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A Survey Based Research Paper on (BDMS) Blood Donation Management System & its Methods

[1]Abhishek Patel, [2]Rakesh Yadav, [3]Anil Kumar Azad, [4]Vaibhav Singh, [5]Anmol Kumar Sahu
[6]Jay Chand, [7]Ashish Kumar Srivastava, [8]Sanjay kumar Sonkar, [9]Dr Nikhil Srivastava, [10]Rakesh Kumar Gautam, [11]Shashank Tiwari

[12345]Student, Computer Science Engineering, [6 7 8 10 11]Assistant Professor, [9]Associate Professor

[1 2 3 4 5 6 7 8 9 10 11]Kamla Nehru Institute of Physical and Social Sciences Sultanpur UP India

Abstract: Blood donation and transfusion have always been a major problem, and blood shortages worldwide have resulted in many deaths. The need for a centralized blood donation system largely hinges on this misfortune. In today's age of online and advanced modalities, a common blood draw method is direct. A computerized structure is needed to monitor the center and provide data to stakeholders. We have created a website that takes care of all these blood donations and blood donation issues in-house. We envisioned a Mongo DB database as an integral part of the coordinate system to store actual blood donation information in a centralized database for descriptive processing. The proposed system would allow people to register as donors and use themselves wherever their blood type is. We've introduced a browse tab to make it accessible to those who are willing to donate. In our proposed donor recruitment framework, health-related concerns are updated in the blood management framework database for everyone to see.

***Keyword*-Blood donation, Blood transfusion, Central processing, Careful processing, Automated processing, and Screening**

I. INTRODUCTION

Our country needs good online healthcare. Phlebotomy techniques are needed to isolate infectious diseases and to provide safe and adequate service to the population. The principle of the strategy is to collect blood from donors, control all infectious diseases and reduce blood loss. The country's blood donation strategy is complex and lacks adequate resources such as adequate infrastructure and funding. The distribution, acceptance and availability of blood tests and blood products require appropriate equipment and quality facilities. For the organization and management of blood services, the requirements of Good Manufacturing Practices should have maximum protection against existing problems and use good methods for all management. In this process, blood taken from other healthy people is used to give to those in need. The curfew related to COVID-19 has caused blood shortages in the country. Central and state governments can raise public awareness of voluntary blood donation and aphaeresis', and organize scientific conferences and large-scale discussions to educate people about the benefits of donating blood. Likewise, more blood donation centers could be set up near public places to encourage people to donate blood. WHO recognizes that all activities involving the collection, testing, processing, storage and distribution of blood in the country require blood cooperation and coordination? National blood policy and regulatory agencies should review blood in the country to meet blood and blood quality and safety standards and consistency.

WHO recommends the following blood safety strategies for use by stakeholders, policy makers and partners: [2]

• Establish national blood banks capable of providing quality service and coordination, integrity and timely products. Use blood to meet the needs of each patient. [2]

• On a precautionary and advisory basis through collection of blood, blood and other blood products from low-risk, regular, voluntary, free donations, blood donation and donation management. We have tried to focus our work on the above information to develop a comprehensive website that addresses many important questions regarding blood donation and collection. Make sure to donate blood on time, donate blood regularly, and make an effort to understand the quality of blood donors and blood donors.

II. LITERATURE REVIEW

The current blood bank storage system is focused on files. This ensures that data and knowledge about blood, donors, and recipients are stored in documents and archives. Data and information processing becomes difficult and time-consuming as a result of this. All tests of blood donation and transfusion are recorded on physical papers as well. This makes information helpless to blunders and human errors which in turn put human lives in peril. Another underlying problem with this framework is destitute productivity. The sheer time-consuming method of recovering blood, be it donor or recipient information takes a lot of effort. The information retrieval being such a time-consuming process makes it very hard for hospitals to save lives at crucial times. Information Security &Information backup is another additional point to consider as the papers and records are effortlessly stolen or misplaced. This makes it an untrustworthy framework.

The goal behind our project has been to provide a platform that has all the information regarding blood donation, registered donors, which may in turn help in providing fast blood delivery. We have put our efforts into researching all about blood management systems and practices and have used the knowledge in making our project the best of what it could be.

Every blood donation management system is required to accomplish some basic tasks. It has to have a mechanism for information exchange to be made available for donors, receptors, and other stakeholders. It must also ensure that the information regarding the blood inventory status of different stakeholders such as blood banks, hospitals are made available.

It was important for us to find the faults in the existing system so that we can find the solutions to the flaws and implement them in our project.

2.1 Existing system:

Researchers have composed on the concept of blood bank administration frameworks with nearly all of them lauding computerization as an instrument to accomplish productivity and viability in this region though not looking at a few issues the framework may confront due to restrictions or abuse of functionalities. We looked at some of the systems we could discover.

