International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 13, Issue 3, 2025

Blood Bank Management System

[1]K Madhuravani, [2]Alampally Shailu, [3]Sarasam Spandana, [4]Jarpula Yamunabai

[1]Assistant Professor, Department of Information Technology, Bhoj Reddy Engineering College for Women

[2.3.4]B,tech students, Department of Information Technology, Bhoj Reddy Engineering College for Women

sarasamspandana123@gmail.com

ABSTRACT

Blood is a critical resource in the healthcare system, especially during accidents, surgeries, and medical emergencies. Timely availability and accurate management of blood can save countless lives. However, many traditional blood bank systems are still dependent on outdated, manual processes such as phone calls and paper records. These methods are inefficient, prone to delays, and often lead to confusion during emergencies. To address these challenges, this project proposes the development of an ***Automated Blood Bank Management System (ABBMS)*** *that streamlines and digitizes the entire blood donation and distribution process.*

The proposed system incorporates real-time tracking of blood inventory, automated email notifications, and smart donor-patient matching based on blood type, urgency, and geographic location. It acts as a centralized platform connecting blood donors, recipients, hospitals, and blood banks. With real-time updates and instant communication, the system ensures that the required blood units are delivered to the right place at the right time, minimizing delays and enhancing patient care.

This user-friendly platform reduces the burden of manual work for hospital staff and eliminates common human errors associated with traditional methods. It also encourages voluntary blood donations by allowing donors to register online and receive alerts when their blood type is needed. The system maintains a secure and accurate database that builds public trust and improves transparency in blood management.

In the future, the system can be integrated with mobile applications, GPS services, and national health databases to further enhance its functionality and reach. It has the potential to support large-scale disaster response and ensure equitable blood distribution across regions. By making blood management faster, safer, and more reliable, this project contributes significantly to the modernization of healthcare infrastructure.

Keywords: *Automated Blood Bank Management System (ABBMS),Blood, Donor-patient matching, Emergency healthcare support, Digital blood management.*

1-INTRODUCTION

Blood banks play a critical role in healthcare by ensuring the timely availability of safe and compatible blood for patients in need. Efficient management of blood inventory, donor information, and transfusion records is essential to prevent shortages and wastage while maintaining quality control. Traditional manual methods of blood bank management are prone to errors, delays, and data inconsistencies, which can impact patient care adversely. With the increasing demand for blood and blood components in hospitals and emergency situations, there is a pressing need for automated systems that streamline blood donation, storage, and distribution processes.

A Blood Bank Management System (BBMS) aims to digitize and optimize the workflow by tracking donor details, blood group compatibility, stock levels, and expiry dates in real-time. By incorporating features such as donor registration, blood request processing, and inventory alerts, BBMS enhances operational efficiency and ensures transparency.

Though various solutions exist, many lack integration with mobile platforms or real-time analytics, which are crucial for timely decision-making during emergencies. Our proposed BBMS addresses these challenges by offering a user-friendly interface and comprehensive database management, enabling healthcare staff to manage blood resources effectively. Early adoption of such systems can significantly reduce manual workload, prevent blood wastage, and save lives by improving the availability of compatible blood for transfusions.

Existing System

The purpose of the Blood Bank Management System is to streamline and automate the entire process of managing blood donations, inventory, and transfusions. It aims to maintain accurate records of donors and blood stock, monitor blood group compatibility, track expiry dates, and facilitate efficient blood requests and distribution. By digitizing these processes, the system reduces manual errors, minimizes blood wastage, and ensures timely availability of blood for patients in need. Additionally, it provides an easy-to-use platform for healthcare professionals to manage blood bank operations effectively, ultimately improving patient care and saving lives.

Proposed System

The proposed Blood Bank Management System aims to overcome the limitations of the existing system by automating blood donation, storage and distribution processes. It will include real-time blood stock updates, ensuring accurate inventory tracking and reducing delays in finding the required blood type.To address the issue of manual contact delays, the system will feature an automated email message request system, enabling faster communication between blood banks, hospitals and donors. Additionally, it ensures ensuring timely blood availability during emergencies.By implementing

this system, blood banks can operate more efficiently, reduce response time in critical situations and enhance overall patient care.

