

# Chapter 1: Software Business Requirements

## [Safe Haven Watch]

### - **Brief Description:**

The System for Managing Lost Children in Public Places uses technology to quickly and reliably reunite lost children with their guardians in crowded areas like malls and amusement parks. It facilitates efficient communication between parents, security staff, and administrators to ensure children's safety.

### -**Software Stockholders:**

Parents/Guardians

Security Personnel

### - **Business Requirements:**

Real-Time Location Tracking:

The system must provide accurate and real-time location updates to relevant users.

Safe Zone Monitoring:

Implement geofencing features to notify stakeholders when a child leaves a designated safe area.

Effective Communication:

Enable secure and efficient communication channels between users, such as voice or text messaging capabilities. **User-Friendly Design:**

Ensure the system interface is intuitive and easy to navigate for all users, regardless of technical expertise. **Enhanced Reliability:**

Deliver consistent performance with features like extended battery life for tracking devices and robust system uptime. **Integration with Existing Tools:**

Ensure compatibility with commonly used tools, such as CCTV systems, public address systems, and portable communication devices.

**Emergency Response Support:**

Optimize the system to reduce response times by automating alerts and centralizing critical information. **Privacy and Security:**

Safeguard user data and communications to ensure privacy and prevent unauthorized access.

**Scalability and Adaptability:**

Design the system to handle various environments, such as crowded areas, public events, or large facilities.

### Comprehensive Data Management:

Support the collection, storage, and retrieval of detailed and accurate information to aid in child recovery efforts.

### **-Type of software:**

Embedded control systems

### Summary of the Interviews: **Parents/Guardians:**

#### **Biggest Fears in Crowded Places:**

Fear of losing sight of their child in a crowd.

Concern that their child won't know how to seek help.

Difficulty in finding children quickly in large spaces.

#### **Current Tools/Devices:**

GPS watches, though not always accurate.

Mobile tracking apps, which can be complex to set up.

Most rely on keeping a close watch due to distrust in existing devices.

#### **Essential Features:**

Accurate, real-time location tracking.

Instant notifications if the child exits a safe zone.

Long-lasting battery for the device.

Simple and user-friendly app interface. **The**

### **questions that were asked.**

What is your biggest fear when visiting crowded places with your children?

Do you currently use any devices or apps to track your children?

What features do you consider essential in a child tracking device?

### **Security Personnel:**

Challenges in Searching for Lost Children:

Time is critical; delays make finding a child harder, especially in crowded areas.

Parents often provide incomplete or unclear information due to panic.

Communicating with lost children is difficult as they may be scared or unable to articulate properly.

### Current Tools Used:

Reliance on CCTV to track the child's last seen location.

Use of public address systems for announcements.

Coordination via walkie-talkies with team members. **Desired**

### Features:

Real-time tracking system with a live map.

Instant alerts on personal devices for quicker response.

Direct communication with the child via voice messages. **The**

### **questions that were asked.**

What are the biggest challenges you face when searching for a lost child?

What other tools do you currently use in cases of missing children?

Are there any additional features you'd like to see in the system?

# Chapter 2: Software Requirements

## [Safe Haven Watch]

### Functional requirements:

#### **1- The user shall be able to create an account on the app:**

- 1.1 The system should allow the user to enter a phone number, email, and a new password to register.
- 1.2 The system should check the email by sending a verification code to it. - If the email is invalid, the system should display: "Please enter a valid email." - If the email is valid, the system should send the verification code.
- 1.3 The system should allow the user to enter the verification code received.
  - If the code is incorrect, the system should display: "Incorrect code. Please try again." - If the code is correct, the system should create the account.
- 1.4 After the account is created, the system should display: "Account created successfully."

#### **2- The user shall be able to log in to the app:**

- 2.1 The system should allow the user to log in using their email and password.
- 2.2 The system should check if the email and password match the data in the database.
  - If the email is not found, the system should display: "This account doesn't exist." - If the password is wrong, the system should display: "Wrong password. Please try again."
- 2.3 If the login is successful, the system should open the home screen.
- 2.4 The system should save the time and date of the login for future use.

