Emergency Response Network Using Motion Sensors & Adaptive Location-Based Power Management

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Submitted to the APJ Abdul Kalam Technological University
in partial fulfillment of requirements for the award of degree

Bachelor of Technology

in

Computer Science & Engineering

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Eighth Semester 2021 Admission

Sreepathy Institute of Management & Technology
Vavanoor, Palakkad-679533
Affiliated to
APJ Abdul Kalam Technological University
April, 2025

SREEPATHY INSTITUTE OF MANAGEMENT AND TECHNOLOGY,VAVANOOR KOOTTANAD 679533

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Sreepathy Institute of Management And Technology
Vavanoor, Palakkad-679533

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the project report entitled **Emergency Response Network Using Motion Sensors & Adaptive Location-Based Power Management** submitted by **Ajay Krishna (SPT21CS005), Mohammed Badusha (SPT21CS027), Salman Faris A.V (SPT21CS035), Vipin (SPT21CS049)** to the A P J Abdul Kalam Technological University in partial fulfillment for the award of Degree of Bachelor of Technology in Computer Science and Engineering is a bonafide record of the mini project work carried out under our supervision during the year 2024-2025.

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ABSTRACT

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

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Chapter 1

INTRODUCTION

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1.1 MOTIVATION

The motivation driving the creation of Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

1.2 OBJECTIVES

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum. Key Objectives:

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These objectives collectively aim to transform the landscape of emergency response, empowering individuals and communities to effectively mitigate the impact of accidents and emergencies through swift and coordinated action facilitated by the ERN application.

1.3 PROJECT OUTLINE

The rest of the project report is organized as follows. In chapter 2, literature survey done for this project work is given. Chapter 3 presents the overall design of the proposed system. Chapter 4 describes the dataset used for the analysis. Chapter 5 deals with the experimental results associated with this project and Chapter 6 brings out the conclusion and future work.

Chapter 2

LITERATURE SURVEY

In their collaborative endeavor, Hajar Izzati Mohd Ghazalli, Muhammad Izaiddin Hassan, Zuhri Arafah Zulkifli, and Siti Nuramalina Johari have ingeniously developed MotoSOS [1], a groundbreaking mobile application aimed at revolutionizing motorcycle safety through advanced technology. By harnessing the capabilities of smartphone sensors, particularly accelerometers and gyroscopes, MotoSOS autonomously detects motorcycle accidents with remarkable precision. In the development of MotoSOS, the team employed cutting-edge technology centered around smartphone sensors, specifically accelerometers and gyroscopes. These sensors are ubiquitous in modern smartphones and are capable of measuring various aspects of motion and orientation. Accelerometers, utilized extensively in MotoSOS, detect changes in linear acceleration along different axes, including x, y, and z. This capability allows MotoSOS to detect sudden changes in motion indicative of a motorcycle accident. Through rigorous experimentation, the team established threshold values for acceleration that trigger accident detection, ensuring the reliability of the system. Gyroscopes, another essential component of MotoSOS, measure the rate of rotation or angular velocity of the smartphone along its axes. By analyzing gyroscope data, MotoSOS can detect changes in the orientation of the smartphone, which correlates with the movement of the rider during an accident. Similar to accelerometers, threshold values were established for gyroscope data to accurately detect accident scenarios. The integration of these sensors into MotoSOS enables the application to autonomously detect motorcycle accidents without requiring user intervention. Upon detecting a potential accident based on sensor data exceeding predefined thresholds, MotoSOS initiates emergency protocols, such as sending SMS alerts to designated emergency contacts. The utilization of smartphone sensors underscores the versatility and accessibility of MotoSOS, as it leverages existing hardware found in most smartphones without the need for additional external devices. This approach ensures widespread applicability and ease of adoption among motorcycle riders, contributing to its potential impact on enhancing motorcycle safety. Overall, by harnessing the capabilities of accelerometers and gyroscopes, MotoSOS represents a technologically advanced solution to address the critical issue of motorcycle accidents, with the potential to significantly improve emergency response and ultimately save lives.

The Accident Detection System Application [2], proposed by Akshay Agrawal et

al. from the Department of Computer Science at Vishwakarma Institute of Information Technology in Pune, India, addresses the critical need for timely emergency response following accidents. With accidents being a leading cause of fatalities worldwide, the proposed system aims to bridge the gap between accident occurrence and emergency medical personnel dispatch. Leveraging the ubiquitous presence of smartphones, particularly Android devices, the system utilizes built-in sensors such as accelerometers and rotational sensors for accident detection. Upon detecting an accident, the system captures images from the front and rear cameras of the smartphone and records the GPS location. This data is then encapsulated into SMS and MMS notifications and promptly sent to pre-stored emergency contacts, thereby alerting authorities and facilitating swift response. What sets this system apart is its adaptive algorithm, which tailors accident detection thresholds based on the characteristics of individual cars. By analyzing inputs from the vehicle during normal operation, the system can dynamically adjust its sensitivity to accurately detect accidents, enhancing its effectiveness across different car models. The proposed system offers a cost-effective and accessible solution, given the widespread adoption of smartphones and the Android platform. Moreover, the report highlights the feasibility of the proposed idea by referencing related works and successful implementations in similar projects. Ultimately, the accident detection system application has the potential to significantly improve emergency response efforts, ultimately saving lives on the road.