2. RELATED WORK

While previous studies have explored manual record-keeping and standalone software for blood bank management, there has been limited investigation into fully integrated, automated systems that combine donor management, inventory control, and real-time blood request processing. For example, Sharma et al. developed a basic blood inventory tracking system using barcode scanning, which improved accuracy by 75%, but lacked features like donor management or expiry tracking. Kumar and Singh created a web-based blood bank management portal that supported donor registration and blood requests; however, it did not offer real-time stock updates or alerts for low inventory.

Some researchers have proposed the use of mobile applications to facilitate blood donation drives and donor notifications. Gupta et al. designed a mobile platform for donor recruitment, which increased donation rates by 20%, but did not integrate with hospital blood banks to automate inventory management. More recently, Patel and Mehta applied machine learning algorithms to predict blood demand trends based on historical data, achieving 85% prediction accuracy, but this approach was not combined with operational management.

Furthermore, while various standalone systems handle components such as blood grouping or transfusion records, few studies address the need for a centralized system with end-to-end workflow automation, including donor eligibility verification, compatibility matching, and expiry alerts. Our proposed Blood Bank Management System aims to fill this gap by offering a comprehensive solution with features such as real-time stock monitoring, automated notifications, and a user-friendly interface accessible via desktop and mobile devices.

By integrating these functionalities, our system can significantly reduce manual errors, prevent blood wastage, and improve the efficiency of blood resource management, ultimately enhancing patient care in hospitals and emergency settings.

3. REQUIREMENT ANALYSIS

Functional Requirements

A database is required to store all the blood bank-related data including donor details, blood inventory, and request records. Technologies like **MySQL** along with **phpMyAdmin** are used for efficient data storage and management. A web server such as **Apache** with **XAMPP** is required to host and run the system locally or on a network.

The system should include a user-friendly interface for easy data input and retrieval. Real-time updates of blood stock and donor information are essential for accurate inventory management and quick response to blood requests.

Functional requirements for managing the blood bank using technology include:

- **User Registration and Authentication System:** Secure login and profile management for donors, patients, and admins.
- **Donor Management Module:** Registration, search, and filtering of donors based on blood group and location.
- **Blood Inventory Management:** Real-time tracking of blood units by type, quantity, and expiry date.
- **Blood Request and Approval System:** Online submission of blood requests with admin approval workflow.
- **Automated Notification System:** Alerts and messages for donors, and admins regarding requests, approvals, and stock status.
- **Reporting Dashboard:** Visual reports and analytics on blood donations, requests, and inventory levels.
- **Data Security and Access Control:** Protect sensitive information with authentication, authorization, and data encryption.

Non-Functional Requirements

Data should be validated and cleaned before being entered into the system to avoid errors and inconsistencies. For example, donor details must be complete with no missing or incorrect information, and blood stock records must be updated accurately. Proper validation ensures reliable operation and accurate reporting. Technologies like **MySQL** and input validation techniques will be used to maintain data integrity.

While developing the system, performance, security, and usability are key non-functional requirements that guide design and implementation.

Software Requirements

Backend : MySQL
Frontend :HTML,CSS, JavaScript
Editor :Visual Studio Code

Hardware Requirements

Processor : Any processor more than i3
RAM : 8 GB
Hard Disk : 512GB

4-DESIGN

System Architecture

System architecture defines the structure and behavior of the technological infrastructure supporting the Blood Bank Management System. This conceptual framework outlines how different system components interact to fulfill organizational

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 3, 2025

goals such as blood donor registration, data storage, communication, and efficient donor retrieval.
The primary purpose of system architecture activities in the blood bank system is to define a comprehensive and logical solution that aligns with principles, concepts, and properties critical to the success of the system. These architectural elements are derived from a clear set of system requirements, which themselves are traceable to business goals and stakeholder expectations
The *Blood Bank Management System Architecture* is visualized in the following diagram:
This architecture diagram represents the flow of interactions:
* Browser is the interface used by donors or staff to interact with the system.
* Registration Form is accessed via the browser during the sign-up process and stores user data into the Database.
* Post-registration, users Login to access services.
* Logged-in users can view the Donor List, which retrieves information from the Database.
* The Message module is responsible for communication (such as alerts or notifications), sending information to both Donor and Database.
* The Database serves as the central repository, storing and retrieving donor and system-related data.
The architecture emphasizes abstraction and high-level design principles, ensuring system robustness and scalability. It integrates structural, functional, and behavioral models to comprehensively manage user interactions and backend processes.
In line with ISO/IEC/IEEE 42010 standards, this system architecture takes into account:
* Stakeholder concerns (e.g., privacy, availability of blood types),
* Multiple architecture viewpoints (e.g., data flow, user interface, communication),
* System lifecycle considerations (e.g., registration, updating records, notifications).
The architecture provides a consistent and reusable foundation for building, managing, and evolving a family of similar blood bank systems.

