

Blood Bank & Donor Management System

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Blood Bank & Donor Management System

**A dissertation submitted for the Degree of Master
of Information Technology**

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Declaration

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

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Abstract

At the very outset this study explored the problem of managing one of the critical health services supplies, the Blood donor management information system. It is an operable information management of donors who may be enlisted and their information could be managed by means of digital formats totally excluding use papers. Also this service supplies the blood for needy patients occurs to have transfusion of blood quicker means and highly secured methods. This shows the critical nature and its vital value of managing such information secure, safe reliable and faster way.

The digitally management of information such as donor details, blood type, receiver details, blood bank details have been integrated as a single unit of information which provide exact details promptly for the hospital staff. These functionalities are done by the system proposed and built by the researcher as a model. The researcher uses AngularJS as the major platform software on the web based modes of access. Further it was achieved by manipulating various sub sectors of dash board information accession.

This is a Web-based Blood Donation Management System which is an administration system website that enables individuals who want to donate blood to help the needy. It also enables hospitals to record and store the data for people who want to communicate with them, and it also provides a centralized blood bank database. The system is developed by using Angular JS As main console and the common HTML was used .The MySQL provides a database system to manage and store and retrieval of the information and data when required. The V Model is used to develop and build whole system and this web-based blood bank management information console. The system targets three types of user: the public who wants to donate blood, the recipients who need the donated blood, and the hospitals or the health services suppliers who may work as an intermediary to manage the communication between the donors and recipients. One of the sidelined objectives for developing the website is to educate the community on the benefits of blood donation, develop a Web-Based Blood Bank System to manage the records of donors and recipients, and encourage voluntary blood donation, easily accessing any information about blood type and the distribution of the blood in various hospitals in Jeddah, based on the hospital needs.

Chapter 1.Introduction

Blood is about 7% to 8% of human weight, according to scientists. Blood is donated in the conventional way by blood donation services or blood banks around the medical sector in the world. Blood bank is defined as dormitory in which blood is collected as a result of donor blood donation campaigns that is processed and preserved for subsequent transfusion maximally for four weeks. The Sri Lanka's blood banks still do not have real time access to blood donors and the stored banks. A huge amount of blood units are donated on average every year in Sri Lanka.

Approximately the bellow figures show the annual units of collections of blood in Sri Lanka[10]. Accordingly the voluntary donors out numbers the replacement of Blood supplies. This shows a new significance that the voluntary Blood donor service is a dominant method of Blood collection in Sri Lanka. Therefore a prospective donor registry maintained nowadays is not efficient as per the voluntary donors are spread across the island and the dedicated location base availability of the donors is not accessible in an emergency , Therefore the focal problem's solution lies only with on line real time donor data base accessible management system. This project tries to answer this burning question of efficient and effective Blood donor Management Information system. Main features are the needy patient and the donors can directly communicate and a meeting place like interface would allow the connectivity of receiver and the donor. All in all this system shows a practical solution to the Blood Transfusion Service of the Ministry of Health in timely managing the Blood Transfusion Service Collections an efficient and effective mode in managing their operations for the saving of lives of many a Sri Lankan.

Yearly Improvement of blood collection

Year	Voluntary collection	Replacement collection	Total collection
2014	380,367	0	380,367
2015	395,500	0	395,500
2016	414,175	0	414,175
2017	423,668	0	423,668
2018	450,640	0	450,640

Table 1.Comparison between blood donation

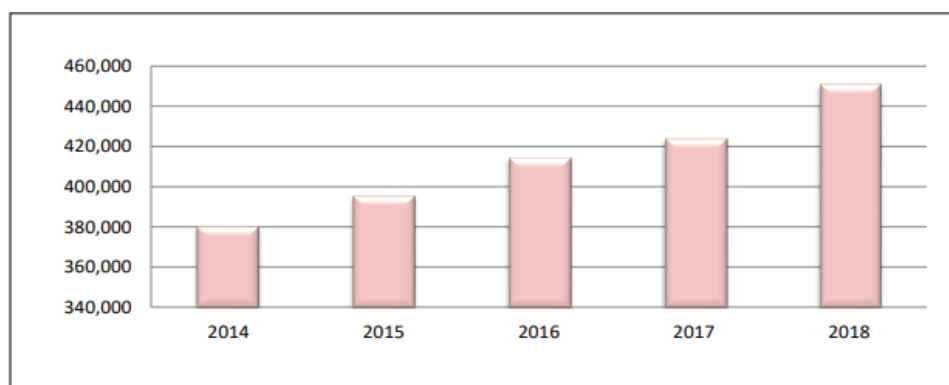


Figure 1. Yearly improvement of blood collection

As a solution we can develop a blood donation management system to simplify and automate the process of searching for blood in case of emergency and maintain the records of blood donors, recipients, blood donation programs and blood stocks in the bank. This system allows the probable recipients to make requests for the blood and find the voluntary donors quickly. Not only that this system also helps to publicize and advertise blood donation programs, provide immediate storage and retrieval of data and information and to provide synchronized and centralized donor and blood stock database. The language selected for the development is PHP, CSS and JavaScript for creating an attractive web based system. MySQL is used as the database management system. And also Headwind SMS Communicator is used to send a text message to blood donors whenever their blood is needed and when someone's life is saved by their blood. It is a nice utility to send and receive SMS on PC through a Gateway device. Blood donation management system encourages new donors and retains old donors to donate blood. In the future this system will help to save a lot of people and this can be used by the Blood Bank to manage blood donors and supply blood in an emergency case.

1.1. Motivation

Blood donation is not harmful to an adult. The human body can regenerate the blood within a few days. It causes no threat to the metabolism of the human body. An ailing body needs blood for various reasons. Even a pregnant mother may need blood in case of an emergency situation. The patient needs blood or his or her group of blood whenever necessary because such a patient may die for want of blood as it is not always available. Blood has four groups. They are A, B, AB and O. The required blood group must be the same while transplanting otherwise the transplantation will go in vain and even the patient may die because of the blood group mismatch. A man with the O group blood is called the universal donor as the people having others can accept it. On the contrary, a man with AB group of blood is called the universal receiver as he can accept all groups of blood.

This process is a little complex mechanism and a tricky and very sensitive scientific medical-related process. This requires a fine-tuned and very correctly managed system operations because it may involve a do or die situation for some urgent cases of blood donation and transfusion in an emergency.

Blood can be stored only for a limited period of time. With the manual system, the only option is to manually search and match donors and then make phone calls to every donor. There is also no centralized database used to keep the donors' records. The records of the donor might not be kept safely and there might be misplacing of donors' records due to human error or disasters. Besides that, errors might occur when the staff keeps duplicate records for the same donor.

If a donor makes a donation in a different hospital, no previous records can be traced except if the donor brings along the donation certificate. Hence, the donor is considered as a novice when he makes blood donation in a different location. Without an automated management system, there is a major problem in keeping track of the actual amount of each and every blood type in the blood bank. Furthermore, there is also no option to alert the relevant people when the blood quantity is below its par level or when the blood in the bank has expired.

Blood can't be stored for a long period of time. That is the main reason why blood banks need a steady and constant collection. Nowadays public awareness is made to donate blood. Most of the time blood banks are running short of required blood.

However, it is very important that while taking blood from a certain person, the concerned authority must make sure the blood is not infected. Blood donation is our human duty. So It's our duty to donate blood without any hesitation as it can make sure the return of a dying man again into the light of life.

1.2 Problem statement

The Table 1 and Figure 1 in the chapter one shows that blood transfusion service is a vital part of health service in Sri Lanka. In 2014 there had been three hundred thousand units of blood units collected by the Blood Bank Management service that operates manually. This is the starting of the Blood Collection Management chain's starting link. The amounts of such information has risen to nearly a double in the years followed until 2018 according to the statistics of Ministry of health Sri Lanka. This shows the significance of managing such a cohort of information in manual methods are not effective and efficient enough for the modern age of health service provision. Therefore the writer researcher felt a need for devising a solution to manage such vital information efficiently by digital means, which may replace the legacy manual operations of the Blood Transfusion Management services of the Health sector in our country. There are problems with the donor records management with the manual system. The donor records may not be securely held and donor records that fail as a result of human errors or disasters. In fact, mistakes can occur if more than one staff document for the same donor is kept. No centralized voluntary donor database is operating as at now.

Blood donation management system encourages therefore, if a person is in an emergency, it's really difficult to find blood. The only way to do this is through checking and matching donors manually and by calling each donor. No centralized database for keeping donor information is available too. Each bank has its own donor registers. If a donor makes a donation in different hospitals, no previous records can be traced unless the donor carries the certificate of donation. In fact, the actual amount of each blood type can be tracked in a blood bank and the donor list without an automatic management system. In order to resolve this problem, we have created the project Blood Bank and Donor System. This is a web project online. You can now easily connect to anything via the Internet service. The online platform is therefore the best choice for our project. The goal of the Blood Bank and Supplier Program is for human well-being to be achieved. We have all the blood information and supplier that you will always need. Many people are here to support you, always ready to give you blood. Look for your blood group. You can support us by registering on our website if you are prepared to donate your blood when required. As a proud member of this community and as a responsible human. You can help a person in need. So, register , donate blood save a life and receive merits.

1.3 Project Objective(s)

As a solution, we can develop a blood donation management system to simplify and automate the process of searching for blood in case of emergency and maintain the records of recipients, blood donors, blood donation programs, and bloodstock levels in the blood bank.

- 1.To make probable recipients make requests for the blood and find voluntary donors quickly.
- 2.To make the System to be used to publicize and advertise blood donation programs through social and other media.

3.To provide island-wide synchronized and centralized donor and bloodstock database supported by way of dashboard displays for the doctors concerned

4.To keep records about the donor and blood details to provide efficient donor and bloodstock management functions to the blood bank.

In an emergency case if someone needs blood it is very difficult to find required blood immediately. As a result, needy people end up going through a lot of pain. People have to put advertisements on television or newspaper to find the necessary blood. It is not an efficient process. So, it becomes really tedious for a person to search for blood in case of an emergency. It occurs due to the current system. That is using the blood bank.

There is no centralized database used to keep the donors' records in the blood banks. So with the manual system, there are problems in managing the donors' records. Without an automated donor and blood bank management system, there are several problems in keeping track of the actual amount of each and every blood type in the blood bank.

With the manual Blood Donation system, when someone needs to find the donor the only option is to manually search and match donors and then make phone calls to every donor. There is also no centralized database used to keep the donors' records. The records of the donor might not be kept safely and there might be misplacing of donors' records due to human error or disasters. Besides that, errors might occur when the staff keeps duplicate records for the same donor.

If a donor makes a donation in a different hospital, no previous records can be traced except if the donor brings along the donation certificate. Hence, the donor is considered to be a first-timer if they make a blood donation in a new place. Furthermore, there is also no option to alert the relevant people when the blood quantity is below its par level or when the blood in the bank has expired. In the current situation, there is no way to send messages to society about blood donation campaigns. Because of this limitation, many volunteers aren't alert about blood donation campaigns.

1.4 Scope of the project

This system covers following user access points accordingly in managing the information for the ease and fast access to solving the main problem of Donor management and Blood transfusion management in an emergency as well.

The solution can be used as Blood Bank and Donor management system to simplify and automate the process of searching for blood in case of emergency and maintain the records of blood donors, recipients, inform about blood amount level in the blood bank, blood donation programs and bloodstock levels in the bank[1].

And above system consists of the Dashboard which is displaying the following information.

- Total Donors
- Total Female Donors
- Total Male Donors
- Total Pending Requests A+
- Total Pending Requests A-
- Total Pending Requests B+
- Total Pending Requests B-
- Total Pending Requests AB+
- Total Pending Requests AB-
- Total Pending Requests O+
- Total Pending Requests O-
- Blood count level of each Blood type

The dashboard can give a full overview of the information which grab through the system. Once the Blood count level went lower than the default level, Administration can send Requests to all donors at once. Using the dashboard can develop a blood system-wide, real-time, inventory monitoring tool that provides visibility of blood component levels for all stakeholders[3].

Main Pages and functions in the web system.

-Be a Donor:

Within this system, new donors can use this Registration Form to register to our system. Once a user registers to the website their information directly saves in the database. Whether you move homes, change your mind about donating blood you can always update your registration with your new details and decision.

-Find a Donor :

This system allows the probable recipients to make requests for the blood and find the voluntary donors quickly.

-SMS process handling :

Textit SMS Communicator is used to send a text message to blood donors whenever their blood is needed and when someone's life is saved by their blood. It is a utility to send and receive SMS on PC through a GSM device.

-Camp Details:

To collect blood more, the system provides camp details as well as guidelines to held blood camp within this page.

-Administrator :

The administrator can log in to the system and do changes to this system. This system will handle by one administrator and he/she will update donors' accounts and handle blood request-response process quickly.

-About donation :

It will provide information for donors. They can get an idea about the donations. And it will help the user to get an idea before register for the system.

-Through Us

Any cooperation or individuals need to organize a blood donation event, they can simply request it through this tab.

-Contact Us

Donors and People who have benefited from receiving blood can send their feedback or experience with this form. It will help to provide more details and encourage donors to register for the system. There is a limitation of compatibility for several operating systems and different web browsers. Mainly focused only on the Chrome browser and the Windows operating system.

Chapter 2. Background

2.1 Introduction

Blood is necessary for several treatments and surgeries, and still a limited resource. The need for blood is about half a million units per year in Sri Lanka [10]. Moreover, people still die in some other Asian countries because of inadequate and inefficient supply of blood products. Hence, Blood plays a fundamental role in healthcare systems, aiming at guaranteeing an adequate blood availability to meet the demand and save lives.

