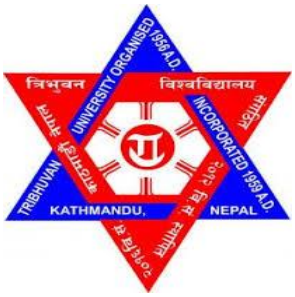

TRIBHUVAN UNIVERSITY

INSTITUTE OF ENGINEERING

HIMALAYA COLLEGE OF ENGINEERING

A THIRD YEAR MINOR PROJECT REPORT

ON

BLOOD DONATION APP IN ANDROID

[CT-654]

SUBMITTED TO

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

Chyasal, Lalitpur

SUBMITTED BY

Abinay Bhandari (30004)

Kiran Sharma (30018)

Sandeep Gautam (30029)

Shiva Shrestha (30034)

August, 2019

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"A THIRD YEAR PROJECT REPORT SUBMITTED FOR PARTIAL FULFILLMENT OF DEGREE OF BACHELOR'S IN COMPUTER ENGINEERING"

SUPERVISOR

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SUBMITTED TO

Tribhuvan University

Institute of Engineering

Himalaya College of Engineering

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ABSTRACT

This project acts as an important role in saving life of human beings and which is also its main aim. The project Blood Donation app system is developed so that users can view the information about registered blood donors such as name, address, and other personal information along with their details of blood group and other medical information of donor. The main aim of developing this application is to reduce the time to a great extent that is spent in searching for the right donor and the availability of blood required. Thus this application provides the required information in no time and also helps in quicker decision making. As, all most everyone carries cell phone with them, it ensures instant location tracking of several blood donors, along with several blood bank and hospitals.

Overall application is developed by using android studio on which code is done in Java and also we used firebase as a database. When the overall project is completed we got an android application which is able to solve the problem related to blood transfusion activity.

Keywords: - *transfusion*

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LIST OF ABBREVATIONS

API : - Application Programming Interface

GPS : - Global Positioning System

IDE : - Integrated Development Environment

JDK : - Java Development Kit

OTP: - One Time Password

RBC : - Red Blood Cell

SDLC : - Software Development Life Cycle

SMS :- Short Message Service

SQL: - Structured Query Language

UI : - User Interface

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CHAPTER 1. INTRODUCTION

1.1 Background

A blood donation occurs when a person voluntarily has blood drawn and used for transfusions and made into biopharmaceutical medications by a process called fractionation. Donation may be of whole blood, or of specific components directly. Blood banks participate in the collection process as well as the procedures follow it.

There are several system or application regarding blood transfusion activity. They include the facility to request blood when the user is seeking for blood also the user will be able to view the donor available all over the country. The existing system is not able to solve the problem of user, so we are intending to develop another system based on android.

This is an android based project which play an important role in saving life of human beings and also its main aim developed an android application will include all the relevant features to provide a means of communication between blood seekers, blood donors and blood bank. This will help user in such a way that user can locate different volunteer blood donors and blood bank in their locality through GPS and then request for the blood in case of emergency.

The users will be able to view information about different blood bank along with blood available in their repository, the information of the registers user who need blood in case of emergency and the blood donors who wish to donate blood when required.

1.2 Problem Statement

As per present context in Nepal, blood transfusion activity can be considered as a challenging activity. As the blood seekers don't get the desired blood at the particular time they have to suffer from different sorts of physical and mental torture, also the patient may die due to lack of blood. We found existing system didn't contain any kind of information about hospital located around the user's location and also the app didn't contain any valid authentication system implemented on the system. Also the system's user interface was not so good as it was tedious to operate. Another problem we found is that there was no any option to inform about any blood campaign held in nearby location.

1.3 Objectives

1.3.1 General

- To create an android application which consists of all information of donors/users details, information who wants to donate blood.

1.3.2 Specific

- To allow the probable recipients to make search and match the volunteer donors, and make request for the blood.
- To implement the google map view to show nearby hospitals, blood bank, current location of user and directions that connect receiver and donor.

1.4 Scope and Application

The application is sure to be very useful and user friendly as it provides a solution for a recurring problem among every individual i.e. transfusion of blood. This app is believed to be useful in different scenarios. The main idea of this app is to enhance communication between seekers and donors for the blood transfusion process. The project also allows to select the right donor online instantly using medical details along with the blood group to reduce the time to a great extent that is spent in searching for the right donor and the availability of blood required. Thus, this application provides the required information in no time and also helps in quicker decision making. This, is applicable in hospitals, blood banks and other blood institutions.

The major applications of this project are:

- User can request blood whenever necessary.
- Minimize scarcity of blood.
- User can get the relevant information about blood donation.
- Can get information about blood bank, hospitals and other blood institutions.
- User can search nearby hospitals for the transfusions of blood.

CHAPTER 2. LITERATURE REVIEW

The main purpose of project is to make a Blood Donation Application that is user friendly and has the intelligence to find the best matches of blood donors by analyzing the nearby donor's profile. The Blood Donation Application will bring the donors and receives so close that blood donation will no longer be a matter of risk and worries. At the beginning of the project some research based on secondary resources was done. From those sources, the existing system was identified and new system with more functionalities is developed.

The Optimization of Blood Donor Information and Management System by Technopedia. Blood is a saver of all existing lives in case of emergency needs. P. Priya, V. Saranya, S. Shabana, Kavitha Subramani has proposed an extended web application to timely update the information regarding the donors, acceptor and patients where the administrator access the whole information about blood bank management system [1]. Also the proposed work has security, to protect the contact details of the donors in web application where it can be misused by third parties. It also maintains the amount of each available blood groups, if the stock of a particular blood group is lower than the required amount then the proposed method notifies the donor to donate blood. In addition to web application, an android mobile application is proposed to search the donors who are available nearby during the emergency cases such as accidents. The web based android application is readily scalable, efficient and adaptable to meet the complex need of blood bank who is key facilitators for the healthcare sector.

Blood is an important aspect for all living things. It proves to be a lifesaving component in case of emergency requirement. None of the online blood bank offers the direct contact between donor and blood bank. This is the major drawback of the existing system. Existing systems are time consuming; require more manpower and it is costly. Tushar Pandit, Satish Niloor, A.S. Shinde has introduced comparison between existing system and improved system [2]. The new idea will improve the existing system and it will move from conventional desktop system to mobile system. E-blood bank is an integrated blood bank automation system. The main purpose of E-blood bank is to interconnect all the blood banks of the state into a

single network, validation, storage and circulation of various live data and information by using computation technology. The data which is stored on the computing devices will help the public for easy access to the blood availability status in blood banks on fingertips so that he can place a request or notify particular blood group in nearby blood bank save a valuable life.

