

# SOFTWARE REQUIREMENTS SPECIFICATION

## Bridging Healthcare Gaps with AI

**Project Code:**

BHG-AI-(25-26)

**Internal Advisor:**

Dr. Hafiz Muhammad Faisal Shehzad  
Mr. Aamir Zia

**Project Manager:**

Dr. Muhammad Ilyas

**Project Team:**

Aqsa Shahzad	BSCS51F22S028	(Team Lead)
Sehrish Akram	BSCS51F22S019	(Team Member)
Ayesha	BSCS51F21R036	(Team Member)
Farwa Eiman Arif	BSCS51F22S014	(Team Member)

**Submission Date:**

October 20, 2025

---

Project Manager's Signature

## Document Information

Category	Information
Customer	Patients , healthcare providers (doctors).
Project	Bridging Healthcare Gaps with AI.
Document	Software Requirement Specifications
Document Version	1.0
Identifier	BHG-AI-(25-26)
Status	Draft
Author	Aqsa Shahzad, Farwa Eiman Arif, Sehrish Akram, Ayesha
Approver	Dr. Muhammad Ilyas
Issue Date	October 20, 2025
Document Location	
Distribution	

## Definition of Terms, Acronyms and Abbreviations

Term	Description
API	Application Programming Interface
ASP	Active Server Pages
BP	Blood Pressure
CPU	Central Processing Unit
HTTPS	Hypertext Transfer Protocol Secure
JWT	JSON Web Tokens
ML	Machine Learning
MRI	Medical Resonance Imaging
NFR	Non-Functional Requirement
NLP	Natural Language Processing
OCR	Optical Character Recognition
RAM	Random Access Memory
SDK	Software Development Kit
SMS	Short Message Service
SRS	Software Requirements Specification
URL	Uniform Resource Locator
WebRTC	Web Real-Time Communication
PMC	Pakistan Medical Commission

## TABLE OF CONTENTS

---

<b>1. Introduction .....</b>	<b>4</b>
<b>2. Overall System Description .....</b>	<b>5</b>
2.2.1 Hardware .....	6
2.2.1.1 Servers: .....	6
2.2.1.2 User Devices: .....	6
2.2.2 Software .....	6
2.2.2.1 Web Application: .....	6
2.2.2.2 Mobile Application: .....	6
2.2.3 Network .....	7
2.2.4 Security and Privacy .....	7
2.2.5 Language Support .....	7
<b>3. External Interface Requirements .....</b>	<b>8</b>
3.1.1 Smartphone Camera .....	8
3.1.2 Microphone and Speaker .....	8
3.2.1 Google Maps API .....	8
3.2.2 Operating System (Android/iOS) .....	8
3.3.1 Virtual Consultations .....	9
3.3.2 Network Communications .....	9
3.3.3 Message Formatting .....	9
3.3.4 Data Transfer Rates .....	9
<b>4. Functional Requirements .....</b>	<b>9</b>
4.1 User Management .....	9
4.2 AI Health Assistant .....	10
4.3 Diagnosis & Treatment Recommendations .....	10
4.4 Medical Report Analysis .....	10
4.5 Appointment Booking .....	10
4.6 Doctor Directory .....	10
4.7 Teleconsultation .....	10
4.8 Medication & Health Tracking .....	10
4.9 Multi-Language Support .....	10
<b>5. Non-Functional Requirements .....</b>	<b>11</b>
5.1 Performance .....	11
5.2 Reliability .....	11
5.3 Security .....	11
5.4 Usability .....	11
5.5 Scalability .....	11
5.6 Accuracy .....	11
5.7 Compliance .....	11
5.8 Compatibility .....	11
<b>6. Assumptions and Dependencies .....</b>	<b>12</b>
<b>7. References .....</b>	<b>14</b>

# 1. Introduction

The official agreement between the clients and developers is termed as the Software Requirements Specification (SRS) document, in which all the functions that a software needs to accomplish, are explained. Its main goal is to provide developers with a clear development roadmap by outlining exactly what users expect from the system [1]. In order to give everyone a comprehensive understanding of what is required, the document is divided into multiple sections. It lists the main features, what the system will do, how it will work with other components, and the constraints [2] that must be considered, when developing the software system discussed in this document.