Blood is classified into groups (A and subgroups, B, O or AB) and based on the Rhesus factor (Rh+ or Rh-), and each donor should be correctly matched with the patient who receives his/her blood. Moreover, as it may transmit diseases, blood must be screened before utilization. Generally, there are two types of donation: whole-blood donation, in which the whole blood is directly collected in a plastic bag, and apheresis, i.e., the donation of specific components in which a mechanical gathering unit decays the required blood parts. Blood requires particular precautions for collection and storage, and its shelf life from donation to utilization is limited, thus requiring a continuous feeding of the system [11]. Hence, a successful BD supply chain should meet the daily demand of blood and follow its temporal pattern. According to [13], BD supply chain and the related management problems can be classified based on the main phases of a blood bag life: donor registration, blood collection, blood screening/evaluation, inventory storage and delivery.

2.2 Literature Review

In this chapter it is planned to present some selected findings and observations done by some leading researchers on the topic of Blood donation banking management systems. The studied & gathered information related to the main area of my concern in the research seems strengthens and reinforce the reading.

New methods relating optimized speedier and accurate space and time saved methods of management of blood supply system methods to healthcare management and logistics is a widely felt need in the system of health care practices over the world. It is a comparatively a new and not so extensively developed area of medical management practices too. But there is an ample example of related literature in the management research area with numerous studies. Specifically, donors, facility location, staff roster, patient allocation, and medical supply transportation are the main themes commonly available both digital and the print mediums.

There are some directly related diverted studies which shows how the Optimization of efficient and effectiveness approaches have been developed for several healthcare related problems, ranging from the resource management in hospitals to the delivery of care services in a territory. However, optimization approaches can also improve other services in the health system that have been only marginally addressed, yet. One of them is the Blood Donation (BD) system, aiming at providing an adequate supply of blood to Transfusion Centers (TCs) and hospitals. This topic of blood donation management system may have its high validity today in a suddenly arising need such as a, or road accident or bomb blasts like other urgent situations.

In Sri Lanka as in other countries, the National Blood Transfusion system is (NBTS) collects approximately 6000 to 10500 thousand units of blood from voluntary blood donors all over the island [10]. Usually every hospital blood bank and the National Blood Centre in Narahenpita encounters a drop in the supply of blood between January and April each year. Likewise this year the issue cropped prematurely, resulting in the blood stocks starting to decline from the beginning of this month. But the news from the Health ministry of Sri Lanka so vital information like blood bank stock checks were not immediately made alert on any visible dash board system. This is a real weakness in the management of blood related data by the said ministry's management system. For example urgency have been doubled the case in a situation such as when Dengue pops up again, or if there is a need for a massive transfusion we will be facing an urgent requirement of blood and other components [10]. Therefore every blood bank should maintain the minimum level of stocks in all blood groups. That's why the doctors, public health inspectors and nurses in all blood banks are struggling to find donors between January and April each year.

The blood bank staff in every blood bank throughout the country is ready to support any group, any organization willing to donate blood. [8]. These trends in supply and demand was unearthed very much later in the field of blood donor's management system in our country and elsewhere too.

The literature on the same as mentioned in many published papers related to blood management systems in the recent information communication technology based applications, According to [6] in their study entitled they defined Blood Bank Information System as an information management system that contributes to the management of donor records and blood bank. Their system allowed an authorized blood bank administrator to sign in with a password to manage easily the records of donors and patients who need blood. The system provided many features including the central database, quick access to the system content through the login, includes the search code to find donors on a given basis, and the ease of adding and updating donor data. The main aim of the system was to complete the process of the blood bank. This system was designed to suit all types of blood banks. Once successful in the implementation of the application, it can be applied and rolled out in several blood banks. This application contains User Login Screen, Blood Management, Menu Form, Blood Stock, Donor Management, Donor Registration, Blood Reservation, Donor Blood Test, Recipient Management and Blood Reservation. In similar manner, the researchers planned in their application to have hospital administrator, doctors, and blood bank receptionists as users. The authors did not mention the research method they used, and failed to provide screenshots of the system prototypes, making difficult for the researchers to visualize their application. No discussion also for their respondents, samples and sampling techniques used. Subsequently, the researchers planned to provide figures to explain the system, screenshots of system prototypes, and other diagrams that can help other researchers to visualize the development of web-based blood bank management system. Also, the researchers will explicitly discuss its research methods, sampling procedures, and statistical treatment to be used for analyzing the gathered data.

In another study, a separate web based blood management which assists the blood donor records management, and provides ease of control in the distribution of blood products in various parts of the country considering demands of hospitals. [9]. The developed system was scalable and adaptable to meet the complex needs usually of a blood bank. Based on this study, since entering the details about the blood donors and related records were done manually, thus, tracking of blood donation activities was difficult and complicated, and even led to erroneous information.

Subsequently, the researchers mentioned that manual-based system can be waste of time, lead to the error-prone results, consumes a lot of manpower, lacks data security, data retrieval requires a lot of time, reports consumes a long time to produce, and there is less precise accuracy on the results. As such, by developing and implementing a web-based blood management information system, there was a quick and timely access to donor records, and the system provided management timely, confidential and secured medical reports.

As in the case of any information management system, in here there are three categories of users such as the Administrator, Prospective Donor, and the needy receiver or prospective receiver (Acceptor). Each user is given a user ID and password to identify their identity. The application was developed using AngularJS and using SQL Server for the database. These software are used as they are most updated in the industry when compared to similar softs which were used by many other simile applications before including ASP.NET, PHP ,which were used by the researchers as programming languages suitable for web-based applications.

This has further implications as the researcher found it important in implementing a web-based blood bank management system in handling records for blood donors and blood donation activities to ensure accurate and readily available information for blood transfusion services. Indeed, the impact of using Information Technology on hospitals provides better healthcare services for the public. In the study entitled [7],it was found out that it is important for every hospital to use an information system to manage data in blood bank. Also, it observed that the manual system has disadvantages for the user and the hospital. One of the disadvantages identified was the blood bank staff should enter the donor details in each time he/she donate blood in which led to duplicate data of the donor and also the data may be lost or missing after period of time. Thus, the author developed a web-based system to help the blood bank to record the donor details fast and easy. The system used rule-based decisions to ensure to have a right decision on right time. Also, system can send messages to donors if any particular blood type is needed. She developed blood bank system based on incremental model. She had chosen this model because the system can be developed through cycle of phase and also because of the advantages of this model such as:

- I. Easy to understand to flow of the phases.
- II. Changes possible in the middle of any phases.
- III. The system can be developed even if there is an error in the middle and it can be corrected in testing phase.

In this study, the researchers observed that the developer failed to include in the system the function to check the availability of blood bags, and to check the shelf life or expiration of blood bags or products. As such, the researchers will include these in their developed system to enhance safety for blood transfusion. In concluding the purpose of the above-mentioned literature reviews was to collect information on how an information system helped the management of blood banks. Based on the reviews, it was found out that web-based blood bank systems provide convenience, efficiency and security to the system users and hospitals compared to the manual systems.

All in all it is explicitly shown that the Blood Donor Management systems are a critical and very important requirement in the health services management of any country. As per above mentioned examples the literature reviews exemplify that Blood donor information management for assured Blood transfusion supplies and its controls by more channels of communication technology applications solve tricky problems of Blood supplies in any emergency.

While much literature exists about information management systems in many other industries and domains this health related services management is not commonly found in many secondary sources as research reports or any other knowledge based information content .A few scholars focus on the technology that appears in the markets commonly but changing them too is a necessity in the case of portability of the software and AngularJs is used in this research project as very much user friendly and highly portable software tool. Also in the analyzing both literature and its technological applications and the communication processes in the same matrices too were selected as per Sri Lankan situation as a customizable software application or information management system of Blood Donor in the local situations.

2.3. Review of Similar work

Blood donor & Transfusion supply chain can be divided into four main steps, as reported in Figure 2. collection, transportation, storage and utilization. First, the blood is collected: donors are checked in blood centers to assess their eligibility and, if eligible, they make the donation. Once the blood is gathered, tests are independently performed on each individual’s blood in order to prevent infectious diseases (screening process). Afterwards, the blood is transported and stored. Components are then distributed to the hospitals based on their inventory needs. Finally, it is transferred to the final users for transfusion.

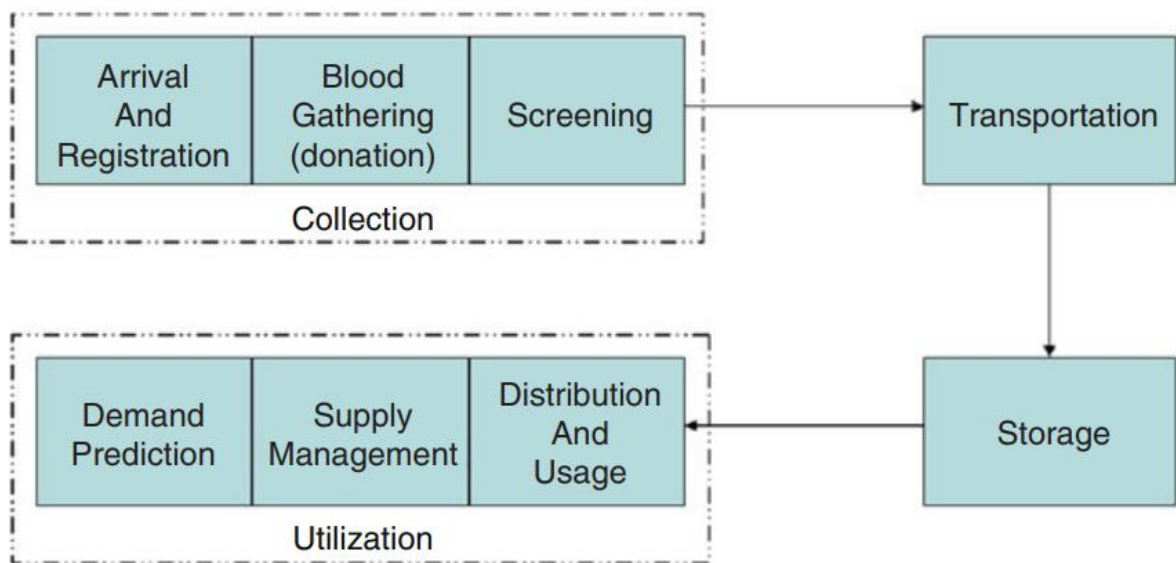


Figure 2. Blood management cycle

The Conventional Management of Blood Donation includes Arrival And Registration Demand Prediction Distribution And Usage Supply Management Blood Gathering (donation) Screening Transportation Storage Utilization Collection Figure 2.1 Phases of the life cycle of a blood bag.

<http://www.nbts.health.gov.lk/index.php/services> website in Sri Lanka which provides only following services.

- Collection of blood within hospital based blood bank premises and in the community via mobile blood collection sessions

- Screening collected blood for transfusion transmissible infections, processing whole blood into components & storage of blood and blood components under optimal conditions.
- Distribution & issue of blood & blood components within blood banks and efficient inventory management
- Promotion of appropriate clinical use of blood & blood components through hospital transfusion committees and by continuous educational programs
- Clinical services therapeutic plasma exchange, HLA typing and provision of HLA matched products on request, reference immunohematology laboratory
- Manufacturing laboratory reagents and reagent red cells
- Conducting training programs for post graduate trainees on Transfusion Medicine and Hematology

In current society, when there is an emergency case if someone needs blood it is very difficult to find required blood immediately. As a result, needy people end up going through a lot of pain. People have to put advertisements on television or newspaper to find the necessary blood. It is not an efficient process. So, it becomes really tedious for a person to search for blood in case of emergency. It occurs due to the current system[2]. That is using the blood bank. There is no centralized database used to keep the donors' records in blood bank. So with the manual system, there are problems in managing the donors' records. Without an automated management system there are also problems in keeping track of the actual amount of each and every blood type in the blood bank[1].

Chapter 3. Methodology

3.1 Introduction

The System Requirements Specification (SRS), the requirements specification for a software system, is a complete description of the functionality of the system to be implemented and may include a collection of use cases describing the experiences that users will have with the software based on the above contexts this research project , a web-based blood bank management website that offers several services, including advertise the blood donation events to the public society and at the same time allow the public to request for blood and donate blood. The system keeps the records of all the donors, recipients and blood donation programs. This system also has the ability to keep track of the donors' donation records and the blood stock in the blood bank. The advantage of application any person who is interested in donating blood can register himself as a donor. Furthermore if any general consumer needs blood immediately he can make a request for blood online, he can also take the help of this site. This application provides simple and quicker necessary options to serve people in their emergency need making them free from worrying for blood by providing a lot of donors at a single click.

The language selected for the development is Angular.js, CSS, PHP, HTML, Bootstrap for creating an attractive web based system. PHP helps to design interactive components within web based system. The following diagram illustrates the main components of the project. And also Bootstrap, CSS and HTML is used to describe the presentation of Web pages including colors, layout and fonts.

The language selected for the development is PHP, CSS and JavaScript for creating an attractive web based system. PHP helps to design interactive components within web based system. The following diagram illustrates the main components of the project. CSS is used to describe the presentation of Web pages including colors, layout and fonts.

MySQL is used as the database management system. And also Textit SMS Communicator is used to send a text message to blood donors whenever their blood is needed and when someone's life is saved by their blood. It is software that is used to send and receive SMS on PC through a GSM device. Selected Software Development Life Cycle and system architecture is V model and service oriented architecture.

