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BLOOD BANK MANAGEMENT SYSTEM FOR EFFICIENT SEARCHING OF DONORS AND RECEIVERS

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Abstract

Blood donation and transfusion have been severe problems for a long time, and the global blood shortage has claimed countless lives. The primary cause of the losses is the absence of a coordinated mechanism for blood donation. The traditional ways of collecting blood are still the only acceptable ones in this age of internet and digital operations. You need an automated system.

To oversee the centres and present the information to others who might be interested. We have created a website that, by itself, resolves every problem associated with blood donation and receiving. In order to keep the record and data of the donated blood and to process it we need a compact database, so to keep our data safe the implementation of a database is also made which is SQLite. The suggested concept would give individuals relaxation in moving here and there in search of blood at needed time.

Keywords:- Scripting Language, Heroku, NodeJS, Database Entities.

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Introduction

Blood is a fluid in the human circulatory system and an essential functional factor for survival. Its various constituents complete various needs of a patient and can be isolated as per their needs. Blood Bank term refers to a point where blood is collected, stored, and tested. Basically, a place to complete the emergent need of blood in patients. It is very important to keep storage of blood for future needs. And this will not be completed by a small step or a single person. It requires an integrated method and a projected approach to implement the solution. A solution to this problem is the management system of blood banks. It is a software system which will have the records of the blood bag during any emergency. It is a systematic approach for maintaining blood supply and avoiding any hassle at the time of requirement. It keeps all the records about donors, donations, receiver, time and date, nearby hospitals, closest blood banks. Thus, providing ease for donors and receivers [1][2].

The goal is to keep all records pre-saved to avoid any difficulty at the time of need because for blood needs, we can say that it is not a deal to delay or not a need that can be ignored. In doing so we can save life of the people by donating them blood in a short time. We have enlighten the project according to WHO recommendations

strategy for blood safety and handlings as to develop a beneficial application that solves the problem faced by both the parties. Nearly every surgical procedure requires the use of blood. The number of people who require blood is rising daily as a result of advances in science and technology, yet there are still issues with blood scarcity and non-availability. Until a suitable blood management system is established, encouraging individuals to donate blood won't be of much use. The goal of this project is to provide the general public with a single clicking answer to every problem related to giving and receiving blood. The website will allow users to search nearby blood banks to verify the availability of blood and register for blood donations online, all of which may be done online to save time [3][4].

It is possible to successfully use the blood bank system to learn about the blood groups that are currently accessible as well as how to get in touch with blood donors who have the matched blood group and reside in the same city. In order to save a life, a user might request a matched donor if his blood type is not present in the blood bank. By using a location-tracking device like GPS, our website also displays the addresses of the closest blood banks and donors in the user's area [5][6].

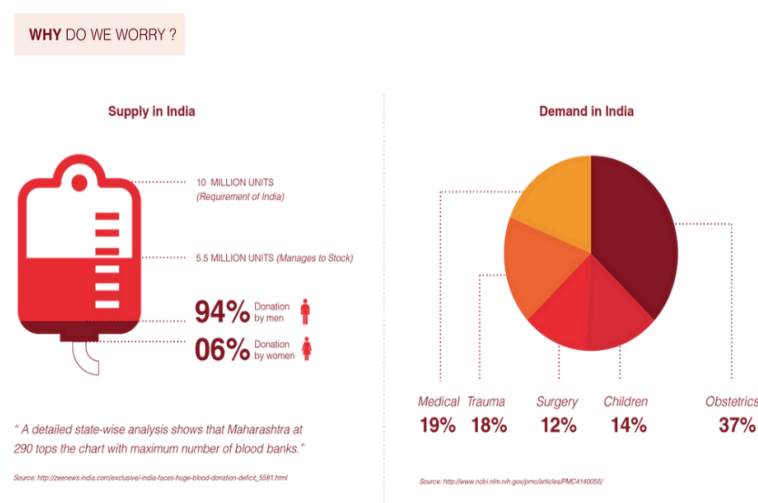


Figure1: State-wise demand analysis

According to the Ministry of Health and Family Welfare, a total of 3840 licensed blood banks are reported for India in 2022. And they have also reported that 12.7 million units were donated in 2020 which is lesser than projected due to the COVID-19 pandemic and a study envisioned the eligible donor population of India in 2022 at 402 million. In almost every country the requirement is much more than the supply. Reasons for such deficiencies are social ignorance, family disruption and some false notations between society [7][8].

