Software Requirements Specification

for

E-Vaidya

Version 1.1

Prepared by

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Revisions

Version	Primary Author(s)	Description of Version	Date Completed
Initial Draft (v1.0)	Debuggers	Initiated the document. Added all the necessary details.	27/01/23
Final(v1.1)	Debuggers	GUI of initial document updated, some rectifications also done	23/04/23

1 Introduction

1.1 Product Scope

Our project aims to automate the working of the Health Center. Currently, the entire medical history of the Students is maintained in their individual health booklets. Prescriptions of medicines and vitals' measurements are noted on the same. This entire record is handled manually and is paper based. Due to this, the Students have to carry the health booklet each and every time he/she visits the HC. Apart from that the appointment

system, even though currently accessible through the OA portal, lacks user-friendliness as well as an integrated system.

We aim to solve these problems through the software we are developing. Our software provides an intuitive and portable web-based interface which can be accessed from all devices. It allows Patients to book appointments and view their medical records and eliminates the need to maintain a paper-based health booklet. It also provides an easy interface for Doctors to view the entire medical history of the Patient and easily prescribe treatment, thus simplifying and digitising the entire process of obtaining treatment at the HC.

1.2 Intended Audience and Document Overview

This document is intended to facilitate interested parties to get a detailed overview of the planned model for our software. It includes the user requirements as collected by the team through interviews conducted with Doctors and Receptionists of the HC. It also includes the corresponding specifications for the system to fulfill those requirements.

- Section 2 consists of an overall description of the design of our system. This section is mainly targeted towards the project managers and the developers as it specifies the design on a High level.

- Section 3 contains the technical requirements of our system. This section, which offers comprehensive information about the interfaces used in the system's creation, needs to be paid close attention by developers. The project managers might also find this section helpful for managing the project team. Additionally, the writers of the documentation should take additional care when crafting this section as even a small mismatch in the details can result in a poorly constructed product.

- Section 4 consists of all the other non-functional requirements and specifications of the software. This section is mainly aimed at the testers and users of the software so that they can understand the expected behaviour of the system in terms of non-functional requirements.

1.3 Definitions, Acronyms and Abbreviations

API	Application Programming Interface
CSS	Cascading Style Sheets
GUI	Graphical User Interface
HC	Health Centre, IIT Kanpur
HTML	Hypertext Markup Language
HTTP	Hypertext Transfer Protocol
IITK	Indian Institute of Technology, Kanpur
OA	Office Automation, IIT Kanpur
OPD	OutPatient Department
SRS	Software Requirement Specification

We have used Student and Patient interchangeably in the document

1.4 Document Conventions

- Arial font size 11 has been maintained throughout the text.
- The document text is single spaced and 1” margin has been maintained throughout the document.
- Italics have been used for writing comments.

1.5 References and Acknowledgments

- All the specific details regarding the appointment booking system currently in place at the HC were discussed with the HC Reception staff.

- The already existing features in the OA HC Management Software were discussed with the HC staff.

- We would like to thank Dr. Rakesh Mishra, Medical Officer at HC, who helped us with specifics regarding the Doctor’s interface and discussed the general idea of the software.

- We would like to acknowledge the help of our instructor Dr. Indranil Saha in guiding us through the process of making this document.

2 Overall Description

2.1 Product Overview

This is a standalone software which maintains its own database of Patients and uses a pre-existing database of HC staff with option for login and registration. It is an improvement over the currently existing appointment booking system maintained by OA and can be considered as a healthy replacement of the currently running health booklet system. This software is not part of any larger system or will not be merged with any other larger software of similar functionality in the foreseeable future. The purpose of the product is to digitise many facets of the HC's operations as they are currently – including Patient prescriptions and medical information (all contained in an all-too-easily misplaced booklet, currently), Doctor appointment and scheduling systems (which, though already semi-digitised, are difficult to use and obscure).

2.2 Product Functionality-

The major functions of the system being developed, sorted according to the type of user include:

1. Patient:
    a. User registration
    b. Users can schedule appointments and view previous appointments
    c. The Patient can view which Doctors are on duty
    d. The Doctor and Patient can view the Patient's medical record which will be updated by the Doctor during the appointment

2. Doctor:
    a. The Doctor can view all the scheduled appointments for the current shift/day and select an appointment and view the complete medical history of the Patient.
    b. He/she can also assign diagnostics and tests, as well as prescribe medicines to the Patient.

3. Pharmacy:
    a. The Pharmacist can view the prescriptions received from the Doctor and issue necessary medicines to the Patient.

4. Reception:
    a. The Receptionist can manage all appointment requests and allot the Patients to Doctors.
    b. Has the ability to view schedules of all Doctors and assign Doctors to shifts.
    c. Has the ability to upload medical reports of the Patient.

5. Nurse:
    a. The Nurse can add the measured vitals.

2.3 Design and Implementation Constraints

- Memory Requirements:
  As the user would have to upload medical reports, there needs to be a dedicated storage space in the server to store the necessary documents.

- Conventions and Programming Requirements:
  Since the software would be maintained by people other than the developers, so Object Oriented Programming Paradigm is to be used to enhance the software's maintainability.

- Security Considerations:
    - Usage of IITK email-based authentication for user registration to ensure that only legitimate users can register into the system.
    - We will store the salted hash of the passwords of the users instead of storing the passwords directly to address security concerns.

  - Depending on the type of user, different levels of privileges will be granted with respect to the ability to access the medical history and other sensitive personal information.

- Tools, Languages and Databases:
  - MongoDB is to be used to handle the large amount of data associated with the users.
  - jQuery is to be used to perform various logical decision-making operations associated with the backend.
  - We will be using Express.js to enhance performance and satisfy timing constraints.
  - We plan to use React, HTML, CSS and JavaScript to ensure that the website has a user-friendly, responsive and portable GUI.

- Communication Protocols:
  - We plan to use the HTTP protocol to communicate between servers.

2.4 Assumptions and Dependencies

The major assumptions and dependencies which may affect the design of our project include:

1. We assume that the smaller dummy database which we shall use to perform the testing and development of our project is sufficiently close to the actual database on which the product will depend.

2. We assume that the any valid requests for appointment are not rejected by the reception due to sufficient availability of Doctors.

3. We assume that an already existing HC database of staff members can be accessed for profile management and regulating access control of HC staff, and to assign correct roles to different staff members.

4. We assume that all users of the software have a unique ID in the form of Roll number or PF number.

Software Dependencies:

1. We will be using Bootstrap v-5 for CSS styling.
2. We will be using some additional JavaScript libraries for adding animation to the website.
3. We will be using some REST APIs for sign-in
4. We plan to use JWT API for secure authentication.