Vikas Kulshreshtha Research Scholar, Dr. Sharad Maheshwari has introduced the review of the main features, merits and demerits provided by the existing Web-Based Information System for Blood Banks [3]. Blood is universally recognized as the most precious element that sustains life. It saves innumerable lives across the world in a variety of conditions. A blood bank is a place designed especially for the storage of blood and blood products. The term „"blood bank" typically refers to a division of a hospital laboratory where the storage of blood product occurs and where proper testing is performed to reduce the risk of transfusion related events. Large coolers hold these products at a constant temperature and they are available at a moment's notice. The blood bank management information system offers functionalities to quick access to donor records collected from various parts of the country. It enables monitoring of the results and performance of the blood donation activity such that relevant and measurable objectives of the organization can be checked. They are providing the efficient search who needs the blood in their own city as fast as possible.

T.Hilda Jenipha and R.Backiyalakshmi, made a cloud based blood donation app and we get to know about this from their paper "Android Blood Donor Life Saving Application in Cloud Computing" [4]. Where the contact details will appear in alphabetical order on the screen. In case of urgent blood requirement, one can quickly check for contacts matching a particular or related blood group and reach out to them via Phone Call/SMS through the Blood Donor App. Their Blood Donor App provides list of donors in your city/area. According to them, Cloud- based services can prove important in emergency blood delivery since they can enable central and immediate access to donors' data and location from anywhere. Since almost everyone carries a mobile phone with them, it ensures instant location tracking. The location-based app, operational on android platform, will help users easily find donors of matching blood groups in their location and can be accessed via their mobile numbers.

From Shek and Shilpa [5] – the authors of "Android Blood Donor Life Saving Application in Cloud Computing" we can understand, the importance of having blood donation app. According to them, despite numerous significant achievements, the discipline of Supply Chain Management (SCM) is still incapable of satisfactorily addressing many practical, real-world challenges. The user's location will be detected using GPS. If there is need of blood, the donor with the required blood group is identified and notified of the requirement. The project includes algorithm which detects accurate location of the donors, identifies the donors who are available nearby to the location of requester and notifies them. If the identified donors are not available or not willing to donate blood at present, then the scope of detection is increased. This is done by increasing the scope of search. Notifying the donor about the need of the blood is the most important task of the system.

Snigdha, Pratiksha, Siddhi, Pranita and Varsha thinks the problem is not insufficient number of donors, but finding a willing donor at the right time [6]. They want to build a network of people who can help each other during an emergency. Their application timely updates the information regarding the donors where the administrator accesses the whole information about blood bank management system. Donor will be prompted to enter an individual's details, like name, phone number, and blood group. In the urgent time of a blood requirement, someone can quickly check for blood banks or hospitals matching a particular or related blood group and reach out to them through the App. Blood bank App provides list of blood banks in an area. They feel that, a large number of blood donors are attracted using an Android application. Since almost everyone carries a mobile phone with them, it ensures instant location tracking and communication. Only a registered person, with willingness to donate blood, will be able to access the service. In this application they are using the GPS technology that was been to trace the way to the blood bank. The user will get the route to reach the desired location and he won't have to ask manually, therefore time can be saved.

Several android applications have been developed to provide an efficient solution for blood donation.

Blood Donor by American Red Cross Blood Donor is an initiative taken by American Red Cross to help user's register for blood donation drives and camps which are conducted in their nearby area [7]. The application creates a great

medium to create a user's profile and reward the donor with points in order to encourage blood donation among people. The application strives towards promoting blood donation however does not solve the problem of a user in case of an emergency.

Indian Blood Donors is another user-friendly blood donation application build to exchange information between blood donors and receivers. One can have direct access to the donor or receiver by making a phone call. The feature in this app allows you to directly contact the respective donor. This can be efficiently used within Indian boundaries. But blood emergency can take place any part of the world, and to give equality beyond boundaries is necessary. Keeping an app universal can bring great aid.

Friends2support is a unique application made by JJ F2S team [8]. The mobile app is developed based on a website Friends2Support.org which brings voluntary donors and those who need blood at the same platform. It allows its services to be used in India, Sri Lanka, Bangladesh, Nepal and Yemen. This app adds great value by providing facts that are required before or after donation.

Blood For Sure, a blood donation application that detects the user location and nearby donors [9]. The features provided by this application include first aid tips, finding the nearest ambulance and blood bank service around the user. The application provides an upper hand in the facilities provided to the user because of this reason many resources are available at the same time making the interface slow and less user friendly.

An Android Application for Volunteer Blood Donor proposes an effective method to validate a every donor through a web portal system after which the donor has to pass the health checks conducted by blood recruitment center’s staff only after which he/she is given the user Id and password to the proposed application. This technique minimizes user intervention however makes the entire process tedious and lengthy. It allows easy connectivity and exchange of personal information between donors and receivers. This keeps no boundaries for the good cause allowing worldwide users to acknowledge help. Keeping the app simple and to the point makes it user friendly. Ashita Jain, AmitNirmal, NitishSapre, Prof

ShubhadaMone (2016) introduced Online Blood Bank system using Android which is developed so that users can view the information of nearby hospitals, blood banks [10]. This project is developed by three perspectives i.e. hospital, blood bank and patient/donor. We have provided security for authenticated user as new user have to register according to their type of perspective and existing user have to login. This project requires internet connection. This application we are developing helps to select the nearby hospital online instantly by tracing its location using GPS. We are also proving a alert system for severe accidents as using that function an ambulance will be sent to your destination without any wastage of time. This application reduces the time to a greater extent that is searching for the required blood through blood banks and hospitals. Thus this application provides the required information in less time and also helps in quicker decision making.

CHAPTER 3. REQUIREMENT ANALYSIS

Requirement analysis is the first step involved in development of a system. It consists of two type of analysis. They are included below:

3.1 Functional Requirement

There is various requirement that are included in functional requirement, they are included below: -

3.1.1 Authentication

The system provides security features through OTP where only authorized user can access the system with different authorization level.

User Input: - Contact number

Output: - Validation code

3.1.2 Profile Registration

This allows healthy public to register as volunteer donor.

Input: - Donor/ Recipient Name, Sex, Blood Group, Address, Contact Number, Email Address.

Output: - Successfully Registered.

3.1.3 Donor/Recipient Management

The records of all donors/recipient are kept in one centralized database and thus reducing duplicate data in the database. The record of donation is maintained by the system.