Literature review

The blood bank's current administration system focuses on files. By doing this, it is made sure that the data and information about blood, the donor, and the recipient are saved in records and charters. In turn, this makes processing data and archives difficult and time-consuming. Physical papers are also used to document every record of blood donation, receipt, and transmission [9][10].

Advantages of Management Systems in Blood Banks by Vikas Kulshreshtha and Dr. Sharad Maheshwari [3] details the advantages of the management of data framework in blood banks. The data structure for blood bank administration is the main focus of the article. It looks at the blood bank administration data framework's recipients. The Optimization of Blood Donor Information and Management System by Technopedia by P. Priya and V. Saranya [4] has provided a capable and trustworthy blood donor data and management system based on GIS coordinates in a portable Android application. The benefits provided by the suggested method are valuable to and profitable for the human population. The audit is presented in "Blood Bank Management Information System in India" by Dr. Sharad Maheshwari and Vikas Kulshreshtha [5] [11][12].

The system indicated above stated that hunting for donors in each location was a curb. Except for rural and agricultural

areas, major cities did not experience a significant shortage of blood. Poor people cannot afford data connections. When urgent situations develop, hospitals, patients, and administration may not always be able to reach registered donors since they might not always be available to respond. For the registered donors, there is no proper integrated database. All the data is digitally operated and stored in an organized database. Donors and receivers have to take appointments for the process, and thus have their proper entity in the database. In case of emergency when the receiver is not able to create the profile and take the appointment, hospitals will complete the process of his entry in the database. The system will make sure to provide the details of the nearest hospitals and nearest blood banks, additionally, it will also give information related to the availability of blood in the fetched blood bank details [13][14].

Anyone with reach the application can easily sign up to donate blood when someone is in need. Patients and hospitals can use the provided search tool at any time to look for donors in the appropriate location. We are suggesting a centralized structure. As a result, it will be a system that is integrated and used by many people for a variety of objectives. Anybody can access the volunteer system with the help of the internet and a web browser. We ensure that customers upload the necessary and verified documents throughout the registration procedure. Only if the potential donor meets the criteria for blood donation may they move on to the registration stage. To tackle the fake request a password function is offered to prevent the problem of bogus callers asking for blood. The profile of the individual who requested blood can also be viewed by donors [15][16].

Supply and logistics for consumables in this pandemic, productivity and service delivery disruptions are equally as problematic as the illness itself. Because

there are not many local makers of the reagents required in blood banking, service during the lockdown period was limited. Stakeholders are groups of people who have a vested interest in the organization or website's success. The admin is in charge of overseeing donations, users of the system, and the efficient operation of the system. Any user may be added or removed from the system at any moment as needed, and the admin can also do any other necessary actions. If a user wants to donate blood, he or she can register an account in this module. The user's unique identifier is their area, username, and password [17][18].

The user must prove his or her identity by presenting special identification documents. Donors can access the news dropdown to find out information on blood donation camps. Every time there is an update, the user will be that is a crisis. Employees of the Blood Bank always have access to system features as designated by the administrator. Demand fluctuation is a significant component to which the whole process should appropriately respond; for example, managing blood inventory is common to become crucial in the event of increasing demand, and the immediate solution must be made promptly. Yet, it is difficult to satisfy demand since it is also impossible to predict the quantity of donors; therefore, an integrated strategy that takes demand fluctuation with increasing donor arrivals into account is necessary to effectively manage the BD chain [19][20].

Another key aspect of BD system management is demand forecast. An incorrect assessment of the blood requirement might have unfavourable effects. For instance, underestimating a service's quality results in bad service quality, out-of-stocks, and additional costs; on the other hand, overestimating a service results in overproducing and overstocking, which increases costs and poses clinical and ethical issues with tossing out bags. One more crucial system stage is storage. To

maintain blood in ideal circumstances, prevent expiration and discharge, and provide a suitable balance between the blood to store and that to transmit, storage management must be effective. This highlights the need of providing a sufficient diet in light of demand. Current methods try to forecast and alleviate blood shortages and obsolete bags and often depend on the examination of the general stock level. However, blood feeding with unified management system, i.e., scheduled donors appointments, could increase the efficiency of entire BD chain, decrease both the shortage of blood and outdated bags. Finally, by using optimization technologies, shipping and distribution of blood products are mainly handled. The majority of the currently available works concern delivery vehicle routing for the distribution of blood components. With the increased use of blood components, future research may concentrate on the distribution of different items while considering both cost reduction and their diverse shelf lives [21][22].

