Design and Development of Online Blood Donor Searching App: Blood Donor

by

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Supervised by
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Submitted in partial fulfillment of the requirements for the degree of
Bachelor of Science in Computer Science and Engineering



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SONARGAON UNIVERSITY (SU)
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APPROVAL

The project titled "**Design and Development of Online Blood Donor Searching App: Blood Donor**" submitted by Amit Bhowmik (CSE2102023006), Md. Minhag Amin Riham (CSE2102023073), Misti Khatun (CSE2002020022) and Sathi Akter (CSE2102023101) to the Department of Computer Science and Engineering, Sonargaon University (SU), has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents.

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DECLARATION

We, hereby, declare that the work presented in this report is the outcome of the investigation performed by us under the supervision of **Md. Rashedul Islam, Lecturer,** Department of Computer Science and Engineering, Sonargaon University, Dhaka, Bangladesh. We reaffirm that no part of this project has been or is being submitted elsewhere for the award of any degree or diploma.

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ABSTRACT

We have development android app called Blood Donor. The Blood Donor app is a digital platform designed to streamline and enhance the process of finding and connecting blood donors with those in need. The platform leverages technology to create a bridge between donors and recipients, providing a faster, more reliable way to fulfill urgent blood requirements. Key features include a user-friendly interface, a searchable donor database, and integrated communication tools. Users can register as donors or recipients, specify their blood type, and indicate availability. Advanced filtering options allow recipients to locate donors based on proximity, blood type, The system aims to minimize delays in securing life-saving blood donations, particularly during emergencies. By utilizing secure data management and ensuring donor confidentiality, the platform fosters trust and encourages community participation. The Blood Donor not only addresses critical gaps in traditional donation networks but also promotes a culture of altruism and social responsibility, ultimately saving lives and improving healthcare accessibility.

ACKNOWLEDGMENT

At the very beginning, we would like to express my deepest gratitude to the creator for giving us the ability and the strength to finish the task successfully within the schedule time.

We are auspicious that we had the kind association as well as supervision of **Md. Rashedul Islam**, Lecturer, Department of Computer Science and Engineering, Sonargaon University whose hearted and valuable support with best concern and direction acted as necessary recourse to carry out our project.

We are also thankful to all our teachers during our whole education, for exposing us to the beauty of learning.

Finally, our deepest gratitude and love to my parents for their support, encouragement, and endless love.

LIST OF ABBREVIATIONS

JSON	JavaScript Object Notation.
PC	Personal Computer.
XML	Extensible Markup Language.

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CHAPTER 1

INTRODUCTION OF BLOOD DONOR APP

1.1 Introduction

The Blood Donor app addresses the critical need for efficient blood donation by connecting donors and recipients through a user-friendly online platform. Traditional methods of searching for blood donors are often slow and inefficient, leading to critical delays during emergencies. This app leverages district-based services and secure databases to enable users to quickly find suitable donors, improving response times and outcomes.

The project focuses on simplifying donor registration, enhancing search efficiency, and ensuring data privacy. In addition to finding individual donors, users can search for donors from registered organizations. The app also integrates additional lifesaving features, including Ambulance Services, Volunteer Services, a Thalassemia Patient List, and a National Helpline service, creating a comprehensive tool for emergency response and healthcare support. By offering a scalable and accessible solution, the Blood Donor app strengthens communication between donors, recipients, and healthcare providers, ultimately saving lives through faster, more reliable blood donation matching. [1]

1.2 Features of Blood Donor App

User and Donor Registration and Login: Enables users to sign up and create profiles, either as regular users or blood donors, and log into their accounts.
Forgot password: Allows users to reset their passwords if they forget them by using mobile number recovery methods.
Donor Search: Provides a search function to find registered blood donors based on blood type or district.
Blood Request Sent: Enables users to send blood requests directly to nearby donors or organizations.
Organization Service: Users can also collect blood from blood donation organizations if they want.
Ambulance Service: Offers a feature to find and contact nearby ambulance services in emergencies.
Thalassemia Patient List: Displays a list of registered thalassemia patients who require regular blood donations.
Facts: Shares informative facts and tips about blood donation to increase awareness and knowledge.
National Help Line Service: Provides contact information for national emergency and health helplines.
Volunteer Service: A feature where users can register as volunteers to support blood donation drives or assist with other community services.
Feedback Service: Enables users to provide feedback about the app's functionality or their donation experiences.
Contact us Service: Provides contact details or a form to reach the app support team for inquiries or technical support.
Contribution Service: This service is for those who donate any money for the development work of the app

User and Donors Count Number: Displays a real-time count of the total users and registered donors on the app.
Rating: Users can rate their experience with the app.
Edit Profile: Allows users to update their personal information and preferences within their profile.
Admin: A dedicated admin interface for managing users, donors, and all content moderation.
Share: A feature that enables users to share the app or its content through social media and messaging platforms.
Follow Facebook: Provides a link to follow the app's official Facebook page for updates and community engagement.
Privacy Policy: A section that outlines how user data is collected, used, and protected.
Notice: Displays important announcements and notices related to blood donation or app updates.
Advertise: Provides an in-app advertising platform for health-related businesses and services.
Exit: An option to close or exit the app.

1.3 Importance of Blood Donor App

- **Time-Saving in Emergencies:** Quickly locating suitable blood donors during critical situations can be life-saving. The app reduces search time by providing instant access to a network of registered donors.
- **Efficient Donor-Recipient Connection:** Real-time notifications and district-based searches streamline the process of connecting donors with those in need, improving response efficiency.
- **Expanded Reach:** Users can search for donors from both individuals and organizations, increasing the chances of finding a match.
- **Data Privacy and Security:** Secure databases protect sensitive user information, ensuring a safe environment for donors and recipients.
- **Comprehensive Health Support:** Integration of additional features, such as ambulance services, volunteer networks, a Thalassemia patient registry, and national helplines, enhances emergency medical assistance.
- **Community Engagement:** The platform encourages voluntary blood donation and fosters a supportive community, increasing awareness and participation in life-saving activities.
- **Accessibility and Scalability:** A user-friendly interface makes the app accessible to a wide audience, while its scalable design allows for continuous expansion and improvements in services.

By offering a reliable, efficient, and comprehensive solution, the Online Blood Donor Searching App addresses critical gaps in blood donation systems and contributes significantly to public health and emergency response. [1]

1.4 Goal

the primary goal of blood donor app is to create a streamlined, accessible, and efficient platform that connects blood donors and recipients in real-time to save lives and enhance the availability of blood donations. The app serves as a bridge between those in urgent need of blood and voluntary donors while promoting awareness and simplifying the blood donation process.

1.5 Waterfall Model

The Waterfall Model is a linear and sequential software development methodology where each phase of the project flows into the next. It is one of the oldest and most traditional approaches to project management in software engineering. The model consists of clearly defined stages:

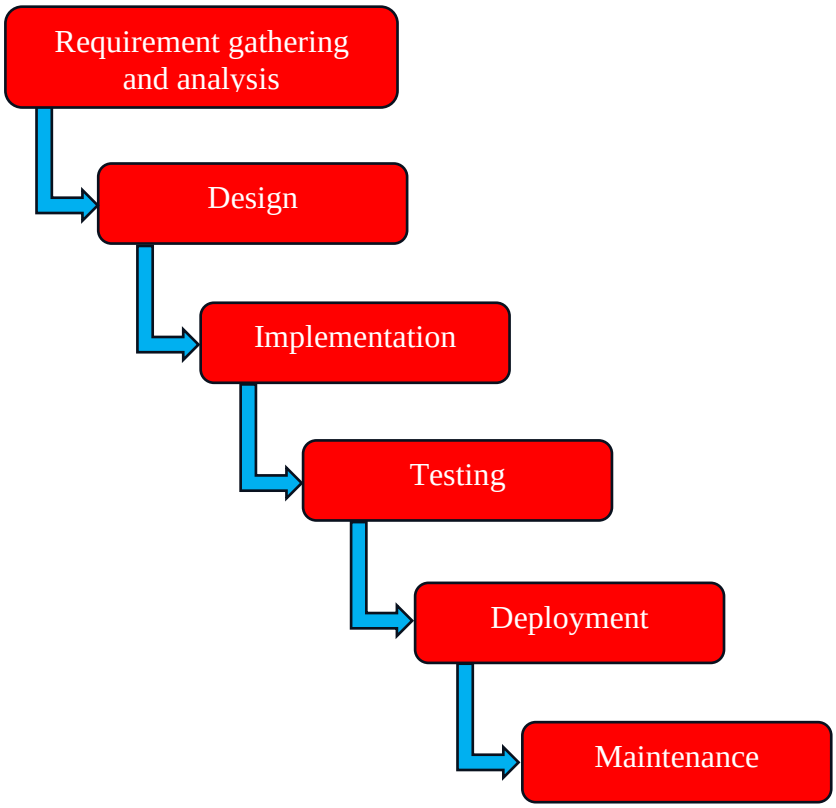


Figure 1.1: Waterfall model

Requirement Gathering and Analysis: Collect and document all user and system requirements before development begins.
System Design: Define the architecture, design components, and data flows based on the gathered requirements.
Implementation: Develop the application according to the design specifications.
Testing: Test the system for defects and ensure that it meets the initial requirements.
Deployment: Deliver the finished product to end users or clients.
Maintenance: Perform ongoing maintenance to fix issues and update the software. [2]

1.6 Project Schedule

The project schedule outlines the phases, key tasks, and estimated timeframes for completing the development of the **Blood Donor** using the **Waterfall Model**. Each phase must be completed before the next begins. [1]

Gantt chart:

S.L.	Phase	Start Date	End Date	End Date
1	Requirement Gathering	Week 1	Week 4	4 weeks
2	System Design	Week 5	Week 12	8 weeks
3	Implementation	Week 13	Week 24	12 weeks
4	Testing	Week 25	Week 28	4 weeks
5	Deployment	Week 29	Week 29	1 week
6	Maintenance (ongoing)	Week 30	Ongoing	Continuous

Table 1.1: Project schedule duration table

Requirement Gathering and Analysis: Identify and document user needs (donors, recipients, admin). Define core features (registration, donor search, blood request, ambulance service, organization service etc.). Collect legal and regulatory requirements (data privacy, safety).
System Design: Design user interface mockups and workflows. Develop system architecture (data flow, APIs, and database schema). Define technology stack and integration points.
Implementation: Develop user registration and login functionality. Implement donor search and blood request modules. Integrate organization and ambulance services. Develop admin dashboard for system management. Implement feedback, privacy policy, and help sections.
Testing: system testing. Fix bugs and optimize performance.
Deployment: Deploy the app on target platforms (Android). Configure backend services and database.
Maintenance and Updates: Monitor app performance and user feedback. Release updates for bug fixes and enhancements.

1.7 Problem Statements

There are a few or no options that provide totally free service. Traditional blood donor search methods are slow and inefficient. Critical delays can lead to life-threatening situations. Need for a real-time, secure, and reliable solution.

1.8 Proposed Solution

I saw the problems with the existing system. So, I will fix all and develop that: User-friendly UI layout and free of cost.

CHAPTER 2

REQUIRMENT SPECIFICATION

2.1 Introduction

The Requirement Specification Document (RSD) defines the functional, non-functional, and system requirements for developing a Blood Donor App. This document serves as a blueprint for the development process. [3]

2.2 Functional Requirements

These are features of the system must perform to satisfy the intended use.

