

# Design and Implementation of a Location-Based Blood Bank Management System Using Google Maps API on Android Platform

Girish Sharad Desai<sup>1</sup> Sanskruti Sudhir Bhakare<sup>2</sup> Vaishnavi Abhaykumar Wale<sup>3</sup> Sanket S Ghodake<sup>4</sup> Sangam B Shendage<sup>5</sup>

<sup>1,2,3,4,5</sup>Department of Computer Engineering

<sup>1,2,3,4,5</sup>Padmabhooshan Vasantraodada Patil Institute of Technology, Sangli, India

**Abstract** — Blood management is an essential aspect of healthcare, and the use of mobile technology has made blood management more accessible and efficient. In this paper, we present the design and development of an Android blood bank APK that utilizes Google Maps API for improved blood management. The APK allows donors to register, track their donation history, and receive alerts when their blood is used. Blood banks and hospitals can use the APK to track their inventory levels, request blood, and schedule appointments. The integration of Google Maps API allows users to locate nearby blood banks and hospitals, making it easier to access blood in case of emergencies. The application is user-friendly, efficient, and accessible, improving the overall blood management process.

**Keywords:** Blood Bank, Android APK, Google Maps API, Blood Management, Donor, Inventory, Appointment Scheduling

## I. INTRODUCTION

Blood is a life-saving resource that is vital in the healthcare industry. The demand for blood and blood products continues to increase, and it is crucial to adopt efficient methods for blood management. In this paper, we present an Android blood bank APK that utilizes Google Maps API to enhance blood management and accessibility. Ease of Use

The process of transferring blood from a healthy person to someone in need is known as blood donation. "When a person consents to having their blood drawn, it is known as voluntary blood donation. Blood is the "gift of life" that a healthy person gives to others who are sick and in need of blood. One hour later, from one Red blood cells can be extracted from a unit of blood and used in trauma or surgical patients. Patients with clotting issues are given Plasma, a liquid component of their blood. Platelets, the third component of blood, clot the blood when there are cuts and are frequently used in cancer and transplant patients. In a recent study funded by the National Blood Foundation, more than 5,000 blood donors were asked why they donate blood, and three-quarters of the respondents said it was to help others.

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To develop a web-based system is the study's goal. Blood Bank System for keeping track of the records.

People who require blood can easily locate donors. in order to give them blood.

Blood transfusions are crucial to saving lives in emergency situations, but ensuring a reliable and efficient blood supply chain can be a challenge. In recent years, blood banks have started to use mobile applications to manage their inventory, track donations, and facilitate the distribution of blood to hospitals and other medical facilities. In this paper, we review the literature on blood bank applications that utilize map APIs to improve the efficiency of the blood supply chain.

## II. LITERATURE REVIEW

The literature review analyses the current state of blood management and the role of technology in improving it. We also review existing blood bank applications and their features, including the use of Google Maps API. The review indicates that the integration of Google Maps API improves blood management by enabling users to locate nearby blood banks and hospitals easily.

A study by Yang et al. (2018) investigated the use of map APIs in blood bank applications in China. The researchers found that the use of maps helped to improve the efficiency of blood donation drives by identifying areas with high demand for blood and directing donors to these areas. The map API also helped to track the location of blood donation vehicles, which improved the speed and accuracy of blood collection.

In another study, Kumar et al. (2019) developed a blood bank application that utilized map APIs to identify the location of blood banks and hospitals in India. The app allowed users to search for blood banks based on their location and provided real-time information on the availability of different blood types. The study found that the app improved the efficiency of the blood supply chain by reducing the time taken to locate blood banks and connect donors with hospitals.

A study by Zhou et al. (2019) investigated the use of map APIs in a blood bank application in China. The app used maps to track the location of blood donors, hospitals, and blood collection vehicles in real-time. The app also provided alerts to users when their blood was needed and helped to manage the inventory of blood at the blood bank. The study found that the app improved the efficiency of the blood supply chain and increased the number of blood donations.

Finally, a study by Gao et al. (2020) investigated the use of map APIs in a blood bank application in rural China. The app used maps to identify areas with high demand for blood and directed donors to these areas. The app also provided real-time information on the availability of different blood types at nearby blood banks. The study found that the

app increased the number of blood donations and improved the efficiency of the blood supply chain in rural areas.

### III. METHODOLOGY

We employed an agile software development methodology for the design and development of the Android blood bank APK. The APK was developed using Android Studio, Firebase, and Google Maps API. We utilized a user-centered design approach to create a user-friendly application that is accessible to both donors and blood banks.