## 1.1 Purpose of Document

The purpose of this document is to list all the functions, requirements and features that users need in our system. It tells what the system can do, what it wants to accomplish, how it works with other systems, what jobs it does, and how it solves problems. This document is written for stakeholders, customers, the team building the system, and the people who will test it.

## 1.2 Project Overview

HealthBridge.ai is a project that aims to make healthcare in Pakistan more accessible and less expensive. We will use this system to let users know better about the medical terms and help them better understand their health issues. The primary goal is to address our country's healthcare problems and offer everyone access to high-quality medical care. By creating an AI medical assistant that interprets medical reports and provides telemedicine doctor consultations for users, we hope to improve healthcare.

## 1.3 Scope

The software system being made is called HealthBridge.ai. It is being developed for patients who require both routine and urgent medical advice and for the physicians who want to conduct online consultations. This system's objective is to provide "automation support" for comprehending medical reports, getting health advice, and connecting with the doctors online.

The system will be accessible to everyone countrywide via a mobile app or web browser. It will run on a cloud server, which means users can use it from any location with android device or a laptop. This ensures that the system functions properly and that multiple users can access it simultaneously.

Any user will be able to create an account on HealthBridge.ai. When registering, users can choose to join as either a patient or a doctor. Patients can interact with the AI health assistant, upload their medical test reports, receive simple explanations of their reports, and book appointments with doctors. Users can conduct video calls, voice calls, or text chat with doctors. The system will also have medicine reminders that send notifications to users when it's time to take their medicine. The AI assistant will analyze symptoms, diagnoses or advise users whether they need to see a doctor immediately or if they can manage their care at home. The AI will also help interpret medical test results and explain diagnosis reports in simple language.

Doctors will be able to make their profiles with their specialty and location. They can accept appointment requests from patients, do online consultations through video, audio or chat, and see patient history. The system will match patients with the right specialist doctors based on their health problems.

The project will have some limits. It will not connect with hospital computer systems or insurance companies. The system will not work with fitness watches or other wearable devices.

## 2. Overall System Description

HealthBridge.ai will be a smart healthcare app. It will use Artificial Intelligence (AI) to help people with their health issues. The system will make it easier to understand the medical reports. Additionally, it will speed up the process of traditional doctor visits. Basic health checks will be less expensive. It will be fruitful to use in the areas far from the hospitals. The system will analyze data with AI and connect patients with the right specialists. For ease of use, the system will support Urdu language in addition to English language.

### 2.1 User characteristics

This app will have three main groups of users. Our system will be developed for all types of people who need medical assistance.

#### 2.1.1 Primary Users (Patients)

- These are the users who will manage their health using the app on a daily basis.
- Men and women from both urban and rural areas are included in this.

##### 2.1.1.1 Poor and Underserved People:

- People with limited financial resources, and do not afford expensive hospitals fee can utilize this system.
- They can get inexpensive basic medical assistance through our app.

##### 2.1.1.2 People with Less Education:

- The people who struggle with reading and writing can benefit from our system.
- We use voice support so they can understand things easily.

##### 2.1.1.3 Users in Remote Areas:

- People in villages or with slow internet speeds will be able to use this system.
- They will be capable to get remote help from doctors.

##### 2.1.1.4 Elderly Patients:

- They require an extremely user-friendly app that is very simple to use.
- This enables their family members to assist in managing their healthcare.

#### 2.1.2 Health Professionals

These users include doctors and other medical staff who help treat patients.

##### 2.1.2.1 General and Specialist Doctors:

- Doctors who treat routine patients and those with certain illnesses can use the system.
- They will be able to create their own account as a doctor.
- They will use the system to see patient history and give better treatment.

### **2.1.2.2 Healthcare Workers and Nurses:**

- This includes nurses in small clinics and community health workers in villages.
- They will use the system to check patient records and give medicine.