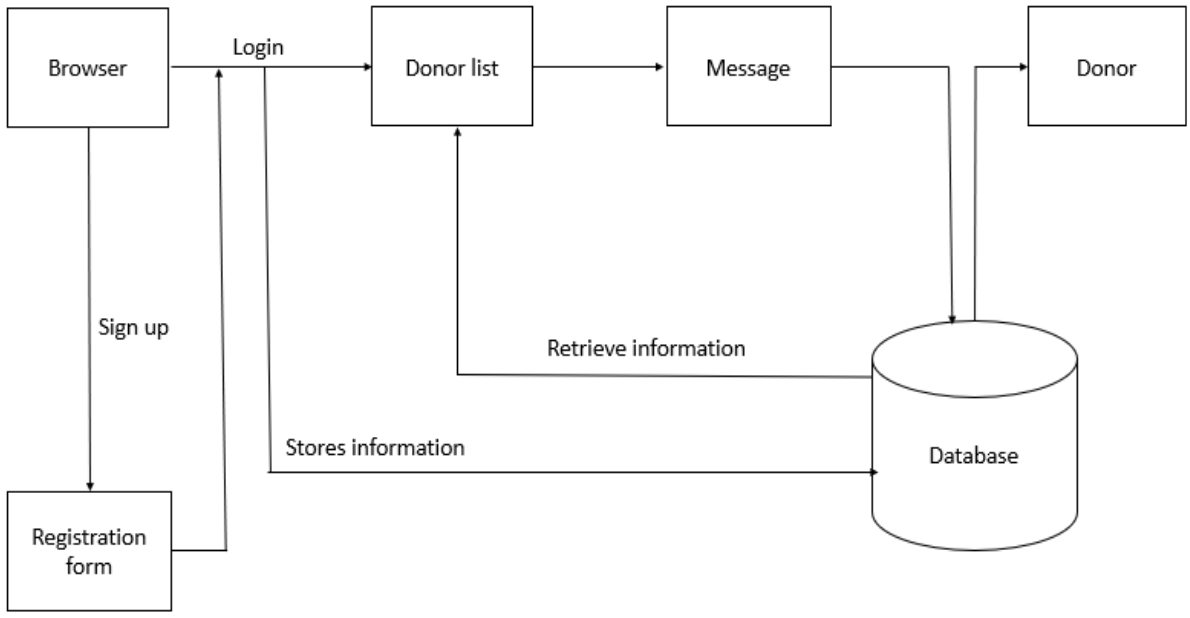

Fig. 4.1.1.1 System Architecture

5-IMPLEMENTATION

5.1 Libraries

• MySQL(Database):
MySQL is a PHP extension used to interact with MySQL databases. It allows the project to execute SQL queries to manage blood donor data, handle login credentials, fetch user profiles, etc. It supports both procedural and object-oriented programming.
• Bootstrap(Technology):
Bootstrap is a popular front-end CSS framework used for designing responsive and mobile-first web pages. It provides pre-styled components like navigation bars, forms, buttons, and layout grids which are used throughout the project to build a clean and functional UI.
• jQuery:
jQuery is a lightweight JavaScript library that simplifies HTML DOM tree traversal and manipulation, event handling, and AJAX interactions. It is often used in this type of PHP web app to make forms dynamic and responsive without reloading pages.
• Font Awesome:
Font Awesome is used to include scalable vector

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 3, 2025

icons that can be customized with CSS. Icons such as user avatars, login/logout symbols, and form controls are typically used in dashboard and navigation menus.

• PHPMailer (optional/assumed):

PHPMailer is a popular library used to send emails from a PHP script. If the system includes features like "Contact Us" or "Password Recovery", PHPMailer would typically be used for sending emails securely using SMTP.

• Session Handling (Built-in PHP):

PHP has built-in support for session management, which is critical in handling user login, logout, and role-based access (admin, donor, recipient). This project utilizes PHP $_SESSION superglobal for maintaining user state across pages.

• Apache Web Server (Recommended for Hosting):

Apache is a widely-used web server that supports PHP. It is often bundled with XAMPP or WAMP for local development and is ideal for hosting PHP applications like this one.