#### **3- The user shall be able to track the child's real time location through the system:**

- 3.1 The system should use GPS to provide real time location updates within 3 seconds of the child's movement.
- 3.2 The system should display the location on an interactive map accessible via the mobile app in multiple languages.
- 3.3 The system should support zooming in, zooming out, and moving the map to pinpoint the child's location accurately.

#### **4- The user shall be able to define and modify safe zones:**

Safe zones are specific areas defined by the user on the map where the child is considered safe. Users can either draw these zones directly on the map or input precise coordinates.

- 4.1 The system should provide tools to draw zones on the map or in specific coordinates.

#### **5- The user shall be notified immediately when the child exists a predefined safe zone:**

- 5.1 The system should monitor the child's movement and compare it with the safe zones set by the user in the app.
- 5.2 The system should send notifications via multiple channels (push notifications, SMS, or email).

## **6- The user shall be notified when the SOS button is pressed:**

- 6.1 The system should send alerts containing the child's GPS location, timestamp, and device ID.
- 6.2 The system should ensure notifications are delivered securely and encrypted.

## **7- The user shall be able to report incident of lost children quickly and accurately:**

- 7.1 The system should provide a simple and user-friendly interface for submitting incident reports.
- 7.2 system should allow the user to enter details of the incident including the child's name, description, last known location and time of incident.
  - If the required fields are not completed, the system should display: "Please fill in all required fields".
- 7.3 The system should log all incident reports in a secure database with a timestamp for future reference.
- 7.4 The system should send an immediate notification to the relevant authorities once an incident report is submitted.
- 7.5 The system should store and retrieve historical incident data securely, ensuring data privacy and protection.
- 7.6 The system should allow the user to track the status of the reported incident in real-time.

## **8 - The user should be able to send and receive voice messages and voice calls with the child:**

- 8.1 The system should allow recording and playback of encrypted voice messages.
- 8.2 The system should ensure both voice messages and calls are delivered quickly.
- 8.3 The system should support VoIP secure protocols for direct communication.
- 8.4 The system should maintain call availability 24/7 through cellular network or other reliable communication methods.
- 8.5 The system should notify the user that communication is unavailable in case of no signal or connectivity, and the call or message cannot be delivered until connection is restored.

## **9 - The user shall receive notifications when the device's battery is low:**

- 9.1 The system should send alerts when the battery level is 20%.
- 9.2 The system should shut down non-necessary features to conserve battery life.
- 9.3 The system should allow the user to activate energy-saving mode through the app.

## **10 - The user should be notified if the child's device is removed or played with:**

- 10.1 The system must include detection sensors that trigger an alert when the device is removed.
- 10.2 The alerts must include the child's last known location and timestamp.

# Non- Functional Requirements:

## 1- Real-Time Location Tracking:

- The system must provide accurate and real-time location updates to relevant users.

## 2- - Safe Zone Monitoring:

- Implement geofencing features to notify stakeholders when a child leaves a designated safe area.

## 3- - Effective Communication:

- Enable secure and efficient communication channels between users, such as voice or text messaging capabilities.

## 4- - User-Friendly Design:

- Ensure the system interface is intuitive and easy to navigate for all users, regardless of technical expertise.

## 5- - Enhanced Reliability:

- Deliver consistent performance with features like extended battery life for tracking devices and robust system uptime.

## 6- - Integration with Existing Tools:

- Ensure compatibility with commonly used tools, such as CCTV systems, public address systems, and portable communication devices.

## 7- - Emergency Response Support:

- Optimize the system to reduce response times by automating alerts and centralizing critical information.

## 8- - Privacy and Security:

- Safeguard user data and communications to ensure privacy and prevent unauthorized access.

## 9- - Scalability and Adaptability:

- Design the system to handle various environments, such as crowded areas, public events, or large facilities.

