Bilkent University

Department of Computer Engineering

Senior Design Project

Project short-name: ShareInHappiness

Analysis Report

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Jury Members: Çiğdem Gündüz Demir, Can Alkan

Progress/Final Report
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Contents

Analysis Report

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1 Introduction

Health care is one of the most important human needs. High quality healthcare saves millions of lives and provides people with a sense of safety and security. However, treatment of health problems such as cardiovascular disease, cancer, SMA and etc. can be very expensive and most of the people cannot afford it. [1] These people try to use social media platforms to raise money to pay for the medications. Unfortunately, impostors can also share fake posts on social media to collect money. Many people hesitate to donate money because it is not possible to track how this money will be spent later on.

To solve this problem, our team decided to develop a welfare platform.Each user will have a wallet and he/she will be able to load money into this wallet. If users have sufficient credit in their wallet, they can purchase one or more items listed by the people who need special devices and medications.There will be no direct money transaction between the users so this will prevent the scammers from abusing the platform.

2 Current System

There are many platforms on which people can ask for donations. Main difference of our program is its security. People asking for donations don't directly get the money. Instead they get the medical supplies they need. Platforms that have similar functions can be found below.

2.1 GoFundMe

GoFundMe is a crowdfunding platform which allows people to raise funds for events ranging from life events such as celebrations and graduations to challenging circumstances like accidents and illnesses. People can start a fundraising campaigns by writing their stories, adding photos and setting a fundraiser goal. People who want to contribute can donate to these campaigns and be a part of them. When the campaign ends, money is transferred to the account of the person who created the campaign. This looks good on paper but it also exposes the system to the impostors.

People can easily create fake donation campaigns to collect money and disappear. There is no way to verify the authenticity of these campaigns.

2.2 Social Media Platforms (Instagram, Twitter, Facebook etc.)

Social media platforms like Instagram, Twitter, Facebook allow their users to post anything they want (given that it is within the guidelines of the platform). People share posts to request donations from the people in the platform even though this is not the main purpose of these platforms. People who are interested in donating can contact the post owner and donate the money. The authenticity of these donation requests cannot be verified since the social media platforms do not have a protection system to verify these. This leaves the system exposed for fraud and misuse since anyone with an account can post these donation requests.

3 Proposed System

3.1 Overview

ShareInHappiness is a welfare platform developed for Android. The main purpose of this platform is to create a secure environment in which patients who have diseases with expensive treatment costs can ask for medication donations and users of the platform can donate to these patients. Patients can register to the platform by providing a medical report. After their account is verified, they can create a donation request and list the medications and medical devices required. After a donation request is created, users can view the request and donate some items from the list to the patient. Medical markets will have accounts in the system to provide the patients with necessary medications.

Main difference between *ShareInHappiness* and other donation platforms is the security. *ShareInHappiness* requires patients to provide a medical report when registering. This prevents the frauds from abusing the platform. However, this is not the only security measure. There will be no direct money transactions in the platform. Patients will only get the necessary medications and medical devices. This will encourage the donators to donate more since they will be certain that they are donating to the people who really need help.

3.2 Functional Requirements

3.2.1 Donation request

- Users of the platform will be able to create a donation request to ask for medicines and medical devices that they need after they register to the platform.
- To register, users will provide the necessary information about themselves and a medical report.
- Donations requests will include the donation description and a list of the necessary medications and medical devices.

3.2.2 Make donation

- All the users of the platform will have a wallet and they will be able to deposit money into this wallet.
- If users want to donate and have enough money in their wallet, they will be able to purchase and donate one or more of the items listed in the donation request of another user.
- After a donation is made, the donor will be sent a payment receipt.

3.2.3 Anti-fraud system

- There will be no money transfer between users so scammers will not be able to abuse the platform.
- The system will contact the retailer to purchase the necessary medication or the medical device.
- After the process is done, the donator will be sent a notification.

3.3 Non-functional Requirements

3.3.1 Security

- In order to prevent misuse, fraud and unauthorized access, patients are required to register with a medical report.
- In the system, all users will be able to see the list of needs and patients. In this way, they will be able to provide assistance to the needy most suitable for them and their location and check that they have been deleted from the list when help arrives.

- The user will be able to see the price and code of the medical she/he wants to buy for the patient from the medical specialist in the region she/he chooses.