• XAMPP/WAMP (Local Development Environment):

XAMPP or WAMP is commonly used during development. These stacks include Apache, PHP, and MySQL pre-configured to run PHP-based web applications on a local machine.data.

6-SCREENSHOTS

Fig.6.1 Home page

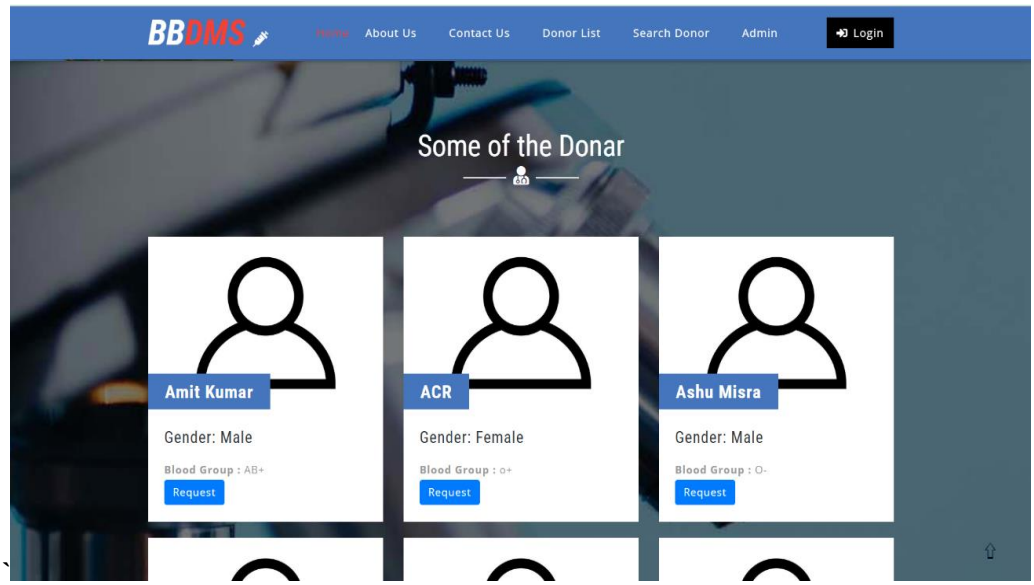

Fig.6.2 Home page interface 2

