# Abstract

We propose to develop an interactive application that can be used to schedule an individual's blood donation to a specific blood bank, request blood for a person, keep a database of blood banks in an area containing information about them and their blood availability status. Our project aims to providing users an easy to understand and informative User Interface for Blood Donation and requirement to save them the hassle of contacting every blood bank in the neighbourhood individually.

# Introduction

**BloodCell is** an interactive application that can be used to schedule an individual's blood donation to a specific blood bank, request blood for a person, keep a database of blood banks in an area containing information about them. Our project aims to providing users an easy to understand and informative User Interface for Blood Donation and requirement to save them the hassle of contacting every blood bank in the neighbourhood individually.

The BloodCell Application uses **Relational Database (MySql Database)** to Store User Information for Login and Registration. It also uses **Relational Database (MySql Database)** for Storing Donation Request, Recipients Request, Blood Bank Database and Feedback for respective User ID's.

# Incremental Model

We are implementing Incremental Software Development Model for our Project as a Blood Bank Application needs to have some basic functionalities like **Requesting for Blood, Donation of Blood.** These Functionalities need to be implemented first.

We will develop the **Blood Bank Application** in increments in which the first Increment (**Prototype 1**) will implement the basic and essential functionalities like **Blood Request and Blood Donation** and further Prototypes will display other functionalities like **Donation History, Searching for Blood Bank etc.**
Also, each Prototype will have a **Feedback Page**, that can be used to survey users for requirements for the next Prototype.

# Functional Requirements

In this application user can schedule donation of his blood, request blood by filling a blood request form and user will also be able search blood banks and view information about them

1. **Scheduling Donation of Blood**

   - User selects this option.
   - User can choose blood bank of his choice.
   - User selects date and time slot for donation.
   - On submitting the data will be updated on database and an email will be send to the blood bank.

2. **Request Blood**

   - User selects this option
   - A Request form is generated with various fields (ex. Name, Blood group, reason, blood bank etc) which are required to be filled by the user.
   - Submit the request
   - Data will be updated on the database and an email will be sent to the blood bank

3. **Search Blood Bank**

   - User selects this option
   - User can view various information about them (email, phone etc.) By map
   - User can drag to specific area on a map
   - Blood banks in that area if available will be displayed
   - User can navigate to a particular blood bank from his current location

4. **Check blood Availability**

   - User selects this option Choose a Blood bank
   - Availability according to the blood groups will be displayed

5. **Education info**

   - User will get a brief information about donation of blood and its facts

6. **History**

   - User can history of their donation and recipient requests history.
   - Each request is displayed containing blood-bank name, date, status, type
   - Status of request denotes if the request was accepted or rejected.

7. **Blood-Bank Portal**

   - This will be a portal for the bloodbanks in the forms of a website where each bloodbank can login and view donation and recipient of all users for the particular bloodbank.
   - The bloodbank's admin can accept and reject requests of the users from the portal
   - An SMS is sent to the user for every acceptance or rejection of their requests by the bloodbank

8. **Feedback form**

   - User can ask general queries about the application, can suggest changes or improvements in the application.
   - User can also provide feedback about blood banks and share their experience.

## User Interface Requirements

- Maintain consistency of user interface and data across all platforms for every user.

- Provide shortcuts for the easy access and quick response for most important and urgently needed feature E.g. Blood Request.

- Allow users to ask general queries about the application, can suggest changes or improvements in the application. User can also provide feedback about blood banks and share their experience.

- Display appropriate and informative dialog boxes at completion of each task.

- Provide various constraints and validation for every forms and inputs to reduce possibility of errors.

- Provide option to undo at the end of every action to allow users to fix mistakes.

- Provide a central menu for access of all basic functionalities of the application from a single page view.

- Reduce redundancy in data by using normalized database and store cached information of most common blood banks for quick response time.