In the exploration of time-frequency analysis methods [3], Tatsuro Baba's review delves into the enduring relevance of the Short Time Fourier Transform (STFT) technique. Baba elucidates the critical role of time-frequency representation across various domains, emphasizing the trade-off between time and frequency resolutions dictated by the uncertainty principle. Through a meticulous examination of STFT and other analyzing methods, he underscores its suitability for non-stationary signal analysis, particularly in ultrasound blood-flow imaging. Baba's review extends to proposing innovative control mechanisms for manipulating time-frequency resolution while preserving the aspect ratio of the Point Spread Function (PSF). This report provides a comprehensive insight into the practical utility and technological foundations of STFT, offering valuable insights for researchers and practitioners aiming to advance time-frequency analysis techniques across diverse applications.

The work by Filipe Felisberto, Florentino Fdez.-Riverola, and António Pereira [4] presents a solution aimed at addressing the challenges of monitoring the elderly population in a non-restrictive manner while maintaining their quality of life. With the increasing aging population and economic constraints, there is a pressing need for efficient methods of ensuring the well-being of the elderly without resorting to premature nursing home admissions. Their proposed system utilizes sensor fusion technology, leveraging data from a network of wireless sensors placed around the user's periphery. Designed with cost-effectiveness in mind, the system aims to reach a broad target demographic. The system's capability to accurately detect and distinguish body postures and movements facilitates effective monitoring and rehabil-

itation of users, particularly in identifying long-term issues. While demonstrating near-perfect precision in detecting normal falls, further research is required to address the detection of complex falls, such as hampered falls, to enhance the system's overall effectiveness in accident detection and response.

The research by Abdul Mateen, Muhammad Zahid Hanif, Narayan Khatri, Sihyung Lee, and Seung Yeob Nam [5] introduces an innovative approach to address the escalating risk of accidents on roads, particularly exacerbated by adverse weather conditions. In response to the heightened danger posed by reduced visibility and hazardous road conditions during inclement weather, the study proposes an Accident Alert Light and Sound (AALS) system for autonomous accident detection and alerts across all vehicle types. By installing the system on roadside infrastructure, non-equipped vehicles (nEVs) and electric vehicles (EVs) can seamlessly benefit from the AALS system without necessitating modifications to their onboard systems. This approach aims to transform conventional roads into smart roads (SRs), streamlining accident detection and alert mechanisms. Leveraging a combination of sensors embedded in SRs, the system autonomously detects accidents and promptly alerts approaching vehicles via wireless communication. Furthermore, the incorporation of pre-saved locations reduces the time required to pinpoint accident locations, enhancing response efficiency without reliance on GPS technology. The proposed AALS framework not only facilitates timely accident alerts but also mitigates the risk of multiple-vehicle collisions (MVCs), thereby contributing to the overall safety and efficiency of road transportation systems.

2.1 LITERATURE REVIEW

SI No	Author	Title	Objective
1	Hajar Izzati Mohd Ghazalli, Muhammad Izaiddin Hassan, Zuhri Arafah Zulkifli, Siti Nuramalina Johari	*MOTOSOS [1]*	A groundbreaking mobile app leveraging smartphone sensors for precise motorcycle accident detection, triggering emergency protocols to enhance safety and potentially save lives.
2	Akshay Agarwal	*ACCIDENT DETECTION SYSTEM [2]*	Utilizing smartphones' sensors for timely accident detection to bridge the gap between occurrence and emergency medical dispatch, enhancing road safety and saving lives.
3	Tatsuro Baba	*TIME-FREQUENCY ANALYSIS USING SHORT TIME FOURIER TRANSFORM [3]*	Investigating control methods for optimizing time-frequency resolution in STFT analysis while evaluating image quality using PSF for non-stationary signals. Proposing a method to maintain constant PSF aspect ratio during image expansion and contraction.
4	Abdul Mateen, Muhammad Zahid Hanif, Narayan Khatri, Sihyung Lee, Seung Yeob Nam	*SMART ROADS FOR AUTONOMOUS ACCIDENT DETECTION AND WARNINGS [4]*	Implement an accident detection and warning system on smart roads to reduce human fatalities in traffic accidents.