3.2 Non Functional Requirement

There are several nonfunctional requirements included in our system. Some of them are mentioned below: -

3.2.1 Usability

The system should be able to provide good user experience. One of the ways to achieve it is by prioritizing the important functions of the system based on the usage patterns. The User Interface should also be good for the user to have good experience with the application.

3.2.2 Performance

Performance of the system is measured by its response time. The system should be able to perform even in the peak time. The system is interactive and the delays involved are less. When connecting to the server/database the delay is minimum.

3.2.3 Reliability

The system should be accurate in order to be reliable. The data calculated or provided by the system should have good accuracy and also the system should have long mean time between failures. As the system provide the right tools for problem solving it is made in such a way that the system is reliable in its operations and for securing the sensitive details.

3.3 FEASIBILITY STUDY

3.3.1 Technical Feasibility

System is completely capable of carrying out the project along with using a secure database to hold all the information about donor and receiver. All the resource and technology required for the project is easily available. The project size also induces minimal risk. So, the proposed system is technically feasible.

3.3.2 Operational Feasibility

The response time and throughput of the project is well along with timely, pertinent, accurate and useful formatted information related to blood donation. Also the project provides reliable service to the end user. So the project is operationally feasible.

3.3.3 Economic Feasibility

Economic feasibility deals with the economic aspects of the project development. As the cost to develop overall project along with the systems analysts' time, cost of systems study, cost of employees' time for study is not so expensive, so that the project is economically feasible.

CHAPTER 4. SYSTEM DESIGN

The overall system of blood donation is explained on the basis of diagram mentioned below: -

4.1 SDLC

This project is based on Incremental model. Incremental Model is a process of software development where requirements are broken down into multiple standalone modules of software development cycle. Incremental development is done in steps from analysis design, implementation, testing/verification, maintenance.

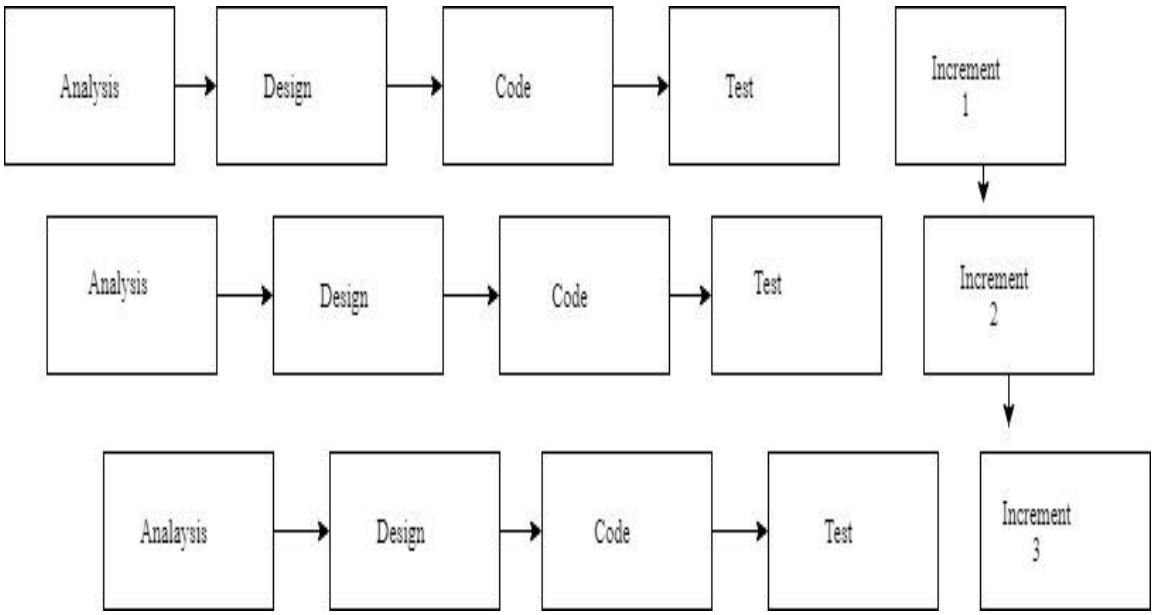

Figure 4. 1 Incremental Model

Advantage of Model in this System

- Easy to Understand
- Errors are detected after each increment of Development.
- It is flexible and less expensive to change requirements and scope.
- Errors are easy to identify.

Disadvantages

- It requires a good planning design.
- Each iteration phase is rigid and does not overlap each other.
- Modifying a problem in one unit requires correction in all the units and consumes a lot of time.

