

Team Project

SYSTEM AND ANALYSIS

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Section – 1

1.1 Abstract

The project, titled "Prothirodh," focuses on developing a real-time smart security band and accompanying mobile application aimed at enhancing personal safety in Bangladesh. It addresses the need for improved security solutions in the context of increasing urbanization and security challenges. The security band integrates features like GPS tracking, vital sign monitoring, and an emergency alert system, while the app allows users to manage settings and view data. The project also emphasizes data security, user education, and collaboration with emergency services, targeting a market demand for personal safety solutions and leveraging technological advancements.

1.2 Introduction

The Introduction to the "Prothirodh" project details the development of an innovative security solution tailored for the urban population of Bangladesh. This project responds to the growing concerns over personal safety in urban areas, exacerbated by rapid urbanization and the increasing complexity of safety challenges. It introduces a smart security band paired with a mobile application, designed to provide real-time safety features such as GPS tracking, vital sign monitoring, and an emergency alert system. The project emphasizes the importance of leveraging advanced technology to create user-friendly, reliable, and secure personal safety tools. Additionally, it explores the integration of these technologies with existing emergency services and the importance of ensuring data security and privacy. By addressing these critical aspects, the "Prothirodh" project aims to offer a comprehensive solution to improve personal safety in Bangladesh's urban landscape.

1.3 History leading to project request:

The need for a real-time smart security band project in Bangladesh arises from a historical context characterized by rapid urbanization, increasing security challenges, and technological advancements. Over the past decade, Bangladesh has grappled with crime, civil unrest, and natural disasters, highlighting the urgency of enhanced personal security measures. The proliferation of smartphones and wearable technology has underscored the potential for innovative security solutions. Simultaneously, the population's growing awareness of personal safety and government policies focused on security and disaster management have created a fertile ground for such projects. The smart security band project aims to leverage these trends and developments to develop a multifunctional wearable device that empowers individuals and contributes to a safer environment, aligning with national priorities and responding to the historical and contemporary security challenges of Bangladesh's urban landscape. The problem at hand is the need for improved personal security and safety in Bangladesh, driven by increasing urbanization, security challenges, and natural disasters. Incidents of crime, civil unrest, and emergencies have exposed vulnerabilities in the existing security infrastructure. Citizens require an effective solution to enhance their personal safety and response to critical situations.

1.4 Identify Problem, solutions, and opportunity

1.4.1 Problems

The problem at hand is the need for improved personal security and safety in Bangladesh, driven by Increasing urbanization, security challenges, and natural disasters. Incidents of crime, civil unrest, and Emergencies have exposed vulnerabilities in the existing security infrastructure. Citizens require an Effective solution to enhance their personal safety and response to critical situations.

1.4.2 Solutions

Real-time Smart Security Band: The primary solution is the development of a real-time smart security band that integrates various features, including GPS for location tracking, vital sign monitoring, and an emergency alert system. This wearable device can instantly notify designated contacts or authorities in the event of emergencies, such as medical issues or personal threats.

- **User-Friendly Mobile App:** A mobile application complements the security band, allowing users to configure settings, view real-time data, and receive alerts. This app

offers an intuitive interface, making it easy for users to manage their security preferences and access essential information.

- **Emergency Response Integration:** Collaborate with local authorities and emergency response services to ensure that alerts from the security band directly reach the appropriate agencies, expediting response times in critical situations.
- **Data Security and Privacy:** Implement robust data encryption and privacy measures to protect users' sensitive information, ensuring that personal data remains secure.
- **User Education and Training:** Provide user education and training programs to ensure that individuals understand the functionality of the smart security band and how to use it effectively.

1.4.3 Opportunities

- **Market Demand:** The project capitalizes on the growing market demand for personal safety solutions, aligning with the heightened awareness of security issues in Bangladesh.
- **Technological Advancements:** Leveraging advancements in wearable technology and IoT, this project aligns with the technological landscape, offering opportunities for innovation and market leadership.
- **Public-Private Collaboration:** Collaborating with government agencies and local authorities creates opportunities for public-private partnerships to improve emergency response systems and overall security infrastructure.
- **Data-Driven Insights:** The project generates valuable real-time data, potentially offering insights for public safety improvements and urban planning.
- **Job Creation:** The development, distribution, and maintenance of smart security bands and associated technologies can stimulate job creation in the tech and security sectors, contributing to economic growth.

1.5 Project goal and objectives

1.5.1 Project Goals

The project's overarching goals are fundamental to the establishment of our real-time smart security band system. These objectives represent the project's core vision, articulated through qualitative statements, with the primary aim of enhancing personal security. The project seeks to

accomplish this by implementing real-time monitoring and emergency response capabilities, thereby contributing to improved user safety. Furthermore, the project is designed to facilitate seamless integration with external devices and services. These high-level objectives serve as the guiding principles, offering a clear sense of purpose and direction for the project.

1.5.2 Project Objectives

Project objectives constitute the specific, quantifiable, attainable, relevant, and time-bound (SMART) milestones derived from our overarching goals. These objectives delineate the detailed action steps required to realize our project's vision. For our real-time smart security band endeavor, these objectives encompass several critical areas. They encompass the development of hardware and software components, inclusive of sensor integration and a real-time alerting system. User testing and feedback collection, crucial to enhancing the user experience, and the implementation of stringent data security and privacy measures are also among the defined objectives. Additionally, the project entails integration with external systems, adherence to regulatory compliance and certification standards, and the development of a comprehensive marketing and distribution strategy.

Section-2

2.1 Literature Review

2.1.1 Context

Certain conference papers dig into various aspects of Protirodh's functionality, reaching from the fundamental technological frameworks to real-world applications. By analyzing these academic works, we aim to comprehend the usefulness, limitations, and potential improvements of Protirodh as an inclusive smart security solution. The papers under deliberation cover a diversity of topics, including sensor technologies working in the security band, data analytics algorithms for emergency detection, user interface design, and the overall impact of Protirodh in real-world security circumstances.

- **“A Study on Wearable Devices for the Safety and Security of a Girl Child and Woman”:** This paper examines the implementation of different smart security frameworks, including armbands, coats, savvy toys, brilliant watches, and wristbands,

planned to safeguard the two children and women. The study paper reviews methods and frameworks proposed by various scientists, examining their benefits and negative marks. Identifying limits in current frameworks, the authors propose another framework in view of the Internet of Things (IoT) to overthrow these problems. A conclusive objective is to provide women and children with a way to safeguard themselves and communicate trouble signs to relatives, neighbors, or the police [\[1\]](#).

- **“An Intelligent Human Security Device”:** This proposed system addresses the global issue of immoral physical harassment, mostly focusing on the security of women, children, and specially challenged individuals. The World Health Organization (WHO) and the National Crime Records Bureau (NCRB) report a major occurrence of such crimes worldwide. In response, the paper proposes a Global Positioning System (GPS) and Global System for Mobile (GSM) based human security system. The proposed device integrates an emergency button trigger that, when pressed, sends alerts and messages to legal personnel with the victim's location. The system aims to improve security, especially for women, in the face of rising crimes. A heart rate sensor automates the device, activating it in response to an abnormal increase in the pulse rate. Additionally, a hidden camera captures the face image of the possible culprit, stored on an SD card for later identification and permissible action [\[2\]](#).
- **“Smartwatch for Human Safety Based on The Internet of Things (IoT)”:** Here, they discourse the serious need for providing security in several circumstances containing harassment, theft, robbery, kidnapping, and health emergencies. Recognizing the limitations of current security applications, the paper focuses on wearable devices specifically smartwatches as a solution. It also highlights the importance of integrating Internet of Things (IoT) technology specifically smartwatches to improve personal safety with real-time alerts, location tracking, and communication features in a critical situation [\[3\]](#).
- **“Smart Security System Using IoT”:** The paper emphasizes the capability of IoT stages to accumulate and examine information from different gadgets, empowering informed navigation. It shows how IoT networks with sensors can give significant data, permitting organizations to understand use designs, track status, and pursue informed choices gradually. The case of a vehicle manufacturing business is introduced, outlining the way

that IoT can be applied to improve standard management in view of display area reputation and deals information [4].

- **“Design of a Novel Smart Device for Human Safety”:** This paper comes up with a novel smart device that enhances human safety by monitoring heart rate and motion sensing with location tracking functions. This device is designed as a wearable watch, and it has a false alarm control function, which makes it a good personal security technology. This device is implemented on System on Chip (SOC) technology with a built-in Wi-Fi module that is used to transfer data into the cloud [5].
-

2.1.2 Major Findings & Key Points

Here are the key findings and important points from the studies and research papers mentioned above:

- Smart security systems can provide human safety, especially for women and children, and for those who really need it.
- This system can detect emergency cases like criminal activities, fires, and vulnerabilities. Also, it can detect the victim's real-time location using GPS and send the location to the local authorities.
- It also explores the use of wearable devices, including armbands, bracelets, and smartwatches.
- Overall, this system integrates IoT technology into wearable devices for real-time monitoring to provide broad security features like GPS tracking, communication, and automatic activation in emergency situations.

2.1.3 References

- [\[P. Nandhini and K. Moorthi. \(2018\): A STUDY ON WEARABLE DEVICES FOR THE SAFETY AND SECURITY OF A GIRL CHILD AND WOMEN. Int. J. of Adv. Res. 6 \(Oct\). 231-237\] \(ISSN 2320-5407\).](#)
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Section 3

3.1 Product Description

Prothirodh is a technologically advanced wearable designed for personal safety. With real-time GPS tracking, vital sign monitoring, and an instant emergency alert system, it empowers users to take control of their security and well-being. The user-friendly mobile app allows customization and real-time data access, while robust data security safeguards privacy. Prothirodh Pro offers peace of mind, rapid emergency response, and versatility for a wide range of scenarios, making personal safety a top priority.

3.2 Product Stakeholders:

- End Users: The primary users of the smart security band, whose safety and satisfaction are paramount.
- Investors: Financial backers who have a significant interest in the project's success.
- Development Team: The engineers, designers, and project managers responsible for the product's creation.
- Regulatory Authorities: Government agencies ensuring compliance with safety and data privacy regulations.
- Emergency Services: Local police, medical, and emergency response teams that will respond to alerts from the band.