3 Specific Requirements

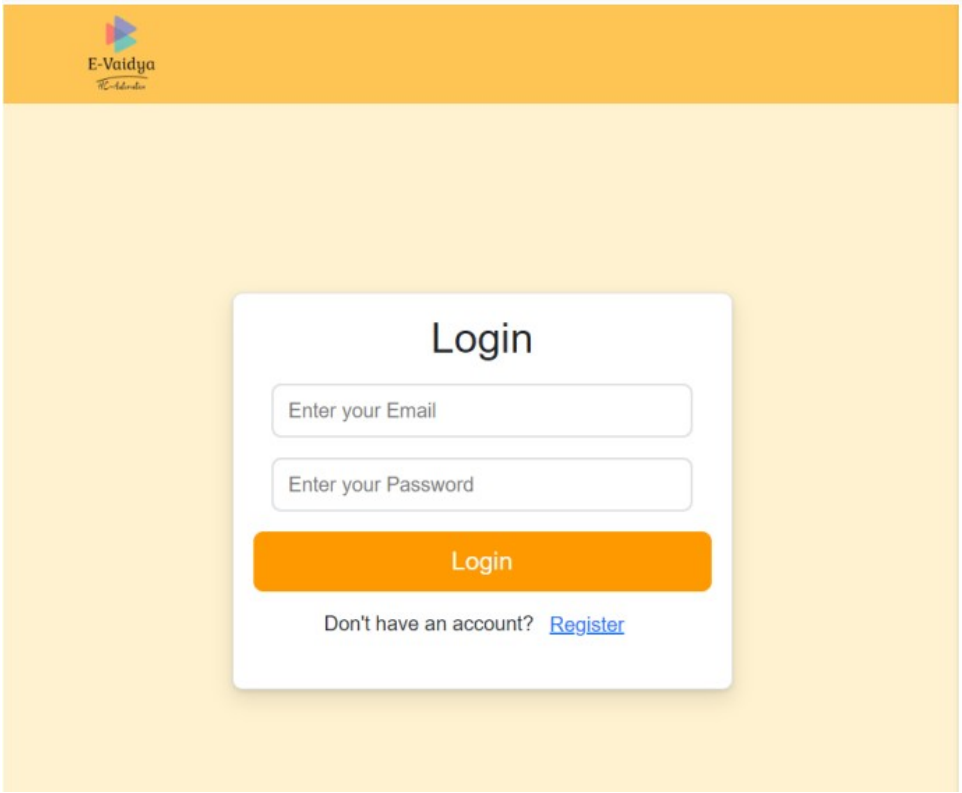
3.1 External Interface Requirements

3.1.1 User Interfaces

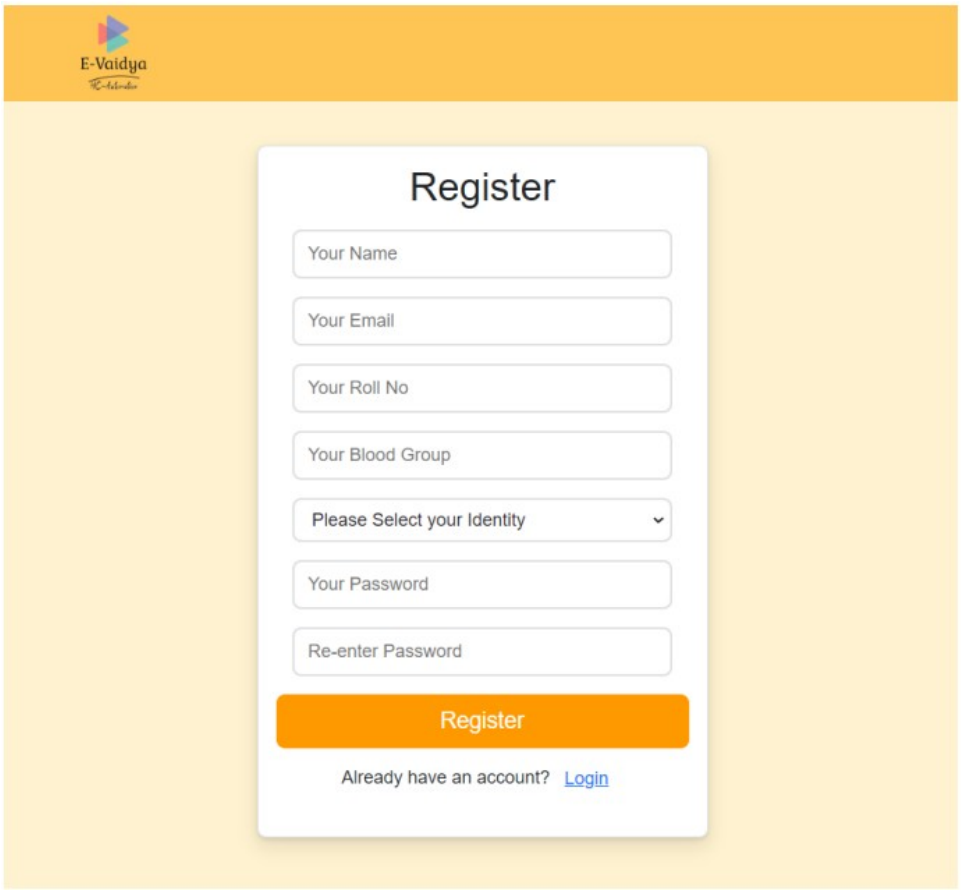
The system will be accessed by all users through one website – users will log in with their accounts and be shown different pages depending on whether their account is marked as Patient, Doctor, Reception or Pharmacy.

- The Login Page

The log-in page will have a simple log-in dialog and a sign-up button. The sign-up button will replace the log-in dialog with a sign-up dialog with which Students can input their IITK emails and a password to register as Patients. Doctor, Reception and Pharmacy users will have their accounts created for them by the development team.

