

# A Mobile Application for Blood Transfusion in Sri Lanka for Emergency Cases Based on Government Hospitals

KCM de Alwis#, EMSK Ekanayake, MMNH Bandara and D Ganepola

*Department of Information Technology, Faculty of Computing, General Sir John Kotelawala Defence  
University, Sri Lanka*

#chamodidealwis@gmail.com

**Abstract** - Blood is known as one of the most precious gifts that humankind can give to one another, and the need for blood is most felt when one begs for life from anaemia. In an emergency, the increase in the number of victims is uncontrollable and a victim may need more than 100 pints of blood. In today's challenging environment, a Mobile Application for the transfusion of blood is a great blessing, and the goal here is to find blood donors in the shortest amount of time. This paper is primarily concerned with the transfusion of blood in the shortest possible time in an emergency. The proposed Mobile Application allows blood donors to enter details, including blood type, the location used by Google Maps and contact information. This Mobile application enables hospital staff members to request blood from the donors in an emergency through voice input. Hospital staff can track where the donors are according to their predicted minimum time, and could contact them for blood needs. The hospital should be able to provide transport facilities to solicit accepted donors. This blood transfusion system is crucial in emergency blood distribution, because it allows for central and immediate access to donor data and location from any location. The primary goal of this paper is to maintain a well-informed group of blood receptors that can be used at any given time.

**Keywords:** *mobile blood transfusion system, emergency, blood shortage*

## I. INTRODUCTION

Donated blood can be lifesaving for persons who have lost substantial amounts of blood because of serious accidents, new medical and surgical procedures, civil conflicts, and military wars as well as for patients who have become severely anemic because of serious hematological

diseases or treatments such as cancer therapy. Therefore, the availability of blood is an important concern to society. Blood Donation is a selfless act that will help to save one's life. Even though a vast number of blood transfusion mobile applications have been developed, most of them do not incorporate voice recognition as an input or are not designed for a large crowd in an emergency case. Therefore, it is mostly focused on building a blood transfusion mobile app to address these issues. According to the World Health Organization (WHO), 108 million blood transfusions are performed annually from all types of blood donors. (Voluntary free, family/replacement, and paid), with 65 percent of blood transfusions provided to children under the age of five in low-income countries. It is worth noting that about half of all blood donations are raised in high-income countries, which account for 15% of the global population. The WHO has set 2020 as the target year for all countries to receive 100% of their blood supplies from unpaid volunteers. (Sofia Ouhbi,2015) Supply chains of blood donation have been more complicated in recent years than in the past. Most of the deaths may have been caused due to a lack of blood donation or a delay in receiving blood. However, these inefficiencies in the blood donation chain caused due to the complexities can be minimized with the aid of technology. Technology-based blood transfusion aiding applications can save lives by:

- assisting blood donors to easily locate donation centers & keeping track of their blood donation activities.
- assisting blood requesters to easily find blood donors on time to save their loved one's life.

Considering the blood transfusion service of Sri Lanka, this is a manual procedure. Finding the nearest blood bank in Sri Lanka is performed through a manual cluster system. In case of an emergency, hospitals inquire about the victims' families and friends to see if a blood group that matches a victim can be found. If they are unable to locate them, they check into blood banks located in the area the hospital is located. Recently implemented in finding blood donors through social media sites such as Facebook. (National Blood Transfusion Service, 2016). However, during an emergency where blood is required in mass amounts for many patients (e.g., due to a mass bombing, large-scale accidents, etc.), the above procedure is inefficient to locate blood donors on time. If they fail to locate blood using the methods described above, the patient faces certain death. A recent example is at the time of the Easter attack in April 2019, six blasts that rocked Colombo and Batticaloa on Easter Sunday have left at least 160 dead and over 300 injured. The high casualties have caused an overflow of patients requiring treatment in hospitals. Sri Lankans requested people to donate blood through social media (news18, 2020). To minimize such inefficiencies in situations where a large crowd needs blood, we develop this mobile application. This mobile application is not only useful in emergencies but it can also be used for other small-scale blood transfusion services as well specifically developed to our country Sri Lanka based on government hospitals.