- Manufacturers: Companies producing smart security bands.
- Healthcare Providers: If the band includes health monitoring features, healthcare professionals may have a stake in its functionality.
- Distributors and Retailers: Those involved in distributing and selling the product.

3.3 System Context diagram

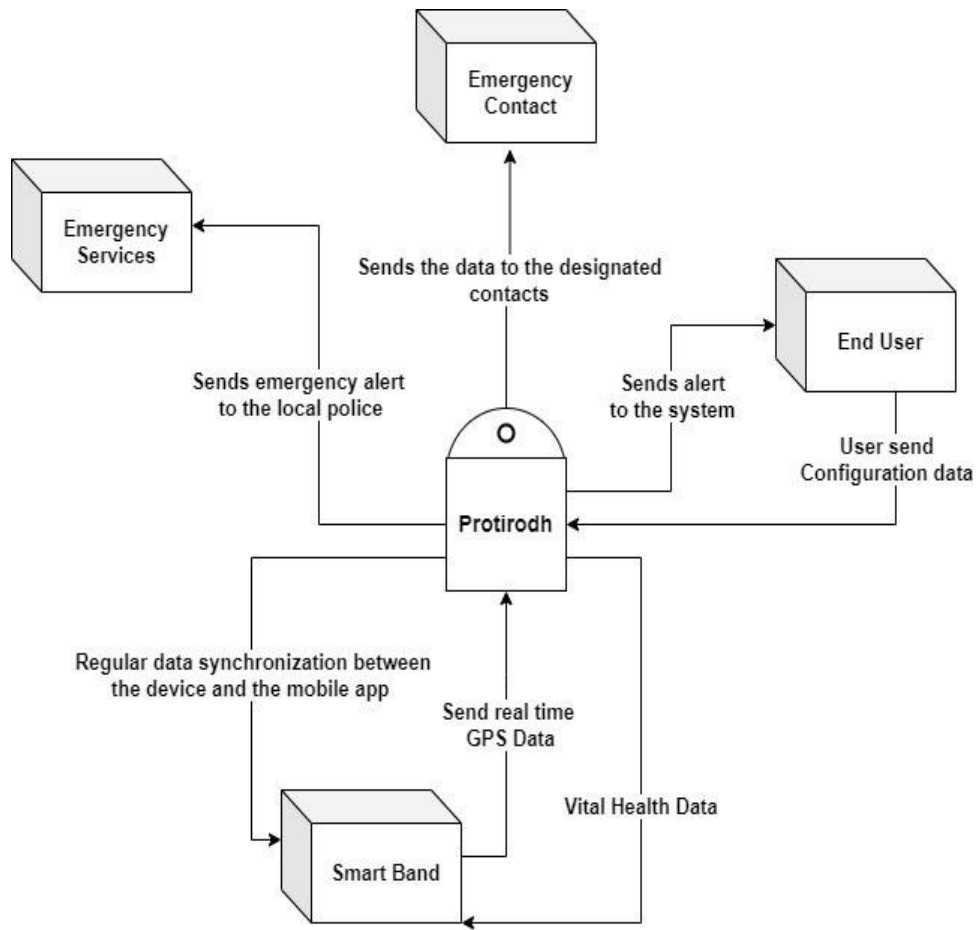


Figure 1 : System Context diagram

3.4 Hardware & Software detail

3.4.1 Development Environment

3.4.1.1 Hardware Components

Component	Description
GPS Module	Accurate location tracking for real-time user positioning.
Heart Rate Sensor	Monitors user's heart rate, providing vital health data.
Emergency Button	Instant alert triggers immediate assistance.

Communication Module	Enables seamless data exchange with the mobile app.
Battery	Long-lasting, rechargeable battery for extended usage.
Microcontroller	Controls device operations, ensuring efficient functionality.

3.4.1.2 Software Components:

Component	Description
Firmware	Manages hardware interactions, ensuring device stability.
Real-time Data Processing	Processes GPS and health data for immediate use.
User Interface	Intuitive interface for users to customize settings.
Alerting System	Generates and sends alerts to designated contacts.
Mobile App	Enables users to configure settings and view data.

3.4.2 Operation Environment

3.4.2.1 Hardware Architecture:

The Prothirodh features a compact and ergonomic design, integrating the GPS module, heart rate sensor, emergency button, communication module, and microcontroller seamlessly within its casing. The hardware components work cohesively to provide accurate tracking, health monitoring, and instant alert capabilities.

3.4.2.2 Software Architecture:

The software architecture follows a modular approach. The firmware acts as the core, interfacing with hardware components. Real-time data processing modules handle GPS and health data, ensuring accuracy. The user interface allows customization, while the alerting system triggers emergency notifications. The

mobile app acts as the user's control center, connecting wirelessly to the device for configuration and data visualization.

3.5 Rich Picture

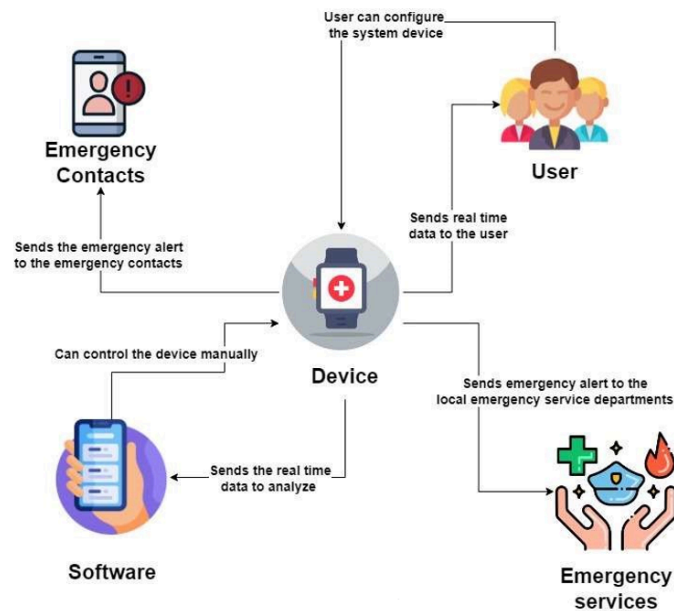


Figure 2 : Rich Picture

3.6 Software key technical features

3.6.1 Product Description

Prothirodh offers a robust and feature-rich software ecosystem designed to ensure user safety and peace of mind. Here are the key technical features of the software:

1. Real-Time GPS Tracking:
 - Utilizes GPS technology for precise real-time location tracking.
 - Geofencing capabilities enable users to set safe zones and receive alerts when leaving or entering specified areas.
2. Health Monitoring:

- Continuous heart rate monitoring ensures users stay informed about their well-being.
 - Periodic reminders for health check-ins, promoting a proactive approach to personal health.
3. Instant Alert System:
 - An emergency button provides an immediate alert to pre-configured contacts or local authorities.
 - Automatic alerts include the user's location, health data, and timestamp for prompt response.
 4. User-Friendly Mobile App:
 - A user-centric mobile application offers seamless connectivity to the device.
 - Allows users to customize settings, receive alerts, and view real-time data at a glance.
 5. Data Security and Privacy:
 - State-of-the-art encryption ensures the security and privacy of user data.
 - Complies with data protection regulations and provides peace of mind regarding sensitive information.
 6. Multi-Platform Compatibility:
 - Available for both iOS and Android platforms, ensuring broad accessibility.
 - Cross-device synchronization allows users to seamlessly transition between smartphones.
 7. Smart Notifications:
 - Intelligent notifications inform users about relevant health and safety information.
 - Alerts for low battery, connectivity, and other critical updates
 8. Data Analysis and Insights
 - Collects and analyzes user data to provide valuable insights into health trends and safety.
 - Empowers users with actionable information for a healthier and safer lifestyle.
 9. Emergency Service Integration:
 - Collaborates with local emergency services to ensure that alerts are routed directly to the appropriate response teams.
 - Enables efficient and coordinated emergency response.
 10. User Training and Support:
 - Comprehensive user guides and support resources are readily available through the app.
 - In-app tutorials and assistance for first-time users ensure a smooth experience.

Prothirodh software combines real-time tracking, health monitoring, and instant alerting to create a cohesive safety solution. It offers users advanced features in a user-friendly interface, prioritizes data

security and privacy, and ensures compatibility across platforms. The software's analytical capabilities further contribute to improved user safety and well-being.

Section 4

4.1 Information Gathering Methods

Information collecting is a key step in the system development process. To establish the system scope, identify constraints, gather requirements, and develop the system design, it is crucial to understand the requirements of the system's end users. Gathering information ensures the system is scalable, dependable, and meets user requirements. Developers could wind up building a system that is neither workable nor satisfies users' needs, resulting in expensive and time-consuming redesigns. To ensure that the system is constructed within the proper cost and restrictions while meeting the needs and expectations of the users, information gathering is thus necessary. For the “Prothirodh” project, we have used these three information-gathering methods:

- Surveys and Queries
- Interviews
- Market Research and Competitor Analysis

4.1.2 Surveys and Questionnaires:

Surveys and questions are effective methods to collect structured data from a targeted group. For the Prothirodh project, a survey can be designed to gather user preferences, security concerns, desired features, and usability feedback. The process involves several steps:

- **Planning Phase:** Define the objectives of the survey, identify the target audience (users, security experts, medical professionals), and caquelons that address specific project needs. Consider using a mix of closed-ended (multiple choice, rang scales) and open-ended Questions.
- **Survey Creation:** Utilize online survey platforms (such as Google Forms, SurveyMonkey) to create the survey. Ensure clarity in ques on wording, logical flow, and easy navigation for respondents.
- **Pilot Testing:** Before distributing the survey widely, conduct a pilot test with a small group to identify any issues with questions on clarity or response options.
- **Distribute on:** Deploy the survey through various channels like email, social media, or dedicated forums. Emphasize the importance of par cipa on and ensure anonymity if required.
- **Data Collection on:** Monitor survey responses regularly. Analyze and compile the gathered data to identify trends, preferences, and user sentiments regarding smart security bands.