Proposed Approach:

The system has a well maintained database to store all the information. This section contains all the designs of research, all the methodology and the compaction of data. Also sampling the strategy required and analysing the data methods even the theoretical or conceptual under-pinnings of the study are all presented in this part.

This project's major goal is to automate and connect the various points of the process of giving blood to required consumers. So as to have a clear idea the website is made for simpler and more trustworthy than usual old ways. The website offers a very simple user experience along with several functions that are necessary right now. Some of these features include finding blood banks nearby, Some of the features include finding blood banks nearby, giving the current location with the help of the button provided named share, and hence will give the directions to a particular blood

bank along with google map. A direct link to several other options are also given like for availability of blood, quantity of blood and more, unit wise increasing in real time [23][24].

The system will retain data of the persons who will be the consumers, donating of blood programmes, and stockpiling of blood in the bank as well as streamline and make the process efficient of looking out for the blood in any case or in an emergency [25][26].

Direction and Path:

- problem identification

- design of system
- system construction
- testing and analysis
- implementation

It is possible to expand the system in order to have a track of particular hospitals, donation of organs and many factors containing records of each and every sector. Future modifications will also be there in the design. A thorough documentation is required to make future improvement simple. The future development in the system will be used as a managing system in case of donating blood.

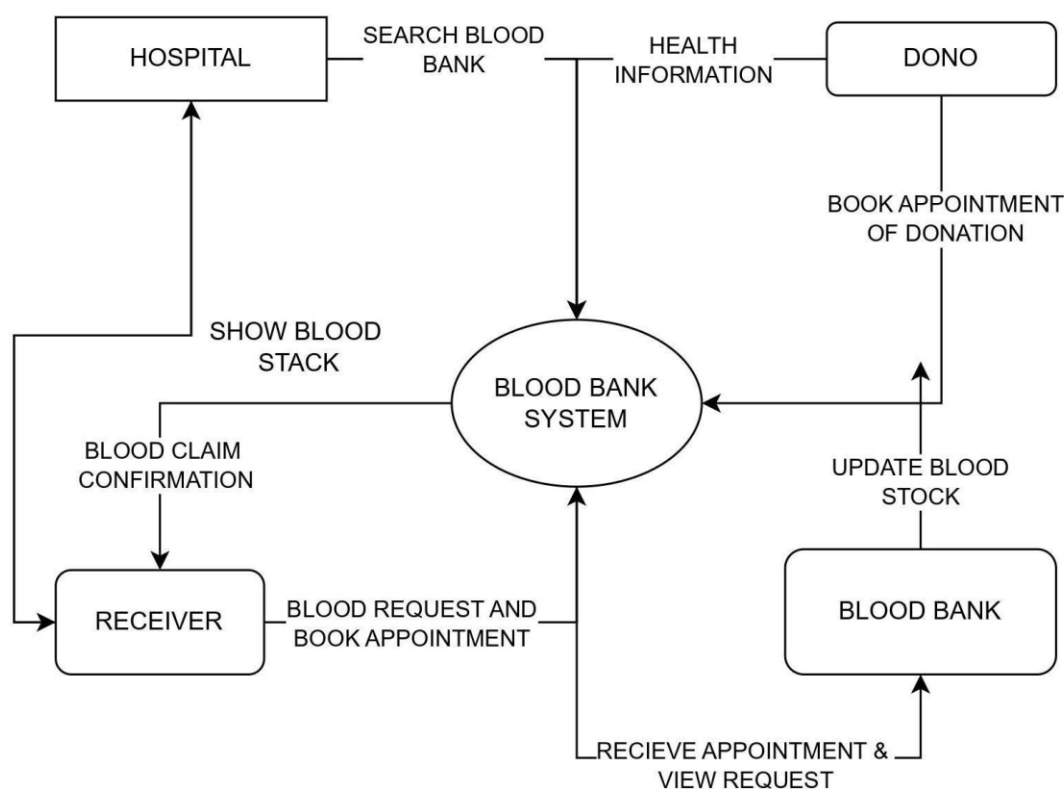


Figure2: Directive Framework of BBMS

● **Datasets and Methodologies:A.**

Data:A1. Data about Donor Recipients Name

- Donor/ Recipient Id
- Birth Date
- Identity
- Blood Group
- Location
- Contact No.
- Email
- Diseases (if any)
- Event Id Date
- Gender

