

Software Requirements Specification

by 2023316 .

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Software Requirements Specification



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AidPath: AI-Driven Emergency Healthcare & Ambulance Booking Platform

1. Introduction

1.1 Project Overview

AidPath is a web platform powered by artificial intelligence that optimizes ambulance dispatch, offers real-time medical assistance, and provides financial support options to improve emergency healthcare services. Through a multilingual chatbot, the system provides AI-based first aid instructions, links patients with the closest available ambulances (government, private, or volunteer-based), and assists users in obtaining insurance or microloan opportunities to get over financial obstacles in an emergency. The ultimate goal is to save lives by increasing emergency medical responses' efficiency, speed, and accessibility.

1.2 Purpose

The aim of AidPath is to apply AI to tackle the problem of delayed emergency medical response and lack of immediate assistance. The platform's targets are to speed up ambulance response times, supplying financial aid options, offering immediate first aid advice via a chatbot that speaks multiple languages. In this approach, AidPath hopes to improve the speed, accessibility, and price range of urgent care, particularly in dangerous situations.

1.3 Scope

Included Features:

- Integration of government, private, and volunteer ambulance services to connect users with the nearest available transport.
- AI-powered chatbot capable of providing real-time, multilingual first aid guidance through text and voice interfaces.
- Basic functionality to help users access emergency insurance coverage or micro-loan options.

Excluded Features:

- Full integration with hospital management systems (for now).
- Comprehensive financial analysis or complete partnerships with all insurance and loan providers.
- Nationwide deployment; the prototype will be developed for a specific region and demographic only.

1.4 Assumptions & Constraints

Assumptions:

- Users will have access to a stable internet connection to use the web application.
- Ambulance providers (government, private, volunteer) are willing to register and update their availability on the platform.
- The Gemini API and Map API will function reliably to support the chatbot and location services.
- Users will be able to understand and interact with the multilingual chatbot.
- Basic mobile devices or computers will be available to users accessing the service.
- In case of an emergency, **it is assumed that either the patient or the person assisting them has the AidPath app installed and accessible** to quickly start the ambulance booking or first aid process.

Constraints:

- The project will be developed only as a **prototype** for a **specific region and demographic**, not nationwide.
- Financial module integration will be limited to basic eligibility checking, without full financial transactions.
- Real-time ambulance tracking depends on the external Map API's accuracy and uptime.
- The chatbot's medical advice will be limited to **first aid guidance** and will not replace professional medical consultation.

2. Requirement Elicitation

2.1 Techniques Used

- **Surveys:** Three separate Google Forms were distributed:
 - One for the general public (potential patients).
 - One for doctors and medical staff.
 - One for ambulance service providers.
- **Interviews:** In-person discussions were held with doctors, medical staff, and ambulance service providers to collect deeper insights.
- **Prototyping:** Initial user interface designs and user journeys were created using Figma to gather early feedback from stakeholders.

2.2 Stakeholder Details

➤ **Primary Stakeholders:**

- Individuals needing emergency medical services (general public).
- Ambulance service providers (government, private, volunteer).

➤ **Secondary Stakeholders:**

- Doctors and medical staff (providing medical feedback and guidance).
- Insurance companies and micro-loan financial institutions.
- Government healthcare authorities.
- Development Team (project managers, software engineers, UI/UX designers).

2.3 Data Collection

A. General Public

- 82.9% of respondents were aged 18–29, indicating a young, tech-savvy audience.
- 51.2% reported experiencing delays in ambulance arrival.
- 61% emphasized the importance of fast ambulance access during emergencies.
- 46.3% were comfortable using a mobile app for emergency services.
- 61% said a feature showing real-time ambulance availability would be very useful.
- 31.7% were confident using an AI-based chatbot for first aid; another 31.7% were open to the idea.
- 63.4% demanded multilingual and voice command support in emergency tools.
- 34.1% said they would consider using insurance or loan features in emergency situations.
- 56% raised privacy concerns regarding the use of AI in medical emergencies.
- Users suggested:
 - Add a first aid guide for use before the ambulance arrives.
 - Introduce an offline mode for areas with poor internet access.

B. Medical Professionals

- 80% face coordination issues with current systems (ambulances ↔ hospitals).
- 53.3% support integration of **public and private ambulance services**.
- 46.7% said their departments are highly favorable toward AI.

- 33.3% are confident in **training AI on anonymized patient data**.
- Doctors recommended a **triage system** with emergency labels:
 - Red: Life-threatening (unconscious, heart attack)
 - Orange: Serious but not critical (deep wounds)
 - Green: Non-critical (sprains, minor injuries)
- Uploading **medical history** (like allergies, chronic diseases) would help in faster and better treatment.
- Requested **chat/call support** between patients and ambulance responders for smoother coordination.
- Stressed the need for **accurate location data sharing** to avoid delays due to vague directions.
- Highlighted challenges:
 - Poor connectivity in emergency zones.
 - Data stored in different formats across agencies (hospitals, traffic, weather).
 - Risk of **false predictions by AI** causing panic or resource misuse.
 - Difficulty of AI handling varying symptoms and overlapping conditions.
- Ethical and legal expectations:
 - Compliance with Pakistan's **Data Protection & Privacy Laws**.
 - Follow **Health & Safety Regulations** and national **AI accountability standards**.
 - Licensing for medical apps and integration with **NDMA, Sehat Sahulat**.
- Expert recommendations:
 - Collaborate early with government agencies.
 - Ensure local data hosting and **data encryption**.
 - Align with services like **Rescue 1122** and **NADRA**.
 - Provide **multilingual customization** for different regions.
 - Make AI decisions **transparent and auditable**.