4.1.2 Interviews

Interviews, especially structured and semi-structured ones, offer insights into specific user needs, pain points, and expectations. For the Prothirodh project, conducting interviews with potential users, security experts, and healthcare professionals could yield valuable information on. The process involves several stages:

Planning and prepare on: Identity interview objectives, determine the target interviewees, and develop a set of structured or semi-structured interview questions. Tailor questions to gather insights into user habits, security concerns, and health-related needs.

- **Participant Selection:** Identify and recruit participants from diverse backgrounds (age, occupation, local on) relevant to the smart security band's potential users. Arrange interview schedules and ensure their willingness to participate.
- **Conducting Interviews:** Conduct interviews in person, over the phone, or via video calls. Use the prepared questions as a guide but allow flexibility for follow-up queries based on the participant's responses. Ensure active listening and note-taking during the interviews.
- **Data Analysis:** Analyze interview transcripts or recordings to identify recurring themes, common pain points, and valuable suggestions or insights provided by the participants.

Here are a few sample questions that can be asked to potential interviewee:

For Potential Users:

- How open do you consider personal security as a concern in your daily life? Can you provide specific scenarios where you felt vulnerable?
- What features or functionalities would you prioritize in a wearable security device like the Prothirodh band?
- How comfortable are you with sharing personal health data (like heart rate, location) for security purposes? What level of data privacy and security would you expect?
- Have you used any similar security wearables before? What did you like or dislike about them?
- How crucial is the integration of emergency alert systems (like panic buttons) in a security wearable for you?

For Security Experts:

- In your experience, what are the critical aspects to consider in designing a secure wearable device, especially in terms of data encrypted on and protection?
- What potential vulnerabilities do you foresee in a wearable security device, and how can they be mitigated?
- From a cybersecurity perspective, what security standards or protocols should a device like Prothirodh adhere to?
- What specific functionalities or features would you recommend for ensuring the device's resilience against hacking or unauthorized access?
- How important is it for a security wearable to have seamless integration with emergency response services from a security standpoint?

For Healthcare Professionals:

- How do you envision the integration of health monitoring features within a security wearable like the Prothirodh could benefit users in emergency situations?
- What health metrics or data points would be most critical to monitor in such a device for health emergency purposes?
- What challenges do you foresee in accurately interpreting health data collected from wearables for emergency medical response?
- How crucial is it for emergency responders to have access to a user's health information during an emergency? What specific details would be most vital?

- What potential ethical or legal considerations should be taken into account when combining health monitoring and security functionalities in a wearable device?

Tailor these questions based on the interviewee's experience or background and use them as a guide to initiate discussions that uncover valuable insights relevant to the Prothirodh project.

4.1.3 Market Research and Competitor Analysis:

Understanding the existing market landscape and analyzing competitor's offerings is crucial for product positioning and feature differences. This involves comprehensive research and analysis:

- **Defining Research Objectives:** Clearly define the purpose of market research - understanding user preferences, identifying market gaps, analyzing competitor strengths and weaknesses, etc.
- **Gathering Market Data:** Use various sources such as industry reports, market analysis tools, online databases, and competitor websites to gather information. Analyze user reviews, product specifications, and marketing strategies adopted by competitors in the smart security band domain.
- **Data Synthesis:** Compile and organize the gathered data into meaningful insights. Compare features, pricing strategies, user feedback, and market trends among competing products.
- **Strategy Formulation:** Use the acquired market intelligence to refine the Prothirodh project strategy, identify opportunities for innovation, and develop a product that addresses identified gaps or fulfills unmet user needs.

By employing these Information on-gathering methods, the Prothirodh project can accumulate diverse and valuable insights crucial for product development, ensuring alignment with user preferences, market demands, and industry standards.

4.3 Use Case Diagram

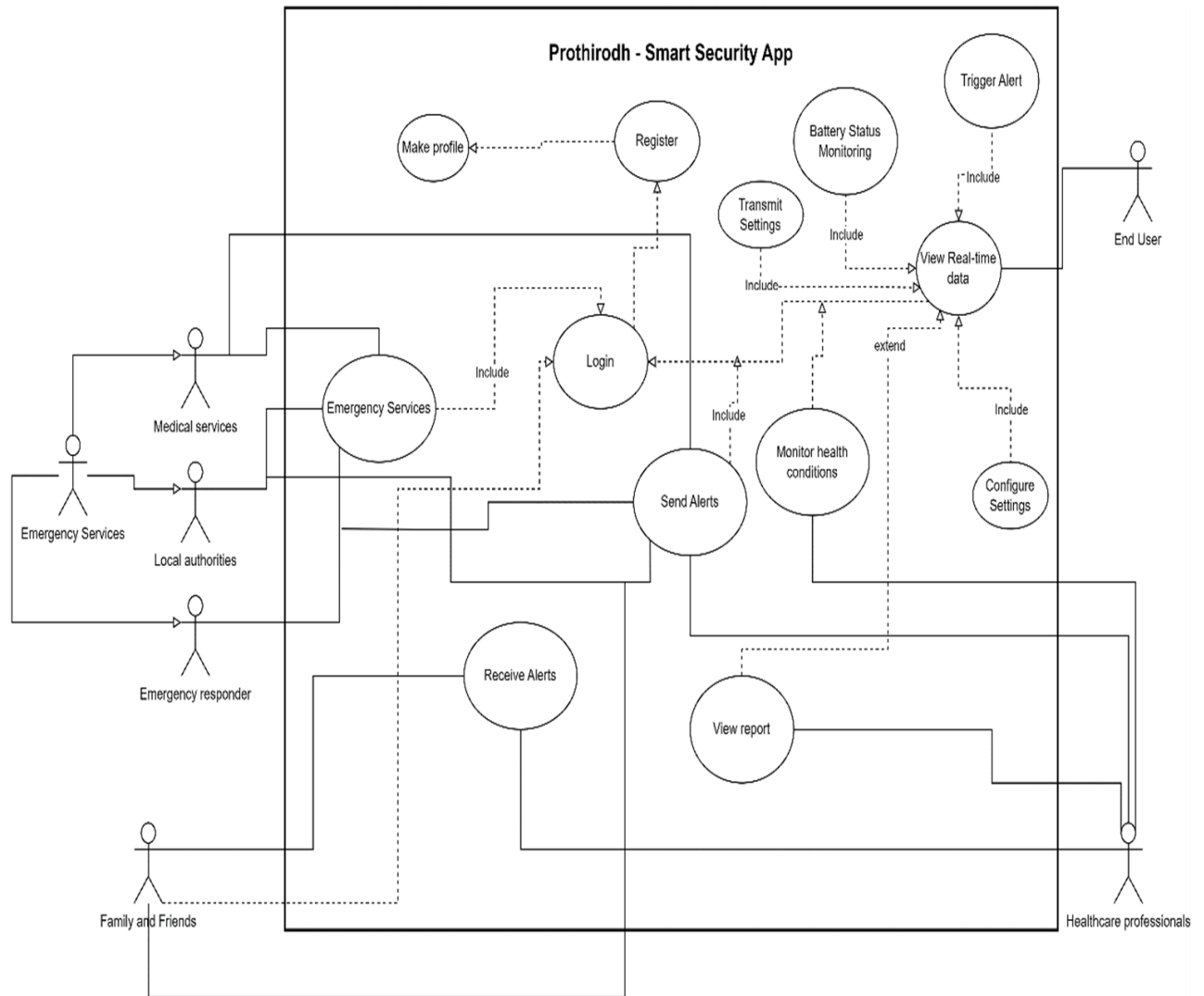


Figure 3 : Use Case Diagram

4.4 Normal Scenarios

4.4.1 Case 1

Use case Name : View Real-time Data		Unique ID: PB-0001
Area: User Interface		
Actor(s): User		
Stakeholders:, End Users, Emergency Services		
Description: User accesses real-time location and health data on the Prothirodh app.		
Triggering Event: User opens the app and navigates to the "Real-time Data" section.		
Trigger Type: Direct user action		
Steps Performed (Main Path):		Information Required for Steps:
1. User launches the Prothirodh app.		1. User's device connection
2. User navigates to the "Real-time Data" section.		2. User login details.
3. The app requests data from the Prothirodh device.		
4. The device sends real-time location and health data.		
5. The app displays the received data on the interface.		
Pre-condition: User's device must be connected and logged into the app.		
Post-conditions: User can view their real-time location and health data.		
Assumption: Stable internet or mobile data connection.		
Success Guarantee: User can reliably access and view their real-time data.		
Minimum Guarantee: User successfully views at least one data update.		
Outstanding Issues:		
● None noted.		
Priority: High		
Risk: Low		

4.4.2 Case 2

Use case Name: Trigger Alert		Unique ID: PB-0002
Area: Emergency Handling		
Actor(s): User		
Stakeholders: End Users, Emergency Services		
Description: User triggers an emergency alert through the Prothirodh device or app.		
Triggering Event: User activates the emergency button on the device or app interface.		
Trigger Type: Direct user action		
Steps Performed (Main Path):		Information Required for Steps:
1. User activates the emergency button on the Prothirodh device or app.		1. User's emergency activation
2. The device or app sends an emergency signal to the connected app or designated contacts.		2. Location

3. The app collects the user's current location and health information.	3. Health data
4. The app sends the alert to designated contacts and emergency services with the user's information.	
Pre-condition: User's device connected and logged into the app.	
Post-conditions: Alert is successfully transmitted to designated contacts and emergency services.	
Assumption: Stable internet or mobile data connection.	
Success Guarantee: User's alert is received and acknowledged by designated contacts or emergency services.	
Minimum Guarantee: Alert transmission to at least one designated contact.	
Outstanding Issues:	
• None noted	
Priority: High	
Risk: High (due to emergency situations)	

4.4.3 Case 3

Use case Name : Health Insights and Trends		Unique ID: PB-0003
Area: Data Analysis		
Actor(s): User, App		
Stakeholders:, End Users, Health Professionals		
Description: The app analyzes health data to provide insights and trends regarding the user's well-being.		
Triggering Event: Regular data analysis intervals or user request for health insights.		
Trigger Type: System-triggered or user-initiated		
Steps Performed (Main Path):	Information Required for Steps:	
1. App collects and aggregates user's health data over a period.	1. User's health data	
2. The app runs analysis algorithms to identify health patterns and trends.	2. Analysis algorithms.	
3. App presents insights, such as heart rate trends, activity levels, or anomalies, in the user interface.	3. Bin Output Data.	
Pre-condition: Sufficient historical health data available.		
Post-conditions: User presented with insights into their health patterns.		
Assumption: Appropriate data quality for accurate analysis.		
Success Guarantee: Accurate presentation of health insights to the user.		
Minimum Guarantee: At least one health trend or insight displayed.		
Outstanding Issues:		
● None noted.		
Priority: High		
Risk: Medium		