A2. Hospital

- Address
- Coordinators
- Blood Quantity
- Nearest Blood Bank

A3. Blood

- Blood Id
- Blood Group
- Availability
- Expiry date

B. Datasets Example

Sr No	Blood Bank Name	State	City	Address	Contact No	Email	Blood Component Available
1	G.B. Pant Hospital Blood bank	Andaman And Nicobar Islands	Port Blair	Atlanta Point Near Cellular Jail	03192 230628	bbgbpant@gmail.com	YES
2	I.N.H.S. Dhanvantri	Andaman And Nicobar Islands	Port Blair	Ashvini Nagar, Port Blair, Andaman and Nicobar Islands.	03192 248759		NO
3	Pillar Health Centre Blood Bank	Andaman And Nicobar Islands	Port Blair	Lamba Line, P.B. 526, P.O. Junglighat, Opposite Airport	03192 233193, 03192 233993	pillarbloodbank2016@gmail.com	NO
4	Indian Red Cross Society Blood Bank	Andhra Pradesh	Anantapur	Near JNTU Engineering College, Sarada Nagar	08554 246344	NA	YES
5	Govt. General Blood Bank	Andhra Pradesh	Anantapur	Govt. General Hospital, Anantapur	08554 275024	bloodbankgghatp@gmail.com	YES
6	Indian Red Cross Society	Andhra Pradesh	Anantapur	Blood Bank Medical Officer, Indian Red Cross Society	8554246344	ircsbloodbank.anantapur@gmail.com	YES
7	Rural Develop Blood Bank	Andhra Pradesh	Bathalappalli	Kadiri Road, Bathalappalli,	08559 244259	NA	YES
8	South Hospital Blood Bank	Andhra Pradesh	Guntakal	S.C. Railway Hospital, Ananthapuramu	08552 227166	NA	NO
9	Indian Red Cross Society Blood Bank	Andhra Pradesh	Hindupur	Government General Hospital Blood Bank, Hindupur, Anantapur	08556 225900	ircshup@gmail.com	NO
10	Indian Red Cross Blood bank	Andhra Pradesh	Kadiri	Ground Floor, (Govt. General Hospital)	08494 221544	kadiriircs@gmail.com	NO

C. Methods and Process:

C1. Main Page

The site will be opened with a view having following functions- Hospital Page, donor login, receiver profile, emergency call, admin section.

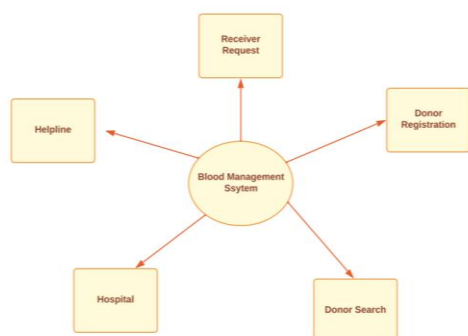


Figure3: General Architecture of Blood Bank System

C2. Donor Login

The system offers security protections with username-password authentication, allowing access to only authorised users with multiple levels of verification to the system. This enables the general public to sign up as a volunteer donor.

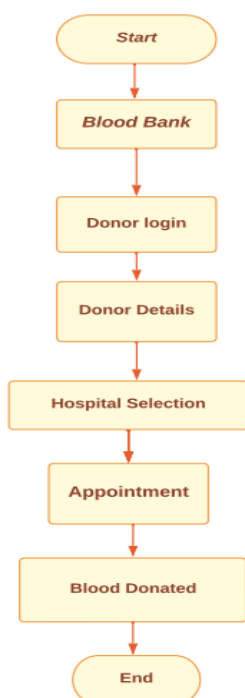


Figure4: Donor Process Flow

C3. Helpline

A helpline or switchboard is provided to help those who call at the time of need. Many helpline services now offer more than telephone support - offering help 24x7.

C4. Publicity for blood donation drives

This function allows blood bank staff to advertise blood donation events online. The public may find out where and when the blood donation activities are taking place.

- Registration of Donor Profiles
- Online blood donation requests

This enables potential recipients to contact the donor online. Donors are matched when the request is submitted, and the request is then sent through SMS with all the essential information.

C5. Blood Stock Management:

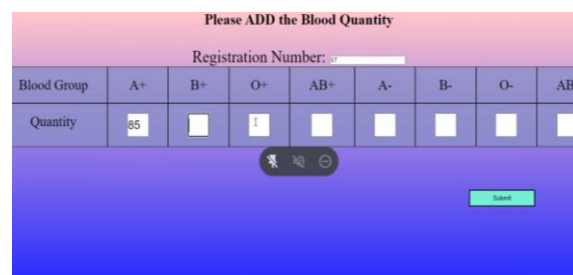


Figure5: Blood Availability

Through this system, the blood bank staff may manage the bloodstock from blood collection through screening, processing, storage, transfer, and transfusion. You may track every procedure or workflow using the database. When the blood supply falls below the required phase or when the stocked blood availability runs out, the system will also notify the personnel through an alert.