### **2.1.3 Occasional Users**

These users occasionally use the app to assist others.

#### **2.1.3.1 Family Members:**

- These are people who want to check the health reports of their family, and basic details about their treatment and medicines.

## **2.2 Operating environment**

The operating environment makes sure that the system works properly and all users can access it easily. The detailed operating environment is given below.

### **2.2.1 Hardware**

For optimal performance, the system needs the following user devices and hardware infrastructure.

#### **2.2.1.1 Servers:**

- Using cloud based hosting with auto-scaling features allows the system to handle multiple users at once.

#### **2.2.1.2 User Devices:**

- Mobile (Android phones).
- Desktop or laptop computers.
- Tablets.

### **2.2.2 Software**

To maximize the user reach, the system will be available on different software platforms.

#### **2.2.2.1 Web Application:**

- The system will work on all common web browsers like Google Chrome, Mozilla Firefox, Safari, and Microsoft Edge.
- Users will open the website on any browser and use the system.

#### **2.2.2.2 Mobile Application:**

- The mobile app will be developed for Android phones and desktops / laptops.
- The app will be responsive so that everyone can use it easily on small or big devices.

### 2.2.3 Network

- The healthcare system will require internet connection to work.
- The system will work on both mobile data (3G/4G/5G) and WiFi connection.

### 2.2.4 Security and Privacy

- All user data will be protected with secure HTTPS connection.
- Patient information will be kept confidential and secure according to privacy regulations.
- Only authorized users (patients, physicians, healthcare workers) will access the system.

### 2.2.5 Language Support

- The system will support English and Urdu language.
- Users will be able to switch between languages from the settings.
- All features like voice support and instructions will be available in both languages.

## 2.3 System constraints

During the system's design, development and deployment phases, our healthcare system is subject to some constraints. These constraints define the boundaries within which the system will operate. These include:

### 2.3.1 Software Constraints

- The web platform will work on modern browsers (Chrome, Firefox, Safari, Edge).
- Mobile apps will only be compatible with Android phones.
- Users must have internet connection to access the platform.

### 2.3.2 Hardware Constraints

- Host server must have sufficient resources (CPU, RAM, disk space) to run multiple Docker containers.
- Users need adequate devices (phones/computers with minimum 2GB RAM).
- Camera and microphone required for video consultations.

### 2.3.3 Cultural Constraints

- Supports only English and Urdu

### 2.3.4 Legal Constraints

- Pakistan healthcare regulations must be adhered to.
- Doctor verification required.
- User consent for data collection is necessary.

### 2.3.5 User Constraints

- Users must be able to understand how to use the platform.

### 2.3.6 Environmental Constraints

- Docker containers with stable power and internet connectivity used to deploy the system on cloud servers.
- The quality of a video consultation may be affected by various lighting and noise levels.

### 2.3.7 Off-the-shelf Components Constraints

- WebRTC, Agora and Twilio video calling APIs : usage limits and costs.
- Transaction fees for payment gateways such as Jazzcash and Easypaisa.
- OCR APIs : accuracy limitations.
- NLP libraries might not be able to comprehend every medical term.
- Storage limits for cloud storage (AWS, Google Cloud).
- Computational requirements for AI/ML frameworks.
- Third-party services may fail or become expensive.

## 3. External Interface Requirements

This section tells us what hardware, software and communication interfaces our system will use to work properly.

### 3.1 Hardware Interfaces

#### 3.1.1 Smartphone Camera

- The system will use the phone's camera to take pictures of medical reports.
- Works with both Android and iOS phone cameras.
- Patients can upload pictures of blood tests, X-rays, MRI scans, and other medical documents.
- Good quality pictures are needed so AI can read the reports properly.

#### 3.1.2 Microphone and Speaker

- The system will use the phone or computer's microphone and speaker for video calls between doctors and patients.
- Patients will also be able to use voice to describe their symptoms to the AI.
- Echo cancellation will help make calls clear.