- ✓ User Registration and Login
- ✓ Forgot Password
- ✓ Donor Search
- ✓ Blood Request
- ✓ Organization Service
- ✓ Ambulance Service
- ✓ Thalassemia Patient List
- ✓ Facts
- ✓ National Help Line Service
- ✓ Volunteer Service
- ✓ Feedback System
- ✓ Contact Us
- ✓ Contribution Service
- ✓ User and Donor Count Display
- ✓ Rating System
- ✓ Profile Management
- ✓ Admin Interface
- ✓ Advertising
- ✓ Social Media Sharing
- ✓ Privacy Policy and Notices

2.3 Non-Functional Requirements

These specify the quality attributes of the system.
Performance: Fast response time for donor search and blood requests.
Scalability: Support an increasing number of users and data.
Security: Secure user data with encryption and proper access controls.
Usability: Intuitive user interface for ease of navigation.
Availability: Ensure the system is accessible 24/7.
Reliability: Consistent performance with minimal downtime.
Compatibility: Available on mobile (Android).

2.4. System Requirements

These outline the technical and hardware needs.
User-Side: Supported on Android.
Server-Side: Cloud-based backend service for managing user data and requests.

Database: A relational database (such as Firebase) to store user, donor, request and all records information.

2.5 Data Requirements

New User Registration:

- Full name
- Age
- Gender
- Blood group
- District
- Upazila / Thana
- Present address
- Valid mobile number
- Password
- As a donor

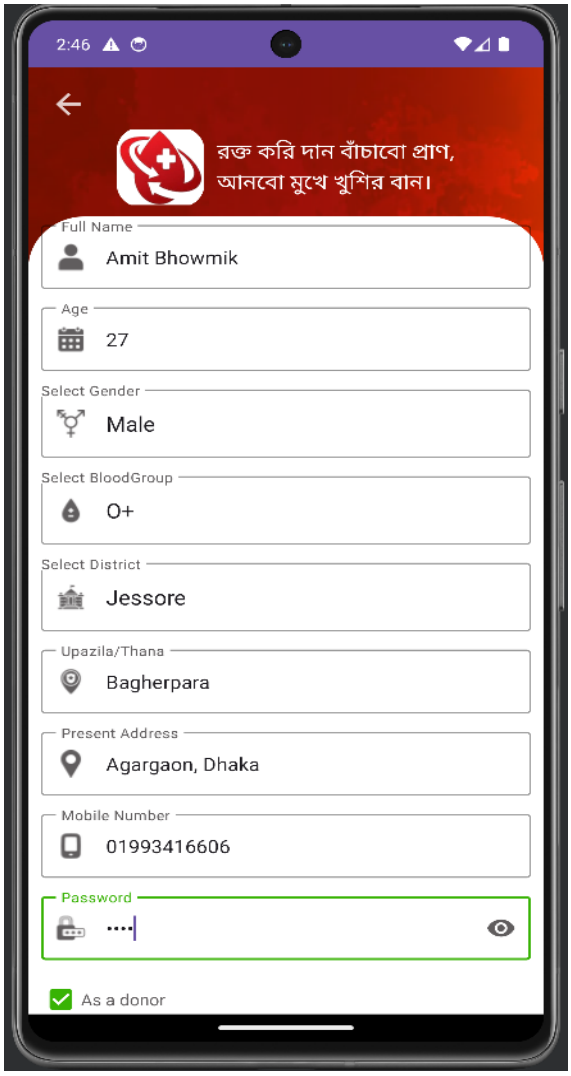


Figure 2.1: User registration

User sign in:

- Mobile number
- Password

Admin sign in:

- User id
- Password

Blood Request:

- Patient name
- District
- Blood group
- Blood quantity
- Required date
- Required time
- Type of disease
- Hospital name
- Hospital address
- Mobile number

Add Organization:

- Organization name
- District
- Service area / upazila / thana
- Office address
- Mobile number

Add Ambulance:

- Driver name
- Hospital name
- District
- Service area / upazila / thana
- Present address
- Mobile number

Contact us:

- Full name
- Mobile number
- Message

The rest of the options are almost the same.

CHAPTER 3

REQUIRMENT ANALYSIS

3.1 Introduction

The Requirement Analysis phase involves evaluating, refining, and documenting the needs for the Blood Donor App to ensure clarity, feasibility, and completeness before moving to design and development. The focus is on identifying user roles, defining functional areas, and analyzing system constraints and dependencies.

3.2 Use Case Diagram

A Use Case Diagram is a type of behavioral diagram in Unified Modeling Language. [4]

Use Case Diagram for User:

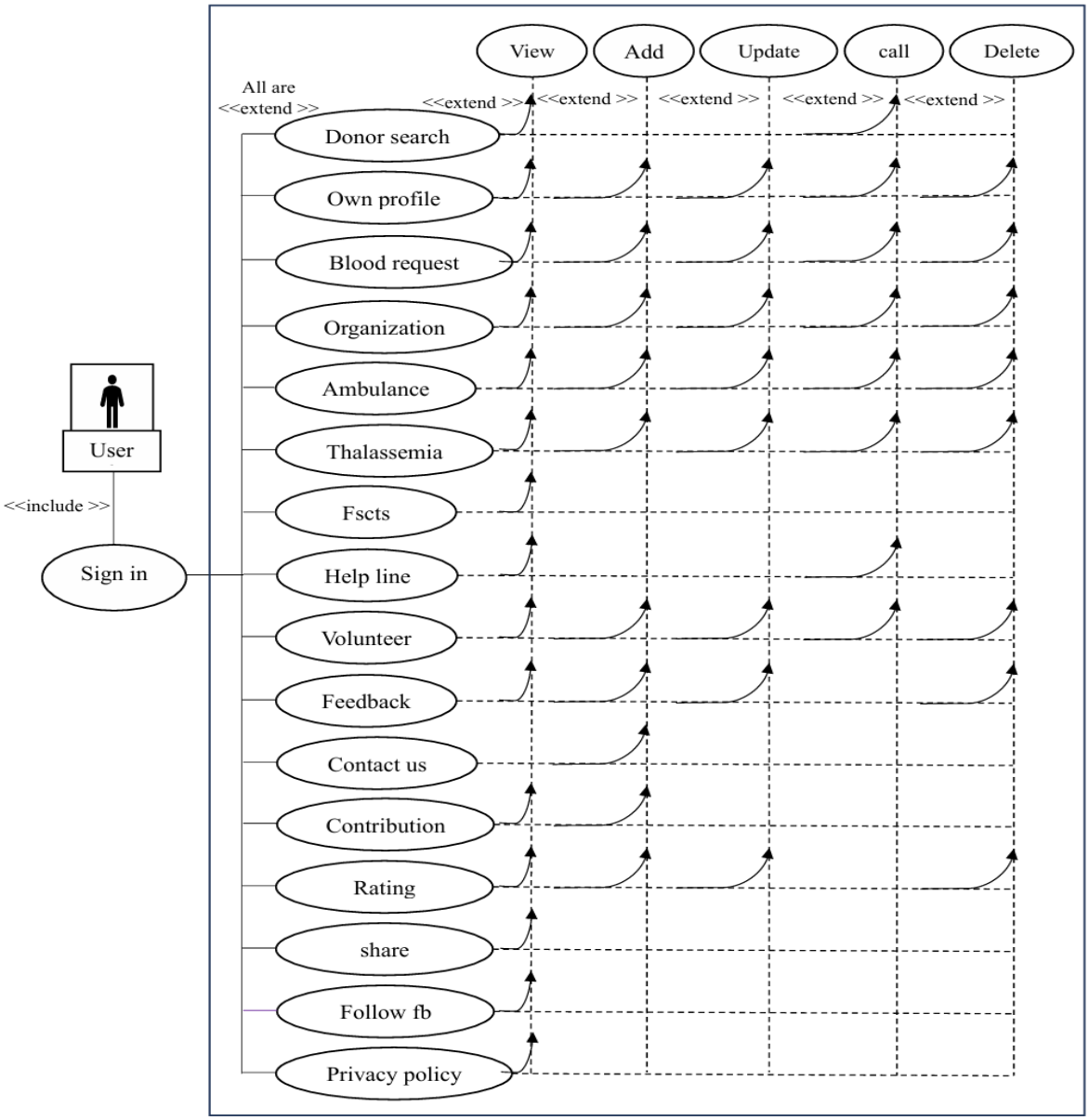


Figure 3.1: User use case diagram

Use Case Description for User:

Use Case	User Role
Goal	To request for and donate blood, ambulance service, organization service, help line service etc.
Preconditions	Must be authenticated with own mobile number and user password. User type must be general user
Post Condition	Users can view all own info and all blood request. User can own post edit and delete.
Primary Actors:	General User
Secondary Actors:	Admin
Trigger	Login
Description:	User can view blood requests, create request for blood and delete own existing request and same are edit and delete their existing post for another service.

Table 3.1: User use case description

Use Case Diagram for Admin:

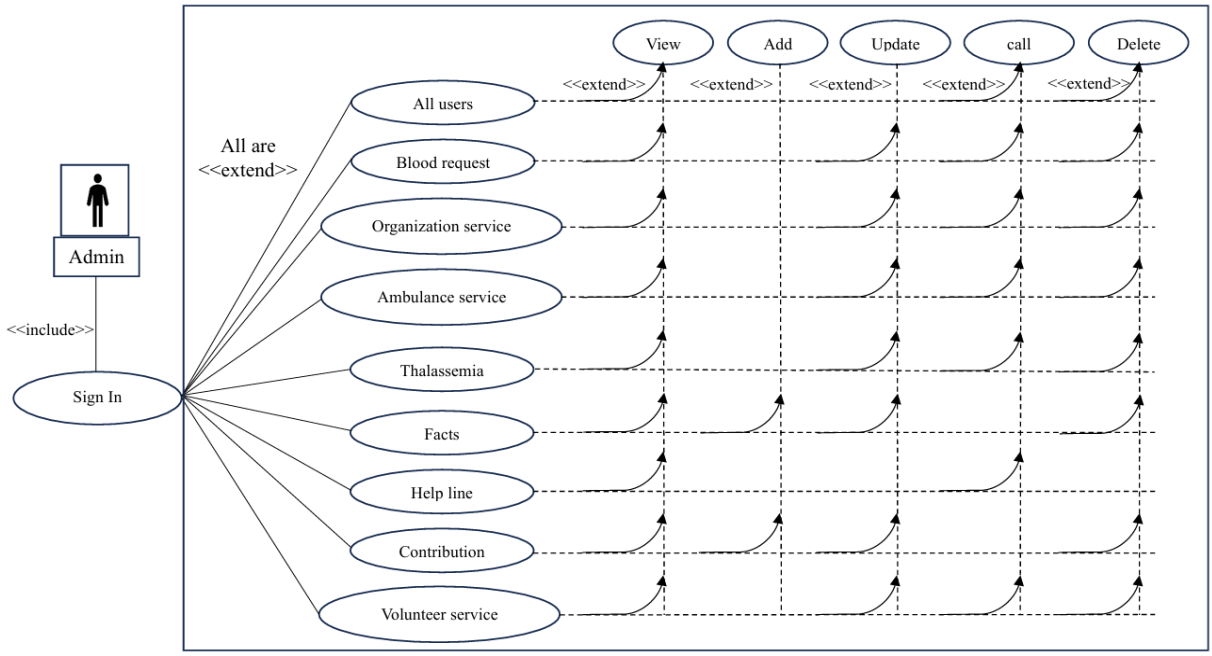


Figure 3.2: Admin use case diagram

Use Case	Admin Role
Goal	Manage users and all option.
Preconditions	Must be authenticated with own user id and user. User type must be Admin
Post Condition	Admin can view data and update or delete data.
Primary Actors:	Admin
Secondary Actors:	Users
Trigger	Change data.
Description:	Admin view report of all data. Modify user data. Admin can add, edit approve and delete information.

Table 3.2: Admin use case description

3.3 Activity Diagram

An Activity Diagram is a UML diagram that represents the flow of actions or activities within a system or process. It visually describes the sequence of operations and the decision points in a process, showing how activities are coordinated. [5]

Activity Diagram for User:

The activity diagram for a user illustrates the sequence of actions a user follows when interacting with the app. It highlights the key processes, decision points, and flows to achieve specific goals such as searching for donors or every process.