4.4.4 Case 4

Use case Name : Registration		Unique ID: PB-0004
Area: User Account Management		
Actor(s): User, App		
Stakeholders: End Users, System Administrators		
Description: New users create an account to access the Prothirodh system.		
Triggering Event: User's desire to register and access system features.		
Trigger Type: User-initiated		
Steps Performed (Main Path):		Information Required for Steps:
1. User launches the Prothirodh app.		1. User's name
2. User selects the "Register" or "Create Account" option.		2. User's email
3. The app prompts the user to enter personal details (name, email, password, etc.).		3. User's Login credentials
4. User fills in the required information.		4. Validation criteria
5. The app validates the entered data for completeness and accuracy.		
6. Upon successful validation, the system creates a new user account.		
7. The app confirms successful registration and allows the user to log in with the newly created credentials.		
Pre-condition: App installed and operational, stable internet connection.		
Post-conditions: User successfully registered with a new account and logged into the app.		
Assumption: Proper validation checks for entered user details.		
Success Guarantee: New user account creation and access to system features.		
Minimum Guarantee: Successful creation of at least one new user account.		
Outstanding Issues:		
• None noted.		
Priority: High		
Risk: Low		

4.5 Alternative Scenarios

4.5.1 Case1

Use case Name : View Real-time Data		Unique ID: PB_ALT-0001
Area: User Interface		
Actor(s): User		
Stakeholders:, End Users, Application		
Description: User encounters connectivity issues while attempting to view real-time data.		
Triggering Event: User accesses the "Real-time Data" section in the app.		
Trigger Type: Direct user action		
Steps Performed (Main Path):		Information Required for Steps:
1. User opens the app and selects "Real-time Data."		1. Device connectivity status
2. The app requests real-time data from the device.		2. Data transmission
3. Connectivity issues interrupt the data transmission.		
4. The app displays a notification indicating the connectivity problem.		
5. The app attempts to reconnect automatically.		
Pre-condition: App running, device connected, and logged in.		
Post-conditions: User notified of connectivity issues and app's attempt to reconnect.		
Assumption: Intermittent or unstable internet or mobile data connection.		
Success Guarantee: App notifies the user of connectivity issues and initiates reconnection attempts.		
Minimum Guarantee: Successful initiation of reconnection attempts upon detecting connectivity issues.		
Outstanding Issues:		
• Reconnection attempts might fail in certain network conditions.		
Priority: Medium		
Risk: Medium		

4.5.2 Case 2

Use case Name: Trigger Alert		Unique ID: PB_ALT-0002
Area: Emergency Handling		
Actor(s): User, App		
Stakeholders: End Users, Emergency Services		
Description: The user unintentionally triggers an emergency alert.		
Triggering Event: Accidental activation of the emergency button on the Prothirodh device or app.		
Trigger Type: Direct user action		
Steps Performed (Main Path):		Information Required for Steps:
1. User inadvertently presses the emergency button on the device or app interface.		1. Emergency button activation
2. The device or app sends an emergency signal to the connected app or designated contacts.		2. Alert cancellation action
3. The app receives the alert and detects it as an accidental trigger.		
4. The app displays a confirmation dialog asking the user to confirm or cancel the alert within a time frame.		

5. User confirms the accidental trigger within the specified time to cancel the alert.	
6. The app cancels the alert transmission to designated contacts or emergency services.	
Pre-condition: User connected to the device and logged into the app.	
Post-conditions: Accidental alert canceled, preventing transmission to designated contacts or emergency services.	
Assumption: User's ability to confirm within the specified time frame.	
Success Guarantee: App successfully detects accidental alert and provides an option to cancel within the allotted time.	
Minimum Guarantee: Successful cancellation of at least one accidental alert within the specified time frame.	
Outstanding Issues:	
● Inability to cancel the alert due to delayed user confirmation.	
Priority: Medium	
Risk: Medium	

4.5.3 Case 3

Use case Name : Health Insights and Trends		Unique ID: PB_ALT-0003
Area: Data Analysis		
Actor(s): User, App		
Stakeholders: End Users, Health Professionals		
Description: The app generates misleading health insights due to irregular data patterns.		
Triggering Event: App analyzing health data to provide user insights.		
Trigger Type: System-triggered		
Steps Performed (Main Path):		Information Required for Steps:
1. The app analyzes recent health data for a user.		1. User's health data
2. Irregular or erratic data patterns (due to device malfunction or user errors) exist in the dataset.		2. Data analysis algorithms.
3. The app generates health insights based on available data, including irregular patterns.		
4. Health insights presented to the user might include misleading trends or anomalies due to irregular data.		
Pre-condition: Sufficient health data available for analysis.		
Post-conditions: Health insights provided might be inaccurate or misleading due to irregular data patterns.		
Assumption: App's reliance on accurate and consistent data for generating insights.		
Success Guarantee: The app generates insights based on the available data, even if it contains irregular patterns.		
Minimum Guarantee: Presentation of at least one health insight incorporating irregular data.		
Outstanding Issues:		
● Health insights may misrepresent the actual user health status.		
Priority: Low		

Risk: High

4.5.4 Case 4

Use case Name : User Registration		Unique ID: PB_ALT-0004
Area: User Account Management		
Actor(s): User, System		
Stakeholders:, End Users, System Administrators		
Description: User encounters issues during the registration process due to server overload..		
Triggering Event: User attempts to register a new account within the app.		
Trigger Type: User-initiated		
Steps Performed (Main Path):		Information Required for Steps:
1. User initiates the account registration process by providing personal details.		1. User's registration details
2. The app sends registration data to the server for account creation.		2. Server response time
3. Due to high server traffic or system overload, the server experiences delays in processing registration requests.		
4. The app displays a notification informing the user about the delay and suggests retrying the registration process later.		
5. User decides to retry the registration after some time.		
Pre-condition: App operational, stable internet connection, server overload.		
Post-conditions: User notified of server delay in processing registration requests.		
Assumption: Server capacity might be exceeded due to high traffic or technical issues.		
Success Guarantee: App informs the user about server delays and recommends retrying the registration later.		
Minimum Guarantee: User receives a notification about the server delay during registration attempt.		
Outstanding Issues:		
● Potential user frustration due to registration delays.		
Priority: Medium		
Risk: Medium		

