Indian Institute of Technology Hyderabad (IIT)

Software Engineering [CS4443]

Software Requirements Specification (SRS) for MASS (Medical Access Service System)

Submitted by:

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1. Introduction

1.1 Purpose

MASS (Medical Access Service System) is a comprehensive healthcare management platform designed to streamline and automate patient care, doctor-patient interactions, and hospital administration. It provides a centralized system for scheduling appointments, maintaining medical records, and managing hospital resources, ensuring a seamless experience for patients, doctors, and hospital staff.

1.2 Scope

In Scope:

- Login/Signup for patients, doctors, and hospital administrators.
- Doctors can create, edit, and manage their profiles, including specialization, availability, and hospital affiliations.
- Patients can schedule, modify, and cancel appointments based on doctor availability.
- The system will provide functionality for managing patient profiles, including medical history, prescription uploads, test reports, and personalized health records.
- Real-time notifications for patients regarding appointment reminders, medication schedules, and health alerts.
- Hospital administrators can update patient records, including dietary plans, exercise recommendations, and treatment notes.
- Hospital administrators can manage availability, doctor shifts, medical equipment, and medicine inventory.
- The system will protect patient data, implementing role-based access control to ensure appropriate permissions for different users.

Out of Scope:

- Doctor salary management is not included in the system.
- Automated patient-doctor matching based on medical history is not part of the current scope.

1.3 Acronyms and Abbreviations

- **MASS**: Medical Access Service System
- **SRS**: Software Requirements Specification
- **WWW**: World Wide Web
- **GUI**: Graphical User Interface

1.4 Overview

This SRS document is divided as follows:

• **Section 2 :** provides an in-depth understanding of the overall description, including the product perspective, user classes, and operating environment.
• **Section 3 :** features the software is expected to deliver
• **Section 4 :** Future extensions of the software
• **Section 5 :** Description of user screens

2. Overall Description

2.1 Product Perspective

MASS is designed as a web and mobile application to facilitate seamless communication and management between patients, doctors, and hospital administrators. The platform ensures easy accessibility and high security for managing medical information and appointments. The system will be developed as a cloud-based solution with high availability and scalability.

2.2 Product Functions

- **User Authentication**: Secure login/signup for patients, doctors, and hospital administrators.
- **Doctor Management**: Doctors can manage their profiles, update availability, and view patient history.
- **Appointment System**: Patients can book, modify, or cancel appointments.
- **Patient Record Management**: Secure storage of medical history, prescriptions, and reports.
- **Hospital Administration**: Manage doctor shifts, medical resources, and inventory.
- **Notification System**: Real-time alerts for appointments, medication schedules, and hospital updates.

Use cases related to	**Use cases**	**Description of use cases**
System Authorization	Login	Login as Patient/Doctor/Admin
	SignUp	Sign up as Patient/Doctor/Admin
	Logout	Logout securely from the system
Profiles	Create profile	Fill in patient, doctor, or admin details

	Edit profile	Update personal or professional details
Appointments (Patient and administrator side)	Book Appointment	Patients can book appointments based on doctor availability provided by the administrator
	Cancel Appointment	Cancel an appointment by administrator in case of conflict or by patient
Medical Records Management	View Medical History	Patients update their medical history in profile
	Manage Prescriptions	Administrator can manage patients prescription provided by doctors
Doctor	Profile management	Doctors manage their profiles, update availability
	Access Patient profiles	Doctors can access profile only of patients assigned to them
Hospital Administration	Equipment Management and service availability	Track availability of procedures, services and medical equipment
	Record management	Administrator updates Lab test result and modify prescriptions in a secure way
Notifications (Patient side)	Medication Reminders	Receive alerts for medicine intake schedules
	Appointment Reminders	Notifications for upcoming doctor visits
Calendar Management (Administrator side)	Create Event	Creates, updates, or deletes hospital events or health camps
	View Calendar	Calendar allows viewing events by date, category, and participants
	Notify Events	Adds the event to the hospital calendar and notifies relevant

		users (doctors, staff, patients, etc.)

2.3 User Characteristics

2.3.1 Patients

- Individuals seeking medical consultation.
- Should be familiar with basic web and mobile applications.
- Can book, reschedule, and cancel appointments.
- Can upload and access medical records.

2.3.2 Doctors

- Registered medical professionals managing patient consultations.
- Can update availability and view patient history.
- Can provide digital prescriptions and treatment plans.

