Blood Donation Management System

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ABSTRACT: *This paper is focused on Blood Donation Management System which is a web application with supporting mobile application aimed to serve as a communication tool between patients (who need blood) and blood donor. To become members of the system, donors need to create their profiles by providing fundamental information like name, blood group, email address, password, and exact location from "Google Map". In order to find out the exact location of a donor, Google Map is integrated with this application. The mobile application always updates the location of a donor. As a result, the system can automatically find a registered donor wherever he/she goes. Visitors can search blood donors from the home page by blood group and the place where blood is needed. The system will show the available donors along with their phone number, email address and mailing address through arranging them by nearest place and blood donation expire date. Visitors can send message to all donors through email but a member can send message using email and mobile phone. An appointment will be created only whenever a donor confirms that he/she will donate blood. Then the system will alert the donor before 12 hours of donation. Blood donors can also be searched from the mobile application, but this is only accessible for registered members. The goal of this paper is to reduce the complexity of the system to find blood donors in an emergency situation.*

KEYWORDS- *Online blood donation, Password, Smart phone, Administrator, Web application.*

I.   INTRODUCTION

It is estimated that Bangladesh needs around 600,000 bags of blood every year. There are lots of communication gap among patients (accepting blood), donors (who donate bold), blood banks and hospitals in our country. Medical facility is not available equally in every part of the country. If someone needs blood, first of all he searches it within his family members, then nearest hospitals and blood banks. If they cannot manage blood in these ways, it is really hard for them to contact other people to collect blood in a short time. That is the problem we want to solve through our application, Blood Donation Management System in which electronic information about the donors and organizations related to donating the blood is created. Through this application, any person interested in donating blood can register himself as donor. Moreover if any general consumer wants to make request to have blood online, he can also take the help of this system. As soon as any update occurs in the blood database, the changes are reflected in all the interfaces used. So, the system provides a simple and quick interaction among various groups connected with the blood banks. It is designed to overcome the drawbacks of existing system. The main objective is to improve the efficiency of data communication within the supply chain to reduce response time for each blood demand request. We also focused on managing blood inventory at each blood bank effectively. The results have shown that the proposed system helps enhancing the communication among blood partners within the supply chain network. The recipient can get blood on emergency. The system also provides SMS facility to donors through smart phone so that they can reach to exact location.

Some existing applications of blood donation system are manual which cannot upload and download the latest update and there is no use of web services and remoting. There is no proper coordination between different applications and users. It consumes lot of manpower for better results. Retrieval of data takes lot of time and percentage of accuracy is less. It takes time to produce reports. To debug the existing system, remove procedures those cause data redundancy, make navigational sequence proper [1]-[2]. Chance of mismanagement of data

makes the system less secure. But the system we present here provides a lot of information about donors on different level and also reflects the current work status. User friendliness of the developed system is provided in the application with various controls. The system makes the blood management much easier and flexible. It provides high level of security with different level of   authentication.

The Blood Donation Management System we present here is aiming for human welfare. The entire system has been developed keeping in view of the distributed client server computing technology, in mind. This web application allows you to access the whole information about Blood Donation Management Software, readily scalable and adaptable to meet the complex need of blood banks who are key facilitator for the healthcare sector. Aim of this paper is to provide user friendly and interactive services via web interface, mobile application and SMS. As soon as any update occurs in the blood database, the changes are reflected in all the mentioned interfaces. As a result, the system provides a simple and quicker interaction among various groups connected with blood bank.

II.   LITERATURE REVIEW

The system we present here is adequate for searching blood donors for available blood and thereby saving valuable time and money. This application provides necessary options to serve people on their emergency need making them free from worrying for blood by providing lot of donors at a single click. The options that are provided by this application are:

❖   Donor registration and blood collection
❖   Blood requisition/issue
❖   Discard accounting
❖   User access control
❖   Detailed donor database
❖   Maintain and update unique donor identification
❖   Search facilities by donor, patient, doctor, blood bag, and other recognizing factors
❖   Correlation and cross referencing between files
❖   Powerful search for donors by blood group, sex, location, telephone number.
❖   Exhaustive report formats and registers
❖   Interface with grouping and testing machine
❖   Sends various auto-SMS for alerting donor and reminding location and time
❖   Adequate security to protect users' potential information

Besides these, there are ample scopes to improve this application. Some more features can be added to establish this application for a social networking application.