4.2 Use Case Diagram

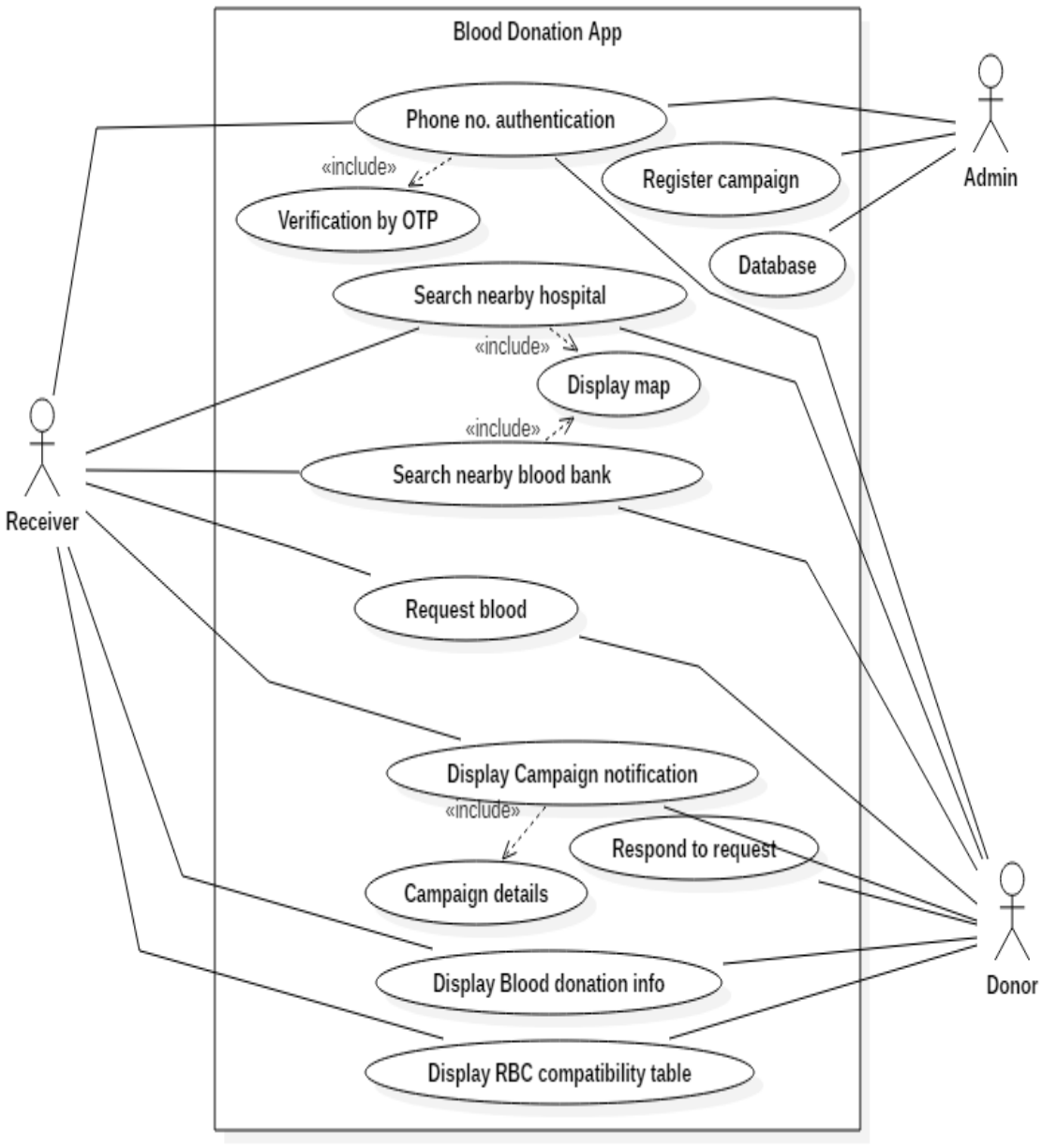

Figure 4. 2 Use Case Diagram

4.3 Class Diagram

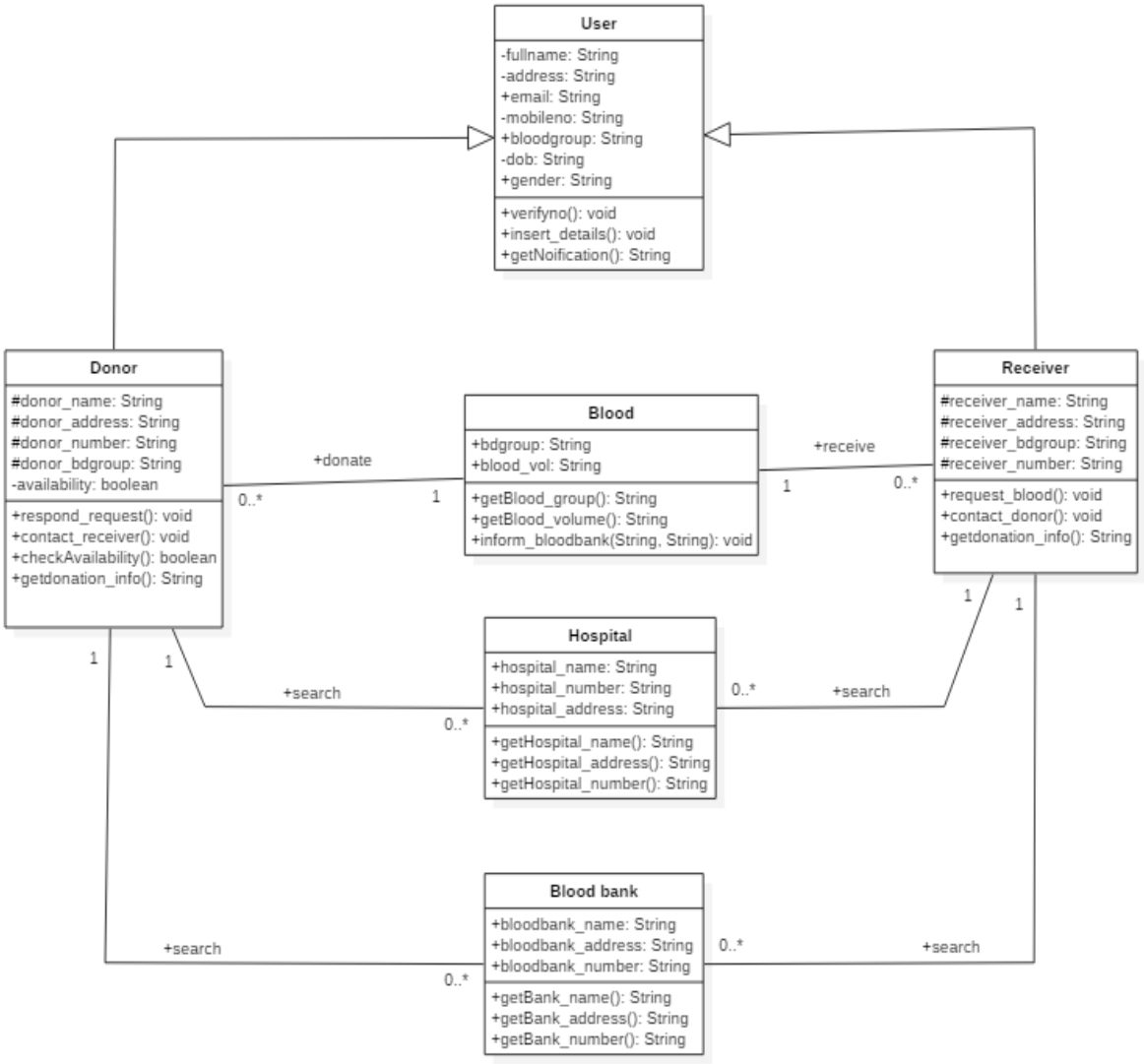

Figure 4. 3 Class Diagram

4.4 System Flow Diagram

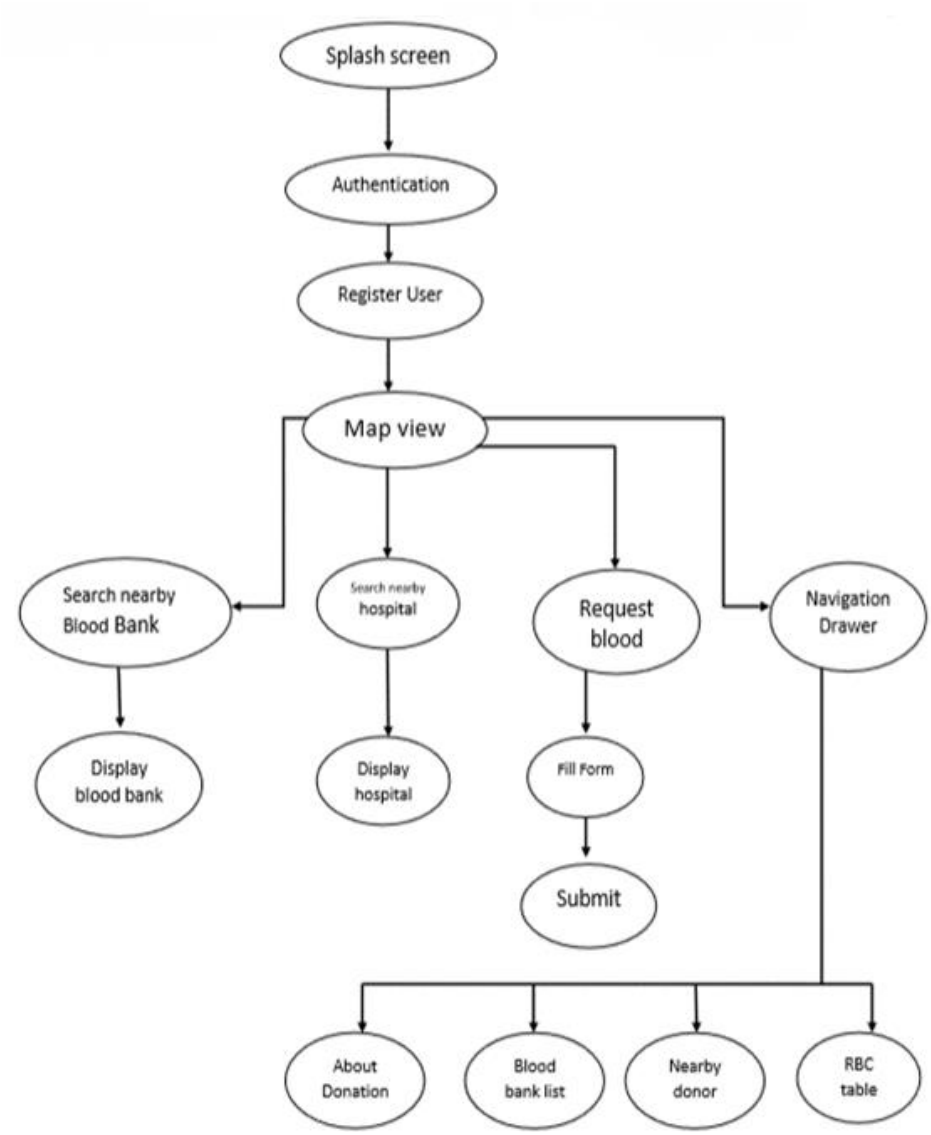

Figure 4. 4 System Flow Diagram

4.5 Sequence Diagram

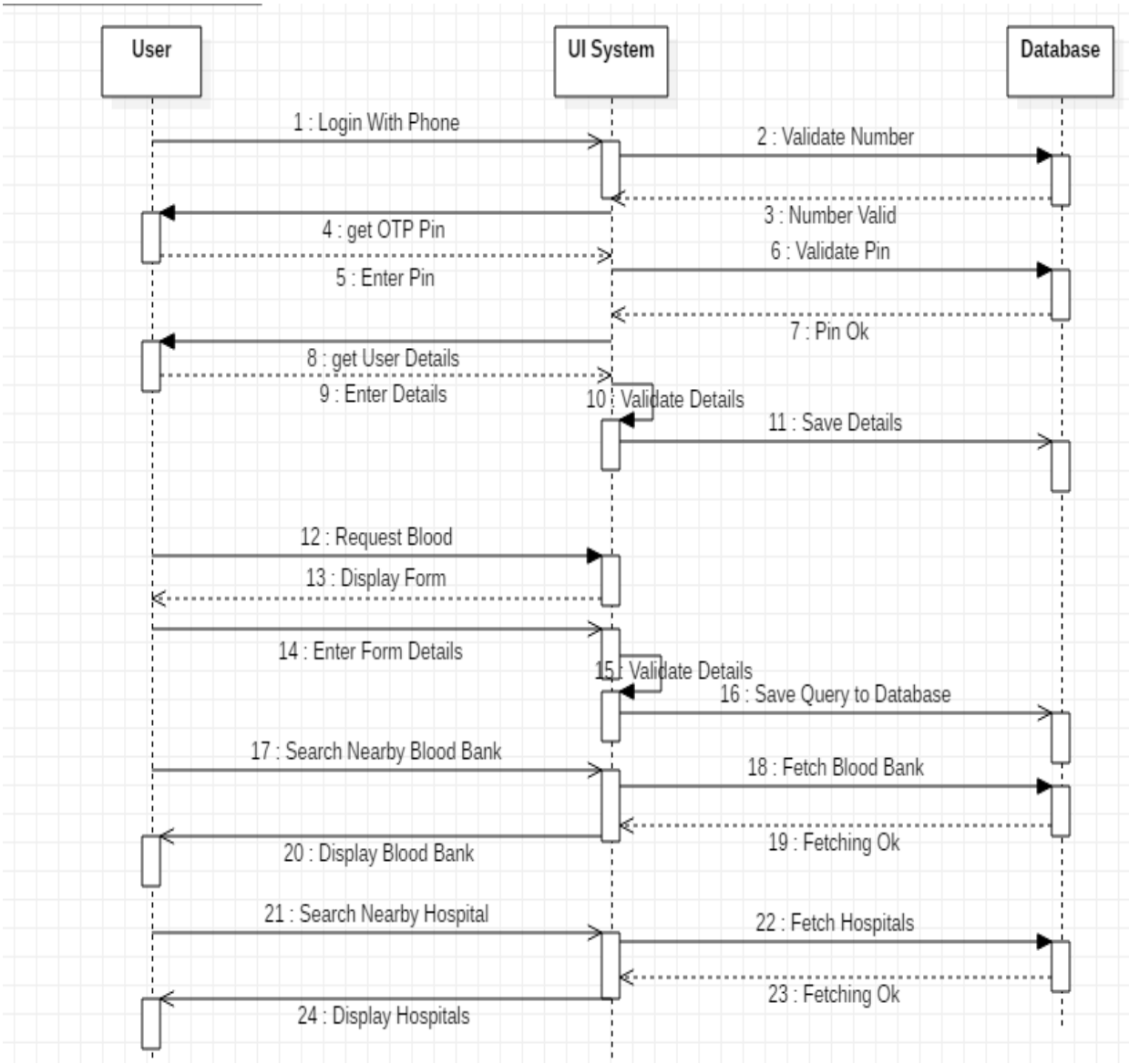

Figure 4. 5 Sequence Diagram

CHAPTER 5. METHODOLOGY

5.1 System Architecture

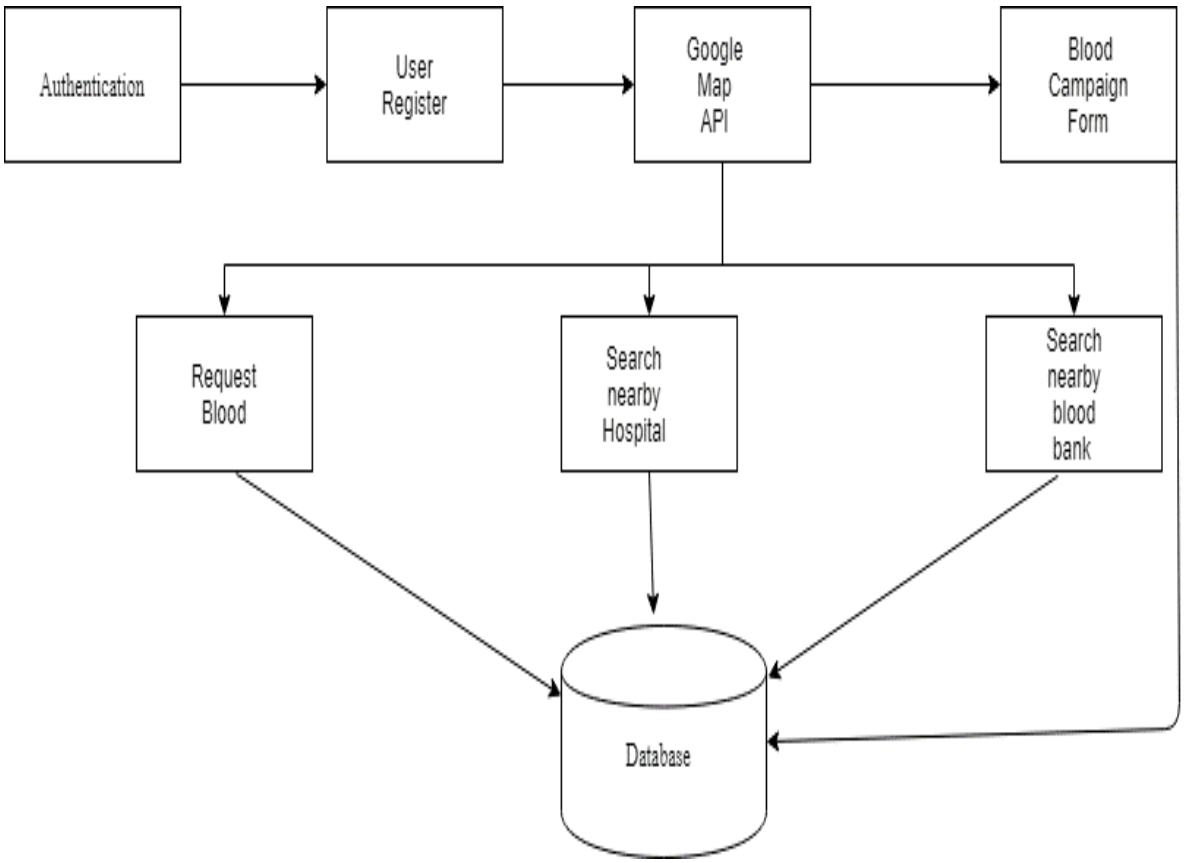

Figure 5. 1 System Architecture

5.2 Working Principle

Blood donation app is the android app in which two different forms of users i.e. donor and receiver interacts to the system in order to donate and receive the particular blood group. To develop the system, we used different techniques which make the user interaction in the system with greater flexibility and influence.

Authentication is the main part of the system which doesn't give access to unauthorized users. This project used Firebase server to store users required information. Firebase Authentication is one of the service provided by Firebase.

This project used OTP authentication system in which valid users could access the services by using unique mobile number. Mobile number is the main information that app took from users to connect the donor and receiver through map view. After giving valid number then system processed user further to take information like full name, address and blood group. After taking basic details of the user, the data were saved in firebase database. After all the information were completely taken then the app direct authenticated user to homepage in which they can request blood group by filling the form. In the form app take information like which blood group, purpose of blood group and current user location.