2.3.3 Hospital Administrators

- Responsible for hospital resource management.
- Can update doctor schedules and hospital inventory.
- Can manage patient records and notify patients of updates.

2.4 Operating Environment

2.4.1 Software Environment

- **Frontend Technology**: React Native for mobile applications.
- **Backend Technology**: Node.js with Express.js (alternative: Django for security-focused development).
- **Database**: PostgreSQL for structured data storage; MongoDB for unstructured patient notes.

2.4.2 Network Environment

- Requires an internet connection for real-time updates and notifications.
- Deployed on cloud platforms like AWS, Google Cloud, or Azure.

2.4.3 Browser Compatibility

- Google Chrome (latest version)
- Mozilla Firefox (latest version)
- Apple Safari (latest version)
- Microsoft Edge (latest version)

2.4.4 Mobile Compatibility

- The system will be designed as a mobile-first application with cross-platform compatibility.
- Android and iOS applications will be available with full functionality.

3. Specific Requirements

3.1 Functional Requirements

3.1.1 Use Cases for Hospital

Use case 1: Hospital Registration and Document Verification

Primary Actor: Hospital Administrator
Precondition: The hospital must provide valid documents for verification.
Main Scenario:

1) The hospital administrator accesses the MASS registration portal.
2) The system asks the administrator to enter hospital details (name, location, contact information, and type of services provided).
3) The administrator provides the necessary details.
4) The system requests the administrator to upload verification documents (hospital license, accreditation certificates, etc.).
5) The administrator uploads the required documents.
6) The system verifies the submitted details and documents.
7) Upon successful verification, the system creates a hospital account and assigns admin credentials.
8) The administrator receives confirmation and login details via email/SMS.

Alternate Scenario:
6(a). Document verification fails.
6(a) 1. The system notifies the administrator of the failed verification.
6(a) 2. The administrator is asked to re-upload valid documents.
6(a) 3. The registration request is rejected if the administrator fails to submit valid documents within a specified period.

Use case 2: Hospital profile management

Primary Actor: Hospital Administrator

Precondition: The hospital must be registered in the MASS system, and the administrator must have valid login credentials.

Main Scenario:

1) The hospital administrator logs into the MASS system.
2) The system displays the hospital dashboard with profile management and report, appointment management options.
3) The administrator accesses the Hospital Profile Management section.
4) The system allows the administrator to update hospital details, such as:
   - Contact information
   - List of available services, procedures
   - Equipment and resource availability
   - Doctors information
5) The administrator saves the updated hospital profile.
6) The system updates the hospital profile and reflects the changes in the system for doctors and patients.
7) The administrator navigates to the Reports & Analytics section.
8) The system generates reports on:
   - Patient inflow and appointment statistics
   - Hospital resource usage
   - Doctor availability and workload
   - Administrative logs

Alternate Scenario:

1(a) Logging into the system fails

1(a) 1. The system notifies the administrator of incorrect credentials.

1(a) 2. The administrator is asked to re-enter the correct login details or provide an option for password recovery.

8(a). Report generation fails due to insufficient data.

8(a) 1. The system notifies the administrator about missing or incomplete data.

8(a) 2. The administrator ensures proper data entry and tries again.

Use case 3: Appointment management

Primary Actor: Hospital Administrator

Precondition: The hospital must be registered in the MASS system, and the administrator must have valid login credentials.

Main Scenario:

1) The hospital administrator logs into the MASS system.

2) The system displays the hospital dashboard with profile management and report, appointment management options.
3) The administrator accesses the Appointment Management section.
4) The administrator reviews and manages:
   - Incoming appointment requests from patients.
   - Available slots for doctors.
5) The administrator approves, modifies, or rejects appointment requests as needed.
6) The system updates the appointment schedule accordingly.
7) The system automatically notifies doctors and patients about the updated appointment status via in-app notifications.

Alternate Scenarios:

5(a). Administrator attempts to modify a slot that is already booked.

5(a) 1. The system prevents the modification and alerts the administrator about the conflict.

5(a) 2. The administrator must manually notify affected users (patients and doctors) if rescheduling is required.

5(a) 3. If rescheduling is needed, the administrator can cancel the appointment and suggest an alternative slot.

5(a)4. The system updates the appointment status and notifies all affected parties.

5(b). Administrator tries to approve an appointment for a doctor who is unavailable.

5(b) 1. The system alerts the administrator about the scheduling conflict.

5(b) 2. The administrator can assign the appointment to an available doctor or notify the patient to choose another slot.

