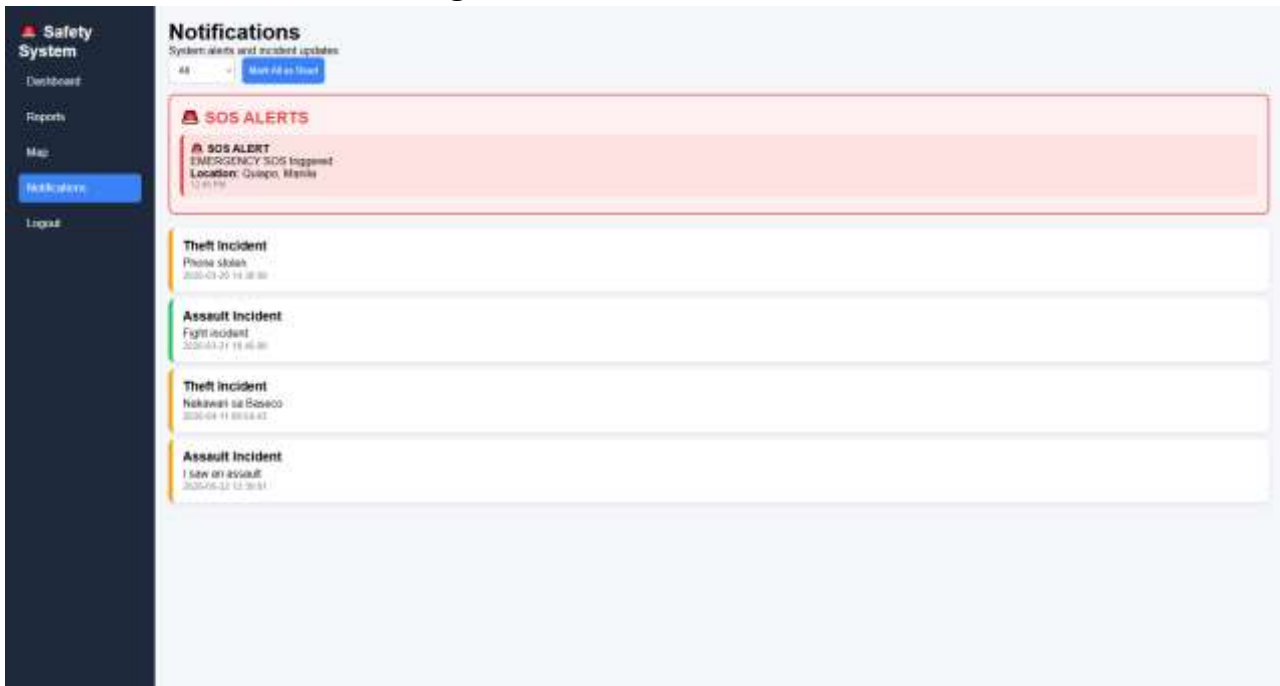


Figure 24 presents the Notifications Interface of the system. The interface displays system alerts, incident updates, and highlighted Emergency SOS notifications submitted by residents for immediate attention and response.

The integration of real-time monitoring, report management, and emergency notification features strengthens coordination between community residents and authorities, supporting the second objective of the study.

### 5.3 Implementation of a Machine Learning-Based Safety Heatmap and Crime Risk Prediction Module

The proposed system integrates an AI-based safety heatmap intended to support crime trend visualization and predictive monitoring. The feature utilizes crime-related data and geographic coordinates to identify potential high-risk areas within Barangay 649, Baseco Port Area, City of Manila. Although the machine learning module is still under development, the planned system design and interface layout were prepared to demonstrate the intended implementation of predictive analytics and geographic visualization.