C6. Recipient management

All recipient histories are stored in a single, central database, eliminating the possibility of duplicating data. The gift record is subject to routine upkeep.

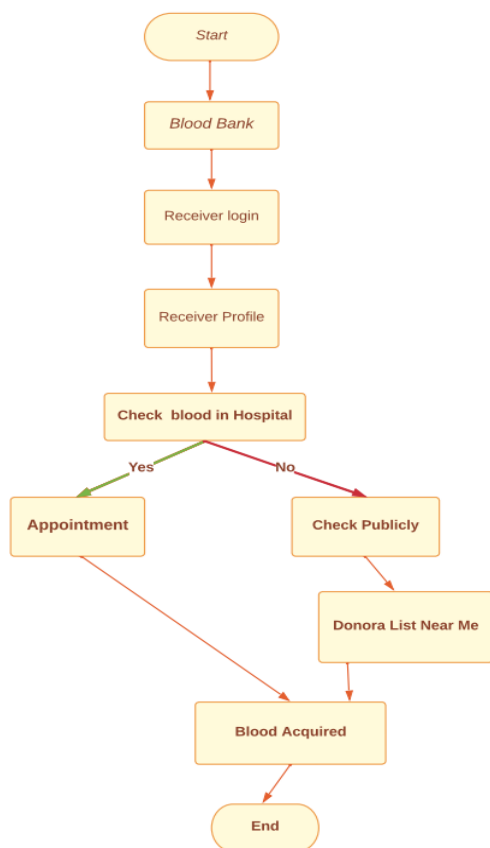


Figure6: Receiver Process Flow

C7. Reports

The system is capable of creating pre-defined reports, such as charts, lists of donors and receivers, personnel directories, and details about the blood supply in the bank.

Results:

An extremely helpful web-based application is provided by the suggested system for emergency services. Providing donors' information that has been sorted by region and blood type, it will be highly helpful in emergency situations. To keep track of all the registered records, the system uses a well-maintained database. Additionally, it offers updates and data on the continuing coronavirus pandemic.

