

# WB-BDS: Web-Based Blood Donation Administration Scheme

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## **Abstract**

*There are numerous accounts of negative outcomes following blood donation. There is an urgent need to guarantee a safe and adequate supply of blood products due to the nation's continuously rising need for blood supplies. The biggest challenges for blood banks, meanwhile, are still finding and keeping blood donors. Finding out where and how a blood bank is organized and how to use its services is highly challenging. We are aware that blood donation results in a wide range of reactions. The majority of the responses were systemic and ranged from 0.08 to 13% between different state. In order to encourage people to donate blood, we also attempt in this article to examine the impact of adverse reactions to blood donation. We have developed a blood donation system that enables donors to monitor local donor data. Our website allows users to register and reserve a slot for a nearby blood drive, ensuring that they are informed of any blood donation events in their area.*

**Keywords:** Transfusion, Recipient, Blood Donation, Cloud Computing, Database Management, Cloud Server

## **1. Introduction**

Every year, blood and their components are using to protect lives of millions of people. Blood and their components are very important medicines, which is a list of medicines that should be provided at all times in a health system, within proper dosage forms, of trusted quality, and at prices that a large number of peoples can afford [1]. Blood services are responsible for ensuring a sufficient and safe blood supply [2]. The greatest method to ensure a safe, affordable, and safe supply of blood is through a safe, donation system [3].

The incidence of negative reactions to blood donation can vary among nations and may be linked to donor characteristics. Even studies conducted in the same nation and year have demonstrated differences, suggesting that various systemic factors, many of which may lead to unfavorable reactions during blood donation, were investigated in one study. As a result, the blood donation procedure becomes important, completing the urgent research of blood product supply chain management, as well as maintaining high quality and safe products in blood banking systems, becomes critical [4-6]. The most common operation performed in US hospitals is blood transfusion [7]. This paper illustrates the key results of earlier current systems designed for managing blood donations and it includes some ideas for helping and providing blood to needed peoples, as well as some potential for future system improvements. The proposed system, which is based on supply and demand concepts, is built using a smart panel.

This panel uses a Donors-on-Call procedure in conjunction with a smart network design for multi-sourcing inventory to arrive at an optimized solution. We have proposed a system for effectively managing blood donations to benefit those in need. The system has been

developed using distributed client-server computing technologies, resulting in a complete and comprehensive solution for blood transfusion management. The website provides extensive information on managing blood donations and is easily scalable and adaptable to meet the complex needs of the healthcare industry. Our goal is to provide a dynamic and user-friendly interface through SMS, mobile applications, and online media, facilitating easy access to blood donations. Whenever the blood registry is updated through the website, the interfaces are automatically refreshed, enabling seamless connections between various parties associated with blood banks. This technology makes it easier for everyone involved in the blood donation process.

## 2. Literature Survey

The Web-Based Blood Donation System (WB-BDS) is an important platform that operates around the clock to serve a broad range of individuals, including blood donation personnel, doctors, donors, recipients, and general users. It allows individuals who have undergone blood tests to register as donors in authorized blood banks, giving them access to useful features such as information about the blood donation system, other donors, and recipients. The system acts as a central hub for coordinating and overseeing blood donation activities, streamlining the process of locating donors and recipients, especially in emergency situations that require prompt action. To sum up, the WB-BDS is a critical tool for ensuring a dependable and efficient blood donation process.

Ali et al. [4] presented a web-based solution for the management of blood donations. The Blood Bag system offers a controlled platform that streamlines all aspects of blood donation and transfusion processes, thereby enabling blood banks and donors to potentially save lives of patients in need. Giridhar et al. [5] presented a data warehouse-based analysis in 2018 for a blood donation system. They also developed a comprehensive framework consisting of front-end web modules and a back-end database to manage the entire blood donation process. With the intention of tackling the problems related to blood management, Sivakamy et al. proposed a blockchain-powered blood donation system. The authors want to resolve these problems by modelling the tracking of blood donors as a supply-chain management issue.