The study of alternative methods with the relevant diagrams associated and the proper justification of the selected one is as bellow

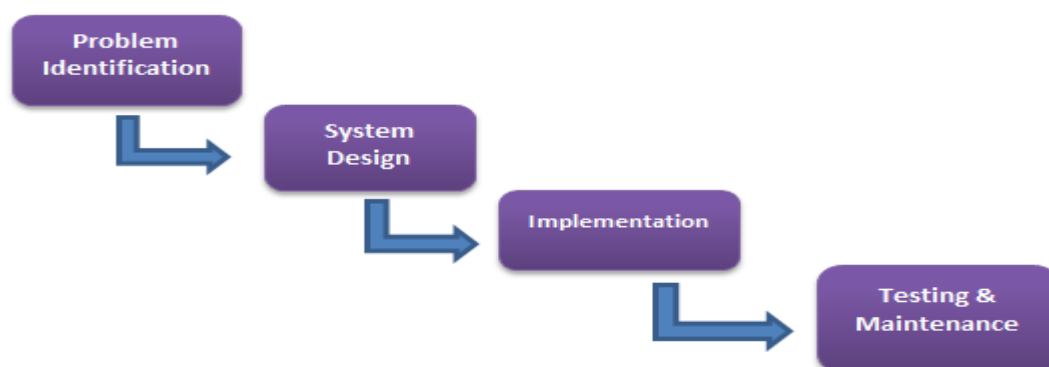


Figure 3.Process of Study

3.2. System Design

Database design involves the production of a model of the data to be stored in the database. A data model is a diagram of the database design that documents and communicates how the database is structured. Following figures show the overview of the system and user interfaces that are created using AngularJS, Bootstrap and CSS.

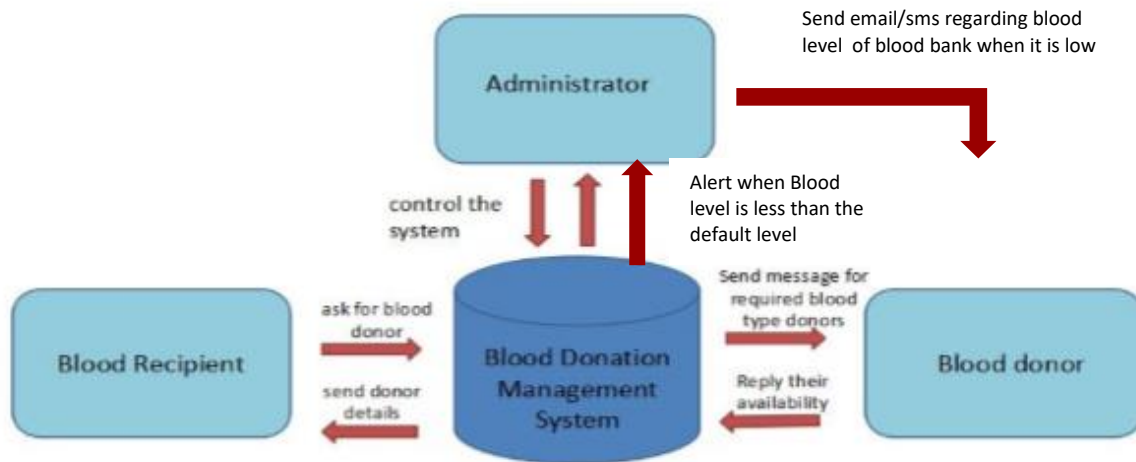


Figure 4. System Architecture

3.2 System Modeling

During the system requirements and design activity, systems may be modeled as a set of components and relationships between these components. These are normally illustrated graphically in a system architecture model that gives the reader an overview of the system organization. System modeling helps to give more detailed system specifications which are in form of graphical representations that can describe problem to be solved or the system that is to be developed. Because of the graphical representations used, models are often more understandable than detailed natural language description of the system requirements. Examples of such modeling tool are a Use Case Diagram and ERD Diagram Etc.

3.2.1 ER Diagram

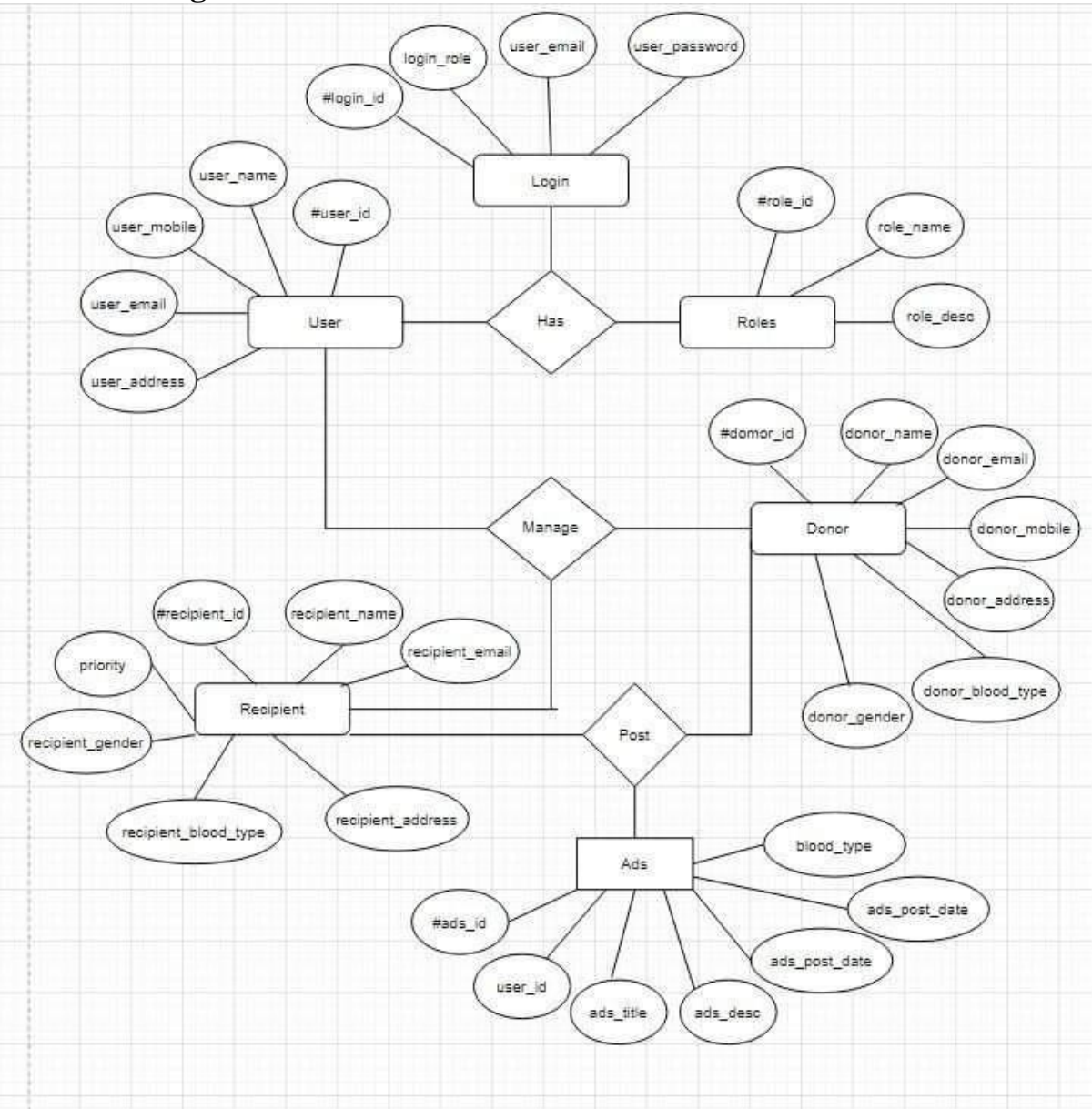


Figure 5.ER Diagram

3.2.2 Use Case Diagrams

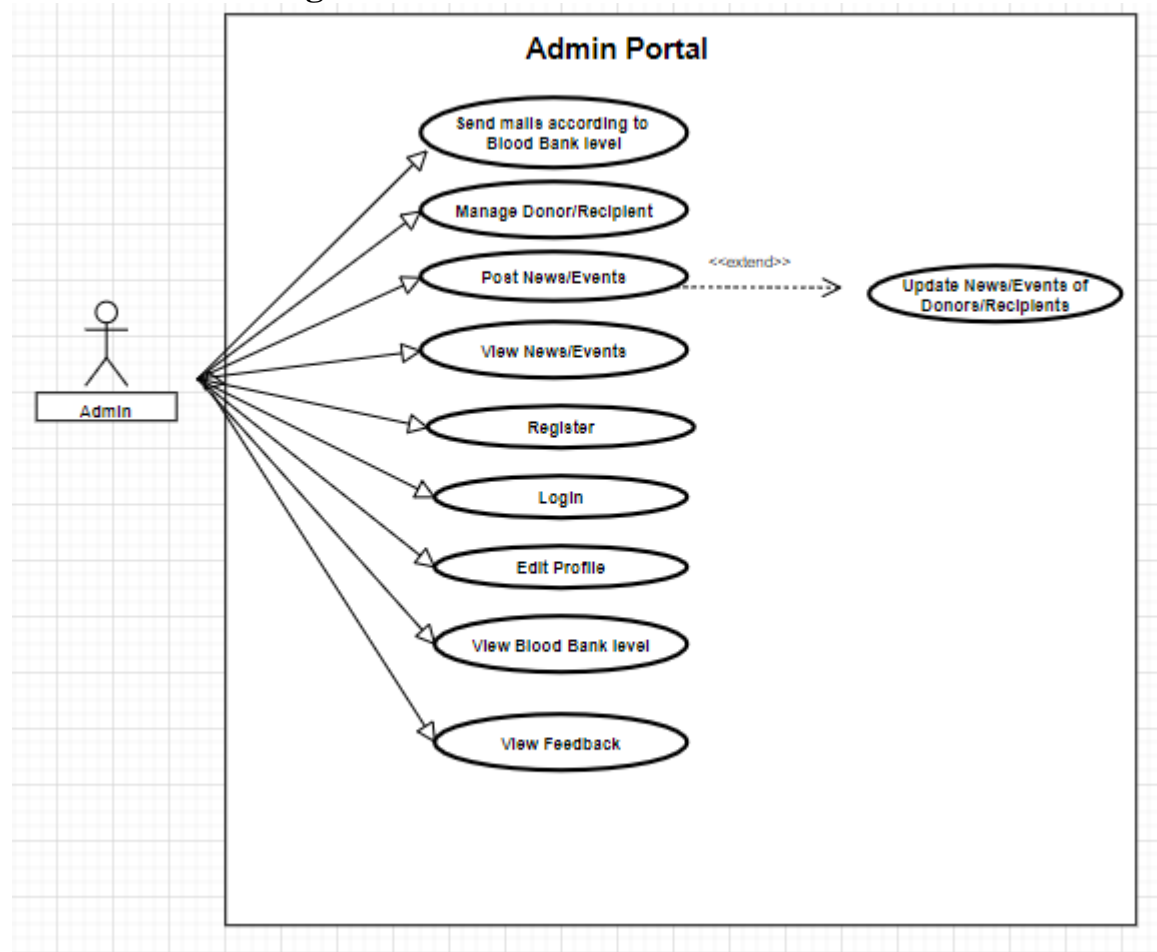


Figure 6.Admin User Case Diagram

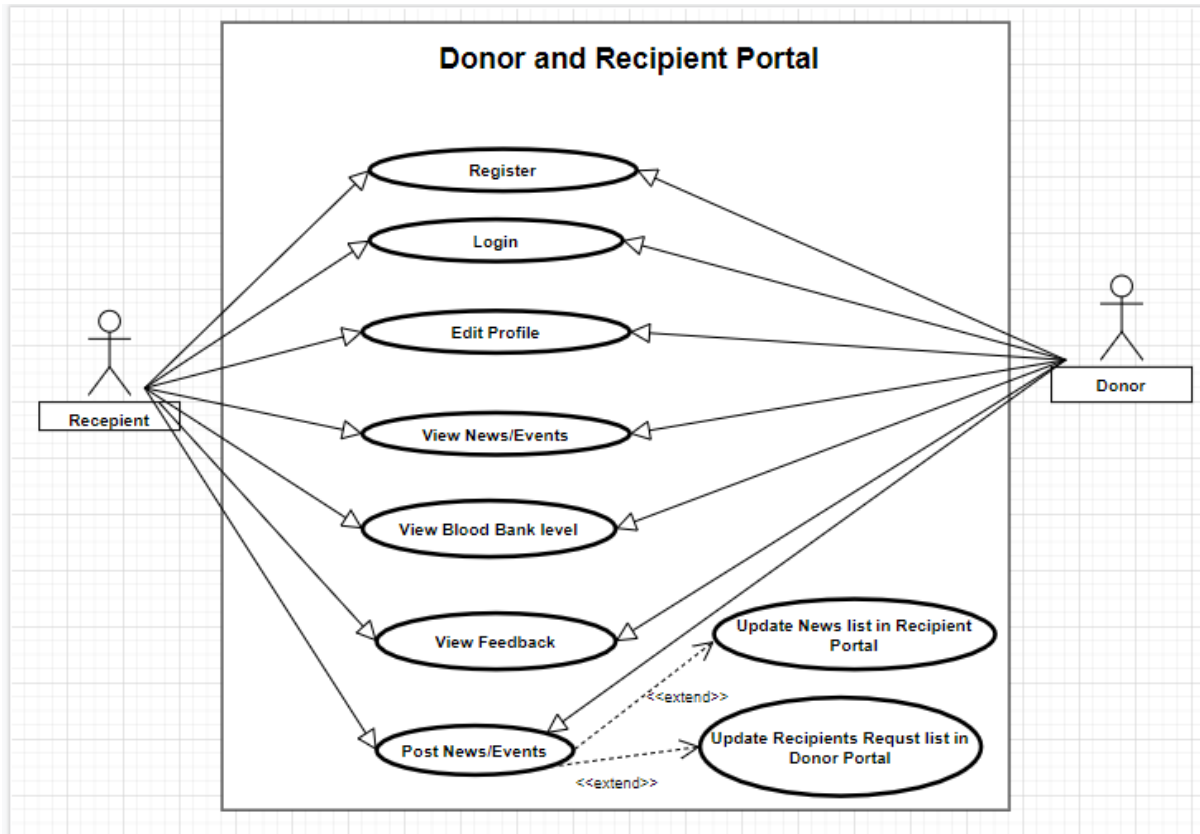


Figure 7.Donor and Recipient User Case Diagram

3.3 Implementation

3.3.1 Technology adopted

The project has been developed using mainly Web technologies. The functions which perform tasks in the system have been written by Angular and it powered the system for making dynamic and interactive Web pages. To style the web application used basically, HTML (Hypertext Markup Language), CSS (Cascading Style Sheets), JavaScripts and to get the responsive layout, used bootstrap for the website. MYSQL database has been used to store relevant data. This is a centralized database. Frontend and Backend of the system have been connected by using PHI API.