5	Filipe Felisberto, Florentino Fdez.-Riverola, António Pereira	*IMPLEMENT AN ACCIDENT DETECTION AND WARNING SYSTEM ON SMART ROADS TO REDUCE HUMAN FATALITIES IN TRAFFIC ACCIDENTS. [5]*	Develop a cost-effective solution for monitoring the elderly and detecting accidents using sensor fusion technology.

Table 2.1: Literature Sources

2.2 BACKGROUND STUDY

The development of the Emergency Response Network (ERN) application is grounded in a comprehensive background study encompassing various facets of emergency response systems, technological advancements, and societal challenges. Key areas of focus include the current landscape of emergency response mechanisms, prevalent issues in timely accident detection and first aid provision, and the role of smartphone technology in addressing these challenges.

Research indicates that existing emergency response systems often struggle to provide timely assistance, particularly in remote or underserved areas where access to emergency services may be limited. Moreover, delays in receiving critical first aid following accidents contribute significantly to preventable loss of lives. This underscores the urgency of developing innovative solutions that leverage modern technology to bridge the gap between accident occurrence and professional medical assistance.

The proliferation of smartphones with built-in sensors, such as accelerometers, gyroscopes, and GPS, presents a unique opportunity to revolutionize emergency response systems. Previous studies, such as "MotoSOS [1]: Accident Detection for Motorcycle Riders Using Motion Sensors" and "ACCIDENT DETECTION SYSTEM APPLICATION [2]," have demonstrated the feasibility of using smartphone sensors for automated accident detection and distress signal dispatch. These findings provide valuable insights into the potential efficacy of smartphone-based solutions in enhancing emergency response capabilities.

Additionally, advancements in signal processing algorithms, as explored in papers like "Time-Frequency Analysis Using Short Time Fourier Transform," offer further avenues for improving the accuracy and reliability of accident detection systems. By leveraging insights from these studies and building upon existing research, the ERN project aims to develop a robust and effective mobile application that empowers bystanders and certified first aid responders to mitigate the impact of accidents and emergencies, potentially saving lives in critical situations.

Chapter 3

PROPOSED SYSTEM

3.1 PROBLEM STATEMENT

It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

3.2 PROPOSED SYSTEM OUTLINE

The system comprises two main components: It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

3.3 SYSTEM ARCHITECTURE

The system architecture is depicted in the figure 2.1. The data flow diagram illustrates the flow of data and interactions between users, first aid responders, the database, and various system components.

At the core of the architecture, EXPLANATION

EXPLANATION: It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.It was popularised in the 1960s with the release of Letraset

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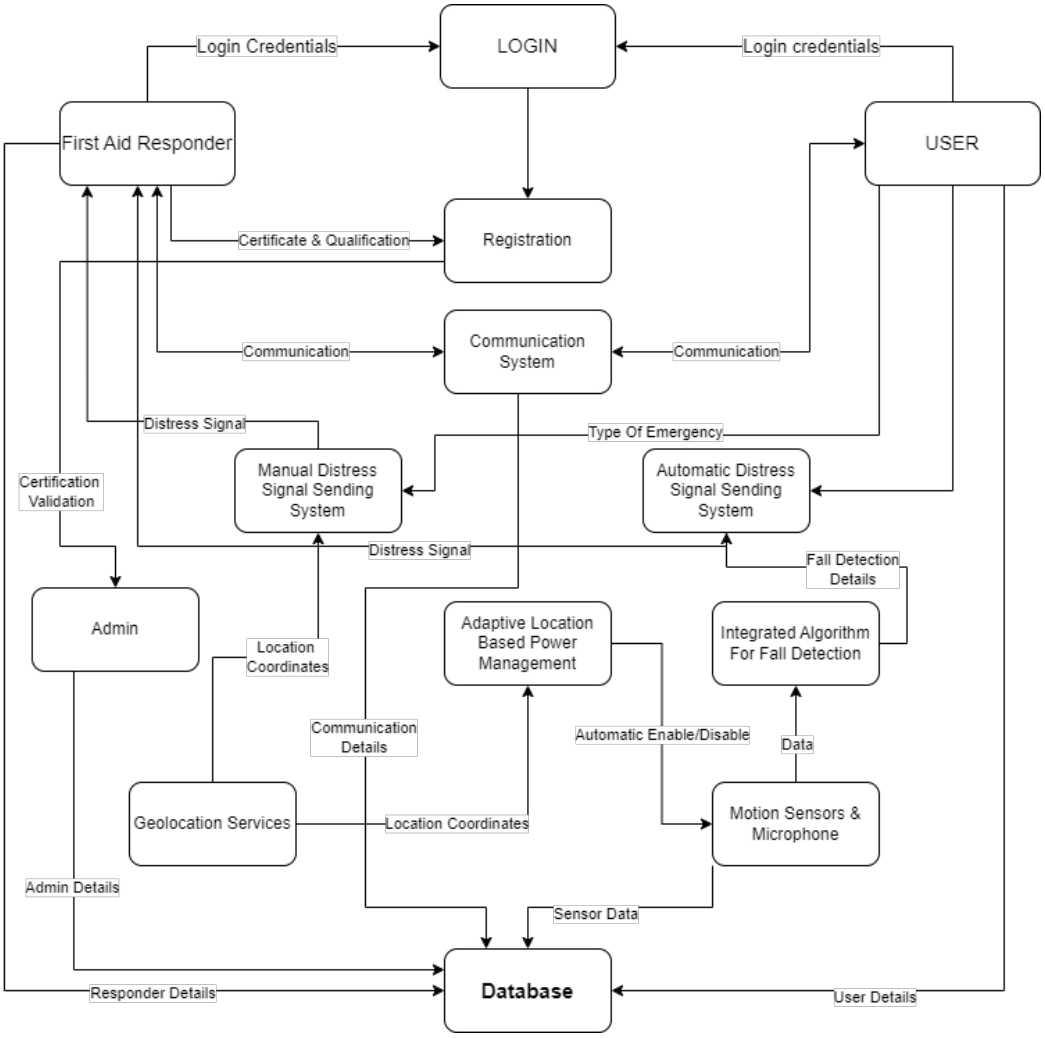

