

# Blood Donor and Blood Bank Finder (Blood Bridge)

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## Abstract:

The *Blood Donor and Blood Bank Finder* is an integrated, intelligent, and secure digital platform designed to connect blood donors, recipients, hospitals, and blood banks in real time. The system addresses one of the most critical challenges in healthcare—delayed blood availability—by providing GPS-based donor tracking, secure data exchange, and automated SOS alerts. Developed using Python’s Flask framework and MySQL database, with Kivy-based cross-platform frontend, the system provides modules for Smart Blood Finder, Emergency Notification, and Blood Stock Dashboard. It employs advanced security mechanisms including AES encryption, SSL, and JWT authentication to ensure data confidentiality and integrity. The project significantly reduces donor search time, enhances transparency, and improves coordination between blood banks and hospitals.

**Keywords:** Blood Donation, Flask Framework, MySQL, Healthcare Automation, SOS Alert, Secure Communication.

## 1. INTRODUCTION

Blood plays a vital role in sustaining life and is irreplaceable in medical science. Every year, thousands of patients die due to a lack of timely access to compatible blood. Traditional methods of blood procurement involve manual calls or social media appeals, which are often inefficient and time-consuming. This gap between demand and availability highlights the need for a centralized and automated system.

The *Blood Donor and Blood Bank Finder* system was developed to eliminate these barriers by connecting donors, hospitals, and blood banks through a unified digital network. The platform integrates live location tracking, instant alerts, and automated donor matching algorithms, ensuring that the right blood type reaches the right patient at the right time. It promotes voluntary blood donation and encourages community participation, thereby supporting national digital health missions.

The primary goal of this project is to improve efficiency, accuracy, and security in blood donation and management using modern technologies like Flask, MySQL, and GPS-based tracking.

## 2. RELATED WORK

Over the years, various blood management systems have been proposed to digitalize the process of blood donation and distribution. However, most of them fail to achieve real-time functionality, reliable security, or large-scale integration.

Sharma [1] developed a database-driven digital blood bank system but lacked mobile and GPS support. Kulsum [2] implemented the *E-Raktkosh* platform, ensuring centralized data sharing; however, it lacked automated emergency notifications. Ghadge [3] designed an Android-based donor application focusing on registration but without backend hospital integration.

Recent advancements emphasize **AI, cloud computing, and IoT** for healthcare solutions. Sahoo and Sinha [5] presented a cloud-based blood bank architecture, while Gupta [7] introduced IoT-enabled storage monitoring for maintaining optimal blood temperature. Blockchain integration for data authenticity has also been explored by Patel [8] and Khan [9].

Despite these innovations, real-time donor tracking, multi-channel alerting, and complete end-to-end security remain unfulfilled requirements. The proposed system integrates all these features, offering a holistic, reliable, and scalable solution.

### 3. METHODOLOGY

#### Algorithms

- **Haversine Formula:** Calculates distance between donors and recipients.

The integration of Flask with MySQL ensures real-time updates and synchronization across all modules.

The Haversine formula is:

$$d = 2R \cdot \arcsin(\sqrt{a})$$

Where:

$$a = \sin^2\left(\frac{\Delta\varphi}{2}\right) + \cos(\varphi_1) \cos(\varphi_2) \sin^2\left(\frac{\Delta\lambda}{2}\right)$$

#### Definitions:

- $\varphi_1, \varphi_2$  = latitudes (in radians)
- $\lambda_1, \lambda_2$  = longitudes (in radians)
- $\Delta\varphi$  = difference between latitudes
- $\Delta\lambda$  = difference between longitudes
- $R$  = Radius of Earth ( $\approx 6371$  km)
- $d$  = Distance between two points

#### Who we use in project

##### Step 1: Store Location Data

When a donor registers:

- Collect latitude and longitude using GPS.
- Store them in the database.

Example database fields:

- donor\_name
- blood\_group
- latitude
- longitude
- availability\_status

Same for blood banks.

##### Step 2: Get User Location

When a patient searches for blood:

- The system captures the user's current GPS location.
- This gives:
  - user\_latitude



- user\_longitude

### Step 3: Apply Haversine Formula

For each donor in the database:

1. Take:
  - User coordinates (lat1, lon1)
  - Donor coordinates (lat2, lon2)
2. Convert degrees to radians.
3. Apply the Haversine formula:

$$d = 2R \cdot \arcsin(\sqrt{a})$$

Where:

- R = 6371 km (Earth radius)
- d = distance between user and donor

### Step 4: Filter and Sort

After calculating distance:

- Filter donors by required blood group.
- Filter by availability.
- Filter donors within a radius (e.g., less than 10 km).
- Sort by distance (ascending).