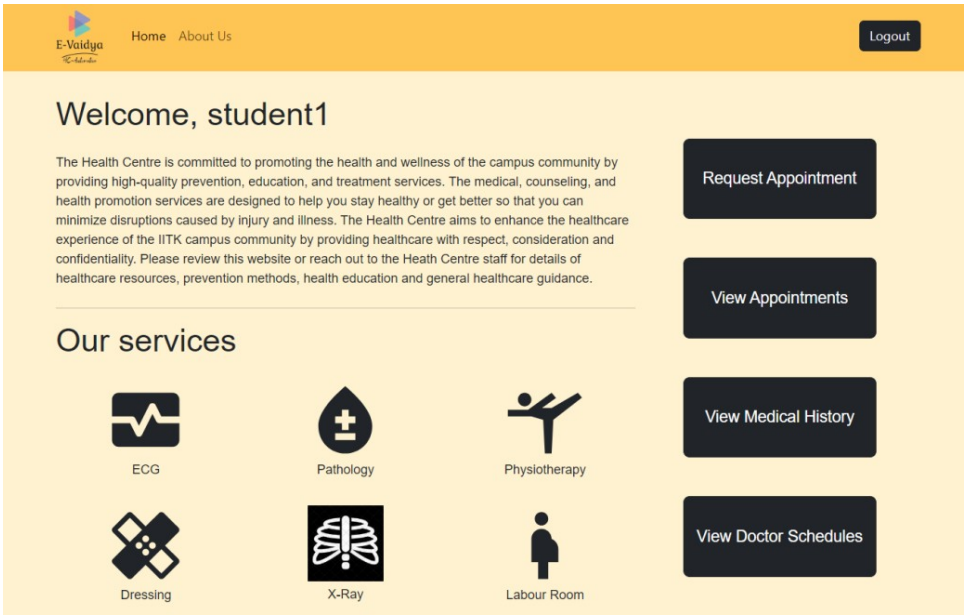


- Registration Page

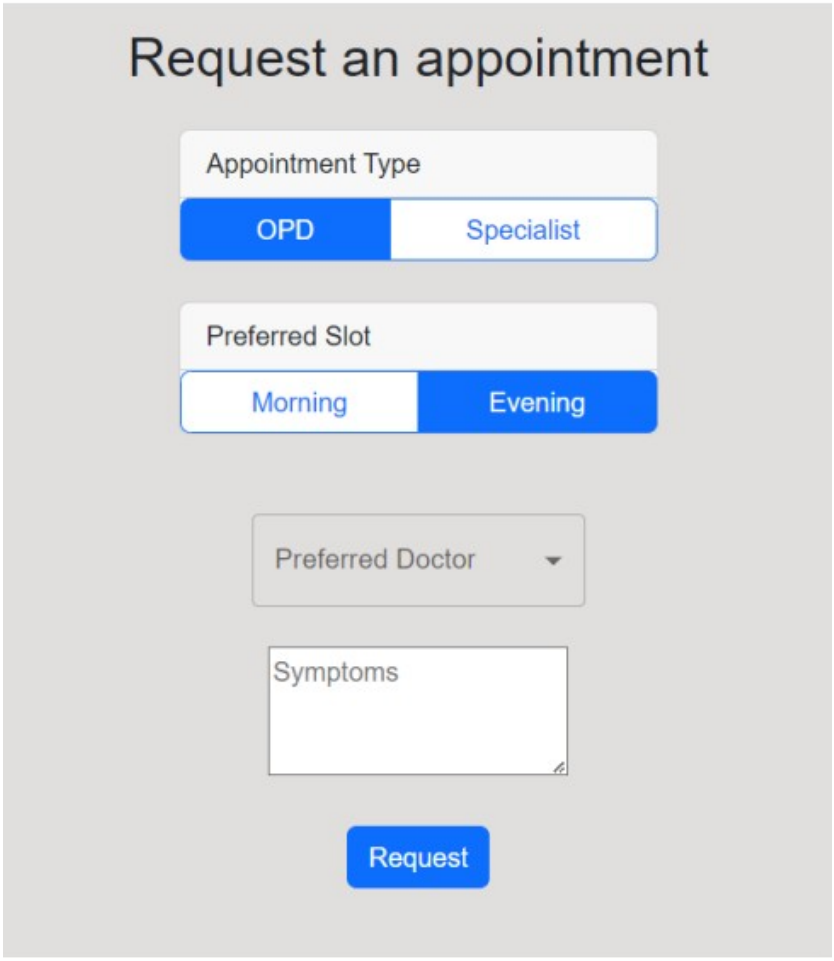


- The Patient's Page

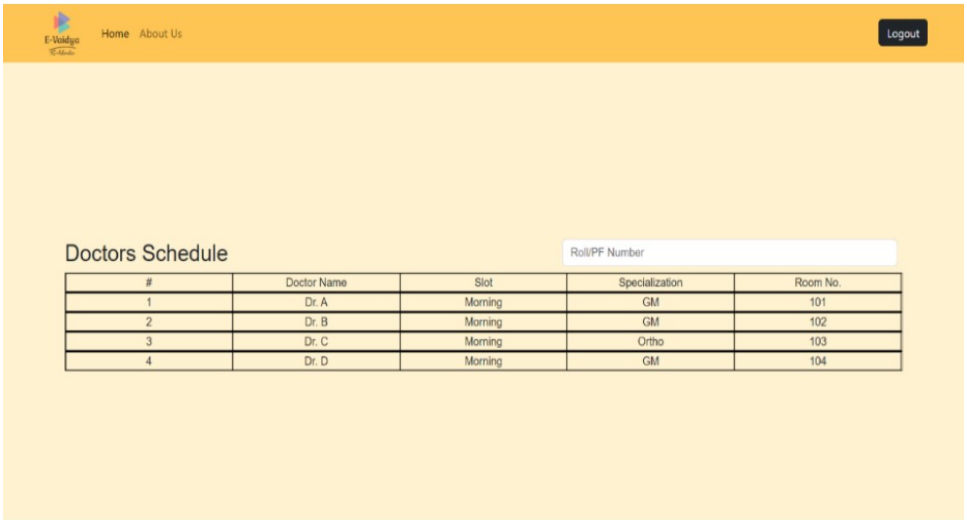
  - Initial Page



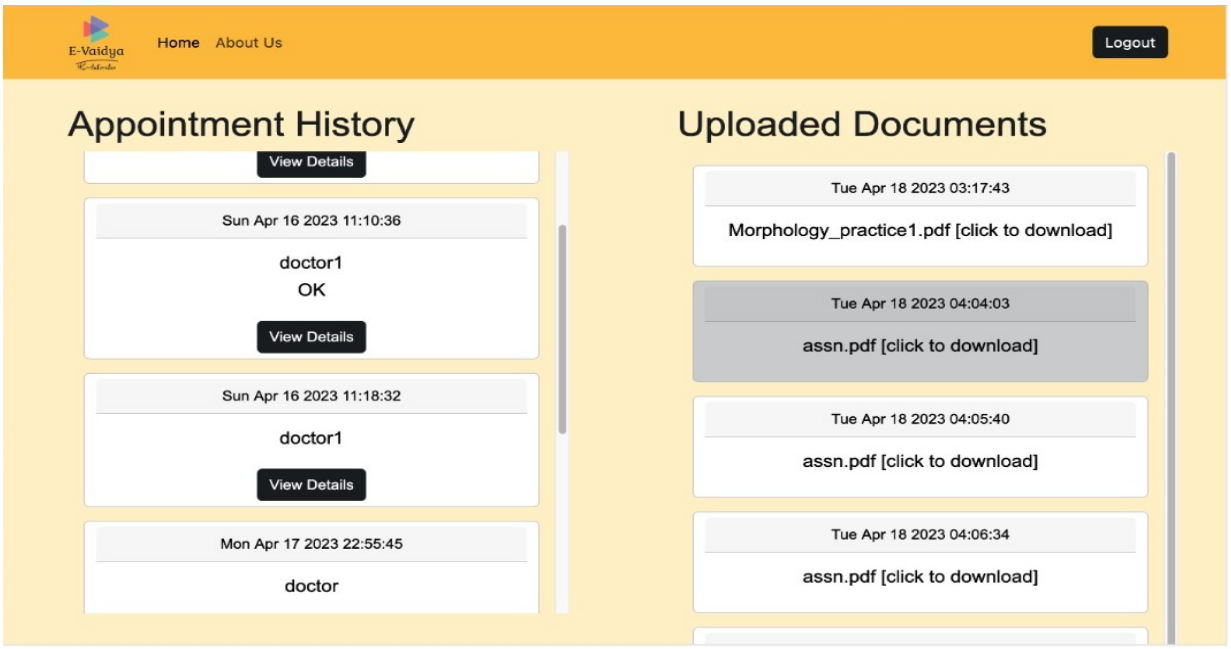
- Book Appointment Page



- View Doctor Schedule Page

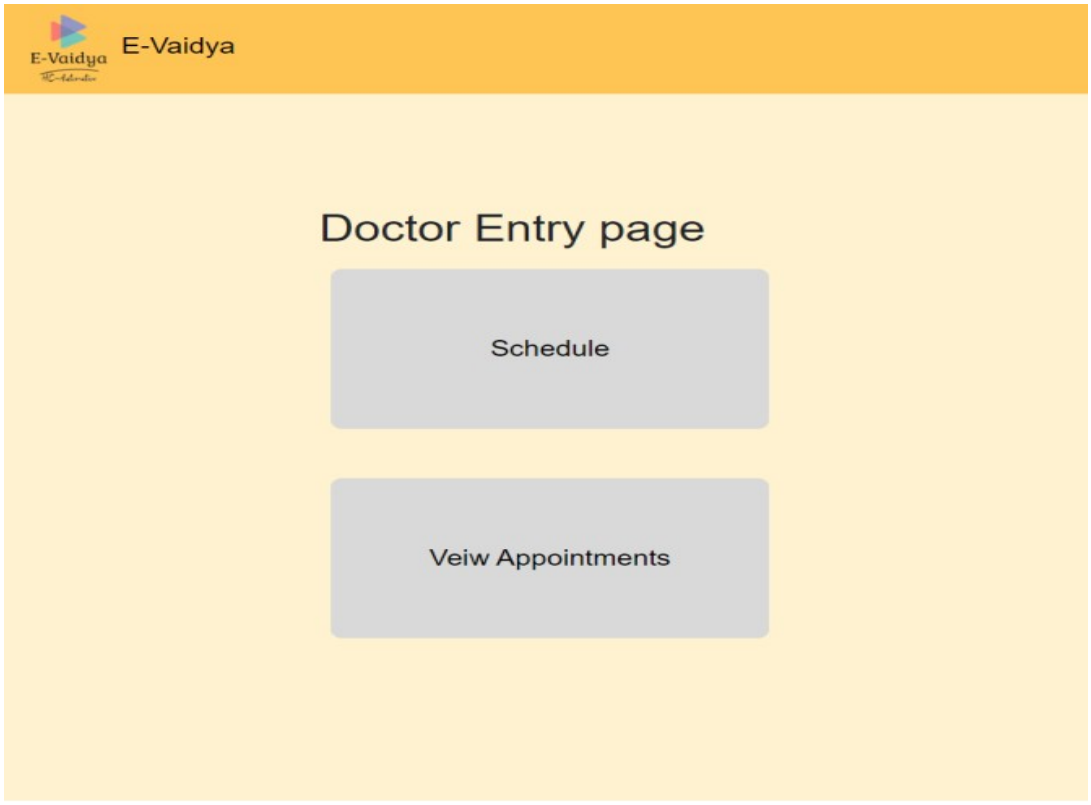


- Medical History

