

# Software Requirements Specification (SRS)

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## ❖ Title:

The title of the project is “LLMedicare: AI-Powered Healthcare Assistant”.

## ❖ Sponsor:

The sponsors for the project are as follows:

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The project is being undertaken under the guidance of Professor Ravi Anand, Assistant Professor in the Department of Computer Science and Engineering at the Indraprastha Institute of Information Technology, Delhi (IIITD), and Professor Pragya Jha, Assistant Professor in the Department of Data Science and Computer Applications at the Manipal Institute of Technology, Manipal, Karnataka. Professor Pragya Jha will also test the website developed during the project.

## ❖ Development Team:

The development team for the project is a group of 4 members. Their names and email IDs are as follows:

- 1) Aditya Gupta - [aditya22031@iiitd.ac.in](mailto:aditya22031@iiitd.ac.in)
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## ❖ Introduction:

**LLMediCare:** AI-Powered Healthcare Assistant is an advanced and comprehensive healthcare management platform to empower patients and healthcare professionals with advanced tools and seamless interactions.

Healthcare professionals can leverage the website to view patient history, aid their decision-making utilizing AI-powered clinical insights and analytics, manage appointments, and securely share prescriptions and test results with patients.

Meanwhile, regular users and patients can leverage the website to manage their medical history, book appointments (both offline and online) with their preferred practitioners, and utilize AI-powered healthcare assistance to get preliminary evaluations based on symptoms, health and medication recommendations, and test report analytics.

The platform's focus on accessibility aims to improve healthcare services for the underprivileged sections of society with virtual consultations and real-time medical advice.

## ❖ Functional Requirement Overview:

The functional requirements for the project are as follows:

<b>Patients</b>	<b>Use Case Name</b>	<b>Brief Description</b>	<b>Priority</b>
	Personalized Health Recommendations	Provides tailored health advice based on user data and preferences	High
	AI-Powered Symptom Checker	Offers probable diagnoses and advice based on user-entered symptoms	High
	Appointment Scheduling	Enables users to book, reschedule, or cancel appointments seamlessly.	High
	Medical Records Management	Allows secure storage and access to medical history and test results.	High
	Medication Reminders	Sends timely reminders to ensure users adhere to their prescribed medications.	High
	Health Education Resources	Provides articles, videos, and interactive content tailored to user medical conditions.	Low
	Virtual Health Community	Connects patients with similar conditions to share experiences and advice.	Medium
	Emergency Contact Integration	Facilitates quick access to emergency contacts or nearby healthcare providers.	High
	Real-Time Chat with Experts	Enables instant messaging with licensed medical professionals for quick advice.	Medium
	Multi-Language Support	Offers the platform in multiple languages for better accessibility.	Low

<b>Healthcare Professionals</b>	<b>Use Case Name</b>	<b>Brief Description</b>	<b>Priority</b>
	Patient Records Access	Enables secure access to patient information and medical history.	High
	Appointment Management	Allows efficient scheduling and rescheduling of patient appointments.	High
	Clinical Insights	Uses AI for predictive analytics to improve treatment planning.	Medium

	Prescription Management	Facilitates electronic prescription creation and sharing with patients.	High
	Patient Trend Analysis	Provides dashboards to track and analyze health trends.	Low
	Natural Language Query Support	Enables data retrieval through natural language queries	Low
	Collaboration Tools	Supports secure communication among healthcare providers.	Low
	Compliance Management	Ensures adherence to healthcare regulations using automated tools.	Medium
	Training and Resources	Provides access to training modules and treatment guidelines.	Low
	AI-Powered Diagnosis Assistance	Suggests diagnoses based on patient data and clinical patterns.	Medium
	Secure Data Sharing	Ensures secure transfer of patient information among professionals.	High

## ❖ Non-Functional Requirement Overview:

The non-functional requirements for the project are as follows:

### ● Website Layout

The layout consists of the following sections:

1. **Header** (Global Navigation Bar)
2. **Sidebar** (Role-Specific Navigation)
3. **Main Content Area** (Dynamic Content Based on User Role and Current Action)

### ● UI Components and Layout Details

#### 1. Header

- **Position:** Fixed at the top of the page.
- **Components:**
  - **Logo (Left):** Displays the application name or logo.
  - **User Profile Dropdown (Right):** Includes user-specific actions like settings, logout, and role-based actions.
  - **Notifications Icon:** Displays real-time updates and alerts for appointments, reminders, or messages.
  - **Emergency Contact:** Displays emergency contact information when this button is clicked.