Blood Donation Management System is a web enabled and mobile-based application to maintain day to day transactions in a blood bank. This application is to create an e-Information about the donor and organization that are related to donating the blood. This software help to register all the donors, Blood collection details, blood issued details etc [3]-[4]. When registration is completed, a user becomes a donor who will be able to open an account providing fundamental information with email ID and Password [5]-[7]. They can modify their account information by updating username, Facebook ID, mobile number and profile picture. If donors are eager to donate blood they can confirm the system [8]. They can remove their account from the system if they wish for. In this application, Admin is the main authority who can add, delete, and modify information if required. A user is able to search donor from the home page. This application provides search facilities by donor, patient, doctor, blood bag, and other recognizable factors. A dynamic search will show donor information by nearest place and blood donation expire date. It will make easier to find and contact with donors when needed. There is add on facility of printing available as an option [9]-[11]. Interface with grouping and testing machine provides user friendly communication. This application sends various auto-SMS for alerting donor and reminding location and time. Donor can send or receive message within this system. This system will automatically alert a donor before 24 hours of donating blood reminding the location and time by sending message when he/she is again eligible for donating blood after his/her previous donating. Donor can used this application through android based mobile phone. Donors login into the system with their e-mail Id and password. It allows donor to search others by location, blood group. They can get other donors details information. If they want to contact with donor, they can directly call to available donors.

We can say in short that Blood Donation Management System is an online centralized web portal which helps blood banks, hospitals and any other users to look for donors in their nearby area who will be available in quick time. This system helps the admin to check the database when he wants and it is very flexible for the hospital management, blood banks and any users to retrieve the data when they want and they can have the data according to the query given by the user from one particular date to another by the query given by admin.

III.   METHODOLOGY

A. Concept:

A Genuine person from the Administrator side will collect information about the blood donor like contact and address details for registration [12]. After filtering the invalid data, the Blood donor will be uploaded in Online Blood Bank System site for general users. Before uploading their details, the Administrator will give unique username and password to each donor. The Administrator can also add new donor who registered through site and allows him to create his own account. The administrator searches various donors details based on normal or map based search. The administrator can view the account information and can also view the suggestion (feedbacks) given by different users of this site. The administrator can view total report of the site.

Every donor will have their own e-mail address and password with which they will login to this site. After they logged on, he can search for other donors, view his own profile, and send message to other donors in the system. He can change and retrieve his password. General users are those who are new users in this site. They can view general information about the Blood Donation System details. They can give their suggestion about this site. They can register themselves and become a donor for the Online Blood Bank system. If a general user is registered as donor, he will be given user name and password with which he can maintain his own account. General user can act as recipient to blood if he requests for blood, he can search required donor based on location using Google Map and blood group. We have used Visual Studio 2010 for doing the implementation of Blood Donation Management System. We have used Microsoft SQL Server 2008 as database server. We use mobile with SMS facility, mobile which support such application.
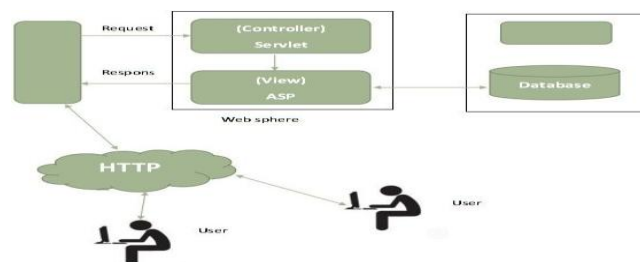