Section 5

5.1 Entity Relationship Diagram

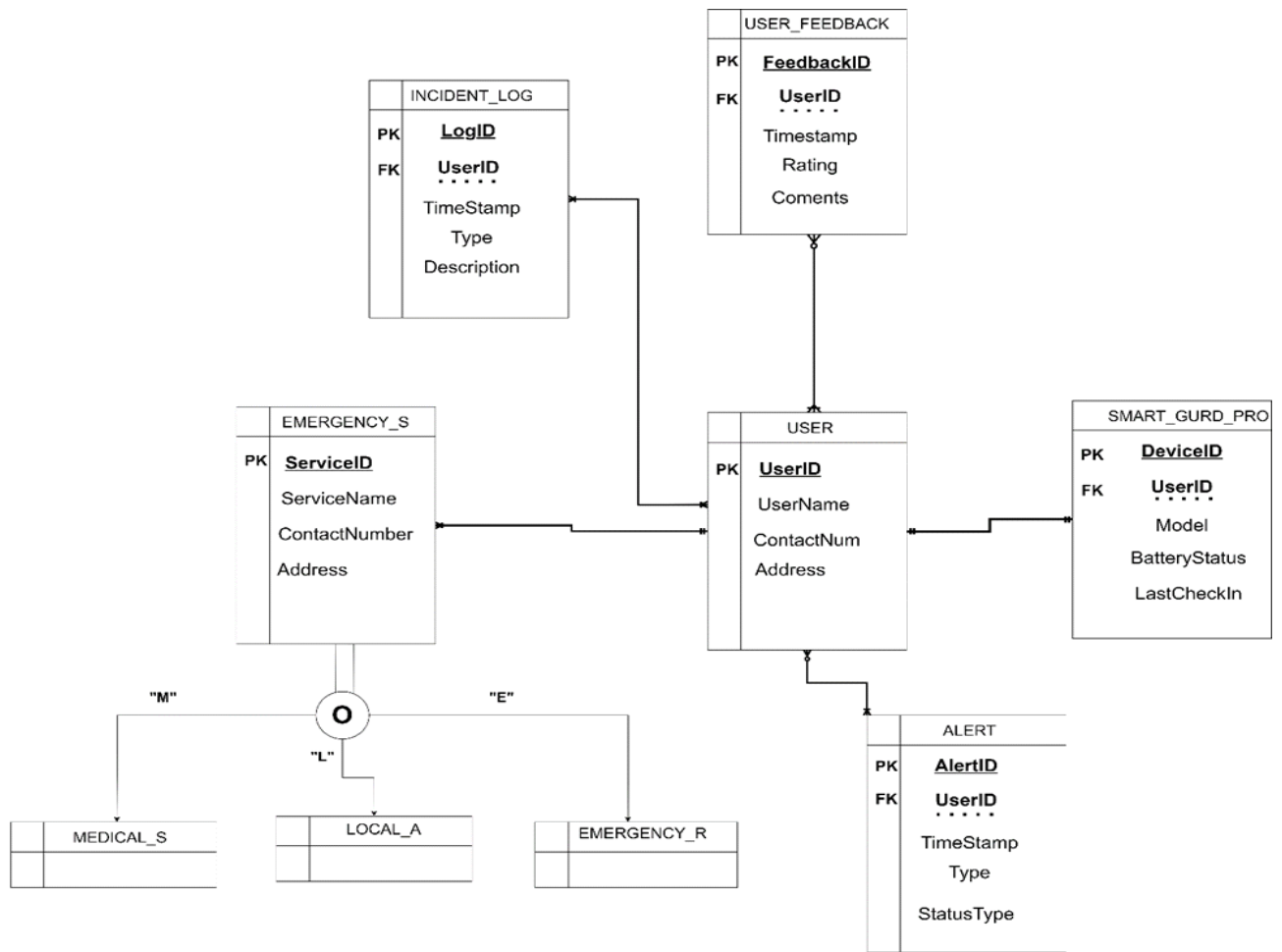


Figure 4 : Entity Relationship Diagram

5.2 Logical Data Flow Diagram

5.2.1 Logical DFD 0

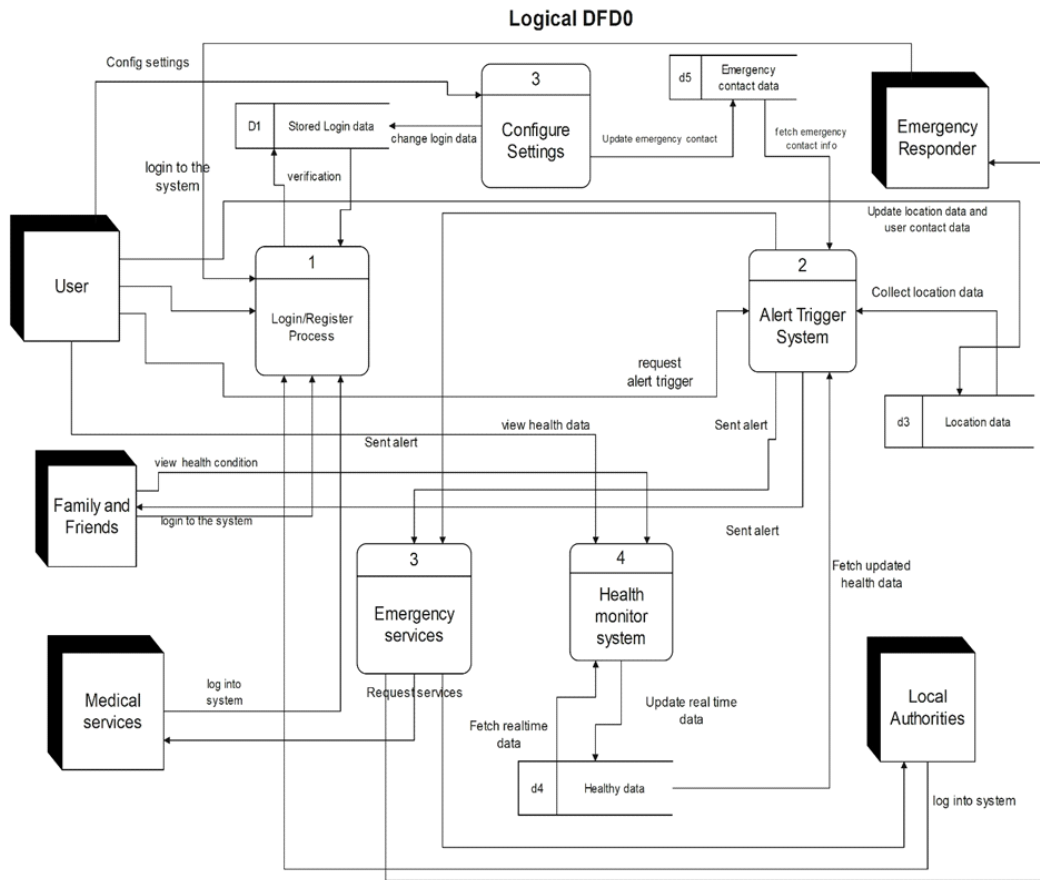


Figure 5 : Logical DFD 0

5.2.2 Logical DFD 1

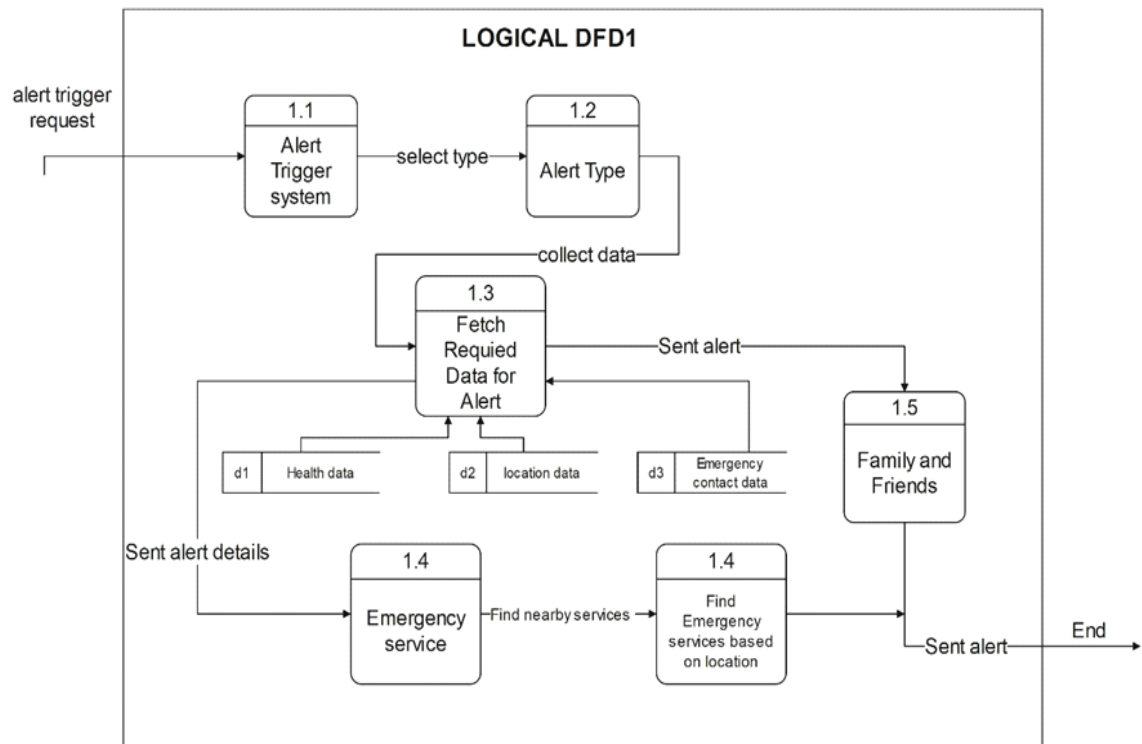


Figure 6 Logical DFD 1

5.2.3 Logical DFD 2

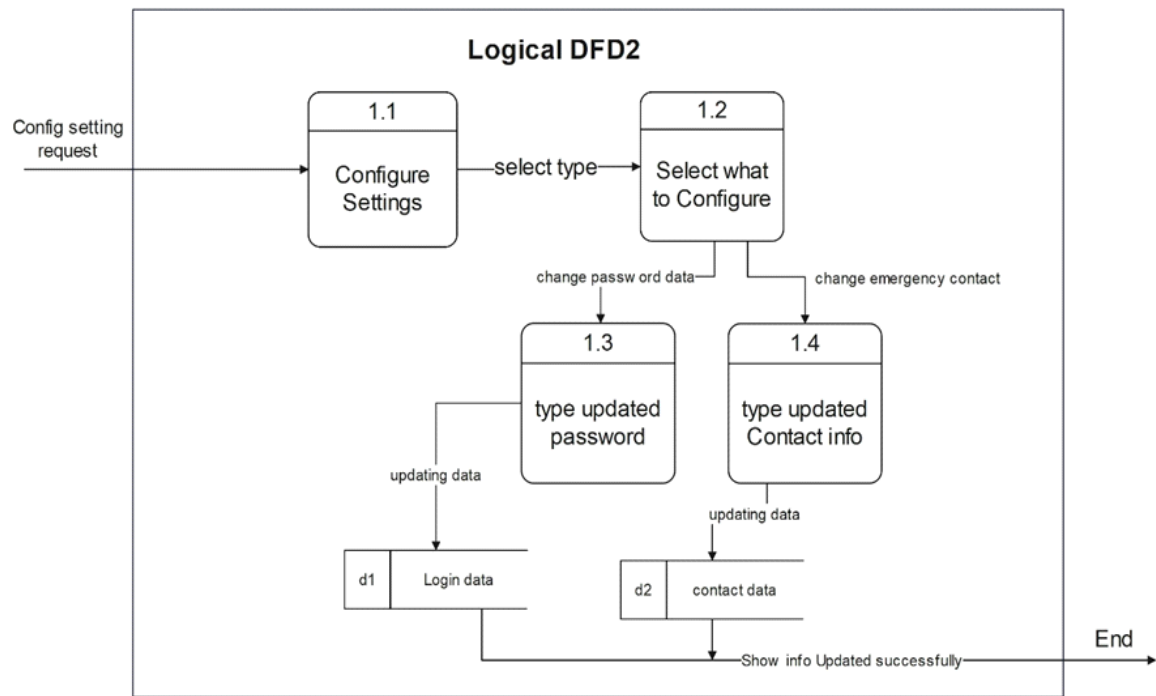


Figure 7 : Logical DFD 2

5.3 Physical Data Flow Diagram

5.3.1 Physical DFD 0

PHYSICAL DFD0

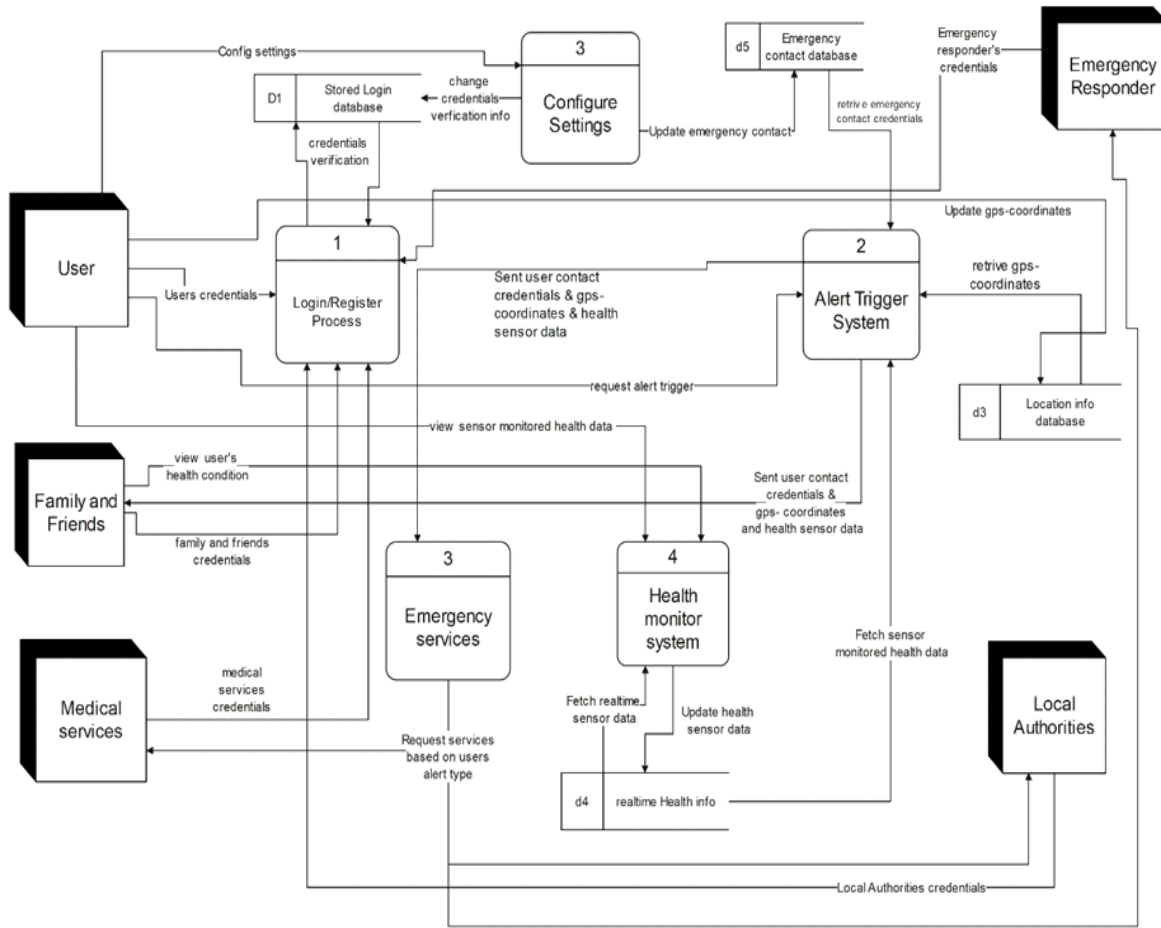


Figure 8 : Physical DFD 0

5.3.2 Physical DFD 1:

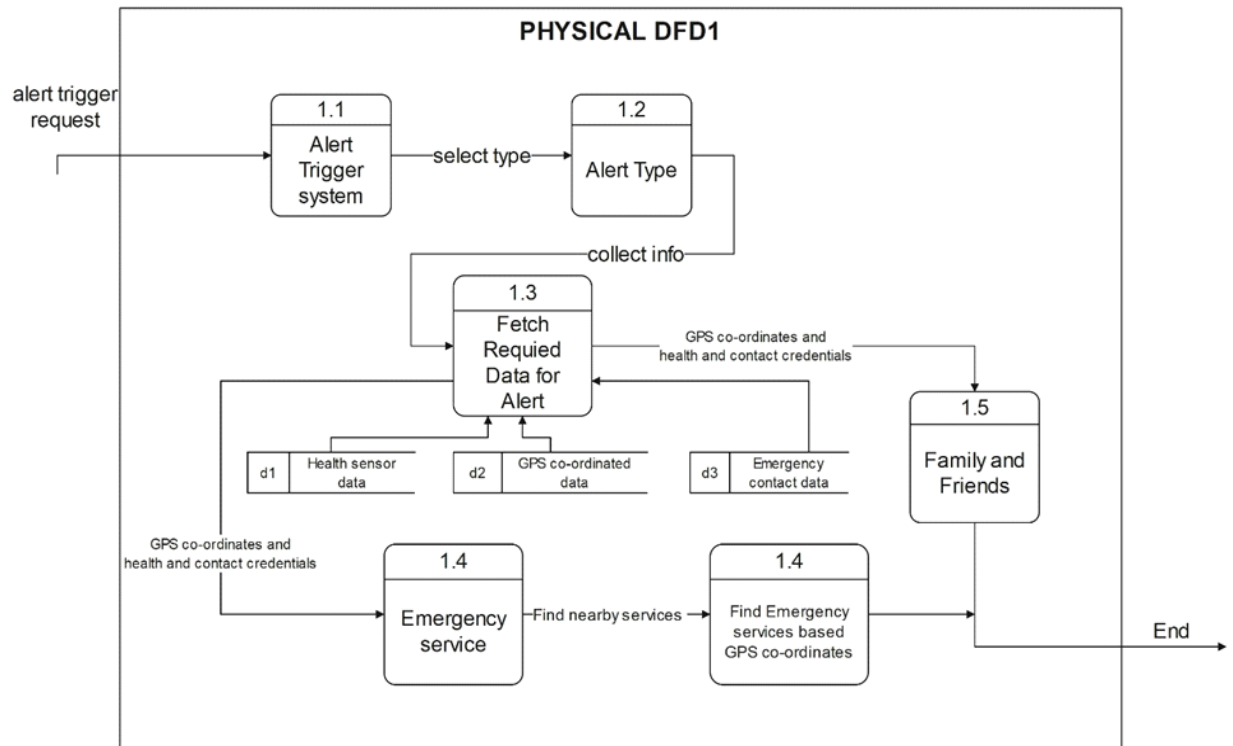


Figure 9 : Physical DFD 1