The WB-BDS encompasses various functionalities such as donor registration and blood collection, blood request and issuance, accounting for discarded items, user access control, comprehensive database management of donors, keeping donor identification numbers up to date, facility location using donor, patient, doctor, and blood bank identifying information, file correlation and cross-referencing, efficient donor location by blood group, gender, phone number, and location. Additionally, the system interacts with testing and grouping machines and sends multiple SMS messages to notify donors of their location and arrival time. The system also has competent security measures in place to safeguard user data.

This program includes features such as accounting for rejected goods, user access restrictions, and a sizable donor database. It is important to keep donor identification numbers current and to use identifying information to search for facilities such as donors, patients, doctors, blood bags, etc. The system also allows for effective donor searches by blood type, gender, location, and phone number. File correlation and cross-referencing are important for maintaining accurate records. There are vast report registries and format options available, and the system can communicate with equipment used for testing and grouping. Donors are notified through auto-SMS to remind them of their location and time, and there is sufficient security to protect user information.

In addition, there are several ways to enhance this program. It could be expanded to include additional features and become a social networking app. The WB-BDS is a web- and mobile-based tool that facilitates day-to-day activities at a blood bank. This program

generates electronic information on donors and blood donation agencies, streamlining the registration process and allowing for efficient recording of information related to blood collection, distribution, and other relevant activities [8,9]. Upon completion of registration, a user becomes a donor and is able to create an account by providing essential details such as an email address and a password [10–12].

### **3. Proposed Architecture**

#### **a) Proposed system**

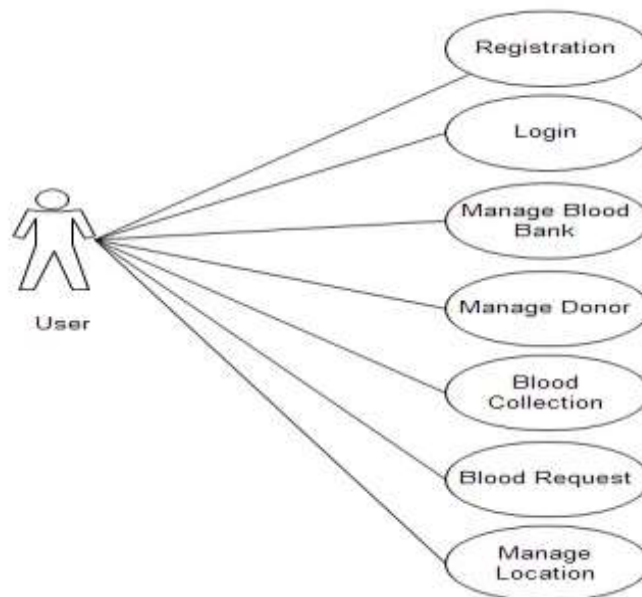
The goal is to establish a system that incentivizes blood donation by providing benefits to donors in exchange for their contributions. The proposed platform would serve as a centralized hub for coordinating and managing blood donation activities, streamlining the process of locating donors and patients. The study emphasizes the importance of providing a convenient and accessible platform that encourages individuals to donate blood regularly while simultaneously fulfilling the needs of patients who require blood. The proposed platform could significantly improve the efficiency and effectiveness of blood donation systems, ultimately saving lives and improving public health outcomes. Main focus in the previous papers has been on blood transfusion facilities, blood banks, and other stakeholders in these institutions, with the goal of establishing a system that integrates and enhances the quality of various services and operations. The proposed plan will be centralized, meaning that there will be a single system that accepts multiple types of users, each with access to the same information and distinct functions.

