BLOOD 365 Blood Donation Mobile Application

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ABSTRACT

Every two seconds, someone needs blood in the world. However, the lack of blood needed at the right time can lead to loss of life. The blood donation system is still in the old notch, even though the world is now in the era of technology. Furthermore, the covid-19 pandemic plaguing is now exacerbating the situation where people are not allowed to gather in public places, usually where the blood donation process occurs. People are also afraid to gather, let alone donate their blood in the open. Blood banks are also increasingly short of blood stocks. The blood bank stores the blood in the refrigerator for up to 42 days. However, if the blood is not used at a valid time, the blood will be wasted. In India, 2019, data show that 6 million litres of blood are wasted due to the valid use of blood expired. Thus, blood banks need new blood collection strategies related to blood donation activities with today's digital innovations. Therefore, this study was conducted to develop a mobile application that allows blood donors to be searched in real-time. The Blood Donation application, or called Blood365, will overcome the wasted blood problems. Through the Blood365 app, donated blood will be guaranteed to be done in hospitals that need blood. The application allows the blood bank, doctor, and patient heirs to request the donor's blood. The corresponding blood donor can accept or even reject the request to donate the blood. The Blood365 app comes with news and information related to blood donation, such as blood donation benefits, blood donation process, and things or foods that can be eaten before and after blood donation. The Blood365 app also provides a donor blood donation history and notifications if the last three months of the donating period have expired for donors to donate blood again if desired. The Blood365 app was developed using a waterfall methodology as each of its phases is simple and easy

to understand. Thus, the Blood365 application developed is expected to help the blood collection process in real-time efficiently and save the lives of those who need it. Waterfall Methodology is used to develop this android application. Flutter is used as a framework of the application which is on dart programming language.

1. INTRODUCTION

People have struggled for blood from the beginning of the modern health care system. In many cases, hospitals cannot prepare blood for emergency patients. The blood banks sometimes run out of specific blood groups. Patients often use social media for the required blood. However, they face difficulties finding blood during an emergency. Numerous blood delivery systems were developed in the past. Nevertheless, none of the systems works appropriately. Therefore, a functional mobile application can help patients and hospitals to find emergency blood whenever required.

The smartphone is a widely used platform in Malaysia. Malaysia has a population of about 25.08 million internet users (79% of the population). Smartphone penetration is very high in this population. In addition, Malaysia's population of 31.2 million includes 24 million social media users, 21.6 million unique mobile users, and 22 million who use social media on their mobile devices. (Anon. 2018). Therefore, it can be said that a mobile application can be an acceptable platform for Malaysians. A mobile application for blood service can be a breakthrough for the health care system in Malaysia.

Not much research has been done in the field of blood services. Furthermore, this topic is neglected by researchers since this field brings less income. However, a blood donation system can contribute to society and the welfare of the Malaysian population.

2   PROBLEM STATEMENTS

The world is facing a dangerous disease called the Covid-19 virus. The pandemic is all over the world. There is no proper vaccine yet on the market. Hence the patient can be recovered by taking plasma from the recovered patient's blood. It is not easy to find a plasma donor when it is required. The plasma must be from patients of the same blood group. Due to the pandemic, the blood banks are facing problems storing blood. Usually, blood banks arrange numerous events in public places to collect blood. Due to the pandemic situation, it is not possible to arrange such events.

To find the donor, the Blood donation app should ensure a user-friendly interface and functionalities. There exist several Blood donation applications nowadays. However, these applications are not user-friendly and do not have enough functionality to ensure user availability. Some of the applications do not provide user data that might help guest users access donor details. In comparing the blood donation platform, there is another issue in the existing app: the Blood seeker can only request the blood, whereas in most cases, the patient needs plasma. In addition, the applications do not have donation reminders and donation history where every use to user base system should provide this function. The user-to-user base application should benefit both users because donor and blood seeker are equally important in the blood donation system. The existing blood donation applications do not provide the points system that could benefit the user to use for the medical discount. These functionalities should be provided by the applications to gain user satisfaction. Hence, these gaps in functionalities in the existing applications motivated the author to develop a new blood donation application called "Blood365".