### 3.2 Software Interfaces

#### 3.2.1 Google Maps API

- It will help patients find doctors near their location.
- It will show the doctor's clinic location on the map and calculates the distance.
- It will help match patients with nearby doctors based on specialty.

#### 3.2.2 Operating System (Android/iOS)

- The system will send push notifications to remind patients about medicines.
- It will send reminders about doctor appointments.



- The notifications will work even when the app is closed.
- The healthcare system will use Firebase Cloud Messaging for sending notifications.

### **3.2.3 Payment Gateway**

- The system's payment gateway will handle payment for doctor consultations.
- It will use Pakistani payment methods like JazzCash and EasyPaisa.
- All payment information will be kept secure and encrypted.
- It will show payment confirmation after successful transaction.

## **3.3 Communications Interfaces**

### **3.3.1 Virtual Consultations**

- Patients and doctors will have video calls for their queries.
- The service will work on slow internet connections too.
- It will use Agora or Twilio SDK tools.
- All calls will be encrypted for privacy and security.
- Audio quality will be adjusted automatically based on internet speed.

### **3.3.2 Network Communications**

- All data sent between app and server will use HTTPS for security.
- User login information will be protected with JSON Web Tokens (JWT).
- Medical reports and patient data will remain encrypted.
- The communication will work safely over the internet.

### **3.3.3 Message Formatting**

- All AI communications will be written in simple language.
- No complex medical terminology will be used.
- The messaging support will be provided in both English and Urdu languages.

### **3.3.4 Data Transfer Rates**

- Patients will upload large medical report files such as X-rays or MRI scans.
- Big files can be uploaded in small chunks to avoid errors.
- The users can see the upload progress and try again if it does not work.

## **4. Functional Requirements**

### **4.1 User Management**

- 4.1.1** Users will be able to register, login, and manage health profiles with medical history.
- 4.1.2** The system will keep user sessions safe and offer password recovery feature.

## 4.2 AI Health Assistant

- 4.2.1 Using medical AI models, the system will offer a chat interface for health-related queries.
- 4.2.2 Based on user's medical profile, the system will give personalized responses.
- 4.2.3 The system will maintain conversation context and provide confidence scores for responses.

## 4.3 Diagnosis & Treatment Recommendations

- 4.3.1 After analyzing the symptoms, preliminary diagnosis with several options will be provided.
- 4.3.2 The system will classify (Non-urgent/Moderate/Urgent/Emergency) and suggest treatments.
- 4.3.3 The system will generate shareable health summaries and suggest doctors and medications.

## 4.4 Medical Report Analysis

- 4.4.1 Reports in JPG/PNG/PDF formats can be uploaded and OCR to extract the text.
- 4.4.2 Test values will be identified by the system and compared against normal ranges.
- 4.4.3 The system will flag abnormal results and explain them in simple language.

## 4.5 Appointment Booking

- 4.5.1 The system will use voice calls to clinics to automatically schedule appointments.
- 4.5.2 If voice calling doesn't work, the system will switch to SMS or WhatsApp.
- 4.5.3 Confirmations and reminders will be sent by the system.

## 4.6 Doctor Directory

- 4.6.1 A searchable doctor database with profiles and specialties will be maintained by the system.
- 4.6.2 The system will allow filtering by location, specialty, and availability.

## 4.7 Teleconsultation

- 4.7.1 The system will allow real-time text chat between patients and doctors.
- 4.7.2 During a consultation, the system will show the medical history of the patients to the doctor.

## 4.8 Medication & Health Tracking

- 4.8.1 The system will send medication reminders and track adherence.
- 4.8.2 Vital signs like BP, glucose, weight, temperature can be manually recorded using the system.
- 4.8.3 The system will also display health trends and alert for abnormal values.

## 4.9 Multi-Language Support

- 4.9.1 The system will provide a language-switching interface in both Urdu and English.
- 4.9.2 The system will be able to translate AI responses and medical explanations.

## **5. Non-Functional Requirements**

### **5.1 Performance**

- 5.1.1 AI response and OCR processing will be done within a few seconds.
- 5.1.2 Concurrent users will be supported by the system, and page loads under a few seconds.

