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1. Introduction:

1.1 What is the app about? What are your expectations from the app?

With healthcare services being the need of the hour as the world faces a pandemic, our app will focus on providing healthcare services to those in need in India. The idea is to have an application that can reach out to and bring light to communities that are in need of healthcare facilities. The app would also utilise healthcare workers from across the globe towards fighting all healthcare related issues in different parts of India.

The following are the expectations from the application:

1. Provide healthcare services to remote and rural areas across India.
2. Provide assistance and aid to local organizations engaged in healthcare work.
3. Reduce misinformation about health related issues and increase awareness about health related commonly made mistakes(such as consuming medicines without prescriptions based on recommendations obtained from social media).
4. Provide professional free health care consultations to reduce impoverishment of poor people by big private health care providers.

1.2 How will it work?

The project aims to eliminate a few incessant healthcare problems in India.

1. The project aims to bring more hands on deck to resolve the human power crisis in India where there is a serious shortage of healthcare workers.
2. It would increase assistance by hiring community health workers.
3. Work with community partners such as nursing homes when conducting community needs assessments.
4. Provide resources for basic training to the existing workers and donating medical and other supplies.
5. Train and equip existing health care workers with the updated technologies.
6. Provide virtual consultations from doctors across the globe.
7. Take special medical requests for cases that require urgent care and connect them to appropriate resources.
8. Conduct sessions to spread awareness about commonly occurring diseases and their prevention methods.

1.3 Why will this app be successful?

Absence of manpower in healthcare: There are several pressing questions, Does India have an adequate number of personnel, are they appropriately trained, are they proportionally allocated where needed? A study estimated that India has 20 health workers per 10,000 population. This workforce isn't distributed proportionately, with most of the workers choosing to work where the infrastructure and family life and growth are better. According to the rural health statistics of the Government of India(2015), 27% of doctor posts at Public Hospitals were vacant.

- Affordability of healthcare: A very simple question lies here, how costly is healthcare in India, and how many people can actually afford it? It is common knowledge that the private sector is the dominant player in the healthcare arena in India. About 75% of healthcare expenditure comes from the common man and the catastrophic costs of healthcare is the very reason for pauperisation.
- Inequality in health between populations exists across India. These differences occur along several axes of social stratification including socioeconomic, cultural, ethnic, political and gender.
- Awareness or lack of healthcare: There are many studies on awareness of healthcare in India. One study shows that adequate knowledge about breastfeeding practice was found in only one-third of mothers in India in two studies. A study in urban Haryana, a rural state in India, found that only 11.3% of the adolescent girls knew correctly about key reproductive health issues, and most of which go undiagnosed.

2. Requirements:

2.1 How can it engage and be useful to end users?

1. NGO's, hospitals and other healthcare providers can use the app as an interface to reach out to rural communities in remote locations in India. These organizations will be under supervision to provide health care facilities without burning the patients pockets. This would provide cost effective benefits to the end users.
2. Nearly 86% of all the medical visits in India are made by ruralites with majority still travelling more than 100 km to avail health care facility of which 70-80% is born out of pocket landing them in poverty. (1) By bringing the updated facilities to the people virtually through trained local organisations, it would reduce travelling costs for poor people.

2.2 Who are the users?

People who need healthcare, Volunteers, NGO's, Marketing Rep, Administrator, Hospitals, Providers, Nurses, Marketing Team, Donators, Customer Representatives.

2.3 Interview Questions:

Questions to the users(Doctors, patients, other healthcare providers) to understand their needs:

Patients:

1. What are the current problems patients face while trying to access healthcare facilities?
2. What expectations do they have from healthcare providers?
3. What can be done to ease the process of getting proper services to their villages?
4. Do they feel safe in availing online services in terms of privacy and security concerns about their medical data, if not, how can we make them feel safer about their data?

Doctors:

1. What are the problems they face while trying to provide virtual healthcare services?
2. Have they used any online consultation portal previously, if yes, what were the problems they encountered while using the application?
3. Would incorporating virtual reality devices help in assessing the patient's problems better?
4. Would you want to work full time on a virtual healthcare providing platform providing healthcare services without borders?

2.4 What is the problem they are facing?

1. The public healthcare facilities are understaffed and under-equipped and the majority of these resources are focused on providing care in urban areas. Due to this, the rural population is subjected to healthcare that is unaffordable and inaccessible.
2. Travelling long distances in order to get basic medical facilities is infeasible and just adds to the expenses they incur. Around 40% of the population either borrow money or sell assets to pay for hospitalization, and 25% fall below the poverty line as a result of medical expenses each year, according to National Accounts Statistics.(1)
3. Understaffed healthcare facilities: The number of healthcare facilities in rural areas is inadequate and even in those few hospitals the shortage of skilled healthcare personnels handicaps the whole system and those requiring care are unable to obtain it. While the number of healthcare facilities across India has increased substantially, as we indicated, the count of medical personnel has not kept pace and rural facilities have the largest gap between the supply and demand of basic health services, as measured by vacancies.(4)
4. Inaccessible health care for uncommon health problems: The initial stage of diagnosis cannot be done for patients suffering from rare diseases in rural areas because of lack of medical supplies and skilled healthcare workers. They need to travel long distances for such cases which proves the system's inadequacy.
5. Inefficient health care: Testing of new medicines are carried out on people from rural areas without their consent, taking advantage of the illiteracy that is prevailing in these areas. Such testing exploits the rural population hence they should be educated on these topics ensuring that these instances are not repeated.

2.5 Is there a gap or opportunity in the marketplace?

There is ample opportunity in the marketplace for mobile health applications as the undocumented, rural population in India forms a major part of the society and are part of the greater percentage of population that does not have access to proper healthcare facilities.

The number of people using mobile devices and the internet via mobile phones in developed and developing countries has drastically increased and is expected to foster the market value. For instance, based on the recent research article, over 4.3 billion individuals are active internet users globally.(2)

The rise of digital technologies, coupled with supportive governmental policies, has augmented the growth of the mobile healthcare market in India.The Indian government, being a key stakeholder, have formulated effective policies and projects to boost the market.(3)

2.6 Identify similar apps:

- Project Hope Worldwide
- Becoming-I Foundation

2.7 Why do people want this app? (Look at the reviews, blog posts, etc.)

- Would help in reducing misguided steps taken towards health issues. For example, a lot of people consume medicines on recommendations obtained on social media.
- Private hospitals/organizations get a non-profit name and share their good deeds through social media and help them to advertise their organizations as well.
- Volunteers/community workers need a place to register and help people.
- Not just what the people would want, but what they need

2.9 Will the customer use it again?

- Very user friendly interface keeping in mind that the people that one section of the people that may use it(locally trained healthcare workers) may not be very tech savvy so the application interface will be kept very simple with guided instructions. The application will also come with a disability friendly mode to allow people with dyslexia, people with visual impairments and senior citizens to browse through with ease.

2.10 How are they marketing to their customers? (Check out screenshots, icon design & descriptions)

The existing applications are following the below strategy and the same strategy will be followed in the app:

- Building community at the community service events
- Form a volunteer base
- Word through mouth
- Advertise what your project need in the hospitals front/reception area
- Prepare awareness video and share in the social media
- Promote the projects through banner and other public places

2.11 What is the competitive advantage of this app?

The marketing team has a wealth of knowledge in digital marketing and so the team is expecting to reach a lot of individuals and volunteers. As the app is free for download and acts as a medium for advertising the hospitals/providers organizations. There is an expectation that the organization will have the right balance of people who are in need and people who provide services. The organization is pretty transparent about the funds and expenses and shares all the projects with pictures and individual feedback and this would give more confidence to the people who donate money.

2.12 What does this app cost? Are there in-app purchases?

This app is free for download.