Symbol	Meaning
Circle	Start and End points
Rounded Rectangle	Activities (e.g., Search for Donors)
Diamond	Decision points
Arrows	Indicate the flow of activities

Table 3.3: Activity diagram symbol meaning

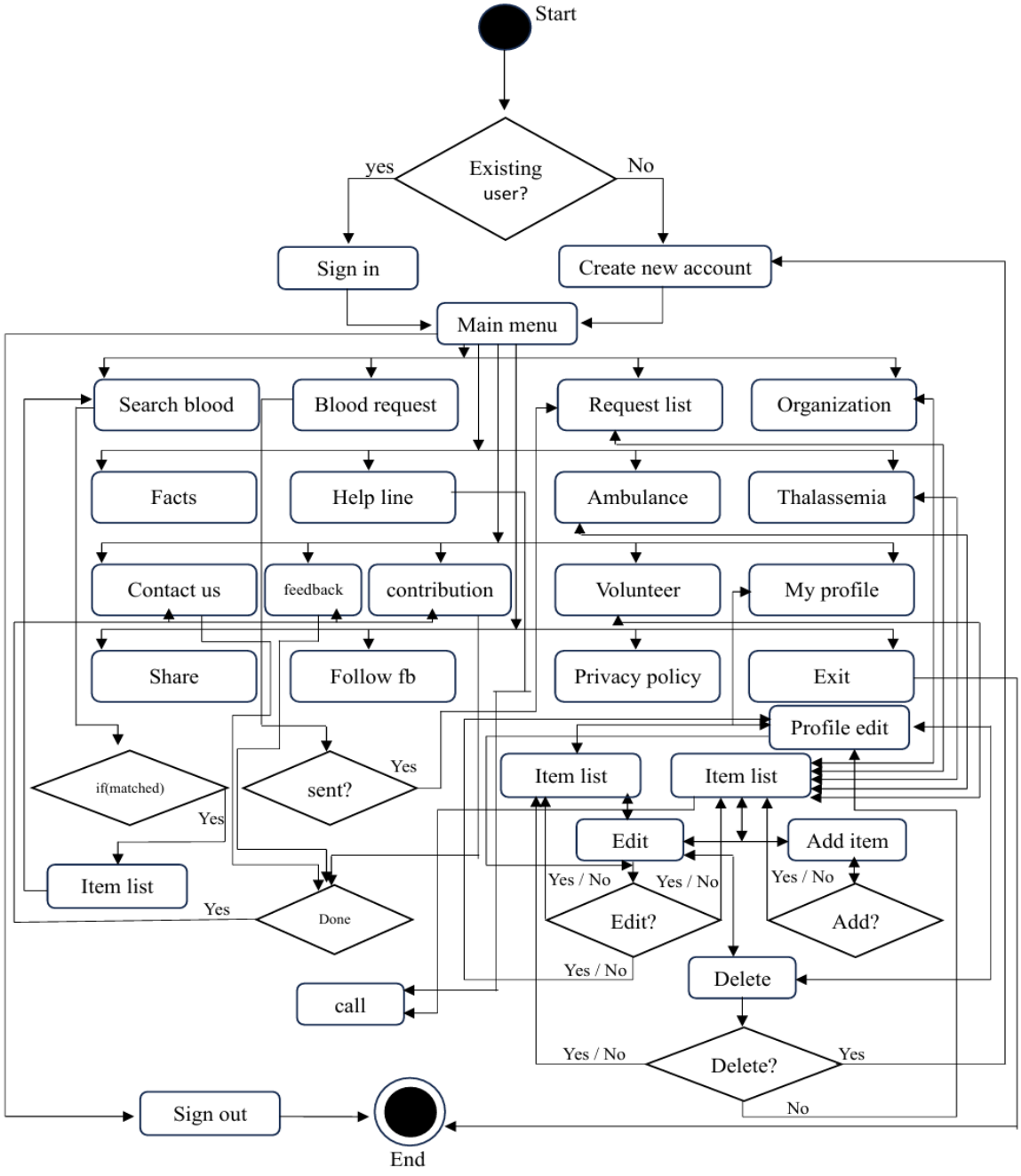


Figure 3.3: User activity diagram

Activity Diagram for Admin:

This activity diagram illustrates the sequence of actions and decision points an Admin follows when managing the Blood Donor App. The admin oversees user accounts, donor data, requests, advertisements, and system content etc.

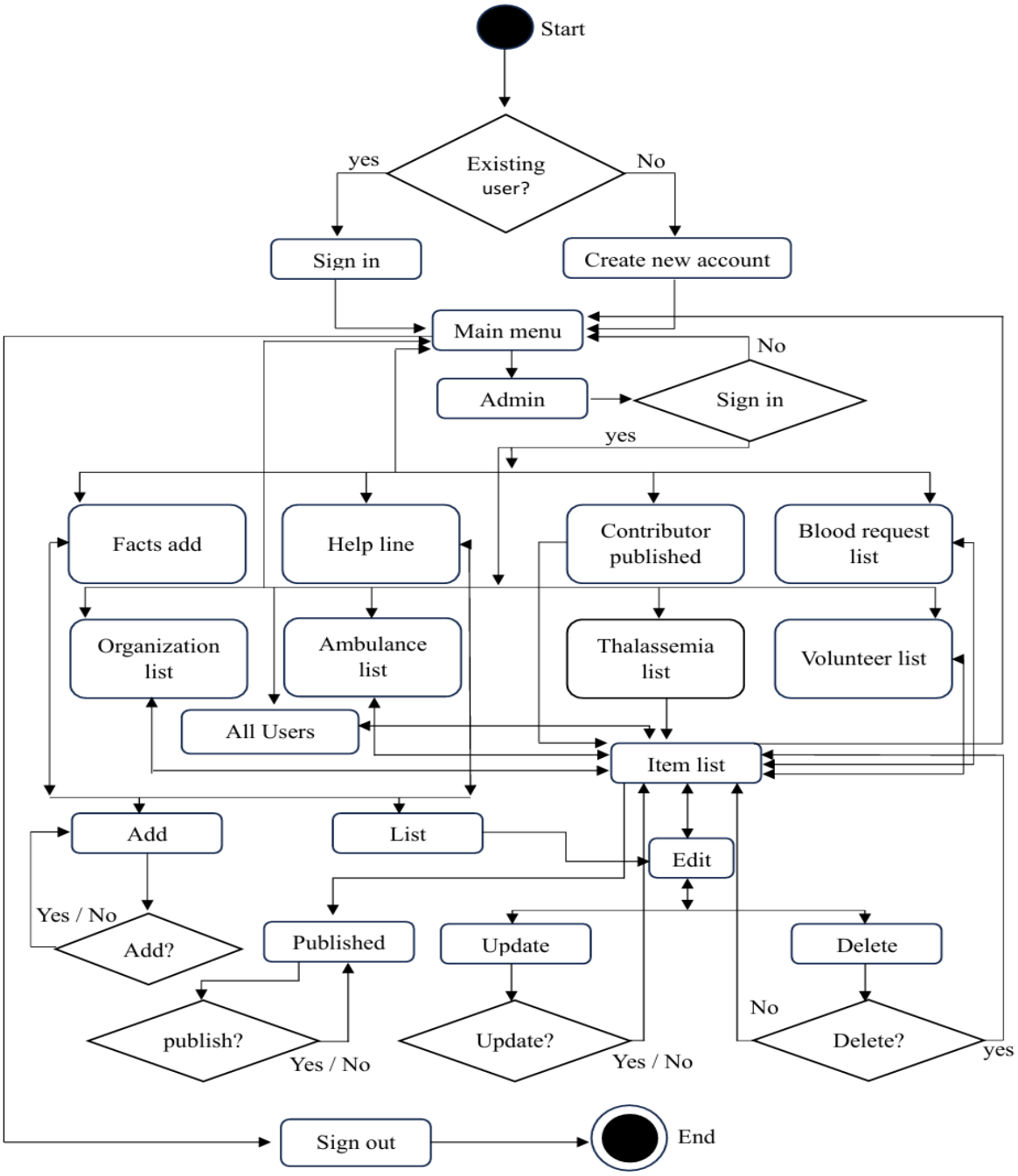


Figure 3.4: Admin activity diagram

3.4 Sequence Diagram

A Sequence Diagram models the flow of messages and interactions between objects or components over time, showing how they collaborate to complete a process in a system. It provides a dynamic view of the system's functionality. [5]

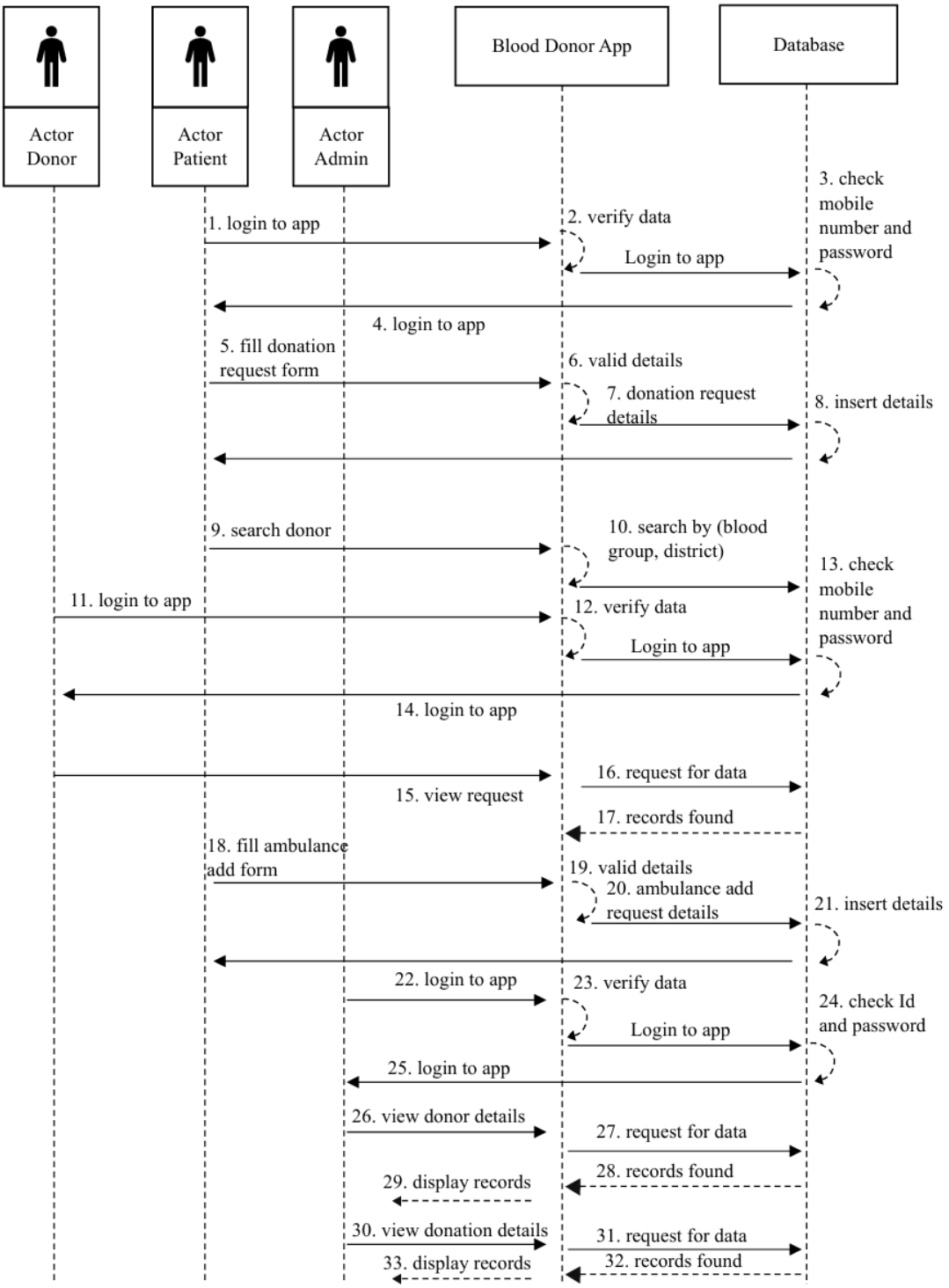


Figure 3.5: Sequence diagram

3.5 ER Diagram

An Entity-Relationship (ER) Diagram represents the data model and the relationships between different entities in a system. It helps in designing and understanding the database structure. [7]

Donor Searching ER Diagram:

Here is a description of an ER Diagram for Donor Searching in a Blood Donor App, focusing on the core elements and relationships involved in managing donor searches.