C. Ambulance Providers

- Challenges during dispatch:

- Traffic congestion, inaccurate caller locations, internet issues, and limited communication.
 - Concerns about misuse of AI or prank bookings.
- Technology feedback:
 - 62.9% are very comfortable adopting **AI-powered solutions**.
 - 67% believe AI can help **reduce costs** over time.
 - 62.5% say integration with broader **public safety systems** would be beneficial.
 - 75% are open to **API-based integration** with existing systems.
- 50% said **real-time analytics** is essential for improving efficiency.
- Only 12.5% rated current public-private coordination as effective, reinforcing the need for AidPath.
- Strong recommendation for:
 - **Live traffic-aware routing** to reduce delays.

2.4 Tools Used

- **Google Forms:** Designed and distributed surveys to different stakeholder groups.
- **Notion:** Used for recording in-person interviews, organizing feedback, and compiling requirements.
- **Figma:** Used for designing initial prototypes of the ambulance booking app, chatbot screens, and financial module.

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3. Functional & Non-Functional Requirements

3.1 Functional Requirements

ID	Requirement Description	Priority
FR1	The system shall allow users to register or log in using phone number or email with OTP-based verification.	High
FR2	The system shall detect the user's current location automatically,	High

	with an option for manual pin-drop on the map.	
FR3	The system shall display available ambulances (government, private, volunteer) in real-time on a map based on the user's location..	High
FR4	The system shall allow users to book the nearest and most suitable ambulance based on location, availability, and urgency.	High
FR5	The system shall provide a multilingual AI chatbot (text and voice) to guide users with basic first aid instructions and emergency support.	High
FR6	The AI chatbot shall automatically classify emergencies into triage levels: Red (critical), Orange (moderate), Green (minor).	High
FR7	The system shall allow users to upload medical history (e.g., allergies, chronic illnesses) to assist ambulance responders in advance.	Medium
FR8	The system shall allow users to apply for emergency financial support such as micro-loans	Medium

	or insurance-related assistance.	
FR9	The system shall enable real-time communication (chat or voice call) between users and ambulance responders during dispatch.	High 1
FR10	The system shall allow administrators to manually assign ambulances in special or high-priority cases.	Medium

3.2 Non-Functional Requirements

ID	Requirement Description	Priority
NFR1	The system shall respond to key actions (login, booking, chatbot) within 5 seconds .	High
NFR2	All sensitive user data (identity, medical records, location) shall be protected using end-to-end encryption and secure authentication protocols.	High
NFR3	The user interface shall be responsive, accessible, and optimized for both mobile and desktop platforms, supporting multiple screen sizes.	High
NFR4	The system shall provide offline access to preloaded chatbot content and basic	Medium

	emergency guidance in case of internet unavailability.	
NFR5	The system shall be designed to support scalability for increasing numbers of users, ambulances, and regions in the future.	Medium
NFR6	The system shall perform automated daily backups and support recovery in the event of a crash, failure, or data corruption.	Medium
NFR7	The AI-based triage system shall follow ethical, transparent, and explainable logic with visible rules or reasoning behind its emergency classification decisions.	High
NFR8 3	The system shall maintain 99.9% uptime to ensure 24/7 availability for emergency support.	High

3.3 Use Cases and User Stories

3.3.1 Use Cases

Use Case 1: Ambulance Booking

- **Actor:** User (Patient or Person Assisting)
- **Goal:** To book the nearest suitable ambulance in an emergency.
- **Description:** The user accesses the AidPath platform, provides their location (automatically detected or manually entered), and selects the urgency level (e.g., Red for life-threatening). The system identifies the nearest available ambulance (government, private, or volunteer) based on location, availability, and urgency, and confirms the booking with estimated arrival time.
- **Preconditions:** User is registered or logged in; internet connection is available.

- **Postconditions:** An ambulance is dispatched to the user's location, and the user receives real-time updates.
- **Main Flow:**
 1. User logs in or registers.
 2. System detects user's location or user manually pins location.
 3. User selects emergency type and urgency.
 4. System displays available ambulances and estimated arrival times.
 5. User confirms booking.
 6. System notifies the ambulance provider and user with booking details.

Use Case 2: AI Chatbot First Aid Support

- **Actor:** User, System
- **Goal:** To receive basic first aid instructions before the ambulance arrives.
- **Description:** The user interacts with the AI-powered chatbot (via text or voice) to describe the emergency situation. The chatbot provides step-by-step first aid instructions in the user's preferred language, tailored to the described symptoms or condition (e.g., CPR for cardiac arrest).
- **Preconditions:** User has access to the AidPath platform; chatbot is operational.
- **Postconditions:** User receives first aid guidance to stabilize the patient until professional help arrives.
- **Main Flow:**
 1. User initiates chatbot interaction.
 2. User selects language and describes the emergency.
 3. Chatbot processes input and provides first aid instructions.
 4. User follows instructions and can ask follow-up questions.
 5. Chatbot logs interaction for future reference.