After successful login in the system, then map view is shown in the homepage which marked the user current location, request blood button and nearby hospitals and blood banks buttons. While pressing the current button, then the system fetches current location by enabling mobile GPS. These all services worked if there is only Internet Service in the mobile. The project uses Google map API for fetching current location in the map view. For showing the nearby hospitals and blood banks app uses the Google map places API which is the service provided by google in which app sorts the places based on hospital, school, university, etc. This project implemented sorted results within given radius that we can manually add according to our basis. This app simply used the radius of 1 kilometer to show the nearby hospitals. Since we haven't got the best results in case of nearby blood banks we add the blood banks that were located inside the Kathmandu valley manually.

In the navigation drawer activity, this app has features like blood bank, blood details, RBC compatibility table, nearby donor and available button. This project implemented check box to show whether the particular user can give the blood or not. If the user unchecked box, then his/her information were not shown to the blood searcher. But if the box is checked then searcher will get information of that nearby donor. In the other hand if the user clicked nearby donor, then the related information of donor that is nearer to them will be shown by distance. All the available donor details are stored in the firebase real time database and can be fetched according to nearby distance from the requester of the blood. Also if the user clicked about donation button then he/she get the related information like who

can/can't donate blood, objectives and frequently asked questions. Similarly, when the user clicked RBC button then the related information about donation i.e. which particular blood group can/can't donate other blood groups were shown. Last feature in the navigation drawer activity is that blood bank in which information related blood bank like bank name, address and phone number are displayed. All the blood bank information fetched from firebase database and we can add the blood bank from firebase server if any new blood bank is opened. These are all the features that we implemented in drawer activity. All the information of user categorized in 'Users' node in NOSQL format with unique id generated during authenticating user.

At the last to implement Blood donation campaign, this app uses the In-App messaging service provided by firebase. This system handled by admin of the firebase. Admin looks up campaign that where going to held in different places. Then the admin pushed forward the template message to all the user that were running this app. User can respond to the message by clicking to link provided. In this way overall part of the system works.

