



Bilkent University

Department of Computer Engineering

Senior Design Project

HelpingHands

Project Specifications Report

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Oct 11, 2021

This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Senior Design Project course CS491/2.

Table of Contents

1 Introduction	3
1.1 Description	4
1.2 Constraints	5
1.2.1 Economic Constraints	5
1.2.2 Ethical Constraints	5
1.2.3 Implementation Constraints	5
1.2.4 Sustainability Constraints	6
1.2.4 Language Constraints	6
1.2.5 Social Constraints	6
1.3 Professional and Ethical Issues	7
1.3.1 Professional Issues	7
1.3.2 Ethical Issues	7
2 Requirements	8
2.1 Functional Requirements	8
2.1.1 System Functionality	8
2.1.2 User Functionality	8
2.2 Non-functional Requirements	9
2.2.1 Extensibility	9
2.2.2 Reliability	9
2.2.3 Usability	9
2.2.4 Accessibility	10
2.2.5 Portability	10
2.2.6 Efficiency	10
References	11

1 Introduction

As mankind progressed through the ages, the technology we possessed and our understanding of science progressed alongside us. Medicine was one of the fields that saw the most progression. Many medical conditions that may have resulted in fatalities in the past have simple solutions to them today. One big development that proved crucial to the field of medicine were blood transfusions. The first human-to-human blood transfusion was performed in 1795. ^[1] Since then, blood transfusions have saved countless lives, but the amount of daily blood donations is still very little. Blood transfusions are used for many medical conditions, such as anemia or cancer, but more importantly they are crucial for blood loss resulting from accidents. ^[2] As donated blood can only be stored for 42 days, and with only a few percent of the population donating their blood^[3], a steady supply of blood donations is needed every day. This can be further proven by the fact that Bilkent University periodically sends requests for emergency blood donations. If our community consisting of 14.000 people needs to send this many requests, it is easy to grasp the grimness of the situation when we enlarge the scale to the whole population of Turkey.

This is where we, as HelpingHands, want to come in. We want to provide a mobile based solution for connecting recipients and donors. We want to provide a platform where people in need, or hospitals, can put requests for types of blood donations, and donors fitting the provided criteria can be alerted by notifications, so that they can contact the recipients easily.

1.1 Description

HelpingHands is a mobile-based Android blood donation software is designed to assist people in finding blood donors online in the event of an emergency. Users can create an account to gain access to the application, which allows them to either register for blood donation at a blood bank or submit a request for blood. Users can see a list of nearby blood banks. Users can browse the donors' profiles, ask for assistance from them, and interact with them. A request might be accepted or rejected by the users. Users will also be notified about discussions and requests for blood donations. This user-friendly mobile blood donation management program can save lives in this way.

The user can request blood donation or donate blood to multiple blood banks using this system, and the user will receive the location of neighboring blood banks via an integrated Google map. The user will have a profile where he may upload images, check feeds, and much more. He will also be able to see the status of sent requests for desired blood or donated blood. The user can also talk directly with donors and will be notified if the donor is available.

1.2 Constraints

1.2.1 Economic Constraints

- The application is free of charge and will not feature in-app payments.
- The development tools that will be used are free of charge.
- The maintenance of the application and the servers will have a cost for our team. Also, the distribution of the application, possibly via Google Play Store, may have a cost as well.
- Google Map API's will be used which are free depending on the traffic incurred.

1.2.2 Ethical Constraints

- The application will hold crucial personal information, such as age, location and blood type. It has to keep this data safe and private, only critical information will be shared between users and the users will be notified of this before any transaction.
- The blood recipient's information will be confidential and the blood bank will act as an intermediary.

1.2.3 Implementation Constraints

- The application is planned to be served over the Android platform. An additional web-based client may be considered as development progresses.
- Github and Git will be used for version control, issue tracking and code review.
- The application will follow a Client-Server architecture.
- Android Studio will be used for the application development.
- phpMyAdmin will be used for server development.
- MySQL will be used as the main database system and NoSQL database systems such as Firebase may be used .