Use Case 3: Emergency Financial Support Application

- **Actor:** User, Financial Provider
- **Goal:** To apply for micro-loans or insurance support during an emergency.
- **Description:** The user accesses the financial support module to check eligibility for emergency insurance coverage or micro-loans. The system prompts the user to input basic information (income, emergency details) and connects them with partnered financial providers for quick approval.

- **Preconditions:** User is registered; financial providers are integrated with the platform.
- **Postconditions:** User receives confirmation of financial support eligibility or application status.
- **Main Flow:**
 1. User navigates to the financial support module.
 2. User inputs required personal and emergency details.
 3. System evaluates eligibility using predefined criteria.
 4. System connects user with a financial provider.
 5. User receives application status or approval notification.

Use Case 4: Admin Ambulance Assignment

- **Actor:** System Administrator
- **Goal:** To manually assign an ambulance in special cases.
- **Description:** In cases where the system fails to automatically assign an ambulance (e.g., due to high demand or system errors), the administrator uses the admin panel to manually select and dispatch an ambulance based on location, availability, and urgency.
- **Preconditions:** Administrator is logged into the admin panel; ambulance providers are registered.
- **Postconditions:** An ambulance is assigned and dispatched to the user's location.
- **Main Flow:**
 1. Administrator receives notification of unassigned emergency request.
 2. Administrator views available ambulances and their details.
 3. Administrator selects and assigns an ambulance.
 4. System notifies the ambulance provider and user.
 5. Administrator logs the manual assignment.

Use Case 5: Real-Time Ambulance Tracking

- **Actor:** User
- **Goal:** To track the dispatched ambulance's location and estimated arrival time.
- **Description:** After booking an ambulance, the user accesses a tracking interface that displays the ambulance's real-time location on a map, along with an updated estimated time of arrival (ETA). The system relies on the Map API for accurate tracking.
- **Preconditions:** Ambulance is booked; Map API is functional.
- **Postconditions:** User is informed of the ambulance's location and ETA.

- **Main Flow:**

1. User opens the tracking interface post-booking.
2. System displays ambulance's real-time location on a map.
3. System updates ETA based on traffic and distance.
4. User receives notifications if delays occur.
5. Tracking ends when the ambulance arrives.

Use Case 6: Medical History Upload

- **Actor:** User

- **Goal:** To upload medical history for better emergency treatment.

- **Description:** The user uploads relevant medical history (e.g., allergies, chronic conditions) to their profile on the AidPath platform. This information is shared with the ambulance provider and medical staff during an emergency to ensure appropriate treatment.

- **Preconditions:** User is registered; system supports secure data storage.

- **Postconditions:** Medical history is stored and accessible to authorized personnel during emergencies.

- **Main Flow:**

1. User navigates to the profile section.
2. User uploads medical history details (e.g., via form or file).
3. System validates and stores data securely.
4. User confirms data accuracy.
5. System makes data available to ambulance providers during booking.

3.3.2 User Stories

User Story 1: Quick Ambulance Booking

- As a user, I want to book the nearest ambulance quickly so that I can get help in a life-threatening emergency.

- **Acceptance Criteria:**

- System detects my location automatically or allows manual input.
- System shows available ambulances with ETA within 10 seconds.
- I can confirm booking with one click.
- I receive confirmation with ambulance details.

User Story 2: AI-Powered First Aid Guidance

- As a user, I want to get immediate first aid advice so that I can stabilize the patient until help arrives.

- **Acceptance Criteria:**

- Chatbot responds in my preferred language within 5 seconds.
- Instructions are clear and tailored to the described emergency.
- I can use text or voice to interact with the chatbot.
- Chatbot saves interaction history for reference.

User Story 3: Financial Support for Emergencies

- As a low-income user, I want to apply for financial help during emergencies so that I can afford urgent medical care.

- **Acceptance Criteria:**

- System provides a simple form to input financial details.
- I receive eligibility feedback within 1 minute.
- System connects me to a financial provider for further steps.
- Application process is secure and private.

User Story 4: Manual Ambulance Assignment by Admin

- As an admin, I want to assign ambulances manually when the system fails to auto-assign in high-priority cases.

- **Acceptance Criteria:**

- Admin panel shows unassigned requests with urgency levels.
- I can view available ambulances and their locations.
- System logs manual assignments for auditing.
- User and ambulance provider are notified of manual assignment.

User Story 5: Real-Time Ambulance Tracking

- As a user, I want to track the ambulance's location in real-time so that I know when it will arrive.

- **Acceptance Criteria:**

- Tracking interface shows ambulance location on a map.
- ETA updates every 30 seconds based on traffic.

- I receive alerts for significant delays.
- Interface is accessible on mobile and web platforms.

User Story 6: Multilingual Chatbot Support

- As a user who speaks a regional language, I want the chatbot to communicate in my language so that I can understand first aid instructions clearly.
- **Acceptance Criteria:**
 - Chatbot supports at least 5 regional languages.
 - I can select my language at the start of interaction.
 - Instructions are accurate and culturally appropriate.
 - Voice and text options are available in all supported languages.