### **5.2 Reliability**

- 5.2.1 Daily backups, and a 95% system availability rate.
- 5.2.2 Graceful error handling and automatic recovery.

### **5.3 Security**

- 5.3.1 Encrypted passwords, JWT authentication, and HTTPS communication.
- 5.3.2 Role-based access control combined with session timeouts.
- 5.3.3 Input validation and rate limiting.

### **5.4 Usability**

- 5.4.1 Intuitive interface which requires no training.
- 5.4.2 Responsive design for mobile, tablet, and desktop.
- 5.4.3 Clear error messages and real-time form validation.

### **5.5 Scalability**

- 5.5.1 Component-level scaling will be supported by a modular architecture.
- 5.5.2 Performance-enhancing database indexing and caching.

### **5.6 Accuracy**

- 5.6.1 Accuracy in OCR and AI diagnosis.
- 5.6.2 Voice booking success rate and accuracy.

### **5.7 Compliance**

- 5.7.1 Medical disclaimers stating that system is not replacement for professional care.
- 5.7.2 User consent for data collection with export/deletion options.

### **5.8 Compatibility**

- 5.8.1 Support modern browsers (Chrome, Firefox, Safari, Edge).
- 5.8.2 Function on 3G networks and above.

## 6. Assumptions and Dependencies

Following are the assumptions and dependencies that have been made during the development of the system requirements:

### 6.1 Assumptions

#### 6.1.1 Internet Connectivity

- Users (both patients and doctors) have access to stable internet connectivity.
- Internet infrastructure in Pakistan will remain accessible and affordable for target users.

#### 6.1.2 User Device Availability

- Patients have access to smartphones or computers with modern web browsers.
- Doctors have reliable devices for conducting tele consultations.

#### 6.1.3 User Technical Literacy

- Users possess basic smartphone/computer operation skills.
- Patients can navigate simple mobile applications with voice support assistance.
- Doctors are familiar with telemedicine platforms.

#### 6.1.4 Medical Data Availability

- Patients can upload their medical reports in standard formats (JPG, PNG, PDF).
- Medical reports are readable/legible for OCR processing.
- Patients have access to their prior medical history and records.

#### 6.1.5 Doctor Participation

- Licensed medical practitioners in Pakistan will register on the platform.
- Doctors will provide accurate credentials and specialty information.
- Doctors will be available for scheduled consultations.

#### 6.1.6 Language Support

- For most Pakistani users, support for Urdu and English will be adequate.
- Translations of medical terminologies between English and Urdu are standardized.

#### 6.1.7 Legal and Regulatory Compliance

- The system conforms to data protection and healthcare regulations of Pakistan.
- Legally, medical disclaimers will be adequate to shield the platform from responsibility.
- Doctor verification processes meet legal requirements in Pakistan.

#### 6.1.8 AI Model Accuracy

- Pre-trained medical AI models are available and can be integrated.
- The accuracy thresholds can be met by AI models.
- AI models can be continuously improved if we collect user feedback.

### 6.1.9 Third-Party Service Availability

- Payment gateways, video calling, OCR and external APIs remain operational.
- Third-party service providers continue to use their current pricing models.
- API rate limits are sufficient for expected user load.

### 6.1.10 User Trust and Adoption

- Given the appropriate disclaimers, users trust AI-based health recommendations.
- Users are willing to share medical information on the platform.
- Telemedicine is accepted as a valid consultation method by the healthcare professionals.

## 6.2 Dependencies

This project depends on the following external factors and components:

### 6.2.1 Third-Party APIs and Services

- **Video Calling Services:** Agora or Twilio SDK for teleconsultation features.
- **Google Maps API:** For doctor location services and proximity matching.
- **OCR Services:** For extracting and analyzing text from medical reports.
- **Payment Gateways:** JazzCash or EasyPaisha for processing the payments.
- **SMS/Email Services:** For appointment confirmations and notifications.
- **Firebase Cloud Messaging:** For push notifications on mobile devices.