5.3 Implementation of tools

The project is implemented on android using Java Programming language, Android Studio as IDE and also it consists firebase as a database whose detail description is given below: -

5.3.1 Android Studio

The project used several user interface tools that assist user in creating layouts, implementing style themes, and building graphic or text resources for our app. The project used Android build system toolkit to build, test, run and package of our app.

5.3.2 Google Map API

In order to check out the location for both donor and receiver, Google Map API is used to search out where the receiver and donor are located from the blood bank or hospital. Using this API both receiver and donor can choose nearest blood bank or hospital in emergency.

5.3.3 Firebase Database

As the android application developed faces with the data being constantly changed by multiple users (all accessing the same database stored in the cloud) so the use of Firebase database can be seen on our project. Firebase data is stored in a NoSQL database and only available as a cloud service.

CHAPTER 6. SYSTEM TESTING

Testing is the process of evaluating a system or its module(s) with the intent to find whether it fulfills the identified requirements or not. Moreover, testing is executing a system in order to recognize any gaps, errors, or missing necessities in contrary to the actual requirements. Before actually implementing the new system into actions, a trial run of the system is done eliminating all the bugs, if any. It is a vital phase of a successful system. After organizing the entire programs of the system, a test plan should be developed and run on a given set of test data. The output of the test run should meet the expected results. This project includes several stages of testing, some of them are mentioned below: -

6.1 Unit Testing

During the development phase each module is tested independently to view whether the desired output is achieved or not. By unit testing the proper functioning of individual part of the system was verified. One of the test case was authentication with OTP, If the user enters valid contact number then the code was generated else not.

6.2 Integration Testing

After unit testing is accomplished by proper functioning, each individual module was integrated and formed a compact system, then overall system was tested to identify whether there was any fault in integration or not.

6.3 Test cases

For Authentication

S. No.	Test Case	Expected Outcome	Actual Outcome	Remarks
1	Enter generated OTP code.	It should direct user to registration layout.	Same as expected	Validated
2	Enter random code.	Shows toast message “Invalid Code Entered….”	Same as expected	Validated

Table 6.5. 1 Test case for authentication

For User registration

S. No.	Test Case	Expected Outcome	Actual Outcome	Remarks
1	Enter each field with valid data.	Successful registration	Same as expected	Validated
2	Enter field with invalid data	Display field as error field	Same as expected	Validated

Table 6.5. 2 Test case for User registration

For Map View

S. No.	Test Case	Expected Outcome	Actual Outcome	Remarks
1	GPS and network status is on.	Map view shows current location of user.	Same as expected.	Verified
2	GPS and network status is off.	Map view show location stored in cache.	Same as expected.	Verified

Table 6.5. 3 Test case for map view

CHAPTER 7. RESULT ANALYSIS AND DISCUSSION

The overall system was tested for any faults and errors and the final result or output was analyzed. Firstly, the UI of the system was interactive for better user experience. The user authentication in system was done by an OTP code which was tested by giving a valid contact number. If invalid contact number was supplied, then the code was not generated.

Another Part is registration of user, there are certain compulsory field in registration form. If all the compulsory field are entered, then the successful registration is done else the registration is invalid or not completed. Moreover, each field consists of varied form of attributes, all the field should be filled as per the desired attributes for successful registration.

One of the most important part of the project is use of google map API. Google map API used various form of permission, if user denied the permission like access to GPS the system is unable to load the desired map. For a successful operation user must allow permission asked by the system. Also user have to allow permission of SMS for successful completion of authentication by OTP.

The information of users is registered or stored in firebase database. The user act as two class on the basis of work done by them. If a user want blood then, the user request for blood, then the user said to be receiver or blood seeker and if a user respond to the blood request then user is said to be blood donor.

CHAPTER 8. CONCLUSION AND FUTURE ENHANCEMENT

With the completion of this project, the main aim of the project is achieved, that is easy and efficient way of blood transfusion. This application integrates various functionalities to provide the best user experience for managing blood donation activity and making their work an efficient, time-saving and less tedious.

With the end of the project, the members involved in project gained a lot of experience on team work and they discovered various predicted and unpredicted problems and also implemented various idea to solve them. Various resources like video tutorials, text tutorials, internet and learning materials were used to make project complete.

8.1 Limitation

The project assists well to record the problem related to transfusion activity. However, this project has some limitations. Such as notification of blood request is sent to all the user and also the app consists limited list of blood bank.

8.2 Future Enhancement

To further enhance the capability of this application, the following recommended features is to be incorporated into the system:

- Notification of blood request to specific blood group user.
- List of blood banks all over the country.

