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# An Extended Research on the Blood Donor Community as a Mobile Application

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## Abstract

In the developing and the least developed countries, the number of blood banks are limited and it is hard to find a blood donor with exact blood group in a crucial moment. Patients have to suffer a lot and in some cases, death is inevitable. Emergency situations like- accidents, ongoing treatments and elective surgeries create critical and immediate need for specific group of blood. In this regards, a little attention has been given on the easier availability of blood from nearest locations. In this paper, we propose a mobile phone application by which anyone will be able to look for their desired blood group at the nearest location. A large number of people is currently using smartphones running on different operating systems. The application will be developed in different platforms e.g. Android, Windows Phone or iOS, where only registered person, with willingness to donate blood will be able to access the service.

**Index Terms:** Blood Donor Apps, Donor Information, Supply Chain Network, Blood Bank, Search Engine using Blood Group and location.

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## 1. Introduction

A donation is when a donor gives blood at a blood bank or hospital to an unknown recipient. Blood donation is one of the noblest donations someone can ever make in his life. It is a great service that a person can offer to the society. In the medical field, someone needs blood to save someone's life every minute. In developing countries like Bangladesh, local blood banks receive blood from various donors, monitor the blood groups database and send the required blood to the hospitals in case of emergencies. But the blood resource lacks in quantity which is a barrier to save others life in a critical moment. The decentralized nature of donor and limited information hampers blood availability at serious times. It is quite difficult tracking the database for particular blood group and maintain it updated using existing system.

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Blood donation can occur at a number of places including blood donation centers, mobile camps and mobile vans etc. There are various types of blood donations such as voluntary blood donation program or donation in emergencies. This is the foundation for safe and quality blood transfusion service as the blood collection from voluntary non-remunerated blood donors is considered to be the safest [1]. But it is a time consuming and lengthy process.

In Bangladesh, organizations like Sandhani and Bangladesh Red Crescent works on safe blood transfusion. The group of people donate blood mostly are aged between 18-25 years (43%). Rest of them are between 26-30 years (23%), 31-40 years (25%), 41-50 years (7%) and 51-60 years (2%) [2]. The maximum numbers of donors are students (58%), others are Businessmen (21%), Service holders (19%) and Housewives (2%) [2]. Sandhani collected 37403 bags of blood in 2010-11, 38102 bags in 2011-12 and 38604 bags in 2012-13 from general people and donors [3]. But the number is still not enough in the context of country like Bangladesh because of the vast population. If anyone want to collect blood or wants to donate blood in Sandhani or Red Crescent society they have to find the donation centers which are not enough compared to the population density. For emergency cases it is not possible all the time to collect blood from those centers because the number of centers are limited.

Field of science and technology has reached such a level that people are expecting more comfortable and useful ways which can make their lives easier. One might expect digital technologies will play a role in human's daily routines which will make their life more comfortable. People who are searching blood in case of emergencies and those who donate blood very often or people who are wishing to donate blood in future facing difficulties because of communication barrier. Mobile technology can play a vital role to reduce the gap between them.

This paper is organized as follows. Section two deals with the related works and relevant peer research in the context of this paper. Section three describes problem domain and the proposed approaches. Section four describes details data analysis and results. The conclusion is given in the final section.

## **2. Related Works**

Donors past donation profiles can be helpful to setup new blood donation centers with maximum donorship potential [4]. A research was carried out for Hong Kong Red Cross to setup new blood donation centers. They have extensively analyzed the linkages related to the blood donation to the location of the blood donation centers. Their findings provide correlations between spatial distance and the incentive for the blood donors which are the uniqueness of this research [5]. The importance of decision making capability is required for effectively running the operations in blood banks. There are various critical areas that are required for the systems to also have in order to enable decision making [6].