3.4 Interfaces of the System.

User Interfaces This application mainly consists of the modules Donor, Receiver, Delivery Agent, and Admin. The system will provide a platform for donors and seekers after they successfully register into the system.

3.4.1 Home Interface

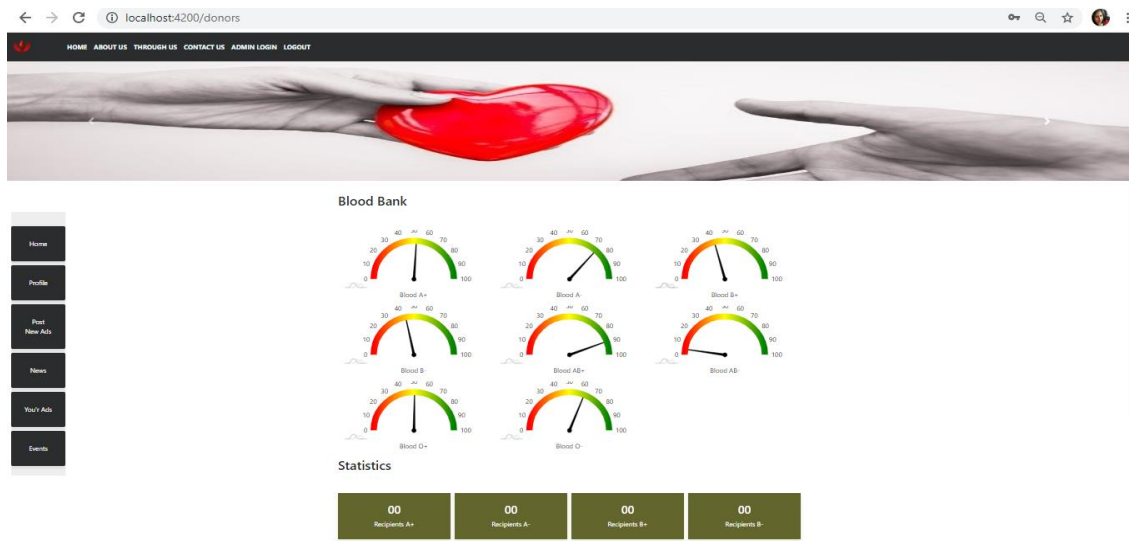


Figure 8.Home Page

3.3.2 Admin Portal

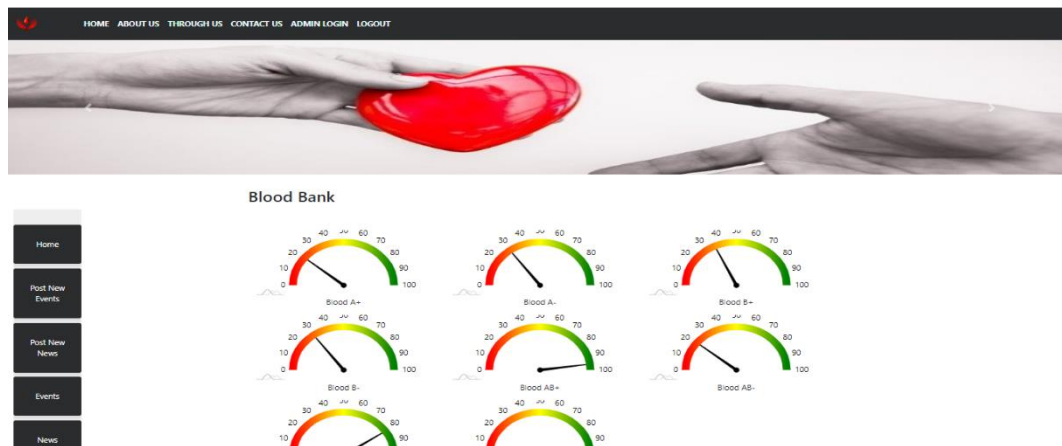


Figure 9.Admin Interface

3.3.3 Donor Portal

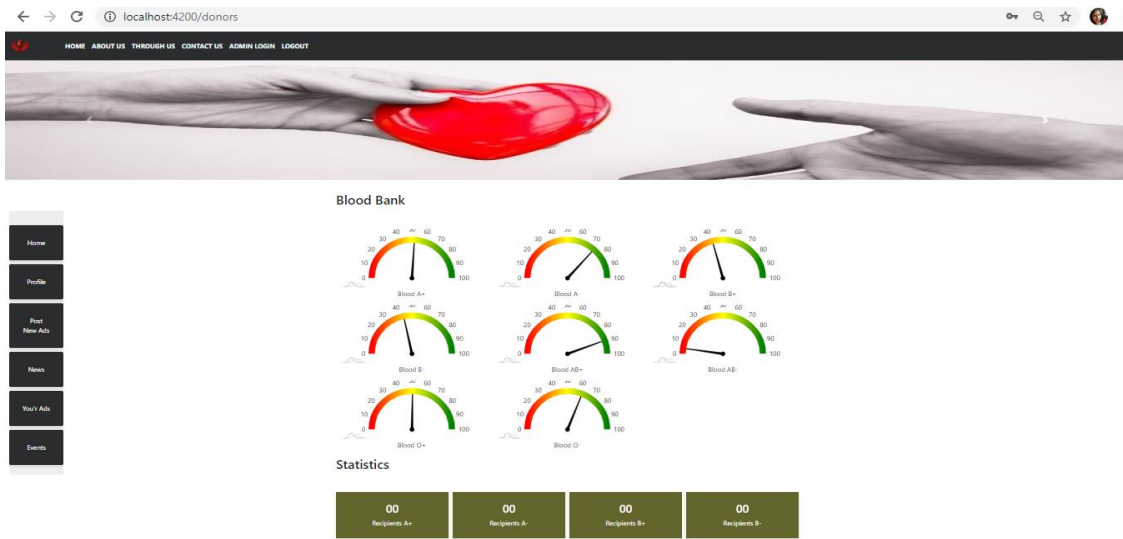


Figure 10. Donor Interface part 1

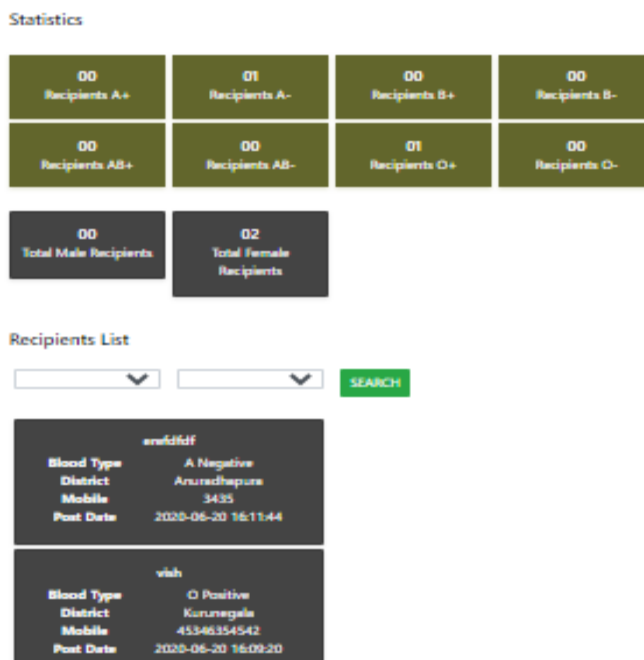


Figure 11. Donor Interface part 2

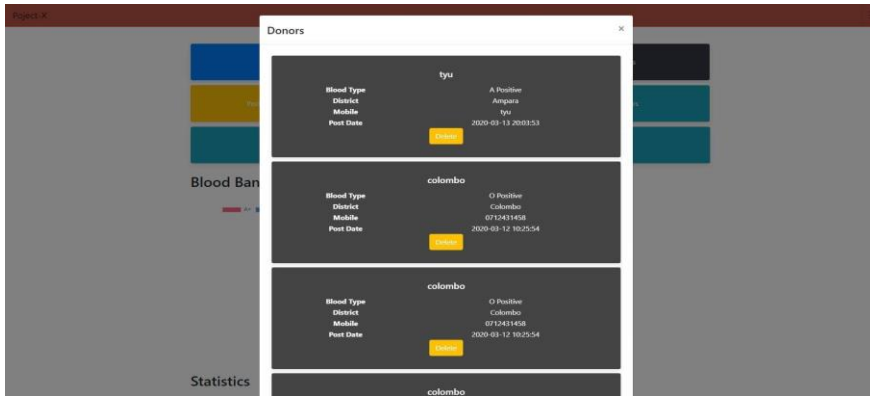


Figure 12. Donors List

3.3.4 Recipient Portal

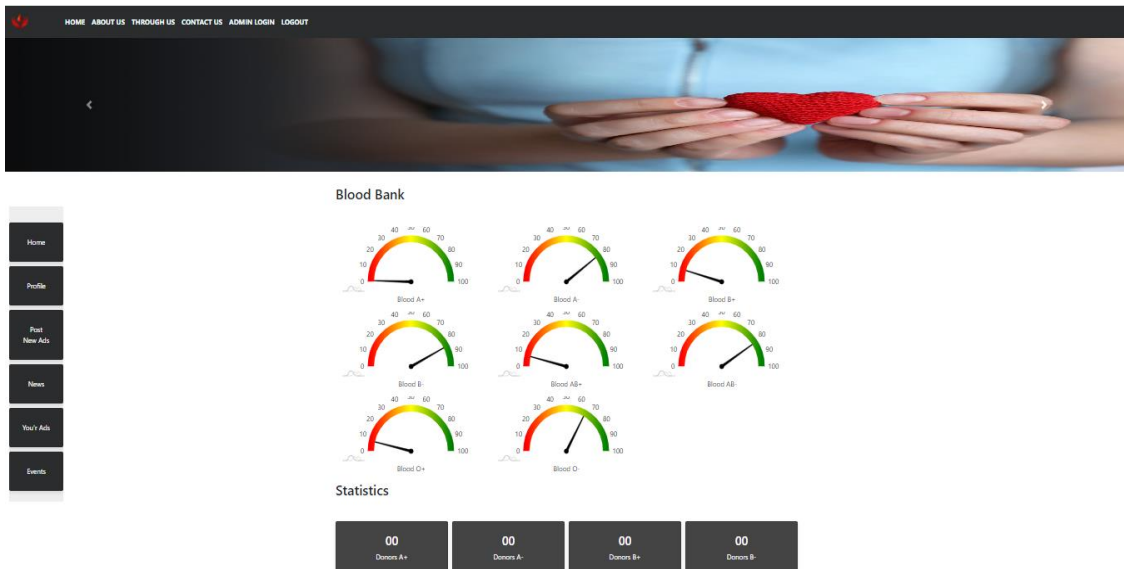


Figure 13. Recipient Interface part 1

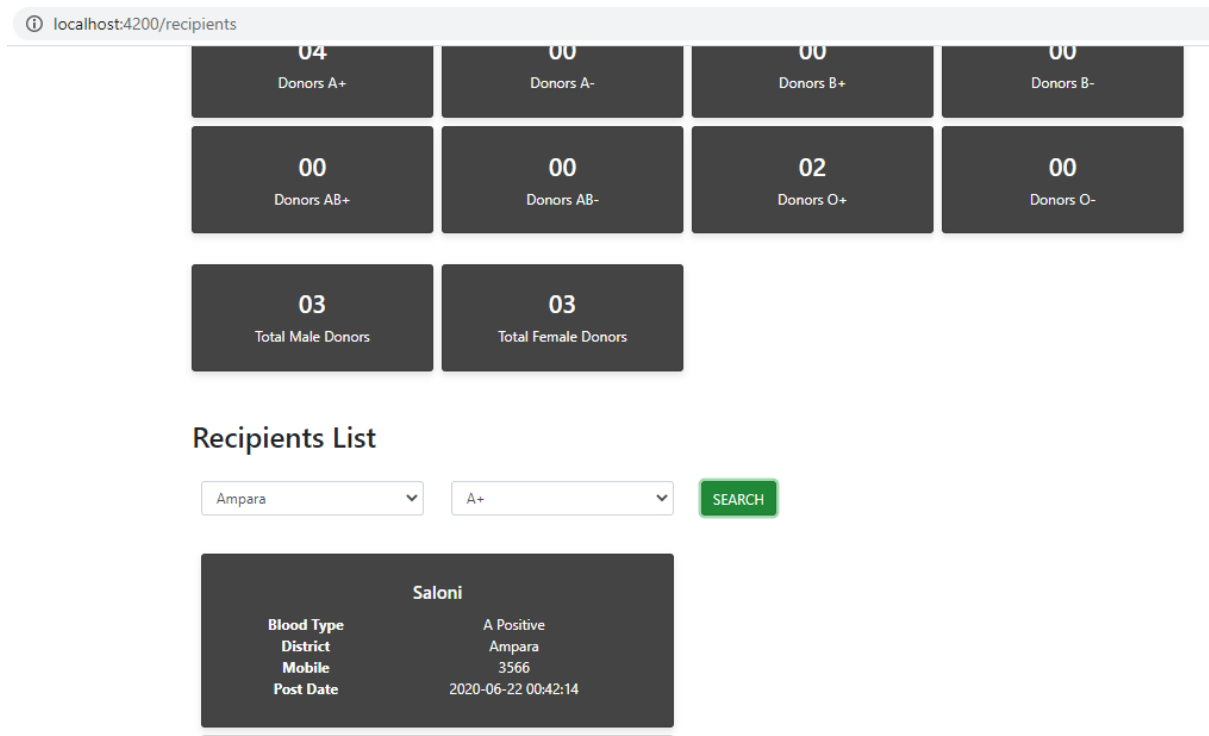


Figure 14. Recipient Interface part 2

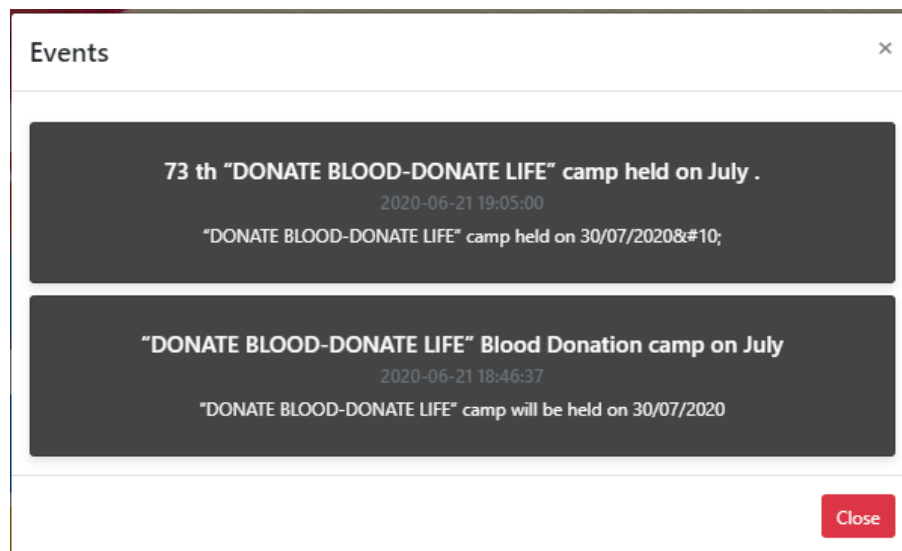


Figure 15. View Events

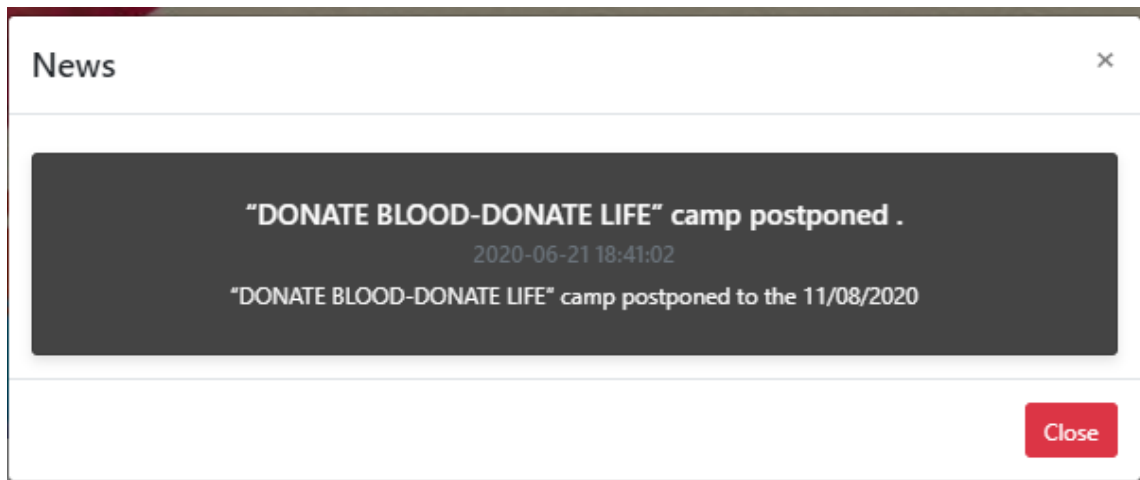


Figure 16. View News

3.3.5 Dashboard

3.3.5.1 Statistics of Users

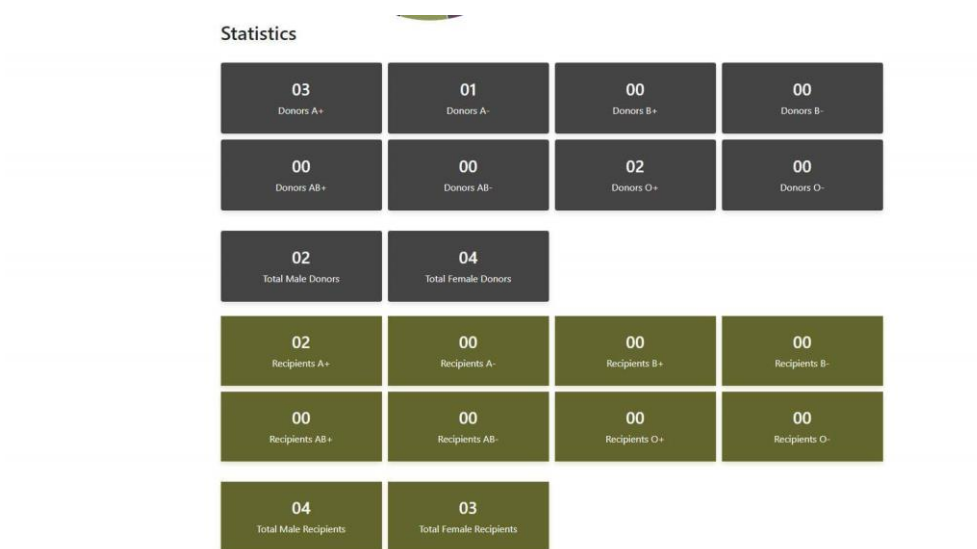


Figure 17. Statistics of Users

3.2.5.2 Blood bank statistics about blood type levels.

Blood Bank

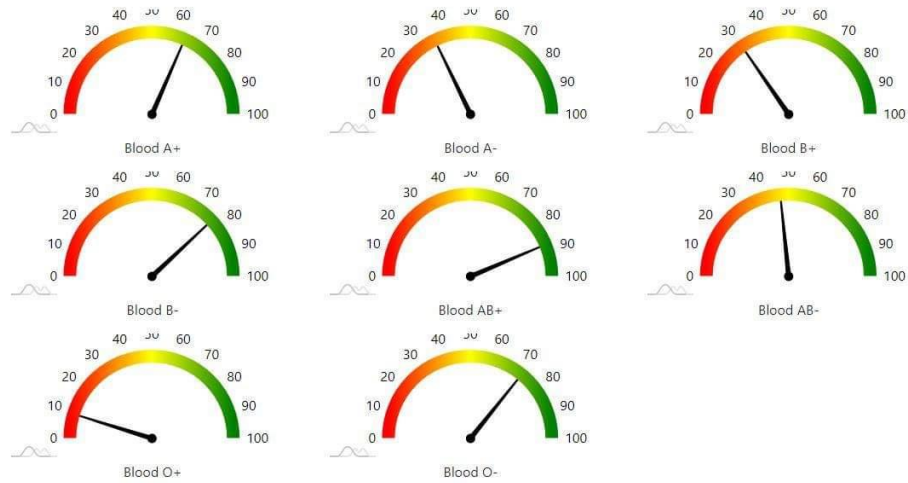


Figure 18. Blood Levels

3.2.5.2 Post an Advertisements.

Post Ad

Name

Email

Mobile

District

Blood Types

Gender

Description

Figure 19. Post an advertisement

Chapter 4 - Evaluation

4. User Evaluation and Testing

4.1 Introduction

Testing and evaluation of the system was conducted recursively when the implementation of the system. The main objective of the testing and evaluation of the system was to measure the functioning accomplishment of the system as well as the level of user acceptability of the final output of the project. Website was tested to ensure that the software has the functionality that has been specified and that conforms to and accommodates all functional requirements. The basic test environment details are mentioned in the table below.

Operating Systems	Windows 7
Web browsers	Google Chrome, Mozilla Firefox, Internet Explorer, Opera
Computers	HP Laptop
Screen Resolutions	1,366x768 (pixels)

Table 2. Basic test environment

In this section some of the significant test cases that were executed to assure the quality of the web-based system are illustrated in below test plan.

4.2 Test Plan

Test Area	Test Case No.	Effort(hrs)	Executed by	Status
Register	Register_1 Register_2 Register_3 Register_4	2h	Vishmi	Passed
Login	Login_1 Login_2 Login_3	1h	Vishmi	Passed
Post News	Post News_1 Post News_2 Post News_3	2h	Vishmi	Passed
View News	View News_1	1h	Vishmi	Passed
Post Events	Post Events_1 Post Events_2 Post Events_3	2h	Vishmi	Passed
View Events	View Events_1	2h	Vishmi	Passed
Managing Donors and Recipients	Delete Donor_1 Delete Recipient_1	1h	Vishmi	Passed
Search	Search Donors	1h	Vishmi	Passed

	Search Recipients			
Edit Profile	Edit Profile_1	1h	Vishmi	Passed
Delete News	Delete News _1	1h	Vishmi	Passed
Delete Events	Delete Events _1	1h	Vishmi	Passed
Delete Ads	Delete Ads _1	1h	Vishmi	Passed
Send sms to Donors by Admin	Send sms to Donors_1	1h	Vishmi	Passed

Table 3. Test Plan

4.3 Test Cases

4.3.1 Register (For all users :Admin, Donor, Recipient)

Test Case ID: Register_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can register with valid information

Pre-conditions:

User need valid email address

Navigate to the Login page through Main Menu→“Admin Login”

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Select “Sign up” option. 2. Provide valid user name. 3. Provide valid password. 4. Click “Register” button.	Name: Kamal Email : Kamal@gmail.com Mobile: 0718909827 Address: No 23/322,Colombo Gender: Male Password: 111111 Confirm Password: 111111	User should be able to navigated to the Registration form.	Passed