Figure1: Technical architecture of the proposed system

B. Method:

This paper is aimed to develop online blood donation information. The entire work has been developed keeping in view of the distributed client server computing technology, in mind. The system is to create an e-Information about the donor and organization that are related to donating the blood. Through this application any person who is interested in donating blood can register himself as a donor. Moreover if any general consumer wants to make request blood online, he can also take the help of this site. The work has been planned to be having the view of distributed architecture, with centralized storage of the database. The application for the storage of the data has been planned. Using the constructs of SQL Server, all the user interfaces have been designed using ASP.Net technologies. The database connectivity is planned using the "SQL Connection" methodology [13]. The standards of security and data protective mechanism have been given a big choice for proper usage. The application takes care of different modules and their associated reports, which are produced as per the applicable strategies and standards that are put forwarded by the administrative staff.

The system has been developed keeping in view of the distributed client server computing technology, in mind. The specification has been normalized up to 3NF to eliminate all the anomalies that may arise due to the database transaction that are executed by the general users and the organizational administration [14]. The user interfaces are browser specific to give distributed accessibility for the overall system. The internal database has been selected as SQL server 2008. The basic constructs of table spaces, clusters and indexes have been exploited to provide higher consistency and reliability for the data storage. The SQL server 2008 was a choice as it provides the constructs of high-level reliability and security [15]. The total front end was dominated using the ASP.Net technologies [12]. At all proper levels high care was taken to check that the system manages the data consistency with proper business rules or validations. The database connectivity was planned using the latest "SQL Connection" technology provided by Microsoft Corporation. The authentication and authorization was crosschecked at all the relevant stages. The user level accessibility has been restricted into two zones namely.

IV.   ANALYSIS

In this system, users can search donors and make request for blood. Donors can login to their own profiles and update information.They can search donor, request for blood and send message to other donors. Admin can maintain system management tasks. The use case diagram and class diagram of the system are shown in the Figure 2 and Figure 3 respectively.
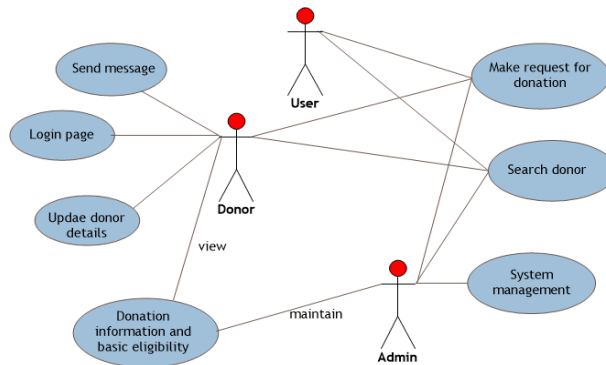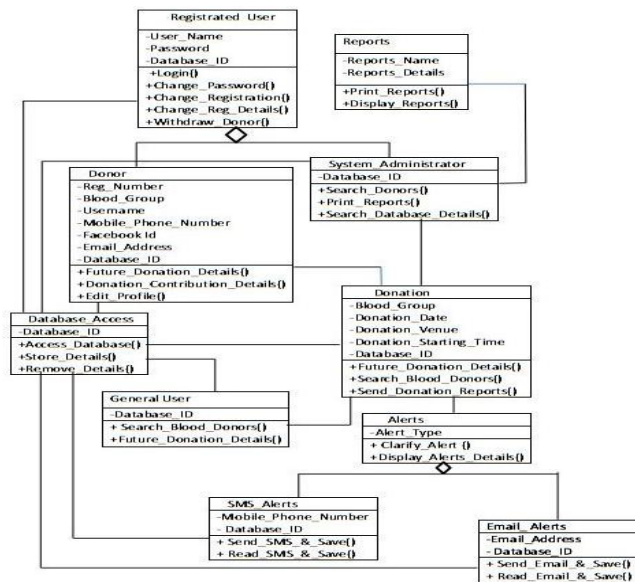
Figure 2:   Use case diagram of the system

Figure 3:   Class Diagram of the system

The database design of the system is presented in Table 1 to Table 7 below.