- Google APIs will be used such as the Maps API for map integration and the Geolocation API for tracking and locating users.
- Further external API's or libraries may be used as development progresses and additional features are demanded.

1.2.4 Sustainability Constraints

- Maintenance will periodically be done on the application.
- A Feedback option will be provided to enhance the user experience.
- Future updates will address encountered bugs.
- A point system with a leaderboard will be established for donors who are consistent and reliable donors. These points may further be used for purchases in real-life, if the application is partnered with another company.

1.2.4 Language Constraints

- The application will be supported in the English (EN) language. Turkish support may be considered in the future but it will not be in the scope of development during the initial development.

1.2.5 Social Constraints

- The application intends to connect donors with recipients in real-life and therefore there may be chances of negative physical encounters which the application will intend to address via user terms and authorization process.

1.3 Professional and Ethical Issues

1.3.1 Professional Issues

- Source code will be kept private since the application deals with confidential information.
- Weekly Scrum meetings pertaining to the project will be done once a week.
- Any breach in data confidentiality will be handled by the whole project as a team.

1.3.2 Ethical Issues

- User's information will be kept confidential and secure.
- To prevent real-life negative interactions, terms of usage will be framed to avoid the victimization of users.

2 Requirements

2.1 Functional Requirements

2.1.1 System Functionality

The system should:

- Ask users to register themselves with their identification for security purposes.
- Find blood banks near the user's location.
- Display the blood types available at the blood bank.
- Display the blood types needed at the blood banks.
- Donors can contact the recipients who posted the request via the blood bank.
- Provide a leaderboard with points allocated for donors.
- Notify donors if blood is needed at a blood bank near them.

2.1.2 User Functionality

- Users should be able to register themselves with their identification documents.
- Be able to select to access the application as a blood donor or as a recipient.
- If a donor, view local blood banks near his/her area that require their blood type.
- If a recipient, be able to post requests for blood donations via his/her nearby blood banks.
- Be able to contact each other via messages.
- View his/her points and access the leaderboard to see his/her rankings.

2.2 Non-functional Requirements

2.2.1 Extensibility

The system should :

- Be easily maintainable
- Be available on other platforms such as a web application, if the need arises for integration with hospitals.

2.2.2 Reliability

The system should:

- Ensure that each user's data remains confidential and protected.
- Ensure that the location of nearby blood banks and donors are correct since any delay may be detrimental in a recipient's state.

2.2.3 Usability

The system should:

- Be user-friendly.
- Have options with themes and app layout, especially a dark theme for night-time viewing.
- Provide correct locations to users and remind users if device calibration is not correct.

2.2.4 Accessibility

The system should:

- Be downloadable from the Google Play Store.
- Be downloadable from the project's official website via the apk file provided there.

2.2.5 Portability

The system should:

- Be able to run on most Android phones.

2.2.6 Efficiency

The system should:

- Be light-weight and not consume space since it is targeted as a health critical application.
- Remain responsive and not lag even if there are multiple donors/recipients in a locale.

References

1) *What is the history of blood transfusion?* Latest Medical News, Clinical Trials, Guidelines - Today on Medscape. (2020, December 6). Retrieved October 10, 2021, from <https://www.medscape.com/answers/434176-183004/what-is-the-history-of-blood-transfusion#:~:text=The%20earliest%20known%20blood%20transfusions,Blundell%20in%20London%20in%201818.>

2) U.S. Department of Health and Human Services. (n.d.). *Blood transfusion*. National Heart Lung and Blood Institute. Retrieved October 10, 2021, from <https://www.nhlbi.nih.gov/health-topics/blood-transfusion>.

3) *US Blood Supply Facts*. Facts About Blood Supply In The U.S. | Red Cross Blood Services. (n.d.). Retrieved October 10, 2021, from <https://www.redcrossblood.org/donate-blood/how-to-donate/how-blood-donations-help/blood-needs-blood-supply.html>.