Table 4. Test Cases Register_1

*Post-conditions: User is validated with database and successfully register as Admin/Donor or Recipient.

Test Case ID: Register_2

Test Priority (Low/Medium/High): High

Test Title: Verify whether registration is unsuccessful with invalid email address

Pre-conditions:

1. Navigate to the Home page
2. Navigate to the Login page through Main Menu→“Admin Login”
3. Click “Donor”/ “Recipient” Panel.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Select “Sign up” option. 2. Provide valid information 3. Provide invalid email. 4. Click “Register” button.	Name: Saman Email : Sam.gmail.com Mobile: 0718909827 Address: No 23/322,Kurunegala Gender: Male Password: 54321 Confirm Password: 54321	User should not be able to registered successfully. Following error message should be displayed. “Invalid Email Address found.”	Passed

Table 5. Test Cases Register_2

*Post-conditions: User is validated with database and user should not available in database.

Test Case ID: Register_3

Test Priority (Low/Medium/High): High

Test Title: Verify whether registration is unsuccessful with invalid mobile number

Pre-conditions:

1. Navigate to the Home page
2. Navigate to the Login page through Main Menu→“Admin Login”
3. Click “Donor”/ “Recipient” Panel.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Select “Sign up” option. 2. Provide valid information 3. Provide invalid mobile number.	Name: Saman Email : Sam.gmail.com Mobile: 07189098	User should not be able to registered successfully. Following error message should be displayed.	Passed

4. Click “Register” button.	Address: No 23/322,Kurunegala Gender: Male Password: 54321 Confirm Password: 54321	“Invalid Mobile Number found.”	
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Table 6. Test Cases Register_3

*Post-conditions: User is validated with database and user should not available in database.

Test Case ID: Register_4

Test Priority (Low/Medium/High): High

Test Title: Verify whether registration is unsuccessful when mismatch is available between “Password” and “Confirm Password”.

Pre-conditions:

Navigate to the Home page

Navigate to the Login page through Main Menu → “Admin Login”

Click “Donor”/ “Recipient” Panel.

Assumptions/Dependencies:

Test Step	Expected Results	Test Data	Status
1. Select “Sign up” option. 2. Provide valid information 3. Provide different passwords for “Password” and “Confirm Password” fields. 4. Click “Register” button.	User should not be able to registered successfully. Following error message should be displayed. “Password mismatch found.”	Name: Saman Email : Sam.gmail.com Mobile: 07189098 Address: No 23/322,Kurunegala Gender: Male Password: 543 Confirm Password: 54321	Passed

Table 7. Test Cases Register_4

*Post-conditions: User is validated with database and user should not available in database.

4.3.2 Login (For all users : Admin/Donor/Recipient)

Test Case ID: Login_1

Test Priority (Low/Medium/High): High

Test Title: Verify login with valid username and password

Pre-conditions: User has valid username and password

Navigate to the Home page

Navigate to the Login page through Main Menu→“Admin Login”

Click “Donor”/ “Recipient” Panel.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Navigate to login page 2. Provide valid user name 3. Provide valid password 4. Click Login button	Username=kamal@gmail Password=111111	User should be able to login successfully.	Passed

Table 8. Test Cases Login_1

*Post-conditions: User is validated with database and successfully login to account.