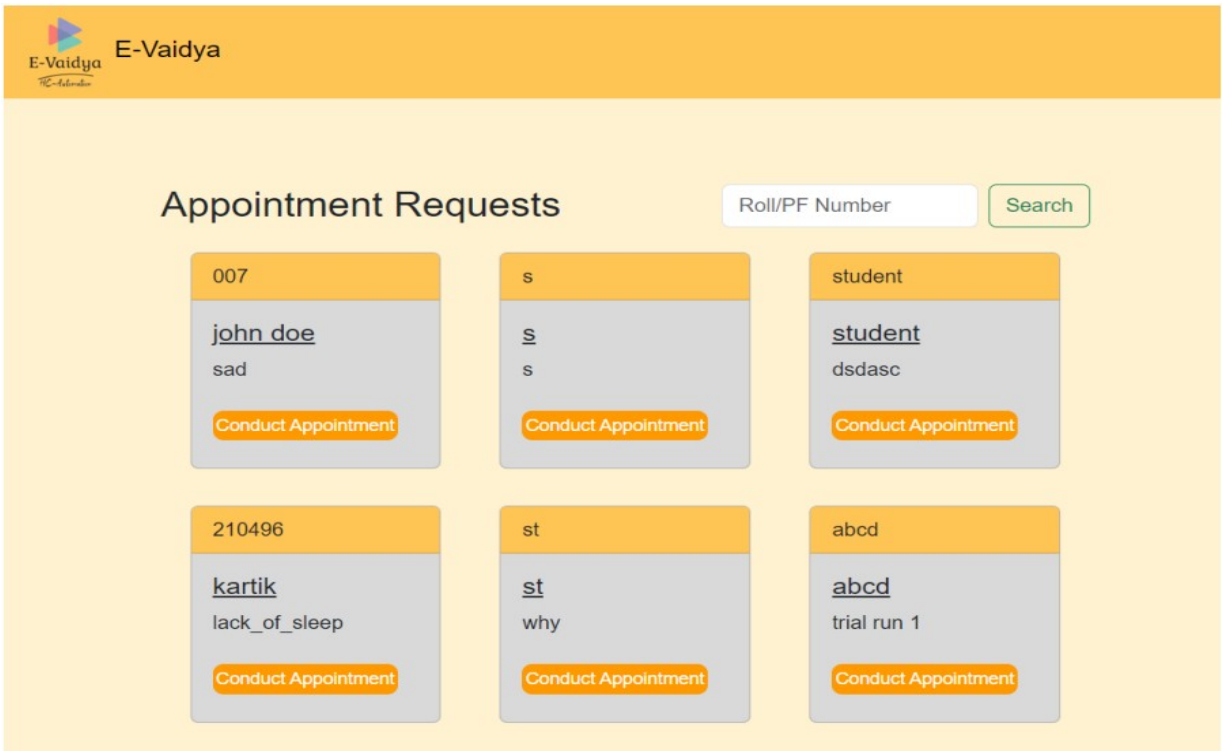


- The Doctor's Page

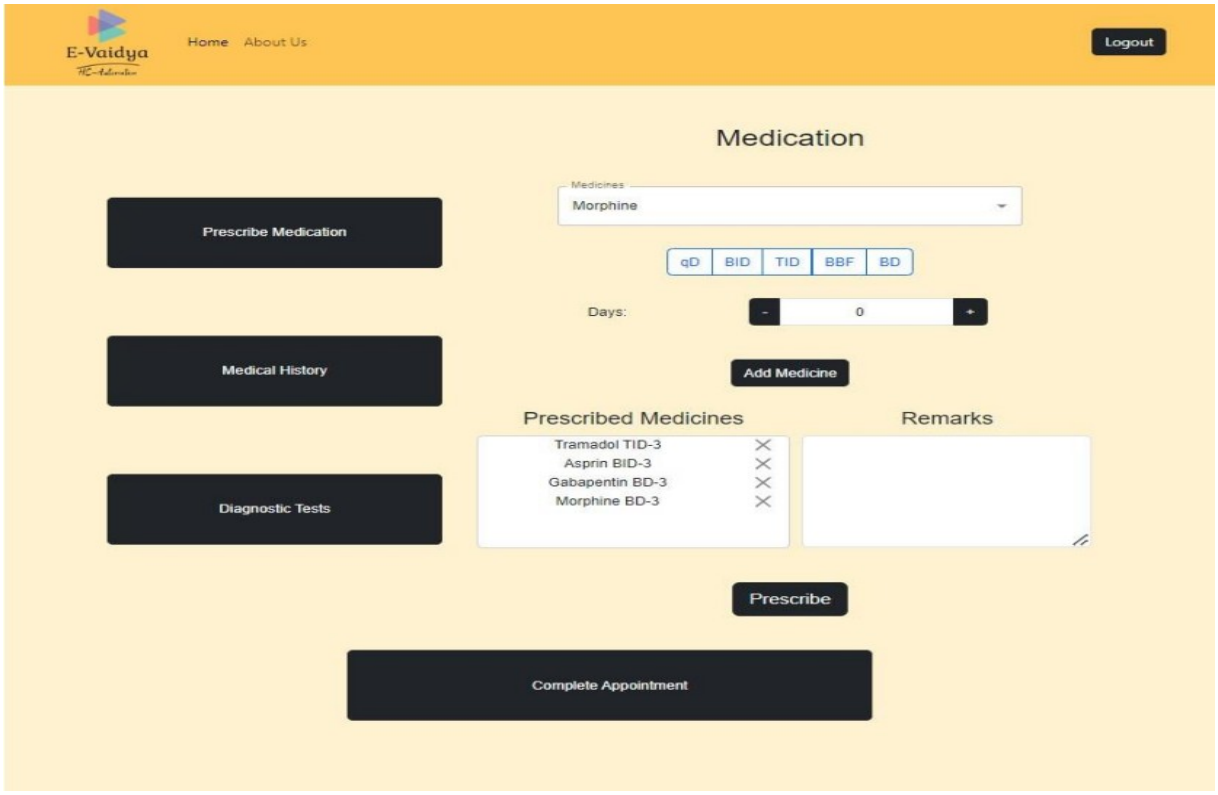
- Initial Page



- View Appointments Page

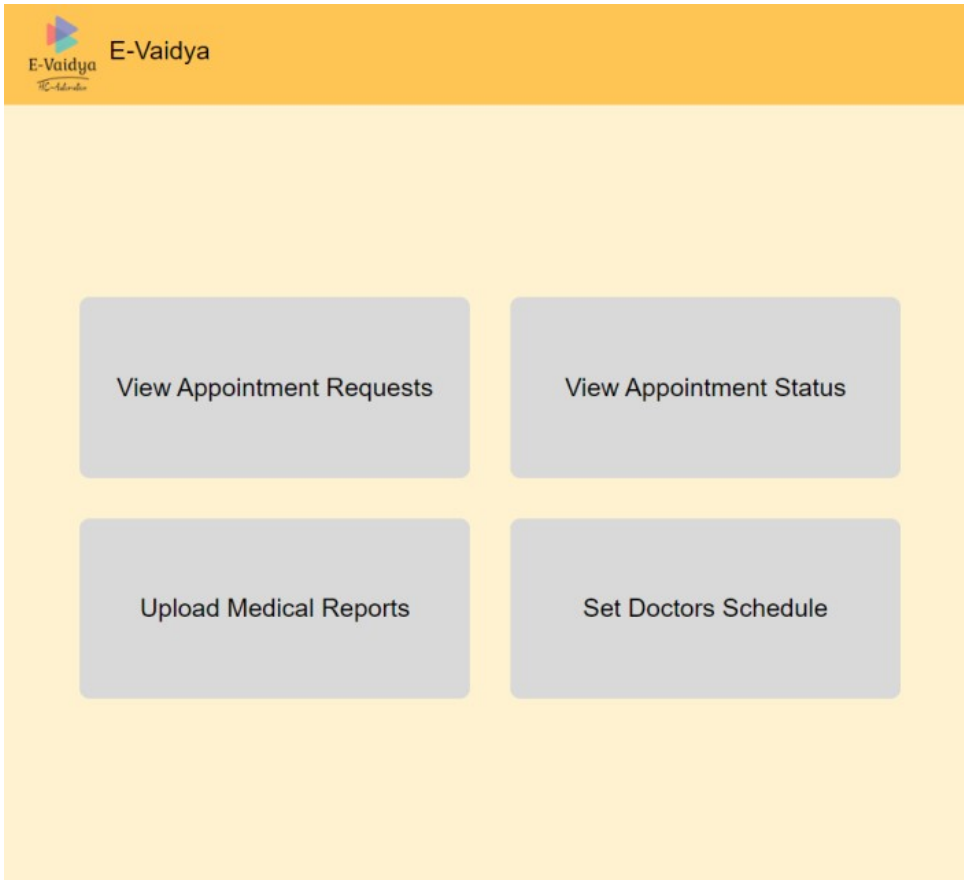


- Conduct Appointments Page

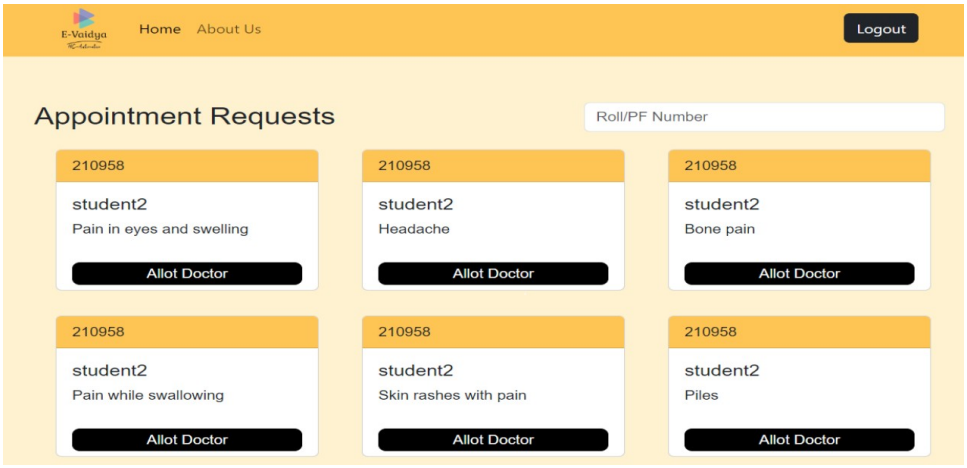


Earlier prescription page and conduction page were planned to different but now they are combined in a single page