# Use Case Diagram
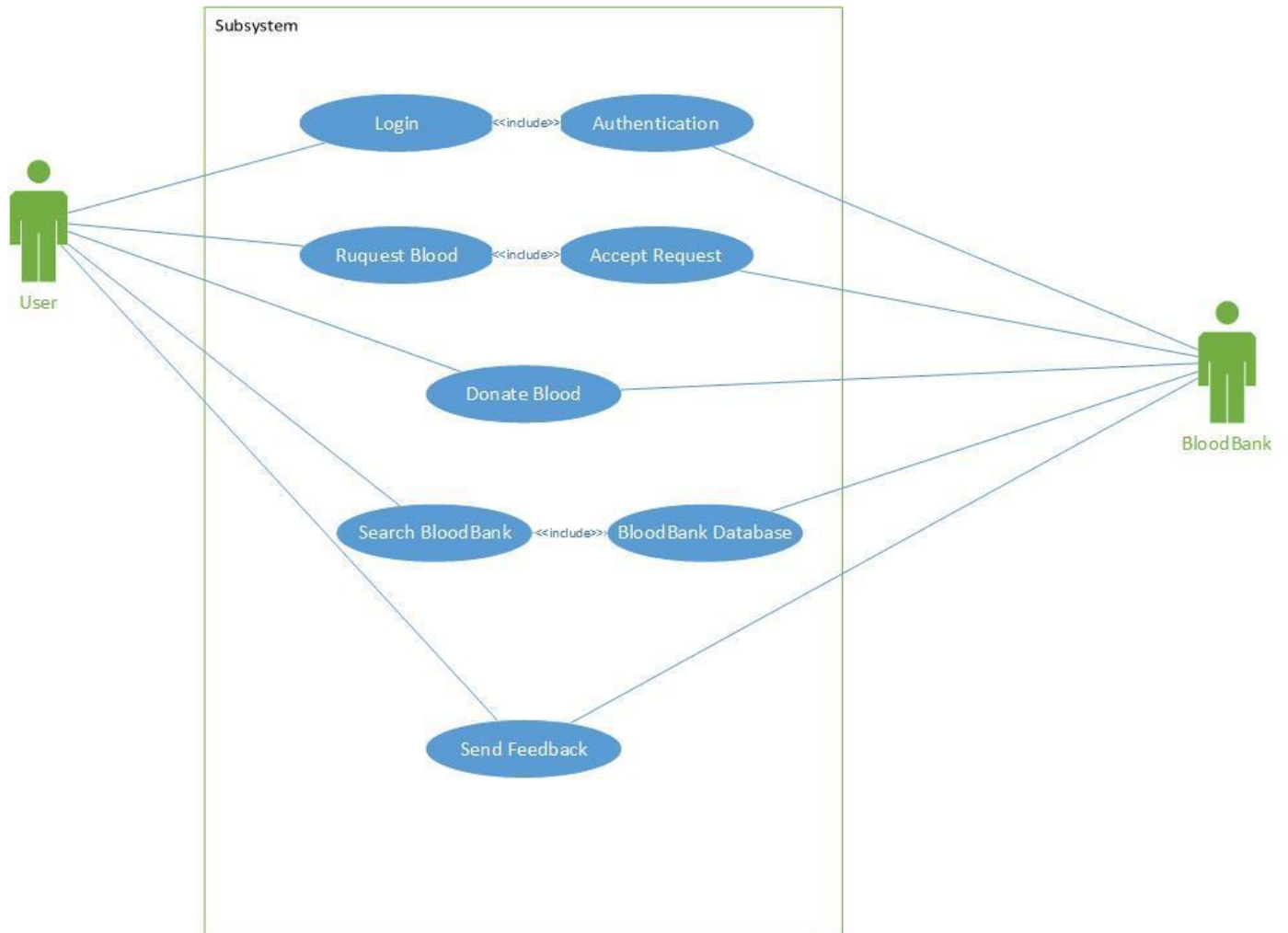
## Proposed Design

Login Page (1)

Registration Page (2)

| Blood App |
| --- |
| Welcome |
| Mobile No. |
| _____ |
| Sign In |
| New User? |
| Register |

| Blood App |
| --- |
| Register. |
| Mobile No. |
| _____ |
| City |
| -Select- ▼ |
| Blood Group |
| -Select- ▼ |
| First Name |
| Last Name |
| o Male  o Female |
| Select DOB |
| Email Address |
| Register |