Test Case ID: Login_2

Test Priority (Low/Medium/High): High

Test Title: Verify login with invalid username and valid password

Pre-conditions:

1. User has invalid username and valid password
2. Navigate to the Home page
3. Navigate to the Login page through Main Menu→“Admin Login”
4. Click “Donor”/ “Recipient” Panel.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Navigate to login page 2. Provide invalid username 3. Provide valid Password 4. Click on login button	Username=kamal.gamail.com Password=111111	System must show an error message “Username or Password is incorrect.”	Passed

Table 9. Test Cases Login_2

Test Case ID: Login_3

Test Priority (Low/Medium/High): High

Test Title: Verify login with valid username and invalid password

Pre-conditions: User has valid username and invalid password

Navigate to the Home page

Navigate to the Login page through Main Menu → “Admin Login”

Click “Donor”/ “Recipient” Panel.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Navigate to login page 2. Provide valid username 3. Provide invalid Password 4. Click on login button	Username=kamal@g amaail.com Password=11	System must show an error message “Username or Password is incorrect.”	Passed

Table 10. Test Cases Login_3

Test Case ID: Login_4

Test Priority (Low/Medium/High): High

Test Title: Verify login with invalid username and invalid password

Pre-conditions:

1. User has invalid username and invalid password
2. Navigate to the Home page
3. Navigate to the Login page through Main Menu → “Admin Login”
4. Click “Donor”/ “Recipient” Panel.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Navigate to login page 2. Provide invalid username 3. Provide invalid Password 4. Click on login button	Username=kama _gmail.com Password=11	System must show an error message “Username or Password is incorrect.”	Passed

Table 11. Test Cases Login_4

4.3.3 Post News (Admin)

Test Case ID: Post News

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can post a News successfully.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Click “Post News” option. 2. Provide Title. 3. Provide description. 4. Click on “Submit” button. 5. Click on “Close” button.	Title= “DONATE BLOOD-DONATE LIFE” camp postponed Description= “DONATE BLOOD-DONATE LIFE” camp postponed to the 11/08/2020	News should be posted successfully.	Passed

Table 12. Test Cases Post News_1

Test Case ID: Post News_2

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can’t post a News with title and empty description.

Pre-conditions:

3. User has valid username and valid password
4. Navigate to the Home page
5. Login to the Admin/Donor/Recipient portal.

Assumptions/Dependencies: N/A

Test Step	Test Data	Expected Results	Status
1. Click “Post News” option. 2. Provide Title. 3. Keep empty “Description” field. 4. Click on “Submit” button. 5. Click on “Close” button.	Title= “DONATE BLOOD-DONATE LIFE” camp postponed . Description=	News should not be poste. Following error message should be displayed. “Description is required”	Passed

Table 13. Test Cases Post News_2

Test Case ID: Post News_3

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can’t post a News with description and without a title.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Click “Post News” option. 2. Provide Title. 3. Keep empty “Description” field. 4. Click on “Submit” button. 5. Click on “Close” button.	Title= Description= “DONATE BLOOD-DONATE LIFE” camp postponed .	News should not be poste. Following error message should be displayed. “News Title is required”	Passed

Table 14. Test Cases Post News_3

4.3.4 View News (For all users : Admin/Donor/Recipient)

Test Case ID: View News_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can view a posted News successfully.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin/Donor/Recipient portal.
4. Post a News.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
<ol style="list-style-type: none"> 1. Click “View News” option. 2. Click on “Close” button. 		<p>Newly added News should be available in “View News” panel.</p> <p>Pop up window should be closed successfully.</p>	Passed

Table 15. Test Cases View News_1

4.3.5 Post Events (Admin)

Test Case ID: Post Events

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can post Events successfully.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin portal.

Assumptions/Dependencies :N/A

Test Step	Test Data	Expected Results	Status
<ol style="list-style-type: none"> 1. Click “Post Events” option. 2. Provide Title. 3. Provide description. 4. Click on “Submit” button. 5. Click on “Close” button. 	<p>Title= 73th “DONATE BLOOD-DONATE LIFE” camp held on July Description= “DONATE BLOOD-DONATE LIFE” camp held on 30/07/2020</p>	Events should be posted successfully.	Passed

Table 16. Test Cases Post Events_1

Test Case ID: Post Events_2

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can't post a Event with title and empty description.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Click "Post Events" option. 2. Provide Title. 3. Keep empty "Description" field. 4. Click on "Submit" button. 5. Click on "Close" button.	Title= 73 th "DONATE BLOOD-DONATE LIFE" camp held on July . Description=	Events should not be posted. Following error message should be displayed. "Description is required"	Passed

Table 17. Test Cases Post Events_2

Test Case ID: Post Events_3

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can't post an Event with description and without a title.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin/Donor/Recipient portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
6. Click "Post Events" option. 7. Provide Title. 8. Keep empty "Description" field. 9. Click on "Submit" button. 10. Click on "Close" button.	Title= Description= "DONATE BLOOD-DONATE LIFE" camp held on 30/07/2020	Events should not be poste. Following error message should be displayed. "Events Title is required"	Passed

Table 18. Test Cases Post Events_3

4.3.6 View Events (For all users : Admin/Donor/Recipient)

Test Case ID: View Events

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can view a posted events successfully.

Pre-conditions:

5. User has valid username and valid password
6. Navigate to the Home page
7. Login to the Admin/Donor/Recipient portal.
8. Post an Event.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
3. Click “View Events” option. 4. Click on “Close” button.		Newly added Events should be available in “View Events” panel. Pop up window should be closed successfully.	Passed

Table 19. Test Cases View Events_1

4.3.7 Delete Donors (Admin)

Test Case ID: Delete Donors_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can delete donors successfully.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin portal.

Assumptions/Dependencies: N/A

Test Step	Test Data	Expected Results	Status
1. Click “Donors” chip. 2. Click “Delete” button which is available in bottom of the donor card. 3. Click on “Close” button.		Pop up window should be loaded with Donors list. Donor should be deleted successfully.	Passed

Table 20. Test Cases Delete Donors_1

4.3.8 Delete Recipients (Admin)

Test Case ID: Delete Recipients_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can delete registered recipients successfully.

Pre-conditions:

4. User has valid username and valid password
5. Navigate to the Home page
6. Login to the Admin portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Click “Recipients” chip. 2. Click “Delete” button which is available in bottom of the donor card. 3. Click on “Close” button.		Pop up window should be loaded with Recipients list. Recipient should be deleted successfully.	Passed

Table 21. Test Cases Delete Recipients_1

4.3.9 Search Donors (for Admin/Recipient)

Test Case ID: Search Donors_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can search donors successfully.

Pre-conditions:

7. User has valid username and valid password
8. Navigate to the Home page
9. Login to the Admin/Recipient portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Go to the bottom part of the Donors interface 2. Provide “District and Blood Type. 3. Click Search	District: Colombo Blood Type: A+	Users results should be filtered according to the search criteria.	Passed

Table 22. Test Cases Search Donors_1

4.3.10 Search Recipients (for Admin/Donor)

Test Case ID: Search Recipients_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can search recipients successfully.

Pre-conditions:

10. User has valid username and valid password
11. Navigate to the Home page
12. Login to the Admin/Donor portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
4. Go to the bottom part of the interface 5. Provide "District and Blood Type." 6. Click Search	District: Colombo Blood Type: A+	Users results should be filtered according to the search criteria.	Passed

Table 23. Test Cases Search Recipients_1

4.3.11 Edit user profiles (for Admin/Donor/Recipient)

Test Case ID: Edit User Profiles_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can edit profile successfully.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin/Recipient/Donor portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Click "Profile" Chip. 2. Update Address 3. Click Submit	Address:No:234/12 ,Bingiriya	New Information should be updated successfully.	Passed

Table 24. Test Cases Edit User Profiles_1

4.3.12 Delete News (for Admin)

Test Case ID: Delete News_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can delete registered recipients successfully.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Click "News" Chip. 2. Go to the relevant News. 3. Click "Delete". 4. Click Submit		News should be deleted successfully.	Passed

Table 25. Test Cases Delete News_1

4.3.13 Delete Events (for Admin)

Test Case ID: Delete Events_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can delete registered recipients successfully.

Pre-conditions:

1. User has valid username and valid password
2. Navigate to the Home page
3. Login to the Admin portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Click “Events” Chip. 2. Go to the relevant Event. 3. Click “Delete” . 4. Click Submit		Event should be deleted successfully.	Passed

Table 26. Test Cases Delete Events_1

4.3.14 Delete Ads (for Admin/Donor/Recipient)

Test Case ID: Delete News_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether user can delete registered recipients successfully.

Pre-conditions:

4. User has valid username and valid password
5. Navigate to the Home page
6. Login to the Admin/Donor/Recipient portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
5. Click “Your Ads” Chip. 6. Go to the relevant Ad. 7. Click “Delete”. 8. Click Submit		Advertisement should be deleted successfully.	Passed

Table 27. Test Cases Delete Ads_1

4.3.15 Alert Donors (for Admin)

Test Case ID: Delete Events_1

Test Priority (Low/Medium/High): High

Test Title: Verify whether admin can inform to donors when blood level of the blood bank is low.

Pre-conditions:

4. User has valid username and valid password
5. Navigate to the Home page
6. Login to the Admin portal.

Assumptions/Dependencies:

Test Step	Test Data	Expected Results	Status
1. Go to the Blood bank statistics location. 2. Click "Send SMS".		SMS should be sent to the relevant donors.	Passed

Table 28. Test Cases Delete Events_1

4.4. Functionality Testing

The below are some of the check points that I am going to perform but not limited to the below list:

- a) Verify the end to end functionality of the system.
- b) Verify the data integrity.
- c) Verify there is no dead page or invalid redirects.
- d) Verify validations on each field.
- e) Verify happy path as well as the wrong paths by inputting wrong inputs to perform negative testing.

4.5 Non-Functionality Testing

1. **Interface testing** - Verify the interface and the dataflow from one system to other.
2. **Usability testing** - To verify how the application is easy to use with.
 - a) Test the navigation and controls.
 - b) Content checking.
 - c) Check for user intuition.
 - d) Testing that interfaces are user friendly
3. **Compatibility testing**- Compatibility testing is performed based on the context of the application.
 - a) Browser compatibility (Chrome)
 - b) Operating system compatibility (Windows)
 - c) Compatible to various devices mobile phones, tablets etc.
5. **Performance testing** - Performed to verify the server response time and throughput under various load conditions.

4.6 Evaluation

Evaluation of the prototype system was carried out to get feedback from the expected users of the system. The process on this evaluation was testing of the conceptual system with the expected users and gets their feedback. For the evaluation process, 7 Donors and 3 Recipients, all together 10 participants were participated.

4.7. Questionnaire

Please refer Appendix A. Questionnaire section.

4.8. Questionnaire results analysis

Following diagram shows results of the question “Were you able to donate same frequency before introduced the online system?” from the sample. 71% percentage of participants couldn't be able to alert about blood donations from manual ways as same as through the online system. Only 29% percentage of donors were able to alert about donations and keep same frequency or donating.

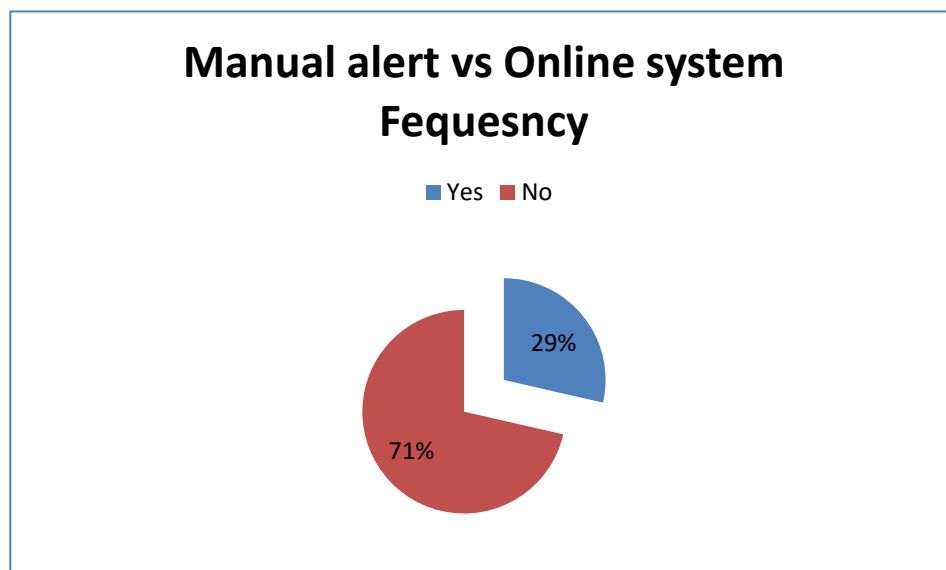


Figure 20. Frequency of alert about blood donation camps

2. Following diagram shows results of the question “Do you think that online Blood donor management system is useful for Sri Lanka?” from the sample. In Sri Lankan context, 80% of participants accepted that online system is more useful than the manual ways.20 % percent of participants had several problems regarding prerequisites like network connection, device etc. Because there are some rural areas in Sri Lanka.

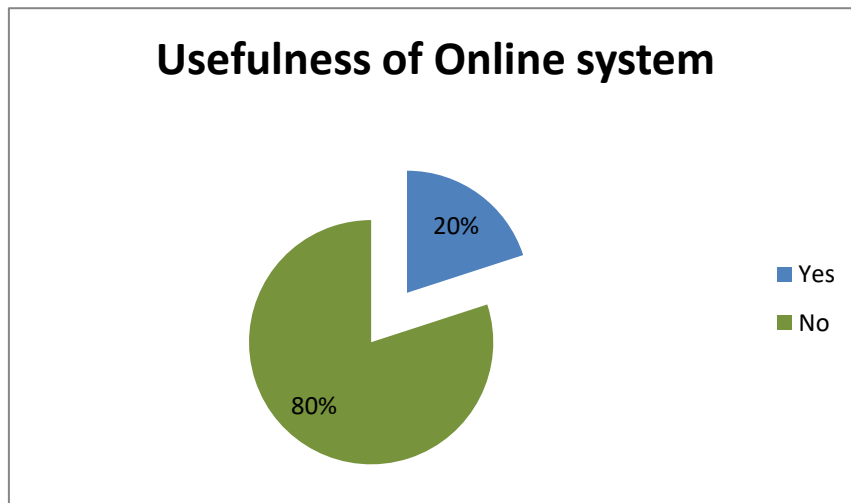


Figure 21. Usefulness of Online System

3. Following diagram shows results of the question “Do you able to find Donors easily through the online system ?” from the sample.78 % of participants were able to find donors quickly and easily rather than calling or asking from friends.22% had to face network problems and delayed to respond by donors.