Use Case 4: Patient-Doctor Record Management

Primary Actor: Hospital Administrator

Precondition: The hospital must be registered in the MASS system, and doctors must be assigned to patients.

Main Scenario:

1) The hospital administrator logs into the MASS system.
2) The system displays the Patient-Doctor Record Management section.
3) The administrator assigns patients to doctors based on their medical condition, department, or appointment history.
4) The system stores and maintains records of:
   - Patient details (name, age, contact, medical history)
   - Assigned doctor (name, specialization, availability)
   - Ongoing treatments and diagnosis
   - Upcoming and past appointments
5) The administrator updates patient assignments when a patient is referred to another doctor or department.

6) The system automatically updates the doctor's patient list and notifies the doctor and the patients.

Use Case 5: Patient Medical Records Management

Primary Actor: Hospital Administrator
Precondition: The hospital must be registered in MASS, and patient records must be maintained following the regulations.
Main Scenario:

1) The hospital administrator logs into the MASS system.
2) The system displays the Medical Records Management section.
3) The administrator retrieves and updates patient records, including:
    - Past medical history
    - Current diagnoses and treatments
    - Lab test results
    - Allergies and dietary restrictions
4) The administrator updates prescriptions based on doctors' instructions, including:
    - Adding new medications
    - Modifying dosages
    - Discontinuing old prescriptions
5) The system automatically notifies patients about prescription updates via in-app notifications and SMS.
6) The system ensures data security and access control, allowing only authorized personnel to view/edit records.

Use Case 6: Calendar Management for Events and Appointments

Primary Actor: Hospital Administrator
Precondition: The hospital must be registered in the MASS system, and users must have valid login credentials.
Main Scenario :
The hospital administrator logs into the MASS system.

1) The system displays the Calendar Management section.
2) The administrator creates, updates, or deletes hospital events (e.g., health camps, awareness programs, staff meetings).
3) The administrator also adds appointments so the doctor and patient get notified about it.
4) The system adds the event to the hospital calendar and notifies relevant users (doctors, staff, patients, etc.).
5) The calendar allows viewing events by date, category, and participants.

Alternate Scenarios:
4(a). Doctor is unavailable for a booked appointment.
    4(a) 1. The system alerts the administrator and the patient.
    4(a) 2. The patient is given rescheduling options.

7. Use Case 7: Doctor Information Management

Primary Actor: Hospital Administrator
Precondition:

- The hospital must be registered in the MASS system, and the administrator must have valid login credentials.

Main Scenario:

1) The hospital administrator logs into the MASS system.
2) The system displays portions for doctor information management.
3) The administrator selects the option to create a new doctor profile.
4) The system prompts the administrator to enter the doctor's details, including:
    - Personal information (name, contact details, etc.)
    - Specialization and experience
    - Medical license and certification details
5) The administrator provided the necessary information and documents.
6) Upon successful verification, the system generates login credentials for the doctor.
7) The system sends the credentials to the doctor via email/SMS
8) After the verification is successful, the administrator approves the doctor's registration.

3.1.2 Use Cases for Patients

Use Case 1: Patient Registration and Profile Setup

Primary Actor: Patient
Precondition: The patient must have a valid email or phone number for account creation.
Main Scenario:

1. The patient accesses the MASS registration portal.
2. The system prompts the patient to enter personal details (name, age, gender, contact information, address, and emergency contact).
3. The patient provides the required information.
4. The system requests the patient to upload identification documents (e.g., government ID).
5. The patient uploads the documents.
6. The system verifies the submitted details.
7. Upon successful verification, the system creates the patient account.
8. The patient receives confirmation and login credentials via email/SMS.

Alternate Scenarios:

6(a). Document verification fails.

1. The system notifies the patient of the failed verification.
2. The patient is asked to re-upload valid documents.
3. The registration request is rejected if valid documents are not provided within a specified period.

Use Case 2: Patient Profile Management

Primary Actor: Patient
Precondition:
The patient must be registered in the MASS system and have valid login credentials.
Main Scenario:

1. The patient logs into the MASS system.
2. The system displays the patient dashboard with options for profile management, appointments, and medical history.
3. The patient accesses the Profile Management section.
4. The system allows the patient to update:
    - Contact information
    - Emergency contact details
    - Preferred hospitals
    - Medical conditions and allergies
5. The patient saves the updated profile.
6. The system updates the profile and reflects changes across the platform.

Alternate Scenario:

1(a). Logging into the system fails.

1. The system notifies the patient of incorrect credentials.
2. The patient is prompted to re-enter credentials or reset the password.

