Software Requirements Specification Document

for

Electronic Health Record Monitoring System

Version 1.0 approved

Prepared by:

Priyanshu Rai
Satyam Mishra
Devendra Izardar
Pranay Ingle

Date : 04 May 2025

Table of Contents

1 Introduction

1.1 Purpose

The purpose of this document is to comprehensively define the functional and non-functional requirements for the **Electronic Health Record (EHR) Monitoring System** to be implemented in hospitals. This system is intended to serve as a centralized and integrated platform for managing all aspects of patient health information. It aims to streamline the collection, storage, retrieval, and sharing of electronic health records among authorized healthcare professionals, departments, and systems within the hospital infrastructure.

1.2 Document Conventions

- Requirements are numbered following the format: FR-XXX for functional requirements and NFR-XXX for non-functional requirements
- Priority levels: High (H), Medium (M), Low (L)
- Keywords are **bolded** for emphasis

1.3 Intended Audience and Reading Suggestions

This document is intended for:

- **Developers**: Focus on sections 2 and 3 for system requirements
- **Project Managers**: Review entire document for project scope
- **Stakeholders**: Focus on sections 1 and 4 for business objectives

1.4 Project Scope

The EHR Monitoring System will:

- Digitize patient health records
- Provide secure access to authorized medical personnel
- Enable real-time monitoring of patient vitals
- Generate reports and analytics
- Integrate with existing hospital systems

2 Overall Description

2.1 Product Perspective

The system will serve as a standalone application that interfaces with:

- Hospital Management Systems
- Laboratory Information Systems
- Pharmacy Management Systems
- Medical devices through IoT integration

2.2 Product Features

Key features include:

- Patient registration and profile management
- Electronic medical records management
- Prescription and medication tracking
- Appointment scheduling
- Analytics dashboard