5.3.3 Physical DFD 2:

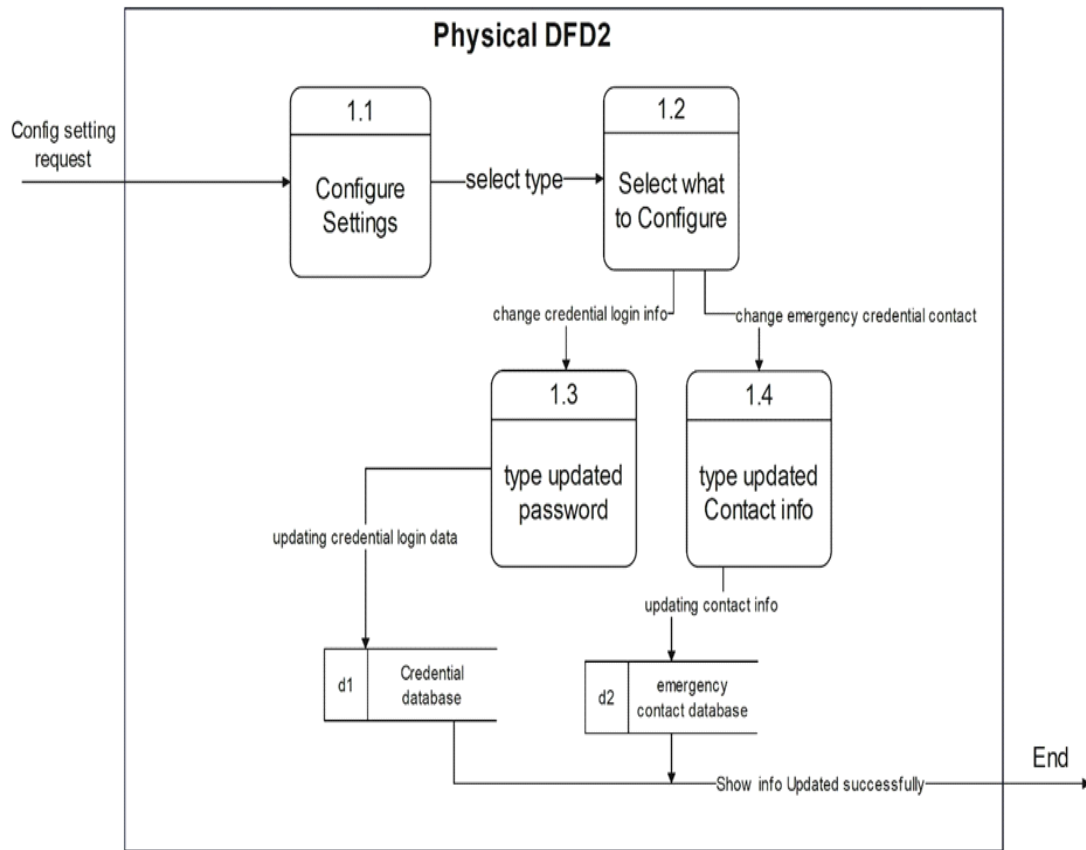


Figure 10 : Physical DFD 2

5.4 Activity diagram

5.4.1 Activity Diagram for register on website:

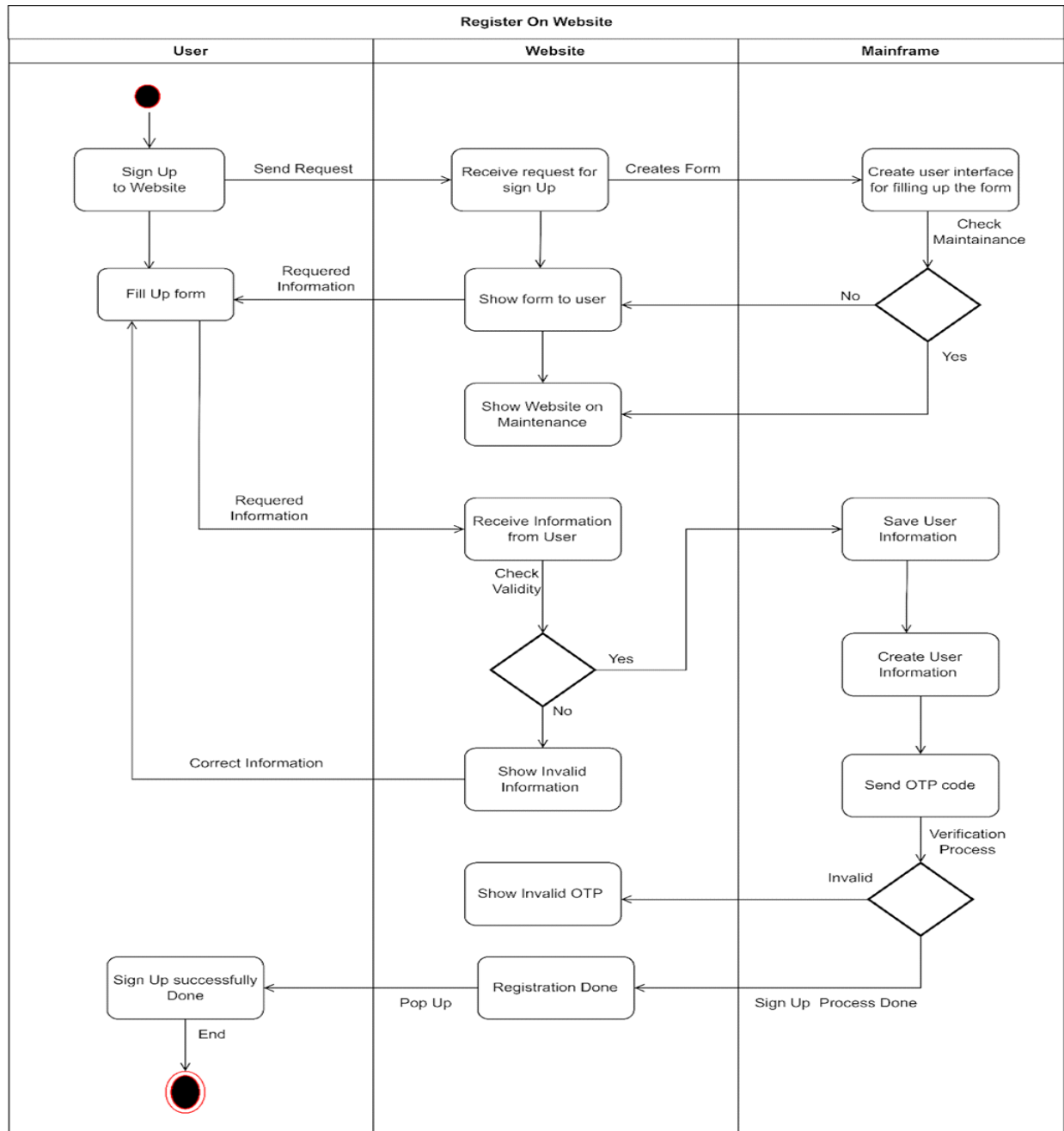


Figure 11 : Activity Diagram for register on website

5.4.2 Activity Diagram for Prothirodh-Smart Security App

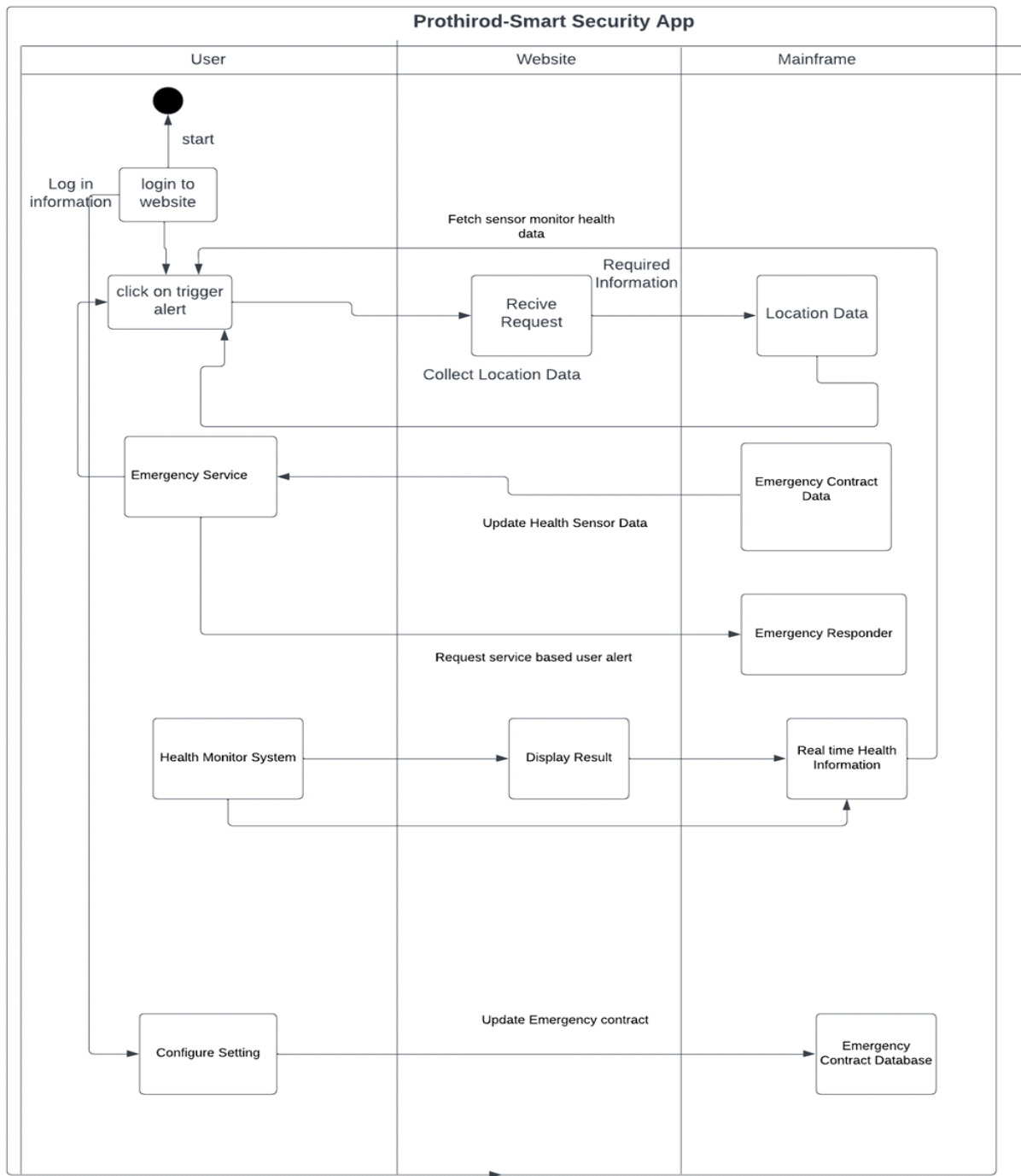


Figure 12 : Activity Diagram for Prothiordh-Smart Security App

5.4 Sequence diagram

5.4.1 Sequence Diagram for finding Emergency Alert

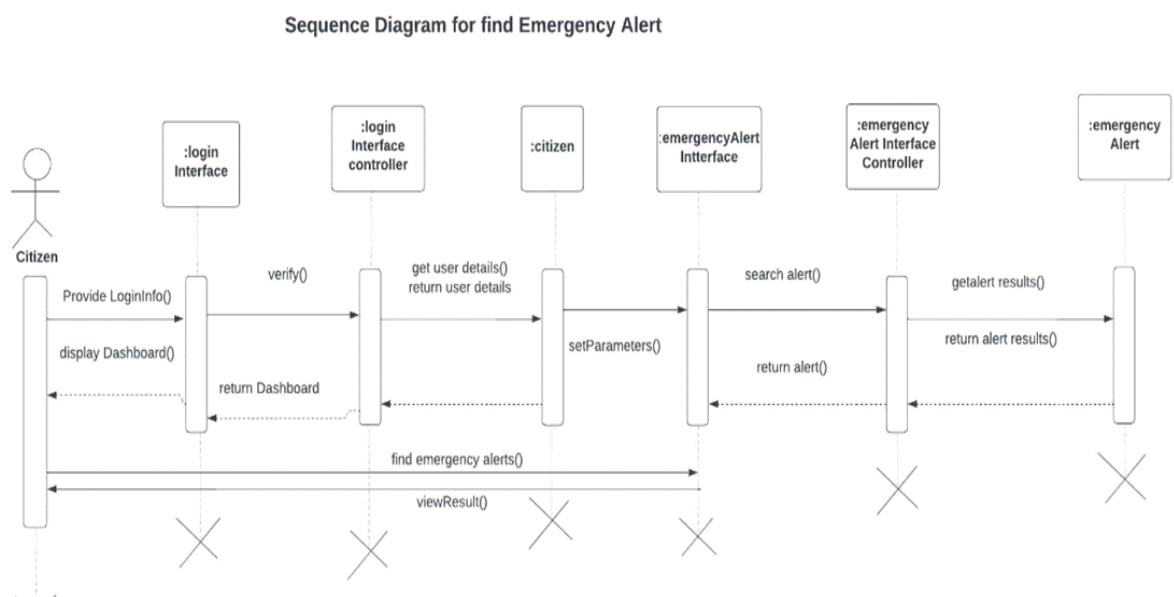


Figure 13 : Sequence Diagram for finding Emergency Alert

5.4.2 Sequence Diagram for Registration