3   OBJECTIVES

This project aims to develop a mobile application called "Blood365," a platform for blood donors and blood donation seekers. To obtain the objectives, some sub-objectives need to be accomplished. The sub-objectives are stated below:

1. Identify the project's requirements, such as the background, the problem statements, the objectives, the scopes, and the methodology, including the applications' flow.

2. Develop an application based on the project's requirements.

3. Conduct the usability test for the developed apps

4 METHODOLOGY

To establish this flutter framework, Waterfall Methodology is used. This technique ensures high consistency with the product's rapid development. The Waterfall model allowed the developers to be innovative and address the issues before progressing to the next step. If the previous stage is not over, the next step will not be started. Thus, the steps do not conflict with one another. The product is manufactured in units where each product component is evaluated and updated before creating the next unit. According to Balaji (2012), proper documentation of the development's quality is followed at each stage. Figure 1 shows the development process of the mobile application using a waterfall methodology.

4.1 Discussion Phase

In this phase, the problem, the scope, objectives, and questions are defined. The concept of design and visualization of present blood donation systems is the focus of the study on related platforms. The discussion phase is important for project development because it identifies the requirements of project development.

4.2 Analysis Phase

In this phase, the requirements are analysed to understand the problem. All the requirements are listed in the specification document.

4.3 Design Phase

This phase involves the development of a concrete solution concept based on the previously determined requirements. The system and hardware requirements, architecture, framework, prototype to develop the software are determined.

4.4 Testing Phase

The most important step of the waterfall model is when the units are combined to create the final result. In this phase, all the units were separately tested before integrating the full system. The acceptance tests created during the analysis phase may be used to verify whether the program fulfils the requirements that were previously specified. To test the system's result and behaviour, black-box test design techniques are used as a testing process. Several public users have tested the application to verify functionality of the application based on the requirements.

5   Development Results

The 'Blood365' development results are discussed in this section. To run the application the user needs android device or IOS device. The android operating device is used to test the application. The testing was done on the virtual android emulator and the physical android device. Flutter and dart programming language is used to develop the application. The most well-known domain-driven architecture is implemented into the development process. Dynamic testing is used to test the functionality. The testing identifies errors and corrects them following the functional requirements.

The figures from 5.1 to 5.7 show the Graphical User Interface of this application. As the application is the user-to-user base system, the graphical interface is professionally designed to make it more user-friendly. Figure 5.1 shows the interface for the registration page of the system. User is required to provide necessary details in the form. The user also needs to allow the GPS permission to give access to the location of his device which is a store to the firebase firestone database. The longitude and latitude are used to show donors list on the map screen by blood group. The input fields have a customized design with input text fields. User also needs to select their blood group and gender from the dropdown menu. There is only one button signup which will be executed only once, the user provides the required information. The regular expression is used in email and password, where email must include the '@' and password comprising of not less than 8 characters and a character with a number. If the form is not complete, the error message will appear to inform the user what about what has gone wrong.

Figure 5.1 Register

Figure 5.2 is the log in Interface. Users have the option to provide the user with credentials and the log in button to log in. There is also a text instruction saying 'Don't have account? Sign Up . The sign-up interface will navigate once the user clicks on the text hints.

Figure 5.2 Login Interface

Figure 5.3 shows the Dashboard Interface which the user can access only when the log in email and password are matched. The system will navigate the user to dashboard Interface. The interface is designed based on Grab application which allows the user to navigate the other screen by icon navigator. On the top of the screen, the story will appear to provide health tips to the user. The story package is used to call the function. The data of the tips are real-time connected with the firebase database. The admin can update, edit, add, delete the data from the database. On the bottom of the story, user

details with the current points will appear from the database. Users can navigate the appreciation screen by clicking on their names. Besides the user details Request Blood button is provided to navigate to the request screen. At the bottom of the section, my request upcoming, Donation, Donation History Pending Request navigation icon is provided to navigate to the desired interface. On the top of the icon, the current amount of numbers will appear based on the user data. Lastly, Upcoming Request will pop up once a donor accepts a request. Where the donation details will appear as a text widget. Several data are included in this widget.