Request Blood (3)

| Blood APP |
| --- |
| City |
| -Select- ▼ |
| Blood Banks |
| -Select- ▼ |
| Blood Group |
| -Select- ▼ |
| Patient Details |
| Name |
| Age |
| o Male  o Female |
| Select Date |
| Submit |

Request Blood Donation (4)     Quick Map

**Blood APP**

City
[ -Select- ▼ ]

Blood Bank
[ ▼ ]

[ Select Date ]

Time Slot
[ Select ▼ ]

[ Submit ]

---

**Blood APP**

[ ☺ ]
Users

· Donate Blood
· Blood Availability
· Donation History
· Search Blood Banks
· Educational Info.

· Contact Us
· Feedback

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Searching (5)

Search By Map (5.1)

**Blood APP**

| Search By Map | Search By City |

( ⊙ )                    [ ⊕ ]

♀                    ♀
BankA          BankB

< Vellore Map >

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**Blood App**
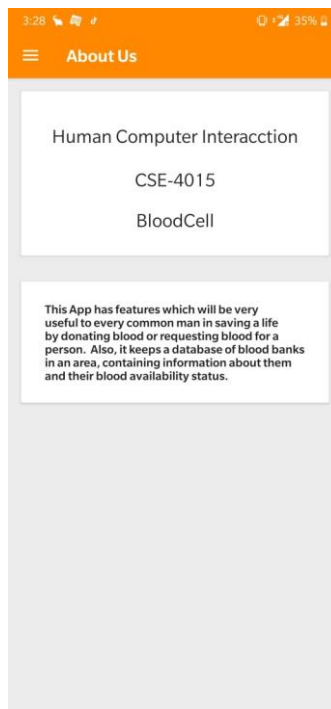
| Search By Map | Search By City |

♀ Enter City...

· List of
· Blood Banks
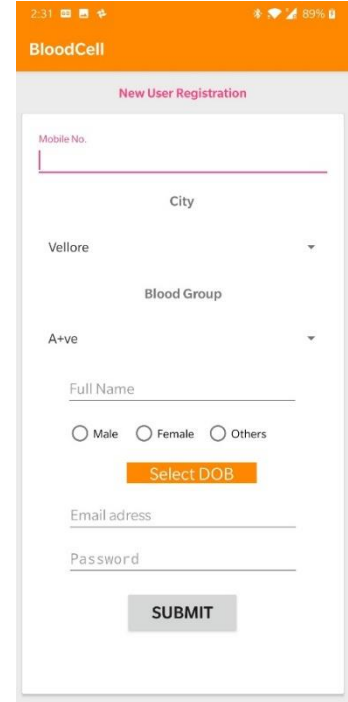· with Location
· and Contact Details
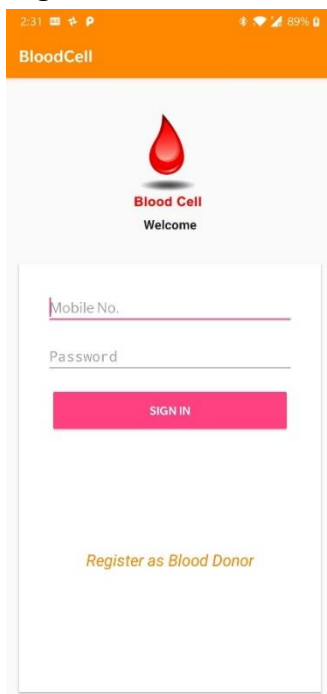
# Mobile app UI Screenshots