In developed countries there are dedicated organizations that have effective blood donor management processes. One such example is the U.S. department of defense (DOD), which uses an enterprise blood Management software that will manage the blood supply chain including donor management, blood collections, testing, distribution and transfusion. Additionally this also provides a proactive delivery of information and services through a web portal [7]. Using cloud with data mining techniques, the implementation of blood donor recruitment strategies are recorded, where the information about the recruitment is to be considered by focusing on social networks and community rather than intrinsic altruism [8]. To improve data confidentiality using Novel Techniques by data mining where this novel technique in blood donor recruitment information and management system for smart phone application user is seen here [9]. Currently, smartphones are widely used worldwide. So an Emergency Panic Button option [10] [11] in smartphones can be used to provide facility to the customer who suffers from the accident. Most of the applications are unable to provide location and spatial search for geographical location for blood donors. But by using GPS and GSM with blood donor application in smartphones they can be tracked [12]. It can provide the location of the donor and spatial search for geographical location for blood acceptor.

### 3. Problem Domain and Proposed Approach

Across Bangladesh, every day there remains an urgent need for all types of blood groups. Emergency situations like accidents and major surgeries, a large amount of blood is needed. But the lack of blood bank in a specific area seems to be a big problem. Most of the people collect blood within their relatives, friends or friends of friends but when blood of a rare group is needed, people have to face problems to find their required blood in blood banks, hospitals or from donors. Though people found blood banks, most of the blood banks do not have sufficient stock of different group's blood. In some areas, there are more than 50 hospitals and only 6 blood banks are available and also they have a very low amount of blood in their stock [13]. The problem which currently exists in the medical field is that blood is needed immediately for an injured person or any major operations; it is not easily available even though blood banks are present [14].

In developing country like Bangladesh, there is hardly dedicated organizations that have effective blood donor management processes. The recruitment of blood donor when compared with other countries is very less in overall blood donating percentage annually [15]. Besides this recruitment, the screening of donor and the management system is not well maintained. There are some websites present for donating blood. They have the phone numbers of the donors are present which are not reliable since they don't get updated regularly. As a result, when people look for blood donor they don't know where to find them. They normally looks for someone in their relation or places nearby in search of required blood group but most of the time it doesn't actually work.

In this regard, our findings propose to develop a mobile application which will help to find a blood donor. A donor database will contain all the necessary information starting from donation centers to blood donors' contact information. If anyone wants to be a blood donor, he must register in the application by filling some required information like name, date of birth, gender, cell phone number, blood group and the last date of blood donation if donated blood in past. Also a registered person can broadcast his current location using the application. If blood is needed, other people will be able search their desired blood group using a search option. Search engine will search donors regarding blood group, age and last donation date at nearest locations. If there is any desired blood donor found, a message will be sent to him for a donation request. If the donor agrees, further information such as donating location, time and date will be sent. The only thing that a receiver has to do is press a button and he will get all the necessary information about blood donors. Every donor will be qualified to donate blood after four months from the last date of donation. If donors donate blood, there will be an update option for updating their blood donation information but it will verified by blood receiver.

### 4. Data analysis and Results

All the participants were explained about the aims and objectives of the study. Written consent was taken from the participants. Particulars of the each participant were taken in a data collection sheet. We collected different types of data related to blood donation.

Table 1. Blood Group Percentage

Blood Group	Percentage
O+	33%
B+	30%
A+	21%
A-	1%
O-	1%
B-	3%
AB+	8%
AB-	1%

Table 1 and Fig. 1 show the percentage of blood of different group. Out of 230 people, group O+ predominant with 33%, followed by group B+ with 30%, group A+ with 21%, group A- with 1%, group O- with 1%, group B- with 3%, group AB+ with 8% and group AB- with 1%. But previously, another survey recorded 27.6% people having group O+ and 39.6% people with group B+ [16].