“Benefits of Management information system in Blood Bank” by VikasKulshreshtha and Dr. SharadMaheshwari [3] portrays the benefits of administration data framework in the blood banks. The paper is fundamentally centered on the blood bank administration data framework. It examines the recipients of the blood bank administration data framework. In “The Optimization of Blood Donor Information and Management System by Technopedia” by P. Priya and V. Saranya [4], they have proposed a proficient and solid blood donor data and management system based on GIS coordinates in an android portable application. The benefits given by the proposed system is necessary and profitable to the human being segment. “Blood Bank Management Information System in India” by VikasKulshreshtha and Dr. SharadMaheshwari [5] presents the audit of fundamental highlights, merits, and demerits given by the existing web-based Data Framework for Blood Banks. This ponder depicts the comparison of the different existing frameworkand give a few more thought for making strides in the existing framework. “Android Blood Bank” by Prof. Snigdha, PratikshaLokhande, Siddhi Kasar and Pranita More [6] depicts the android application which conveniently upgrades the data with respect to benefactors where the admin gets the complete data. The app gives a list of blood banks depending upon the user’s location. “A Study on Blood Bank Management System” by A. ClemenTeena, K. Sankar, and S. Kannan [7] is an information administration framework. The framework will permit the authorized blood bank officer to log in employing a watchword and effectively manage the records of the blood benefactors and the patients in need of blood. In “MBB: A Life-Saving Application” by Narendra Gupta, RamakantGawande, and Nikhil Thengadi [8], they have proposed the framework that will connect all donors. The framework will offer assistance control, a blood transfusion benefit, and make a database to hold information on stocks of blood in each region as information on givers in each city. Moreover, individuals will be able to see which patients require blood supplies by means of the application. They will be able to enroll as donors and hence will get a request from their neighborhood clients who need blood to give blood in cases of requirement. PahEssah and Said AbRahman (2011) [9] proposed the development of a management information system to manage blood banks based on information of donor, recipient, and blood. E. M. S. S. Ekanayaka and C. Wimaladharma (2015) [10] developed a Blood Bank Management system to gather all the blood donors into one place automatically [11].

The existing system has almost everything when it comes to people donating blood at normal times. The users can view the information of the donors registered along with their name, address, and contact information. The existing system shows blood donors in a vast spread area. Hospitals are contacting donors only when there is demand in need of blood. In spite of the obtainability of the potential blood donors but 10% of the general Indian population donates blood. Advancement in natural science has increased the blood demand and it's found that blood donors usually don’t come to grasp the requirement for blood. These causes inspire us to grow a stronger system that will assist the present blood donation system

2.2 Limitations of Previous Systems:

In the previous systems searching for donors in a given area was a constraint. Availability of blood in major cities was not a huge problem as it is agricultural and village areas. Data connection isn't economically viable to poor citizens. It is not always easy for hospitals and patients to contact the registered donors during emergency situations as the donors might not be in a situation to lift the call. There is no proper centralized database for registered donors.

2.3 Proposed System and Advantages:

All the records are computerized and stored in a well-maintained database. Anyone can visit the website and easily register themselves for donating blood in need. Hospitals and patients can search for donors in their desired location by typing in a landmark as a keyword.
The system we are proposing will be centralized. That means it will be a single system with a lot of people looking out for different purposes though all using the same modules with varying functionalities. The proposed system can be accessed by anybody with an internet connection and a web browser

This system is very User-friendly and interactive between the donor and the recipient. The system avoids wasting time for people to visit the hospitals during covid times and register themselves for blood donation. Records for hospitals and recipients are effortlessly available at all times. It is not always feasible for donors to be available at all times or lift the calls during emergency times. Our system allows the donor to know the emergency by sending a web notification to the recipient. If there are no donors available at the emergency hour at the nearest area, the patient/hospital can send the urgency through a group that consists of all the same blood type donors from the same city. This enables the hospitals to get in contact with the donors who don't live in the same area but are ready to donate. Provide security to data through authorization.

2.4 Challenges/Issues faced in BMS:

2.4.1 Tackling fake donors: During the registration phase, we make sure they upload all the supporting health and proof documents. The desired donor can proceed to the registration phase only if they pass the factors required to donate blood.

2.4.2 Tackling fake requests: In order to prevent the issue of fake callers demanding blood, a password facility is provided. The donors can also check the profile of the person who requested blood.

2.4.3 Updating database: It is mandatory for the registered donors to update their information every 35 days to show that they still free from diseases and are clean to donate blood.

2.5 Stakeholders:
Stakeholders are sources who are responsible and accountable for the success of the website and the organization.
2.5.1 Admin: Admin manages donors, system Users, and the smooth functioning of the website. The admin can add or remove any user from the system anytime whenever required and also carry out other necessary actions required.

2.5.2 User: In this module, the user can create an account if he/she desires to donate blood. To uniquely identify the user, they are given a username and password. The user needs to authenticate him by providing unique identification proofs. Donors can get the information from the news regarding blood donation camps from the news dropdown. The user will be notified whenever there is an emergency.