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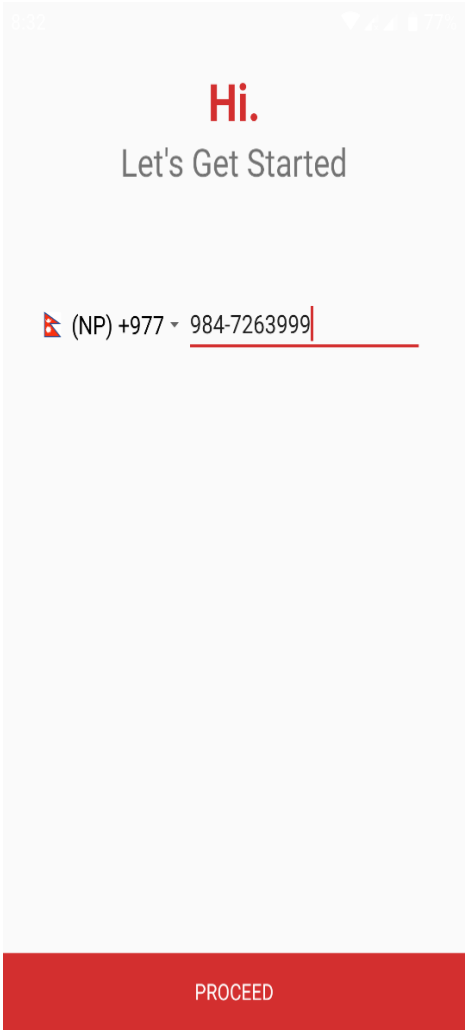
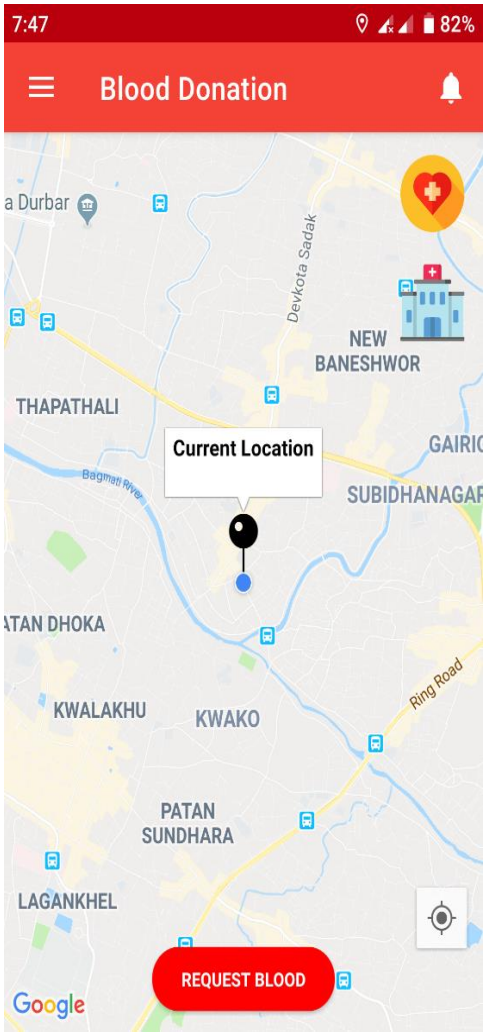
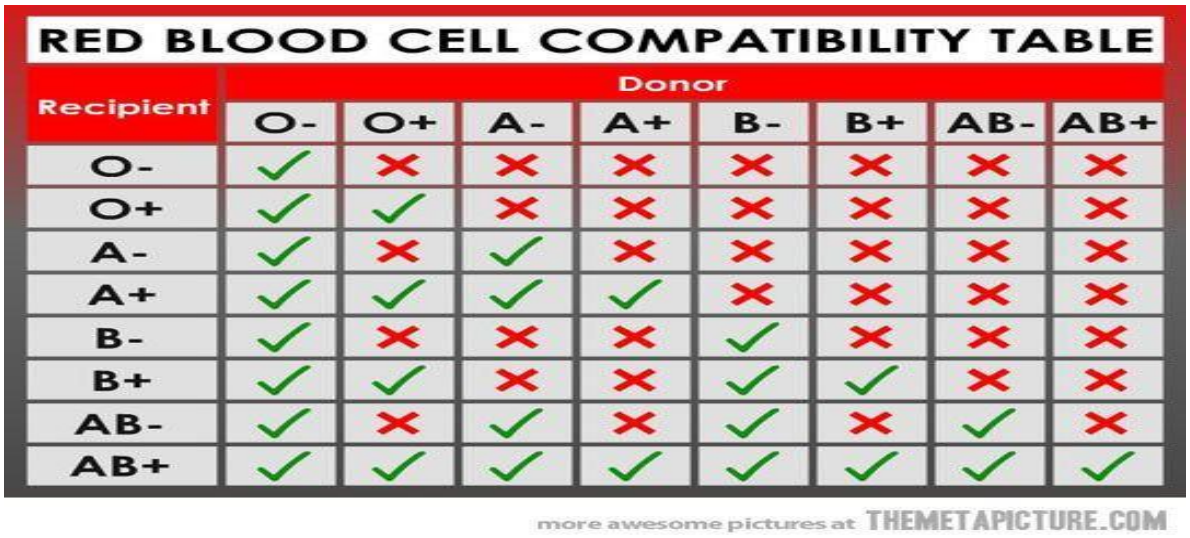
APPENDICES



Authentication

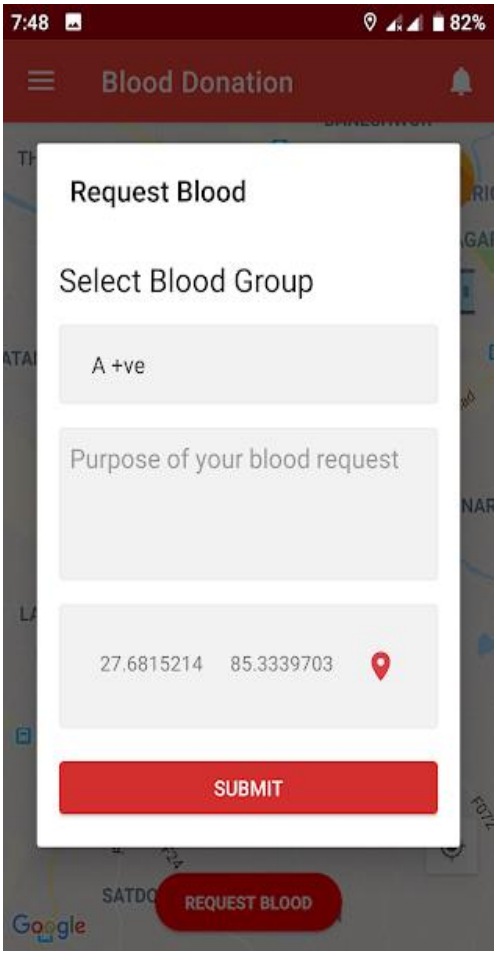


Google Map API

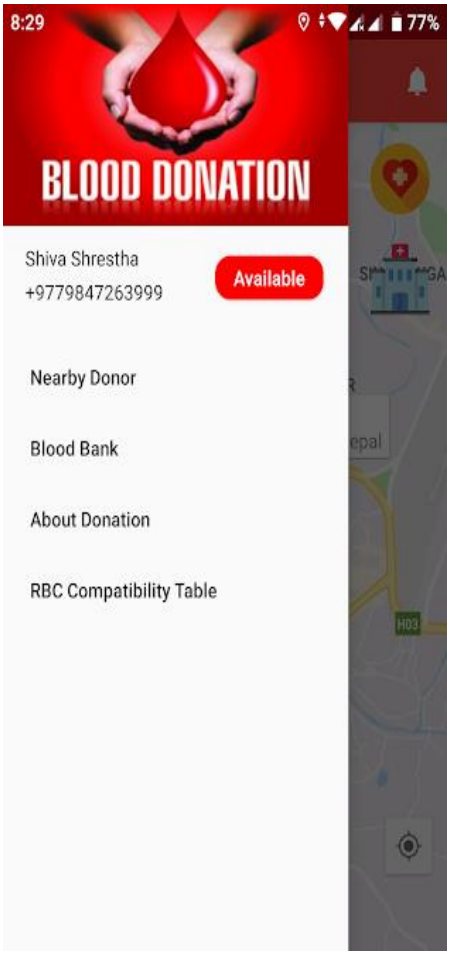


RBC Compatibility Table

Campaign Info



Blood Request



Navigation Drawer