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 3, 2025

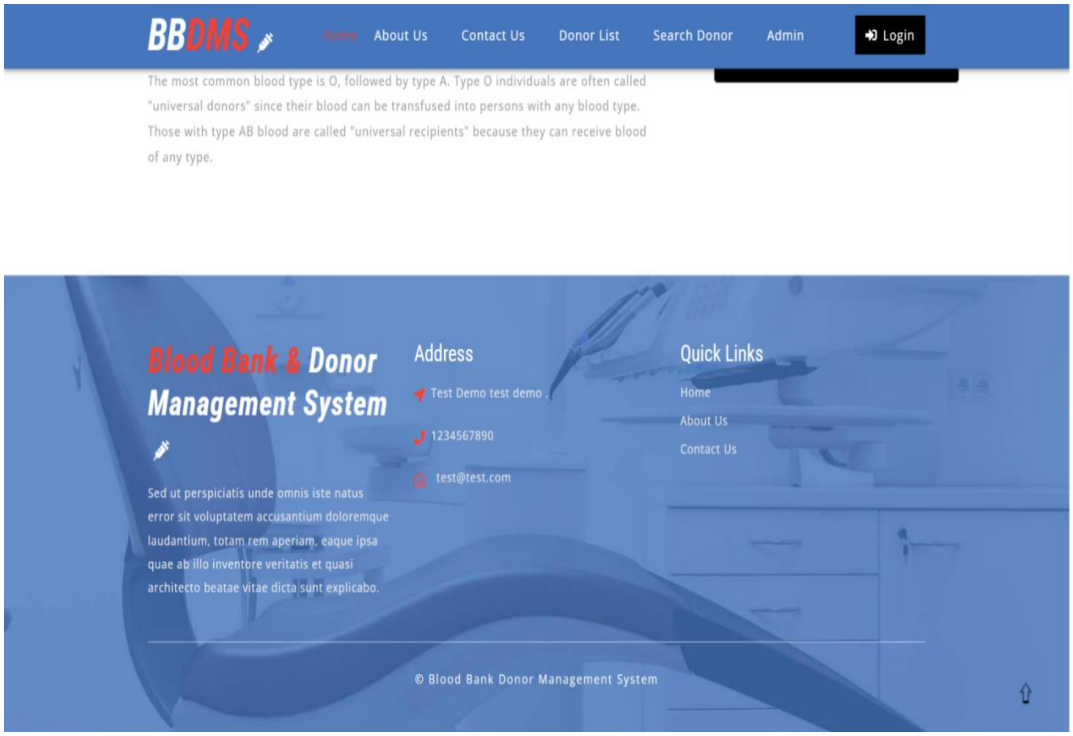

Fig.6.3 Home page interface 3

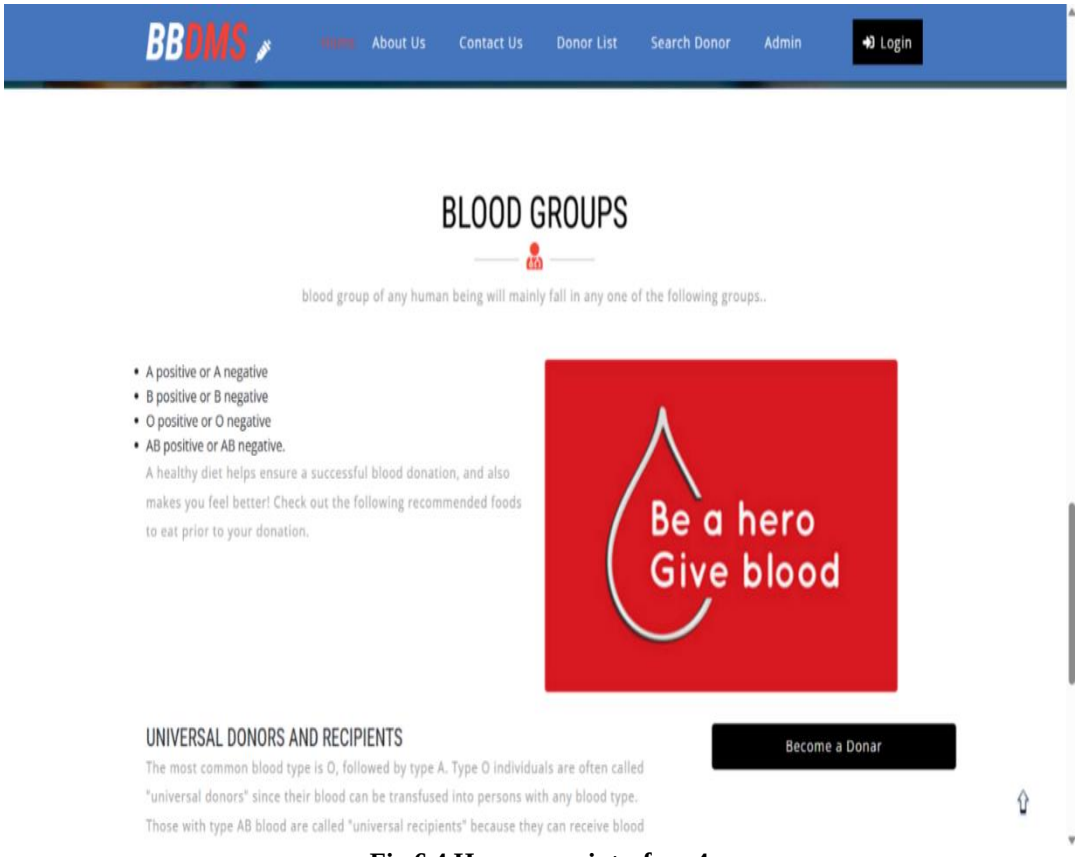

Fig.6.4 Home page interface 4

International Journal of Information Technology & Computer Engineering
ISSN 2347–3657
Volume 13, Issue 3, 2025