3. UML Diagrams:

3.1 Use Case Description:

User	Use Case
People	Healthcare request
People	Virtual Assistance
People	Requesting Medical Equipments
Administrator	Creating Volunteer opportunities, Managing financials, Allocate funds/budgets
Hospitals/Providers, Doctors, Nurses	Register, Manage the accounts, checking the People request and accept or Deny
NGO, Volunteers	Register or accept volunteer opportunities
Marketing Team	Reports (user counts, funds), New Events
Donators (Money or Physical materials)	Register, Checkout as a guest, Donating Medical Necessities, Donate money
Customer Representative	Chat option for any assistance on the app, Checking emails and provide responses

3.2 List of use cases & workflow:

User	Use Case
Patient	- Create a healthcare request - When users ask for virtual healthcare assistance - Doctors on video/audio call - Make a complaint
Donors/Benefactors	- Donate money - Donate Medical supplies - Donate other items
Customer Service Representative	- Verify and register healthcare providers(local) - Verify and register volunteering organisations(local)

	- Verify and register volunteering organisations(global) - Verify and register all the doctors for virtual assistance - Maintaining medical supplies records - Maintaining medical supplies requests - Register complaint - Remove healthcare providers
Administrator	- Verify and register healthcare providers(local) - Verify and register volunteering organisations(local) - Verify and register volunteering organisations(global) - Verify and register all the doctors for virtual assistance - Maintaining medical supplies records - Maintaining medical supplies requests - Register complaint - Remove healthcare providers - Managing bank accounts
Providers/Hospitals	- Read a healthcare request - Accept or deny healthcare request - Create a request for volunteer assistance - Training village local midwives - Give CPR training to the local nurses/healthcare workers
Marketing	- Upload Videos - Upload latest project pictures - Editing the web page contents depends upon the season/situation
NGOs/Volunteers	- Register for volunteer activities - Awareness camps - Develop joint projects

3.3 How are all the activities coordinated? How is the work assigned to the different teams and team members?

- Create a schedule plan for the project.
- We identified the start and finish dates for the project tasks.
- Defined the goals, plans, responsibilities and expectations at the beginning to avoid inconsistencies.
- Identified the duration of each task and activity.
- Identified the critical path to prioritize the work that will make the project successful.
- Identified the tasks where lag is allowed.
- Figured out the task interdependence.
- Developed a project schedule
- The activities were coordinated and managed by communicating expectations clearly and assigning tasks to each member of the team with clearly defined responsibilities.

3.4 Project Schedule:

Iteration	Time	Task
Iteration1	2 months	Project Design: 1.1 Start the project 1.2 Start the design work 1.3 Complete design work
Iteration2	1 months	Project Planning: 2.1 Feasibility study 2.2 List necessary project resources 2.3 Do a risk assessment 2.4 Budget report
Iteration3	4 months	Project Initiation: 3.1 Hire crew(developers, UI designers, Volunteers, etc) 3.2 Develop the mobile and web app 3.3 Apply for permits
Iteration4	2 months	Project Implementation 4.1 Launch beta version 4.2 Market app to healthcare users and providers
Iteration5	2 months	Project Monitoring 5.1 Test app 5.2 App maintenance
Iteration6	1 months	Project Closure 6.1 Prepare lessons learned

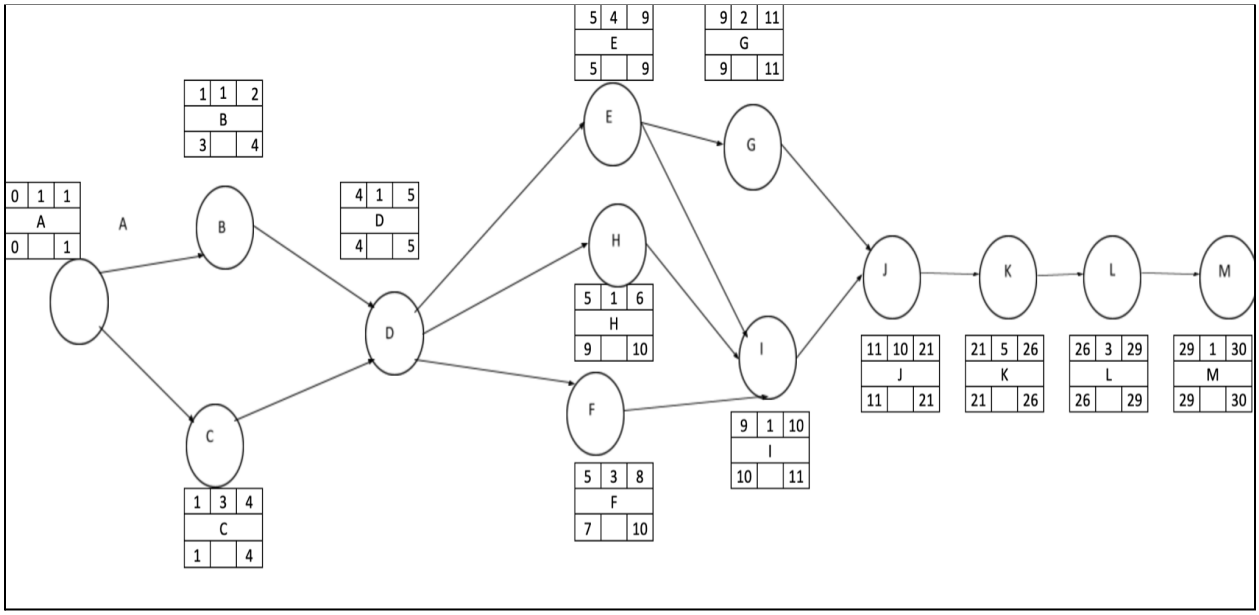
		6.2 Prepare final report 6.3 Present to stakeholders

Total = 12 months

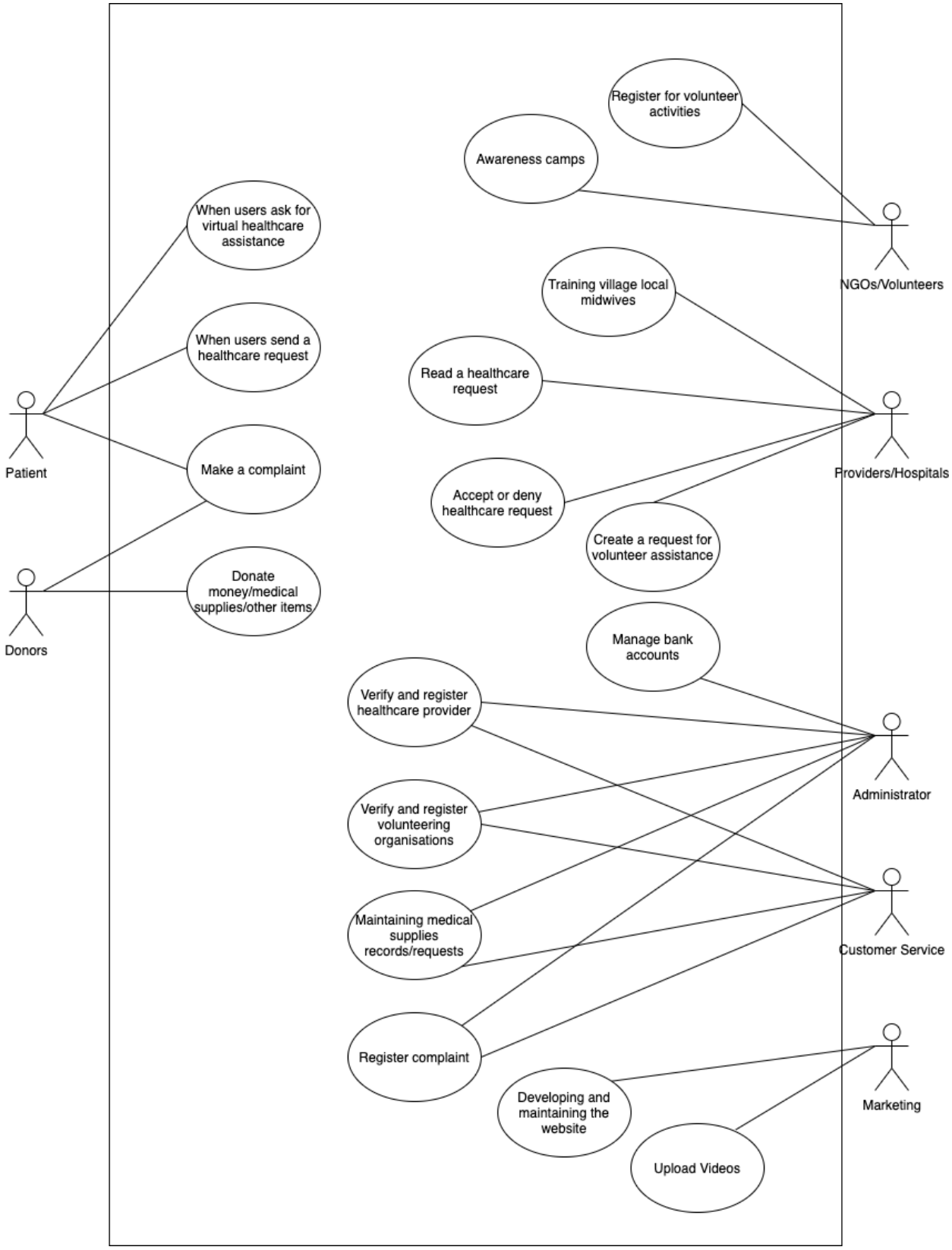
3.5 Network diagram:

Sr No.	Task	Duration	Predecessor
1	A. Project Initiation	1	-
2	B. Research and Focus groups	1	A
3	C. Development teams	3	A
4	D. Marketing to users	1	B,C
5	E. Development & Implementation activities	4	D
6	F. Monitoring the app	3	D
7	G. Hiring new crew	2	E
8	H. Ensuring project is within the scope	1	D

9	I. Test App	1	E,H,F
10	J. Optimization and maintenance	10	G,I
11	K. Preparing final launch	5	J
12	L. Present to stakeholders	3	K
13	M. End Project	1	L



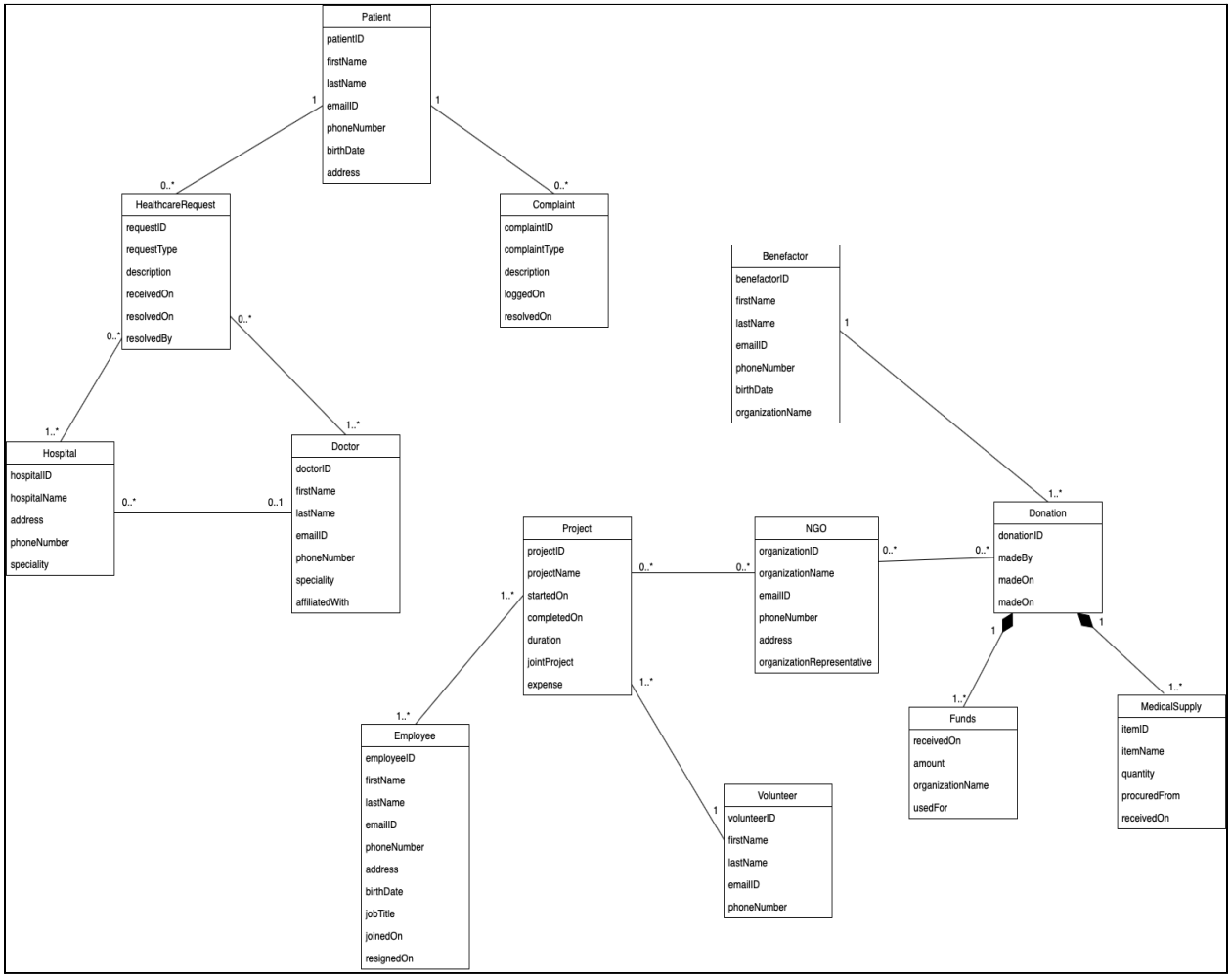
3.6 Use case diagram:



3.7 Class Diagram:

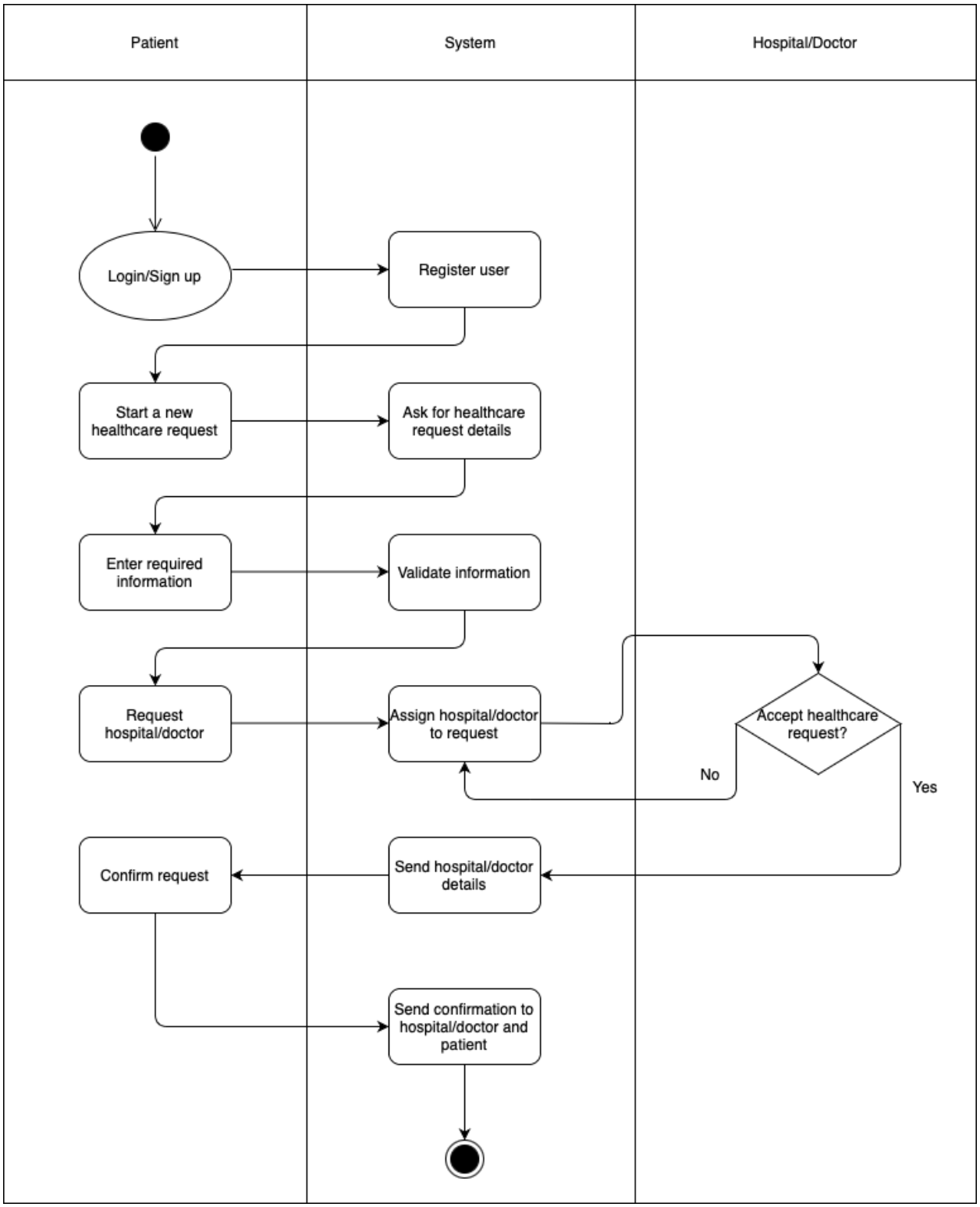
Classes:

- Patient
- Benefactor
- Doctor
- Employee
- Volunteer
- NGO
- Hospital
- Project
- Donation - Composed of Funds, Medical Supply
- Healthcare Request
- Complaint

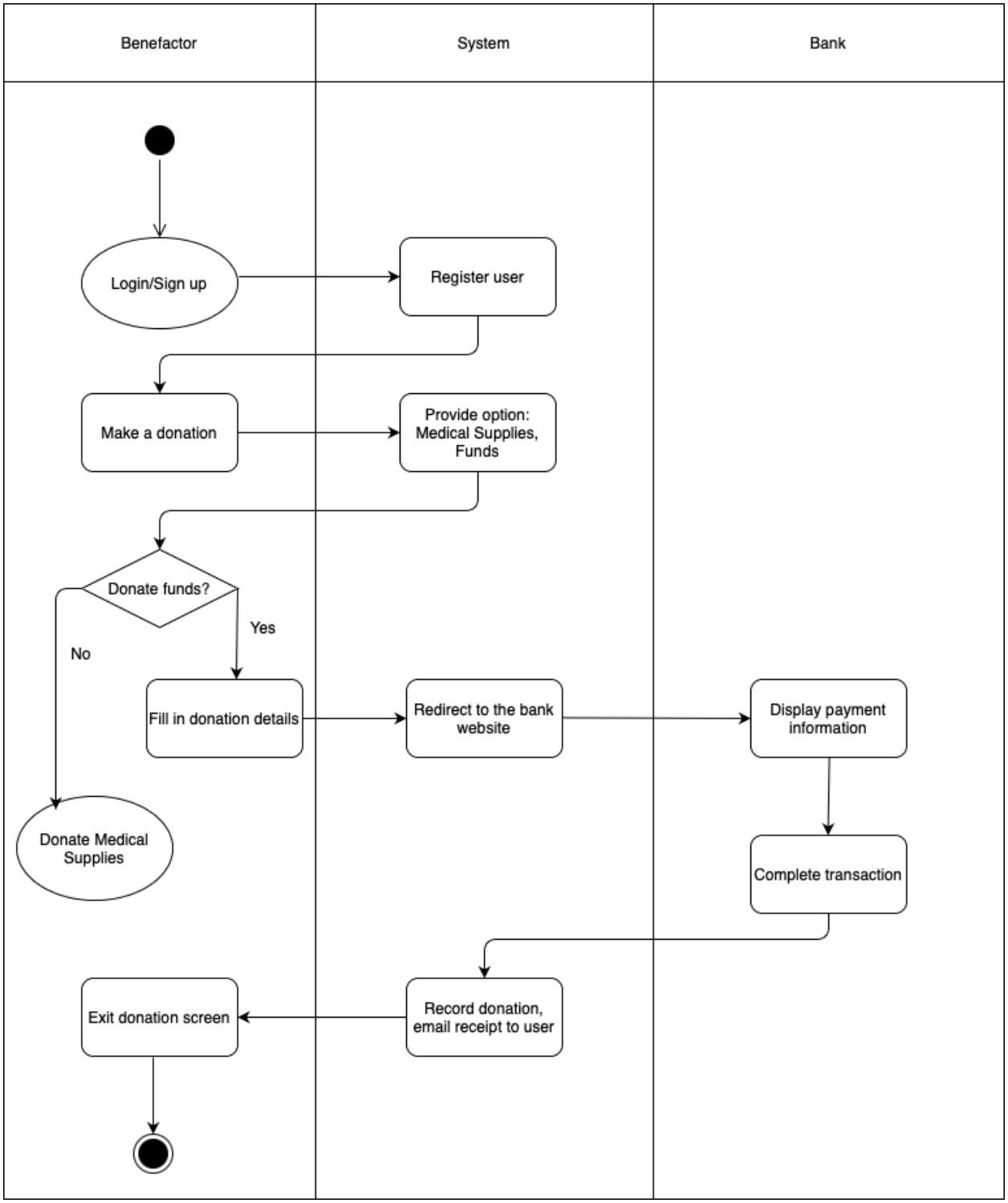


3.8 Activity Diagrams:

Create a healthcare request

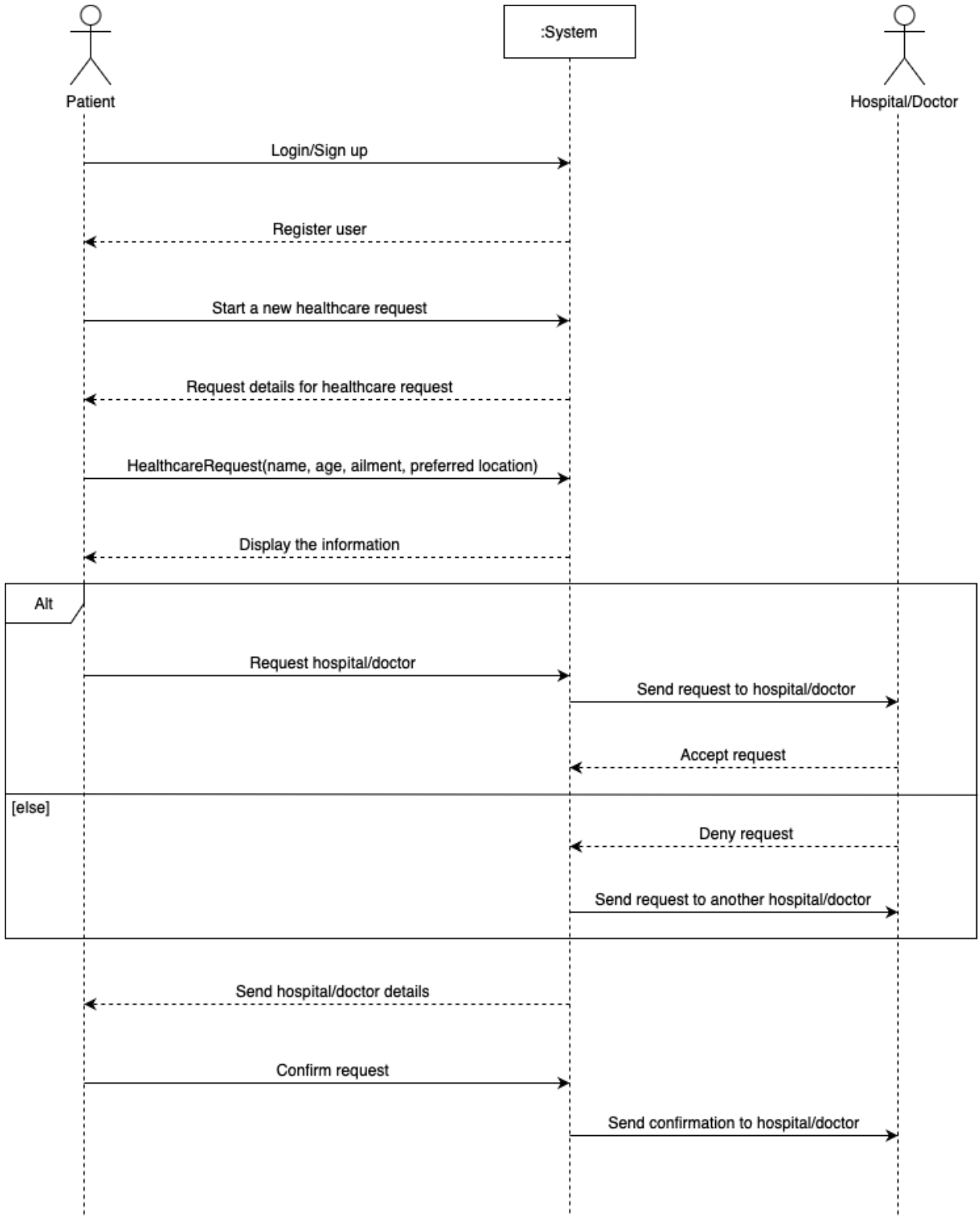


Make a donation



3.9 System Sequence Diagram:

Create a healthcare request



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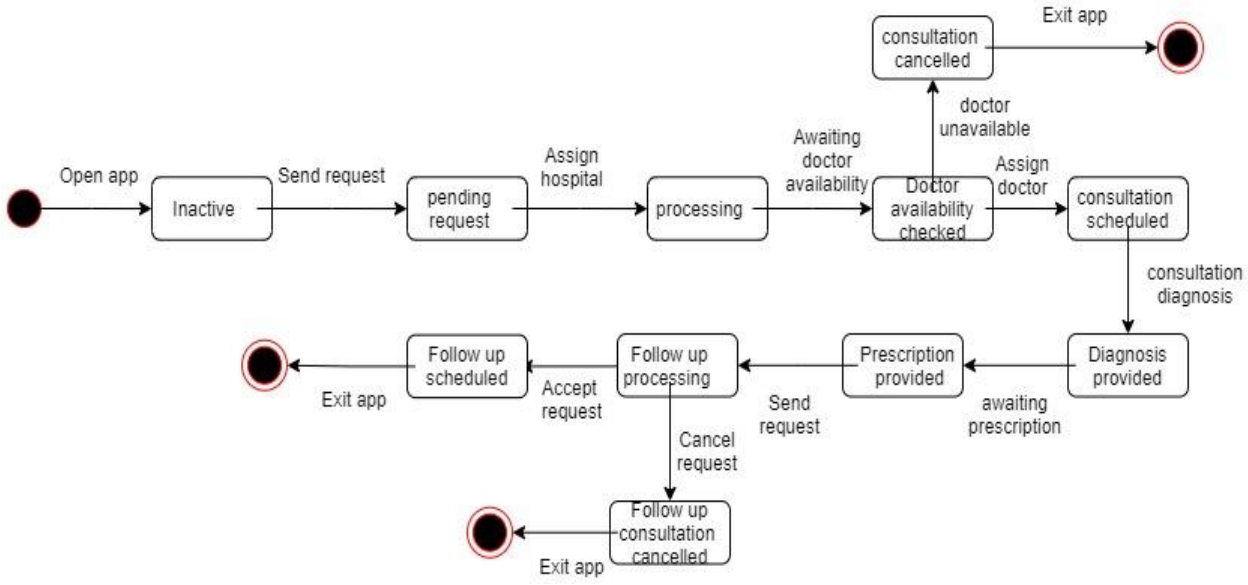
3.10 State Machine Diagram:



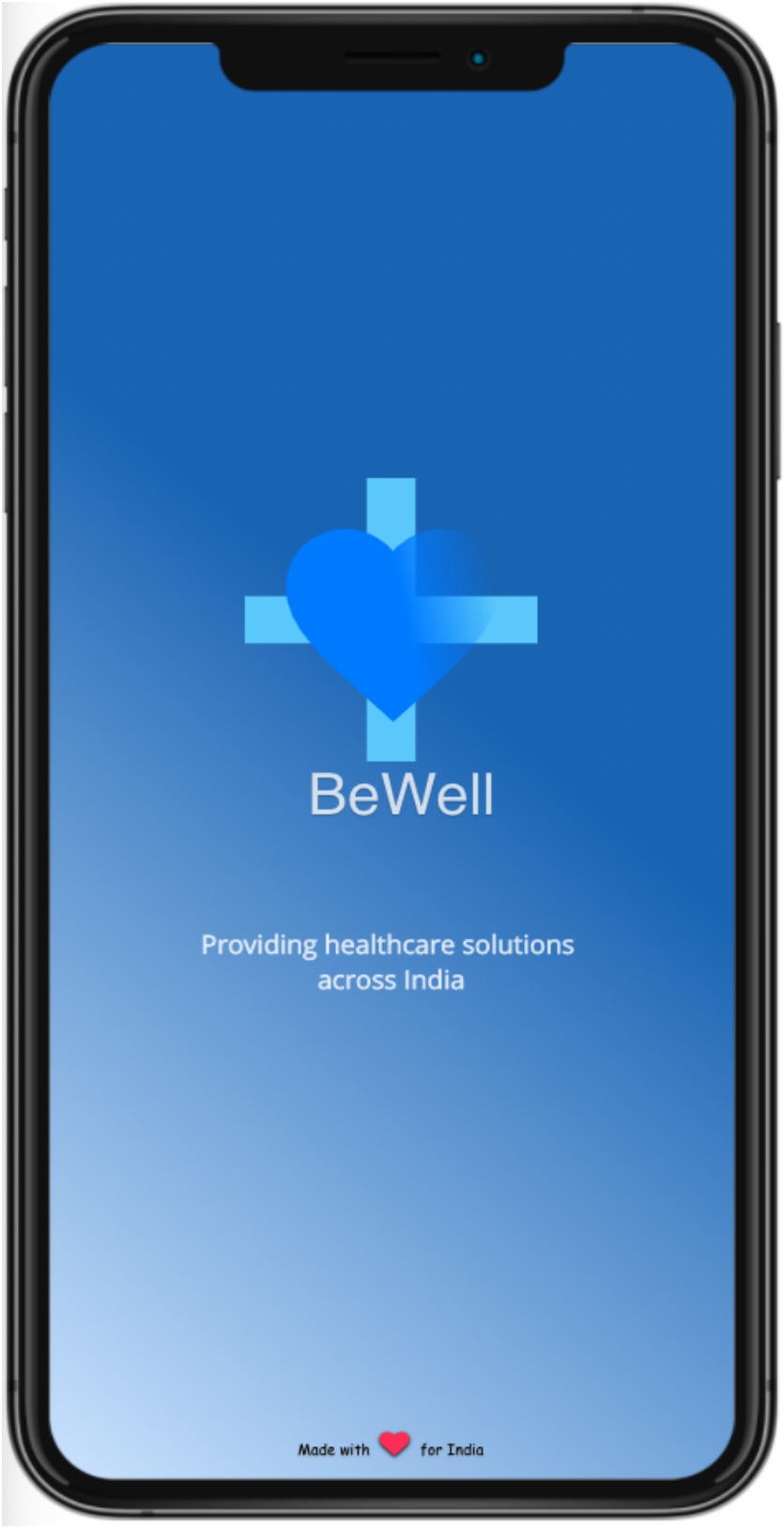
4. Cost Benefit Analysis:

Year	0	1	2	3	4	5
Cost						
Analysis, design, implementation	$1,200,000					
Operation and maintenance	-	$(240,000)	$(240,000)	$(240,000)	$(240,000)	$(240,000)
Total Costs	**$1,200,000**	**$(240,000)**	**$(240,000)**	**$(240,000)**	**$(240,000)**	**$(240,000)**
Discount Factor(15%)	1.00	0.87	0.76	0.66	0.57	0.50
Present Value of Costs	$1,200,000	$208,800	$182,400	$158,400	$136,800	$120,000
Cumulative PV of Costs	$1,200,000	$1,408,800	$1,591,200	$1,749,600	$1,886,400	$2,006,400
Benefit						
Tangible Benefits from system	-	$220,000	$510,000	$610,000	$610,000	$610,000
Intangible Benefits from new systems	-	$200,000	$540,000	$690,000	$690,000	$690,000
Total Benefits	**-**	**$220,000**	**$1,050,000**	**$1,300,000**	**$1,300,000**	**$1,300,000**
Discount Factor(15%)	1.00	0.87	0.76	0.66	0.57	0.50
Present Value of Costs	-	$191,400	$798,000	$858,000	$741,000	$650,000
Cumulative PV of Costs	-	$191,400	$989,400	$1,847,400	$2,588,400	$3,238,400
Cumulative PV of Benefits+Cost	**-$1,200,000**	**-$1,217,400**	**-$601,800**	**$97,800**	**$702,000**	**$1,232,000**