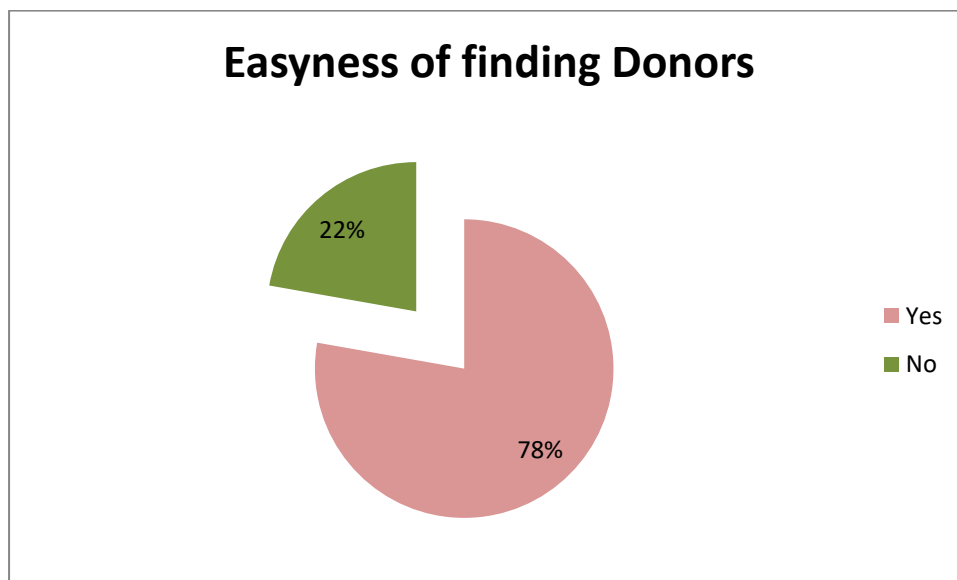


Figure 22. Donors accessibility

4. Following diagram shows results of the question “If answer is ‘**Donor**’ for above, how many times u accept the requests from recipients for the year? “from the sample. Any Donor can donate blood maximum 4 times per year. Everyone should give 3 months gap in between each donation. So 8% percentage of Donors are donating once a year. And 15% donors willing to donate blood two times a year. 31% of donors are willing to donate 3 times pr year and finally 46% of donors are willing to donate 4 times per year.

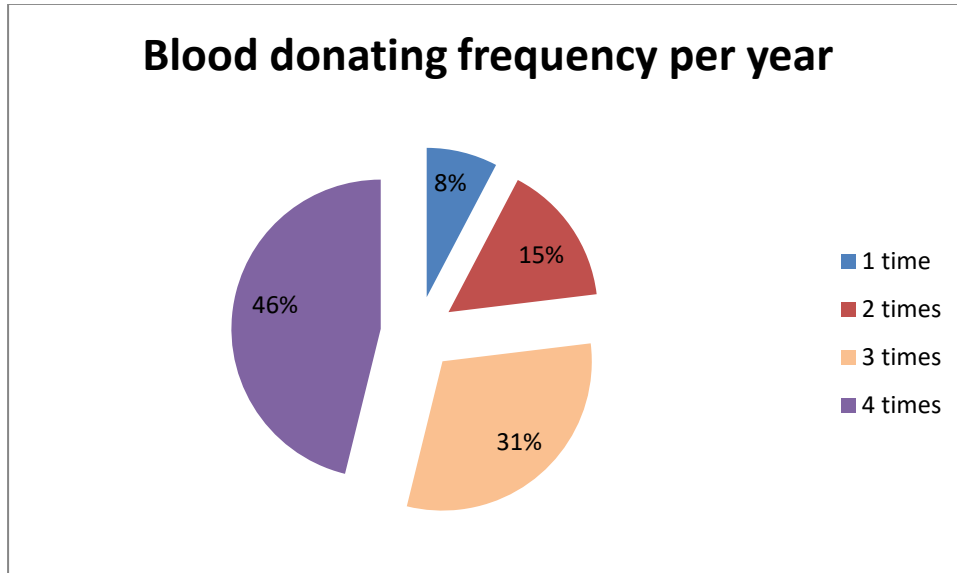


Figure 23. Blood Donating frequency per year

4.7 Summary

In summary, the chapter has more focused on the User Evaluation and Testing of “Blood Bank and Donor Management” system. First section describes the information on test plan of the developed system. It consists of test cases to validate the input and output of the system. Last section consists of the evaluation of the system with the help of participants who were participated via a questionnaire. Results of the questionnaire analyzed, presented in detail manner. Their recommendations and comments are vital for the system evaluation.

Chapter 5. Conclusion

The main goals and objectives of the study was to create a Blood Donation Management System in order to assist in the management of blood donor records and help to find a required blood donor in an emergency case by using modern technology. This system fulfills below requirements.

- 1.To make probable recipients make requests for the blood and find voluntary donors quickly.
- 2.To make the System to be used to publicize and advertise blood donation programs through social and other media.
- 3.To provide island-wide synchronized and centralized donor and bloodstock database supported by way of dashboard displays for the doctors concerned
- 4.To keep records about the donor and blood details to provide efficient donor and bloodstock management functions to the blood bank.

5.1.Future Developments

- Develop mobile application to enhance usability.
- Develop an IOS applications for Apple Devices.
- Increase social media advertising campaign to cater Donors and recipients.

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Appendices

A. Questionnaire

1. Name (Optional):
2. Designation:
3. Organization (Optional)
4. Age (Years)
5. User Type?
 - a. Donor
 - b. Recipient
6. If answer is '**Donor**' for above, how many times u accept the requests from recipients for the year?
 - a. 1
 - b. 2
 - c. 3
 - d. 4
7. Were you able to donate same frequency before introduced the online system?
 - a. Yes
 - b. No
8. If answer is '**Recipient**' for above, how many times you request for blood for the year?

9. Do you able to find Donors easily through the online system ?
 - a. Yes
 - b. No
10. Do you think that online Blood donor management system is useful for Sri Lanka?
 - a. Yes
 - b. No
11. Why we need/no need online Blood Management system?

12. What is your preferred way to alert about donation campaigns?
 - a. Through Online System
 - b. In a manual way
13. What are your expectations from an online Blood management system?

14. Do you think this web-based system covers every aspect of scenarios when it comes to Donate/Receive Blood in a efficient way?
 - a. Strongly Agree
 - b. Agree
 - c. Neither agree nor disagree
 - d. Disagree
 - e. Strongly Disagree
15. Other comments

B. User Documentation

1. Introduction

- **The product** – “Blood Bank and Donor Management System”

Blood Bank and Donor management system is simplyfy and automate the process of searching for blood in case of emergency and maintain the records of blood donors, recipients, inform about blood amount level in the blood bank, blood donation programs and bloodstock levels in the bank.

- **Scope**

Recipient can post a request to find the donors for relevant blood group and posted request will be appeared in the donors dashboard and sending sms to donor's pone who has that blood group and Donor who willing to donate and near to the recipient's city can communicate with the recipient by using his phone number.

2. Prerequisites

- **System requirements**

Website will run on below internet browser versions.

FireFox: higher Version from 48.0 (32/64 bit)

Google Chrome: higher Version from 55.0 (32/64 bit)

Internet Explorer: higher Version from 11.0 (32/64 bit)

- **Platform Support**

Windows that includes above internet browsers can access to the website without any difficulties.

3. Using the website

- **Steps to perform the required tasks**

Admin, Donor and Recipient's Sign In

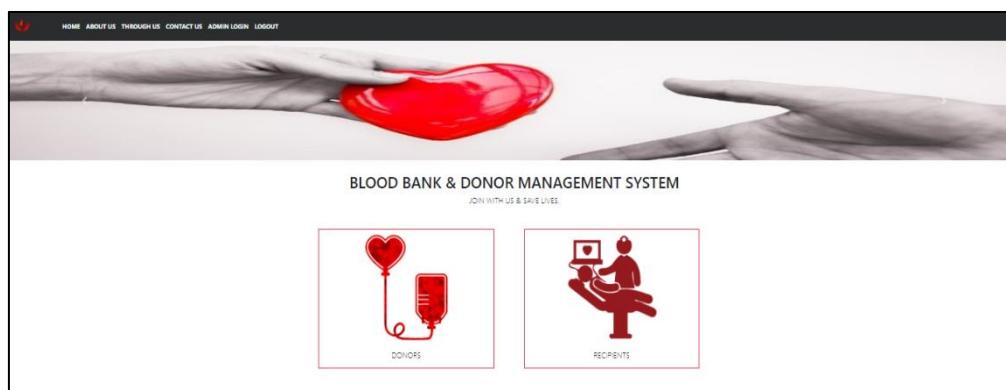


Figure 24. Home Page of the system

Admin/Donor/Recipient Sign Up Form

Sign Up

Name
full name

Email
email@gmail.com

Mobile
Mobile

Address
Address

Gender
▼

Password
Password

Confirm Password
Confirm Password

Register

Already Have an Account? [Log In](#)

Figure 25. Sign Up Form

- User needs to click the Donor or Recipient card to login. If user doesn't have an account he need to register using "Sign In" option which is available in the bottom side of the Login form.
- When user clicks on the login button, login page appears and this is the Donor login, then user needs to login with username and password.
- The end user is responsible for keeping their details secure.
- Ensure that you are logout from all locations
- Always click logout button to securely leave the system.

C. Questionnaire Results

1. Following diagram shows results of the question “Were you able to donate same frequency before introduced the online system?” from the sample. 71% percentage of participants couldn't be able to alert about blood donations from manual ways as same as through the online system. Only 29% percentage of donors were able to alert about donations and keep same frequency or donating.

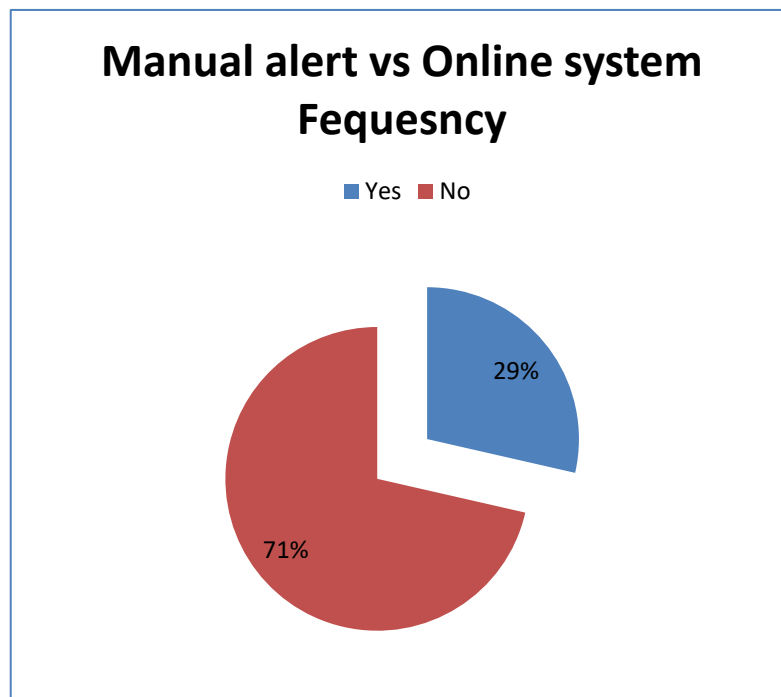


Figure 26. Frequency of alert about blood donation camps

2. Following diagram shows results of the question “Do you think that online Blood donor management system is useful for Sri Lanka?” from the sample. In Srilankan context, 80% of participants accepted that online system is more useful than the manual ways. 20 % percent of participants had several problems regarding prerequisites like network connection, device etc. Because there are some rural areas in Sri Lanka.

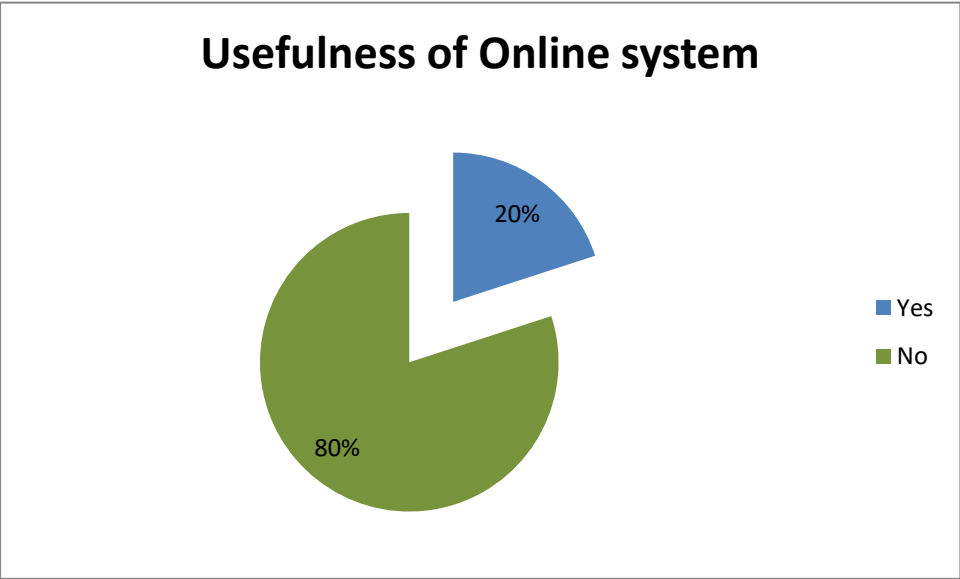


Figure 27. Usefulness of Online System

3. Following diagram shows results of the question “Do you able to find Donors easily through the online system ?” from the sample.78 % of participants were able to find donors quickly and easily rather than calling or asking from friends.22% had to face network problems and delayed to respond by donors.