Attribute name	Data type	Constraints
Name	varchar(50)	Allow Null
Sex	varchar(50)	Allow Null
Phone_ number	varchar(15)	Allow Null
Email_id	varchar(50)	Primary Key
Fb_id	varchar(50)	Allow Null
Blood_group	varchar(50)	Allow Null
Weight	varchar(15)	Allow Null
Height	varchar(15)	Allow Null
Location	varchar(15)	Allow Null
Latitude	varchar(15)	Allow Null
Longitude	varchar(15)	Allow Null
Religion	varchar(50)	Allow Null
Picture	image	Allow Null
Username	varchar(50)	Allow Null
Password	varchar(50)	Allow Null
Memorable Word	varchar(50)	Allow Null
Total_donation	varchar(15)	Allow Null
Last donation Date	varchar(15)	Allow Null

Table 1: Member_entry

Table 1 contains donors' fundamental information which provides user expected result.

Attribute name	Data type	Constraints
Name	varchar(50)	Allow Null
Sex	varchar(50)	Allow Null
Phone_ number	varchar(15)	Allow Null
Email_id	varchar(50)	Primary Key
Blood_group	varchar(50)	Allow Null
Weight	varchar(15)	Allow Null
Height	varchar(15)	Allow Null
Location	varchar(15)	Allow Null
Latitude	varchar(15)	Allow Null
Longitude	varchar(15)	Allow Null
Total_donation	varchar(15)	Allow Null
Last donation Date	varchar(15)	Allow Null

Table 2: Donor_search

When we click donation form, donor's information will be removed from appointment table and stored in donation table. After 4 months, it is permanently remove from this table and return all information into Donor_search table.

Attribute name	Data type	Constraints
Name	varchar(50)	Allow Null
Sex	varchar(50)	Allow Null
Phone_ number	varchar(15)	Allow Null
Email_id	varchar(50)	Primary Key
Blood_group	varchar(50)	Allow Null
Weight	varchar(15)	Allow Null
Height	varchar(15)	Allow Null
Location	varchar(15)	Allow Null
Latitude	varchar(15)	Allow Null
Longitude	varchar(15)	Allow Null
Total_donation	varchar(50)	Allow Null
Last_donation_day	varchar(50)	Allow Null
Old_donation_day	varchar(15)	Allow Null
Last_donation_date	varchar(15)	Allow Null

Table 3: Appointment

When a user is appointed, his/her information will be removed from search table and store in this table (Table 3).

Attribute name	Data type	Constraints
Name	varchar(50)	Allow Null
Sex	varchar(50)	Allow Null
Phone_ number	varchar(15)	Allow Null
Email_id	varchar(50)	Primary Key
Blood_group	varchar(50)	Allow Null
Weight	varchar(15)	Allow Null
Height	varchar(15)	Allow Null
Location	varchar(15)	Allow Null
Latitude	varchar(15)	Allow Null
Longitude	varchar(15)	Allow Null
Total_donation	varchar(50)	Allow Null
Last_donation_day	varchar(50)	Allow Null
Old_donation_day	varchar(15)	Allow Null
Last_donation_date	varchar(15)	Allow Null

Table 4: Donated

Table 4 contains donor's information that will be donated blood in future.

Attribute name	Data type	Constraints
Name	varchar(50)	Allow Null
Sex	varchar(50)	Allow Null
Phone_ number	varchar(15)	Allow Null
Email_id	varchar(50)	Primary Key
Blood_group	varchar(50)	Allow Null
Weight	varchar(15)	Allow Null
Height	varchar(15)	Allow Null
Location	varchar(15)	Allow Null
Latitude	varchar(15)	Allow Null
Longitude	varchar(15)	Allow Null
Total_donation	varchar(50)	Allow Null
Last_donation_day	varchar(50)	Allow Null
Old_donation_day	varchar(15)	Allow Null
Last_donation_date	varchar(15)	Allow Null

Table 5: Donation_appoint

Table 5 contains information of donors who were donated blood.