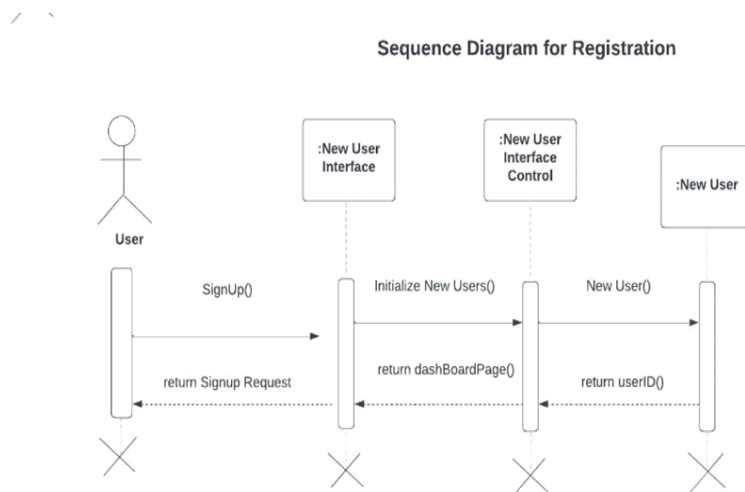


Figure 14 : Sequence Diagram for Registration

5.6 Communication diagram

5.6.1 Communication Diagram of registration

Communication Diagram of Registration

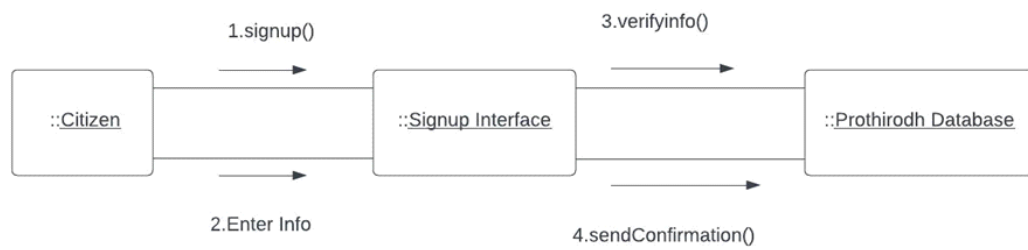


Figure 15 : Communication Diagram of registration

5.6.2 Communication Diagram for finding emergency alert

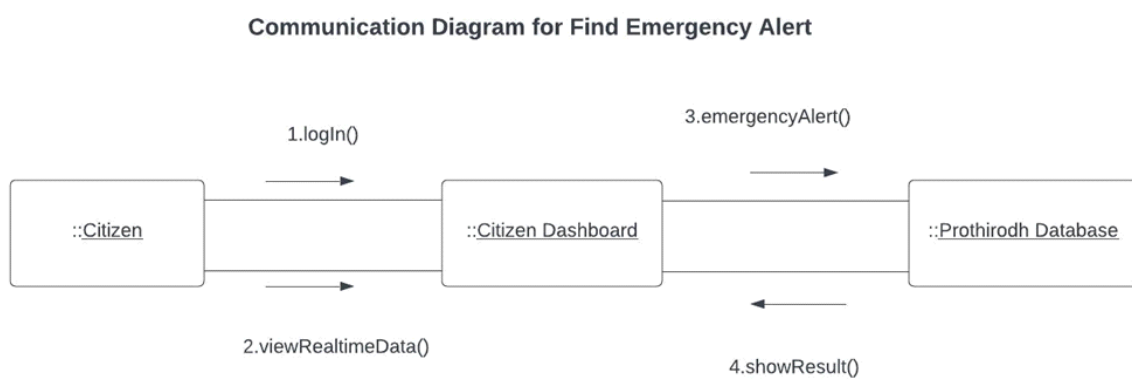


Figure 16 : Communication Diagram for finding emergency alert

5.7 Communication diagram

5.7.1 Communication Diagram of registration

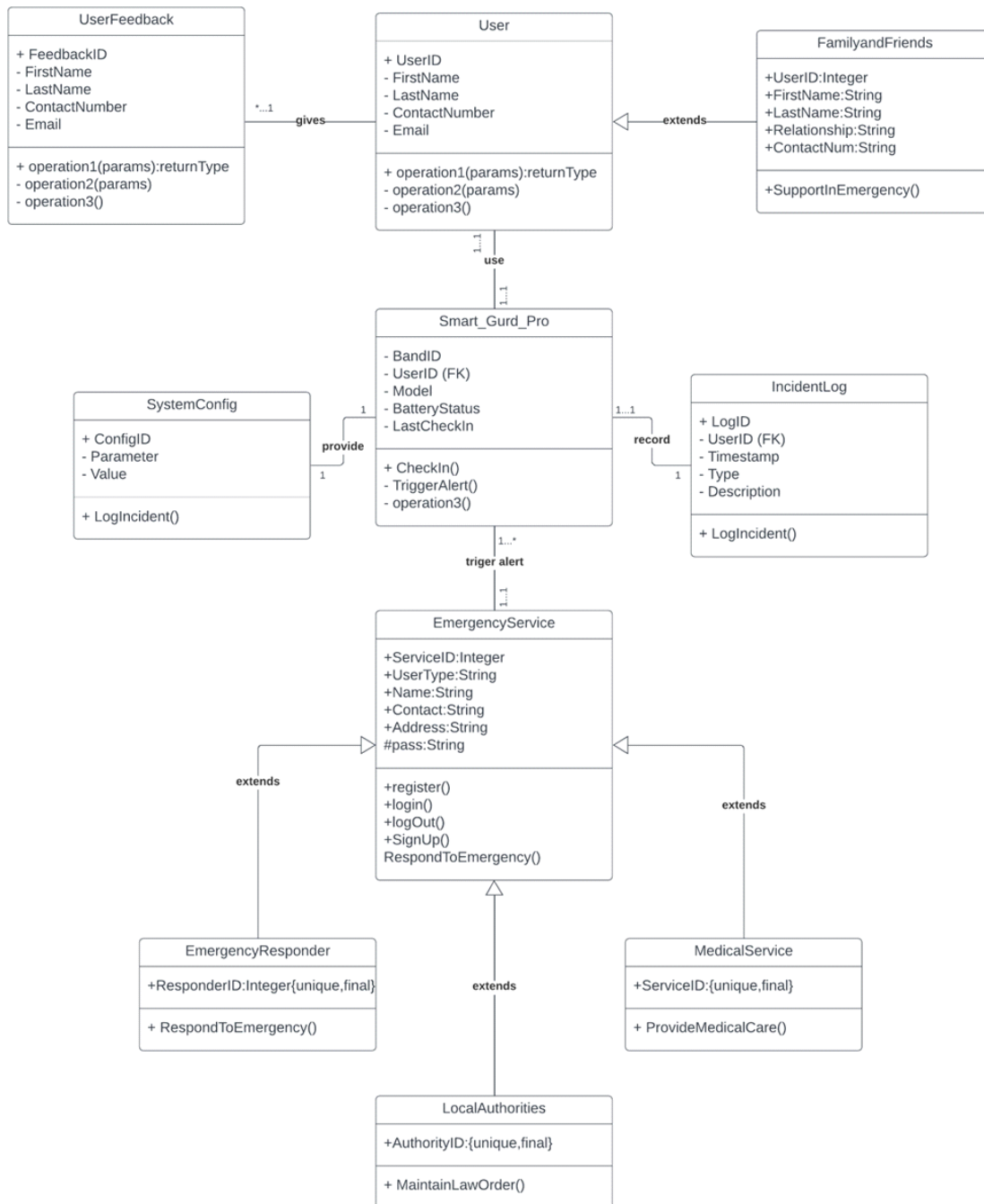


Figure 17 : Communication Diagram of registration.

5.8 State Chart Diagram

5.8.1 State Chart Diagram 1