2.6 Details about Blood:

The various constituents of blood are represented as follows:
2.6.1 Plasma - The medium in which the blood cells are transported around the body.
2.6.2 Red blood corpuscles- It carries oxygen.
2.6.3 Platelets- Which facilitates blood clotting and also the need for blood transfusion
2.6.4 White blood corpuscles- This is the part of the immune system.
2.6.5 Hemoglobin- Which is an essential chemical in the body and carries oxygen from the lungs to other parts of the body.

2.7 Factors and constraints to be considered to register:

The respected donor should be aged between 18 and 60 years only. Hemoglobin should not be more than 12.5g/dL. A Donor should weigh more than 45 kg. Before donating blood, the donor's body temperature and blood pressure should be normal. The donor should be free from diseases from the past 3 years. Most importantly the donor should not be addicted to drugs.

III. MODULES

3.1 Availability

Our website has this functionality to let the users and needy search for the specific type of blood they are looking for. Here we are passing the GET request where initially get Stock request gets executed by fetching details from the database. Then validation takes place by purifying the get request with the Dreg data, if the request is valid then the filtered data from database placed in a dictionary and return to the page through rendering.

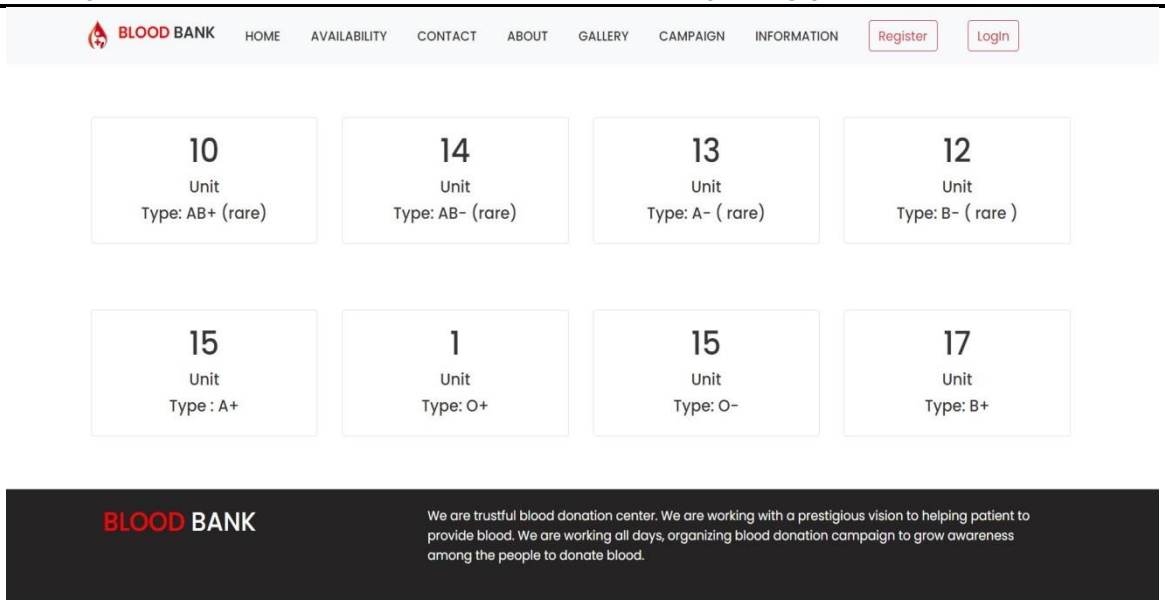

Figure 3.1: The screenshot of availability page

3.2 flyleaf

We have also integrated a need blood for people looking blood nearby. This we have done considering the fact that a lot of people need blood urgently and have no time to wait for it. With this functionality, they can request and acquire blood near them and save precious time.
Another similar process which travels along with POST request as a common request for blood donate where backend apimakes sure whether all detail has been filled or not through the model library parameters which is one of the most powerful valuators. If all values entered match the data of Dreg in the database, then the donate blood executed precisely. The interface of the blood donation management system implementing the donate blood and need blood is shown in Figure 3.2