Figure 3.1: Data Flow Diagram

3.4 TECHNICAL DETAILS

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3.4.1 Smartphones

The primary hardware component utilized in the ERN is smartphones, which serve as the platform for running the mobile application. Smartphones provide the necessary computational power and connectivity to enable real-time accident detection, distress signal transmission, and communication with first aid responders. Additionally, smartphones feature built-in sensors such as accelerometers and gyroscopes, essential for detecting motion and orientation changes indicative of accidents or falls.

3.4.2 Motion Sensors

Accelerometers and gyroscopes are integral components of smartphones that detect motion, acceleration, and orientation changes. These sensors play a crucial role in the ERN's accident detection mechanism, where threshold-based algorithms analyze sensor data to identify potential accidents or falls. By continuously monitoring motion sensor data, the ERN can trigger distress signals in the event of emergencies, facilitating swift response from nearby first aid responders.

3.4.3 GPS Receivers

Global Positioning System (GPS) receivers integrated into smartphones provide accurate location data, enabling precise positioning of users in real-time. This location information is crucial for accident detection and distress signal dispatch within the ERN. By leveraging GPS data, the ERN can determine the user's exact coordinates and transmit this information to nearby first aid responders, ensuring timely assistance in emergencies.

3.4.4 Internet Connectivity

Seamless internet connectivity is essential for the ERN to transmit distress signals, exchange data with Firebase's backend services, and facilitate communication between users and first aid responders. Whether through Wi-Fi or mobile data networks, reliable internet connectivity enables the ERN to function effectively in various environments and conditions.

3.5 METHODOLOGY

The development of the application follows a systematic methodology encompassing several key stages, including planning, development, testing, and deployment.

3.5.1 SUB HEADING 1

- **TITILE 1** Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

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Chapter 4

DATASET

To obtain values indicative of an accident occurrence, we conducted a series of experiments using our custom-built application to record data from the accelerometer and gyroscope sensors. This application allows for real-time data collection and analysis, providing both live values and maximum values for further examination(fig 4.1 & fig 4.2). For the accelerometer data, experiments were conducted in various scenarios, including normal riding conditions, simulated accidents, throwing the phone to the ground, and dropping the phone from a desk height. The results of these experiments, as shown in Table 4.1, indicate that the maximum value for triggering accident detection is determined to be above 70 m/s^2. It's important to note that these values serve as preliminary thresholds, subject to further testing and calibration across different smartphone models to ensure accuracy and reliability. Additionally, gyroscope data was analyzed, focusing solely on the x-axis to represent the tilting of the smartphone corresponding to the rider's body movement. The values exceeding 2 or falling below -2 on the gyroscope axis are indicative of abnormal tilting and thus trigger the accident detection module within the application.

Table 4.1: Accelerometer Experiment Results

Experiment Situation	Maximum MA Value (m/s2)
Normal ride	36.92
Simulated	72.69
Throw	65.52
Desk drop	38.79

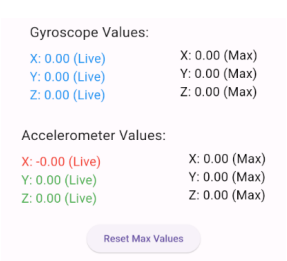

Figure 4.1: Moion sensor values at rest

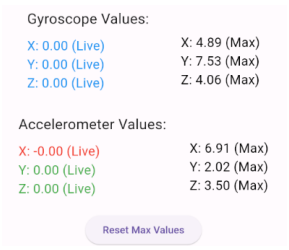

Figure 4.2: Moion sensor values after simulation

Chapter 5

EXPERIMENTAL RESULTS

To evaluate the performance and reliability of our system, extensive experimentation was conducted utilizing real-world scenarios and simulated accidents. This section presents the experimental results and analyses the effectiveness of the Emergency Response Network (ERN) application in detecting and responding to emergencies.