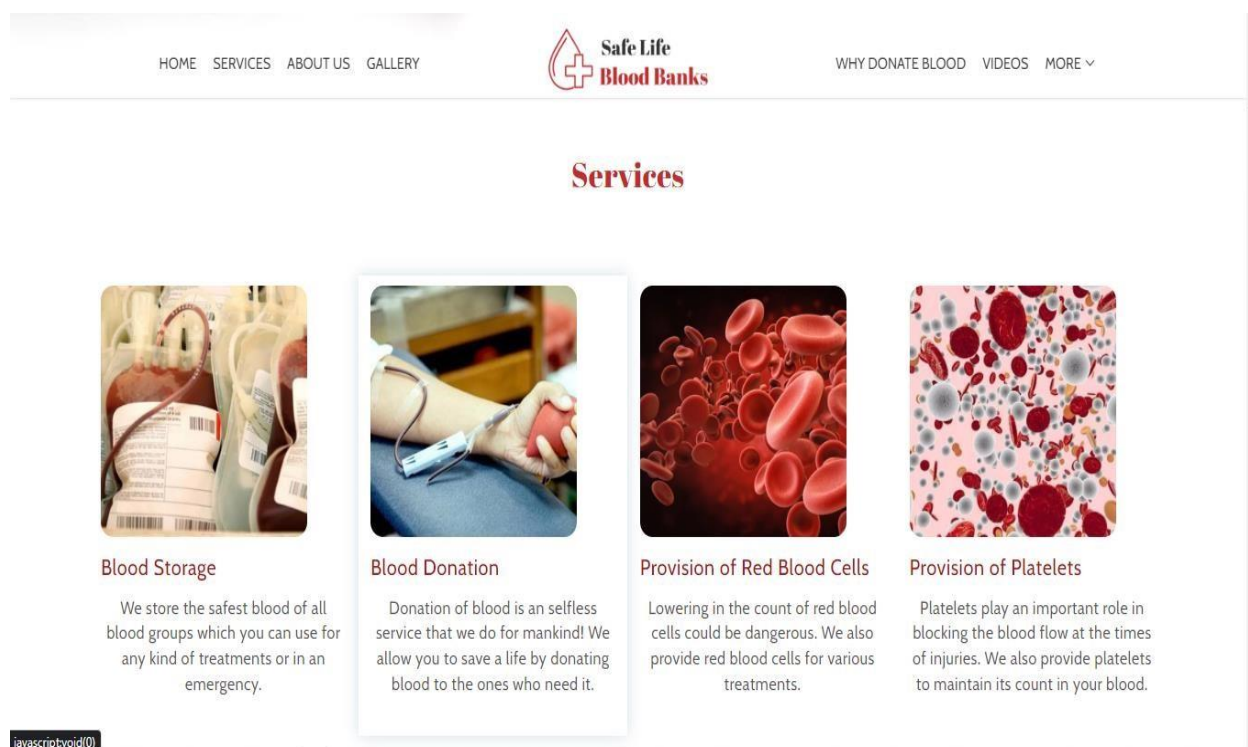


Figure7: Main page of BBMS

Figure 10 depicts the BBMS's home page. This interface is available to all system users. Everyone has access to this interface, not only system users who have information access.