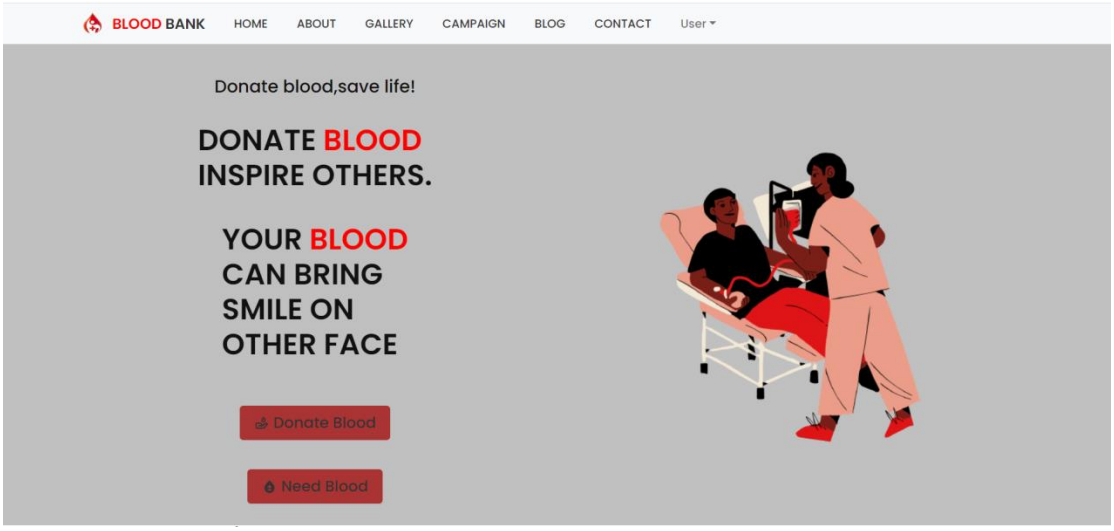

Figure 3.2: The screenshot gives a front-end view of landing page.

3.3Donate Blood

Donors can be divided into returning donors, who donate on an almost regular basis, and walk-in donors, who are entering the system occasionally or for the first time.

We have integrated a form for donor parties to register themselves as donors. The form will ask the name, gender, date of birth, number, email, address, donation date age etcetera. We have applied all types of constraints in the form so that false or wrong information is cast aside.

Same post request is used initially data gets filled into the parameters through validation and must and should fields, later as usual data gets connected and stored in Dreg category of the database if all the valid and verify conditions of the library models has been satisfied. After the successful render summarized data gets visible on the screen.

Here POST requests have been used mostly as the POST carrier request in the message body provides the most secured way of transferring data from client to HTTP protocol by

-never caching process
-requests do not remain in the browser
-these requests can't be bookmarked
-it has no restrictions on data length

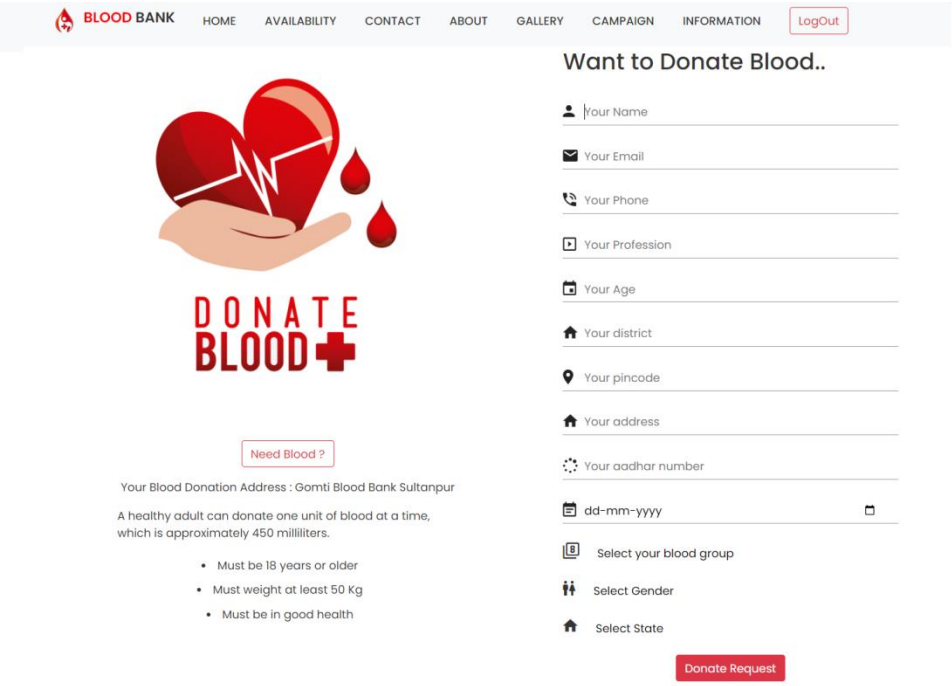

Figure 3.3: The screenshot shows our Donate Blood form.

3.4 Need Blood

Our aim is to increase awareness of the need for blood donation and make the process more accessible to everyone. By providing a simple and efficient way for donors and recipients to connect, we hope to save more lives and contribute to the betterment of society. Blood Bank is committed to maintaining the highest standards of safety and confidentiality, ensuring that all users can participate in the donation process with peace of mind.

We have integrated a form for recipient parties to register themselves as acceptor. The form will ask the name, email, address, donation date age etcetera. We have applied all types of constraints in the form so that false or wrong information is cast aside.

The post request initialized to fill the data in request body and send all data to backend where validate each fields data and response back to end user either data correct or incorrect or missing.

When form will successfully submit end user will receive confirmation message on browser and an email message.