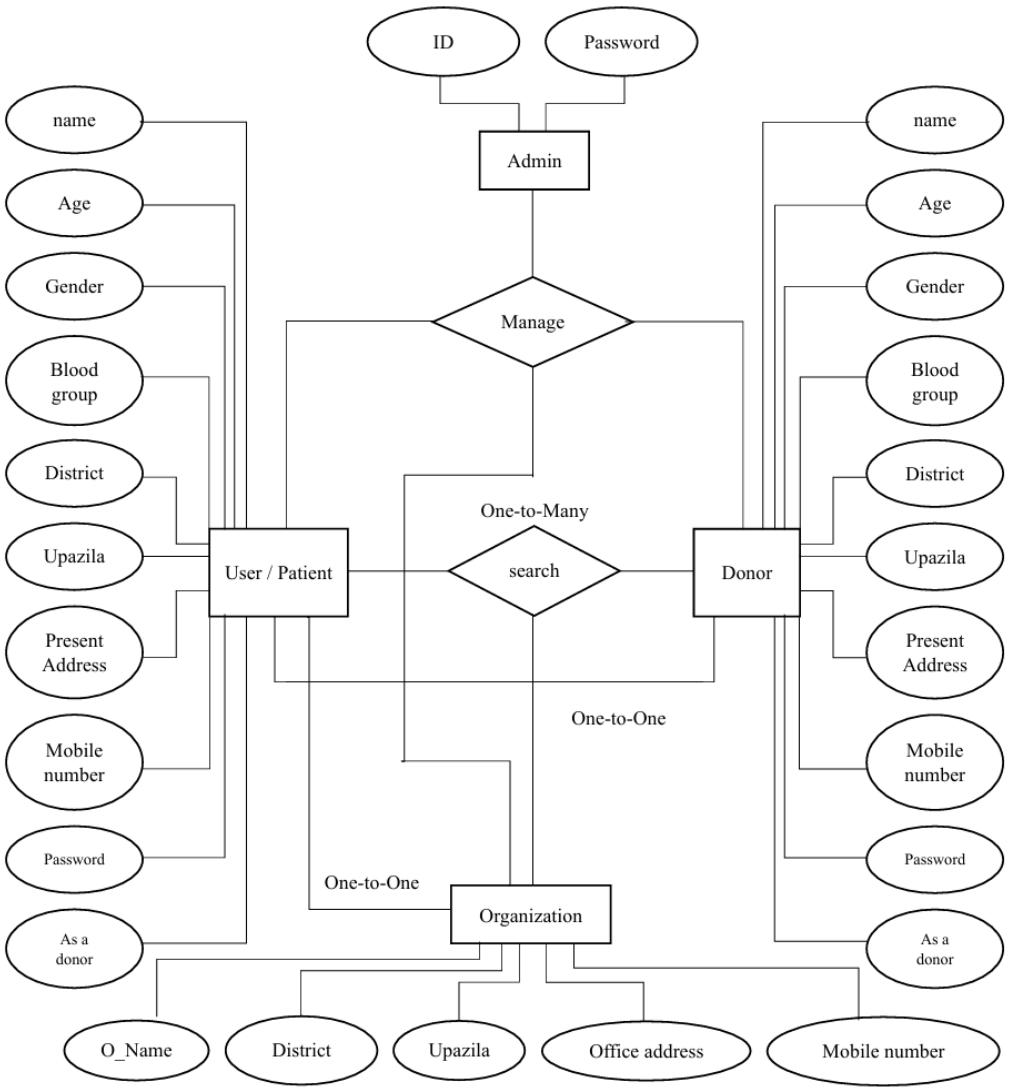


Figure 3.6: Donor Searching ER Diagram

Blood Request Send ER Diagram:

Here is a detailed ER Diagram for Blood Request Sending in a Blood Donor App. This diagram models the key entities, their attributes, and relationships needed to manage the process of sending and managing blood requests.

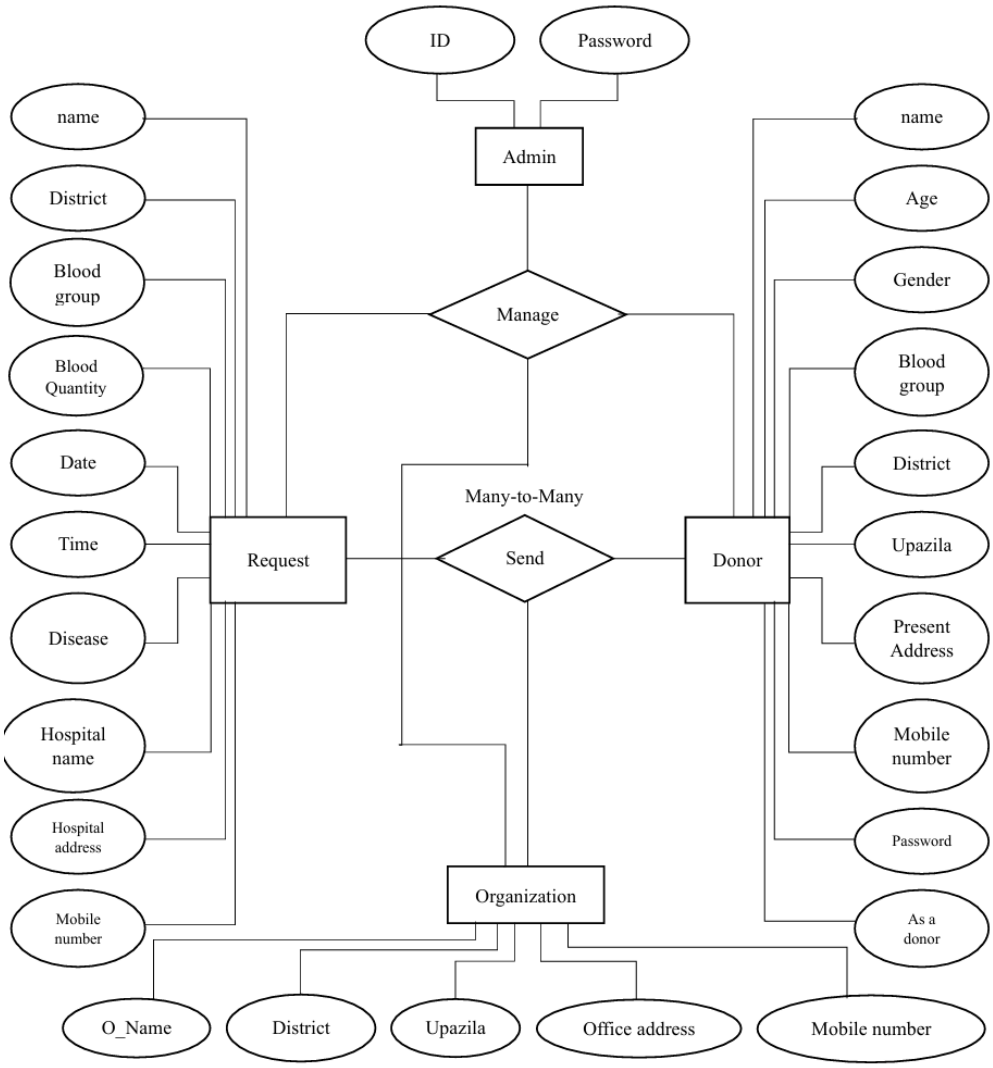


Figure 3.7: Blood Request Send ER Diagram

ER Diagram for Others Services:

Here is an ER Diagram for Other Services in a Blood Donor App representing various features beyond donor searches and blood requests, such as ambulance services, volunteer registration, helplines, and feedback mechanisms.

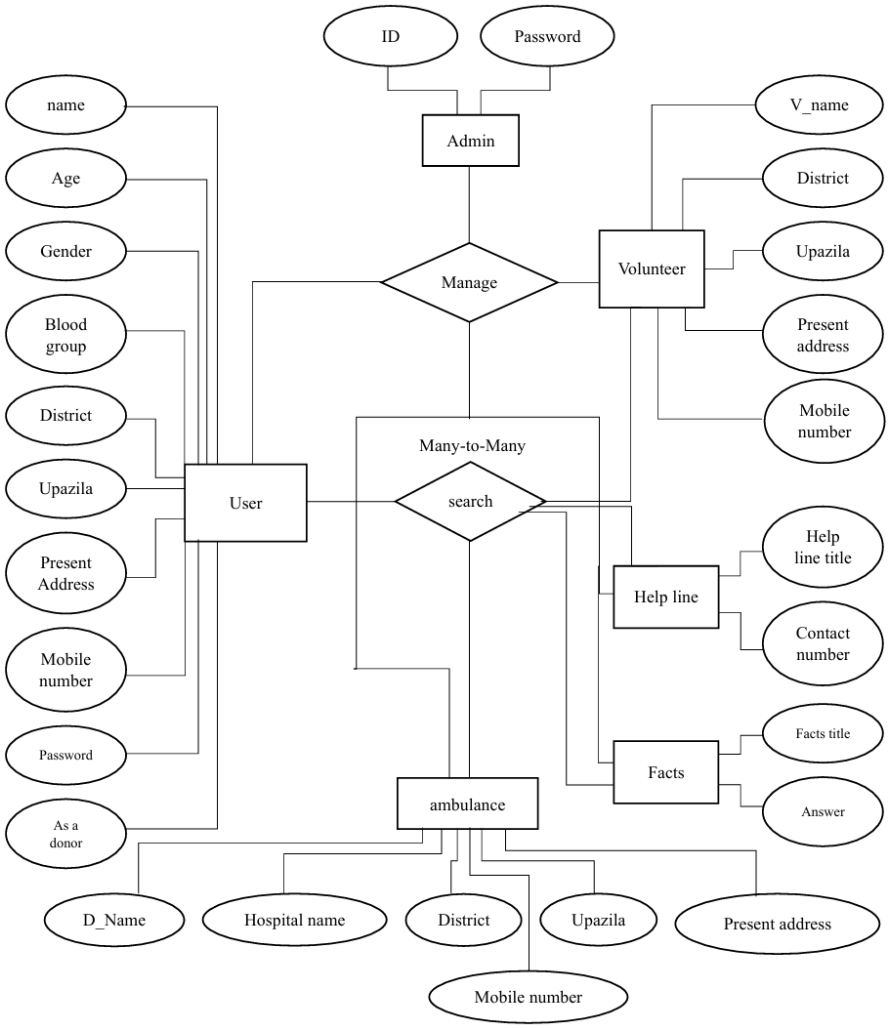


Figure 3.8: ER Diagram for Others Services

3.6 Logical Data Model

A Logical Data Model (LDM) represents the structure of the data elements and the relationships between them without specifying how they will be implemented in a database. It focuses on organizing data for clarity and is independent of any specific DBMS. [8]