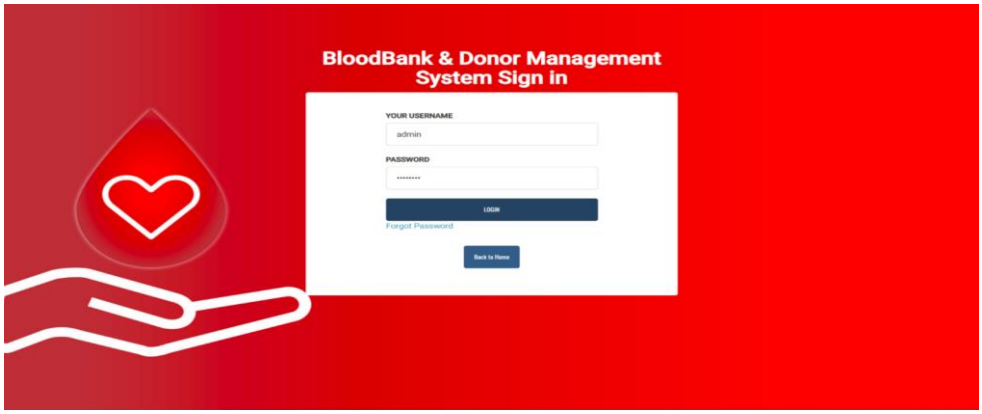

Fig.6.5 Admin login

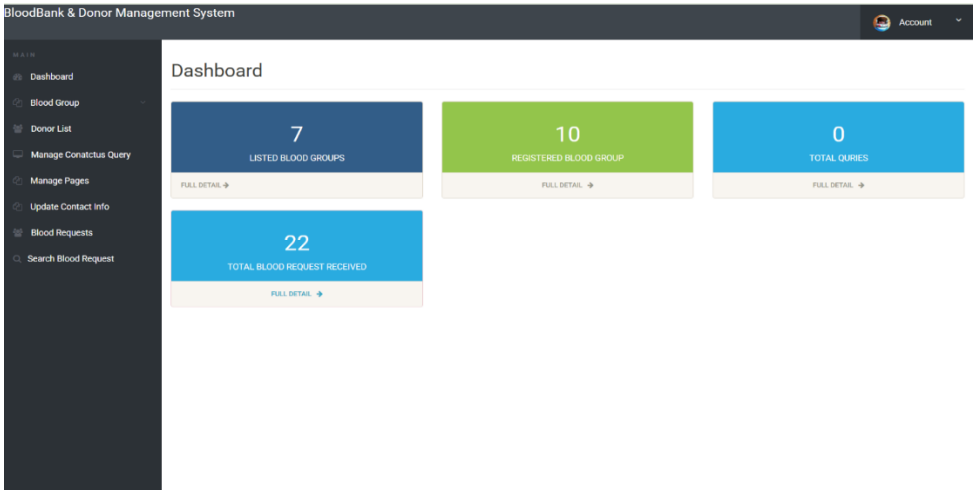

Fig.6.6 Admin dashboard

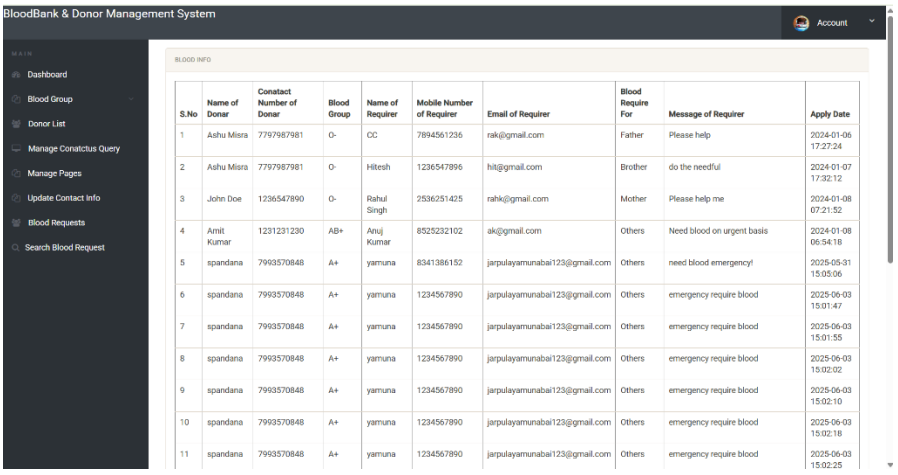

Fig.6.7 Blood Requests

International Journal of Information Technology & Computer Engineering

ISSN 2347–3657

Volume 13, Issue 3, 2025

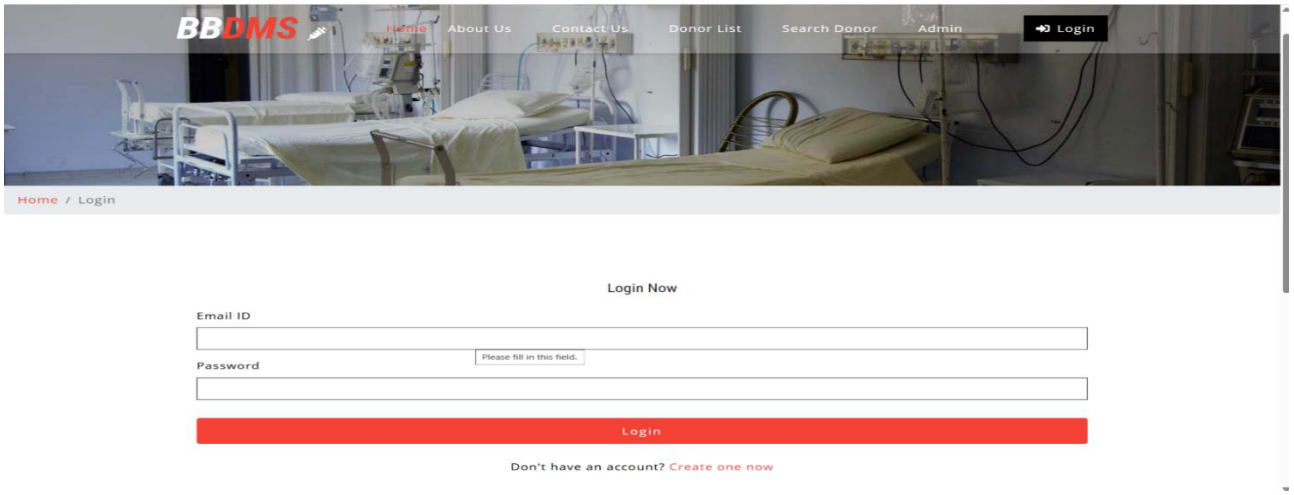

Fig.6.8 Login page

7. CONCLUSION

Using real-time donor and inventory data, the proposed Blood Bank Management System achieves efficient tracking and response, improving accuracy and reducing manual errors. The system performs well under high-demand scenarios, as all modules—including donor registration, blood request processing, and inventory updates—are integrated and function cohesively. With automated notifications via SMS and email, the system ensures timely communication between donors, hospitals, and blood banks.

Both web and mobile accessibility make the system adaptable to various healthcare environments, including emergency and rural settings. Due to its scalability, reliability, and user-friendly design, we recommend this system as a sustainable solution for managing blood resources effectively. In the future, integration with biometric donor verification and IoT-based blood storage monitoring can further improve security and tracking. Our long-term objective is to support healthcare delivery through telemedicine by enabling smart, automated blood management systems accessible from any location.

REFERENCES

1. Gupta, R., Sharma, S., & Verma, A. (2018). *A Mobile Based Blood Donation Management System*. International Journal of Advanced Research in Computer Science, 9(3), 177–181.