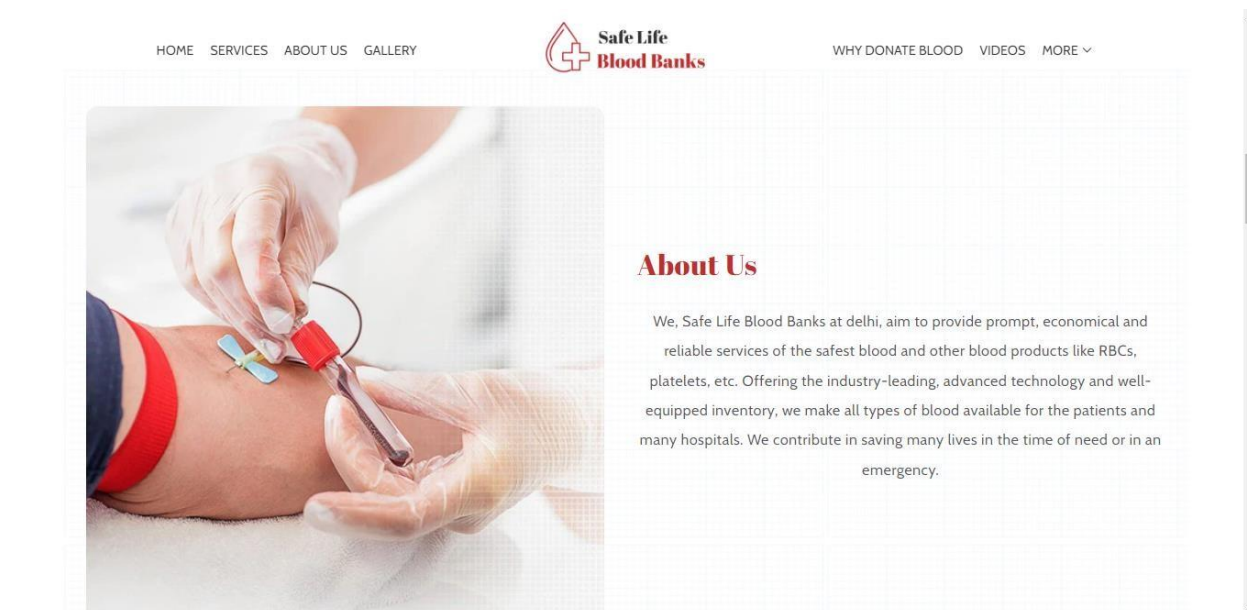


Figure8: About Us Page

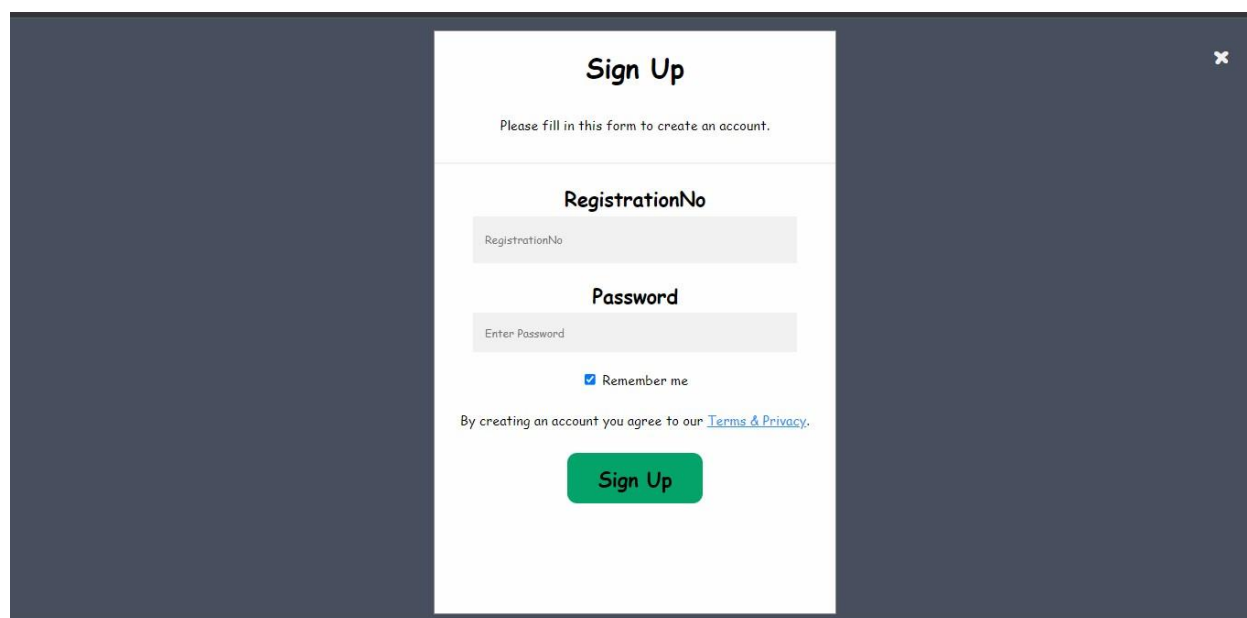


Figure9: Hospital Sign Up page

The blood bank can be contacted by hospitals by phone or email with the type and quantity of blood they require. The manager is accountable in determining whether the requested blood type is available. The administrator will remove the blood from the stock and transport it to the hospital if the required blood type is available. However, the administrator will email the hospital to let them know if the requested blood is not available.