Use Case 3: Choosing Hospitals and Service

Primary Actor: Patient
Precondition: The patient must be registered and logged into the MASS system.
Main Scenario:

1. The patient logs into the MASS system.
2. The system displays the list of hospitals and doctorsThe system ensures data security and access control, allowing only authorized personnel to view/edit records..
3. The patient applies filters (specialization, availability, location, ratings) to find suitable options.
4. The patient selects a preferred hospital and service they are looking for.
5. The system saves the selection for future reference.
6. The patient can directly book appointments based on their chosen preferences.

Alternate Scenario:

4(a). The selected doctor is unavailable.

1. The administrator notifies the patient about unavailability.
2. The patient chooses another doctor from the available list.

Use Case 4: Appointment Booking

Primary Actor: Patient
Precondition: The patient must be registered and logged into the MASS system.
Main Scenario:

1. The patient logs into the MASS system.
2. The system displays the appointment booking section.
3. The patient selects service.
4. The system provides available appointment slots provided by the administrator.
5. The patient selects the slot and confirms the booking.
6. The administrator confirms the appointment schedule.
7. The patient and doctor receive appointment confirmations via notifications and SMS.

Alternate Scenarios:

5(a). The selected slot is no longer available.

1. The administrator notifies the patient about the conflict.
2. The patient selects an alternative available slot provided by the administrator of that hospital.

5(b). The patient wants to reschedule the appointment.

1. The patient reaches the administrator to reschedule the appointment.
2. The administrator provides alternative slots.
3. The patient selects a new slot and confirms.
4. The administrator updates the appointment and notifies the doctor.

Use Case 5: Viewing and Managing Medical Records

Primary Actor: Patient
Precondition:
The patient must be registered in the MASS system, and medical records must be available.

Main Scenario:

1. The patient logs into the MASS system.
2. The system displays the Medical Records section.
3. The patient accesses their medical records, which include:
    - Past medical history
    - Current diagnoses and treatments
    - Lab test results
    - Allergies and prescriptions
4. The patient reviews and downloads medical reports if needed.
5. The system ensures data security, allowing access only to authorized users like hospital administrators.

Alternate Scenarios:

4(a). No medical records are found.

1. The system notifies the patient of missing records.
2. The patient contacts the hospital to update records.

Use Case 6: Receiving Notifications

Primary Actor: Patient
Precondition: The patient must be registered in the MASS system.
Main Scenario:

1. The patient logs into the MASS system.
2. The system enables notification settings for:
    - Appointment reminders or updates
    - Prescription updates
    - Hospital events and health checkups
3. The patient receives timely notifications via in-app alerts, email, and SMS.
4. The patient can acknowledge or take necessary actions based on notifications.

Alternate Scenarios:

3(a). The patient disables notifications.

1. The system stops sending non-essential alerts.
2. Critical alerts (e.g., emergency notifications) remain active.

Use Case 7: Managing Diets and Prescriptions

Primary Actor: Patient
Precondition: The patient must have an active medical record in the system.
Main Scenario:

1. The patient logs into the MASS system.
2. The system displays the Diet and Prescription Management section.
3. The patient views:
    - Prescribed medications and dosages
    - Recommended dietary guidelines
4. The system allows the patient to:
    - Set reminders for medication intake
5. The administrator updates prescription details based on doctor instructions.
6. The patient receives notifications for prescription changes and upcoming medication schedules.

Alternate Scenarios:

5(a). The prescription update fails.

1. The system notifies the patient of an update failure.
2. The patient contacts the hospital or doctor for clarification

3.1.3 Use Cases for Doctors

Use Case 1: Doctor Profile, Authenticating and Logging into the System

Primary Actor: Doctor

Precondition: The doctor must have valid credentials and licensing information.
Main Scenario:

1. The doctor accesses the MASS system (registration or login portal).
2. While registering, the system prompts the doctor to enter personal and professional details (name, specialization, license number, contact information, affiliated hospitals/clinics) and upload necessary documents (e.g., medical license, hospital affiliation letter). → done by the hospital admin no?
3. The doctor provides the required information and uploads the documents.
4. The system via the administrator of the hospital verifies the submitted details.
5. If verification is successful, the system creates the doctor's account, and login credentials are sent via email/SMS.
6. The doctor logs into the MASS system using their credentials.
7. The system displays the doctor dashboard with options for profile management, appointments, and patient records.
8. The doctor accesses the Profile Management section and updates details like:
    - Contact information
    - Specializations
    - Availability for consultations
9. The doctor saves the updated profile.
10. The system updates the profile and reflects changes across the platform.