2. Jain, S., & Yadav, V. (2019). *Design and Development of E-Blood Bank Management System*. International Journal of Computer Science and Mobile Computing, 8(5), 21–26.

3. Dixit, R., & Joshi, R. (2022). *Digital Blood Bank using PHP and MySQL*. International Research Journal of Engineering and Technology (IRJET), 9(7), 1234–1240.

4. Patel, D., & Mehta, H. (2021). *A Smart Blood Bank Management System using Machine Learning and IoT*. International Journal of Engineering Research & Technology (IJERT), 10(4), 239–243.

5. Shaikh, R., & Jadhav, A. (2019). *A Comparative Study of Blood Bank Management Systems:Survey and Analysis*. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 5(2), 205–210.

6. Goyal, A., & Singh, H. (2017). *A Survey on Role of Information Technology in Blood Bank Management*. International Journal of Engineering and Techniques, 3(2), 123–128.

7. Pandey, A., & Agrawal, D. (2016). *Survey of Existing Blood Bank Management Systems in India and Proposed Improvements*. International Journal of Computer Applications, 139(3), 14–18.

8. Sharma, A., & Thakur, P. (2021). *Analysis of the Performance of Blood Bank Portals with Real-Time Data Integration*. International Journal of Innovative Research in Science, Engineering and Technology, 10(6), 5500–5505.

10. World Health Organization (WHO). (2023). *Blood safety and availability*. Retrieved from [https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability](https://www.who.int/news-

ISSN 2347–3657

Volume 13, Issue 3, 2025

room/fact-sheets/detail/blood-safety-and-availability)

11. National Blood Transfusion Council (India). (2022). *Blood Donation and Transfusion Guidelines*. Retrieved from https://nbtc.naco.gov.in