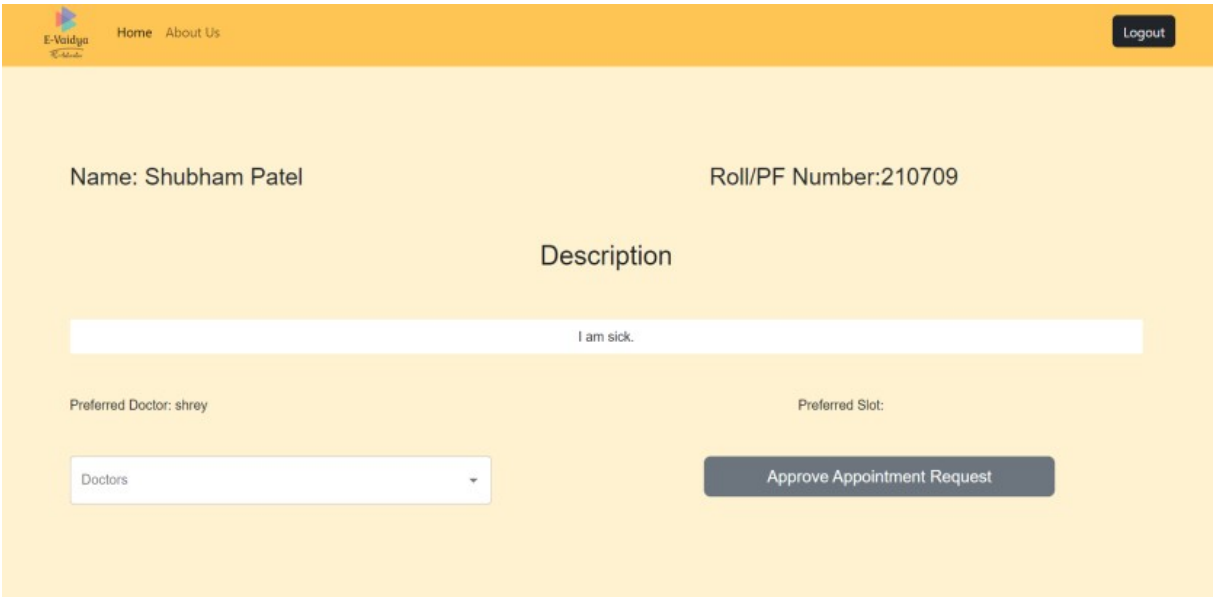
- # The Reception Page
  - Initial Page



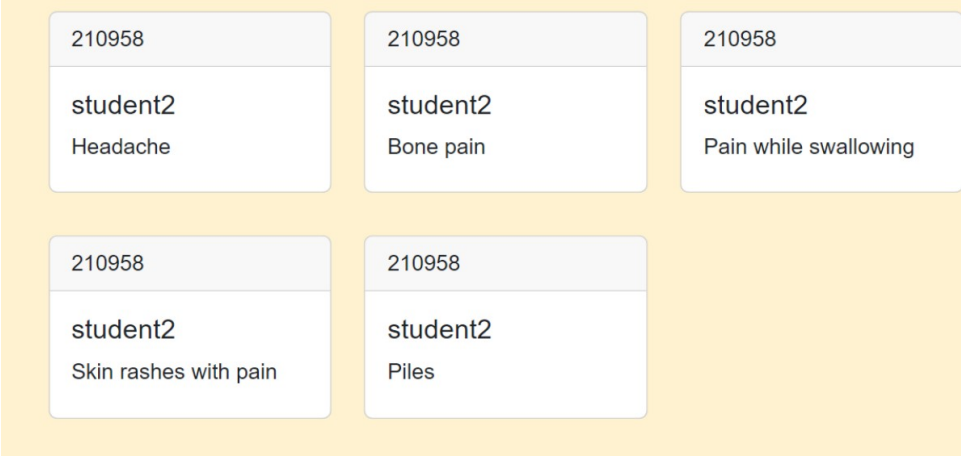
  - Appointment Requests Page



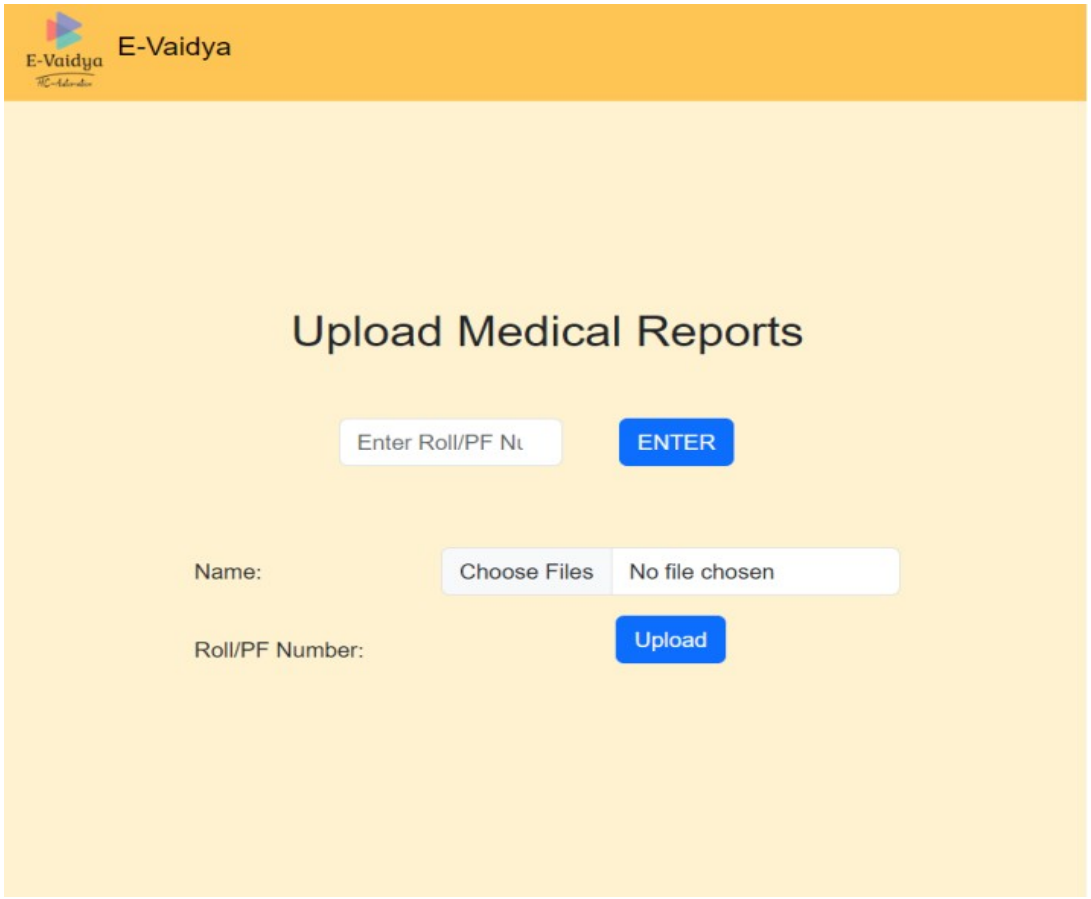
- Doctor Allotment Page



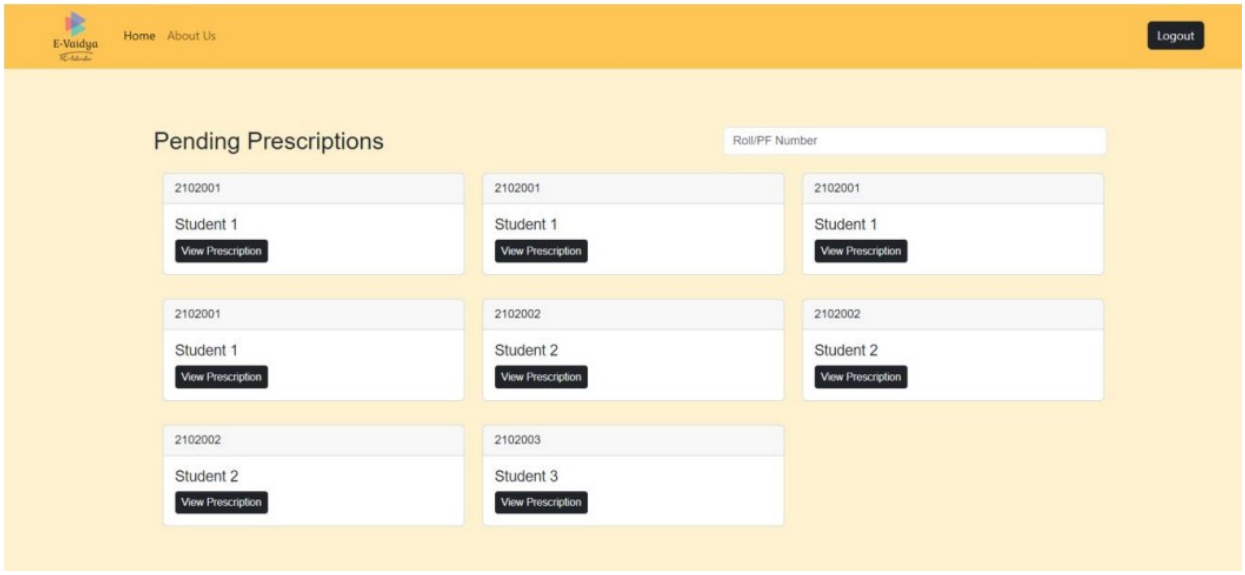
- Appointments of Doctor Page



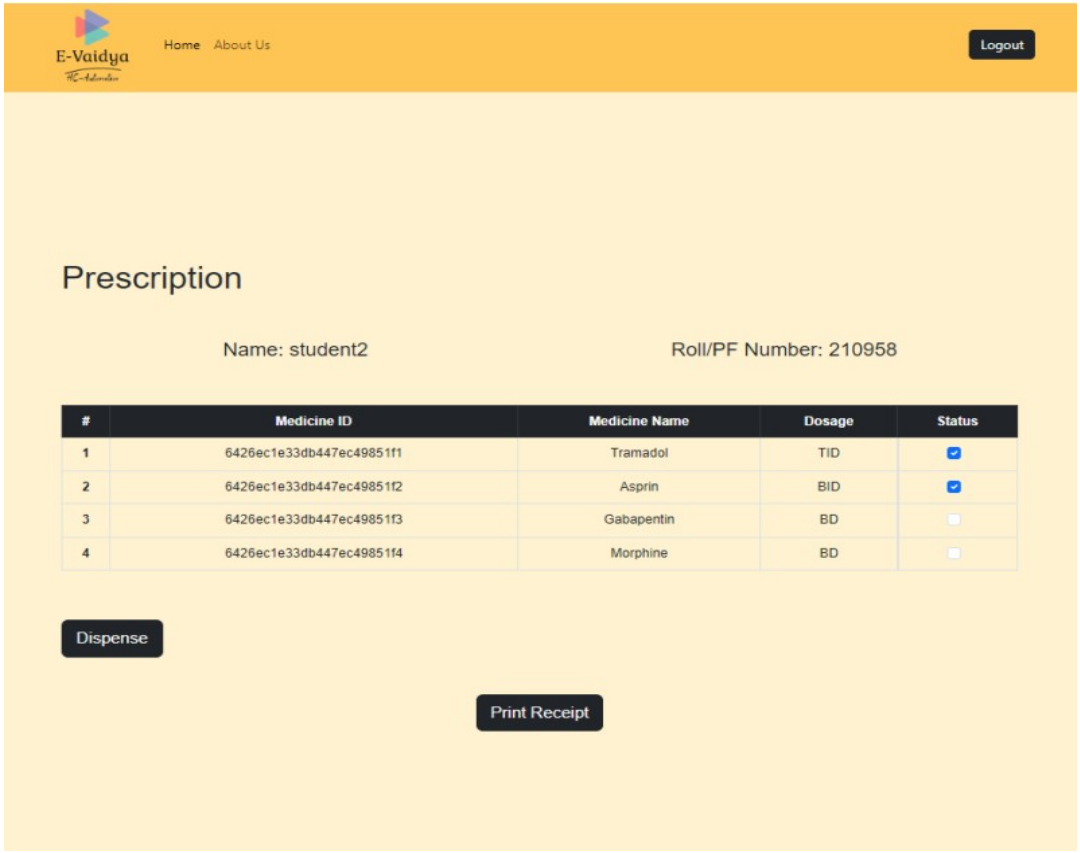
- Lab Reports Upload Page



- The Pharmacy Page
  - Initial Page



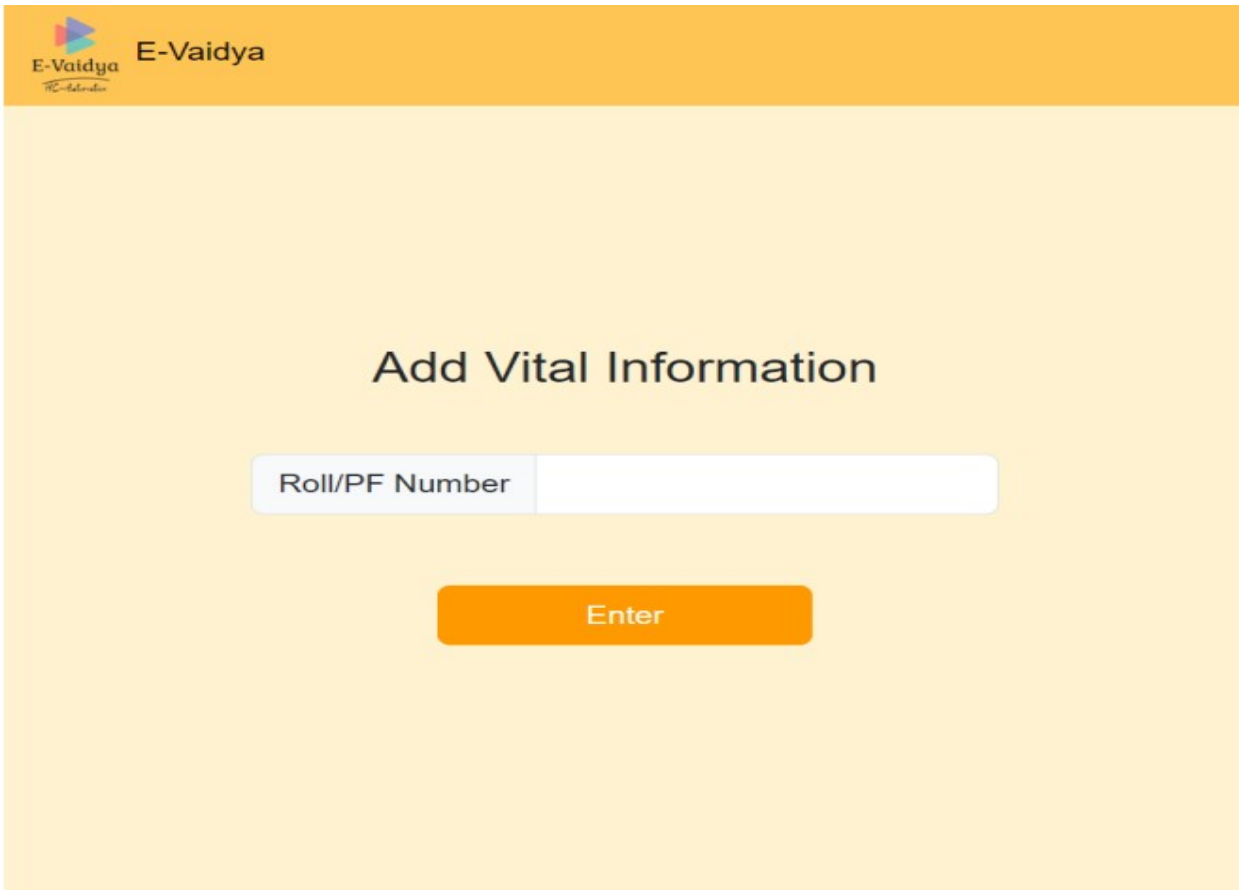
- Prescription Page



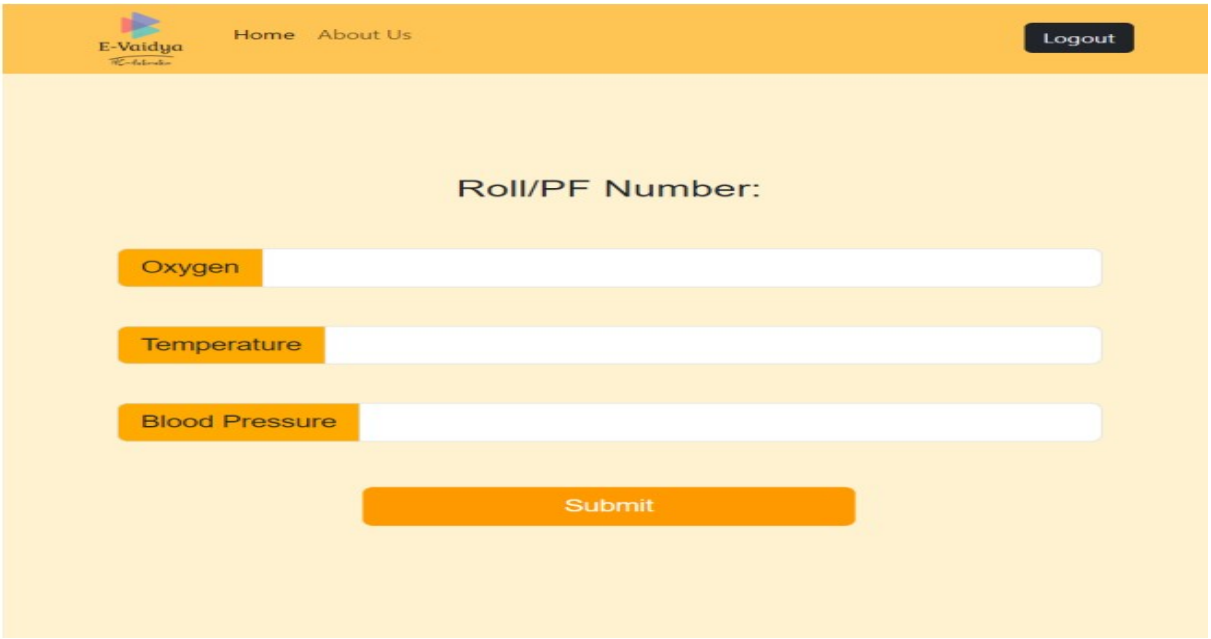
- ~~Completed Prescriptions Page~~

- The Nurse Page

  - Initial Page


E-Vaidya
E-Vaidya
Add Vital Information
Roll/PF Number
Enter

- Vitals Page


E-Vaidya
Home
About Us
Logout
Roll/PF Number:
Oxygen
Temperature
Blood Pressure
Submit

3.1.2 Hardware Interfaces

- Users will require a device that can open and use webpages to access the user interface. This can be a smartphone or a computer.
- Servers (i.e., dedicated computers) will be necessary for storing Patient data.
- The website will send requests to the server for necessary data (such as the prescription of a certain Patient) via API calls, using authorisation tokens to restrict access.

3.1.3 Software Interfaces

The software consists of three major components: the front-end, or the website that users will access, receive data from and send data to the server from; the back end, or the processing on the server to send data requested by users; and the database, used to store all Patient information.

3.2 Functional Requirements

3.2.1 Patient Registration

All Patients must initially register on the system, using their unique identification. They should enter their medical details like basic health information (blood group, height, weight etc.), current medical conditions, family history etc.