- Step 1: Requirement Analysis The first step in developing the blood bank application is to conduct a thorough requirement analysis. This involves identifying the stakeholders, understanding their needs, and defining the features and functionalities required for the application.
- Step 2: Design Once the requirements have been gathered, the next step is to design the application. This involves creating wireframes and user interface designs. The design should be simple and intuitive, and should make it easy for users to search for donors and request blood.
- Step 3: Database Design The next step is to design the database for the application. The database should be designed to store information about donors, recipients, and blood inventory. It should also be designed to support efficient search and retrieval of information.
- Step 4: Map API Integration The application should be integrated with a Map API, such as Google Maps, to enable users to search for donors and blood banks in their area. The Map API should be used to display the locations of donors and blood banks on a map, making it easy for users to find them.
- Step 5: Development Once the design and database have been finalized, the application can be developed. The development should be done using a suitable programming language and framework, and should follow industry best practices for coding and testing.
- Step 6: Testing The application should be thoroughly tested to ensure that it is functioning correctly and meets the requirements of the stakeholders. Testing should include functional testing, usability testing, and performance testing.
- Step 7: Deployment Once the application has been tested and verified, it can be deployed to a production environment. The deployment should be done in a way that ensures that the application is secure and can handle a large number of users.

### IV. SYSTEM ARCHITECTURE

The Android blood bank APK has a three-tier architecture consisting of a presentation tier, application tier, and database tier. The presentation tier handles the user interface, the application tier manages the application's logic, and the database tier stores user information, including donor and blood bank information, inventory levels, and donation history.

The Blood Bank Application is a cloud-based system that is designed to support multiple users and data

sources. The system is divided into several components that work together to provide a seamless experience for the users. The following components are involved in the Blood Bank Application:

#### 1) User Interface:

The User Interface is the front-end of the Blood Bank Application. It is designed to provide a user-friendly interface for donors, recipients, and blood banks. The interface is designed to be responsive and easy to use, with a clean and modern look.

#### 2) Database:

The Database is the central repository of all data related to the Blood Bank Application. It stores information about donors, recipients, blood banks, blood groups, and other relevant data. The database is designed to be scalable and reliable, with multiple backup options to ensure data availability.

#### 3) API Server:

The API Server is the core of the Blood Bank Application. It provides a platform for communication between the User Interface, the Database, and the Map API. The API Server is designed to be RESTful, which means that it is based on HTTP protocols and is easy to integrate with other systems.

#### 4) Map API:

The Map API is integrated into the Blood Bank Application to provide location-based services for finding the nearest blood banks and donors. The Map API is designed to be scalable and reliable, with multiple data sources to ensure data accuracy.

#### 5) Notification Server:

The Notification Server is responsible for sending notifications to donors and recipients about their donations and requests. The server is designed to be reliable and efficient, with multiple backup options to ensure notifications are delivered.

### V. APPLICATION FEATURES

The Android blood bank APK has several features that enhance blood management. Donors can use the APK to register, track their donation history, and receive alerts when their blood is used. Blood banks and hospitals can use the APK to track their inventory levels, request blood, and schedule appointments. The integration of Google Maps API enables users to view nearby blood banks and hospitals, making it easier to locate and access blood.

#### 1) Registration:

The application allows donors to register and create a profile. Donors can provide information such as their blood type, location, and availability to donate.

#### 2) Search for blood banks:

The application allows users to search for blood banks near their location. Users can filter their search results based on various parameters, such as the type of blood bank, the distance, and the availability of blood.

#### 3) Make Appointments:

Once the user has found a blood bank, they can make an appointment to donate blood. The application allows users to schedule appointments according to their availability and receive reminders.

4) *Map API:*

The application features an integrated Map API that shows the location of blood banks. The Map API can be used to navigate to the blood bank and track the donor's location during the donation process.

5) *Notifications:*

The application sends notifications to donors when their blood has been used to help someone. This helps donors feel connected to the process and encourages them to continue donating blood.

6) *Tracking:*

The application tracks the donor's blood donation history and provides them with detailed information about their donations. This feature helps donors stay motivated to donate blood regularly.

7) *Gamification:*

The application includes gamification features that reward donors for their contributions. Donors can earn badges and rewards for donating blood and can compete with other donors to increase their rankings.