## II. LITERATURE REVIEW

(M. Fathima, A. Valarmathi, 2017) had developed a mobile application. The features included timely updating the information regarding the donors where the administrator accesses the whole information. The donor will be prompted to enter an individual's details, like name, phone number, and blood group. However, the drawback is that This app is designed for a single user, but it should be able to handle a large crowd in an emergency.

(K M Akkas Ali<sup>1</sup>, Israt Jahan, Md. Ariful Islam, Md. Shafa-at Parvez, 2015) had developed a Blood Donation Management System with a

smartphone app to go along with it. Donors must build profiles by entering basic details such as their name, blood type, email address, password, and precise location. From the home page, visitors can search for blood donors by blood group and location where blood is required. However, the drawback is that This device is also intended for a single person, but it should be able to manage a large crowd in an emergency and does not have voice recognition as an input.

(Moh. Nabil a, R. Ihab b, H. El Masr c, S. Said d, S. Youssef e, 2019) had developed a Cloud medical monitoring and Web-Based Blood Donation System will allow blood donors and patients to offer/request blood donation from blood banks. Medical experts remotely monitor the health status of patients and give prompt medical advice However, the drawback is that This system is also designed for a single user, but it should be able to handle a large crowd in an emergency.

(T. Hilda Jenipha R. Backiyalakshmi, 2014) had developed a Blood Donor App that offers a list of potential donors in your area. Only those who have enrolled and are willing to donate blood will be eligible to use the program. Users would be able to locate matching blood group donors in their area using a location-based app. However, the drawback is that Voice recognition is not included as an input here it should be included since no one can type in an emergency.

(Prof. Snigdha<sup>1</sup>, Varsha Anabhavane, Pratiksha Lokhande<sup>3</sup>, Siddhi Kasar<sup>4</sup>, Pranita, 2016) had developed a mobile application that includes a directory of local blood banks. A donor will be asked to enter personal information such as a person's name, phone number, and blood type. The app makes use of GPS (Global Positioning System) technology to track the route to the blood bank. However, the drawback Voice recognition is not included as an input.

(Sofia Ouhbi · Jos´e Luis Fern´andez-Alem´an · Ambrosio Toval · Ali Idri · Jos´e Rivera Pozo, 2015) From the 188 apps found, a search of Google Play, Apple App Store, Blackberry App World, and Windows Mobile App Store yielded 169 free BD apps. Most of the apps chosen were created for the Android operating system,

according to the findings presented in this paper. However, the drawback is that The App should be able to operate any phone brand and be available in any app store. (Samy S. Abu Naser, Dr. Ihab Zaqout, Rreham K. Abumughessib, 2016 that connect users with the Blood Centre to facilitate the blood collection from donors. However, the drawback Voice recognition is not included as an input.

### III. SYSTEM DESIGN

This mobile application has two types of users: donors and hospitals (authorized personnel from the blood bank division at the hospital) This mobile application supports the following technologies:

**1. Voice recognition for input-** It can capture speech much faster than you can type, which is useful

in an emergency, and it has drawbacks as well, especially in emergencies where voice commands are lost in the background due to ambient noise. However, the voice input embedded in this mobile application has the capability of filtering background noises and identifying the specific voice of requests.

**2. Geo-Location & Geo Tagging -** During an emergency, it is helpful to find donors using a variety of location-specific information and to identify the geographic location of the donors, specifically near the hospital that needs blood.

**3. OTP/Fingerprint for User Verification-**It is advantageous when it comes to donors accepting emergency blood requests because fingerprint identification is unique, highly accurate, and simple to use.

This app provides awareness about the basic requirements that a donor must meet for a blood transfusion when things need to be done urgently.

To assess the feasibility of a mobile application, we had to conduct a survey. According to the survey, 100% of the 40 respondents are willing to donate blood but only 2.50 percent have used a blood donation mobile app previously.

The most common blood type is B+, and 12.82 percent are unaware of their blood type. It would be beneficial if we create an awareness program for them to assist them in determining their blood type.

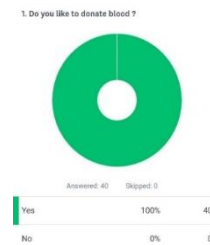


Figure 1-Willingness to donate blood.