Attribute name	Datatype	Constraints
Name	varchar(50)	Allow Null
Phone number	varchar(50)	Allow Null
Blood_group	varchar(50)	Primary Key
Location	varchar(50)	Allow Null
Need_amount	varchar(50)	Allow Null
Need_date	varchar(50)	Allow Null
Donation date	varchar(50)	Allow Null

Table 6: Acceptor

Acceptor table (Table 6) contains information about blood donation.

Attribute name	Data type	Constraints
Name	varchar(50)	Allow Null
Sex	varchar(50)	Allow Null
Phone_ number	varchar(15)	Allow Null
Email_id	varchar(50)	Primary Key
Blood_group	varchar(50)	Allow Null
Weight	varchar(15)	Allow Null
Height	varchar(15)	Allow Null
Location	varchar(15)	Allow Null
Latitude	varchar(15)	Allow Null
Longitude	varchar(15)	Allow Null
Total_donation	varchar(15)	Allow Null
Last donation Date	varchar(15)	Allow Null

Table 7: Fixt_donor

Table 7 is used to show monthly report of the donor.

V.   SCREENSHOTS

Figure 4 to Figure 21 illustrates some screenshots of the system.
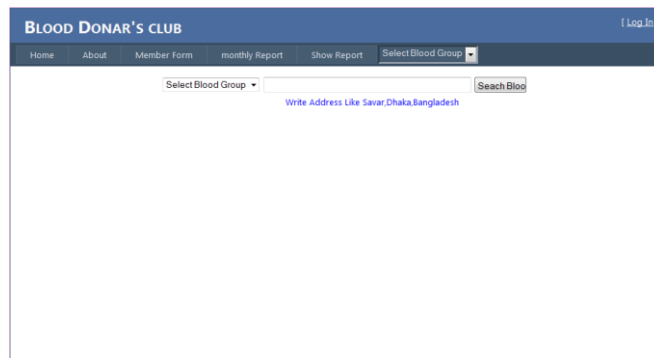

Figure 4:   Homepage

In the homepage, the search box is placed for every visitor or member searching blood quickly. They can request donors to donate blood.

Figure 5:   Search result page

The search page searches for donors who in turn can search other donors and send SMS including blood group, location of donation and date of donation to available donor.
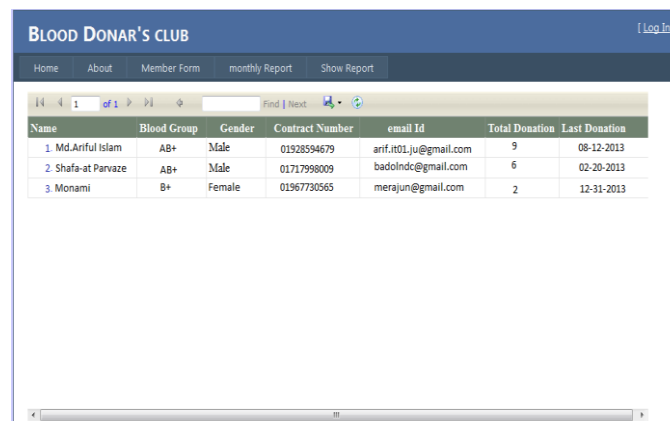

Figure 6:   Report page

The report page of donation details can be shown in Microsoft Word, Microsoft Excel, and PDF format. User can download this report.

User can register by entering name, blood group, mobile number, username, date of birth, mail address, Facebook ID, total donation, last donate date, location, weight, height, memorable word using member entry form (shown in Figure 7 and Figure 8).

Figure 7:   **Member entry form 1**

Figure 8:   **Member entry form 2**

Donor can login to his own profile by entering valid email ID and password using User Login page (shown in Figure 9).