5.1 User Login and Signup

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. The figure 5.1 shows the Signup page of the application and figure 5.2 shows the Firebase authentication database.

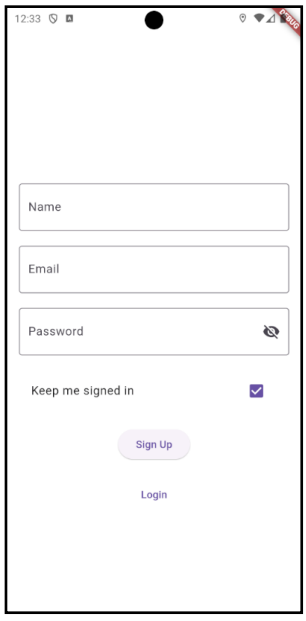

Figure 5.1: Login Page

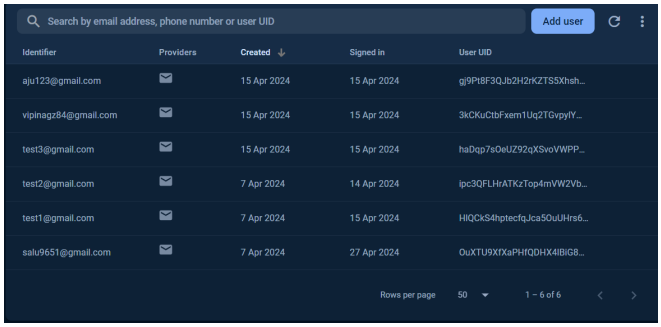

Figure 5.2: Authentication Database

5.1.1 Profile Setup

Upon signup, users can complete their profile setup by providing essential details, including a profile picture, gender, blood group, description of any medical conditions, and phone number (fig 5.3). These data are securely stored in Firebase Firestore (fig 5.4), ensuring accessibility and privacy. When a distress signal is sent, the user's profile information is automatically attached, enabling responders to quickly access relevant details about the victim, such as medical conditions or emergency contact information. This comprehensive profile setup enhances the efficiency of rescue operations and facilitates prompt assistance in critical situations.

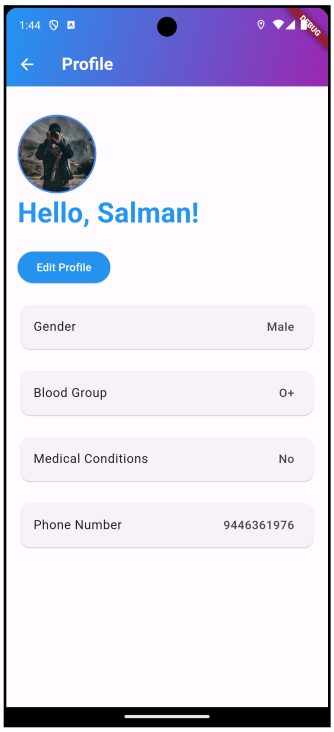

Figure 5.3: Profile Page

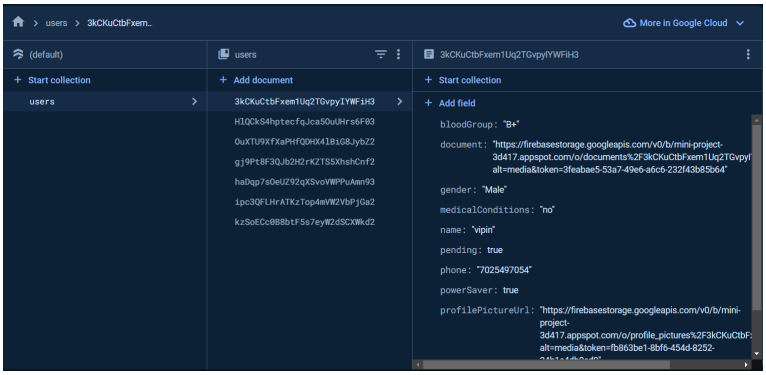

Figure 5.4: Firestore User Database

5.2 Registration and Verification Process

In the application, users have the option to register as first aid responders by submitting required documents (fig 5.5). Upon submission, the documents are stored in the database for review by the admin (fig 5.6). The admin has the authority to verify the documents and designate the user as a responder (fig 5.7). Once verified, the corresponding responder status is updated in the database (fig 5.8), enabling access to responder-specific features. This streamlined process ensures that

only qualified individuals are granted responder status, enhancing the effectiveness and reliability of emergency response efforts within the ERN application.