The proposed program will be available online and will be upgraded to PHP and SQL/Oracle on the WWW platform. SQL will be used for the backend functionality, while PHP will be used to streamline the application interface. Many of the current programs lack important features, such as preventing entry of contaminated blood into the system. The proposed program will provide real-time updates on blood bank availability and help resolve financial testing issues. Additionally, blood donors, whether voluntary or paid, will be able to learn about the blood donation process and find information about the locations of blood centers and donation groups.

Donors will also have the option to sign up for frequent donations, and links to continued programs will be provided. The donor will simply need to click on the required information at the blood bank or event. The proposed technique will minimize uncomfortable group testing and reduce genetic variability when a donor contributes. Additionally, the system will provide essential information to the recipient regarding the availability of the appropriate blood group and the nearest blood donation site.

#### **b) Proposed Methodology**

The proposed methodology involves several steps. Firstly, the user will need to register themselves through the website. After completing the registration process, the appropriate blood type will be presented and the donor's eligibility will be assessed. Then, the user will be able to undergo testing for blood group detection. The acquisition list will be continuously updated and revised as needed. To ensure quick access to the database and user input, a dedicated internet connection will be required. Here are the steps involved in the blood bank management system:



**Figure 1 Architecture of Web-Based Blood Donation**

- **User Registration:** The user will need to register themselves and create an account through the website by providing their basic information like name, contact details, age, and including their blood group.
- **Donor Eligibility Assessment:** After registration, the system will assess the donor's eligibility to donate blood based on factors such as age, weight, medical history, and other factors.
- **Blood Group Detection:** Once the donor is deemed eligible, the system will test the donor's blood to determine their blood type through a simple blood test.
- **Blood Donation:** If the donor's blood group is needed and they are willing to donate, they can schedule an appointment to donate blood at a nearby blood bank or donation camp.
- **Blood Collection:** The system will record the collection of the donated blood, including the date and time, donor information, amount of blood collected and their donation history.
- **Blood Bank Inventory Management:** The system will also keep track of the inventory of blood units available at various blood banks and hospitals.
- **Blood Request and Allocation:** The system will enable hospitals and blood banks to request blood units as per their requirement, and the system will allocate the required units based on the availability and compatibility of blood groups.

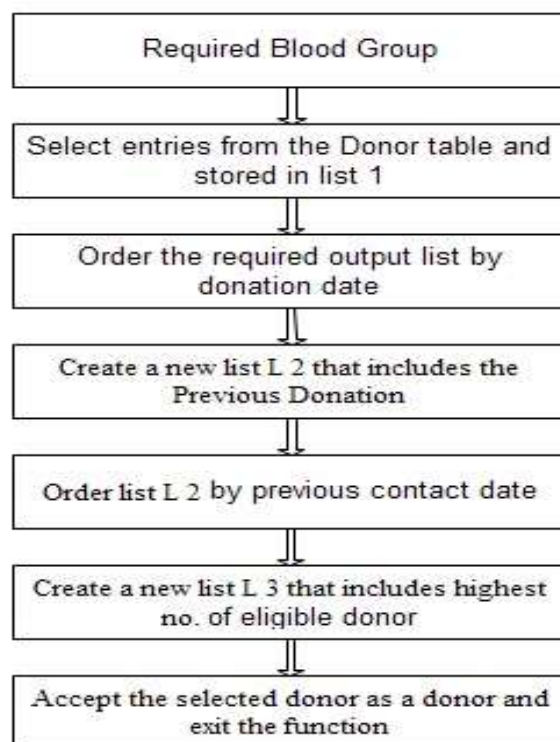
### c) Algorithm

- ✓ Define a function that takes as input a table of donor information and a value for BMI (Body Mass Index).
- ✓ Select all rows from the donor table where the "Line of Code" (LOC) value is within a certain vicinity (to be defined based on the context of the problem).
- ✓ Compile a list of the ten donors with the highest LOC values from the selected rows.
- ✓ Set the "Previous Donation" value to the date of the most recent donation in the list of ten donors.
- ✓ Create a new list L.2 that includes the "Previous Donation" value as the most recent donation date.
- ✓ Set the "Previous Communication" value to the oldest contact date in the L 2 list.