### Homepage
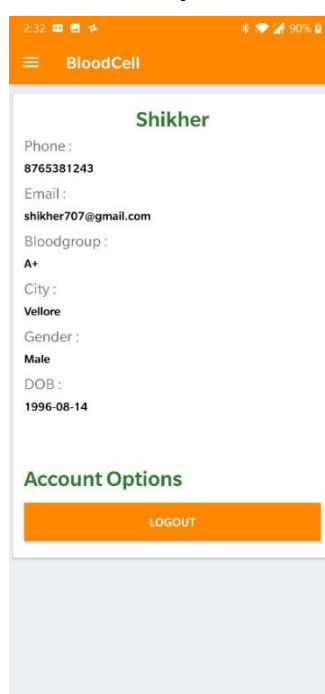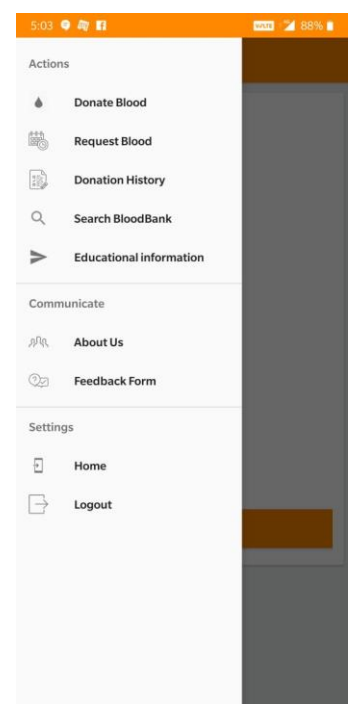
**Blood Cell**

Be a Hero. Donate Blood

### About Us

**About Us**

Human Computer Interacction

CSE-4015

BloodCell

This App has features which will be very useful to every common man in saving a life by donating blood or requesting blood for a person. Also, it keeps a database of blood banks in an area, containing information about them and their blood availability status.

### Registration

**BloodCell**

New User Registration

Mobile No.

City

Vellore

Blood Group

A+ve

Full Name

○ Male   ○ Female   ○ Others

Select DOB

Email adress

Password

SUBMIT

### Login

**BloodCell**

**Blood Cell**

Welcome

Mobile No.

Password

SIGN IN

*Register as Blood Donor*

### Main Activity

**BloodCell**

**Shikher**

Phone :
**8765381243**
Email :
**shikher707@gmail.com**
Bloodgroup :
**A+**
City :
**Vellore**
Gender :
**Male**
DOB :
**1996-08-14**

**Account Options**

LOGOUT

### SideBar Menu

Actions

● Donate Blood

Request Blood

Donation History

Q Search BloodBank

➤ Educational information

Communicate

About Us

Feedback Form

Settings

Home

Logout

## Donation Request



## Recipient Request



## Blood-Bank Search



## Educational Information



## Navigate to Blood-Bank



## Feedback

## Donation Request History

| | |
|---|---|
| 10:49 | 86% |
| **History** | |

**DONATION REQUESTS**    RECEPEINT REQUESTS

| Blood- | Masonic Blood Bank |
|---|---|
| Request Type: | Donation |
| Date: | 2018-10-09 |
| Status | Not Approved |

| Blood- | Masonic Blood Bank |
|---|---|
| Request Type: | Donation |
| Date: | 2018-10-10 |
| Status | Not Approved |

| Blood- | Bangalore Blood Bank |
|---|---|
| Request Type: | Donation |
| Date: | 2018-10-13 |
| Status | Not Approved |

| Blood- | Lions Blood Bank |
|---|---|
| Request Type: | Donation |
| Date: | 2018-11-17 |
| Status | Not Approved |