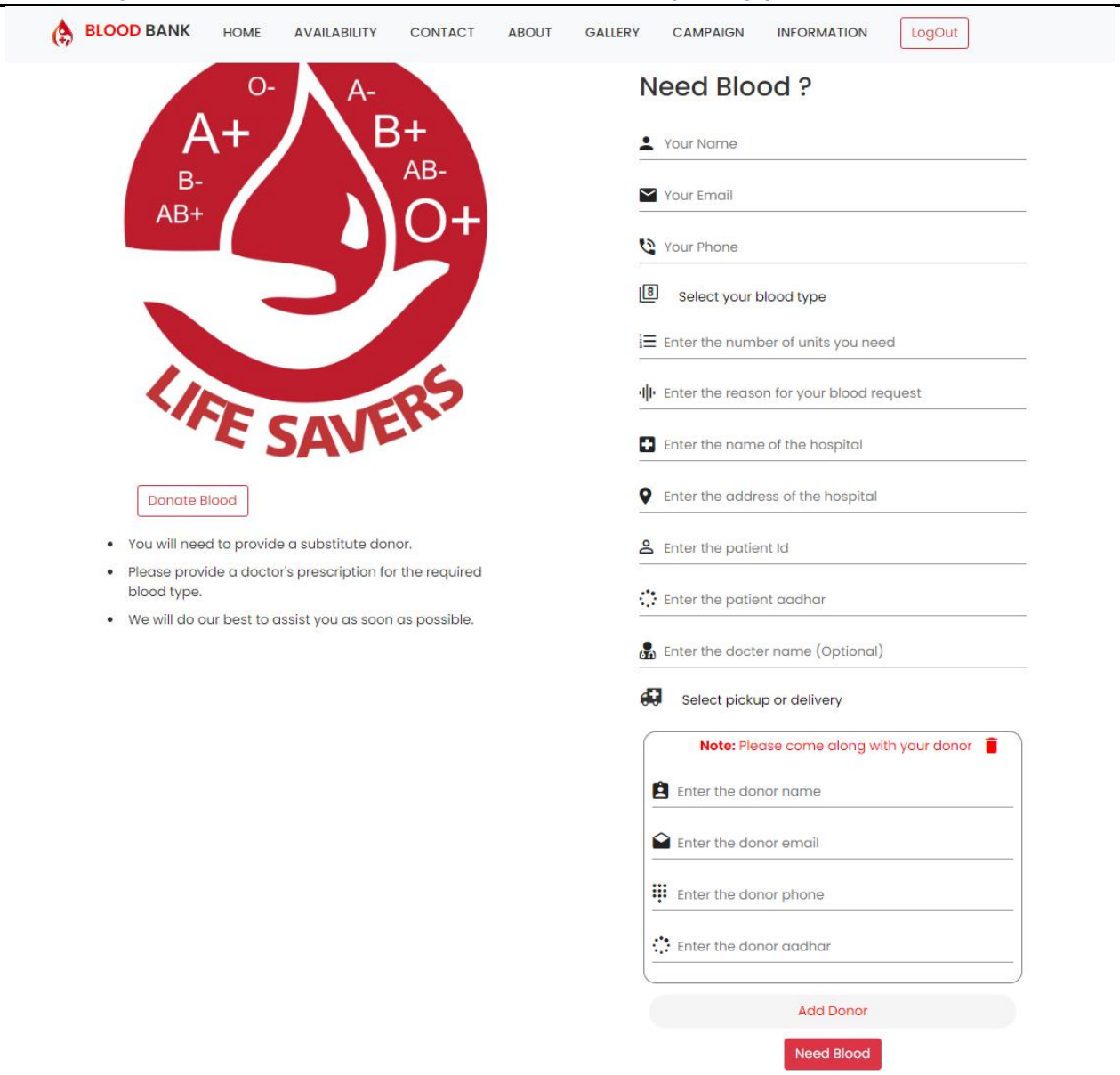

Figure 3.4: The screenshot shows our Need Blood form.

3.5Contact Us

The Contact us module manage user feedback and quarry, user contact information automatically filled by using get request to backend and fetching details of user to database only use have to enter message click to submit. The form will submit with post request and send all details to backend where all data validated and response to end user.