Using Profile page (shown in Figure 10), a donor can request other donors to donate blood. He can update his profile, change password, retrieve password and delete own membership. Donor can also cancel appointment for donation blood.
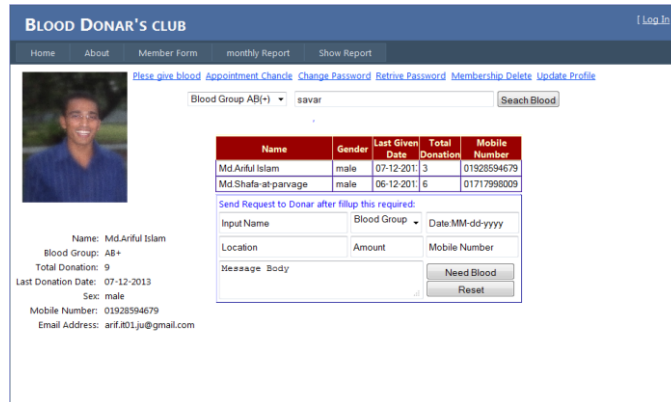

Figure 9:   **User login page**

Figure 10:   **Profile page**

Figure 11:   Donor search page

Donor can search donor (Figure 11) by blood group and location. They can send SMS including location, amount of blood, donation date to others donor for blood donation.
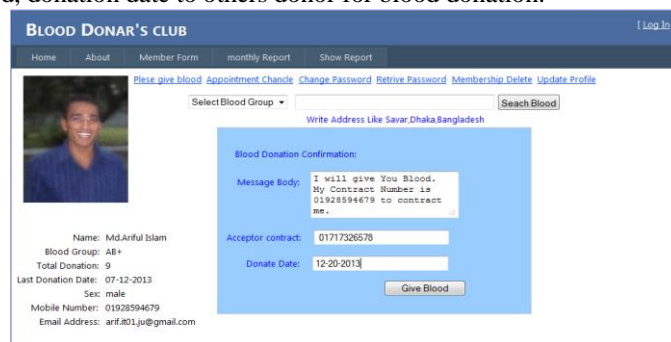
Figure 12:   Donor confirmation page

Using donor confirmation page (Figure 12), a donor can easily send SMS to acceptor to confirm for blood donation.

Appointment cancel is the page (Figure 13), where donor can cancel any previous appointment. When donors insert name, mail address and donation date and press cancel button, the message sends to appointed donor to inform them that the appointment is canceled.
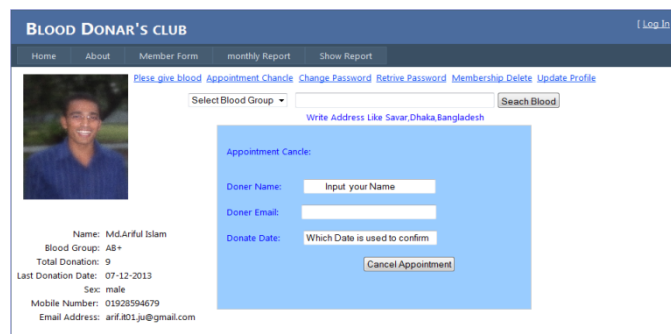
Figure 13:   Donor appointment cancel page
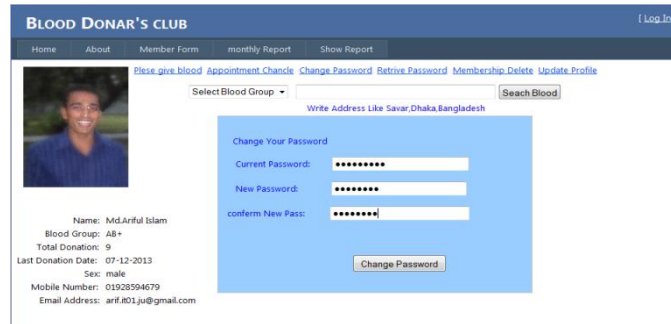
Figure 14:   **Donor change password page**