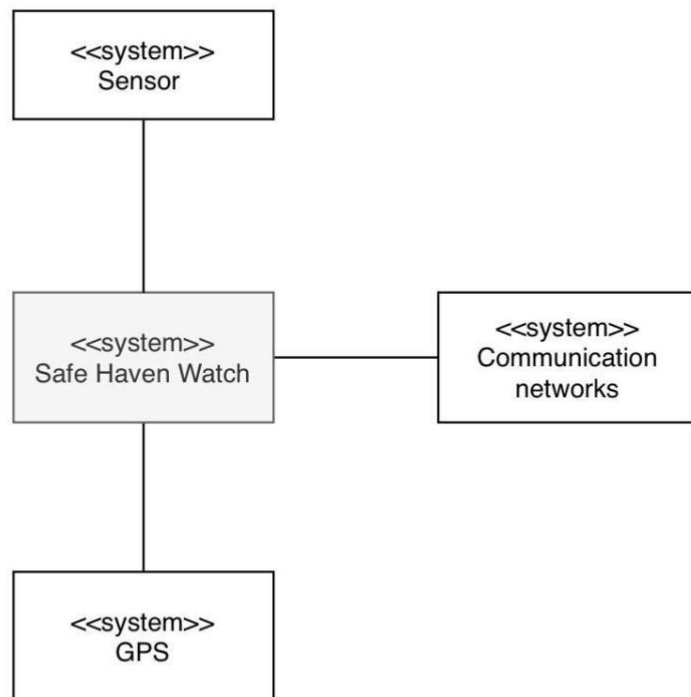
## 10- - Comprehensive Data Management:

- Support the collection, storage, and retrieval of detailed and accurate information to aid in child recovery efforts.

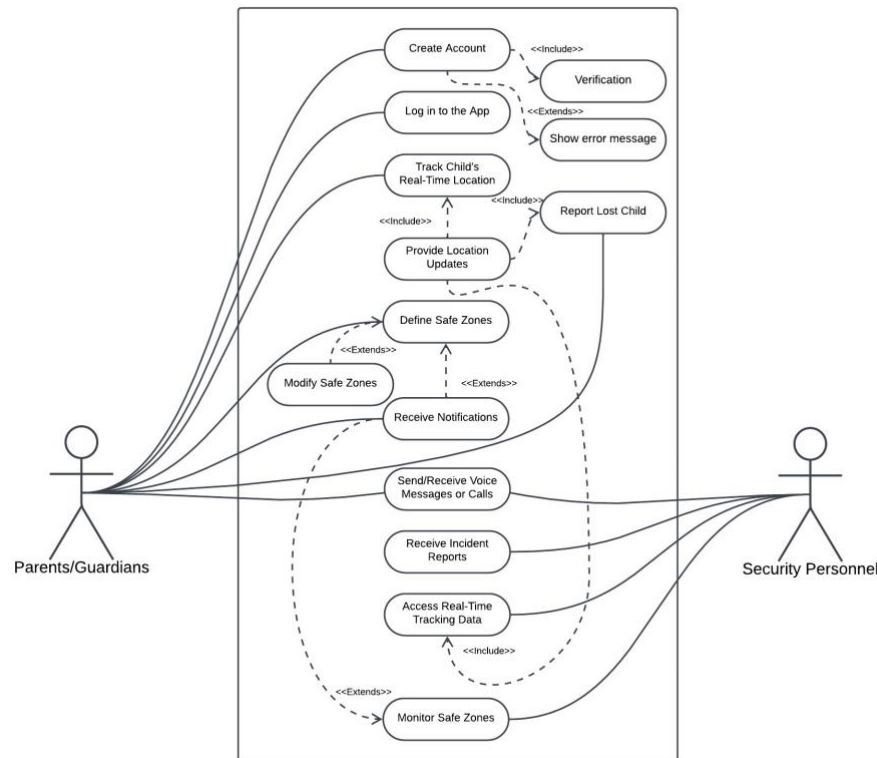
# Chapter 3: Software Modeling

## [Safe Haven Watch]

### -Context Diagram:



## -Use Case Diagram:



## Scenario: Using Safe Haven Watch to Locate a Lost Child.

### Initial Assumption:

- Parents/Guardians have set up a Safe Haven Watch device for their child, ensuring it is paired and operational.
- The child is wearing the GPS-enabled Safe Haven Watch.
- Safe zones are defined using the watch interface or an associated setup portal accessible by parents/guardians.
- Security personnel are registered in the system and have access to real-time tracking data from the watch.

### Normal Flow of Events:

#### Child Exits Safe Zone:

1. The child unknowingly exits the predefined safe zone.
2. The Safe Haven Watch detects this movement using geofencing and sends an alert to the parent/guardian via a linked notification method (e.g., SMS or email). **Parent Receives**

#### Notification:

1. Parents receive a notification that includes the child's current location.
2. The watch transmits real-time tracking data to assist in locating the child.