### Step 5: Display Result

Show:

- Donor name
- Contact number
- Distance (e.g., 3.5 km away)
- Blood group



#### 4. OUTPUT



## Blood Bridge

 Login

 Register



## Register

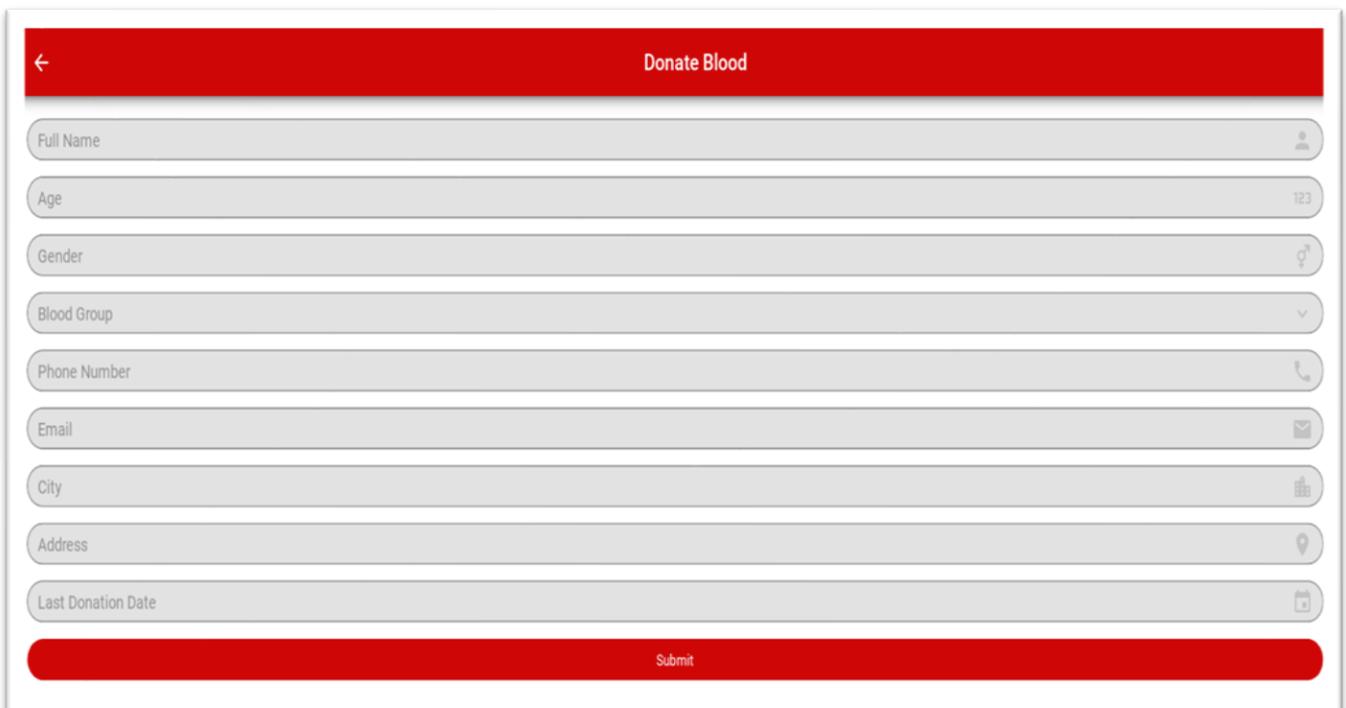
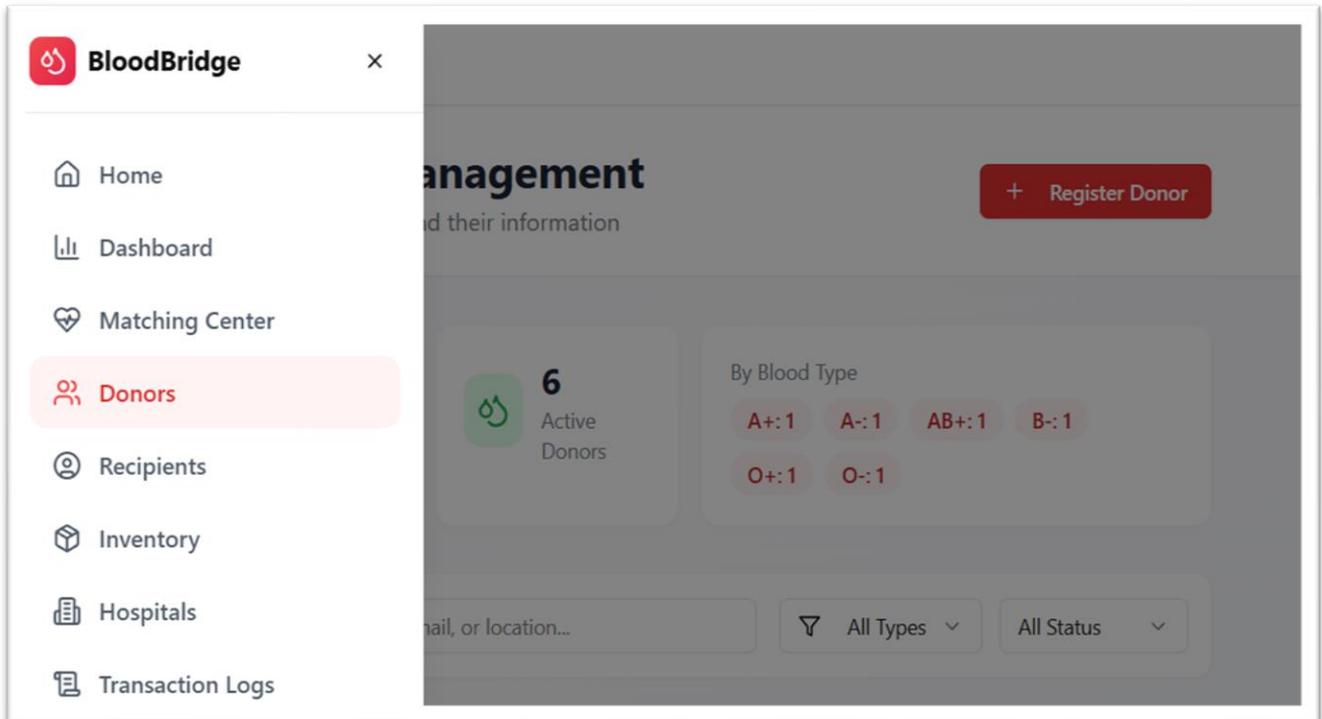