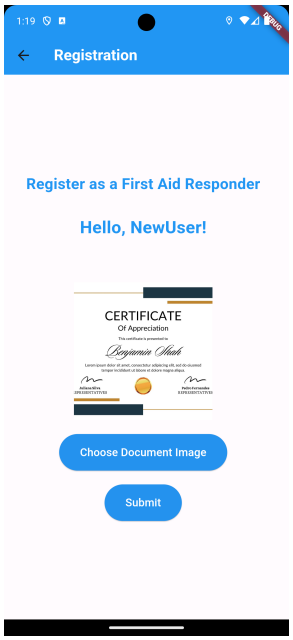

Figure 5.5: Registration Page

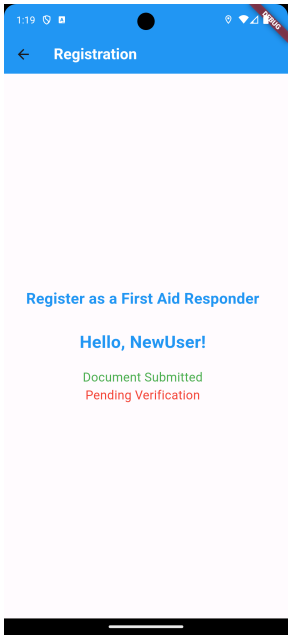

Figure 5.6: After Submission

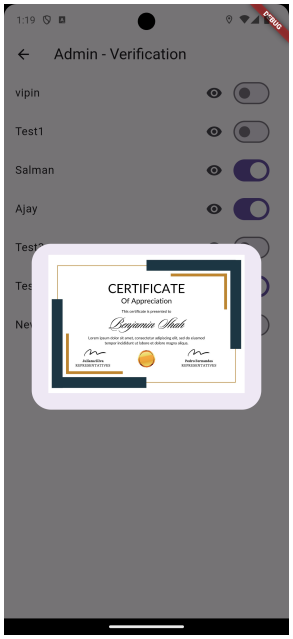

Figure 5.7: Verification Page(Admin)

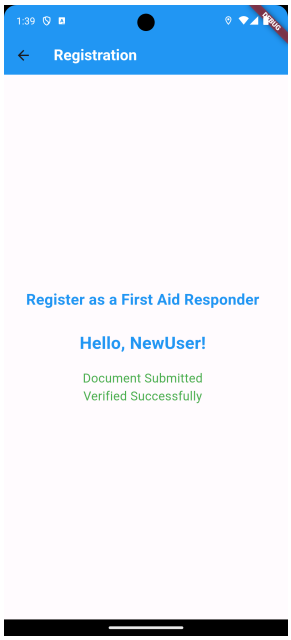

Figure 5.8: After Verification

5.3 Live Location Monitoring

The application continuously monitors the live location of users upon login, updating their coordinates (latitude and longitude) and timestamp in Firebase Realtime Database in real-time (fig 5.9). This dynamic tracking ensures that the latest location data is readily available for use in various application features, facilitating timely assistance and accurate positioning of users during emergencies. By leveraging live location monitoring, the ERN enhances the effectiveness of emergency response efforts, enabling swift coordination and intervention when needed.

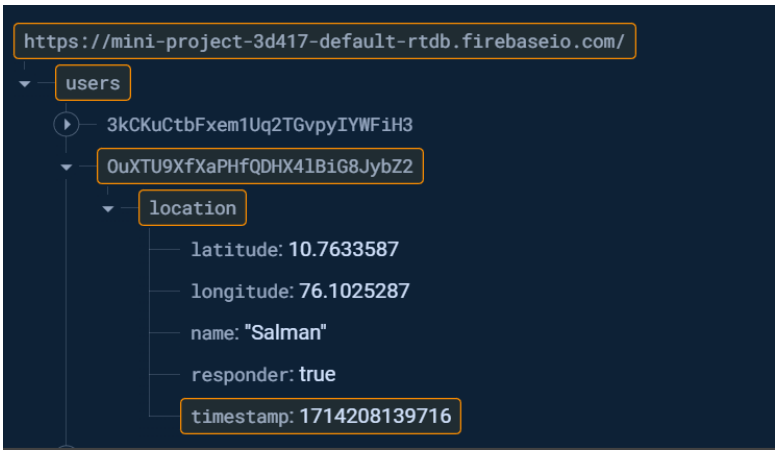

Figure 5.9: Real Time Database

5.4 Location-Based Power Management

The application incorporates a location-based power management feature to optimize energy consumption while ensuring efficient accident detection using motion sensor data. Users have the option to enable or disable power-saving mode, which dynamically controls the activation of the motion sensor. When power-saving mode is disabled, the motion sensor remains enabled at all times, providing continuous accident detection capability. However, when power-saving mode is enabled, the application utilizes location services to determine whether the user is traveling. If the user is stationary, the motion sensor is disabled to conserve power. Conversely, if the user is in transit, the motion sensor is activated to enable accident detection functionality. This intelligent power management strategy balances energy efficiency with the need for real-time accident detection, enhancing the overall usability and effectiveness of the ERN application.