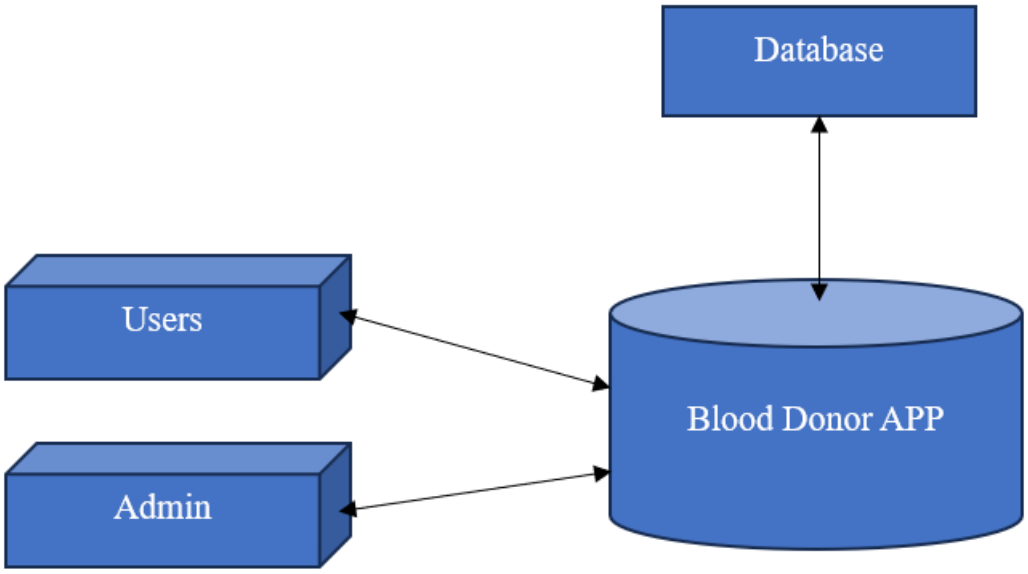


Figure 3.9: Logical data model

CHAPTER 4

DESIGN AND DEVELOPMENT

4.1 Front-End Design

Front-end design focuses on the user interface (UI) and user experience (UX), providing a visually appealing and user-friendly way for users to interact with the system. We are using XML for front-end design. [9]

UI/UX Considerations

Consistency: Use consistent colors, fonts, and button styles throughout the app.
Accessibility: Ensure text is readable and forms are easy to fill on mobile.
Ease of Navigation: Use a clear menu or hamburger icon for mobile navigation.
Feedback Mechanisms: Provide user feedback on form submission and error handling.
Tools for Front-End Design:
XML Layouts.

4.2 Front-End Design Overview

New User Registration:

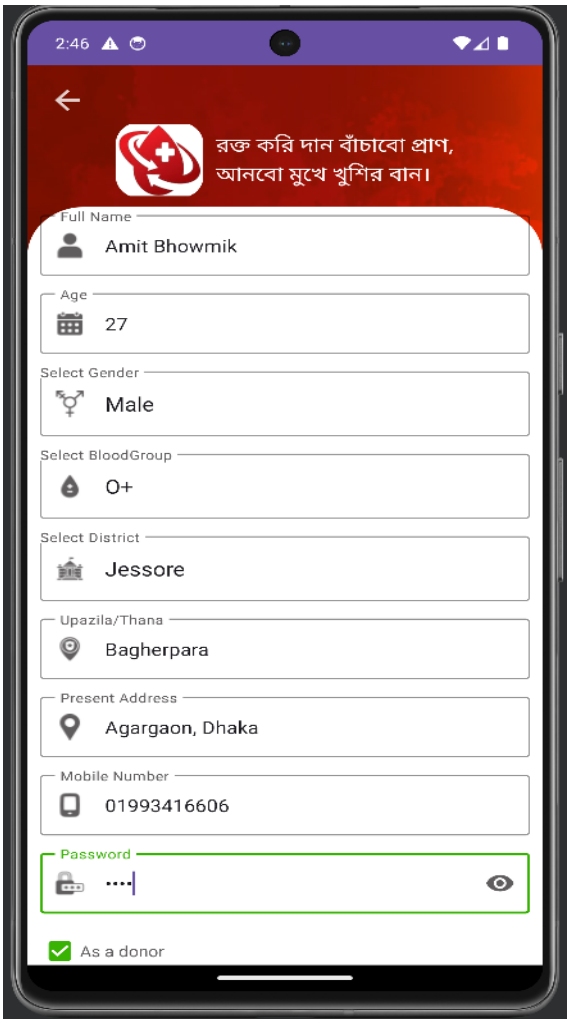


Figure 4.1: User registration overview

Existing User Sign In:

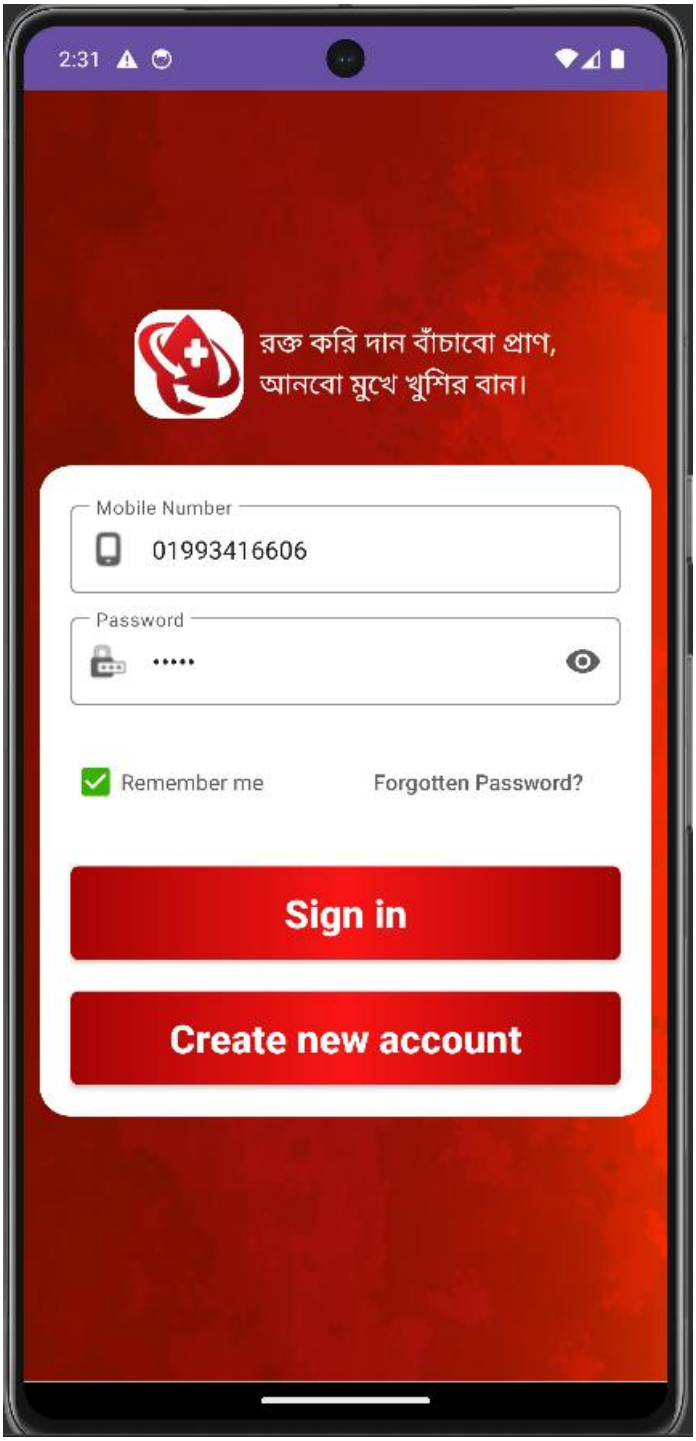


Figure 4.2: User sign in overview

Main Menu:



Figure 4.3: Main Menu overview

Blood Donor Search Overview:

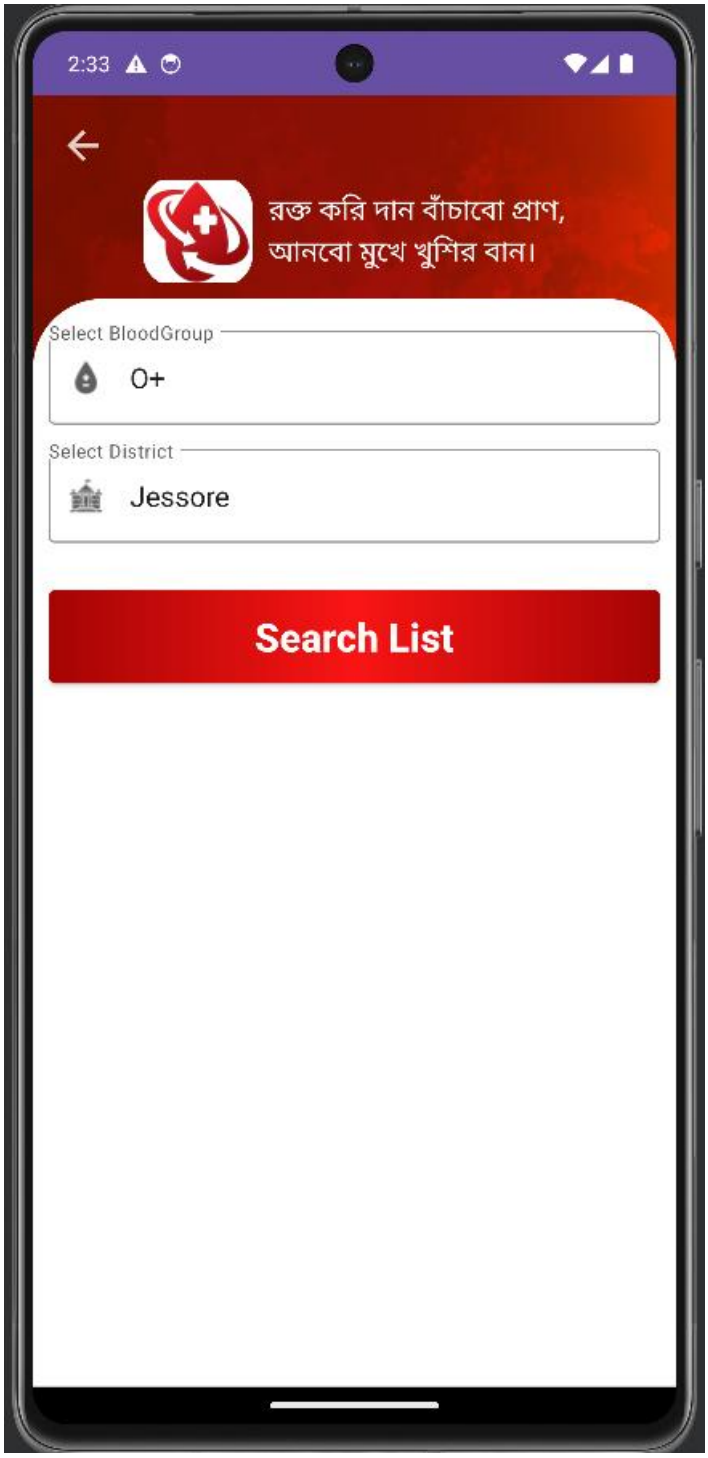


Figure 4.4: User sign in overview

Donor List Overview:

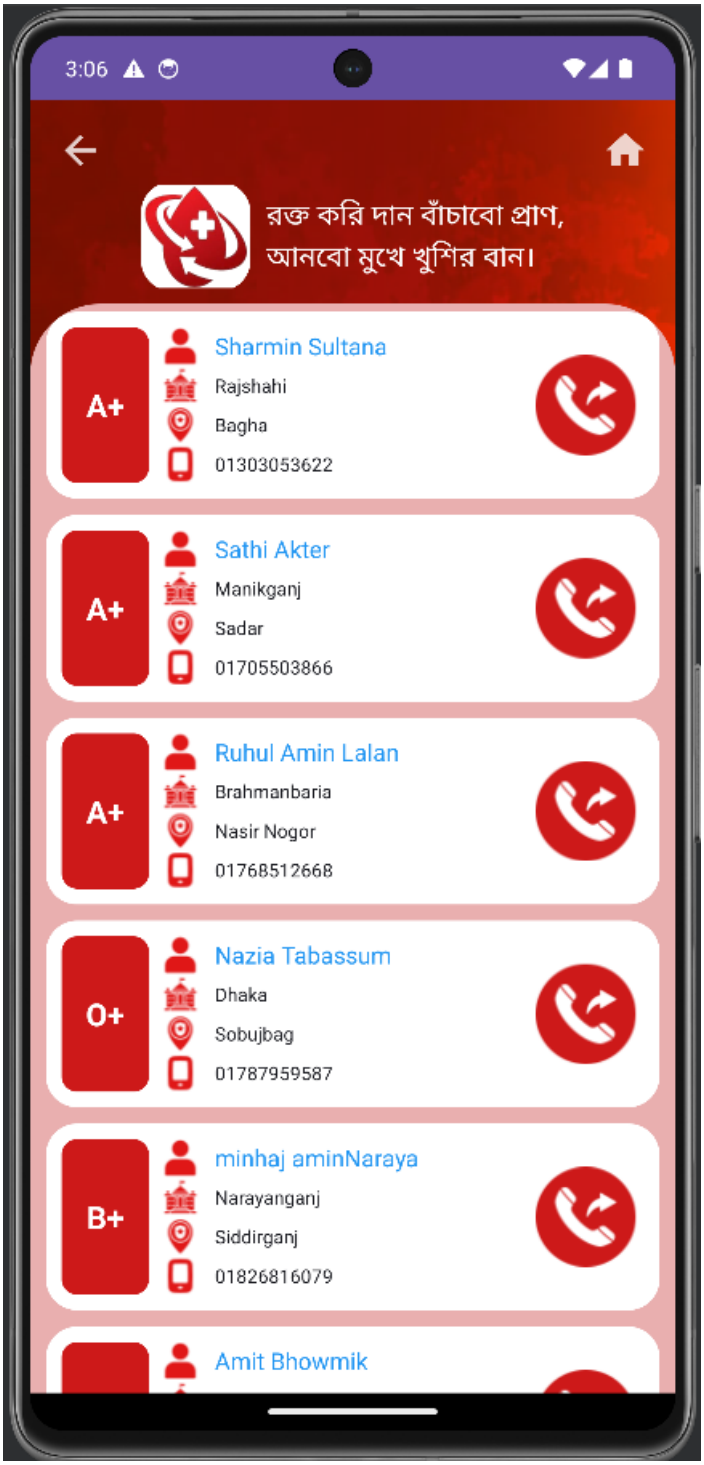


Figure 4.5: Donor list overview

Blood Request:

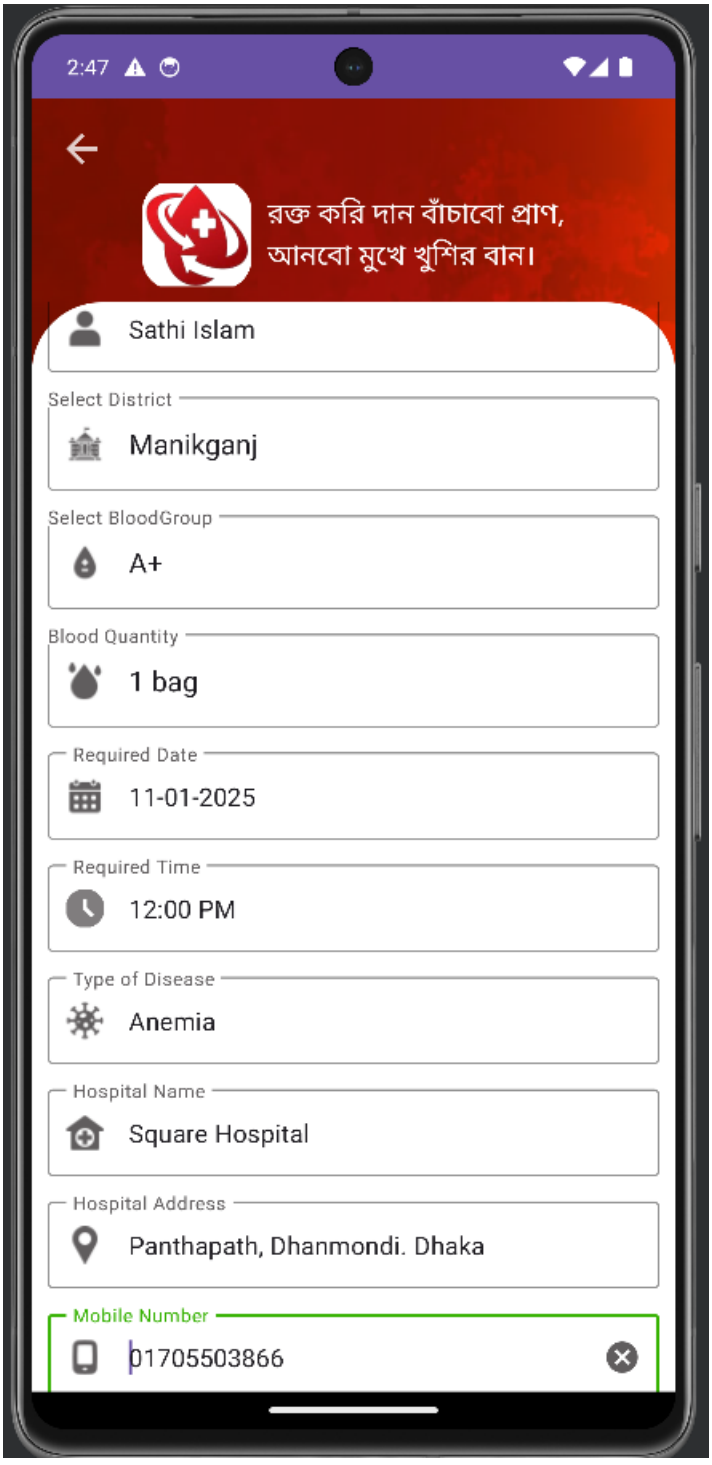


Figure 4.6: Blood request overview

Blood Request List:

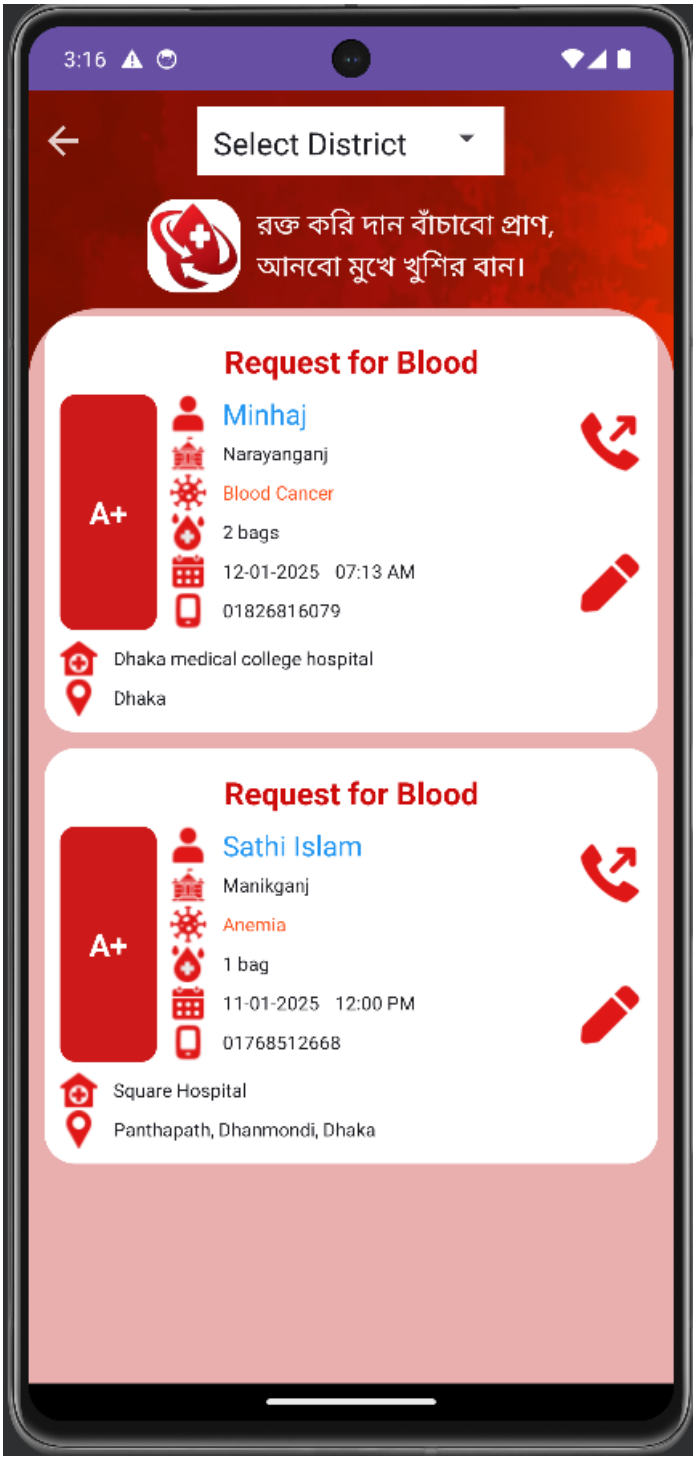


Figure 4.7: Blood request list overview

Add Ambulance:

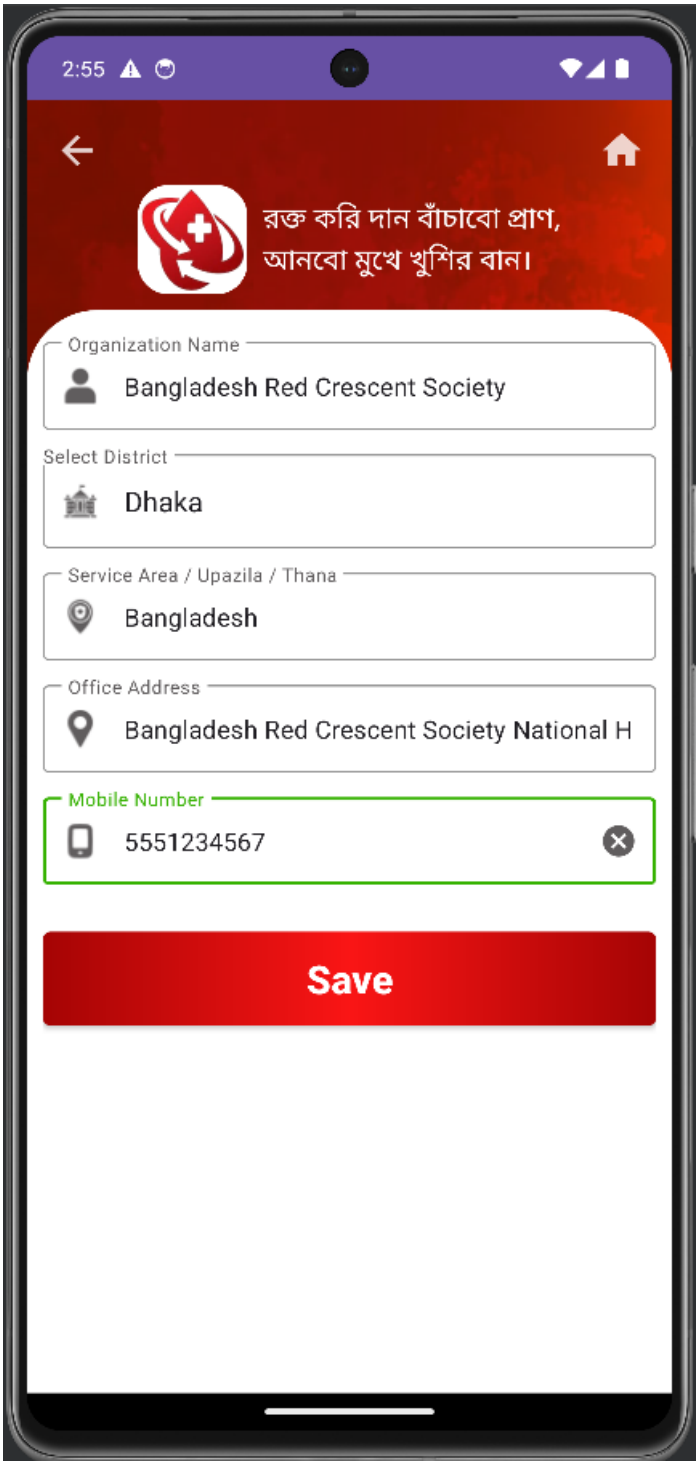


Figure 4.8: Ambulance add overview

Contact Us:

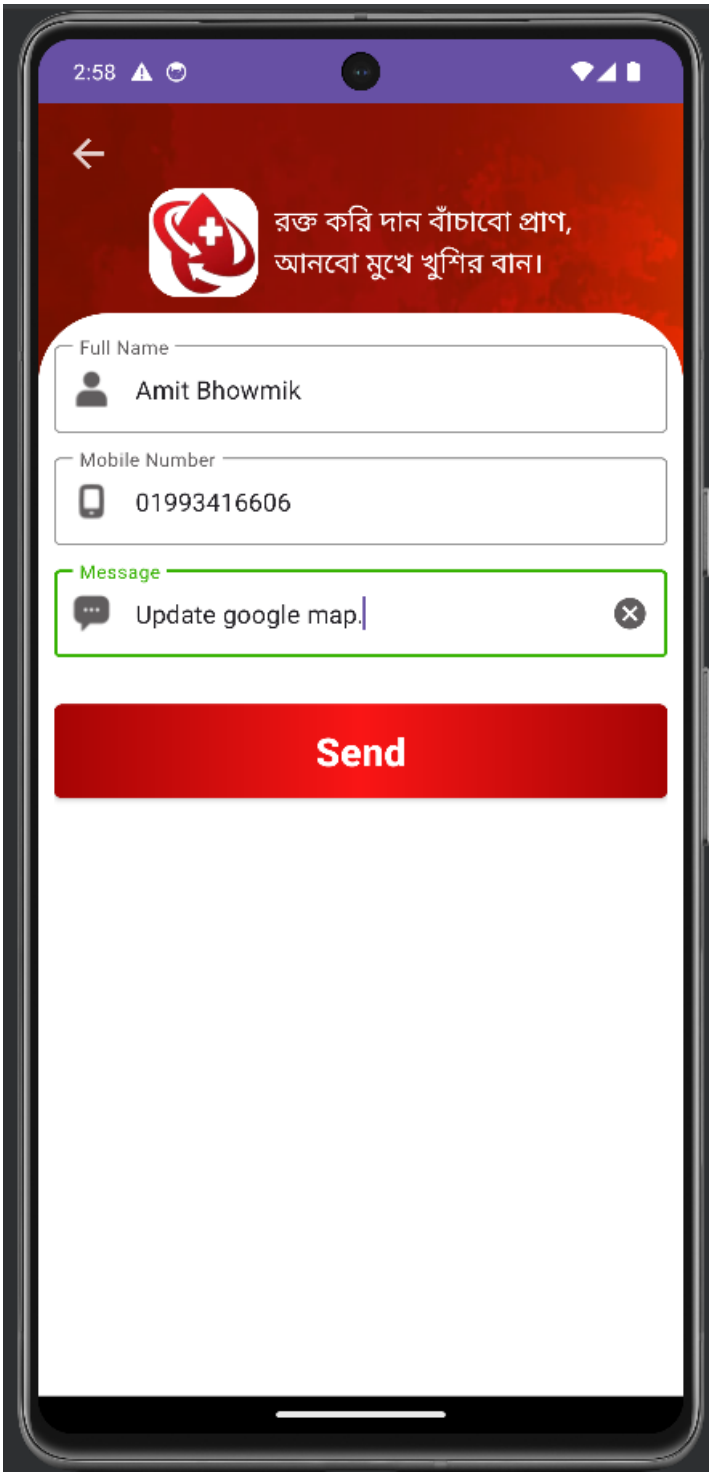


Figure 4.9: Contact us overview

Navigation View:

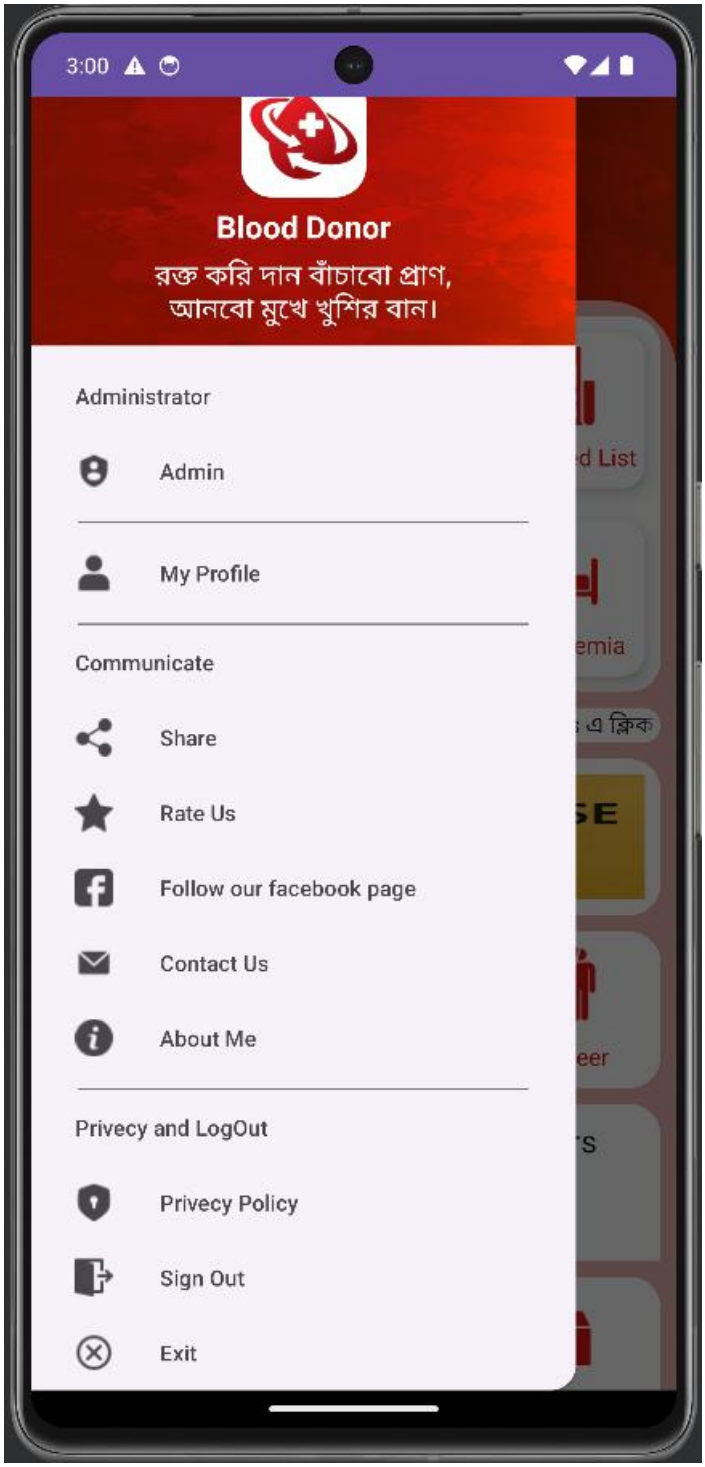


Figure 4.10: Navigation view

4.3 Back-End Design

The back-end of the Blood Donor App is responsible for managing the app's core functionality, including data storage, user authentication, processing blood requests, donor matching, service management (e.g., ambulance, helplines), and ensuring smooth communication between the front-end and the database. The back-end ensures that all app data is correctly stored, retrieved, and processed to provide a seamless experience for users.

Key Responsibilities of the Back-End

User Management: Handle user registration, login, and authentication. Allow users to reset passwords, update their profiles, and view their activity logs. Maintain user roles (e.g., regular users, donors, admins) with different levels of access to services and data.

Donor and Blood Request Management: Match donors to blood requests based on blood type and district. Allow donors to register, update their profiles, and track their donation history. Facilitate the submission of blood requests by users who need blood and notify potential donors.

Service Management: Handle requests for ambulance services, volunteer services, and other emergency services. Track the status of blood donations, ambulance availability, and help requests in real-time.

Data Storage: Store all data related to users, donors, blood requests, feedback, and donations in a secure database. Maintain audit logs for important actions such as blood requests and donor actions.

Security: Ensure data encryption and secure communication between the front-end and back-end.

Admin Panel: Provide administrators with tools to manage users, approve or reject blood requests and view system analytics.

4.4 Back-End Development

Back-end development is responsible for implementing the server-side logic that powers the core features of the Blood Donor App. It involves creating the necessary infrastructure to support the front-end's functionality, such as user authentication, managing blood donations, donor matching, processing requests, and providing real-time notifications.

In this section, we'll cover the development process, technologies, and architecture involved in building the back-end for the Blood Donor App. [10], [11]

Technology Stack

For building the back-end of the Blood Donor App, the following technologies and tools will be used:

Programming Languages:

Java: Java is a robust, object-oriented programming language that is widely used for building scalable and secure back-end applications. For a Blood Donor App, Java can be an excellent choice due to its strong ecosystem, security features, and support for creating RESTful APIs. In this section, we'll focus on how to build the back-end of the app using Java.

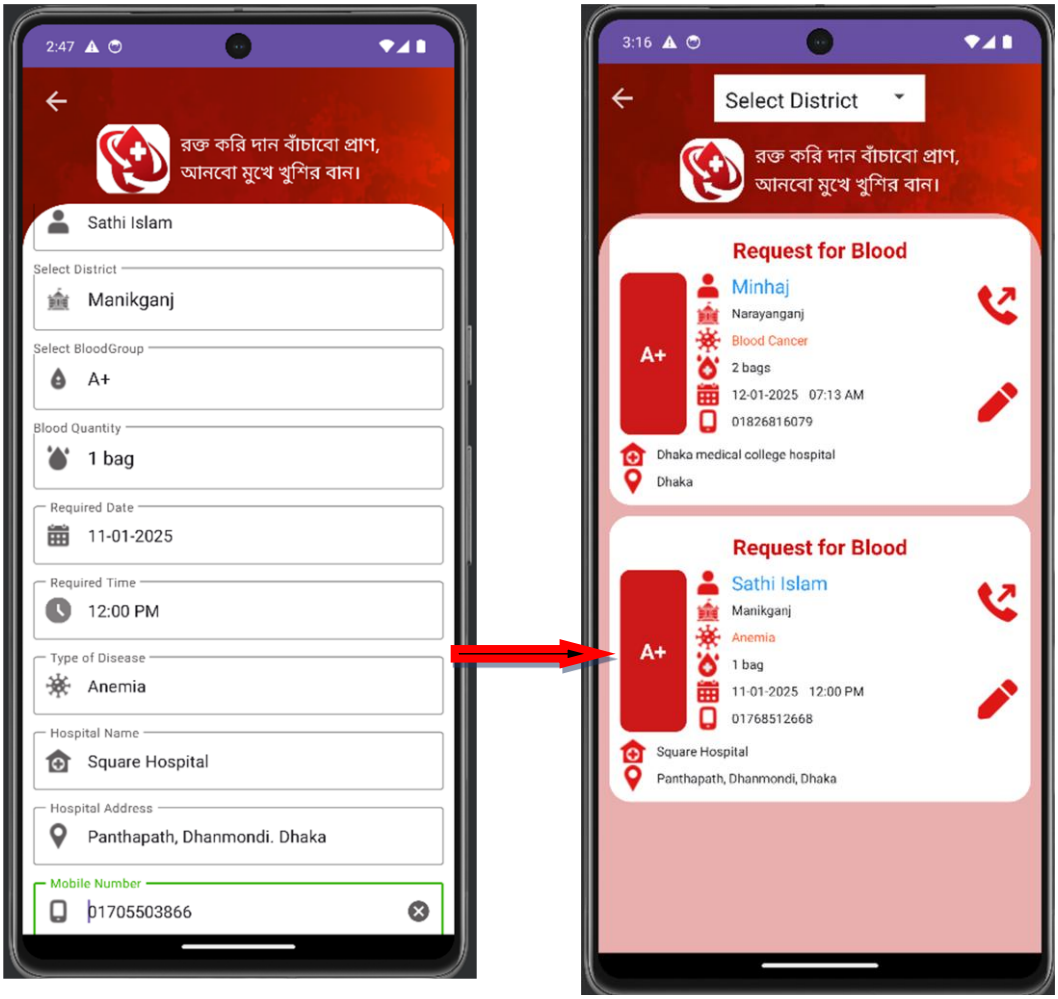


Figure 4.11: Implementation output

Database:

Firebase: Firebase is a comprehensive suite of cloud-based tools provided by Google for mobile and web application development. It offers features like real-time databases, authentication, cloud functions, and more, which can greatly simplify the development process for the back-end of the Blood Donor App.