- ✓ Create a new list L.3 that includes all donors in the L.2 list who were in daily contact with the "Previous Communication" date.
- ✓ Select the donor from the L.3 list with the highest BMI value that is greater than or equal to the input BMI value.
- ✓ Accept the selected donor as a donor and exit the function.

This algorithm assumes that the donor table contains all necessary information about each donor, including their contact history and BMI value. Additionally, it is important to note that this algorithm is intended as a rough guide and may require additional steps or modifications depending on the specific context and requirements of the problem. This paper is entirely powered by PHP, MySQL, and Oracle. A feasibility study was done to assess the proposed system's technological, operational, and financial viability. We can readily see the pros and cons after analyzing the possibilities.

The system acts as a central hub for organizing and overseeing blood donation activities, simplifying the process of locating donors and recipients, particularly in emergency situations where time is critical. The system also has various functionalities, including donor registration and blood collection, blood request and issuance, user access control, comprehensive database management of donors, facility location, file correlation, and cross-referencing. Overall, the Blood Donation Management System plays a pivotal role in ensuring a dependable and efficient blood donation process.



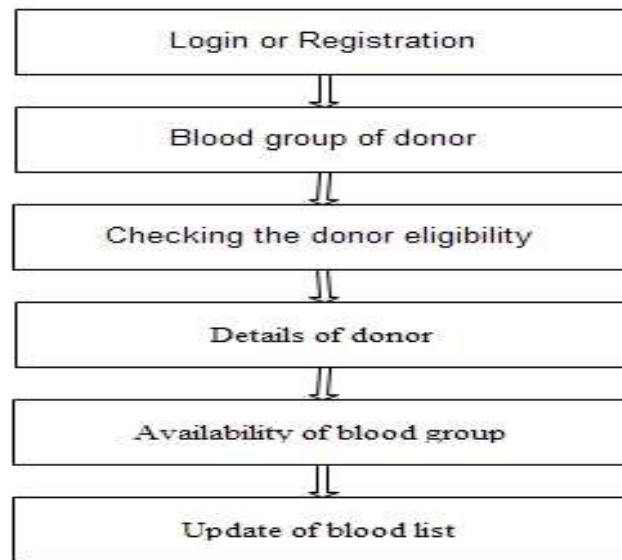
**Figure 2 Steps of Algorithm Web-Based Blood Donation**

#### **d) Module for Blood Bank Administration**

This module is a large blood donation center setup that keeps all blood donation data. This module is well-coordinated with other modules, making it noticeable at the blood donation facility and capable of keeping the pack ready for evacuation. Overall functional block diagram is shown in fig 3. This module is in charge of:

- Recruitment drive for blood donors.
- Accepting a blood.

- Choose an expiration date and wallet number.
- A thorough examination of the necessary blood collection and releasing the patient.



**Figure 3 Overall functional Block diagram**

To use this system, the user is prompted to either log in or register upon launching. If they choose to register, they will be prompted to provide personal information and create a new account. Alternatively, if they choose to log in, they will be prompted to enter their login credentials and verify their identity.

Once logged in, the user is prompted to enter the donor's blood group, and the system checks the donor's eligibility based on their blood group and other relevant criteria. If the donor is eligible, the system retrieves their details from the database and checks the availability of the required blood group in the blood list. If the required blood group is available, the system updates the blood list, notifies the user of the successful donation, and updates the donor's status and availability of their blood group in the database. However, if the required blood group is not available, the user is notified that the donation cannot be accepted at this time. It's important to note that the system assumes the existence of a database that stores the details of donors and blood availability.

#### **e) Administration and security module**

The Administration and security module of a WB-BDS is an essential component that ensures the smooth functioning and security of the system. The module is responsible for managing user accounts and their access levels, ensuring that only authorized personnel can access and modify sensitive data. The administrator can create, modify and delete user accounts, and assign appropriate roles and privileges based on their job responsibilities.