3.2.2 Patients can schedule appointments and view previous appointments

The Patient will be able request an appointment on the portal in which he/she has to enter his/her preferred Doctor and time slot, as well as the symptoms he/she is having. he/she can choose whether he/she wants to see a general OPD or a specialist. he/she will be assigned a token number based on the existing queue. he/she will also have an option to view his/her upcoming appointments.

3.2.3 The Patient can view which Doctors are on duty

The Patients will be able to view the list of doctors who are on duty depending on the day and time slot. The list of specialist doctors will also be available, showing their weekly schedule.

3.2.4 The Doctor and Patient can view their medical record which will be updated by the Doctor during the appointment

The Patients will be having an option to view their medical history which will display the diagnosis of the Doctor, the medication and tests prescribed as well as the lab reports of all the corresponding appointments. The appointments will have a time stamp. This history will also be visible to the Doctor during the duration of the appointment. The

Doctor will write the current diagnosis and prescribe the medication, which will be appended to the medical history after the appointment.

3.2.5 The Doctor can view all the scheduled appointments for the current shift/day and select an appointment and view the complete medical history of the Patient

A list of all the currently scheduled appointments will be visible to the specific Doctor. The Doctor can click on any appointment to view the details of the Patient including the medical history and lab reports of the Patient. The vitals will also be visible which will be sorted according to the time stamp.

3.2.6 The Doctor can also assign diagnostics and tests, as well as prescribe medicines to the Patient

The Doctor will be able to write the current prescription and diagnosis in the same window while viewing the Patient's medical history. There will be different sections for each field input. This report will later be added to the medical history after the completion of the appointment.

3.2.7 The Pharmacist can view the prescriptions received from the Doctor and issue necessary medicines to the Patient

The prescription by the Doctor will be available in the form of card to the Pharmacist. After providing necessary medicines as prescribed to the Patient, he will have an option to mark the prescriptions as complete as well as print a receipt.

3.2.8 The Receptionist can manage all appointment requests and allot the Patients to Doctors

The Receptionist can view the list of all appointment requests and can allot the Patients to Doctors depending on the availability of the Doctor as well as based on the symptoms shown also considering the preferred doctors of patients. The Receptionist can shift the request for specialist to general OPD if the need for specialist is found unnecessary.

3.2.9 The Receptionist can view schedules of all Doctors and assign Doctors to shifts

The Receptionist will be able to view the current schedule of all the Doctors and can assign and edit the shifts to incorporate changes in their schedule.

3.2.10 The Receptionist can upload medical reports of the Patient

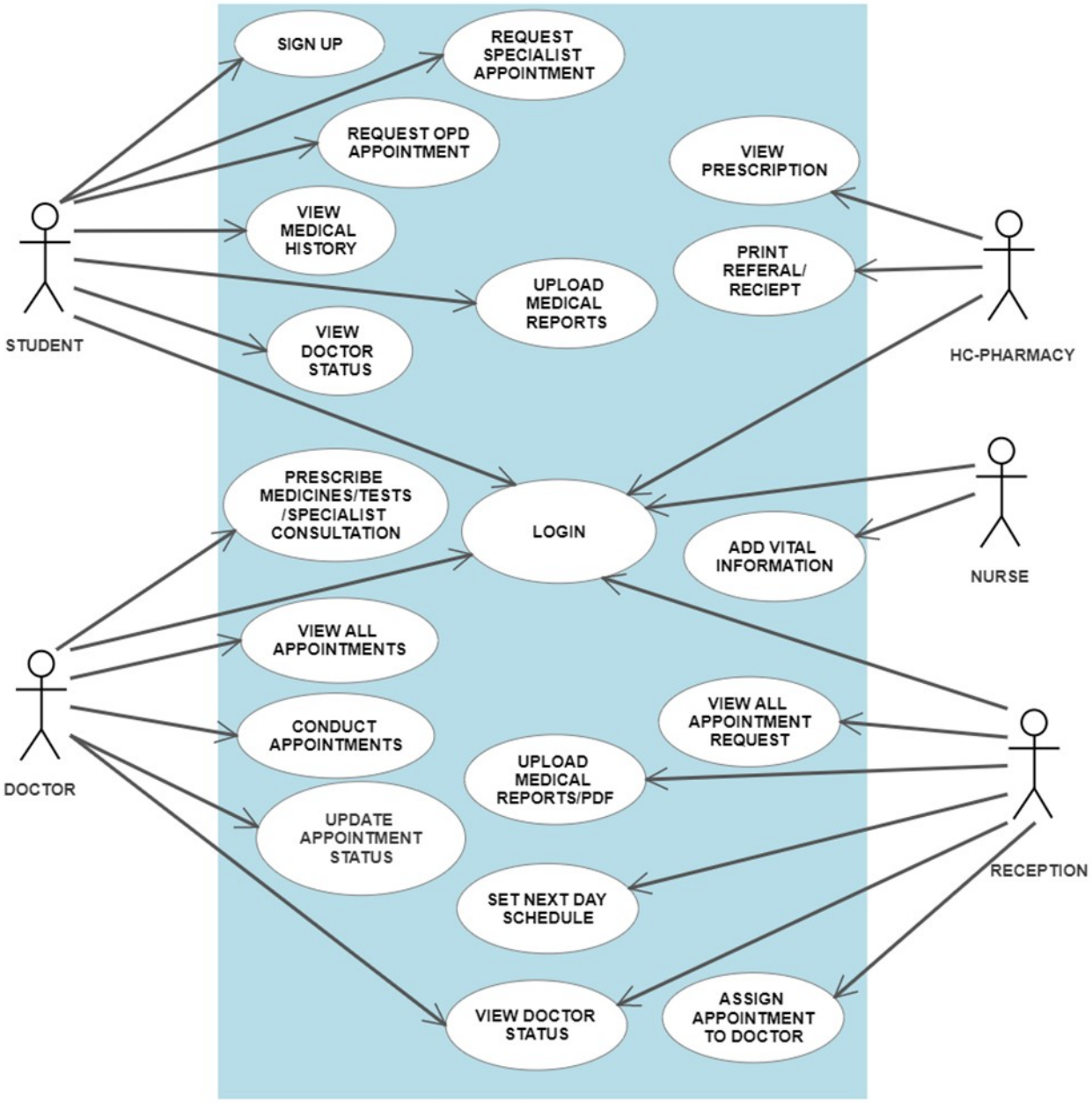
The Receptionist has the ability to upload the medical reports of the Patient to the corresponding appointment in his/her medical history. The Receptionist can also view the uploaded reports of the Patient.

3.2.11 The Nurse can add the measured vitals

The Nurse can measure the vitals of the Patient like body temperature, blood pressure, oxygen levels etc. These will be added to the medical record of the Patient corresponding to the ongoing appointment.

3.3 Use Case Model

3.3.1 U1 - Student views their medical history



Author – Swastik

Purpose - Student would be able to see his/her medical history which contains info regarding previous appointment that includes his/her vital info, Doctor's prescription and symptoms observed

Requirements Traceability – Student should be logged in to the system

Priority - Medium

Preconditions – Student is registered with HC and is currently logged into the system

Post conditions – Nothing in the system will change but only Student will see his/her medical history

Actors – Students clicks on the “View Medical History” tab on his/her dashboard

Exceptions – No medical history is there to be displayed

Includes - None

Notes/Issues - None

3.3.2 U2 – Request OPD appointment

Author – Aniket

Purpose – The Patient can request an OPD appointment with a doctor of his/her choice, or request a doctor be assigned to him/her, provided s/he has provided the symptoms (by the reception).

Requirements Traceability – None

Priority – High

Preconditions - The Patient is logged into the system.

Post conditions – A request to book an appointment for the Patient is sent to the Receptionist for further action.

Actors – Patient

Exceptions – None

Includes - None

Notes/Issues - None

3.3.3 U3 – Request Specialist appointment

Author – Narendra

Purpose – The Patient can request an appointment with a specialist Doctor, after describing the symptoms.

Requirements Traceability – The Doctor must be available for that appointment slot.

Priority – High

Preconditions – The Patient must be logged into the system.

Post conditions – A request for an appointment with the specialist is sent to the Receptionist for approval.

Actors – Patient

Exceptions – None

Includes - None

Notes/Issues - None

3.3.4 U4 – View all prescriptions

Author – Shrey

Purpose – To allow the HC Pharmacy to view all the prescriptions to be disbursed.

Requirements Traceability – HC Pharmacy should be logged in to the system

Priority - High

Preconditions –The prescription must be approved by the Doctor.

Post conditions – The HC Pharmacy can view all the prescriptions.