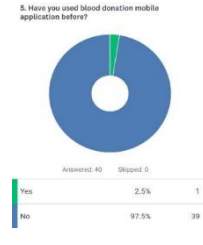


Figure 2-Before usage of Blood Donation app

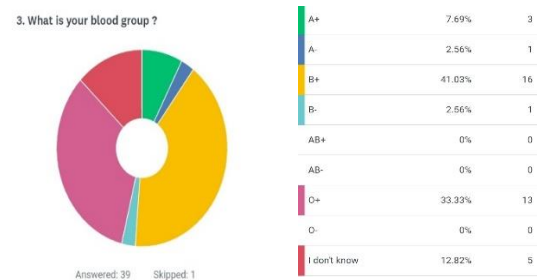


Figure 3-Blood group Classification

100% believe it is effective to design a mobile app that aids in blood donation.

6. Do you think it's effective to develop a mobile application that helps for blood donation?

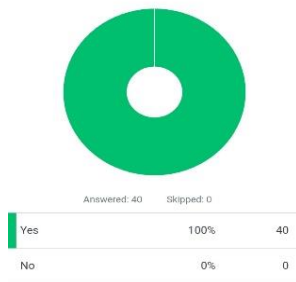


Figure 4-Effectiveness of developing a mobile app.

Also, according to the responders' suggestions, Sri Lanka's daily blood needs, current blood storage status, and blood group information should be available in a mobile application and available on both Android and iOS.

### Proposed System

The interfaces in our proposed application are designed and set up in such a way that both the donor and the requesting hospital can communicate with one another. The Mobile Application will track where the donors are according to their estimated time of arrival to the hospital and will contact them through calls in case of an emergency for blood needs.

During an emergency, we use Geo-Location & Geo Tagging to find donors using a variety of location-specific information and to identify the geographic location of the donors, specifically the year the hospital requires blood and OTP/Fingerprint for user Verification It is advantageous for donors who accept emergency blood requests. It provides an elevated level of security as well as multiple levels of authentication. It provides central and immediate access to donor data and location from anywhere.

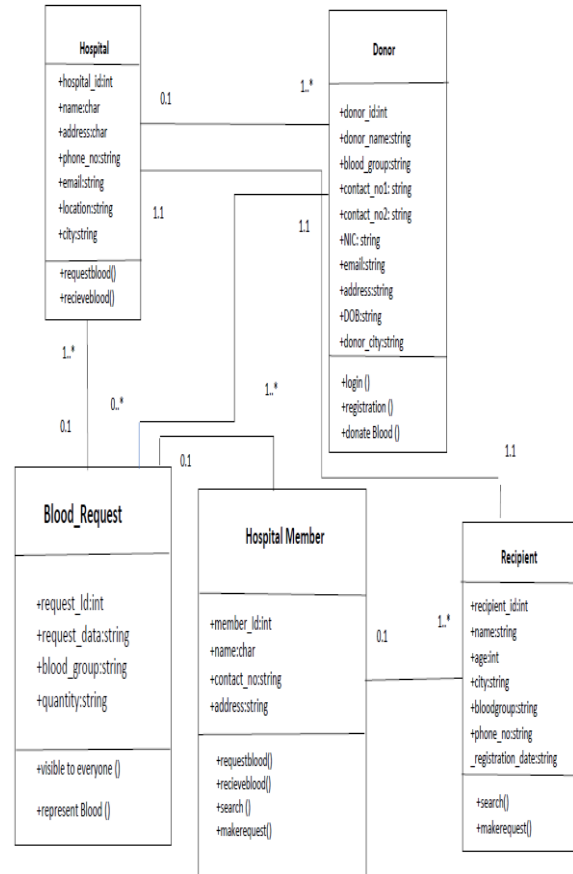


Figure 5-Class diagram for the proposed system

When a user first opens the Blood Donation Mobile Application, the main page appears as shown in Fig. 6 And we named our mobile application as “ප්‍රාණ”.



Figure 6-Main page 1



Figure 7-Main page 2

## 1. DONOR REGISTRATION ELIGIBILITY VERIFICATION

Only users who weigh more than 50kg and are over the age of 18 can register for this app also If donors have previously donated blood, they must wait at least four months before donating again.