This module also provides tools for monitoring and auditing system activities to detect and prevent security breaches, and track user actions within the system. This includes log tracking, intrusion detection, and reporting tools. The module includes several features, including the ability to make plans for supervising clients, provide assistance with data sets, arrange assistance for suitable clients, allow for the arrangement and execution of jobs, and recognition of rights and educated consent in the relevant job. Additionally, the module appears to have a web application interface. Overall, the administration and security module plays a critical role in ensuring the secure and efficient operation of a web-based Blood Bank Management System. It enables system administrators to manage

user accounts, enforce security policies, and monitor system activities to ensure that the system operates in compliance with regulatory requirements and industry best practices.



Figure 4 Admin login portal

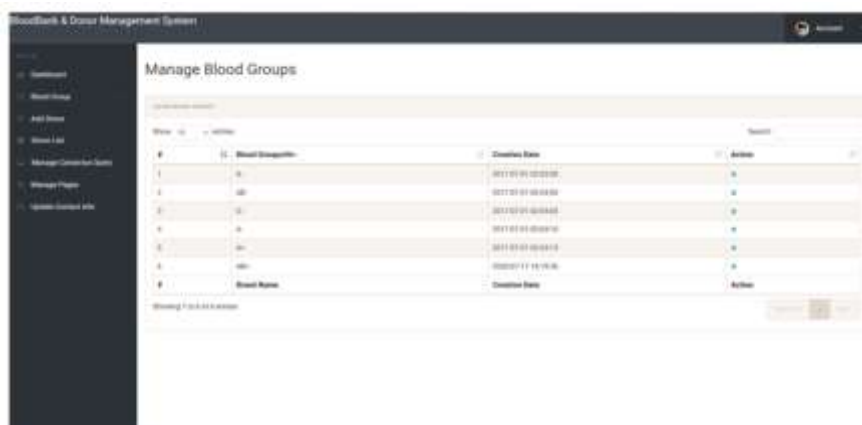


Figure 5 Blood group availability for donation

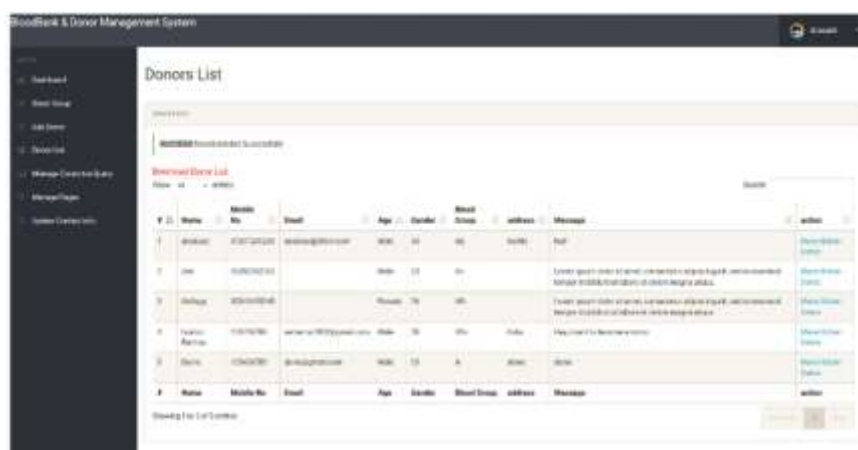


Figure 6 Donor list

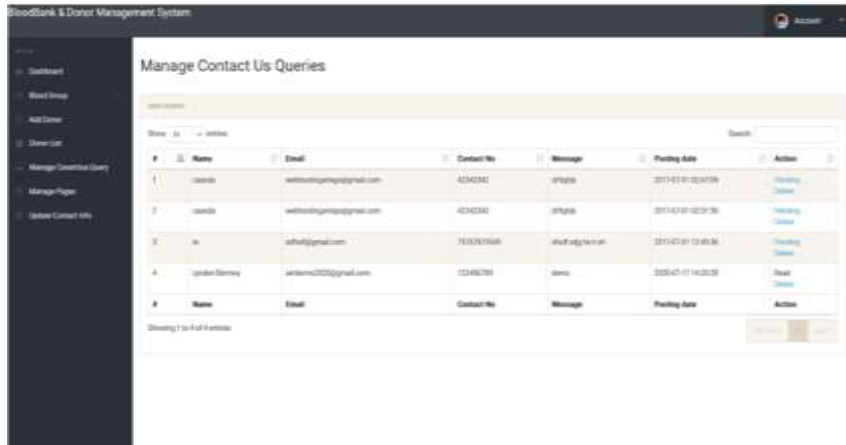


Figure 7 Donor queries management

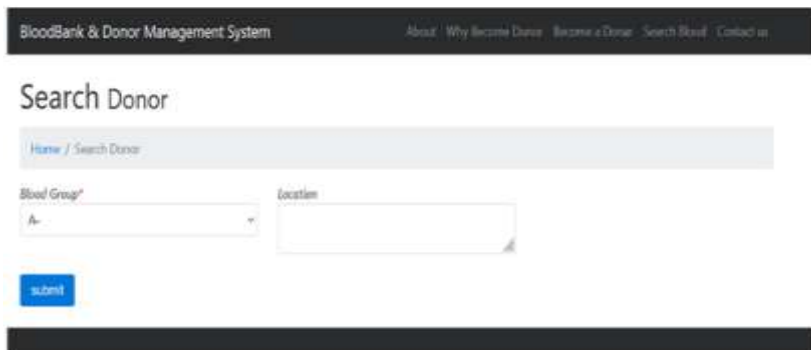


Figure 8 Search for Donor

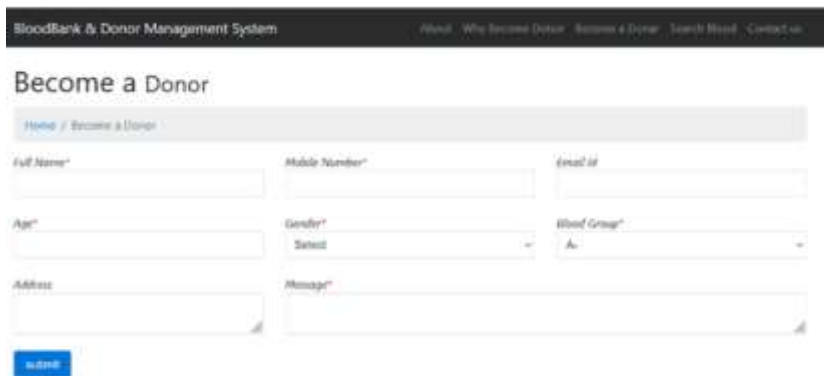


Figure 9 Become a donor form



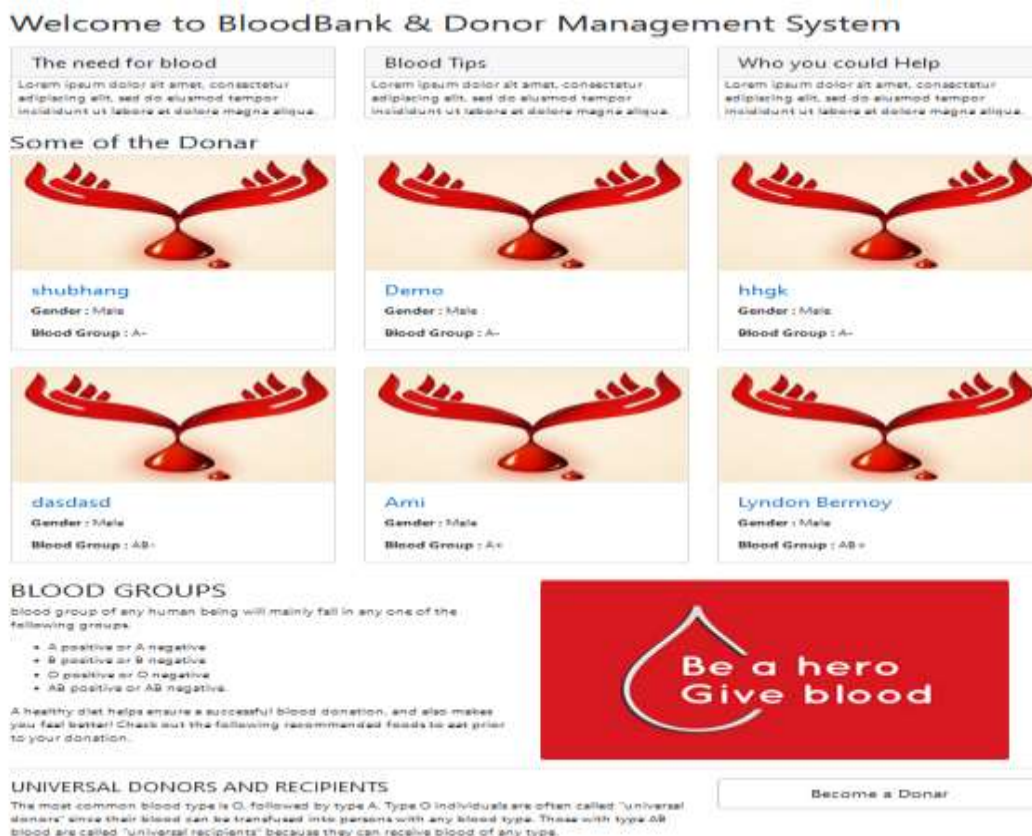


Figure 10 Homepage