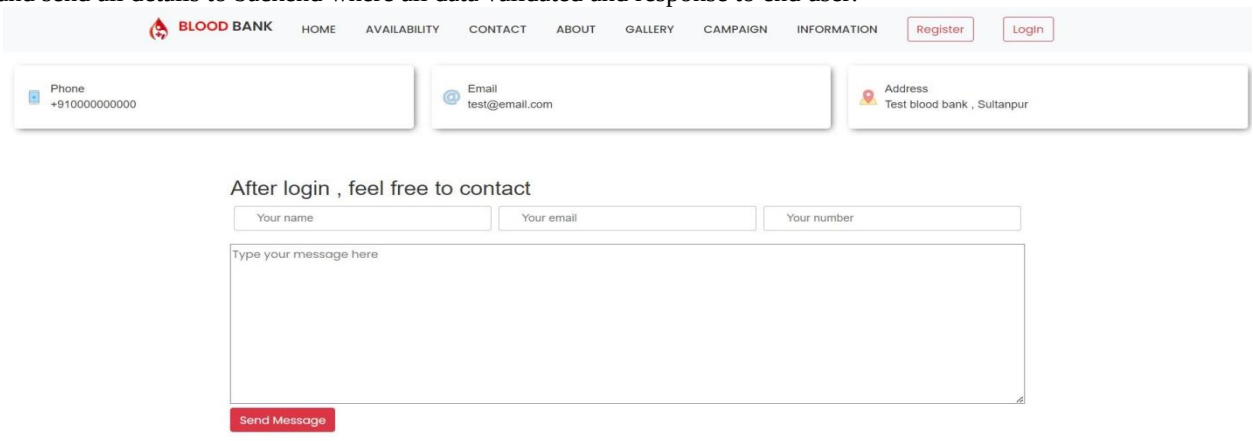

Figure 3.5: The screenshot of contact us

IV. BASIC FRAMEWORK

The system manages blood collection, inventory management, distribution, donor management along with a prior analysis report about the success probability and feasibility of any proposed blood donation camp. The whole system is an integration of some web-based user interfaces, and underlying databases.
Different components are briefly discussed next.

4.1 MERNSTACK:

Model.js: Defines user, donor, recipients, app, and website data fields.
Router.js: Used to analyze, wrangle, modify, and validate the data as per user need. allapi.js.py: Used to store all the URL of apps used.

App.js: Used to declare apps.
Signup.js: Used to register apps. It has access over all data.
Index.html: It is the root of the application used to launch apps.

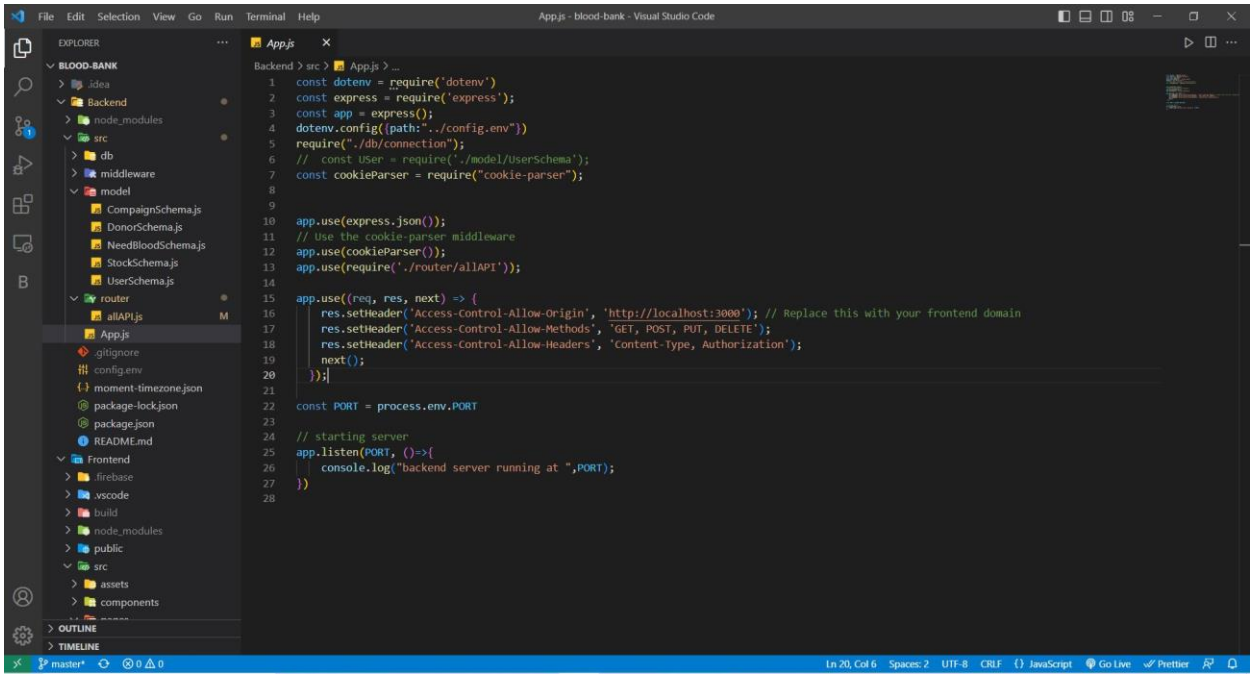

Figure 4.1: The screenshot above shows the implementation of various apps.

4.2 Web Interface

It is a website that can be accessed from anywhere by anyone with an internet connection and web browser. This website will be used by common users/ blood donors/ receivers, Blood banks operators/dealing clerks, registered blood donation camp organizers, nodal hospital officials, central monitoring or nodal agency as well as system administrators for many different purposes. Most of the use cases are easy to identify and already proposed and implemented. In our web interface we have three essential modules that form the framework namely Blood Inventory Management, user management, Donor Management and recipient management.