Alternate Scenarios:

3(a)Document verification fails:

1. The system notifies the doctor of the failed verification.
2. The doctor is asked to re-upload valid documents.
3. The registration request is rejected if valid documents are not provided within a specified period.

6(a) Login failure:
1. The system notifies the doctor of incorrect credentials.
2. The doctor is prompted to retry login or reset the password.

Use Case 2: Accessing Only Assigned Patient Profiles

Primary Actor: Doctor
Precondition: The doctor must be assigned to a patient to access their profile.
Main Scenario:

1. The doctor logs into the MASS system.
2. The system displays the list of assigned patients.
3. The doctor selects a patient to view their medical history, test results, and treatment plans.
4. The system ensures that the doctor can access only assigned patient data.

Alternate Scenarios:

3(a). The doctor tries to access an unauthorized patient profile.

1. The system denies access and notifies the doctor that they are not assigned to this patient.
2. The doctor is redirected to their assigned patient list.

Use Case 3: Managing New Appointments

Primary Actor: Doctor
Precondition: The doctor must be registered and have an active schedule in the MASS system.
Main Scenario:

1. The doctor logs into the MASS system.
2. The system displays the upcoming appointments.
3. The doctor reviews the list of scheduled consultations.
4. The administrator confirms, reschedules, or cancels appointments for doctors based on their availability.
5. The administrator updates the appointment status and notifies the patient of any changes.

Alternate Scenarios:

4(a). The doctor is unavailable for an appointment.

1. The doctor selects a reschedule or cancellation option.
2. The administrator provides available alternative slots.
3. The administrator confirms the changes.
4. The system updates the appointment which notifies the patient and the doctor.

Use Case 4: Managing and Issuing Prescriptions

Primary Actor: Doctor
Prescription:
The doctor must be assigned to the patient and have permission to issue prescriptions.
Main Scenario:

1. The doctor logs into the MASS system.
2. The system displays the list of assigned patients.
3. The doctor selects a patient and reviews their medical history.
4. The doctor prescribes medications and provides dosage instructions to patients manually and also provides details to the administrator.
5. The administrator updates the prescription and the patient's medical records to the system.
6. The patient is notified of the new prescription.
7. Doctors can view the prescription from the patient's profile too.

Alternate Scenarios:

5(a) Prescription updates fail

1. Doctor himself can ask the administrator to update the prescription.

Implementation phases:

The implementation of the MASS system will be divided into two phases to ensure a smooth development:

Phase 1: Core Functionalities

This phase focuses on the essential features required for the initial deployment of the system, ensuring the basic workflow of the hospital is streamlined.
Features included:

1) Hospital registration and hospital profile management
2) Doctor information management
3) Appointment management
4) Doctor-patient information management

Phase 2: Advanced Functionalities

This phase introduces additional features that enhance system efficiency, provide better insights, and improve overall hospital management.
Features included:

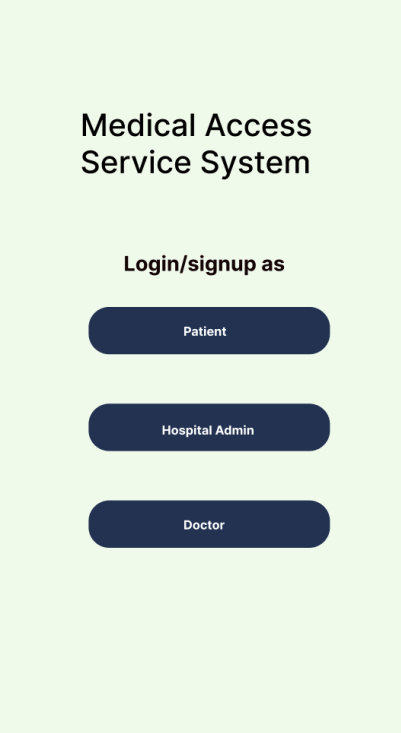
1) All the alternate scenarios
2) Patient medical record management
3) Calendar and notifications

Future Improvements

The following are the features that can be implemented in our system in the future:

- Hospitals will be able to request and share patient records and facilitate cross-hospital consultations.
- An emergency services module, with ambulance booking and tracking, can be implemented.
- Patients can make online purchases of medicines based on prescriptions and also request delivery.
- The system will maintain detailed records of hospital staff, including doctors, nurses, technicians, and administrative personnel, and also the equipment available in the hospital.
- Implement a verification process where a system administrator reviews and approves hospital registrations before they can access the system.