## Recipient History

| | |
|---|---|
| 10:49 | 86% |
| **History** | |

...TION REQUESTS    **RECEPEINT REQUESTS**
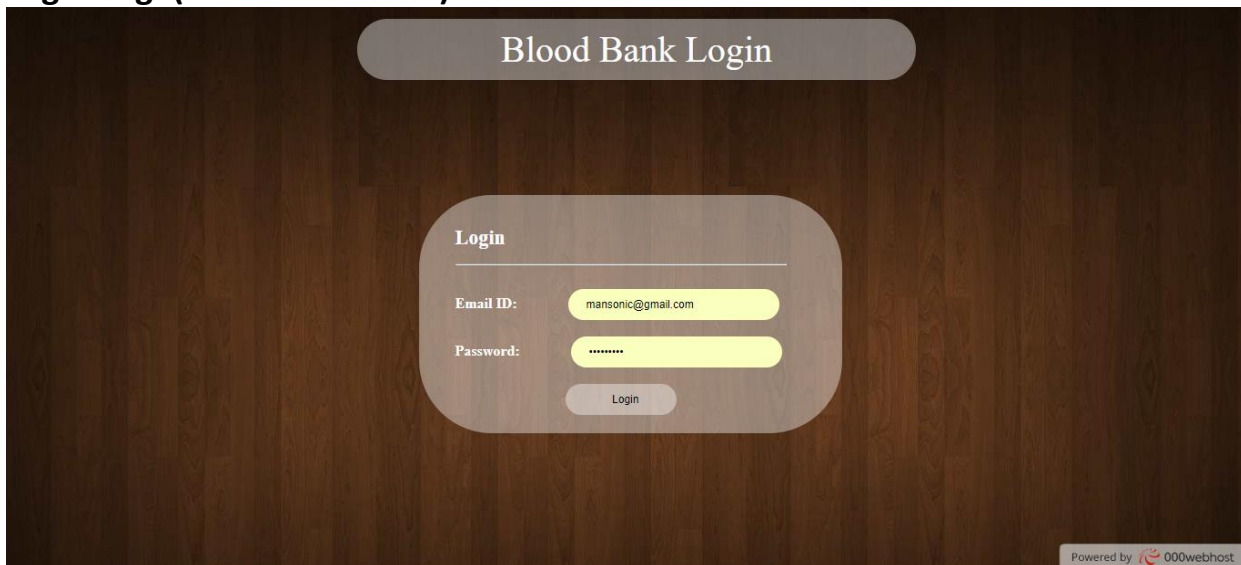
| Blood- | Masonic Blood Bank |
|---|---|
| Request Type: | Request |
| Date: | 2018-10-09 |
| Status | Not Approved |

| Blood- | Masonic Blood Bank |
|---|---|
| Request Type: | Request |
| Date: | 2018-10-09 |
| Status | Not Approved |

| Blood- | Masonic Blood Bank |
|---|---|
| Request Type: | Request |
| Date: | 2018-10-09 |
| Status | Not Approved |

| Blood- | Masonic Blood Bank |
|---|---|
| Request Type: | Request |
| Date: | 2018-10-09 |
| Status | Not Approved |

| Blood- | Annai Teresa Blood Bank |
|---|---|
| Request Type: | Request |

# Website Portal Screenshots

## Login Page( for Blood-banks)



## Blood-bank Requests



After logging into the Portal Blood-bank can either accept requests or reject request and SMS will be sent to user's mobile for both

- ➢ Click ✓ for accepting a request (an SMS will be sent)
- ➢ Click ✗ for rejecting a request (an SMS will be sent)

# Application Process

In this application user can schedule donation of his blood, request blood by filling a blood request form and user will also be able search blood banks and view information about them

1. **Landing Page**

   First, I developed the **Landing Page** for the application displaying the Application Name, Application Icon and the Motto using the Typerwriter Text.

2. **Login Activity**

   Then, I created the **Login Activity** which consists of two EditText fields for Mobile No. and Password. User Logins by Entering their details which are verified before providing access to the user and the message is displayed if there is any error. It also displays a Registration Button at the Bottom of the Page that Redirects to the Registration Page for New Users.

3. **Registration Activity**

   **Registration Activity** has various input fields for users (Name, Email, Password, Mobile), Spinners for City and BloodGroup, and RadioButton for selecting their gender. New Users after filling in their details can Tap on Register to Sign up. Once Registered, The App gets redirected to the Login Page.

4. **Home Page (Main Activity)**

   This Activity works as the landing activity or Home Page for the users, after Logging in all the details of the users are stored Under **Shared Preferences** to provide session functionality for the application. Therefore, once the user is LoggedIn they are directly led to the Home Page on Opening the application.