User Story 7: Medical History Sharing

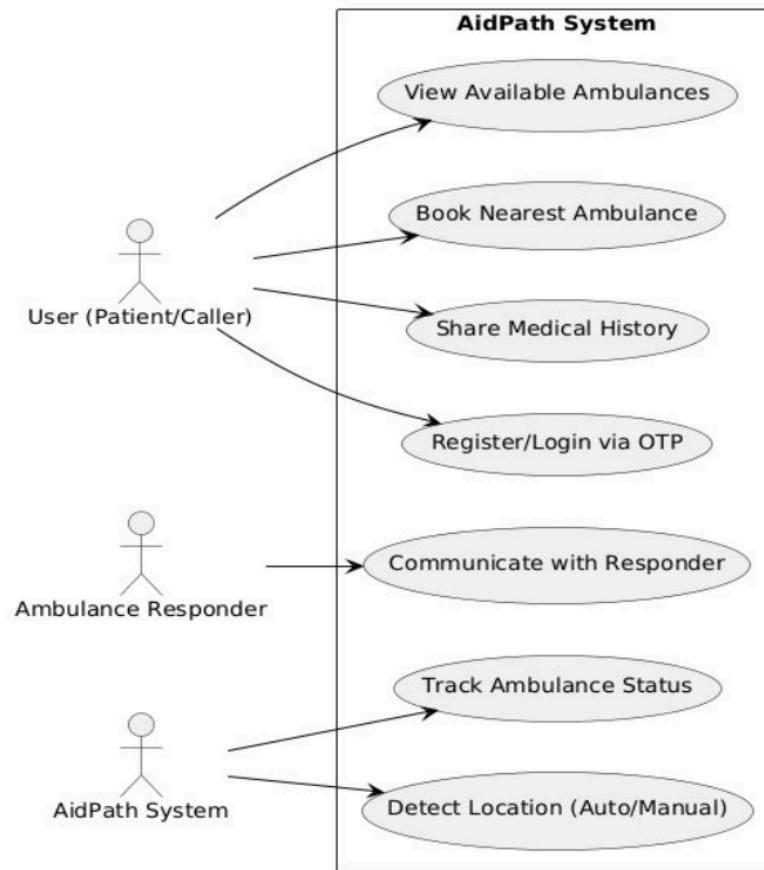
- As a user with chronic conditions, I want to upload my medical history to the platform so that ambulance staff can provide appropriate care.
- **Acceptance Criteria:**
 - System provides a secure form to input medical details.
 - I can update or delete my medical history anytime.
 - Data is encrypted and shared only with authorized personnel.
 - Ambulance providers receive my medical history during booking.

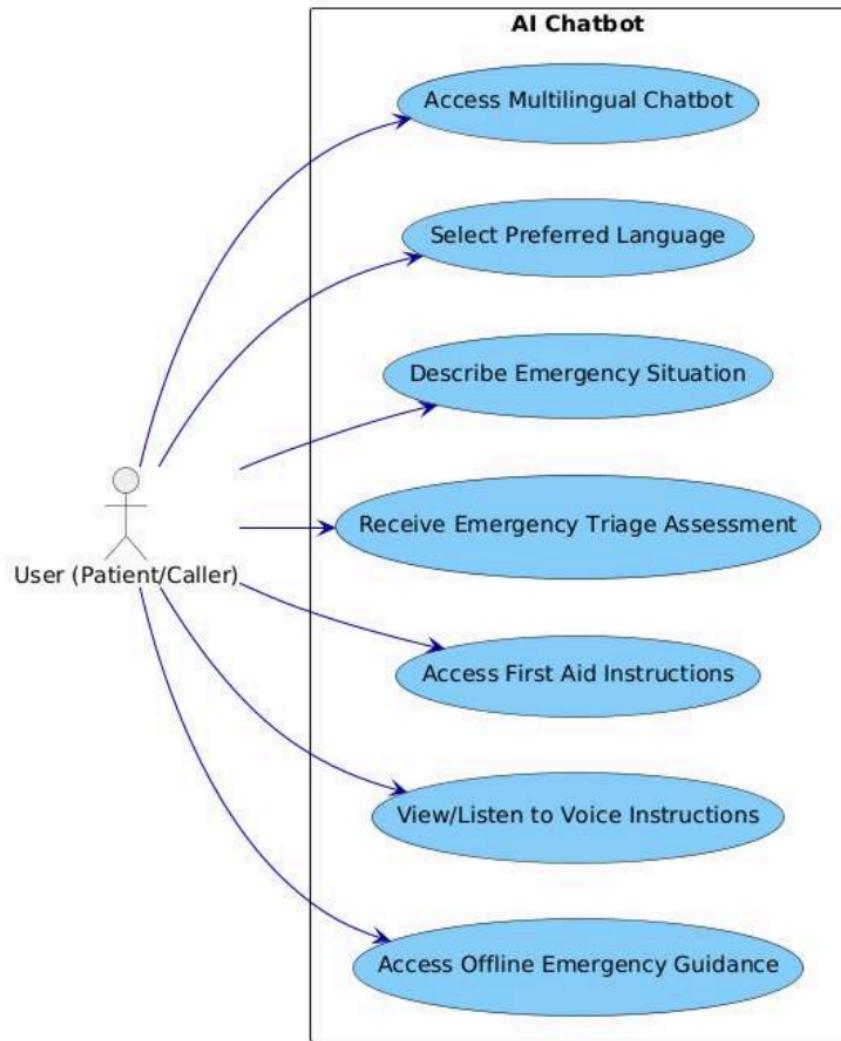
User Story 8: Offline First Aid Guidance