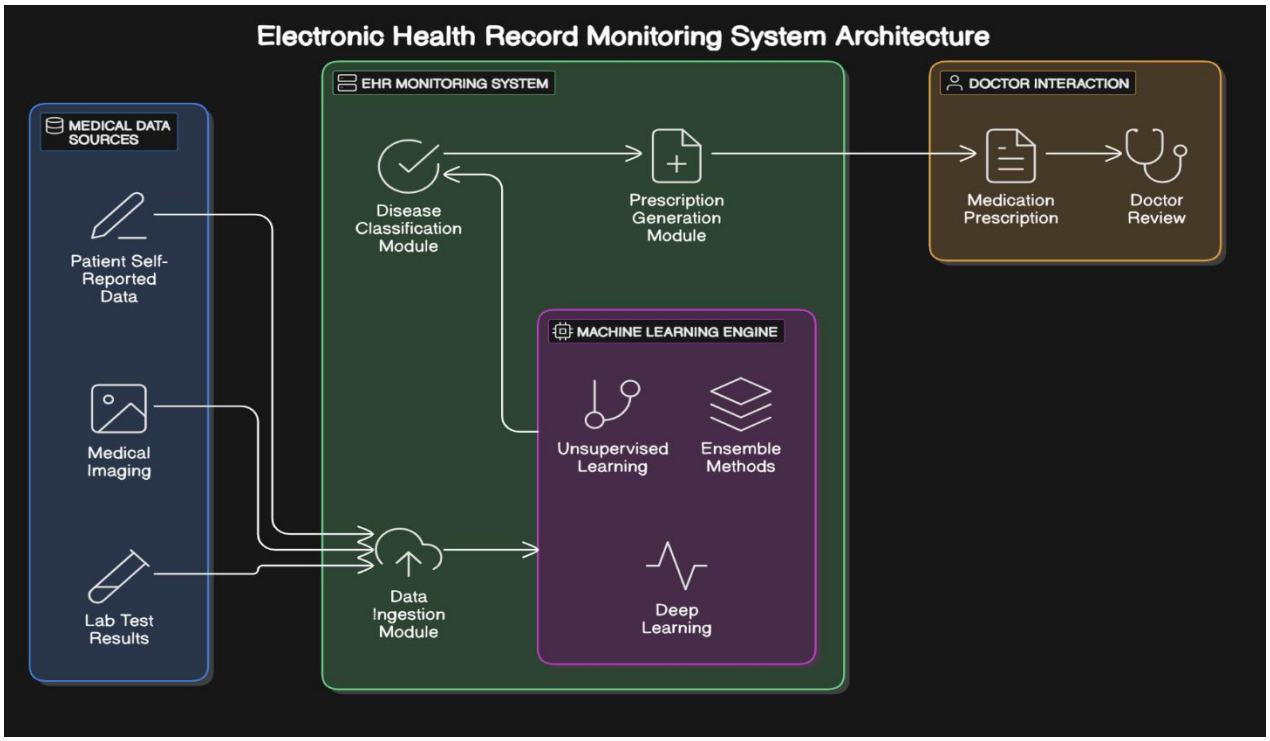
2.3 User Classes and Characteristics

- **Doctors**: Need full access to patient records and prescription authority
- **Nurses**: Need access to patient vitals and medication records
- **Administrators**: Need system configuration and user management access
- **Patients**: Need limited access to view their own records

2.4 System Architecture

The Electronic Health Record Management System follows a **modular, layered architecture** with the following components:

1. Medical Data Source Module
2. EHR Monitoring System
3. Machine Learning (ML) Module
4. Doctor Interaction



2.5 User Classes and Characteristics

- **Doctors**: Need full access to patient records and prescription authority
- **Nurses**: Need access to patient vitals and medication records
- **Administrators**: Need system configuration and user management access
- **Patients**: Need limited access to view their own records

2.6 Use Case Diagram

The use case diagram below provides a visual representation of how different user roles interact with the Electronic Health Record (EHR) Monitoring System.

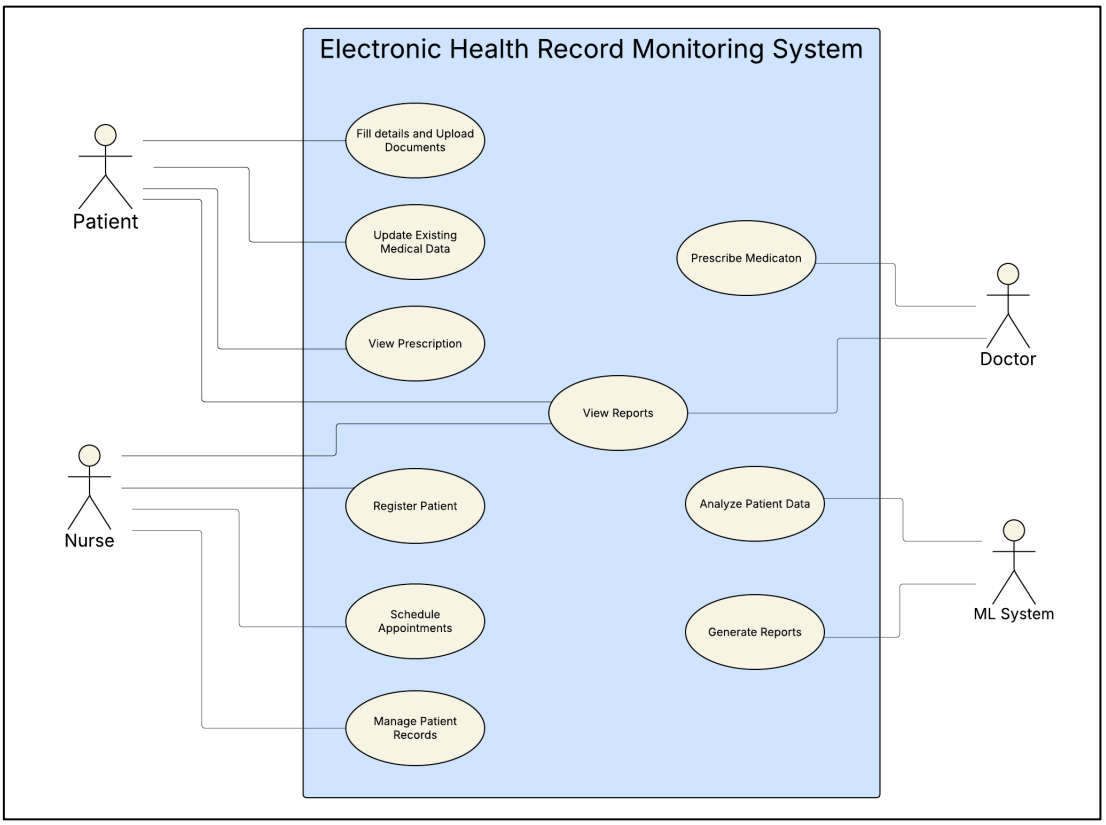


Figure 1: Use Case Diagram for EHR Monitoring System

Actors :