5. **Menu (Drawer Layout)**

   I created the Menu Drawer for the application which can be drawn over the Main Activity and contains actions like Donate Blood, Request Blood, Search BloodBank and Educational Info, Communication optins like Feedback and About and also, setting for reaching back to Home Page and a Button to Logout. All these options will be displayed as fragment over the MainActivity.

6. **Menu (Drawer Layout)**

I created the Menu Drawer for the application which can be drawn over the Main Activity and contains actions like Donate Blood, Request Blood, Search BloodBank and Educational Info, Communication options like Feedback and About and also, setting for reaching back to Home Page and a Button to Logout. All these options will be displayed as **fragments** over the MainActivity.

7. **Donate Blood (Fragment)**

On selection of this option Donate Blood Fragment is inflated over the activity. A Request form is generated with various fields (ex. Name, Blood group, reason, blood bank etc) which are required to be filled by the user. On submitting the data will be updated on database which can looked by bloodbank and confirmation can be provided by bloodbank by email or sms.

8. **Request Blood (Fragment)**

On selection of this option Request Blood Fragment is inflated over the activity. A Request form is generated with various fields (ex. Name, Blood group, reason, blood bank etc) which are required to be filled by the user. On submitting the data will be updated on database which can looked by bloodbank and confirmation can be provided by bloodbank by email or sms.

9. **Search Bloodbank (Fragment)**

On selection of this option Search Blood Fragment is inflated over the activity. A Map Fragment containing the Blood Banks as markers are displayed on the map. User can view various information about them (phone etc.). Users can navigate to a specific bloodbank. User can drag to specific area on a map. Blood banks in that area if available will be displayed. Users current location is also displayed using a bluedot.

10. **Educaition Information (Fragment)**

On selection of this option EducationInfo Fragment is inflated over the activity. This fragment contains a **tabbed layout** which contains multiple page. We can move from one page to other by swiping, this is done using a **ViewPager.** Pages includes (what? why? types, facts)

11. **Feedback (Fragment)**

On selection of this option FeebackFragment is inflated over the activity. This fragment contains Editext Field where users can ask general queries about the application or can suggest changes or improvements in the application. The feedback is submitted after pressing the submit button.

12. **Website Portal (for bloodbanks)**

This is a portal for the bloodbanks in the forms of a website where each bloodbank can login and view donation and recipient of all users for the particular bloodbank.

The bloodbank's admin can accept and reject requests of the users from the portal

An SMS is sent to the user for every acceptance or rejection of their requests by the bloodbank

**Users can anytime traverse to the Home Page or Logout of the Application by clicking the Home and Logout buttons respectively.**

## Software Requirements and Tools Used

- Android Studio
- Android Device
- ButterKnife Package
- Php Back-end
- Google Maps API
- SMS API using Way2SMS

# Database Design

The BloodCell Application uses **MySQL Database (phpMyAdmin)** to Donation and Recipients requests. It also uses it for user Login/Registration and storing data about the blood-banks.

MySQL is an open-source **relational database** management system (RDBMS)

## Structure of Database

### Users Table

| | # | Name | Type | Collation | Attributes | Null | Default | Comments | Extra |
|---|---|------|------|-----------|------------|------|---------|----------|-------|
| ☐ | 1 | id 🔑 | int(10) | | | No | *None* | | AUTO_INCREMENT |
| ☐ | 2 | mobile | decimal(10,0) | | | No | *None* | | |
| ☐ | 3 | email | varchar(50) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 4 | bloodgroup | varchar(10) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 5 | username | varchar(30) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 6 | dob | varchar(10) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 7 | password | varchar(50) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 8 | city | varchar(30) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 9 | gender | varchar(10) | utf8_unicode_ci | | No | *None* | | |

### Donation Table

| | # | Name | Type | Collation | Attributes | Null | Default | Comments | Extra |
|---|---|------|------|-----------|------------|------|---------|----------|-------|
| ☐ | 1 | id 🔑 | int(10) | | | No | *None* | | AUTO_INCREMENT |
| ☐ | 2 | user_id | int(10) | | | No | *None* | | |
| ☐ | 3 | city | varchar(50) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 4 | bloodbank | varchar(50) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 5 | time | varchar(10) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 6 | date | varchar(10) | utf8_unicode_ci | | No | *None* | | |
| ☐ | 7 | approve | int(11) | | | No | *None* | | |