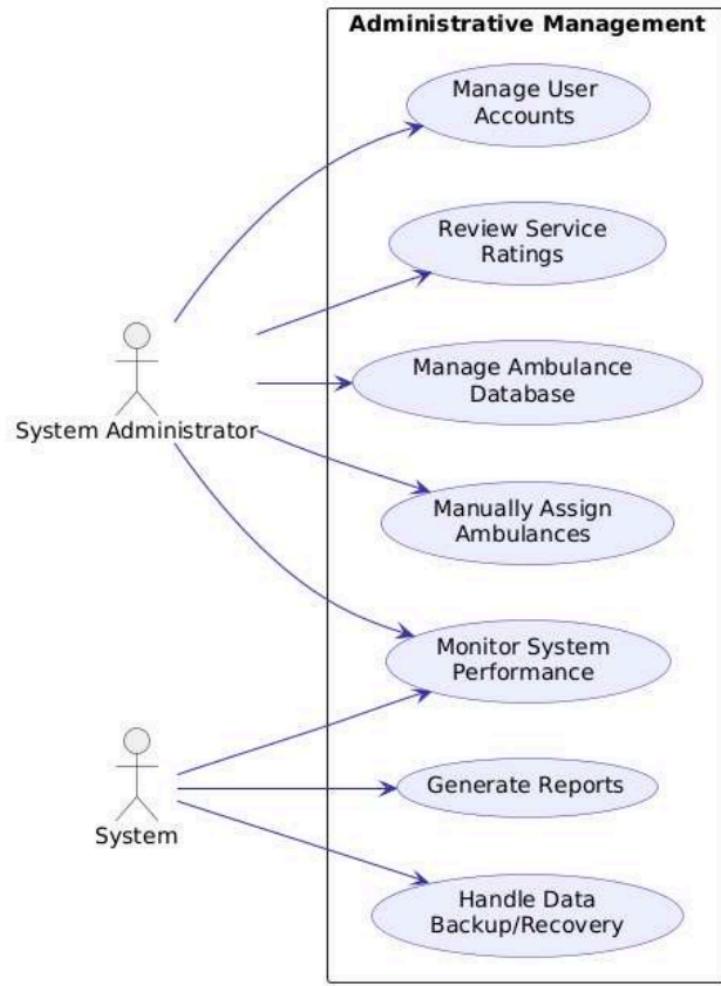
- As a user in an area with poor internet, I want access to basic first aid guidance offline so that I can assist in emergencies without connectivity.
- **Acceptance Criteria:**
 - System offers downloadable first aid guides for offline use.
 - Offline mode is accessible after initial app setup.
 - Guides cover common emergencies (e.g., CPR, bleeding).
 - Offline content is updated when internet is available.