Actors – HC Pharmacy

Exceptions - None

Includes – None

Notes/Issues - None

3.3.5 U5 – Vitals' input by Nurse

Author – Deven

Purpose –When the Student reports at HC, his/her vital information like Oxygen level, temperature, Blood Pressure are required to assess his/her situation

Requirements Traceability – Roll no of the Student is what required for this

Priority – Medium

Preconditions – Student must be registered with HC

Post conditions – Student's medical history will be updated once the Nurse sends post-request

Actors – Nurse who will check the vitals

Exceptions – None

Includes - None

Notes/Issues - None

3.3.6 U6 – Login

Author – Prashant

Purpose – Patients and HC Staff will be able to login/Sign Up on our website

Requirements Traceability – A pre-registered ID and a User preferred Password

Priority – High as system can't recognize anyone as personnel

Preconditions – user must be registered on CC

Post conditions – User will be accessing his/her profile and all given facilities

Actors – Patient, Doctor, Reception, HC Pharmacy, Nurse

Exceptions - If user gives wrong ID/Password, then an option to choose forgot password is given.

Includes - None

Notes/Issues - None

3.3.7 U7 – Conduct Appointment by Doctor

Author – Kartik

Purpose – Doctor can see the details of the Patient of the appointment chosen.

Requirements Traceability – Doctor is logged in and is on the view all appointments page.

Priority - High

Preconditions – Appointment should have been successfully booked by the student and approved by the Receptionist. Patient should have arrived at the Doctor.

Post conditions – Medical History of the Patient is Updated. A medication prescription has been sent to the Pharmacy. The Patient Card has been deleted from the list of upcoming Patients of the Doctor. Tests have been prescribed to the Patient.

Actors – Doctor

Exceptions - None

Includes - None

Notes/Issues - None

3.3.8 U8 – View all appointments

Author – Swastik

Purpose – Doctor would be able to view the list of appointments in his/her current slot

Requirements Traceability – Doctor is logged in to the system, he/she clicks on “View Appointment”

Priority - High

Preconditions – Appointment made by Student should be approved by reception.

Post conditions - Doctor would see the list of appointments.

Actors – Doctor

Exceptions – None

Includes – None

Notes/Issue - None

3.3.9 U9 – Appointment scheduling by Reception

Author – Goutam

Purpose - Reception can schedule appointments according to availability of Doctors and the symptoms/preference of the Patients.

Requirements Traceability – Receptionist is logged into the system

Priority – High

Preconditions – One or more appointment requests are pending with the system.

Post conditions – Pending requests are approved/rejected by the Receptionist and approved appointments are added to the appointment list of the Doctors.

Actors – Reception

Exceptions – If a student has requested an appointment with an unavailable Doctor, the request must be rejected. If number of slots for an available Doctor is full, a further request should be rejected

Includes - None

Notes/Issues - None

3.3.10 U10 – View all appointment requests

Author – Aniket Borkar

Purpose – The reception is able to view all the appointment requests and take further action.

Requirements Traceability – The Receptionist is logged in and is on his/her home page.

Priority – High

Preconditions – The Patients have placed appointment requests.

Post conditions – The appointment requests are visible to the Receptionist, and can be searched by roll no.

Actors – Reception

Exceptions – None

Includes - None

Notes/Issues - None

3.3.11 U11 – Upload medical reports

Author – Aman

Purpose – Receptionist can upload medical reports of the Patient

Requirements Traceability – On the home page of the Receptionist, they must go to "Upload medical reports" tab

Priority - High

Preconditions – Medical report for the Patient has been obtained from the laboratory.

Post conditions – The medical report is added to the medical history of the Patient.

Actors – Receptionist, Patient

Exceptions - None

Includes - None

Notes/Issues - None

3.3.12 U12 – Assign Doctor Schedule for next day's OPD

Author – Shubham

Purpose – Receptionist assigns Doctors to slots for the next day's OPD.

Requirements Traceability – Receptionist is logged in to the system.

Priority – High

Preconditions – Doctor must not have been already assigned duty in the same slot.

Post conditions – Doctor's name appears in the list of doctors for the corresponding slot. Doctor's name is removed from list of un-assigned doctors. List of Available Doctors on the Patient's side are updated for the corresponding slot.

Actors – Receptionist

Exceptions - None

Includes - None

Notes/Issues - None

~~3.3.13 U13 – View Doctors' status~~

Author – Swastik

Purpose – The user can view schedule of each Doctor i.e., appointments assigned to him on the corresponding slot, and the status of the appointment (completed or not)

Requirements Traceability – User is logged in to the system

Priority – High

Preconditions – Doctors are assigned to the corresponding slot that day.

Post conditions - The status of the appointments is visible to the user.

Actors – Receptionist, Student, Doctor

Exceptions – None.

Includes - None

Notes/Issues - None

3.3.14 U14 – Prescription of Medicines/Tests/Specialist Consultation

Author – Aniket

Purpose – This use case allows the Doctor to prescribe the necessary medication or tests to the Patient or refer the Patient to a specialist for further treatment.

Requirements Traceability – The Doctor is logged in and is on the conduct appointment page.

Priority – High

Preconditions - The Doctor has performed the diagnosis on the Patient.

Post conditions – If medication has been prescribed, the same is appended to the Patient's medical history with any remarks/comments related to the diagnosis. This prescription is added to the active prescriptions view of the HC Pharmacy. Any diagnostic tests/specialist referral assigned are also attached to the medical history.

Actors – Doctor

Exceptions – None

Includes - None

Notes/Issues - None

3.3.15 U15 – Printing referral receipt by Pharmacist

Author – Swastik

Purpose – The Pharmacist would print the list of medicines which are not available

Requirements Traceability – Doctor has prescribed the medicines and closed the appointment

Priority – High

Preconditions - The Pharmacist should have selected the medicines which are available and then the unselected medicines in the prescription would be ready to print

Post conditions – The Patient would be able to get remaining medicines from Apollo Pharmacy

Actors – HC-Pharmacist

Exceptions – None

Includes -

Notes/Issues - Any relevant notes or issues that need to be resolved

3.3.16 U16 – Update appointment status

Author – Aman

Purpose – Doctor will update the appointment status of the Patients

Requirements Traceability – Doctor has already conducted the appointment of the Patient

Priority – High

Preconditions – Doctor should have conducted the appointment and prescribed the required medicines to the Patients

Post conditions – The Patient will be removed from the appointment list following the update of the appointment status.

Actors – Doctor who is conducting the appointment

Exceptions – None

Includes - None

Notes/Issues – None

4 Other Non-functional Requirements

4.1 Performance Requirements

Performance:

(a) The software should be able to handle High traffic with Low latency during peak hours
(b) Students' medical records will be updated in real time.
(c) API requests must return within 1000ms.

4.2 Safety and Security Requirements

Safety and Security

(a) The IP Address of the end-user must be that of IITK.
(b) Controlled access – Only the user and the Doctor with whom his/her appointment is scheduled can see user's medical history.
(c) Even developers would be unable to access Students' personal records thus ensuring perfect privacy

4.3 Software Quality Attributes

4.3.1 Reliability

Students/Users can book appointments anytime with their convenience. The software will be able to handle and process a large amount of data in a reasonable time. It will provide an integrated platform for all medical needs.

4.3.2 Usability

The software will provide a one-stop solution to all the medical needs of the registered users. The process of prescription and medical history tracking will be made easier for doctors. All the functionalities like appointment scheduling, medical history tracking, pharmaceutical management etc. will be automated.

4.3.3 Portability

Our Web-Application will be fully responsive and interactive so that it will be portable and will function properly on any device of any size and shape.

5 Other Requirements

Appendix A – Data Dictionary

Appendix B - Group Log

Date	Members Present	Summary of the Meeting
06 Jan	Aman, Aniket, Deven, Kartik, Narendra, Prashant, Goutam, Shrey, Shubham, Swastik	Discussion on a few ideas and other possible domains for project ideas
09 Jan	Aman, Aniket, Deven, Kartik, Narendra, Prashant, Goutam, Shrey, Shubham, Swastik	Discussion on newly proposed ideas from different domains
10 Jan	Aman, Aniket, Deven, Kartik, Narendra, Prashant, Goutam, Shrey, Shubham, Swastik	Expanding into deeper details of the ideas
12 Jan	Aman, Aniket, Deven, Kartik, Narendra, Prashant, Goutam, Shrey, Shubham, Swastik	Discussion on feasibility of ideas and shortlisting of the best
13 Jan	Aniket, Deven, Goutam, Shrey, Shubham, Swastik	List of shortlisted ideas presented to and discussed with Sir. Confirmed HC Automation as the project.
18 Jan	Aman, Aniket, Deven, Kartik, Narendra, Prashant, Goutam, Shrey, Shubham, Swastik	More detailed discussion regarding the user requirements and system requirements
19 Jan	Shrey, Shubham, Swastik, Prashant, Aniket	First visit to HC: Getting basic details regarding the tasks performed at HC
21 Jan	Shrey, Shubham, Swastik, Prashant, Aniket, Deven, Goutam	Second visit to HC: Discussion with Dr.Rakesh Mishra. Got details regarding the exact functioning of various processes at HC. A detailed demonstration of the existing appointment system was given to us.
23 Jan	Aman, Aniket, Kartik, Prashant, Goutam, Shrey, Shubham, Swastik	Finalising on the timeline of the SRS. Division of tasks finalised.
24, 25, 26, 27 Jan	Aman, Aniket, Deven, Kartik, Narendra, Prashant, Goutam, Shrey, Shubham, Swastik	Working on Requirement Documentation