## Request Table

| | # | Name | Type | Collation | Attributes | Null | Default | Comments | Extra |
|---|---|---|---|---|---|---|---|---|---|
| ☐ | 1 | id 🔑 | int(10) | | | No | None | | AUTO_INCREMENT |
| ☐ | 2 | user_id | int(10) | | | No | None | | |
| ☐ | 3 | bloodbank | varchar(50) | utf8_unicode_ci | | No | None | | |
| ☐ | 4 | name | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 5 | description | varchar(50) | utf8_unicode_ci | | No | None | | |
| ☐ | 6 | age | int(5) | | | No | None | | |
| ☐ | 7 | doctor | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 8 | hospital | varchar(50) | utf8_unicode_ci | | No | None | | |
| ☐ | 9 | date | varchar(10) | utf8_unicode_ci | | No | None | | |
| ☐ | 10 | gender | varchar(10) | utf8_unicode_ci | | No | None | | |
| ☐ | 11 | component | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 12 | city | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 13 | bloodgroup | varchar(10) | utf8_unicode_ci | | No | None | | |
| ☐ | 14 | approve | int(11) | | | No | None | | |

## Blood banks Table

| | # | Name | Type | Collation | Attributes | Null | Default | Comments | Extra |
|---|---|---|---|---|---|---|---|---|---|
| ☐ | 1 | bloodbank_id 🔑 | int(11) | | | No | None | | AUTO_INCREMENT |
| ☐ | 2 | name | varchar(50) | utf8_unicode_ci | | No | None | | |
| ☐ | 3 | phone | decimal(10,0) | | | No | None | | |
| ☐ | 4 | city | varchar(20) | utf8_unicode_ci | | No | None | | |
| ☐ | 5 | Latitude | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 6 | Longitude | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 7 | email | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 8 | password | varchar(30) | utf8_unicode_ci | | No | None | | |

## Feedback Table

| | # | Name | Type | Collation | Attributes | Null | Default | Comments | Extra |
|---|---|---|---|---|---|---|---|---|---|
| ☐ | 1 | id 🔑 | int(11) | | | No | None | | AUTO_INCREMENT |
| ☐ | 2 | userId | varchar(30) | utf8_unicode_ci | | No | None | | |
| ☐ | 3 | feedback | varchar(500) | utf8_unicode_ci | | No | None | | |
| ☐ | 4 | datetime | datetime(6) | | | No | CURRENT_TIMESTAMP(6) | | |

# Sample Data

## Users Table

| id | mobile | email | bloodgroup | username | dob | password | city | gender |
|---|---|---|---|---|---|---|---|---|
| 1 | 8765381243 | shikher707@gmail.com | A+ | Shikher | 1996-08-14 | abc123xyz | Vellore | Male |
| 9 | 8564346914 | shssj | AB-ve | suyahs | 2018-10-26 | abc123xyz | Bangalore | Others |
| 10 | 9415752284 | Bear@grylls.com | O-ve | Bear Grylls | 2018-10-13 | abc123xyz | Bangalore | Female |
| 13 | 9999999999 | a@r.com | B-ve | dgsh | 2018-10-17 | ayush123 | Chennai | Male |
| 15 | 9717174801 | ayush@gmaul.com | A+ve | Shivam | 2018-11-02 | abc123xyz | Vellore | Male |

## Donation Table

| id | user_id | city | bloodbank | time | date | approve |
|---|---|---|---|---|---|---|
| 7 | 1 | Vellore | Masonic Blood Bank | 10:00 am | 2018-10-09 | 0 |
| 9 | 1 | Vellore | Masonic Blood Bank | 12:00 pm | 2018-10-10 | 0 |
| 10 | 1 | Bangalore | Bangalore Blood Bank | 10:00 am | 2018-10-13 | 0 |
| 11 | 14 | Bangalore | Masonic Blood Bank | 10:00 am | 2018-10-28 | 0 |
| 12 | 15 | Vellore | Masonic Blood Bank | 10:00 am | 2018-11-09 | 1 |
| 13 | 1 | Chennai | Lions Blood Bank | 02:00 pm | 2018-11-17 | 0 |