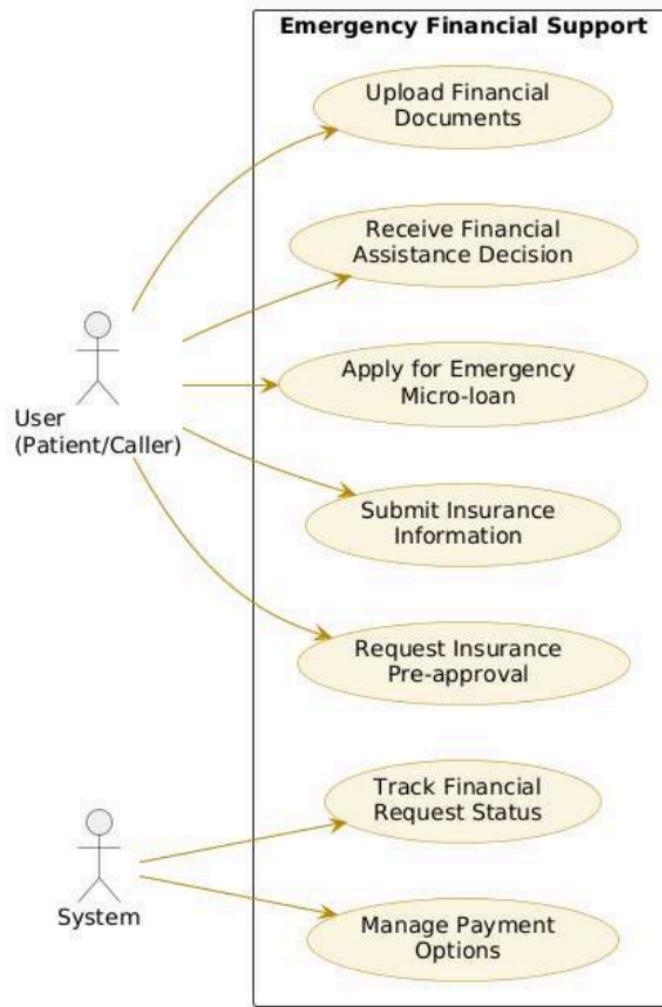
4. Requirement Modeling

4.1 Use Case Diagrams

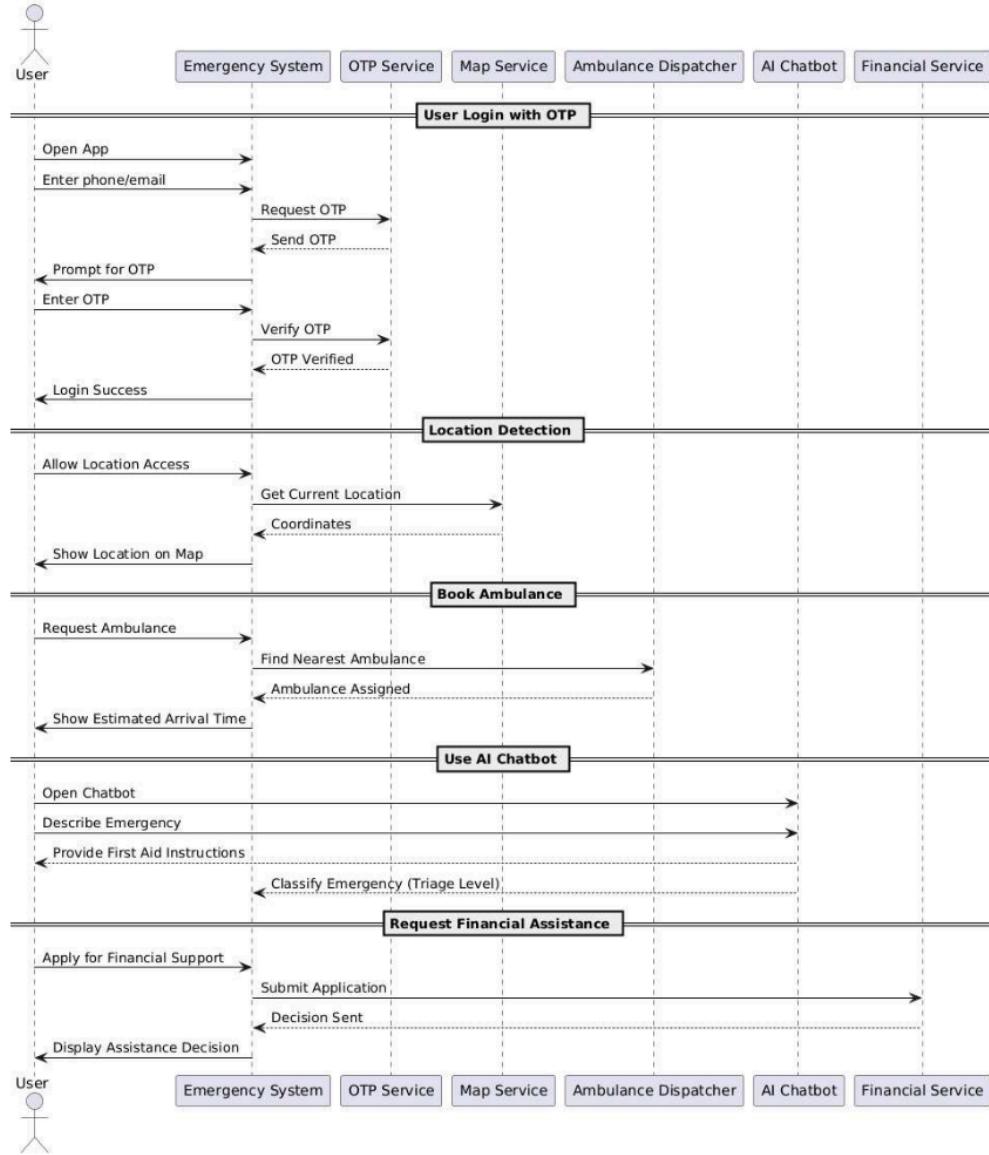




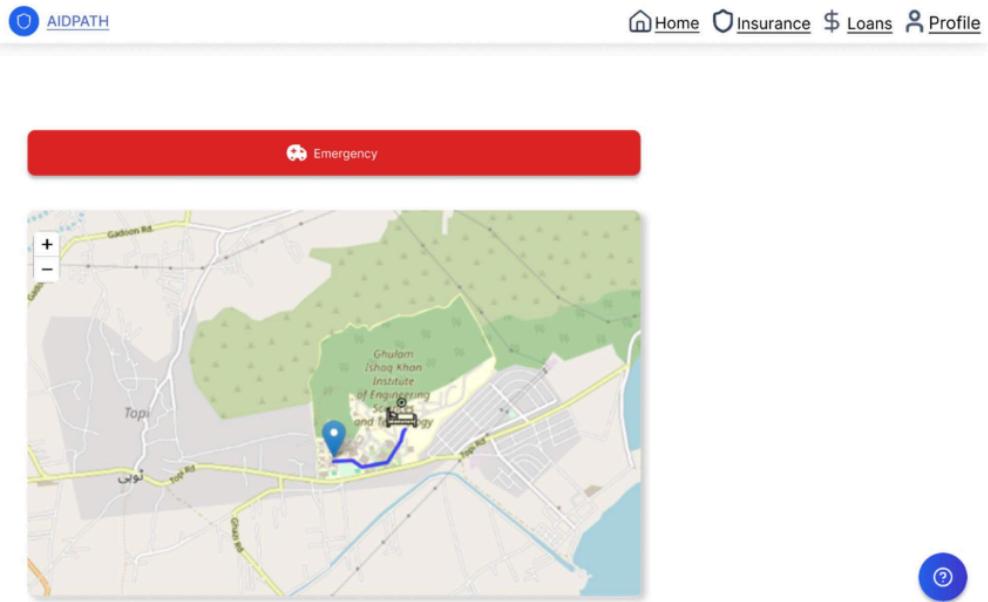




4.2 Interaction Diagram

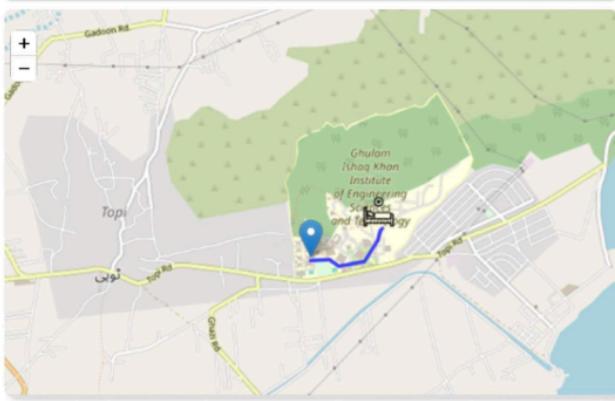


4.3 Wireframes/Prototypes



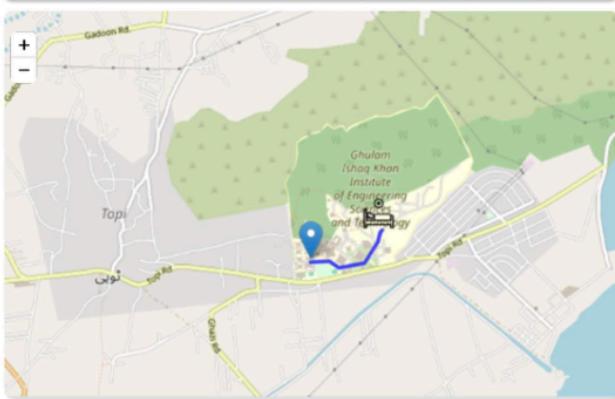
Emergency

Find Ambulance Services



Emergency

Find Ambulance Services



Emergency Support



Welcome to Emergency Support. We're here to help you through difficult moments with care and compassion. Your safety and well-being are our priority.



Type emergency message...



Medical Financial Support

Emergency Medical Loan

Instant loans for emergency medical expenses

Max Amount:	Rs. 500,000
Interest Rate:	8%
Tenure:	12-24 months

- ⌚ Minimal documentation
- ⌚ Quick approval within 4 hours
- ⌚ No collateral required
- ⌚ Direct hospital payment

Eligibility:
Age 21-60 years, Min. income Rs. 25,000/month

Apply Now

Recommended

Planned Surgery Loan

Plan your medical procedures with easy EMIs

Max Amount:	Rs. 1,500,000
Interest Rate:	12%
Tenure:	12-48 months

- ⌚ Pre-approved amounts
- ⌚ Flexible repayment options
- ⌚ Coverage for all major surgeries
- ⌚ Family coverage included

Eligibility:
Age 21-65 years, Min. income Rs. 40,000/month

Apply Now

Long Term Care Loan

Extended financial support for long-term medical care

Max Amount:	Rs. 3,000,000
Interest Rate:	10%
Tenure:	24-60 months

- ⌚ Extended repayment period
- ⌚ Comprehensive coverage
- ⌚ Chronic illness support
- ⌚ Regular health monitoring

Eligibility:
Age 21-70 years, Min. income Rs. 60,000/month

Apply Now

Emergency

Find Ambulance Services

Ambulance Services

ambulance

Edhi - Edhi Foundation	Time: 15 minutes	Book
1122 - Punjab	Emergency Service	Book

Time: 10 minutes

caB

Careem - Careem Networks	Time: 5 minutes	Book
Uber - Uber Technologies	Time: 7 minutes	Book

?