Figure 4 shows the Admin login portal, which is the entry point for authorized personnel to access the backend of the WB-BDS. The portal requires the administrator to enter their login credentials, such as username and password, to gain access to the system. Figure 5 describes the blood group availability for donation feature, which enables the blood bank to keep track of the available blood inventory. The feature displays the current stock of blood units of each blood group, making it easy for the staff to identify the blood groups that are in high demand and need to be replenished.

Figure 6 shows the donor list feature, which displays a list of all the registered donors in the system. The feature includes information such as donor name, blood group, contact information, and donation history. This feature helps blood banks to manage their donor database effectively. Figure 7 describes the donor queries management feature, which allows blood bank staff to manage and respond to queries and requests from donors. The feature includes a ticketing system that enables staff to categorize queries and assign them to specific staff members for resolution. Figure 8 shows the search for donor feature, which allows the blood bank staff to search for donors based on their blood group, location, and other parameters. This feature helps blood banks to quickly identify potential donors who meet the specific requirements for a particular patient.

Figure 9 describes the become a donor form feature, which enables individuals to register as donors in the system. The feature includes a form where donors can enter their personal information, medical history, and blood type. Once registered, the blood bank staff can easily add the donor to the donor database and keep track of their donation history.

## 5. Conclusion

WB-BDS is a crucial tool for coordinating and managing blood donation activities. This system provides a convenient and efficient way for individuals in need to obtain blood of various blood types. It enables individuals who have undergone blood tests to register as donors in authorized blood banks, granting them access to useful features such as information about the blood donation system, other donors, and recipients. The system eliminates the need for users to locate the nearest blood bank, and provides up-to-date information on product availability. It also provides comprehensive information on sponsors and hospitals, making it user-friendly and easy to navigate. The article proposes an online platform that brings together blood donors and patients who require blood. This platform would provide direct website access to donor information in emergency situations, making it easier to locate and contact potential donors. Overall, this blood donation system has the potential to save lives and improve the efficiency of blood donation and distribution.

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