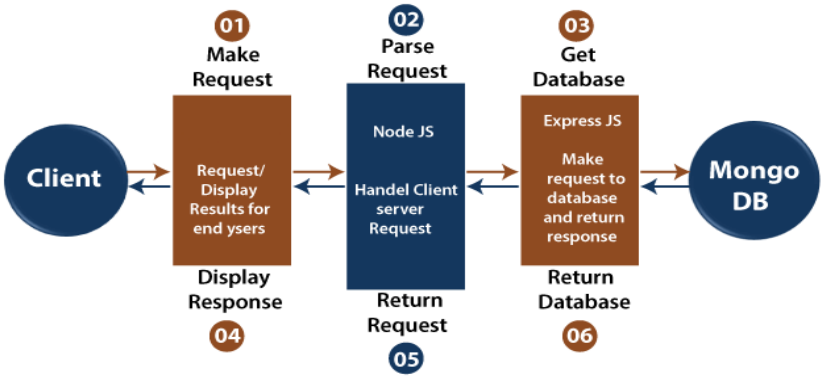

Figure 4.2 explains the workflow of the website with MERN STACK

V. Data Flow Diagram

The DFD diagram is a graphical representation of the Blood Bank web application's data flow. It depicts the flow of data through the application, from the input to the output. The DFD diagram for the Blood Bank web application includes the following components: External Entities, Data Stores, Processes, and Data Flows. The external entities include users, the SMS API, the email API, and the feedback API. The data stores include the donor and recipient databases, the blood inventory database, and the appointment database. The processes include registration, login, blood donation, appointment booking, and need blood request. The data flows show the flow of data between these components. The DFD diagram provides a clear visual representation of the data flow, making it easier to understand and develop

.

5.1 Zero Level Data Flow Diagram

A zero-level data flow diagram (DFD) is a graphical representation that depicts the flow of information between different components or processes in a system. It provides an overview of the entire system and is the starting point for creating higher-level DFDs.

In a zero-level DFD, the system is represented as a single process or bubble, which receives inputs from external entities and produces outputs to them. The external entities can be users, other systems, or organizations that interact with the system. The inputs and outputs are shown as labeled arrows, indicating the direction of data flow.

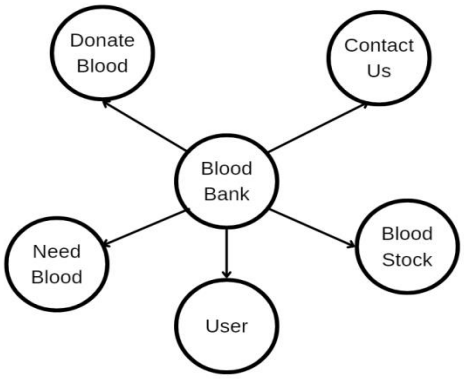

Figure 5.1: The screenshot shows our Zero level Data flow Diagram

5.2 One Level Data Flow Diagram

A level 1 Data Flow Diagram (DFD) represents the system's main processes, data flows, and data stores at a higher level of detail than the context diagram. It decomposes the main process from the context diagram into several sub-processes and shows the data stores, external entities, and data flows between them.

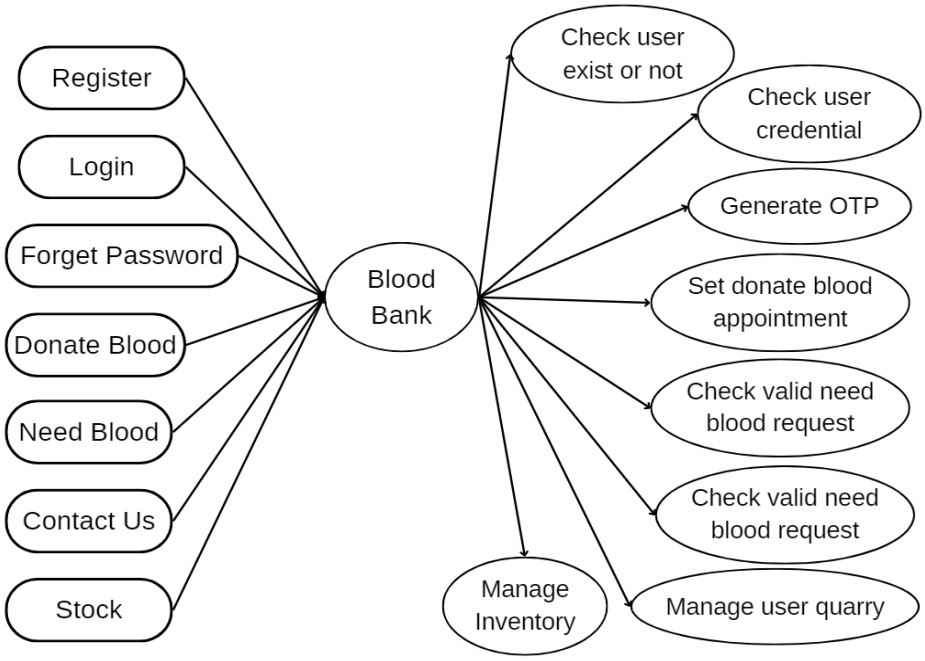

Figure 5.2: The screenshot shows our one level DFD

5.3Two Level Data Flow Diagram

A two-level data flow diagram (DFD) is a graphical representation that depicts the flow of data through a system. It shows the process, data stores, external entities, and data flows between them. A two-level DFD provides more detail than a context diagram, breaking down the processes into smaller sub-processes and showing their interconnections.