## Request Table

| id | user_id | bloodbank | name | description | age | doctor | hospital | date | gender | component | city | bloodgroup | approve |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | 1 | Masonic Blood Bank | ramesh | description | 21 | mr. doc | abc hospital | 2018-10-09 | Male | Whole Blood | Vellore | A+ve | 0 |
| 6 | 1 | Masonic Blood Bank | ramesh | description | 21 | mr. doc | abc hospital | 2018-10-09 | Male | Whole Blood | Vellore | A+ve | 0 |
| 7 | 1 | Masonic Blood Bank | ramesh | description | 21 | mr. doc | abc hospital | 2018-10-09 | Male | Whole Blood | Vellore | A+ve | 0 |
| 8 | 1 | Masonic Blood Bank | ramesh | description | 21 | mr. doc | abc hospital | 2018-10-09 | Male | Whole Blood | Vellore | A+ve | 0 |
| 9 | 1 | Annai Teresa Blood Bank | shikher | suffering Flu | 23 | Mr. Ramesh | abc Hospital | 2018-10-12 | Male | Platelet Rich Plasma | Chennai | O+ve | 0 |
| 10 | 1 | Masonic Blood Bank | John | Internal Bleeding | 18 | Dr. Ram | Apollo | 2018-11-08 | Male | Fresh Frozen Plasma | Vellore | AB+ve | 0 |

**Blood banks Table**

| bloodbank_id | name | phone | city | Latitude | Longitude | email | password |
|---|---|---|---|---|---|---|---|
| 1 | Masonic Blood Bank | 4162220717 | Vellore | 12.930541 | 79.135078 | mansonic@gmail.com | abc123xyz |
| 2 | Chettinad Blood Bank | 4447421000 | Vellore | 12.969511 | 79.154644 | chettinad@gmail.com | abc123xyz |
| 3 | Red Cross Blood Bank | 9389893307 | Vellore | 12.922299 | 79.131772 | redcross@gmail.com | abc123xyz |
| 4 | Indian Red Cross Society | 4162220717 | Vellore | 12.930218 | 79.160342 | indianredcross@gmail.com | abc123xyz |
| 5 | Lions Blood Bank | 4428414949 | Chennai | 13.070194 | 80.260625 | lions@gmail.com | abc123xyz |
| 6 | Annai Teresa Blood Bank | 4422580803 | Chennai | 12.968182 | 80.207104 | annai@gmail.com | abc123xyz |
| 7 | Bangalore Blood Bank | 8023347714 | Bangalore | 13.001723 | 77.569346 | bangalore@gmail.com | abc123xyz |
| 8 | Life Care Blood Bank | 9141364183 | Bangalore | 12.929099 | 77.581011 | lifecare@gmail.com | abc123xyz |

**Feedback Table**

| id | userId | feedback | datetime |
|---|---|---|---|
| 1 | 3 | This is an example feedback. | 2018-10-08 23:20:24.241658 |
| 2 | 1 | hey | 2018-10-09 00:11:50.092868 |

## Conclusion

BloodCell is an application designed to ease the Process of Blood Donation and Blood Requirements for patients in need as well as for Blood Banks to Maintain a fast, responsive system that will speed up Blood Donation and Request Process.

While Doing so we have tried to fulfil all the 10 User Interface Heuristics by **Jakob Nielsen**:



# Ten Design Heuristics

| UNDERSTANDING | ACTION | FEEDBACK |
|---|---|---|
| Consistency | Freedom | Show Status |
| Use Familiar Metaphors & Language | Flexibility | Prevent Errors |
| Clean & Functional Design | Recognition Over Recall | Support Error Recovery |
| | | Provide Help |