Donor can change password for better security using this page (Figure 14).
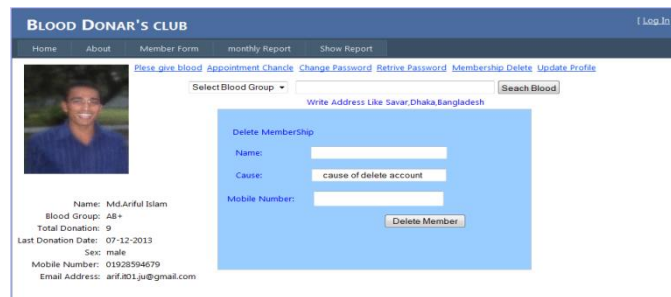

Figure 15:   **Delete membership page**

Donors can cancel membership from this system using delete membership page (Figure 15) When they insert name, cause of delete membership and mobile number into name textbox, cause textbox and mobile number textbox respectively and press delete button, they are deleted from the system.

The statistical graph of donation details is shown in Figure 16. Y-axis of the graph is donor number and X-axis is blood group. By this graph, user can easily understand information of donor.
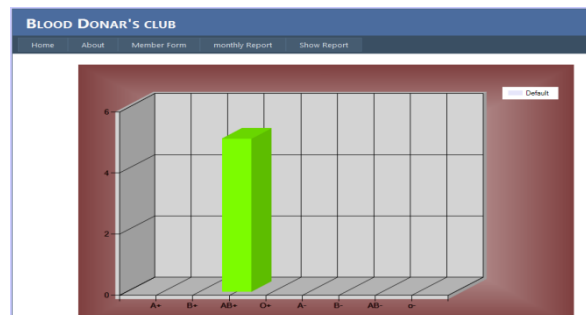

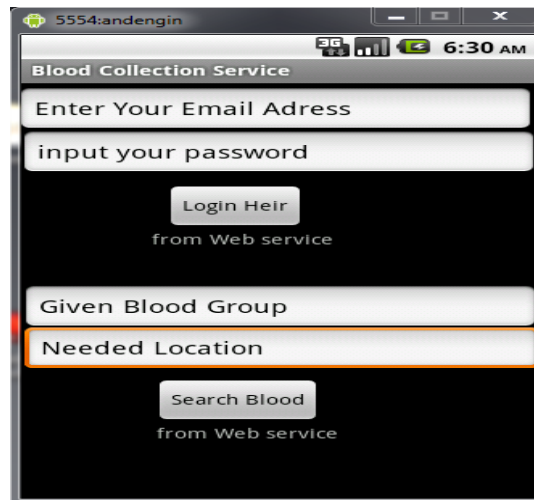**Figure 16:**   **Statistical Graph page**

Figure 17:   **Android home page**

This is the home page (Figure 17) for android application. Here, the member must login by valid mail address and password. Then, they can search donor by blood group and location where blood is needed. When donor visits from one location to another, location of donor is automatically updated. Donor is shown in current location list, while searching donor.

Figure 18:   **Android search page**

Using the android search page (Figure 18), donor can searched other donors by blood group and location.
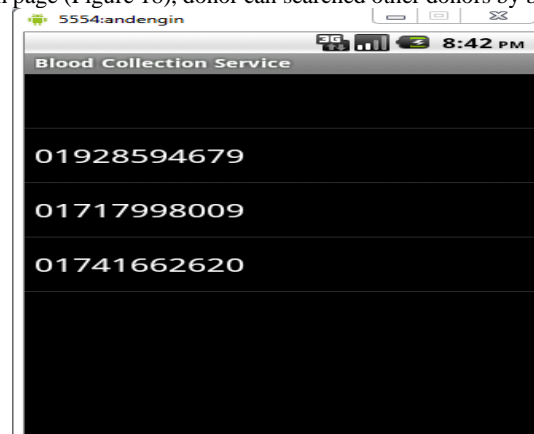