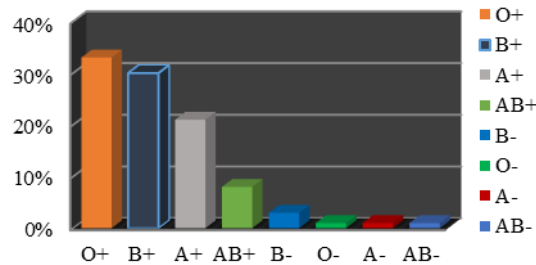


Fig.1. Blood Group Percentage

Fig. 2 represents the percentage of smartphone user. Among 230 people, 78% of them use smartphone and 22% of them use feature phone. But an earlier study found 34% smartphone user in Bangladesh [17]. Regarding the information above, it is clear that the number of smartphone user is increasing rapidly.

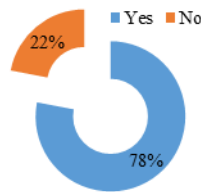


Fig.2. Smartphone User Percentage

Table 2 and Fig. 3 describe the type of smartphone using percentage of the people. 63% of them use Android smartphone, 7% of them use Windows Phone, 6% of them use iOS smartphone and 24% of them use other operating system.

Table 2. Type of Smartphone using Percentage

Smartphone use	Percentage
Android	63%
Windows phone	7%
iOS	6%
Other	24%

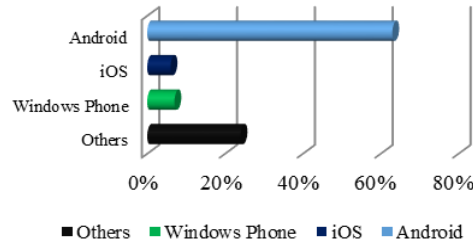


Fig.3. Type of Smartphone Using Percentage

Table 3 and Fig.4 show the percentage of relation between blood donor and receiver. 46% of them donate blood to their relatives, 39% percent of them donate to unknown person and 15% of them donate blood to their friends.

Table 3. Relation between blood donor and receiver

Relationship	Percentage
Relative	46%
Unknown person	39%
Friends	15%

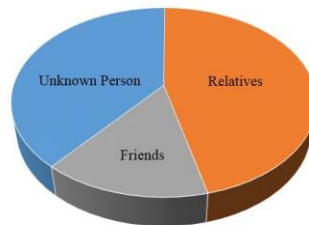


Fig.4. Relation between Blood Donor and Receiver

Fig. 5 describes the percentage of people who are interested to donate blood in future. 90% percent of the whole wants to donate blood in future which a very large proportion, comparing with the other.

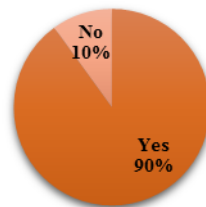


Fig.5. Interested to Donate Blood in Future

Fig. 6 is about the percentage of people who faced problem during collecting blood. Among 230 people, 58% of them faced problem and 42% of them did not face problem.

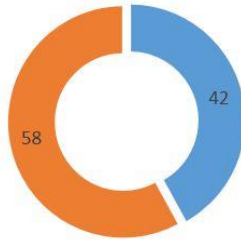


Fig.6. Problem Faced During Collecting Blood

Fig. 7 represents how people manage blood when blood is urgently needed. 37% of people collect it from friends, 40% from their relatives and 13% from unknown during emergencies.

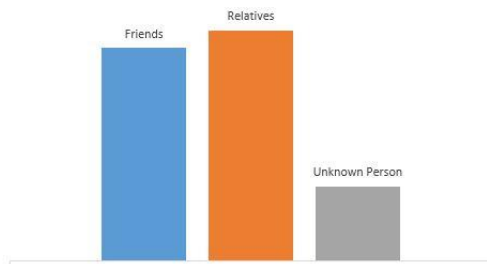


Fig.7. How People Manage Blood during Emergencies

Fig. 8 shows that percentage of system or method is usually uses to collect blood. 65% of them collect it through phone calls, 23% of them use social media, 11% of them use blood banks and only 1% of them use any website.