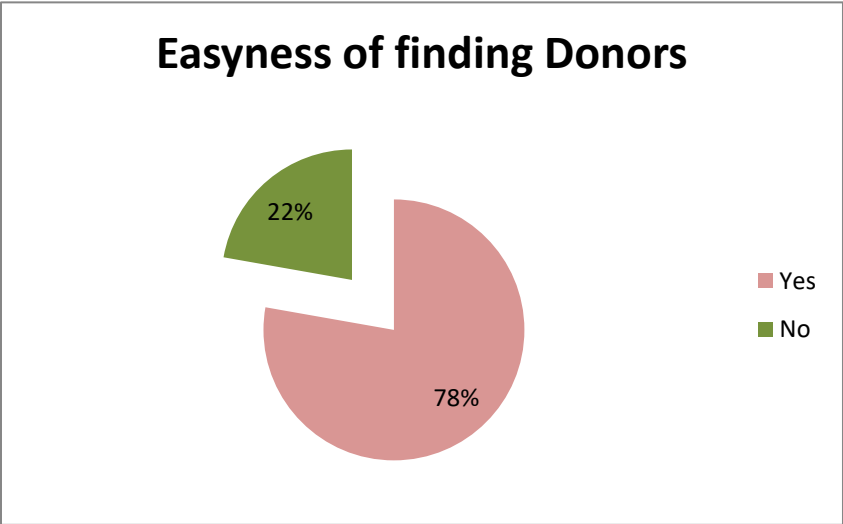


Figure 28. Accessibility of Donors

4. Following diagram shows results of the question “If answer is ‘Donor’ for above, how many times u accept the requests from recipients for the year? “from the sample. Any Donor can donate blood maximum 4 times per year. Everyone should give 3 months gap in between each donation. So 8% percentage of Donors are donating once a year. And 15% donors willing to donate blood two times a year. 31% of donors are willing to donate 3 times per year and finally 46% of donors are willing to donate 4 times per year.

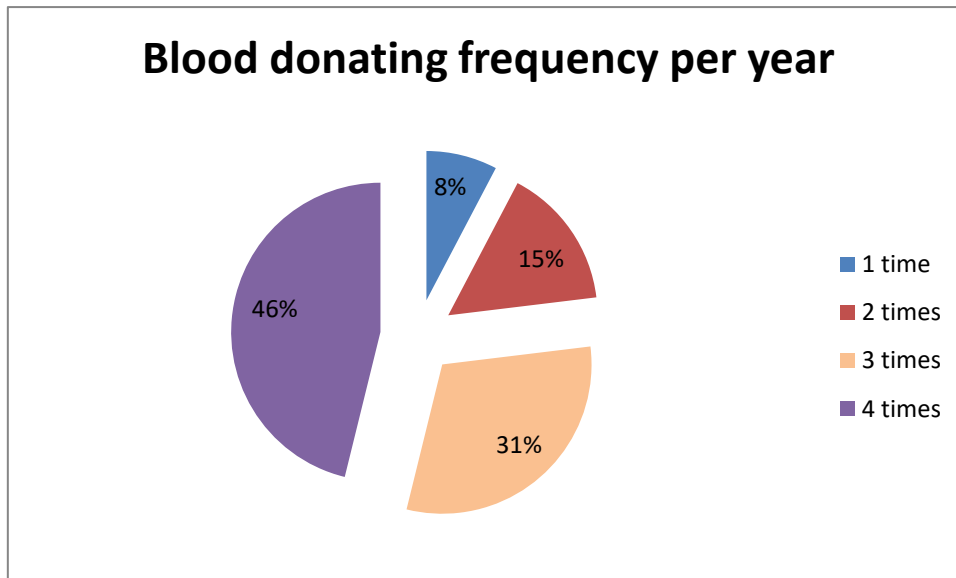


Figure 29. Blood Donating Frequency per year

D. Sample Codes

Source codes of certain major functions of the system are included in this chapter and for easy reading, only major sections will be listed.

Sign In Function

```
<div class="container py-5">
  <div class="row">
    <div class="col-md-12">
      <!-- <h2 class="text-center mb-5">Register Form</h2> -->
      <div class="row">
        <div class="col-md-6 mx-auto">
          <div class="card border-secondary">
            <div class="card-header">
              <h3 class="mb-0 my-2">Sign Up</h3>
            </div>
            <div class="card-body">
              <form class="form" role="form" autocomplete="off">
                <div class="form-group">
                  <label for="inputName">Name</label>
                  <input type="text" class="form-
control" id="name" name="name" [(ngModel)]= "name" placeholder="full name">
                </div>
              </form>
            </div>
          </div>
        </div>
      </div>
    </div>
  </div>
</div>
```

```

                <div class="form-group">
                    <label for="inputEmail3">Email</label>
                    <input type="email" class="form-
control" id="email" name="email" [(ngModel)]=
"email" placeholder="email@gmail.com" required="">
                </div>
                <div class="form-group">
                    <label for="inputEmail3">Mobile</label>
                    <input type="number" class="form-
control" id="mobile" name="mobile" [(ngModel)]=
"mobile" placeholder="Mobile" required="">
                </div>
                <div class="form-group">
                    <label for="inputEmail3">Address</label>
                    <input type="text" class="form-
control" id="address" name="mobile" [(ngModel)]=
"address" placeholder="Address" required="">
                </div>
                <div class="form-group">
                    <label for="inputEmail3">Gender</label>
                    <select class="form-
control" id="gender" name="gender" [(ngModel)]=
"gender">
                        <option value="Male">Male</option>
                        <option value="Female">Female</option>
                        <option value="Female">Other</option>
                    </select>
                </div>
                <div class="form-group">
                    <label for="inputPassword3">Password</label>
                    <input type="password" class="form-
control" id="password" name="mobile" [(ngModel)]=
"password" placeholder="Password"
title="At least 6 characters with letters and numbers" required="">
                </div>
                <div class="form-group">
                    <label for="inputPassword3">Confirm Password</label>
                    <input type="password" class="form-
control" id="c_password" name="mobile" [(ngModel)]=
"c_password" placeholder="Confirm
Password" title="At least 6 characters with letters and numbers" required="">
                </div>
                <div class="form-group">
                    <button type="submit" (click)="userSignup()" class="btn btn-success btn-
lg float-right">Register</button>
                </div> <br><br><br>

                <hr class="my-4">

                <p class="text-
center">Allready Have an Account? <a routerLink="/">Log In</a> </p>

            </form>
        </div>
    </div>
</div>
<!--/row-->

```

```

    </div>
  <!--/col-->
</div>
<!--/row-->

<div *ngIf="alert;" class="alert alert-success alert-dismissible fade show" role="alert">
  <strong>User Registered Successfully.</strong>
  <button type="button" class="close" data-dismiss="alert" aria-label="Close">
    <span aria-hidden="true">&times;</span>
  </button>
</div>

<div *ngIf="erroAlert;" class="alert alert-danger alert-dismissible fade show" role="alert">
  <strong>{{ alertMessage }}</strong>
  <button type="button" class="close" data-dismiss="alert" aria-label="Close">
    <span aria-hidden="true">&times;</span>
  </button>
</div>

</div>
<!--/container-->

```

Signup Form Validation function

```

import { Component, OnInit } from '@angular/core';
import { HttpClient, HttpHeaders } from '@angular/common/http';

@Component({
  selector: 'app-signup',
  templateUrl: './signup.component.html',
  styleUrls: ['./signup.component.css']
})
export class SignupComponent implements OnInit {
  name: any;
  email: any;
  mobile: string;
  address: string;
  password: string;
  c_password: string;
  message: any;
  alert: boolean;
  alertMessage: any;
  erroAlert: boolean;
  ApiUrl: string;
  gender: string;
  constructor(private http: HttpClient) { }
  ngOnInit(): void {
    this.ApiUrl = http://localhost/blood/curd\_donors.php

```

```

this.alert = false;
this.erroAlert =false;
}
userSignup(){
  if(!this.name){
    this.alertMessage = "Name is required";
    this.erroAlert = true;
  }else if (!this.email) {
    this.alertMessage = "Email is required";
    this.erroAlert = true;
  }else if (!this.mobile) {
    this.alertMessage = "Mobile is required";
    this.erroAlert = true;
  } else if (!this.address) {
    this.alertMessage = "Address is required";
    this.erroAlert = true;
  }else if (!this.password) {
    this.alertMessage = "Password is required";
    this.erroAlert = true;
  }else if (this.password != this.c_password) {
    this.alertMessage = "Password mismatch found";
    this.erroAlert = true;
  }else {

    let body : string = "key=signup&name=" + this.name+ "&email=" + this.email+
"&mobile=" + this.mobile+ "&address=" + this.address+ "&gender=" + this.gender+
"&password=" + this.password,
    type : string = "application/x-www-form-urlencoded; charset=UTF-8"

const httpOptions = {
  headers: new HttpHeaders({
    'Content-Type': type
  })
};
this.http.post(this.ApiUrl, body, httpOptions)
.subscribe(async data => {
  if( data['message'])
  {
    this.alert = true;
    this.name = "";
    this.email = "";
    this.mobile = "";
    this.address = "";
    this.password = "";
    this.c_password = "";
  }
}, error => {
  console.log(error);
}); } }}

```

Login Function

```
<div class="container">
  <div class="row">
    <div class="col-sm-9 col-md-7 col-lg-5 mx-auto">
      <div class="card card-signin my-5">
        <div class="card-body">
          <h5 class="card-title text-center">PROJECT X</h5>
          <form class="form-signin">
            <div class="form-label-group">
              <input type="email" id="email" class="form-
control" name="email" [(ngModel)]= "email" placeholder="Email address" required autofocus>
              <label for="inputEmail">Email address</label>
            </div>

            <div class="form-label-group">
              <input type="password" id="password" name="password" class="form-
control" [(ngModel)]= "password" placeholder="Password" required>
              <label for="inputPassword">Password</label>
            </div>

            <div class="custom-control custom-checkbox mb-3">
              <input type="checkbox" class="custom-control-input" id="customCheck1">
              <label class="custom-control-label" for="customCheck1">Remember password</label>
            </div>
            <button (click)="goPage()" class="btn btn-lg btn-block text-uppercase" style="background-
color: #b85440 !important;" type="submit">Log In</button>
            <hr class="my-4">

            <p class="text-center">Don't Have an Account? <a routerLink="/signup">Sign Up</a> </p>

            <div *ngIf="erroAlert;" class="alert alert-danger alert-dismissible fade show" role="alert">
              <strong>Username or password is incorrect</strong>
              <button type="button" class="close" data-dismiss="alert" aria-label="Close">
                <span aria-hidden="true">&times;</span>
              </button>
            </div>

          </form>
        </div>
      </div>
    </div>
  </div>
</div>
```

Figure 32. Donor/Admin/Recipients login (login.component.html)

Get all News and Events

```
get all News
this.http.post<any>(`http://localhost/blood/curd_donors.php?key=getAllNews`, {})
.subscribe(data => {

this.allNews = data;

})

get all Events
this.http.post<any>(`http://localhost/blood/curd_donors.php?key=getAllEvents`, {})
.subscribe(data => {

this.allEvents = data;

})
```

Figure 33. Retrieve all News/Events(recipients.components.ts)

Post New Event

```
postNewAd(){

if(!this.name){
this.alertMessage = "Name is required";
this.erroAlert = true;
} else if (!this.email) {
this.alertMessage = "Email is required";
this.erroAlert = true;
} else if (!this.mobile) {
this.alertMessage = "Mobile is required";
this.erroAlert = true;
} else if (!this.district) {
this.alertMessage = "District is required";
this.erroAlert = true;
} else if (!this.blood_type) {
this.alertMessage = "Blood types is required";
this.erroAlert = true;
} else if (!this.description) {
this.alertMessage = "Description is not match";
this.erroAlert = true;
} else {
```

```

let body : string = "key=postAddRecipients&recipient_id=" + this.recipient_id+ "&name="
+this.s.name "&email=" + this.email+ "&mobile=" + this.mobile+ "&district=" +
this.district+
&blood_type=" + this.blood_type+ "&gender=" + this.gender+ "&des=" + this.description,
type : string = "application/x-www-form-urlencoded; charset=UTF-8"
const httpOptions = {
  headers: new HttpHeaders({
    'Content-Type': type
  })
};
this.http.post(this.ApiUrl, body, httpOptions)
.subscribe(async data => {
  if( data['message'])
  {
    this.alert = true;
    this.name = "";
    this.email = "";
    this.mobile = "";
    this.district = "";
    this.blood_type = "";
    this.description = "";
  }
}, error => {
  console.log(error);
});
}

```

Figure 34. Request Blood (recipients.component.ts)

Search and Delete News

```

searchAd(){
  this.http.post<any>(`http://localhost/blood/curd_donors.php?key=getRecipientsAds&district=${
this.s.s_district}&blood_type=${this.s.blood_type}`, {})
  .subscribe(data => {
    console.log(data);
    this.recipients = data;
  })
}
deleteAd(aid){
  this.http.post<any>(`http://localhost/blood/curd_donors.php?key=DeleteMyAds&id=${aid}`, {})
  .subscribe(data => {
    if(data){
      this.DeleteAlert = true;
      this.ngOnInit()
    }
  })
}

```

Figure 35. Search and Delete News