APPENDIX


Medical Access
Service System
Login/signup as
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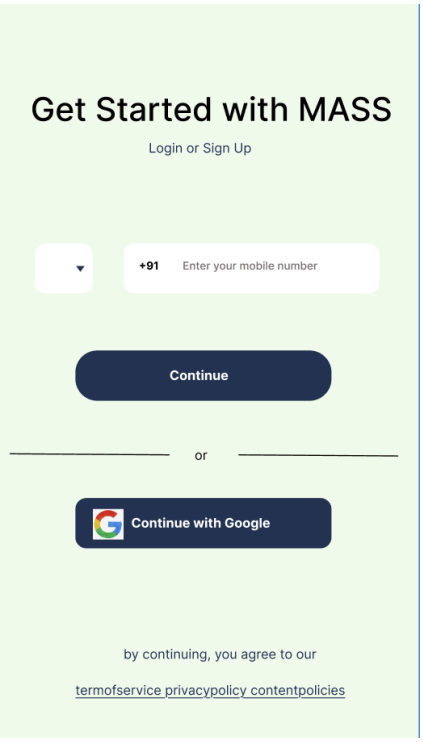
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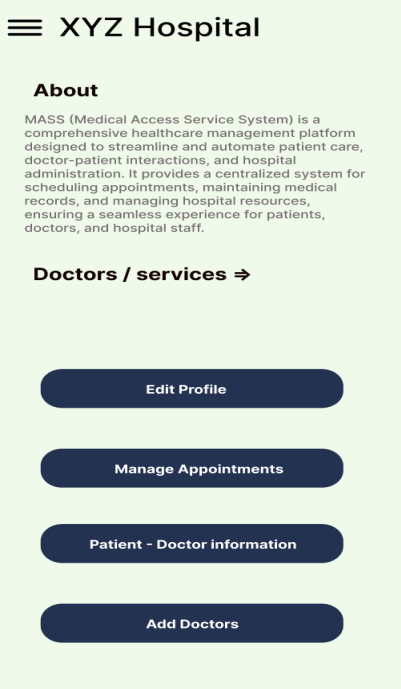
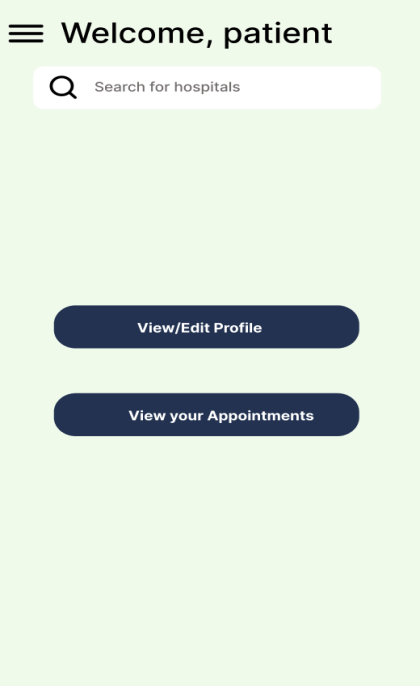
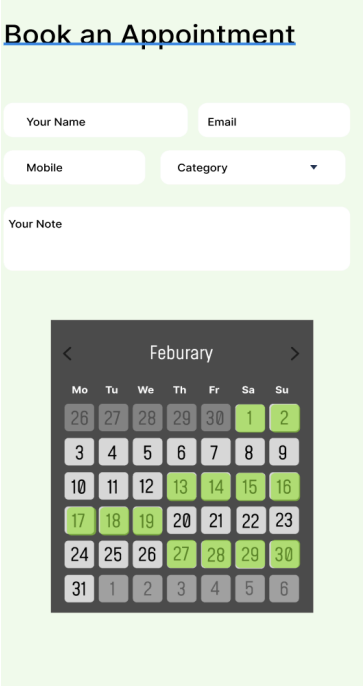

XYZ Hospital
About
MASS (Medical Access Service System) is a comprehensive healthcare management platform designed to streamline and automate patient care, doctor-patient interactions, and hospital administration. It provides a centralized system for scheduling appointments, maintaining medical records, and managing hospital resources, ensuring a seamless experience for patients, doctors, and hospital staff.
Doctors / services ⇒
Edit Profile
Manage Appointments
Patient - Doctor information
Add Doctors


Welcome, patient
Search for hospitals
View/Edit Profile
View your Appointments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