The ongoing pending request which is not accepted by anyone and the request which is within 10KM of the user will pop up at the top of the interface. If there is more than 1 request at a time the request will be appear by list horizontally.
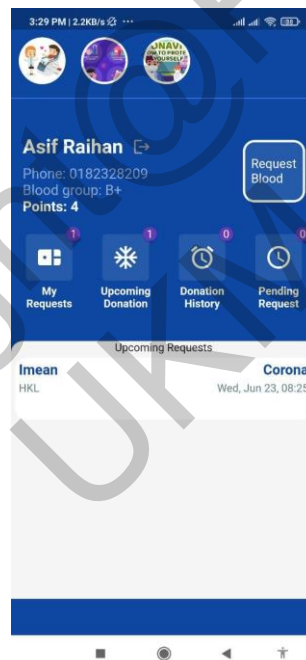

Figure 5.3 Dashboard Interface

Figure 5.4 shows the Request Interface. The user needs to select the blood group and confirm the current GPS location to navigate this interface. There are also several text input fields, a dropdown menu, and the date, time picker. The Request will be visible only to the desired blood group by the requester. Donors should also be within 10KM radius from the requester. The system compares the location of the requester and donor based on the GPS location.

Figure 5.4 Request for blood Interface

Figure 5.5 shows the Map Interface. Map will show the desire blood donor. For example, if a requester needs a B+ blood group, the map will provide a list of B+ users on the map interface. This list is based on the user's longitude and latitude numbers provided during registration.
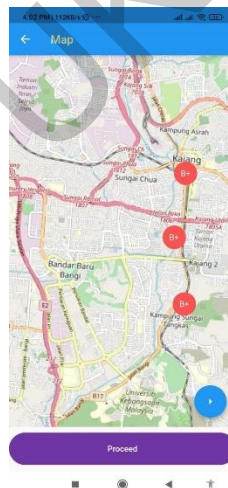

Figure 5.5 Map Interface

Figure 5.6 shows the accept request interface. There are several data in the text box from the database. The call with number button is used to call the donor or request by clicking on the button. Once the donation is completed and the requester clicks on the success button, the following donation points will be added to the donor profile.
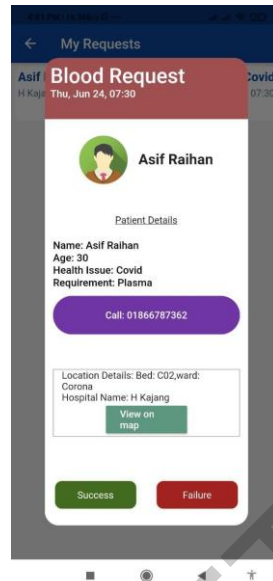
Figure 5.6 Accept Request Interface

Text box used in the appreciation screen is shown in Figure 5.7. Username and point are stored in the database. The default data 'This is certified that "Username from database" is "blood group from the database" blood donor in Blood365. He has been saved (lifesaving amount calculated based on the user points) life. Blood365 appreciates him as a Superhero. We wish him a healthy life.'. The blood365 sign is a default image which is called from the asset folder.
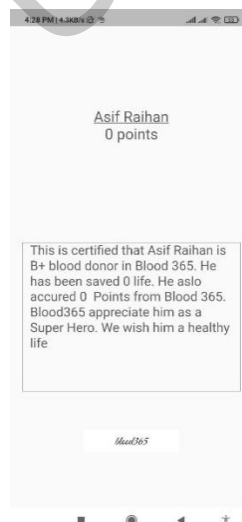

Figure 5.7 appreciation interface

Several testing devices is used to run the application from the public user. The system collects User location or GPS location to find the nearest donor. It compares the GO location with the requester GO location to verify the KM and if it is on 10KM area then, it matches the request and show to the donor service.

6.   Conclusion

This document presents a technical report of the developed application called "Blood365". "Blood365" is a blood donation application which allows users to request a donor and accept a request. "Blood365" will not work as a blood bank; however, it will work as a middleman between two users. The waterfall methodology is used to develop the application.

The striking feature of this application is that it is developed based on the flutter framework. Although the program is developed in one programing language, it can be run on most IOS and android platforms. The user attractive function is developed to find the desired blood donors who are currently within 10Km radius from the requester. Users have access to check the donor list on the map. The story function, icon navigation function, appreciation interface is developed to ensure the user attraction to the application as the application needs to ensure more users. The user GPS location is taken to provide the request function properly as the requirement phase. Several users tested functionality of the application. The demonstration of the application has worked properly and fulfilled the requirements.

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