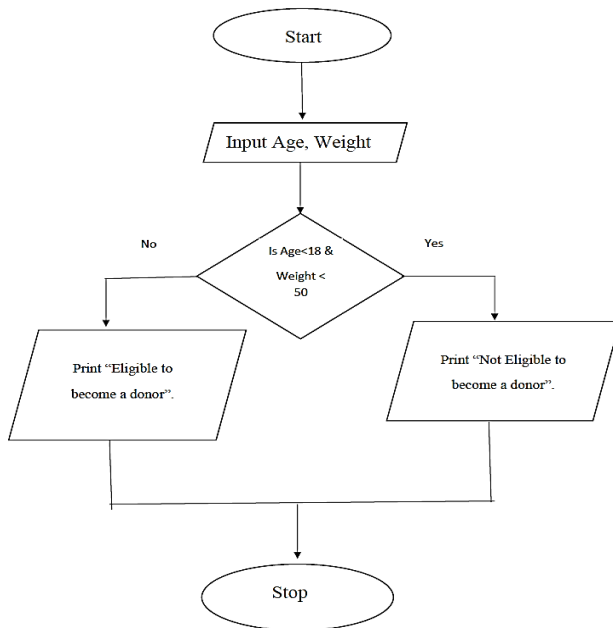


Figure 8-Flowchart to calculate the time to wait for the next donation.

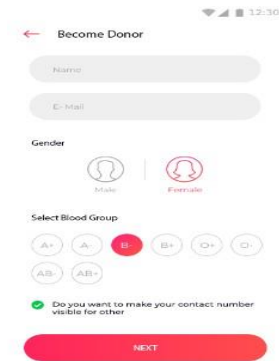


Figure 11-Eligibility Check

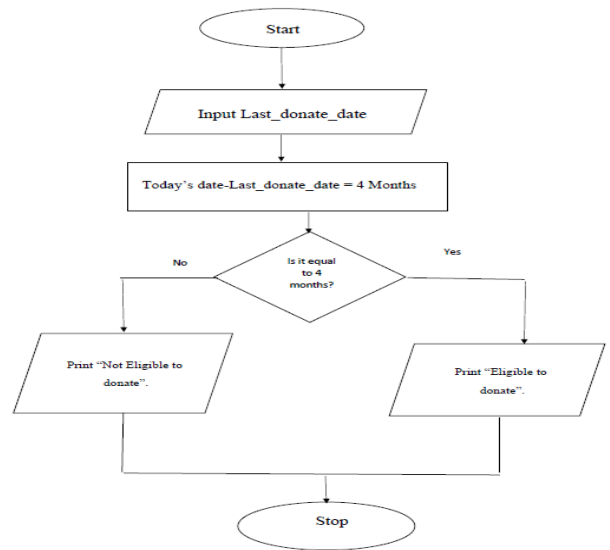


Figure 12-Flowchart to calculate Eligibility.

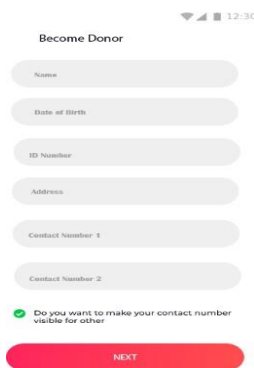


Figure 9-Registration

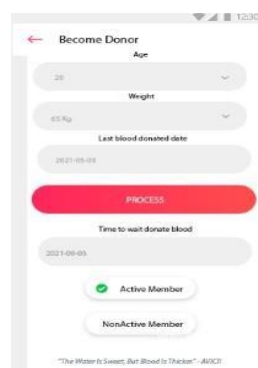


Figure 9-Registration

## 2. DONAR INTERFACES



Figure 13-Login

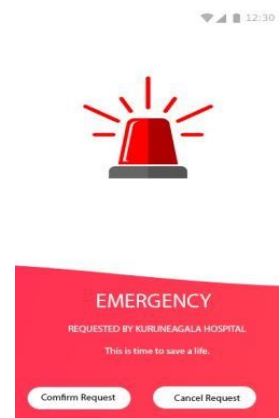


Figure 14  
Emergency

It saves time since the user can log in to the system using a fingerprint.