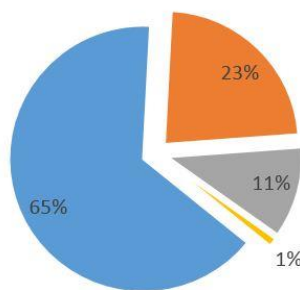


Fig.8. Types of System Use to Manage Blood

Fig. 9 shows the percentage of satisfaction level of people with the current system. 48% of them are satisfied with the current system but 52% of them are not satisfied with it.

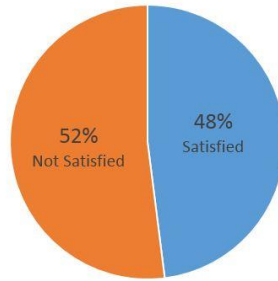


Fig.9. People Satisfied With the Current System

Fig. 10 shows the response that a donor database with an mobile application will be helpful or not. 97% of the people say that it will be helpful and only 3% of them thinks that it should not be implemented.

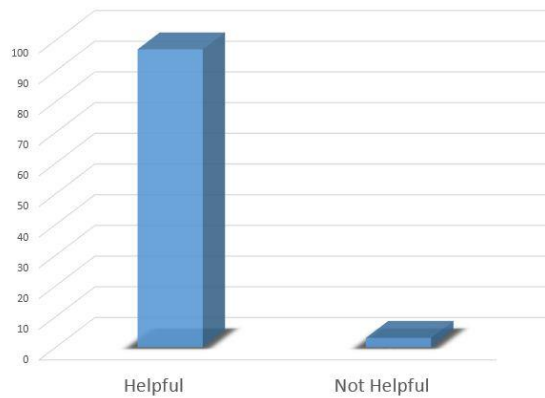


Fig.10. Helpfulness of a Database and a Donor Application

The present study has been carried out to determine the importance of blood donor community application which will hold a database of blood donors' information. Using this application people will be able to search their required blood group without any disturbance. Blood donor application can solve the blood donation problem no doubt. It can also decrease the rate the maintenance problem in blood banks and will be cost effective also.

## 5. Conclusion

Crisis for blood was always there in the hospitals of Bangladesh regardless of being public or private. A timely response of healthy blood can save valuable lives. In this study, we have tried to link the donors using mobile platform and a repository. It will make possible to measure the number of donors in a small or large area according to the data given by the donors. It will be helpful to those people who will be looking for blood in case of emergency and also reduce the pressure for growing demand of blood in local blood banks and hospitals in the area.

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**Abhijit Bhowmik** is an Assistant Professor at the American International University Bangladesh (AIUB) and a Senior System Analyst at the Workspace InfoTech. His research areas are Web Technology, Data Mining, Wireless Sensor Network, Image Processing and Software Engineering. His research specifically focuses on software defects and how people and society discover, diagnose, repair and recover from them, spanning everyone from the people who use software to the people who develop it. He has completed his Master's Degree major in Networking in 2011 and Bachelor degree in Computer Science and Engineering in 2009 from American International University Bangladesh (AIUB).

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**Debajyoti Karmaker** was enthralled by the power of computers and intrigued by the ideal of becoming a computer scientist from his childhood. With the evolution of time, he is now working as an Assistant Professor in the Department of Computer Science at American International University Bangladesh (AIUB) from where he earned both of his B.Sc. and M.Sc. in Computer Science. Throughout his academic and professional career, he was always a curious and research active person and at this point he has the urge to undergo further research and delve deeper into the subject matters at an institute of international eminence under the guidance of distinguished researchers which would strengthen his knowledge and enable him to realize his potential to the maximum.

**How to cite this paper:** A Bhowmik, N A Nabila, M A Imran, M A U Rahman, D Karmaker, "An Extended Research on the Blood Donor Community as a Mobile Application", IJWMT, vol.5, no.6, pp.26-34, 2015.DOI: 10.5815/ijwmt.2015.06.04