Figure 5.10 illustrates the scenario where power-saving mode is off, enabling the motion sensor for continuous accident detection. In Figure 5.11, with power-saving mode activated and the user stationary, the motion sensor is disabled to con-

serve power. Conversely, Figure 5.12 depicts power-saving mode activated while the user is traveling, resulting in the motion sensor being enabled for accident detection.

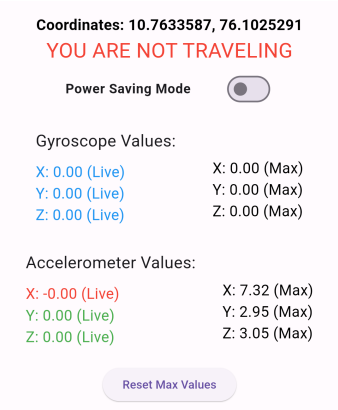

Figure 5.10: Power Saving Mode Disabled

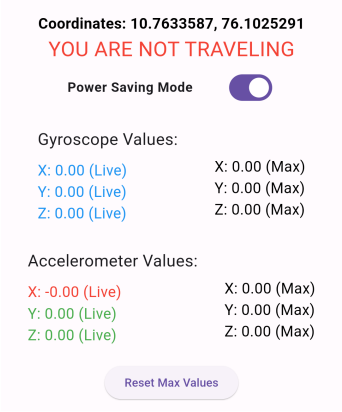

Figure 5.11: Power Saving Mode Enabled and Stationary

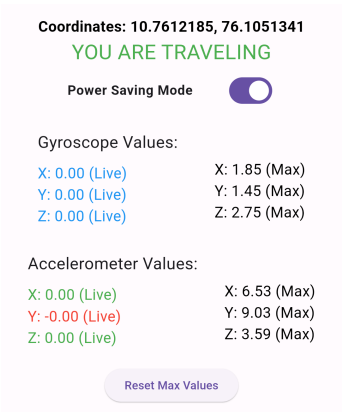

Figure 5.12: Power Saving Mode Enabled and Transit

5.5 Finding Nearest Responder

In the event of an accident, the application employs a mechanism to locate the nearest responder for prompt assistance. By retrieving the current location of the user and the locations of available responders from the real-time database, the ERN calculates the distance between the two points. If the distance is within a predefined radius, typically 5 km, the details of the nearest responder are retrieved for distress signal dispatch (fig 5.14). This efficient process ensures that users receive timely aid from nearby responders, optimizing emergency response efforts within the ERN application.

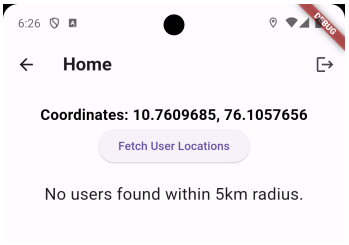

Figure 5.13: No Responder Nearby

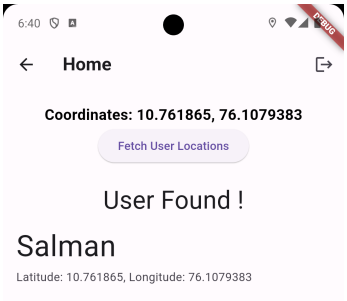

Figure 5.14: Responder Nearby

5.6 Accident Detection and Distress Signal Sending

The application employs automatic accident detection utilizing motion sensor data. When the sensor detects values surpassing a predefined threshold, indicating a potential accident, a pop-up window with a warning sound is triggered. This window provides a slide button to cancel the distress signal if it's a false alarm, allowing the user to respond within a 20-second timeframe. Failure to cancel the signal within this duration prompts the ERN to dispatch a distress signal to nearby responders via push notification or SMS. The distress signal includes detailed user information and coordinates, facilitating swift assistance and ensuring effective emergency response.

Figure 5.15 illustrates the accident detection popup message with a cancel button, allowing users to respond to potential false alarms. In Figure 5.16, the signal send popup appears after the 20-second timeframe, indicating distress signal dispatch to the nearest responder. Figure 5.17 showcases the incoming alert received by the responder, containing detailed victim information and location coordinates. Lastly, Figure 5.18 displays the Google Map view of the accident location retrieved from the alert message, aiding responders in navigating to the scene promptly.