Figure 25 Safety Heatmap and Crime Risk Prediction Interface

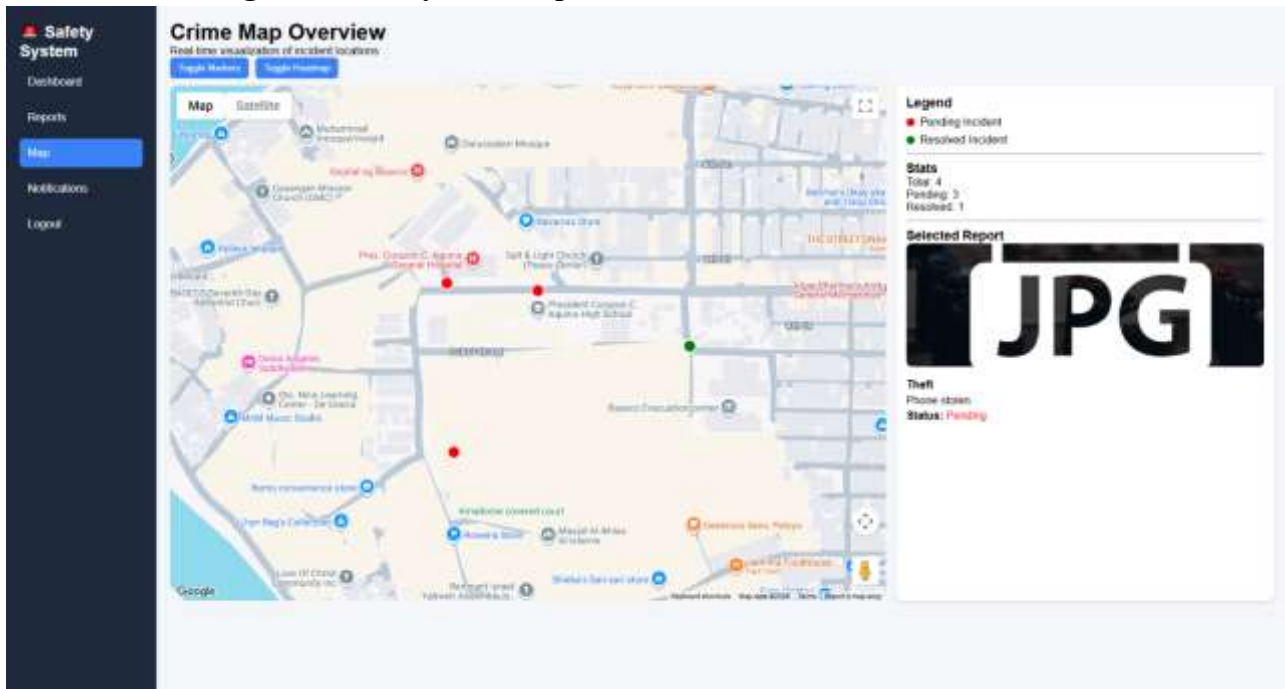


Figure 25 presents the Safety Heatmap and Crime Risk Prediction Interface. The interface visualizes crime-prone areas through geographic heatmapping and displays predicted crime risk levels categorized as Low, Medium, and High based on analyzed incident data and location patterns.

The proposed AI-based module is intended to analyze crime frequency, location patterns, and incident trends using TensorFlow.js. The integration of predictive analytics and heatmap visualization supports proactive decision-making and strategic resource allocation for barangay officials and police authorities. The planned implementation of predictive analytics and heatmap visualization supports the third objective of the study by promoting proactive decision-making and strategic resource allocation for barangay officials and police authorities.

## 6. Expected Contributions of the Study

The proposed system is expected to improve the efficiency of crime reporting and emergency response within Barangay 649, Baseco Port Area, City of Manila. Through mobile accessibility and real-time communication, residents are encouraged to participate actively in community safety initiatives.

The integration of machine learning and geographic visualization also supports proactive decision-making by allowing authorities to identify high-risk locations and monitor crime trends effectively.

Furthermore, the study contributes to the growing implementation of artificial intelligence and mobile technology in local governance and public safety management.

## 7. Conclusion

This study presented the design and development of an AI and Mobile Application-Based Barangay and Police Crime Reporting and Safety Map System intended to improve crime reporting, emergency response, and safety monitoring within Barangay 649, Baseco Port Area, City of Manila.

The proposed system integrates mobile reporting, GPS-based location tracking, multimedia evidence submission, emergency alert functionality, and machine learning-based predictive analysis within a

centralized platform. Through the implementation of an interactive safety heatmap, the system supports proactive decision-making and strategic resource allocation for barangay officials and police authorities. The study demonstrates the potential of integrating artificial intelligence, mobile applications, and geographic information systems in strengthening community participation and improving local public safety management.

## 8. Acknowledgement

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