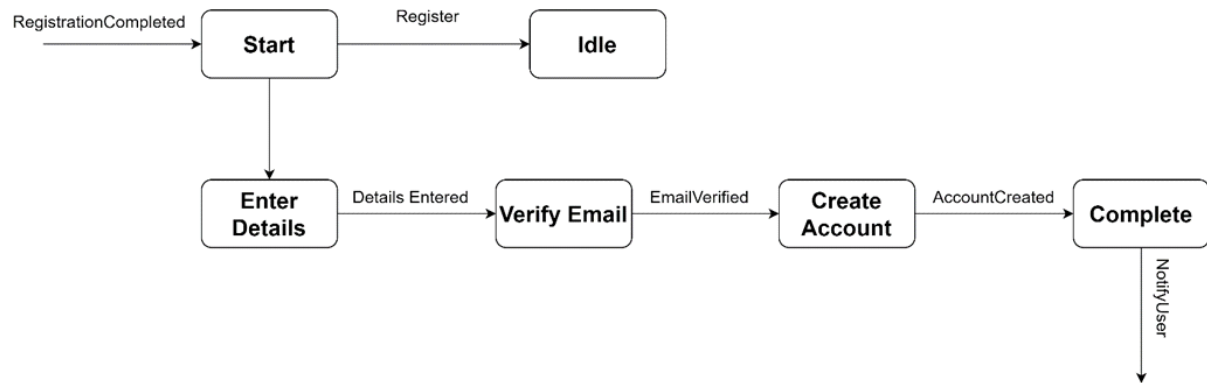


Figure 18 : State Chart Diagram 1

5.8.2 State Chart Diagram 2

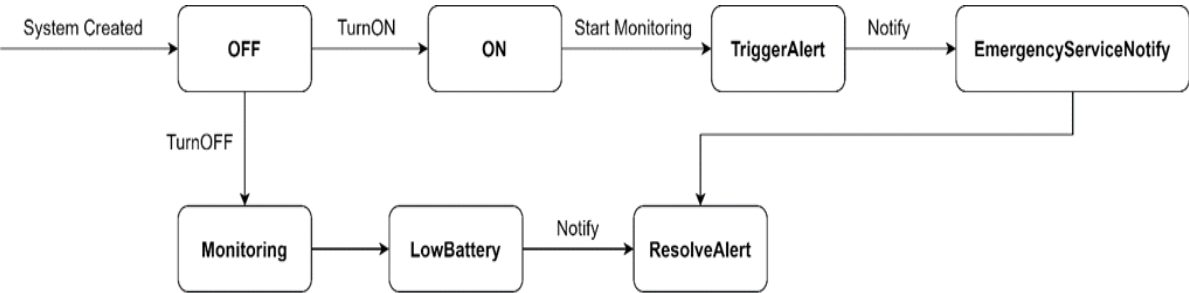


Figure 19 : State Chart Diagram 2

5.9 CRUD Matrix

CRUD Matrix

Activity	User	Medial Service	Local Authorities	Emergency Responder	Family And Friends	SMART GUARD PRO device	Aler t	User feedback	Incident log
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Register Account	C	C	C	C	C	C	-	-	-
Login	R	R	R	R	R	R	-	-	-
Alert Trigger	R	R	R	R	R	R	C	-	C
Configure Contact info	U	U	U	U	U	U	-	-	-
Monitor Health Data	U	U	U	U	U	U	-	-	-
Configure account info	U	U	U	U	U	U	-	-	-

Figure 20 : CRUD Matrix