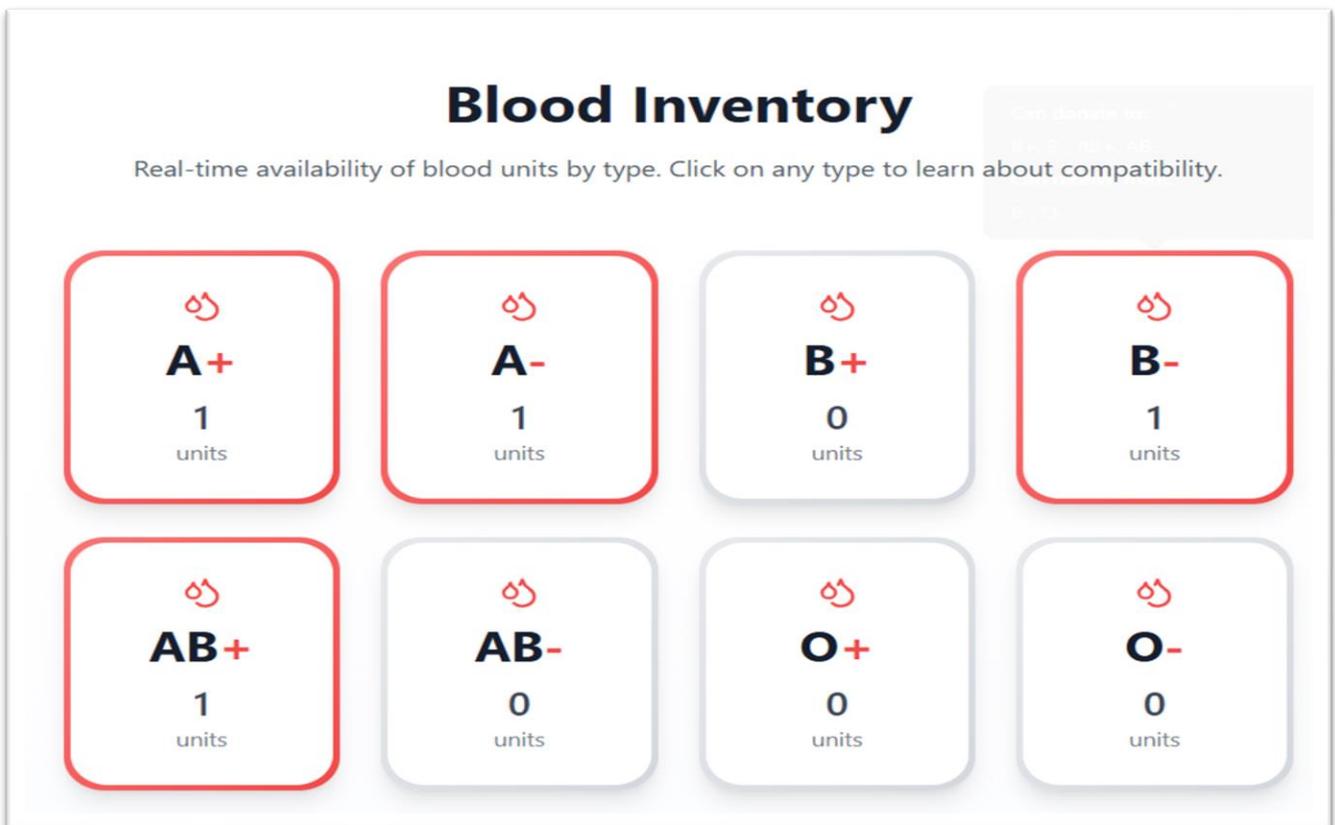
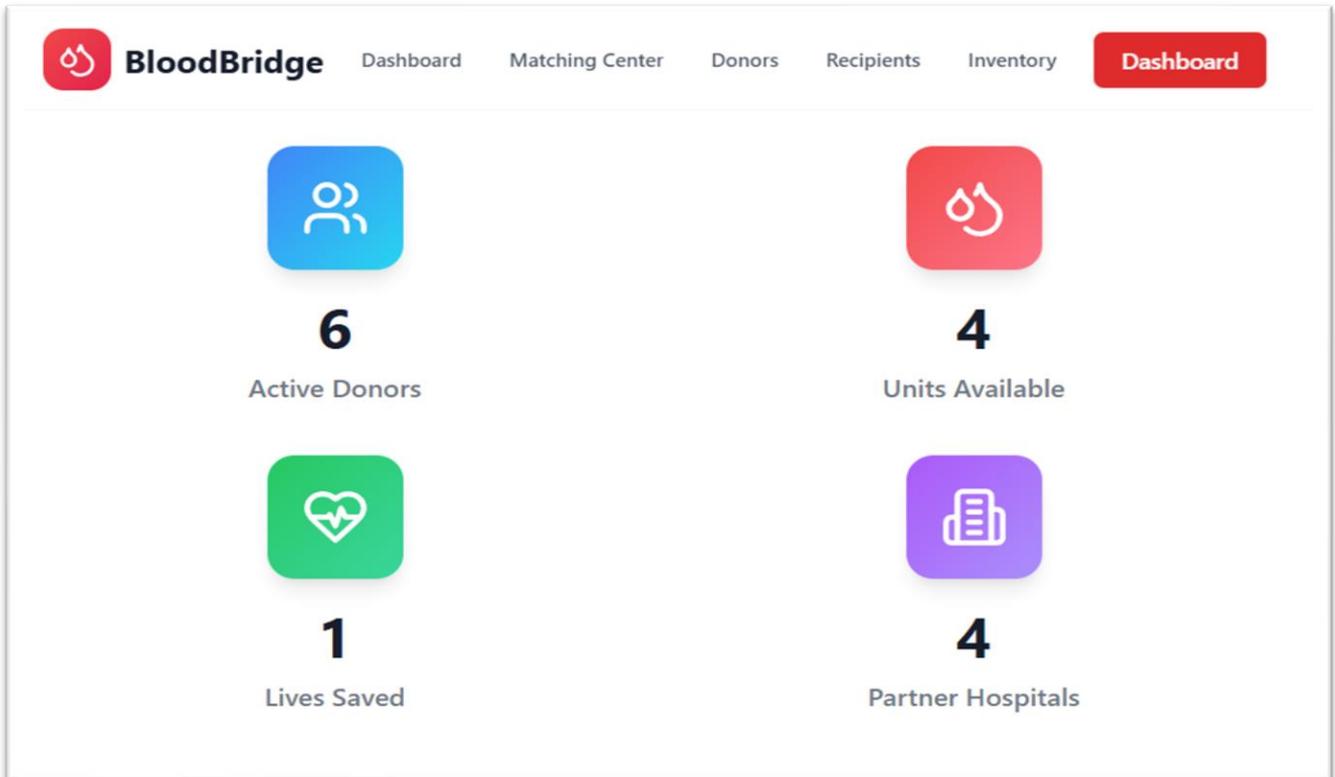
[Back](#)

## Login



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## 5. CONCLUSION AND FUTURE WORK

The *Blood Donor and Blood Bank Finder* project provides a comprehensive and scalable solution to bridge the communication gap between blood donors and recipients. By integrating real-time tracking, automated alerts, and secure data management, the system ensures that lifesaving blood reaches patients without delay.

### Future Enhancements:

- Implementation of **AI models** for blood demand prediction.
- Use of **Blockchain** for tamper-proof donation records.
- Integration of **IoT sensors** for temperature-controlled blood storage.
- Inclusion of **Voice and Regional Language Support** for accessibility.

This research contributes to the modernization of healthcare technology and demonstrates how software innovation can directly save human lives.

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