#### Incident Report:



1. The parent uses the “Report Lost Child” feature on the watch interface or via a connected security system.
2. The system generates an incident report and shares it with security personnel.
3. Security Personnel Involvement:
4. Security personnel access the child’s real-time location data transmitted from the watch.
5. They monitor the child’s movement and coordinate using location updates.

### Communication with Child:

1. The Safe Haven Watch enables two-way communication via voice or text messages.
2. Parents or security personnel can use this feature to reassure the child or guide them to safety.

### Child is Found:

1. Security personnel or parents locate the child using the watch’s real-time location data and communication tools.
2. Once the child is found, the incident is marked as resolved.

## What Can Go Wrong:

- **Signal Loss:**

If the watch loses its signal, the system sends the last known location to parents and advises searching in nearby areas.

- **Battery Depletion:**

If the battery level on the watch is low, a notification is sent to activate energy-saving mode to extend battery life.

- **Device Tampering:**

If the watch is removed or tampered with, the system sends an alert with the last known location and timestamp.

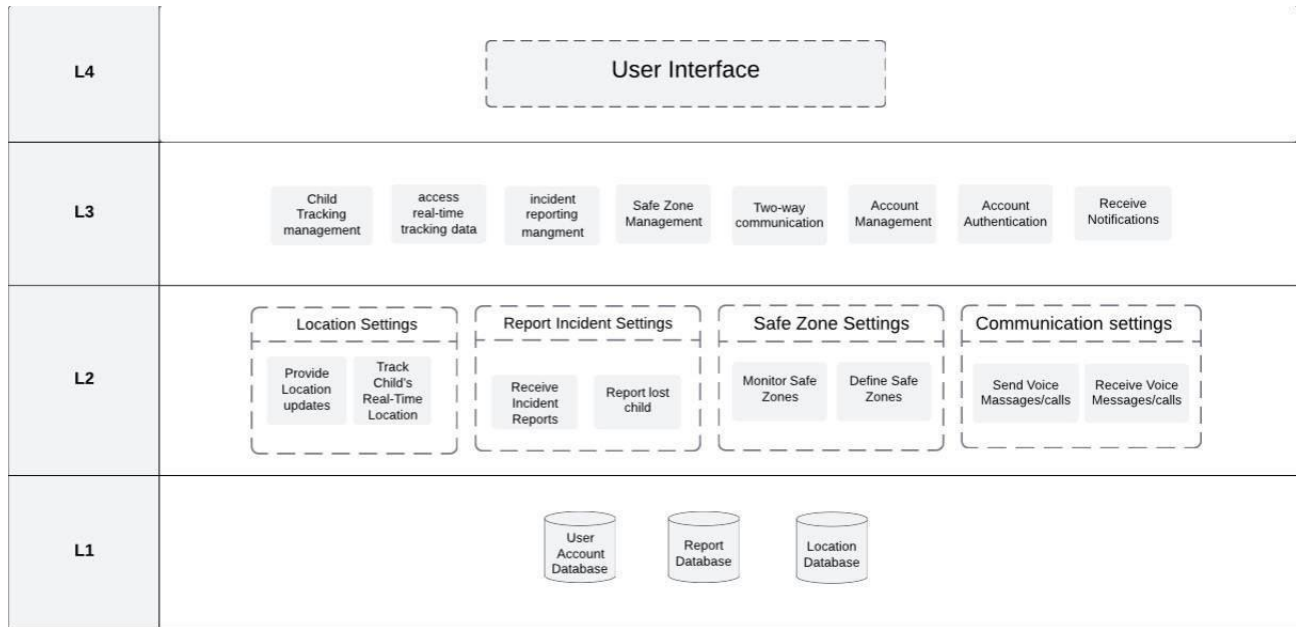
## System State on Completion:

- The incident is marked as resolved in the system.
- Details (e.g., timestamps, location updates, communication logs) are securely stored for reference.
- Parents and security personnel receive a summary of the incident.

# Chapter 4: Software Design

## [Safe Haven Watch]

### Layered architecture diagram:



Repository architecture diagram:

