Project Report - Plasma Donor Application

1. **INTRODUCTION**

1.1 Project Overview :

The world is suffering from the COVID 19 crisis and no vaccine has been found yet.. But there is another scientific way in which we can help reduce mortality or help people affected by COVID19 by donating plasma from recovered patients. In the absence of an approved antiviral treatment plan for a fatal COVID19 infection, plasma therapy is an experimental approach to treat COVID19-positive patients and help them faster recovery.In the recommendation system, a donor who wants to donate plasma can do so by uploading their COVID19 certificate, and the blood bank can see who has uploaded the certificate and make a request to the donor, and the hospital can register/login and search for plasma and obtain plasma.

1.2 Purpose

Our project's major purpose is to create a web application that can aid in lowering mortality or assisting individuals in need of plasma donations. A helping hand would be provided by saving the donor information and notifying the list of current donors about the needy.

2. LITERATURE SURVEY

2.1 Existing problem

As we all know, the conventional methods of finding plasma require one to independently confirm the information by consulting hospital records and contacting recovered donors, who occasionally may not be present at home and may relocate. The health of those who are ill in this kind of situation deteriorates drastically. Finding plasma is not regarded as a quick process as a result.

2.2 References

i) Rishab Chakrabarti, Prof. S. M. Chitalkar - "Lifesaver E-Blood Donation App Using Cloud", 2020

ii) Meiyappan, K. Loga Vignesh, R. Prasanna, T. Sakthivel - "D'WORLD: Blood Donation App Using Android", 2019

iii) P. C. P. C. A. V. I. M. Yan - "Building a chatbot with serverless computing" IBM Watson research center, 2016

iv) Ashlesha C. Adsul, V. K. Bhosale, R. M. Autee - "Automated blood bank system using Raspberry PI", 2018

v) FahimHalil, Ibrahim Cebe, Jawab Rasheed, Farzad Kiani, mHealth – Blood donation application using android smartphone

vi) Z. Al-Ali - "Android Based Health Application in Cloud Computing for Blood Bank", 2018

v) Sultan Turhan - "An Android Application for Volunteer Blood Donors", 2015

vi) Catassi, C. A., Petersen, E. L - "The Blood Inventory Control SystemHelping Blood Bank Management Through Computerized Inventory Control", Transfusion, Vol. 7, No. 60, 196
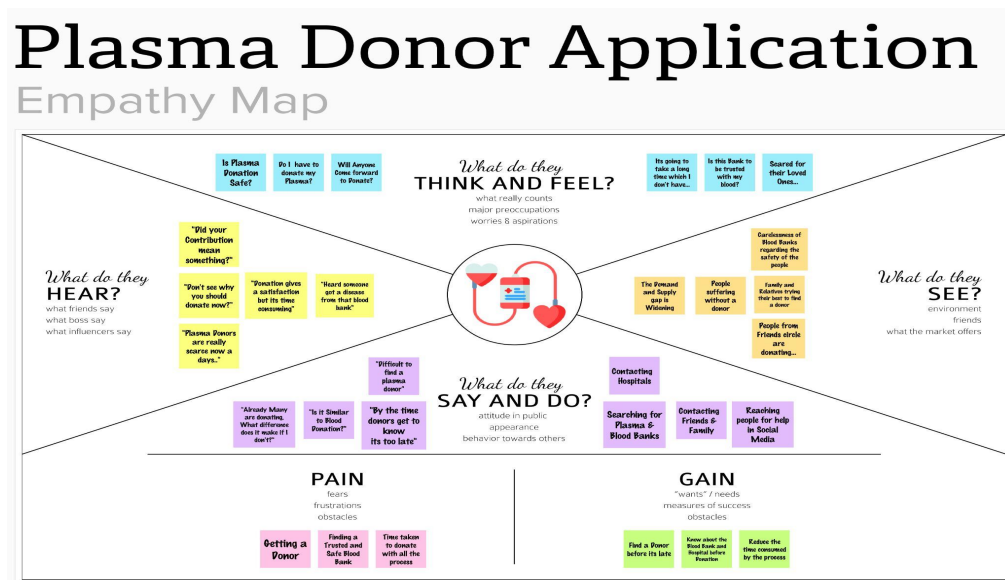Aishwarya, R Gowri – "Developing a Plasma donor application using Function-as-a service in AWS"

vi) Sultan Turhan, "An Android Application for Volunteer Blood Donors", Computer Science & Information Technology- CSCP, pp. 23–30, 2015
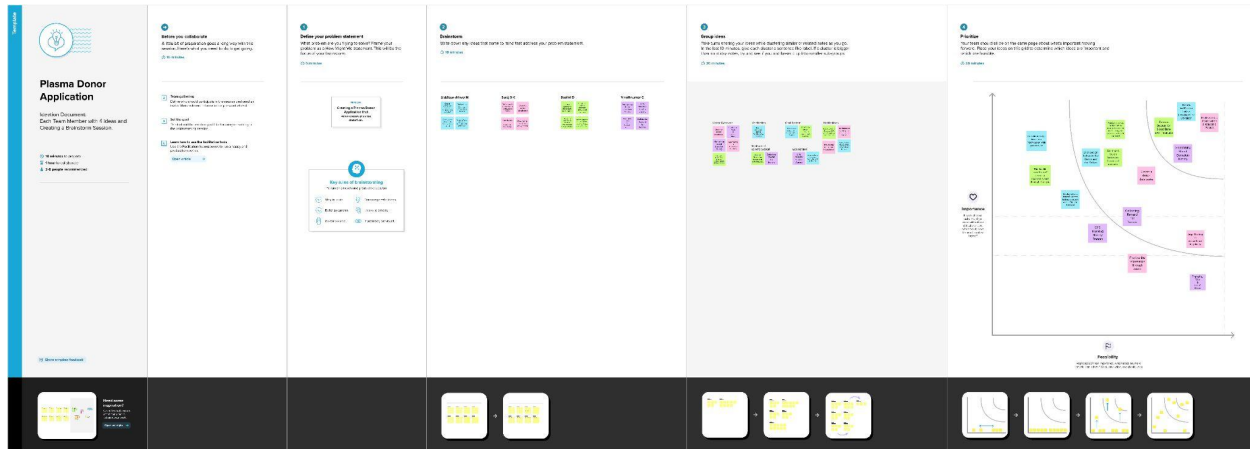
2.3 Problem Statement Definition

The need for plasma surged significantly during the COVID 19 crisis since there were no vaccines available to treat the infected patients. Finding a plasma donor in such a case was extremely difficult, and determining which donors are eligible to donate plasma as well as whether they had previously been infected and have recovered was a difficult effort. We are putting forth a concept in which we will connect the plasma donor and requester in a novel approach in order to create an application that is user-friendly and has more features for better servicing the public.

3. IDEATION & PROPOSED SOLUTION
3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming

1.1 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The need for plasma surged significantly during the COVID 19 crisis since there were no vaccines available to treat the infected patients. Finding a plasma donor in such a case was extremely difficult, and determining which donors are eligible to donate plasma as well as whether they had previously been infected and have recovered was a difficult effort.We are putting forth a concept in which we will connect the plasma donor and requester in a novel approach in order to create an application that is user-friendly and has more features for better servicing the public.

2.	Idea / Solution description	We will be developing a web application that allows users to look up available donors. A donor must fill out the website's registration form with their information. Users who have registered have access to data on the number of donors for each blood group. The database will have all the information. Users can request certain blood groups at any time, and the concerned blood group donors will be notified of the request.
3.	Novelty / Uniqueness	1.Review systems enable people to know more about blood banks and hospitals. 2.Chat system between the Donor and the Patient 3. Push notifications for Donors to accept the request since it is triggered as soon as request is posted. The health condition of the donor or receiver is sent through the app.
4.	Social Impact / Customer Satisfaction	Our website application may contribute to a reduction in mortality and provide assistance to those in need of plasma donations.Saving the donor information and informing the list of active donors about the needy will provide a helping hand.
5.	Business Model (Revenue Model)	Through partnerships with NGOs and hospitals, the company can monetize our application.
6.	Scalability of the Solution	1. We have created an application to solve every issue that the present offline as well as online systems experience in order to encourage people to donate plasma and to assist

		patients obtain plasma in emergency situations. 2. Since the programme is hosted in the cloud, a large number of users can access it. 3. Using this application, we will be able to contact plasma banks and hospitals as well as privately registered donors if a patient needs plasma in an emergency.

3.4 Problem Solution fit

Project Title: Plasma Donor Application   **Project Design Phase-I – Solution Fit**   **Team ID: PNT2022TMID53650**

Define CS, fit into CC

1. CUSTOMER SEGMENT(S)   **CS**
- Plasma Donors and Seekers
- Clients and Hospitals

6. CUSTOMER CONSTRAINTS   **CC**
- Patients can lack the necessary tools and methods for obtaining plasma.
- The data and history of donations are not managed by donation centers in an effective manner.

5. AVAILABLE SOLUTIONS   **AS**
- Both donors and patients have a platform to monitor the availability and viability of the donation procedure thanks to the solutions that are already available.
- Some of the current solutions offer health-related recommendations, but a licensed doctor might not think these recommendations are wise.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS   **J&P**
- Plasma depend and supply gap has grown bigger
- Lack of security
- Lack of incentives for the donors
- Lack of awareness

9. PROBLEM ROOT CAUSE   **RC**
- Lack of plasma donors is the primary issue since only a small number of individuals are aware of how important plasma donation is.
- Users are reluctant to go through the laborious and unnecessary procedure, which makes donating plasma a difficult task.

7. BEHAVIOUR   **BE**
- Donors anticipate a user-friendly contribution process in which, after registering in the app, a date and time slot for their donation at a local center is assigned.
- Additionally, the information is kept private, and the potential contributors are impartial.
- Patients assume that as soon as a request is made, a list of available donors will appear.

Focus on J&P, tap into BE, understand RC

Identify strong TR & EM

3. TRIGGERS   **TR**
- Gain benefits for your donation.
- Be more aware of your data.
- Understands the need.

4. EMOTIONS: BEFORE / AFTER   **EM**
- Before: Confused, Scared, Anxious
- After: Motivated, Relaxed, Helpful

10. YOUR SOLUTION   **SL**
- Users of a customizable donation web-based app can sign up as either donors or patients in need of plasma. Donors will get a date and time slot assigned for donation in a nearby center. Identifying appropriate donors and notifying the receiver through email when the plasma is ready.

8. CHANNELS of BEHAVIOUR   **CH**
ONLINE
- Digital advertisement
- Social Media Marketing

OFFLINE
- Request recommendations from friends or other users.
- Campaigns and awareness programmes are possible.

Extract online & offline CH of BE

4. REQUIREMENT ANALYSIS

4.1 Functional Requirements

- USER REGISTRATION: For registering, the user must enter their name, gender, plasma group, location, contact information, username, and password.
- USER LOGIN: The user should be able to log in to the plasma donor application once they have registered. The database will store the login details for further use.
- DONOR or RECEIVER: The user can choose to switch between being a Donor, a Receiver, or both.
- REQUEST BLOOD PLASMA: The user can specify the plasma group they require.
- SELECT DONOR: From the list of donors, the user can choose the donor they wish.
- VIEW REQUEST: Donor can view the request of the user. SENDING ACKNOWLEDGEMENT: If the request is accepted by the donor, then the ack is sent

4.2 Non-Functional requirements
- USABILITY: The users are of different types – requester, donor.
- PERFORMANCE: The application must perform well in all aspects. The system must have a user-friendly interface that is easy to navigate.
- SECURITY: The system must be secured as it deals with usernames, passwords, blood groups and other personal details of the user.
- AVAILABILITY: The system must be available 24/7

5. PROJECT DESIGN
5.1 Data Flow Diagrams
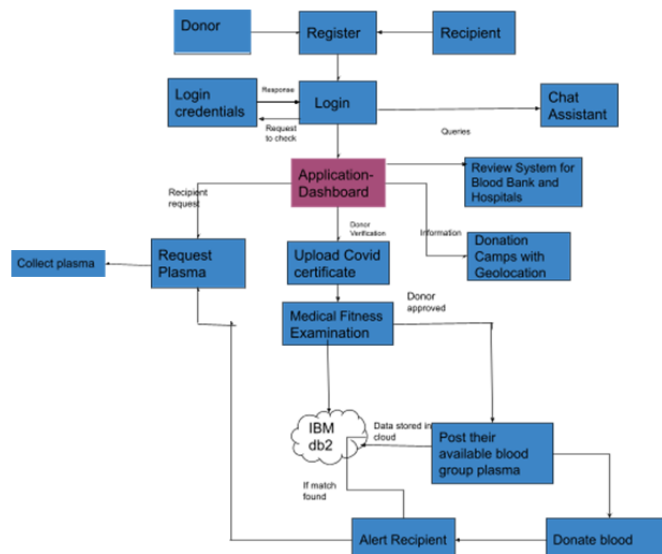
5.2 Solution Architecture

Solution Architecture
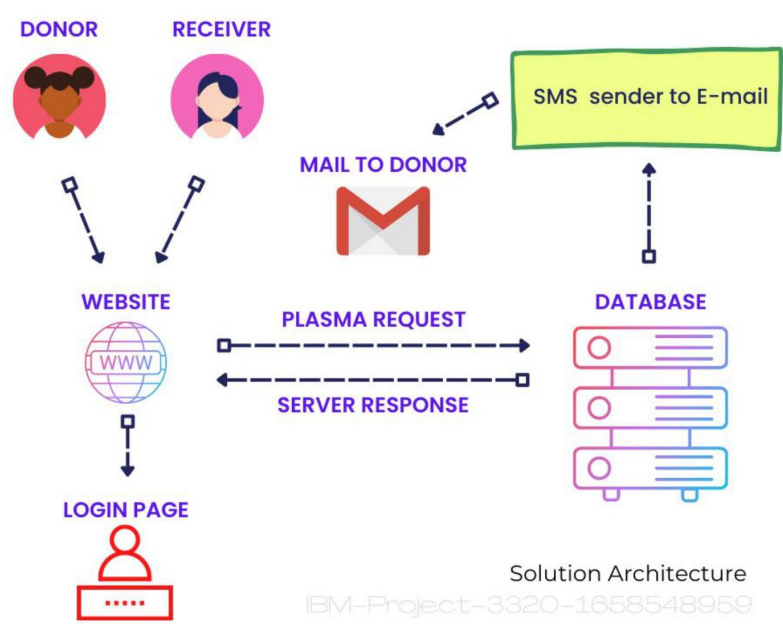
Technical Architecture

Table-1: Components & Technologies:

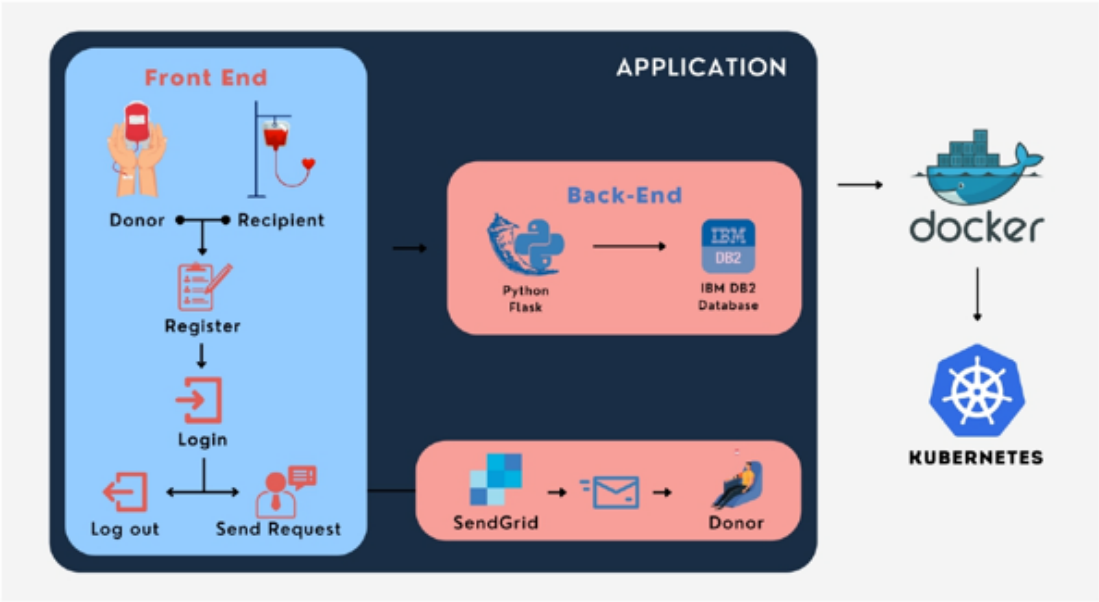| S. No	Component	Description	Technology
1.	User Interface	How user interacts with application	HTML, CSS, JavaScript / React Js
2.	Application Logic-1	Registration with verification and Login to the app.	Python
3.	Application Logic-2	Dashboard with donors and plasma availability details for recipient and requests for donors	Python-Flask
4.	Application Logic-3	Chatbot for FAQs, raising requests and other services	IBM Watson Assistant
5.	Application Logic-4	Raising request for plasma in the app which is sent to the Donors.	Python, SendGrid
6.	Database	String, integer, long, allowed values	MySQL or PostgreSQL
7.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloud
8.	External API-1	Containerize the application	Docker, Container Registry.
9.	External API-2	Send Mail and SMS to notify the Donors on the requests.	SendGrid
10.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud	Kubernetes, Cloud Foundry

Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Open Source Backend Framework to create API Endpoints	Python-Flask
2.	Security Implementations	Prevents data leakage and secures medical records of the users.	Docker content Trust (DCT), Transport Layer Security(TLS), Container registry
3.	Scalable Architecture	Kubernetes Cluster allow containers to run across multiple machines and environments	Kubernetes Cluster, Docker
4.	Availability	Kubernetes and IBM Cloud being run by multinational organizations have a very less chance of going down, hence always available.	Kubernetes Cluster, IBM Cloud
5.	Performance	Kubernetes and Docker are known and used widely, even by fortune 500 companies, for their exceptional performance, all factors considered.	Kubernetes Cluster, IBM Cloud, Docker

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user) ((Donor/Recipient)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register with my Gmail account	Medium	Sprint-1

	Login	USN-5	As a user, I can log into the application by entering email & password	I can register and access user profile with Gmail account	High	Sprint-1
	Dashboard	USN-6	As a user, I can look up the blood type for which I need plasma .	I receive notifications when required plasma from donorS are available	High	Sprint-2
Customer (Web user) (Donor/Recipient)	Login	USN-7	As a user, I can sign up and log into the application via e mail & password to view the profile.	I can register and access user profile with Gmail account/Facebook	High	Sprint-1
	Dashboard	USN-8	As a user, I can see login page and registration page for which the user logins and searches for the required blood group plasma.	I can login through Gmail and Facebook and register for my required blood group plasma.	Medium	Sprint-2

Customer Care Executive	User support	USN-9	I may address the user's concerns and questions as a help desk representative.	I can view and address their concerns and questions	Medium	Sprint-3
Administrator	Registration	USN-9	As an Administrator, I can view the database of the registered users.	I can check and verify the registered user's login credentials	Medium	Sprint-4

	Dashboard	USN-10	I can see how many members require what type of blood group for plasma in my capacity as an administrator.	I can count the number of requirements.	High	Sprint-3
	Application	USN-11	I can manage websites' technical operations as an administrator.	I can help with everything from problem solving to setting up web hosts, ensuring clients have access, and even developing servers.	Medium	Sprint-2

Chat Assistant	Dashboard	USN-12	I can answer all of the recipient's and donor's questions and the help they need in addition to the customer service representative.	I can respond to all of the queries associated with our application.	Medium	Sprint-4

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story points	Priority	Team Members
Sprint 1	User Registration	USN-1	As a user, I can register for the application by entering my email, password, confirmingmy password and phone number.	10	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 1	User Login	USN-2	As a user, I can log into the application by entering username & password.	10	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 1	Access Website	USN-3	User should be able to access application using browser	10	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 2	Dashboard	USN-4	The user upon logging in views the application dashboard where he/she can use all the application's services.	10	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 2	Request For Blood plasma	USN-5	The user who is in need of blood plasma can request for blood by specifying the blood type.	20	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C

				20	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 2	Switch User Roles	USN-6	As a user, he/she can switch roles between Donor and Receiver.			
Sprint 3	View Plasma Request	USN-7	A donor receives an Email of about the receiver's details of the same blood type.	20	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 3	View Donor Details	USN-8	The receiver can view the list of Donors of the blood type requested.	10	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 4	Logout Process	USN-9	The User will be able to Logout of the application.	10	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C
Sprint 4	Bot service in the website	USN-10	The user can use Bot Service to request for Blood Plasma and also switch between roles.	10	High	Siddique Afraaz N, Suraj S K, Saalini D, Vinothkumar C

6.2 Sprint Delivery Schedule

PROJECT TRACKER:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (On Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

VELOCITY: SPRINT - 1

Sprint duration = 6 days

Velocity of team = 20 points

Average Velocity (AV) = Velocity /Sprint duration

$$AV = 20/6 = 3.333$$

Average Velocity = 3.33

VELOCITY: Sprint 1 - 4

Sprint duration = 24 days
Velocity of team = 80 points
Average Velocity (AV) = Velocity/ Sprint duration

$$AV = 80/24 = 3.333$$
Total Average Velocity = 3.33

BURNDOWN CHART
   • A BurnDown Chart plots the amount of work remaining to perform against the amount of time. In agile software development approaches like Scrum, it is frequently employed.
• However, burn down charts can be applied to any project containing measurable progress over time.

7. CODING & SOLUTIONING
7.1 Feature 1:

Customer (Mobile user) ((Donor/Recipient) :
  ● **Registration**
  ● Login
  ● Dashboard

Customer (Web user) ((Donor/Recipient) :
  ● **Registration**
  ● Login
  ● Dashboard

Administrator
  ● Registration
  ● Dashboard
  ● Manage Application

Chatbot:
  ● Address user's queries

7.2 Feature 2:

  ● Highly Scalable
  ● .Users can request certain blood groups at any time, and the concerned blood group donors will be notified of the request.
  ● Deployed on Ibm Cloud

Source Code:

8. TESTING
8.1 **Test cases**

- How the user interacts with application
- Registration with verification and Login to the app.
- Dashboard with donors and plasma availability details for recipients and requests for donors
- Chatbot for queries, raising requests and other services
- Raising request for plasma in the app which is sent to the Donors
- Application Deployment on Local System / Cloud
- Send Mail and SMS to notify the Donors on the requests.

8.2 **User Acceptance Testing**

- Users can register/login into the application via their Gmail account
- Users can access their account / dashboard.
- Donors should update Covid-19 certificate.
- Users can request for the required plasma
- Recipients receive notifications when required plasma from donors are available.
- Chatbot can respond to all the donors and receipient's queries.

10.ADVANTAGES AND DISADVANTAGES
Advantages:

- With our customizable donation web based app ,users can sign up as either donors or patients in need of plasma. So that it is very easy to find donors before it's too late.
- It reduces the time consumed by the process.
- Donors will get motivated about receiving a donor appreciation certificate.
- The chatbot in our application can answer all of the recipient's and donor's queries and the help they need in addition to the customer service representative.
- Plasma donation camps will be available with geolocations to create awareness among users.
- Identifying appropriate donors and notifying the receiver through email when the plasma is ready.
- Plasma can be obtained from a blood bank of the patient's choice. In the event that blood plasma is not available, we also let them know by email.

Disadvantages:
- Lack of plasma donors is the primary issue since only a small number of individuals are aware of how important plasma donation is.

- Users are reluctant to go through the laborious and unnecessary procedure, which makes donating plasma a difficult task.
- The data and history of donations are not managed by donation centers in an effective manner.

11. CONCLUSION

Plasma is a liquid portion of blood; it is a mixture of water, proteins and salts. Antibodies are proteins made by the body in response to an infection. People fully rescued from COVID19 are encouraged to donate plasma, which can help to increase the lifespan of other patients because their plasma contains antigens which helps the affected person to recover faster.Therefore, we can connect the plasma donor and requester very easily using our user-friendly application, which also offers more functions for better serving the public.
.

12. FUTURE SCOPE

Our website application may contribute to a reduction in mortality and provide assistance to those in need of plasma donations. Saving the donor information and informing the list of active donors about the needy will provide a helping hand.Through partnerships with NGOs and hospitals, the company can monetize our application.

13.APPENDIX
Github link

https://github.com/IBM-EPBL/IBM-Project-3320-1658548959

Demo Video link

https://github.com/IBM-EPBL/IBM-Project-3320-1658548959/blob/main/Final%20Deliverables/Demo%20Video.mp4