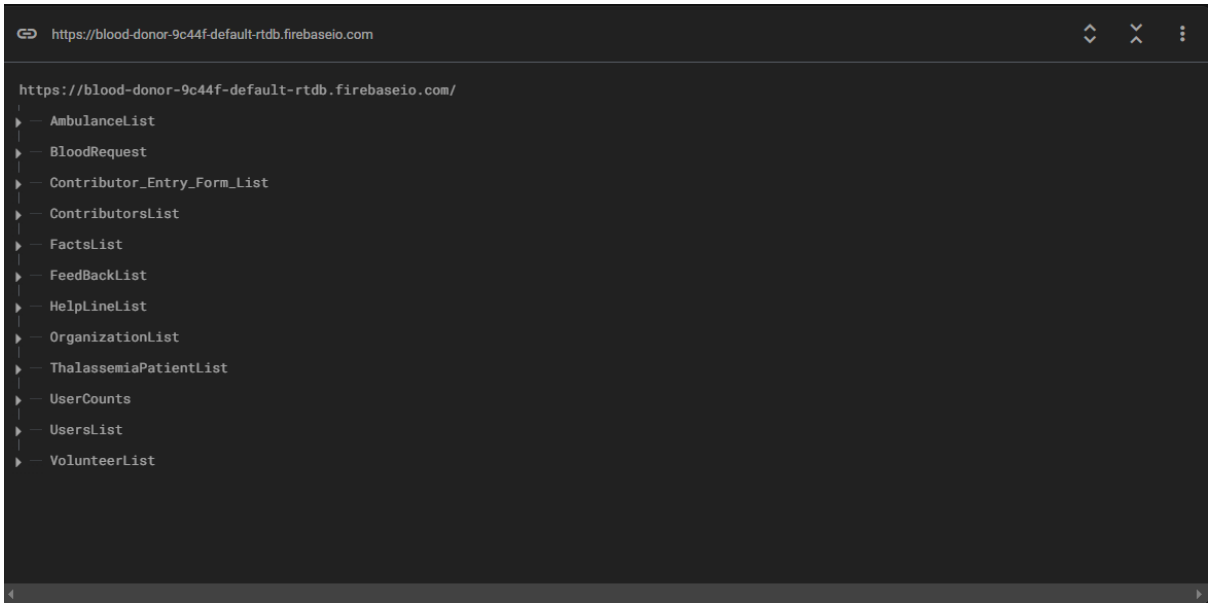


Figure 4.12: Firebase data storage list

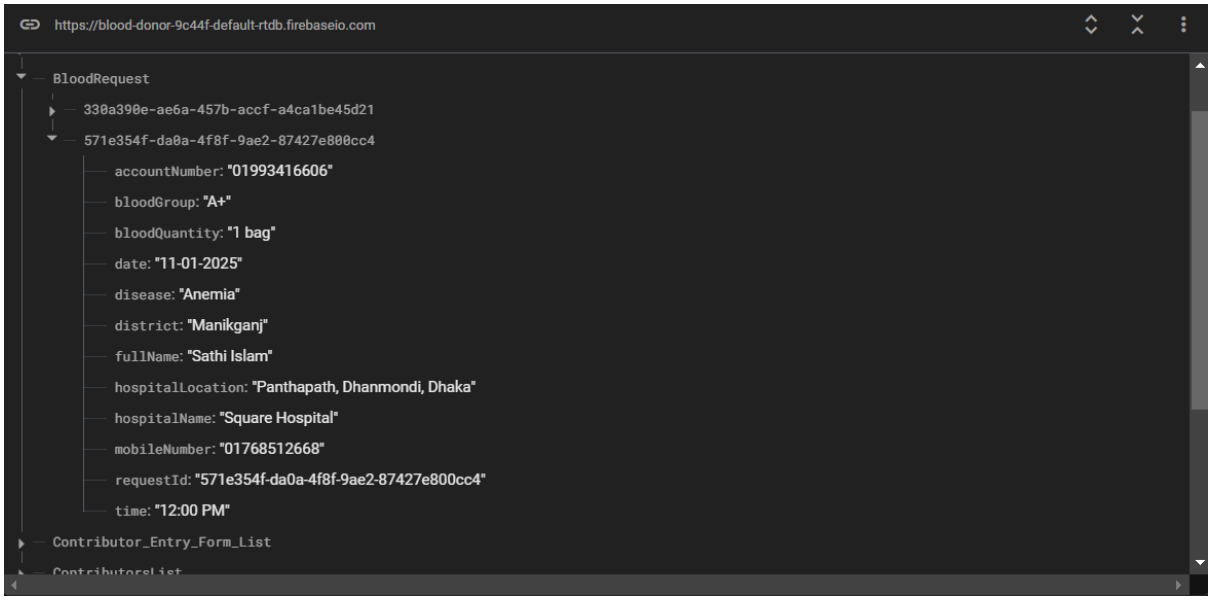


Figure 4.13: Firebase data storage details

CHAPTER 5

TESTING

5.1 Introduction

Testing is a critical phase of app development, ensuring the Blood Donor app functions as expected under various scenarios and meets its performance, security, and user experience standards. [6]

5.2 Manual Testing

Test Case ID	Test Scenario/Description	Steps to Execute	Expected Result	Actual Result	Status (Pass/ Fail)	Comments
TC-01	App Launch	Launch the app by tapping the icon.	App opens with splash screen and displays the sign in screen.	Properly working	Pass	
TC-02	Sign in functionality	Enter valid mobile number and password.	User is logged in and redirected to the main menu.	Properly working	Pass	
TC-03	Password recover	Tap the "Forgot" button.	Redirected to forgot recover page	Properly working	Pass	
TC-04	New password setup	Input mobile number and full name are match update new password	Password updated and redirected to the sign in screen	Properly working	Pass	
TC-05	Sign Up	Tap Sign UP button	Redirected to the sign up page	Properly working	Pass	
TC-06	Sign up functionality	Fill up all text box	Redirected to the main menu page	Properly working	Pass	
TC-07	Search donor	Tap search blood button	Redirected to the search page	Properly working	Pass	
TC-08	Search donor functionality	Select blood group, district and tap search donor button	Redirected to the blood donor list page and show list	Properly working	Pass	
TC-09	Blood request	Tap blood request button	Redirected to the request entry page	Properly working	Pass	
TC-10	Blood request functionality	Fill all text box and tap send request button	Redirected to the request list page and show the list	Properly working	Pass	
TC-11	See request list	Tap request list button	Redirected to the request list page and show the list	Properly working	Pass	

TC-12	Call	Tap call icon	Redirected to the mobile dial pad with mobile number	Properly working	Pass	
TC-13	Edit	Tap edit icon	Redirected to the edit page	Properly working	Pass	
TC-14	Update post	Update data and click update button	Data updated and Redirected to the list page	Properly working	Pass	
TC-15	Delete post	Tap delete button	Open delete dialog	Properly working	Pass	
TC-16	Delete functionality	Tap delete button	Post delete and Redirected to the list page	Properly working	Pass	
TC-17	Cancel delete	Tap cancel button	Redirected to the list page	Properly working	Pass	
TC-18	Organization list	Tap organization button	Redirected to the organization page and show all list	Properly working	Pass	
TC-19	Organization add form	Tap organization add button	Redirected to the organization add page	Properly working	Pass	
TC-20	Add organization	Fill all text box and click submit button	Add organization and show organization list	Properly working	Pass	
TC-21	Search item	Select district	Match district show related item	Properly working	Pass	
TC-22	Facts	Tap facts button	Redirected to the facts page and show blood donation related facts	Properly working	Pass	
TC-23	Feedback	Tap feedback button	Redirected to the feedback entry page	Properly working	Pass	
TC-24	Send feedback	Fill all text box and click send button	Feedback message sent to admin and Redirected to the main menu	Properly working	Pass	
TC-25	Navigation menu	Tap three line menu icon	Open navigation menu	Properly working	Pass	
TC-26	Admin	Tap admin button	Redirected to the admin sign in page	Properly working	Pass	
TC-27	Admin sign in	Enter valid Id and password.	Redirected to the admin access menu	Properly working	Pass	

TC-28	Contributor published	Admin click contributor published button	Contributor published to contributor list	Properly working	Pass	
TC-29	My profile	Tap my profile button	Redirected to the profile menu	Properly working	Pass	
TC-30	Share	Tap share button	Redirected to the phone share option	Properly working	Pass	
TC-31	Rating	Tap rate us button	Redirected to the play store	Properly working	Pass	
TC-32	Follow facebook	Tap follow our facebook page	Redirected to the facebook page	Properly working	Pass	
TC-33	Privacy policy	Tap privacy policy	Redirected to the privacy policy page	Properly working	Pass	
TC-34	Back	Tap back icon	Redirected to the back page	Properly working	Pass	
TC-35	Home	Tap home icon	Redirected to the main menu	Properly working	Pass	
TC-36	Sign out	Tap sign out button	Sign out done and Redirected to the sign in page	Properly working	Pass	
TC-37	Exit	Tap exit button	Close the app	Properly working	Pass	

Table 5.1: Manual testing report

CHAPTER 6

CONCLUSION AND FUTURE SCOPE

6.1 Discussion and Conclusion

Discussion:

The Blood Donor App is an important tool for improving the efficiency and accessibility of blood donation services. By leveraging various technologies and services like Java and Firebase this app can bridge the gap between donors and patients who require blood donations urgently.

Conclusion:

The Blood Donor App is a modern solution that connects donors and patients in need of blood. Through the use of Firebase for authentication, real-time database management, the app provides a streamlined experience for its users. It aims to increase blood donations and create a responsive, user-friendly platform for both donors and recipients.

6.2 Future Scope

The Blood Donor App holds significant potential for further development and enhancement. As technology advances and user needs evolve, there are several areas where the app can expand to offer more features and improve user experience. Below are some of the key future scopes for the Blood Donor App:

Location-based matching: Using geolocation data to connect donors and recipients who are geographically closer, reducing transportation time and improving response time.

Real time notification: Real-time notifications play a pivotal role in enhancing the functionality and user experience of the Blood Donor App. Integrating real-time notifications into the future development of the app could greatly improve responsiveness, streamline communication, and encourage more active participation in blood donation efforts.

6.3 Limitations

This app is not prepared for webpage.

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