## 2. Left - Sidebar (Role-Specific Navigation)

- **Position:** Vertical navigation bar on the left side.
- **Components:**
  - **Dashboard Link:** Default landing page showing an overview of key metrics (e.g., appointments, recommendations).
  - **For Patients:**
    - Schedule an Appointment
    - Set Reminders
    - Community
    - Online Resources
  - **For Professionals:**
    - Appointment Management
    - Collaboration Hub

## 3. Right - Sidebar

- **Position:** Vertical navigation bar on the right side.
- **Components:**
  - **Profile Tab:**
    - Editing Profile Details
    - Adding or Managing Medical Records (For Patients)
  - **Logout Button** (at the bottom of the sidebar for easy access).

- **Style Guide**

- **Color Palette:**
  - **Primary Colors:** Shades of blue and green to evoke trust and health (e.g., #007BFF, #28A745).
  - **Secondary Colors:** Light gray for backgrounds and muted tones for secondary elements.

- **Accent Colors:** Orange or red for critical alerts or error messages.
- **Typography:**
  - **Font Family:** Sans-serif fonts like Roboto or Open Sans for readability.
  - **Font Sizes:**
    - Headers: 24px (H1), 18px (H2), 16px (H3).
    - Body Text: 14px.
    - Buttons: 16px bold.
- **Buttons:**
  - Rounded corners with soft shadows.
  - Color-coded:
    - Primary Actions: Blue.
    - Secondary Actions: Gray.
    - Alerts: Red.

## ❖ Performance requirements, Design constraints

The performance requirements and design constraints for the project are as follows:

### 1) Design Requirements

- Scalability
  - Required to handle increasing numbers of users and data without degrading performance.
  - Should be capable of supporting horizontal and vertical scaling through Azure services such as Azure App Service and Azure Kubernetes Service (AKS).
- Modularity
  - Required to be modular to allow expansion and maintainability.
  - Backend and frontend components must work decisively by utilizing a RESTful API communication model.
- Usability
  - Interface should provide an easy-to-understand, responsive, and accessible experience implemented in recent JavaScript frameworks such as React.js, Angular, or Vue.js.
- Security

- User login and role-based access control must utilize secure token-based authentication (or JWT).
- All sensitive data, including credentials and medical records, must be encrypted during transmission (TLS) and at rest.
- Portability
  - Easily portable across environments by containerization using Docker.
  - Built on a platform-independent basis to allow deployment on cloud (Azure) and on-premises environments if needed.

## 2) Performance Requirements

- Response Time
  - Under normal load, an API call must return a response within 200ms, and under peak load conditions, within 500ms.
- Throughput
  - Must support 1000 concurrent users, having minimum latencies even at peak demands, while scaling on a need basis to allow 10,000 users.
- Availability
  - Must provide at least a 99.9% uptime based on Azure's enterprise-grade SLAs for services such as Azure Database for MySQL and AKS.
- Caching
  - Redis or Memcached should be utilized for reducing backend query load while boosting the response times of frequently accessed data.
- Error Handling
  - Must be able to handle errors in a graceful manner with concurrent requests into the range of 1000 requests per minute by returning meaningful error messages along with resource fallback mechanisms.
- AI/ML Model Performance
  - TensorFlow or PyTorch models should ensure that recommendations or predictions occur within one second of end-user queries.
- Database Performance
  - MySQL queries must be completed in 100ms or less, relying on connection pooling and query optimization.