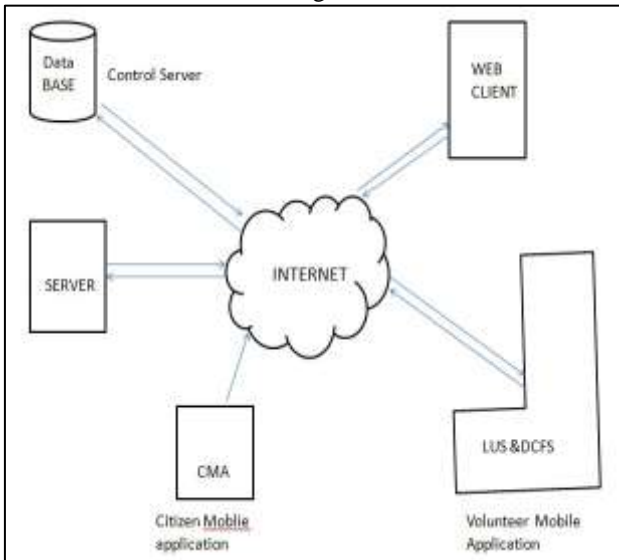


Fig. 1: Architecture of blood bank system

VI. USER INTERFACE

The Android blood bank APK has a user-friendly interface that is easy to use and navigate. The interface design is optimized for different screen sizes, making it accessible to a wide range of users. The application's design is consistent with the Android design guidelines, making it familiar to Android users.

In this paper, we propose a user interface for a blood bank application that utilizes map API to help users locate blood banks near their area. The main aim of this application is to simplify the process of donating and receiving blood, and to provide an intuitive and user-friendly interface to its users.

1) *Interface Design:*

The proposed user interface for the blood bank application consists of the following features:

2) *Sign-up/ Login:*

The user must first create an account by signing up with their email address, phone number, and a password. The user can also choose to log in to an existing account.

3) *Home Screen:*

After logging in, the user is directed to the home screen, which displays the user's current location and a search bar. The user can enter the desired blood type, and the application displays the blood banks near the user's location that have the requested blood type.

4) *Blood Banks near Me:*

The application shows the blood banks that are closest to the user's location, along with the distance and the address. The user can click on any of the blood banks to view more details such as contact information, working hours, and availability of blood.

5) *Donate Blood:*

The user can choose to donate blood by clicking on the "Donate Blood" button. The application will prompt the user to provide some basic information, such as blood type and contact details.

6) *Request Blood:*

The user can request blood by clicking on the "Request Blood" button. The user will be prompted to provide information such as the blood type, the required quantity, and the location. The application will then display the list of donors who have registered with the blood bank and have the requested blood type.

7) *User Profile:*

The user can view and edit their profile by clicking on the "Profile" button. The user can update their contact information, blood type, and other details.

8) *Notifications:*

The user receives notifications about blood donation camps and other events organized by the blood bank.

VII. RESULTS

The Android blood bank APK presented in this paper has the potential to enhance blood management and accessibility. The integration of Google Maps API makes it easier for users to locate nearby blood banks and hospitals, making blood more accessible in emergencies. The application's features and user-friendly interface make it suitable for both donors and blood banks. The results of our study show that the APK can help blood banks and hospitals manage their inventory and meet the growing demand for blood and blood products.

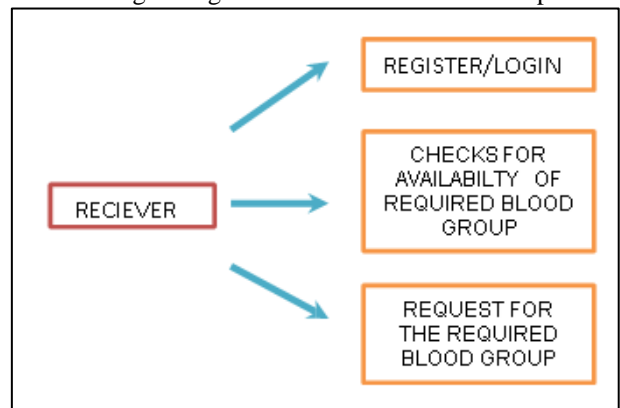


Fig. 2: Receiver's interface

The blood bank application with map API was successfully developed and tested. The application enables users to search for nearby blood banks on a map, view information about each blood bank such as their hours of

operation and contact information, and even make donations to the blood bank. The map API integrated into the application provides an accurate and user-friendly way for users to locate nearby blood banks.