1. **Payback period** = development cost / (annual benefit – annual cost)
   = **3 years**
2. **IRR** = (estimated lifetime benefit – estimated lifetime cost) / estimated lifetime cost
   = $1,232,000 / $2,006,400 = about 61%,
   Annual IRR = 61%/5years = 12.2%
3. **NPV** > 0, feasible project
4. **Profitability index** = PV of benefit / PV of development cost
   = $3,238,400/$1,200,000 > 1 , profitable

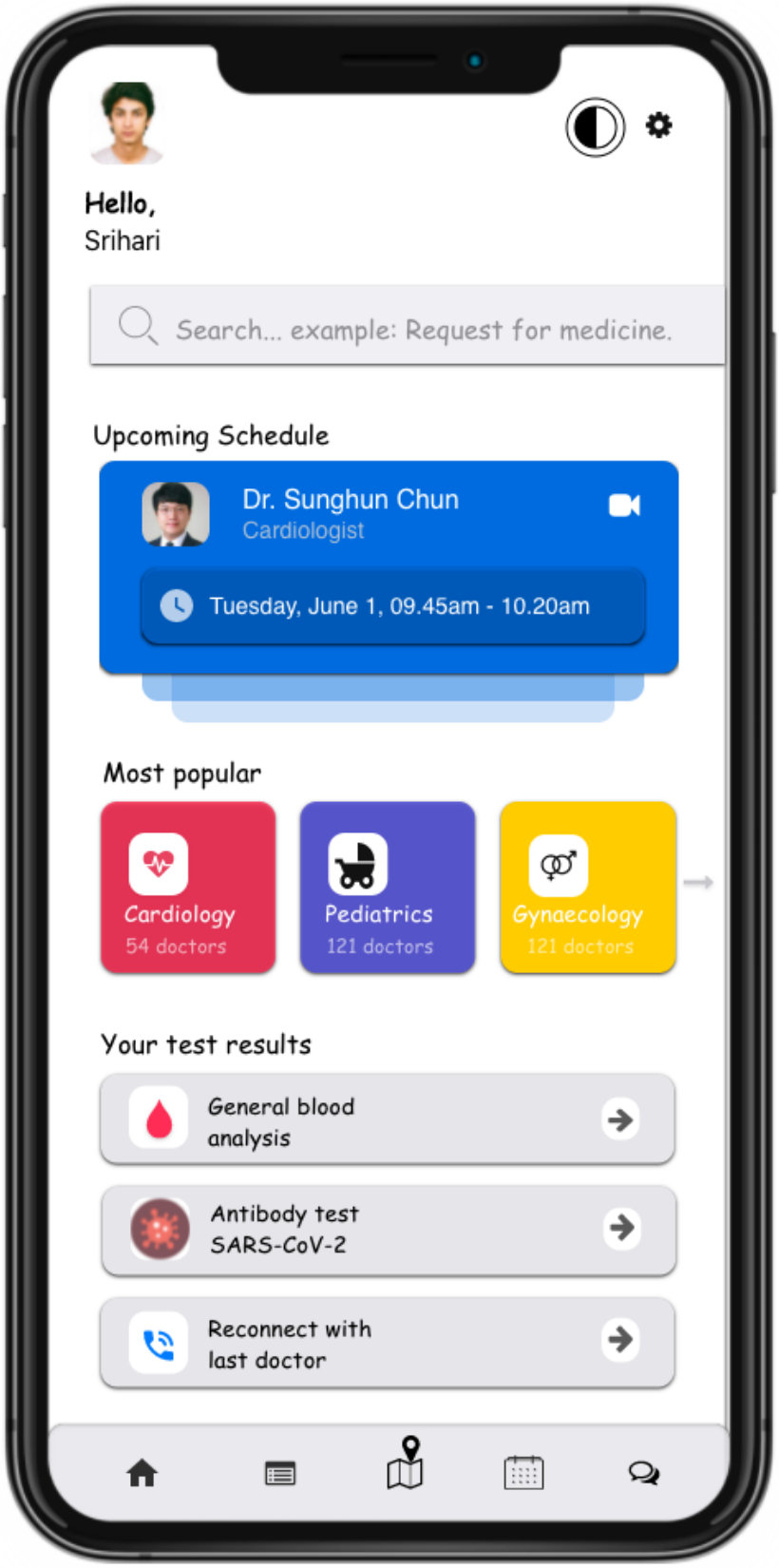
5. User Interface Design:

Landing page:

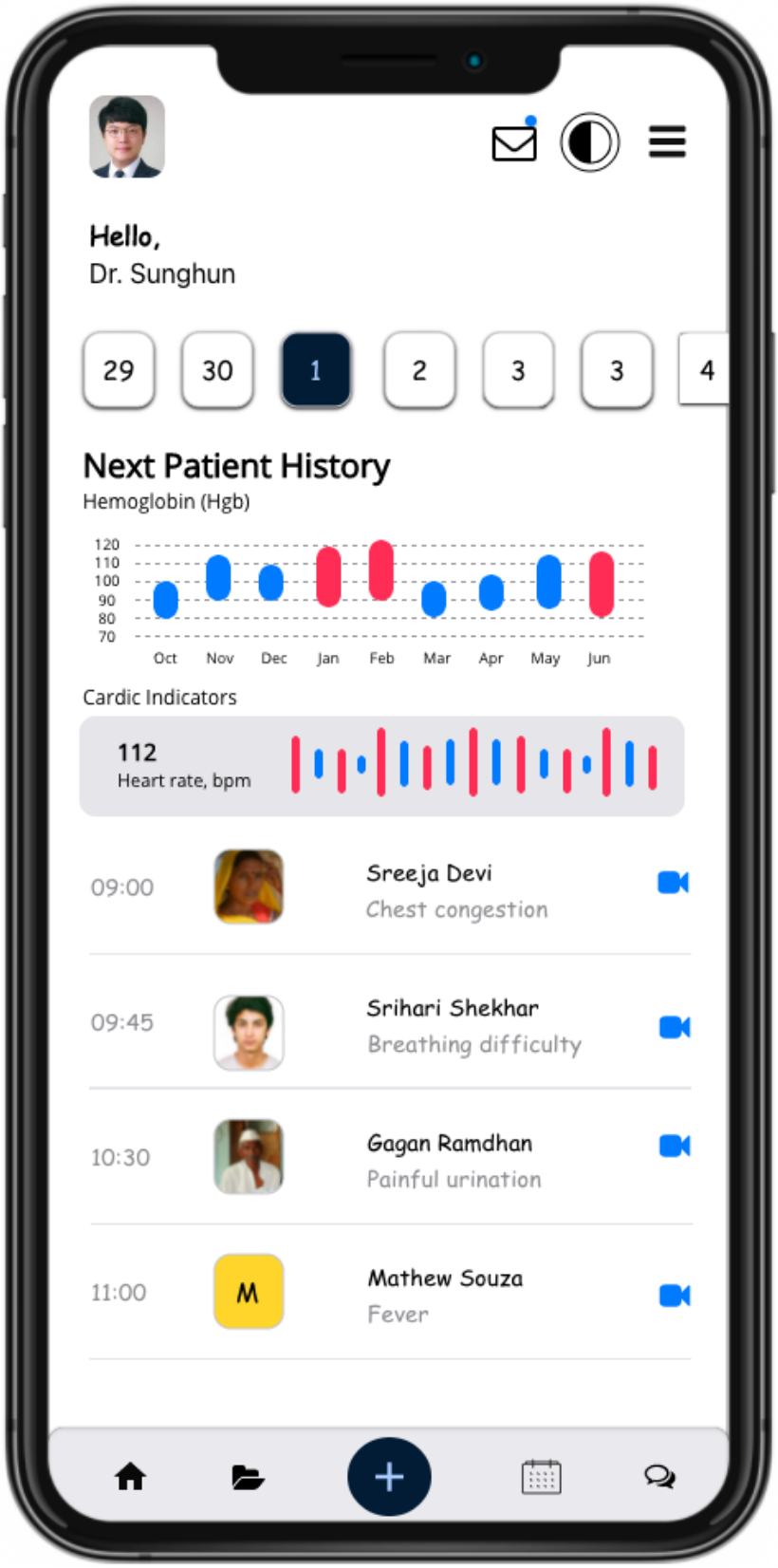


Login screen:

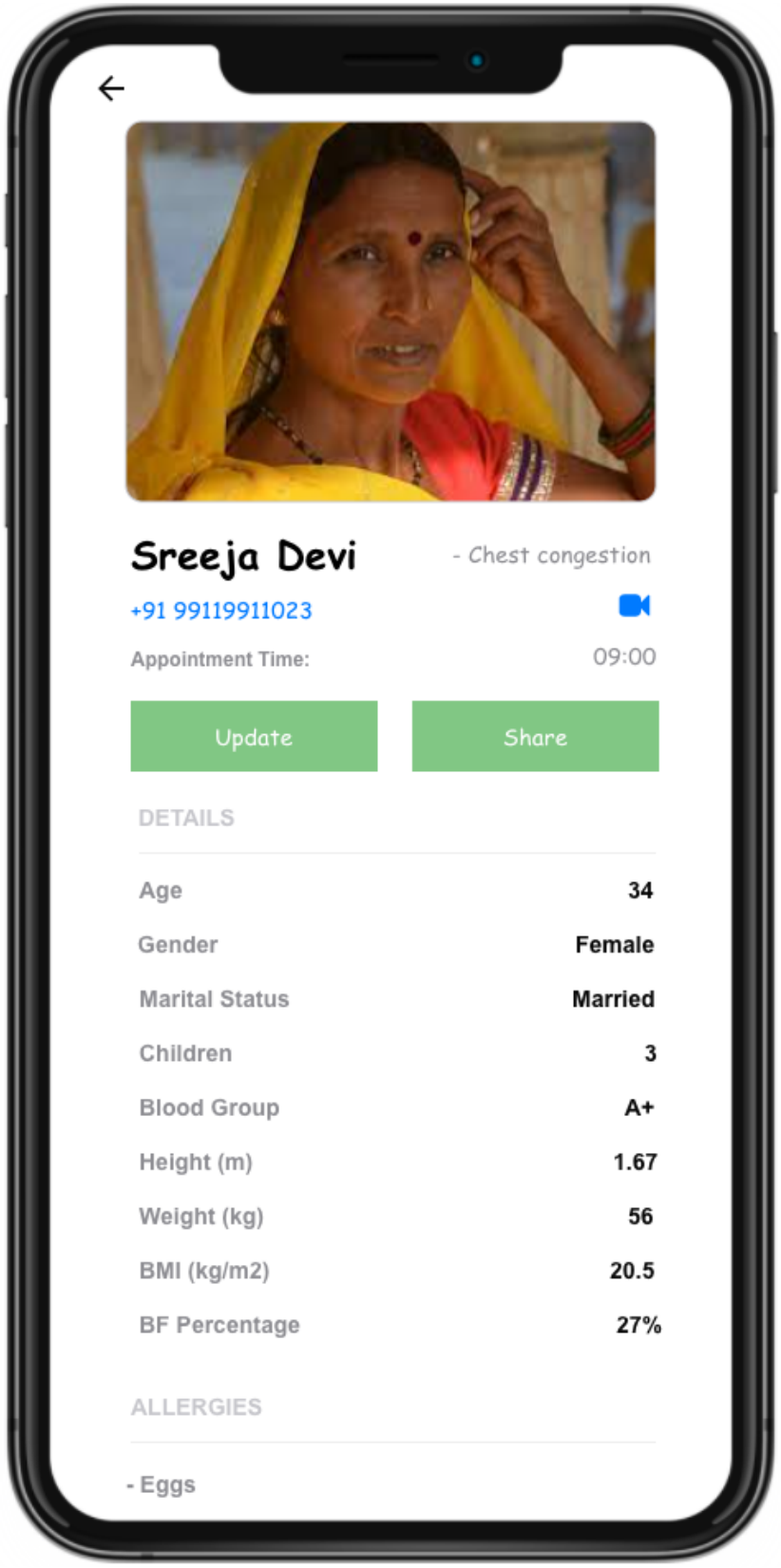
Patient screen:

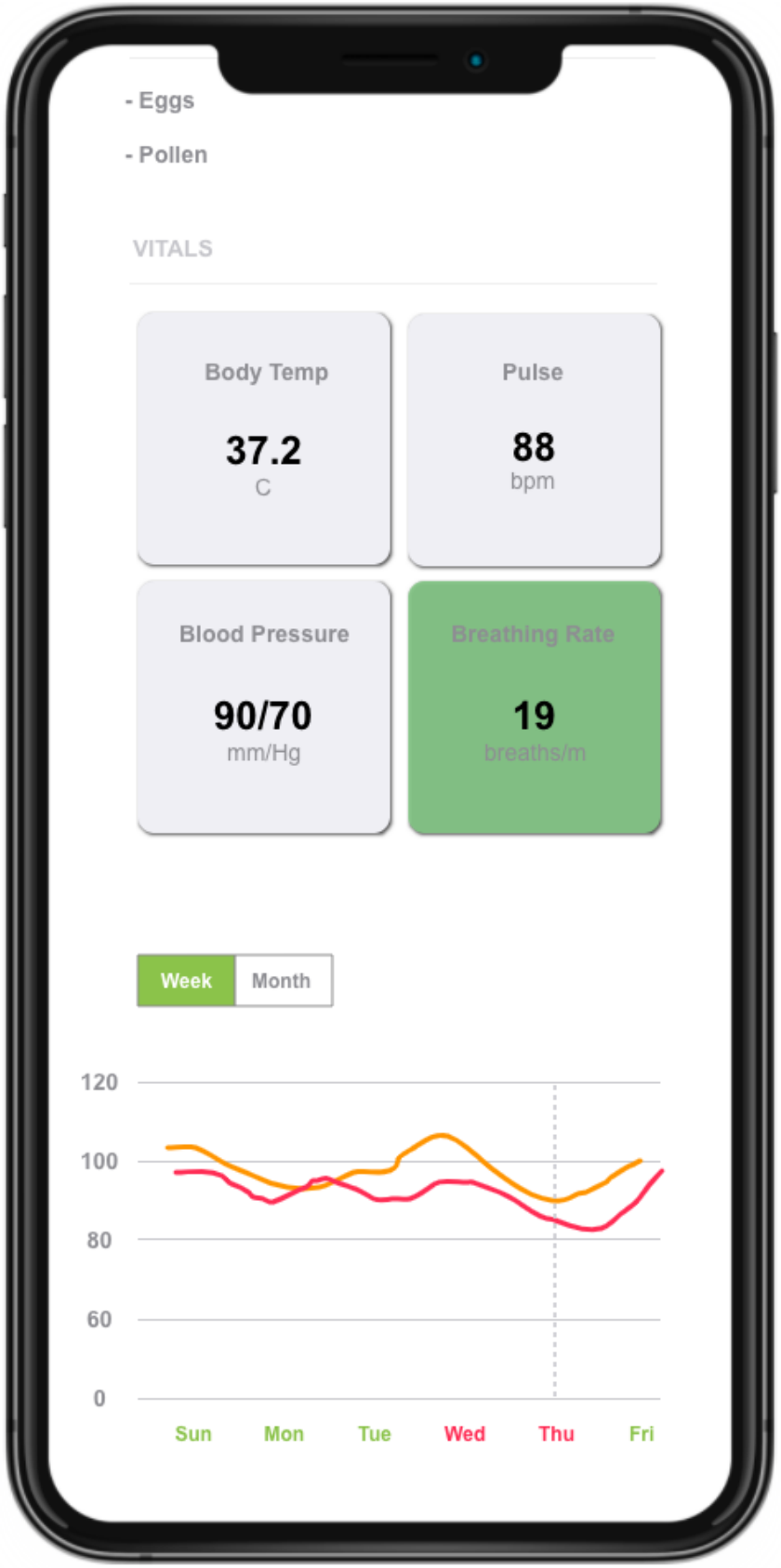


Doctor screen:



Patient Details screen for Doctor:

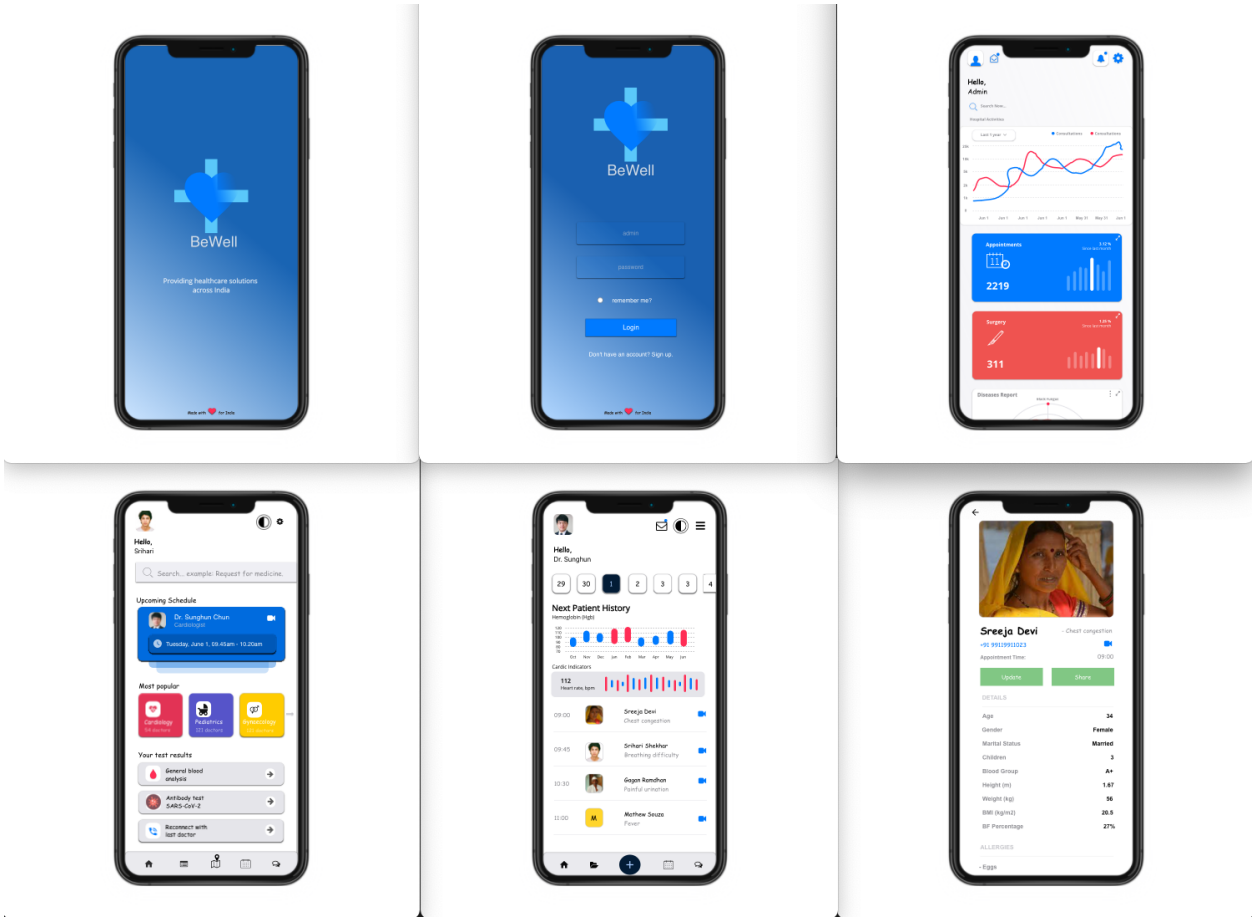


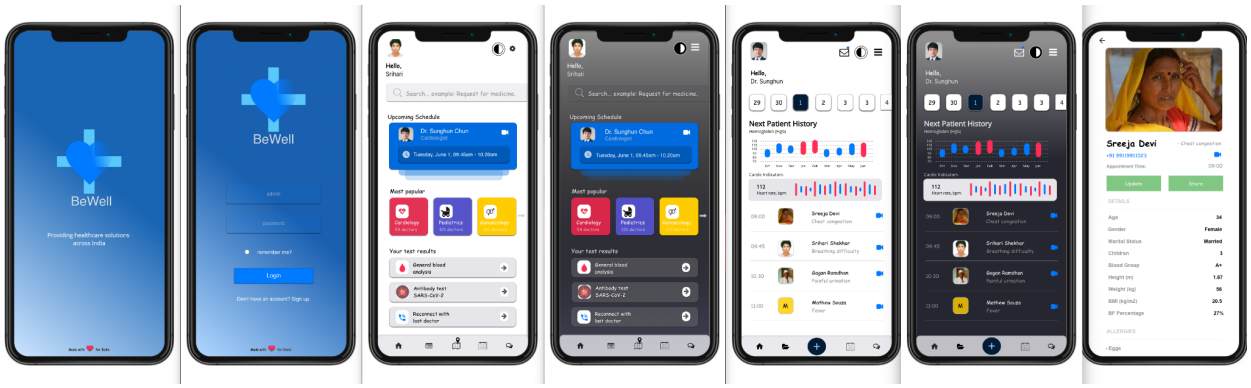

- Eggs
- Pollen
VITALS
Body Temp
37.2
C
Pulse
88
bpm
Blood Pressure
90/70
mm/Hg
Breathing Rate
19
breaths/m
Week
Month
120
100
80
60
0
Sun
Mon
Tue
Wed
Thu
Fri

Admin screen:


Appointments
3.12 %
Since last month
2219
Surgery
1.25 %
Since last month
311
Diseases Report
Black Fungus
Flu
Covid-19
tuberculosis
Hospitals
Medicine Requests
Devasir 50mg
50 Nos
2 mins ago
Buy Order
Amlosafe 100mg
125 Nos
2 mins ago
Buy Order

Integrated View:





5.1 Logic and Flow of the prototype:

- The application starts with the **Opening Page** with a line about the simple purpose of the application - "**Providing healthcare solutions across India**". When the user **taps** on the app logo, the flow moves to the **Login Page**.
- The **login page** is a shared login portal for **patients, doctors, admin, NGOs** and **other healthcare providers**. Upon entering the username and password, the system checks the credentials and knows whether the user is a patient, healthcare provider or admin. The flow then moves to the next page depending upon the user.
- If the user is an **admin,** the application moves to the **Admin Page.** This page contains details about the hospitals, diseases reports and spread, all appointments made through the app, all transactions, medicine requests, etc. The dashboard of the admin page offers all the details mentioned above with a **tap** on the required details button. Each box is expandable which is intuitive and shown with an expand icon on the top right corner of the box.
- If the user is a **patient**, the flow moves to the **Patient Page.** The top left corner of the page has a profile picture icon which expands into a drop down menu upon tapping. The page shows the user all of their medical history and allows them to make appointments virtually to any doctor available or with any registered local healthcare provider. The dashboard also offers the user to view all nearby registered healthcare providers with a **tap** on the map icon provided at the bottom. It shows the user their upcoming appointments and all of their previous appointments. The page also offers a night mode option to be consumable during dark hours to reduce strain to the eyes.
- If the user is a **doctor,** the **Doctor Page** opens upon login. This page provides the doctor with all of the patient's medical history, including previous medications, previously consulted doctors, their heart rate, Hemoglobin, etc. These details are very useful to the doctor. Post diagnosis, the doctors make requests on the application to the admin for the medicines to be prescribed. All the medicines are stored in the database. This allows supervision on all the drugs that are being used and their correct usage.