Health Insurance Plans



Sehat Basic Plan

Essential coverage for individuals and families

Rs. 2,500/month

Coverage up to **Rs. 500,000**

- OPD coverage up to Rs. 2,000 per visit
- Basic lab tests coverage
- Emergency room coverage
- Medicine reimbursement up to Rs. 5,000
- Government hospital coverage

Apply Now

Recommended



Sehat Premium Plan

Comprehensive coverage for complete peace of mind

Rs. 5,000/month

Coverage up to **Rs. 1,500,000**

- OPD coverage up to Rs. 3,500 per visit
- Specialist consultations
- All major lab tests covered
- Room coverage up to Rs. 8,000/day
- Dental coverage up to Rs. 25,000
- Maternity coverage
- Private hospital coverage

Apply Now



Sehat Elite Plan

Premium coverage with exclusive benefits

Rs. 10,000/month

Coverage up to **Rs. 3,000,000**

- Unlimited OPD visits
- VIP room coverage
- International emergency coverage
- All diagnostic tests covered
- Full dental & optical coverage
- Specialized treatments
- Air ambulance service
- Executive health screening

Apply Now

5. Requirement Validation & Management

5.1 Traceability Matrix

Stakeholder Needs	Requirement IDs
Quick and secure user authentication	FR1, NFR2
Accurate and easy location detection	FR2
Real-time ambulance tracking and booking	FR3, FR4
Multilingual AI chatbot with first aid instructions	FR5, FR6, NFR4, NFR7
Uploading medical history for better response	FR7
Emergency financial help	FR8, FR10
Communication with ambulance responder	FR9
Admin control for manual ambulance assignment	FR10
Fast and responsive system	NFR1
Data protection and encryption	NFR2

Cross-device compatibility	NFR3
Future scalability	NFR5
Backup and recovery support	NFR6

5.2 Interaction Matrix

Feature	Location Services	Ambulance Module	Chatbot	Financial Support	Admin Panel	Security
User Authentication	-	✓	✓	✓	✓	✓
Location Detection	✓	✓	-	-	-	-
Ambulance Booking	✓	-	-	-	✓	✓
Chatbot (First Aid + Triage)	-	✓	-	✓	-	✓
Financial Assistance	-	-	✓	-	-	✓
Admin Manual Assignment	-	✓	-	✓	-	✓
Backup, Recovery, Scalability	-	-	-	-	-	✓

5.3 Change Management

To handle requirement changes effectively and prevent scope creep, the following strategy will be used:

1. Any stakeholder or team member proposing a change must submit a formal change request form with justification.
2. The team will assess the impact of the proposed change on time, cost, and other requirements.
3. A dedicated review board (including the product owner, lead developer, and analyst) will evaluate and approve or reject changes.
4. Approved changes will be documented in the requirement specification and reflected in design and code.
5. All stakeholders will be informed about approved changes through regular meetings or emails.
6. **Version Control:** A version control system (like Git) will track all requirement and implementation changes.

Glossary

Term	Definition
AidPath	The AI-driven emergency healthcare and ambulance booking web platform designed to optimize ambulance dispatch, provide real-time medical assistance, and offer financial support options.
AI Chatbot	An artificial intelligence-powered conversational interface that provides multilingual, real-time first aid guidance to users via text or voice interactions.
Ambulance Provider	Entities (government, private, or volunteer-based) that register with AidPath to offer ambulance services and update their availability on the platform.
API	Application Programming Interface; in the context of AidPath, refers to external services like the Gemini API (for chatbot functionality) and Map API (for location and tracking services).
Emergency Financial Support	A feature of AidPath that allows users to apply for micro-loans or emergency insurance coverage to cover medical costs during emergencies.
First Aid Guidance	Step-by-step instructions provided by the AI chatbot to stabilize a patient's condition before professional medical help arrives, limited to basic medical advice.

Gemini API	An external AI service used to power the multilingual chatbot's natural language processing and response generation capabilities.
Map API	An external service used for location detection, ambulance tracking, and traffic-aware routing within the AidPath platform.
Micro-loan	A small, short-term loan offered through partnered financial providers to help users cover emergency medical expenses.
Multilingual Support	The capability of the AI chatbot to communicate in multiple languages, catering to diverse user demographics and regional language preferences.
NDMA	National Disaster Management Authority; a Pakistani government body that AidPath may align with for compliance and integration.
NADRA	National Database and Registration Authority; a Pakistani agency whose services may be integrated for user verification or data alignment.
OTP	One-Time Password; a security mechanism used for user authentication during registration or login on the AidPath platform.
Real-Time Ambulance Tracking	A feature that allows users to monitor the location and estimated arrival time of a dispatched ambulance using the Map API.
Rescue 1122	A Pakistani emergency service that AidPath may collaborate with for ambulance integration and coordination.
Sehat Sahulat	A Pakistani government health insurance program that AidPath may align with for financial support features.
Stakeholder	Individuals or groups with an interest in AidPath, including users (general public), ambulance providers, medical professionals, financial institutions, government authorities, and the development team.
Triage System	A method proposed by medical professionals to categorize emergencies by severity (Red: life-threatening, Orange: serious, Green: non-critical) to prioritize ambulance dispatch and treatment.
User	An individual accessing AidPath services, typically a patient or someone assisting a patient in an emergency, who interacts with features like ambulance booking, chatbot, or financial support.
Wireframe	A visual representation of the AidPath user interface, created using tools like Figma to prototype the application's layout and functionality.

Software Requirements Specification

ORIGINALITY REPORT



PRIMARY SOURCES

1	Submitted to Heriot-Watt University Student Paper	1 %
2	Fortes, Shirley Fermino Rodrigues. "Implementation of an APP for Supporting Best Practices in Tuberculosis Treatment.", Universidade do Porto (Portugal) Publication	1 %
3	Submitted to University of Nottingham Student Paper	<1 %
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