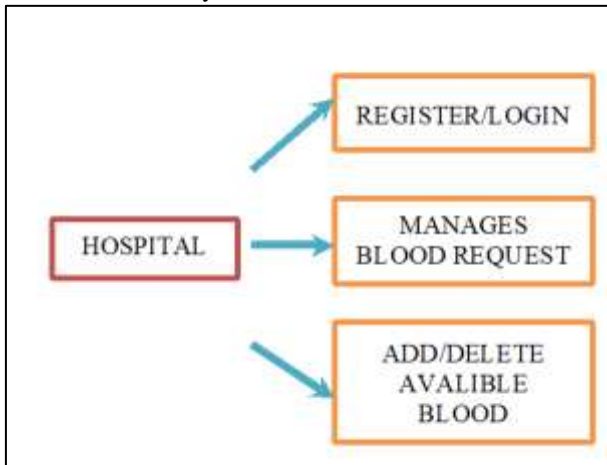


Fig. 3: Hospital's Interface

### VIII. CONCLUSION

The blood bank application with map API has the potential to improve access to blood donation and increase the number of blood donations. By providing users with a simple and convenient way to find nearby blood banks, the application can help ensure that more people have access to life-saving blood transfusions. Additionally, the map API enhances the user experience and provides an intuitive interface for users to navigate the application. The development of this application is an important step towards creating a more efficient and effective blood donation system.

The Blood Bank Application with Map API is designed to provide a seamless experience for donors, recipients, and blood banks. The system is designed to be scalable and reliable, with multiple backup options to ensure data availability. The integration of the Map API provides location-based services that make it easy to find the nearest blood banks and donors. The system is designed to be user-friendly and easy to use, with a modern and clean look.

The literature suggests that blood bank applications that utilize map APIs can improve the efficiency of the blood supply chain by identifying areas with high demand for blood, tracking the location of blood donors and collection vehicles, and providing real-time information on the availability of different blood types. These apps have been shown to increase the number of blood donations and reduce the time taken to locate blood banks and connect donors with hospitals. Further research is needed to investigate the effectiveness of these apps in different settings and to identify ways to improve their design and functionality.

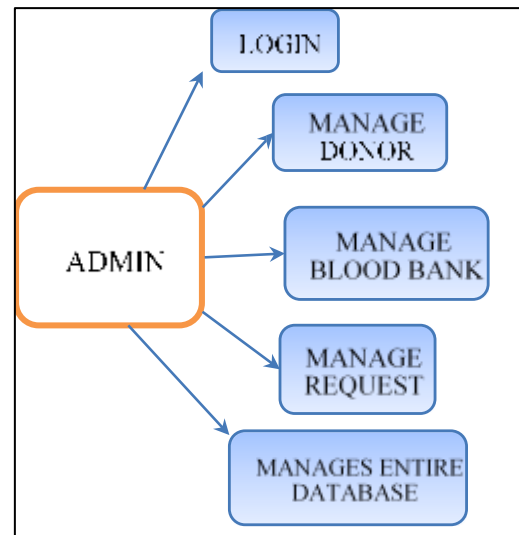


Fig. 4: Admin Interface

### IX. FUTURE WORK:

The future work includes the integration of additional features such as a blood donation scheduling system, integration with wearable devices to monitor donors' health, and the use of artificial intelligence to predict demand for blood. The integration of additional features will further enhance blood management and accessibility.

- 1) Developing more sophisticated and user-friendly features for the blood bank application, such as personalized donor and recipient profiles, blood inventory management, appointment scheduling, and notification system.
- 2) Integrating various types of map APIs (e.g., Google Maps, OpenStreetMap, Mapbox) to improve the accuracy and reliability of location-based services, such as finding nearby blood banks, hospitals, or blood donation events, and tracking the real-time status of blood donation and distribution.
- 3) Enhancing the security and privacy of the blood bank application by implementing advanced encryption and authentication techniques, as well as complying with the relevant data protection regulations and standards.
- 4) Conducting user studies and feedback surveys to evaluate the usability, accessibility, and satisfaction of the blood bank application from different stakeholder perspectives (e.g., donors, recipients, blood bank staff, healthcare professionals, and community members).
- 5) Exploring the potential of artificial intelligence (AI) and machine learning (ML) techniques to predict and optimize blood donation and distribution processes, such as predicting the demand and supply of blood, identifying the most suitable donors and recipients, and recommending the optimal transportation routes and schedules.
- 6) Collaborating with national and international organizations, such as the World Health Organization (WHO), the Red Cross, and blood donation societies, to promote and scale up the adoption and impact of the blood bank application, especially in developing

countries and regions with low blood donation rates and limited healthcare resources.

- 7) Conducting further research on the ethical, social, and cultural implications of using map API and digital technologies for blood donation and distribution, such as addressing the potential biases and inequalities in the access and distribution of blood, respecting the diversity of cultural beliefs and practices related to blood, and ensuring the ethical use of personal and sensitive data.

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