1. Patients
2. Doctors
3. Nurses
4. Administration System/ML System

2.7 Operating Environment

- **Server**: Linux/Windows Server, MySQL/PostgreSQL
- **Client**: Web browsers (Chrome, Firefox, Edge), Mobile apps (iOS/Android)
- **Network**: Secure hospital intranet with VPN access

3 System Features and Requirements

3.1 Functional Requirements

- **FR-001:** The system shall allow authorized medical staff to create and update patient records.
- **FR-002:** The system shall maintain a complete history of all patient interactions, including doctor notes, prescriptions, lab reports, and diagnoses.
- **FR-003:** The system shall generate real-time alerts for abnormal vital signs based on predefined thresholds.
- **FR-004:** The system shall support role-based access control to ensure appropriate data visibility and modification rights.
- **FR-005:** The system shall enable doctors to electronically prescribe medications and automatically notify the pharmacy system.
- **FR-006:** The system shall allow integration and data synchronization with third-party laboratory and diagnostic systems.
- **FR-007:** The system shall enable scheduling and management of patient appointments, including reminders.
- **FR-008:** The system shall log all user activity for auditing purposes, including login, access, and modification events.
- **FR-009:** The system shall support emergency access mode for authorized staff during critical situations, bypassing usual access controls with justification logging.

3.2 Non-Functional Requirements

- **NFR-001: Regulatory Compliance**
  The system must follow HIPAA and other healthcare data protection rules.
- **NFR-002: System Availability**
  The system must have at least 99.95% uptime each month, not counting scheduled maintenance.
- **NFR-003: Scalability and Concurrent Usage**
  The system must support at least 1000 users at the same time without slowing down and be able to grow in the future.
- **NFR-004: Data Security**
  All sensitive and patient data must be encrypted both when stored and during transfer, using standard methods like AES-256 and TLS 1.2 or higher.

- **NFR-005: Performance Response Time**
  For 95% of user actions, the system should respond in under 2 seconds under normal conditions.
- **NFR-006: Backup and Disaster Recovery**
  The system must take daily automatic backups. In case of failure, it should recover within 4 hours and not lose more than 1 hour of data.
- **NFR-007: Audit Logging and Monitoring**
  The system must keep logs of all user access and data changes for at least one year.
- **NFR-008: System Maintainability**
  Routine updates and maintenance should be possible with less than 15 minutes of downtime.
- **NFR-009: Accessibility Compliance**
  The system should be usable by people with disabilities and follow WCAG 2.1 AA standards.
- **NFR-010: Browser and Device Compatibility**
  The system must work well on all major browsers (Chrome, Firefox, Safari, Edge) and on desktops, tablets, and phones.

4. External Interface Requirements

4.1 User Interfaces

- Web-based dashboard with responsive design
- Mobile application for on-the-go access
- Administrative console for system management
- Role-specific views for doctors, patients, and admins
- Integrated chat feature for doctor-patient communication

4.2 Hardware Interfaces

- Integration with medical devices via HL7/FHIR standards
- Barcode scanners for patient identification
- Support for biometric devices (fingerprint, retina) for secure login
- Smart card reader integration for patient health ID access

4.3 Software Interfaces

- REST API for integration with other hospital systems
- HL7/FHIR compatibility for health data exchange
- Integration with cloud storage APIs for large data handling
- Support for third-party analytics and reporting tools

5. Other Non-Functional Requirements

5.1 Performance Requirements

- Response time for record retrieval ≤ 2 seconds
- System should handle 1000 transactions per minute
- System uptime should be at least 99.9%
- Support concurrent access by 500+ active users

5.2 Security Requirements

- Multi-factor authentication for sensitive operations
- Regular security audits and penetration testing
- Data backup and disaster recovery procedures
- End-to-end encryption for all patient records in transit and at rest
- Access logging and real-time intrusion detection system

4 Other Requirements

4.1 Appendices

A. Glossary of Terms

- EHR: Electronic Health Record
- HIPAA: Health Insurance Portability and Accountability Act
- HL7: Health Level Seven International (interoperability standard)
- FHIR: Fast Healthcare Interoperability Resources
- WCAG: Web Content Accessibility Guidelines
- IoT: Internet of Things
- TLS: Transport Layer Security

B. References

- HIPAA: https://www.hhs.gov/hipaa/index.html
- HL7 Standards: https://www.hl7.org/implement/standards/
- FHIR: https://www.hl7.org/fhir/
- WCAG 2.1: https://www.w3.org/TR/WCAG21/