Figure10: Registration Page

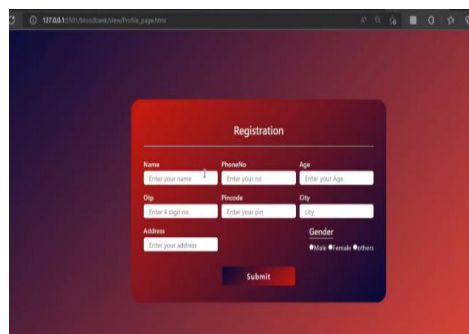


Figure11: Donor login form

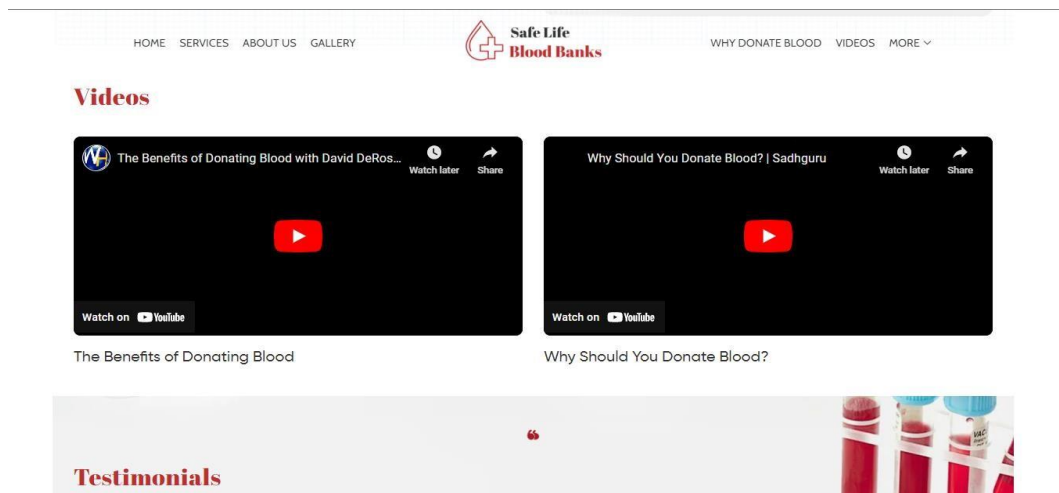


Figure 12: Videos related to need of Blood Bank

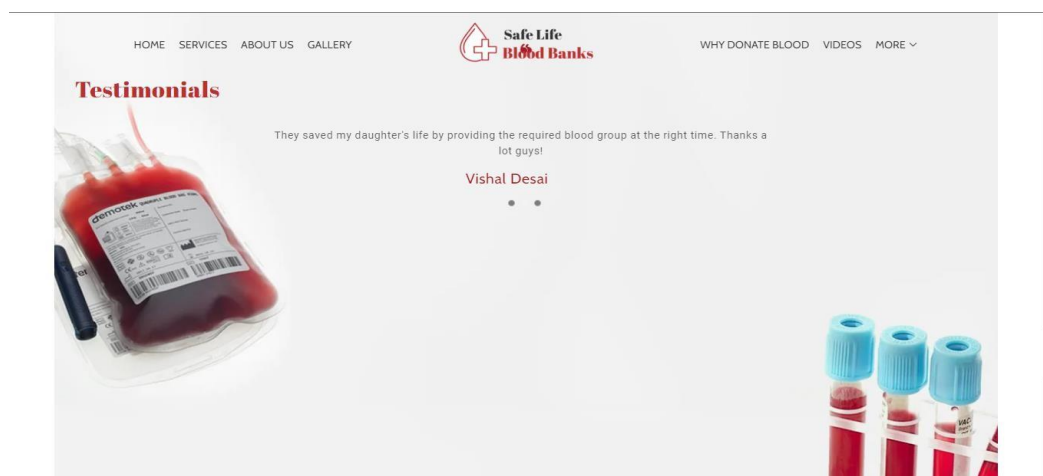


Figure 13: Testimonials

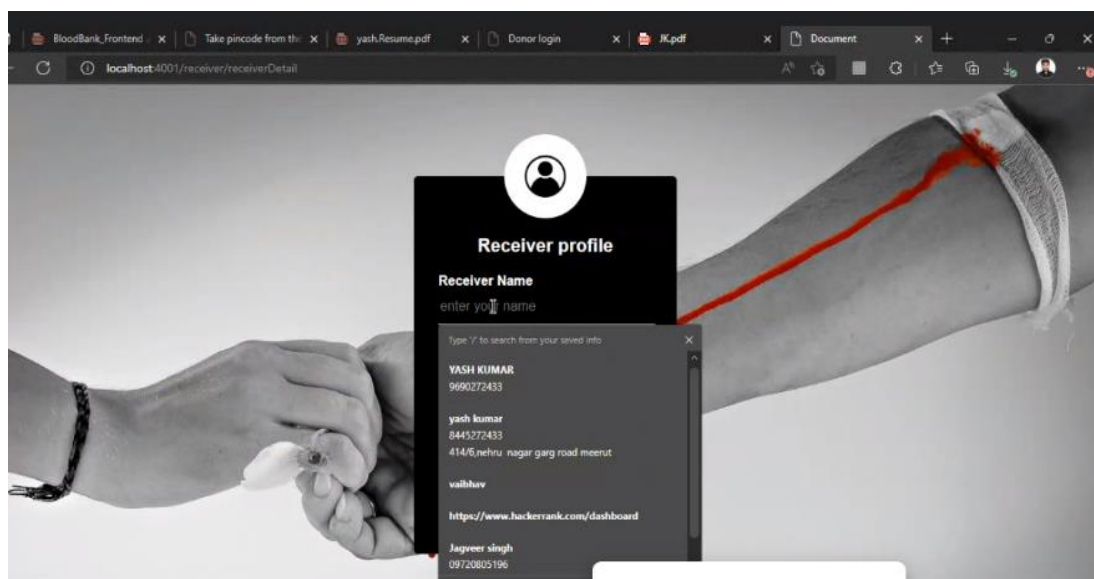


Figure14: Receiver's Profile

Conclusion:

Technology advancement is the main cause of most amenities being readily and rapidly accessible in almost all spheres of life. Like this, our suggested approach is a significant improvement in blood management that aims to boost the effectiveness of blood procurement and collection. The functional services offered in the current edition include management of profiles, blood collection status, donor login, receiver profile, searching of nearby blood banks and hospital page.

For better and quicker response in emergency situations, thanks to the automation of the blood management process. The worth of life, which is currently declining due to blood scarcity, can be restored with the aid of an effective management system that addresses the sector's current problems. To keep track of all the registered records, the system uses a well-maintained database. We gained awareness of the importance of blood donation while working on this project. This motivated and persuaded us to encourage and convince our fellow countrymen to donate blood regularly. In order to base future decisions on accurate analytical findings, records have been set up to analyze historical information about

blood donation and receipt as well as data from camps.

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