The first level of the two-level DFD represents the main processes in the system, while the second level shows the sub-processes that are performed within each main process. The sub-processes are connected to the main processes through data flows, indicating the transfer of data between the processes.

For example, in a Blood Bank web application, the first level of the two-level DFD could represent the main processes, such as Donor Registration, Recipient Registration, Blood Donation, Blood Request, and Blood Inventory Management. The second level would show the sub-processes within each of these main processes, such as verifying donor information, storing donor data in the database, scheduling donation appointments, checking for available blood inventory, and updating inventory levels.

The two-level DFD provides a clear understanding of how data moves through the system and helps identify areas where improvements can be made to streamline processes and increase efficiency.

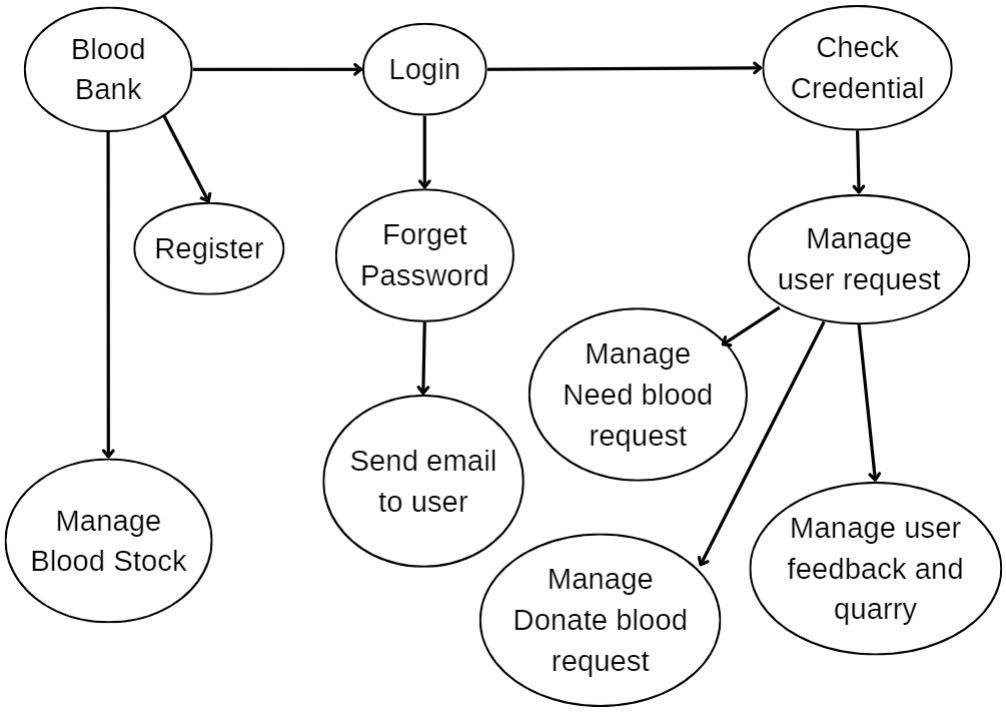

Figure 5.3: The screenshot shows our two level DFD.

VI. OHER USES/SCOPE OF WEBSITE

Our website receives useful data related to blood donation and reception in an integrated manner and helps in making intense situations better. In terms of coordination and fast reaction (that gets to be most imperative to spare the most extreme number of casualties) amid incidents, our framework with analytics will be able to bring the right citizens to the right place at the right time to offer assistance. Our website can also be used in camps as it asks for data to understand eligibility (initially based on the last donation date and minimum gap between two consecutive donations eligibility will be derived, later other medical conditions will be considered by attending doctors in health camps) for donation. In the future, if during any checkup or treatment some infection or any such medical condition is detected then the concerned MP (medical practitioner) will update us and we will update our website accordingly.

In our future work, we plan to explore the generic mathematical model along with different donor groups using data mining tools and analytics. We are also focusing on implementing an application based on the website that will further help with connectivity to wider masses.

VII. CONCLUSION

Finally, it covers the new skills needed to develop web applications. While creating this project, we realized that blood donation saves lives. Thanks to you, we give blood regularly, and our neighbors donate blood too. The database was created to store blood donation and receipt history and gather information from camps for future decisions based on self-identification.

While creating this project, we realized that blood donation saves lives.

This application is based on easily available for both Donor & Accepter .In one Platform all are easily to handle blood bank to donate the blood & accepter for blood in very short time .Time saving as main advantage of our project.

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