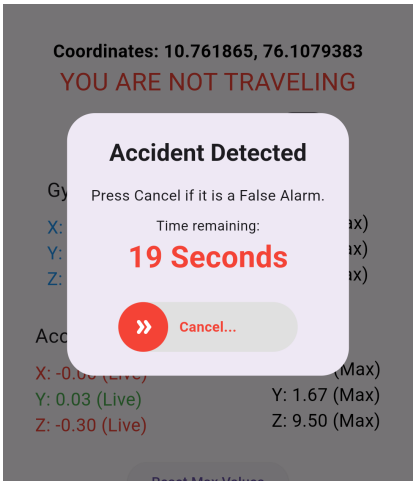

Figure 5.15: Accident Detected Pop-up

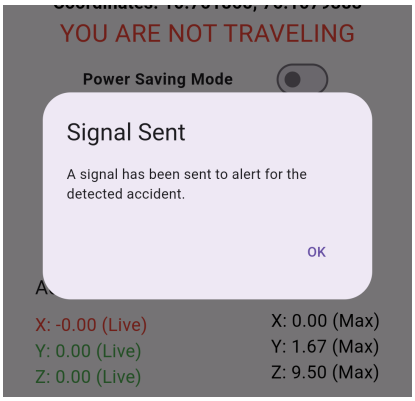

Figure 5.16: Signal Send Pop-up

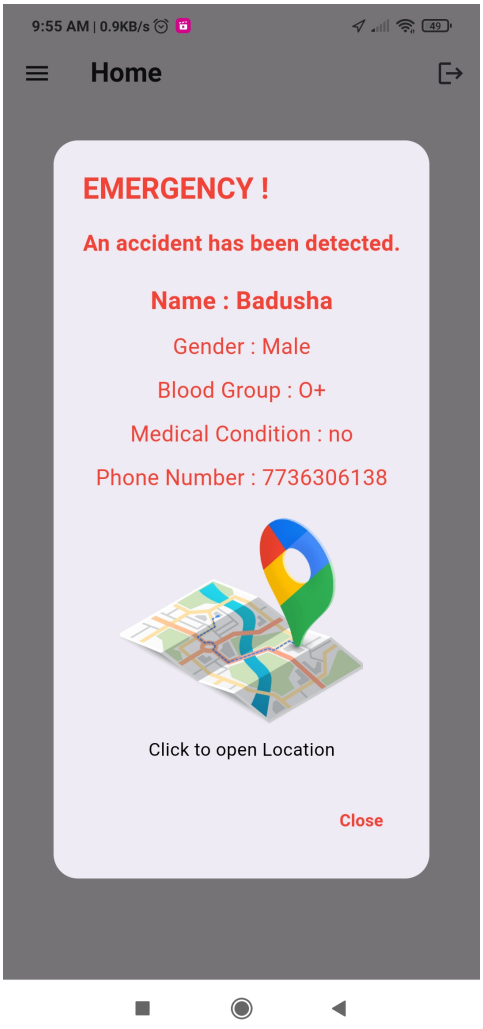

Figure 5.17: Responder View of Alert

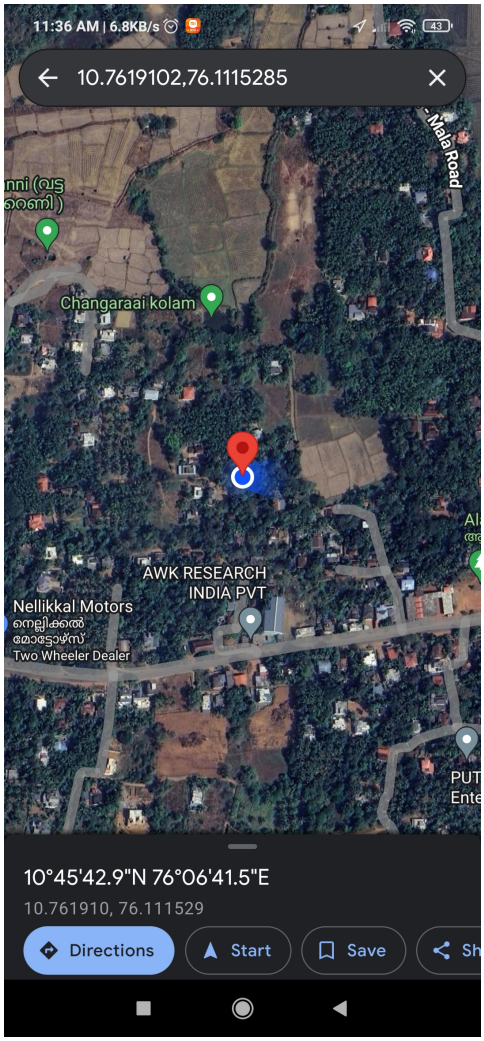

Figure 5.18: Location of the Accident

Chapter 6

CONCLUSION & FUTURE SCOPE

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