### 3) Technical Tools

- Backend
  - Programming Language: Python
  - Framework: Django, Django Rest Framework
  - Database: MySQL
  - AI/ML: TensorFlow or PyTorch for machine learning models; spaCy or Hugging Face Transformers for NLP applications.
  - RabbitMQ or Azure Service Bus serves as the message broker in Celery for asynchronous tasks.
- Frontend
  - Framework: React.js, Angular, or Vue.js for responsive UI
  - Communication: Axios or Fetch API for REST APIs
- Deployment
  - Containerization: the stack includes Docker and Docker Compose.
  - Web Server: Gunicorn as a WSGI server and Nginx as a reverse proxy.
  - Cloud: the stack includes Microsoft Azure (with Azure App Services or AKS) to host and Azure Monitor to monitor its performance).
- Caching
  - Stack includes Redis or Memcached to cache rapidly accessed data.
- Version Control and CI/CD
  - Version Control: Git, collaboration via GitHub or Azure repos.
  - Tools: Azure DevOps or GitHub Actions for automated testing and deployment.
- Testing
  - Frameworks: Django's built-in test, pytest, pytest-django.
- Logging and Monitoring
  - Microsoft's Azure Monitor and Application Insights for real-time test and debugging.

### ❖ Further Details



## 1) Patient's Use Cases

- **Personalized Health Recommendations**

- **Purpose:** Tailor health advice to individual users based on their health history and preferences.
- **Actors:** Patients
- **Details:**
  - Offers tailored health advice based on user data (medical history) and preferences.
  - Can be accessed by patients by asking questions to the AI agent on the Home Page

- **AI-Powered Symptom Checker**

- **Purpose:** Allow users to self-assess their symptoms and receive guidance before consulting a doctor.
- **Actors:** Patients
- **Details:**
  - Provides probable diagnosis and advice based on symptoms entered by the user.
  - Can be accessed by patients by asking questions to the AI agent on the Home Page

- **Appointment Scheduling**

- **Purpose:** Simplify the process of booking and managing healthcare appointments.
- **Actors:** Patients
- **Details:**
  - Provides probable diagnosis and advice based on symptoms entered by the user.
  - Users can open the left sidebar to access the menu and click on the “Schedule an Appointment” Tab.
  - Users can choose from the available list of practitioners and then select an available slot to book their appointment.

- **Medical Records Management**

- **Purpose:** Provide secure storage and easy retrieval of personal medical data.
- **Actors:** Patients
- **Details:**
  - Enables patients to store and access their medical history and test results securely.
  - Users can open the right sidebar to access the menu and click on the Profile Tab.

- Users will be redirected to the Profile Page, where they can add and delete their medical records.
- **Medication Reminders**
  - **Purpose:** Ensure adherence to prescribed treatment plans.
  - **Actors:** Patients
  - **Details:**
    - Sends timely reminders to take prescribed medication.
    - Users can open the left sidebar to access the menu and click on the Set Reminders Tab.
    - Users can then add, delete, or modify reminders.
    - Once a reminder is sent, it goes into the notification section, which can be accessed by the “Bell Icon” in the NavBar from any tab.
- **Emergency Contact Integration**
  - **Purpose:** Enable quick access to help in critical situations.
  - **Actors:** Patients
  - **Details:**
    - Facilitates quick access to emergency contacts or nearest healthcare providers.
    - Users can access this by clicking the Emergency Contact button in the NavBar.

## 2) Healthcare Professional’s Use Cases:

- **Patient Records Management**
  - **Purpose:** Provide centralized access to patient data for diagnosis and treatment.
  - **Actors:** Doctors
  - **Details:**
    - Provides quick access to patient history, test results, and medical notes in a secure environment.
    - Healthcare advisors can access the patient records by clicking on the “Scheduled Appointments” tab on the left sidebar, which will show the patient records of the patient who has scheduled the appointment when clicked on the appointment.
- **Appointment Management**
  - **Purpose:** Help doctors organize their schedules effectively.
  - **Actors:** Doctors
  - **Details:**

- Allows doctors to manage, schedule, or reschedule patient visits efficiently.
  - Healthcare advisors can open the left sidebar and click the “Schedule Appointments” Tab to view and reschedule appointments.
- **Prescription Management**
  - **Purpose:** Facilitate efficient prescription generation and sharing.
  - **Actors:** Doctors, Patients.
  - **Details:**
    - Enables electronic prescription creation and sharing with patients.
    - Healthcare advisors can open the left sidebar, click the Community Tab, and select the person to send the reports and prescriptions directly.
- **Secure Data Sharing**
  - **Purpose:** Enable efficient collaboration with external organizations.
  - **Actors:** Doctors, External Organizations.
  - **Details:**
    - Facilitates secure transfer of patient information between professionals and organizations.
    - Healthcare advisors can open the left sidebar, click the Community Tab, and select the person to send the reports and prescriptions directly.