Figure 19:   **Android search result page**

After searching, donor gets available donors in nearest location. The contact number of available donors is shown in android search result page (Figure 19).
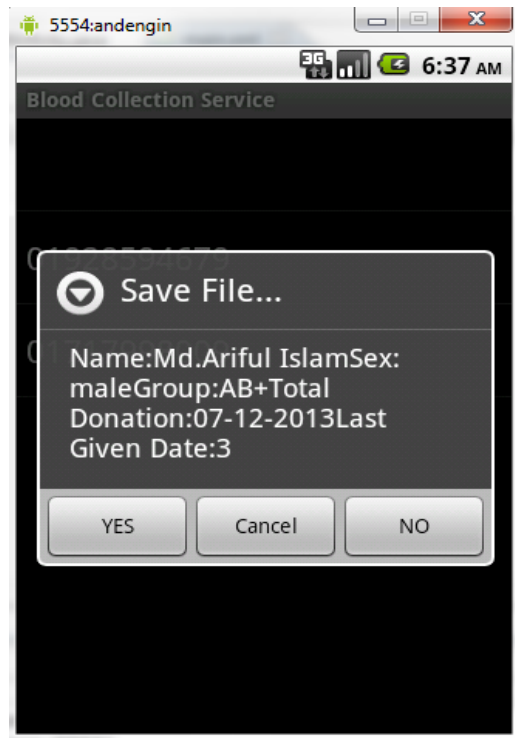
Figure 20:   **Android contact page**

When donors choose a contact number, they get details information of donor from contact page (Figure 20). They want to call donors; they press 'YES' button, otherwise press 'No'
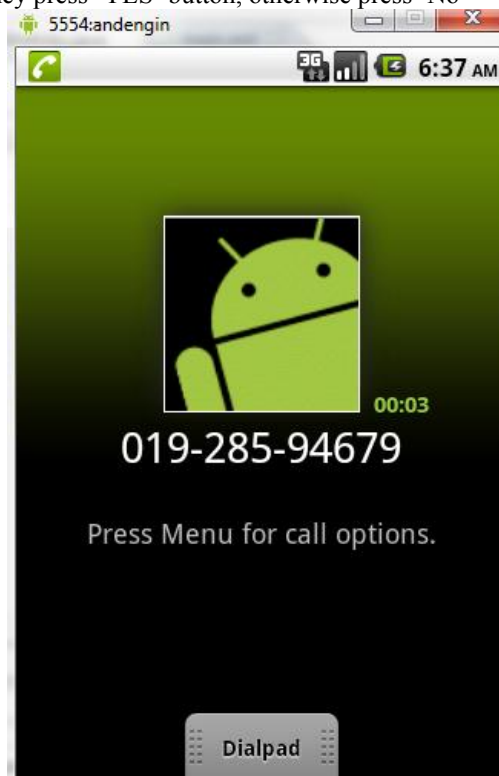

Figure 21:   **Android calling page**

Here is the donor calling page (Figure 21). Donor can directly call others donor to appoint for blood donation.

VI.   CONCLUSIONS

The Blood Donation Management System is a 24×7 system which is essential for different kinds of people like blood donation system personnel, doctors, donors, recipients and other general users. Here any person who has undergone blood test can be registered in any authorized blood bank as donor. That person can get facilities like information about blood donation system, donors and recipients. This paper facilitates services like direct access to the site to get donor's information if there is an emergency. The goal of the paper is to present an online edge for bringing mutually giving blood donors and patients (blood requesters) who need blood. The primary objective of the paper is to create an interactive blood donors, blood requesters and blood bank clinics. This web application is to be conceived in its current form as a dynamic site requiring constant updates both from the blood donors as well as the blood requesters and is to enable blood donors (volunteer) to place their profile and blood requesters (patients) to publish their requests. In future, we will develop the mobile application which will provide the users (with multimedia cell phones) the service of finding a blood donor with map interface. Here the application will consist of a map which will highlight the various blood donors' locations and also it will give information about particular blood donors.

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