A donor profile displays the donor's name, profile, and how many donations the donor has made thus far.

This Emergency interface is displayed on the donor's interface during an emergency.

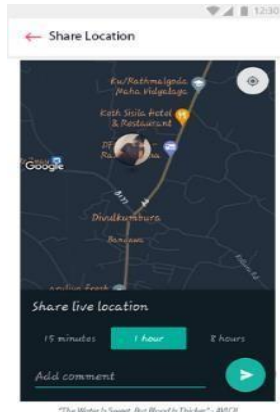


Figure 15-Share Location

After clicking confirm button application displays the share location option.

### 3. HOSPITAL INTERFACES



Figure 16-hospital portal

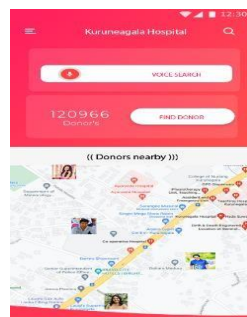


Figure 17-Search portal

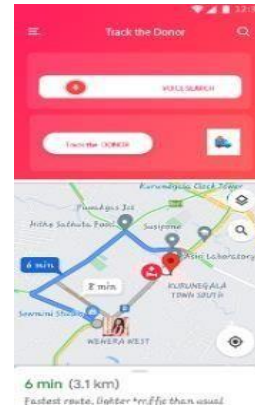


Figure 18- Search Donor for an estimated distance

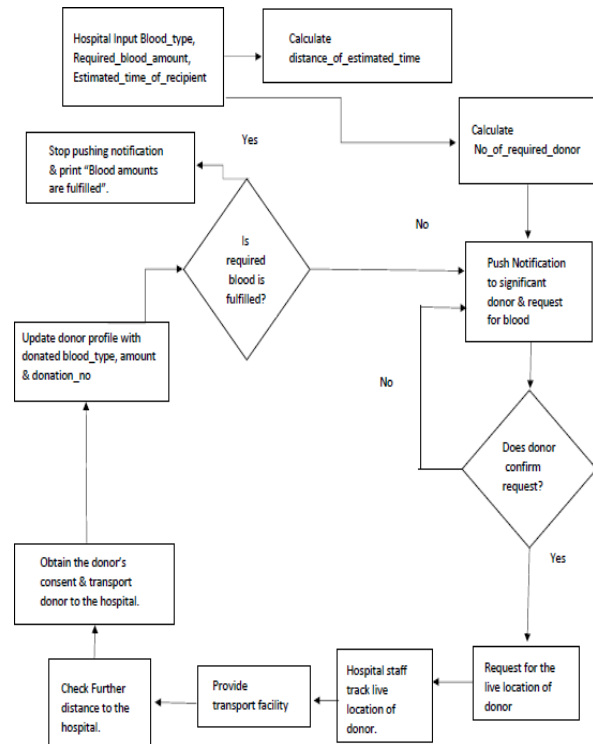


Figure 19-Workflow diagram for an emergency

### IV. CONCLUSION

The main objective of this article is to reduce the Inefficiency caused during transfusion when large amount of blood is required. The proposed solution is in which both the donor and requester are transparent. The app helps to locate the nearest hospital and blood bank. Can be used in rural areas where hospitals and blood banks are far away.

### V. FUTURE WORK

After donating blood in one of the blood donation programs in collaboration with a government hospital, those who wish to donate blood again will be registered with this mobile application. Creating an association with awareness programs through mobile applications targeting the youth generation. Implementing programs to check the basic requirements for blood donation in collaboration with the nearest hospital. Giving users a higher priority in case of emergency blood needs by issuing a card categorized as gold and silver based on donation blood recommending it to donors.

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### AUTHOR BIOGRAPHIES



KCM de Alwis is a 3rd-year information technology undergraduate of faculty of computing, General Sir John Kotelawala Defence University



EMSK Ekanayake is a 3rd-year information technology undergraduate of faculty of computing, General Sir John Kotelawala Defence University



MMNH Bandara is a 3rd-year information technology undergraduate of faculty of computing, General Sir John Kotelawala Defence University