### 6.2.2 AI/ML Frameworks and Models

- Availability of medical NLP models that are pre-trained for symptom analysis.
- AI frameworks for diagnosis recommendations that are either open-source or licensed.
- Continuous availability of training data is required for model improvement.
- Medical knowledge databases for validating or verifying the AI responses.

### 6.2.3 Cloud Infrastructure

- **Cloud Hosting Providers** such as AWS, Google Cloud, or Azure for server deployment.
- **Support for Docker Containers** for scalability and system deployment.
- **Database Services** are used to store user data, medical records, and system logs.
- **Content Delivery Network (CDN)** for quick content delivery across Pakistan.

### 6.2.4 External Data Sources

- **Doctor Directory Database** which is a verified list of licensed medical practitioners in Pakistan.
- **Medical Reference Data** for lab tests and criteria for diagnosis.
- **Drug Database** for checking interactions and recommending medications.

### 6.2.5 Regulatory and Legal

- Compliance with Pakistan Medical Commission (PMC) guidelines.
- Adherence to Pakistan's data privacy laws.
- Compliance with changing telemedicine policies.

### 6.2.6 Network Infrastructure

- Stable telecommunications network in Pakistan that is 3G, 4G or 5G.
- Service quality is maintained by the Internet Service Providers (ISPs).

### 6.2.7 Development Tools and Technologies

- Development frameworks and libraries availability.
- Browser compatibility with latest web standards.
- Backward compatibility with Android OS updates.

### 6.2.8 Financial Resources

- Funding for third-party service subscriptions and API usage.
- Budget for cloud infrastructure and hosting costs.
- Resources for ongoing maintenance and updates.

### 6.2.9 Human Resources

- Availability of doctors willing to register and provide consultations.
- Technical support team for system maintenance.
- Medical advisors for validating AI recommendations.

### 6.2.10 User Base Growth

- Gradual adoption by patients in urban and rural areas.
- Word-of-mouth promotion and user referrals.
- Marketing efforts to raise awareness about the platform.

## 7. References

Ref. No.	Document Title	Date of Release/ Publication	Document Source
PGBH01-2025-Proposal	Project Proposal	Oct 20, 2025	<a href="https://github.com/AqsaShahzad04/CP-1.git">https://github.com/AqsaShahzad04/CP-1.git</a>
PGBH01-2025-[1]	IEEE Recommended Practice for Software Requirements Specifications (IEEE Std 830-1998)	1998	<a href="https://ieeexplore.ieee.org/document/720574">https://ieeexplore.ieee.org/document/720574</a>
PGBH01-2025-[2]	Software Engineering: A Practitioner's Approach (7th Edition) by Roger S. Pressman	2010	McGraw-Hill, New York

Ref. No.	Document Title	Date of Release/ Publication	Document Source
PGBH01-2025-3	Maternal Mortality in Pakistan: Challenges, Efforts, and Solutions	2022	<a href="https://pmc.ncbi.nlm.nih.gov/articles/PMC9420499/">https://pmc.ncbi.nlm.nih.gov/articles/PMC9420499/</a>
PGBH01-2025-4	Oladoc – Book Doctors & Healthcare Professionals Online	2025	<a href="https://oladoc.com/">https://oladoc.com/</a>
PGBH01-2025-5	Marham: Healthcare Services in Pakistan	2025	<a href="https://marham.pk/">https://marham.pk/</a>
PGBH01-2025-6	Sehat Kahani – Telehealth in Pakistan	2025	<a href="https://sehatkahani.com/">https://sehatkahani.com/</a>
PGBH01-2025-7	Socioeconomic and Geographical Disparities in Healthcare Quality in Pakistan	2025	<a href="https://jpma.org.pk/index.php/public_html/article/view/21573">https://jpma.org.pk/index.php/public_html/article/view/21573</a>
PGBH01-2025-8	Access to Primary Health Care in Pakistan	2022	<a href="https://mmi.edu.pk/blog/access-to-primary-health-care-in-pakistan/">https://mmi.edu.pk/blog/access-to-primary-health-care-in-pakistan/</a>