3.3.2 Usability

- We aim to create a simple and understandable interface since the application can be used by the parents of sick children or directly by the patients.
- We plan to increase the productivity of users so that patients can reach the medicals they need quickly.
- We aim to educate users with a short demo that shows how to use the application to satisfy them.

3.3.3 Reliability

- It cannot store and use the user's data unless they give permission.
- Methods such as encryption are used to store application data.

3.3.4 Extensibility

- The reorganization will be provided to improve the application, update, and change the needs.
- The system can be used on the web and mobile.

3.3.5 Accessibility

- The application can be downloaded free of charge from Google Play Store.

3.4 Pseudo Requirements

- ShareInHappiness is an Android application.
- Flutter will be used to develop the application frontend.
- .NET will be used to develop the backend.
- GitHub version control system will be used for the collaboration of group members.
- The project webpage is https://sarptekin.github.io/Senior-Design-Project/

3.5 System Models

3.5.1 Scenarios

Scenario 1: Create Account

Use Case: Create Account

Actors: Donator, Patient, Medical Market

Entry Condition(s): Actor downloads the application from Google Play Store.

Exit Condition(s):

- Donator account is created and donator is redirected to the Main Menu.
- The account for the Medical Market or Patient is sent for verification.

Flow of Events:

1. Actor downloads the app.

2. Actor decides which type of account he/she will create.

3. Actor fills in the necessary information on this page.

4. Actor presses the “Create Account” button

5. Account is created for Donator, account is sent to verification for Patient and Medical Market.

Scenario 2: Login

Use Case: Login

Actors: Donator, Patient, Medical Market, Administrator

Entry Condition(s): Actor launches the application

Exit Condition(s):

- Actor logs in successfully and is redirected to the Main Menu.

Flow of Events:

1. Actor launches the app.

2. Actor selects the login option.

3. Actor fills in the username and password.

4. Actor presses the “Login” button.

5. If the information provided is true, the actor is redirected to the Main Menu.

Scenario 3: Create Donation Request

Use Case: Create Donation Request

Actors: Patient

Entry Condition(s): The Actor has a Patient account in the system.

Exit Condition(s): Donation Request is created.

Flow of Events:

1. Patient clicks the “Create Donation Request” button.
2. Patient provides a description and list of necessary items.
3. Patient clicks the “Submit Donation Request” button.
4. Donation Request is created and Patient is redirected to the Main Menu.

Scenario 4: Add to Wallet

Use Case: Add to Wallet

Actors: Donator

Entry Condition(s): The Actor has a Donator account in the system.

Exit Condition(s): Donation Request is created.

Flow of Events:

1. Donator clicks the “Add to Wallet” button in the main menu.
2. Donator provides the amount he/she wants to add.
3. Donator fills in the credit card information.
4. Donator clicks the “Complete Transaction” button.
5. Money is added to the wallet.

Scenario 5: Donate

Use Case: Donate

Actors: Donator

Entry Condition(s): The Actor has a Donator account in the system.

Exit Condition(s):

- Donation is successfully completed.
- Donation fails due to lack of money in the wallet.

Flow of Events:

1. Donator is browsing through the donation requests.

2. Donator finds a donation request to which he/she wants to donate and clicks on it.

3. The new page with donation request details is shown to the donator.

4. Donator selects the medications he/she wants to donate and their amount and clicks the button to donate.

5. Money is extracted from the wallet and transferred to the medical market.

6. Indication to show that donation was successful pops up on the screen.

Alternative Flow of Events:

A. There is not enough money in the wallet.

a. Donator clicks the button to donate.
b. Application tells the donator that he/she does not have enough money to make this donation.

Scenario 6: Change product availability

Use Case: Change product availability

Actors: Medical Market

Entry Condition(s): The user has a Medical Market account in the system.

Exit Condition(s):

- Product is added successfully.
- Product is removed successfully.

Flow of Events:

1. Medical Market is browsing through the list of products they sell.

2. They click the “Add Product” button if they want to add a product.

3. In the displayed page, Medical Market can provide the details of the new product.

4. Medical Market clicks the “Add” button to add the product to the system.

Alternative Flow of Events:

A. Medical Market wants to remove a product from the system.

a. Medical Market clicks the “Remove Product” button on one of its products.
b. Application shows a prompt asking the user to verify this operation.
c. The product is removed from the system.

3.5.2 Use-Case Model

Figure 1: Use Case Model

3.5.3 Object and Class Model

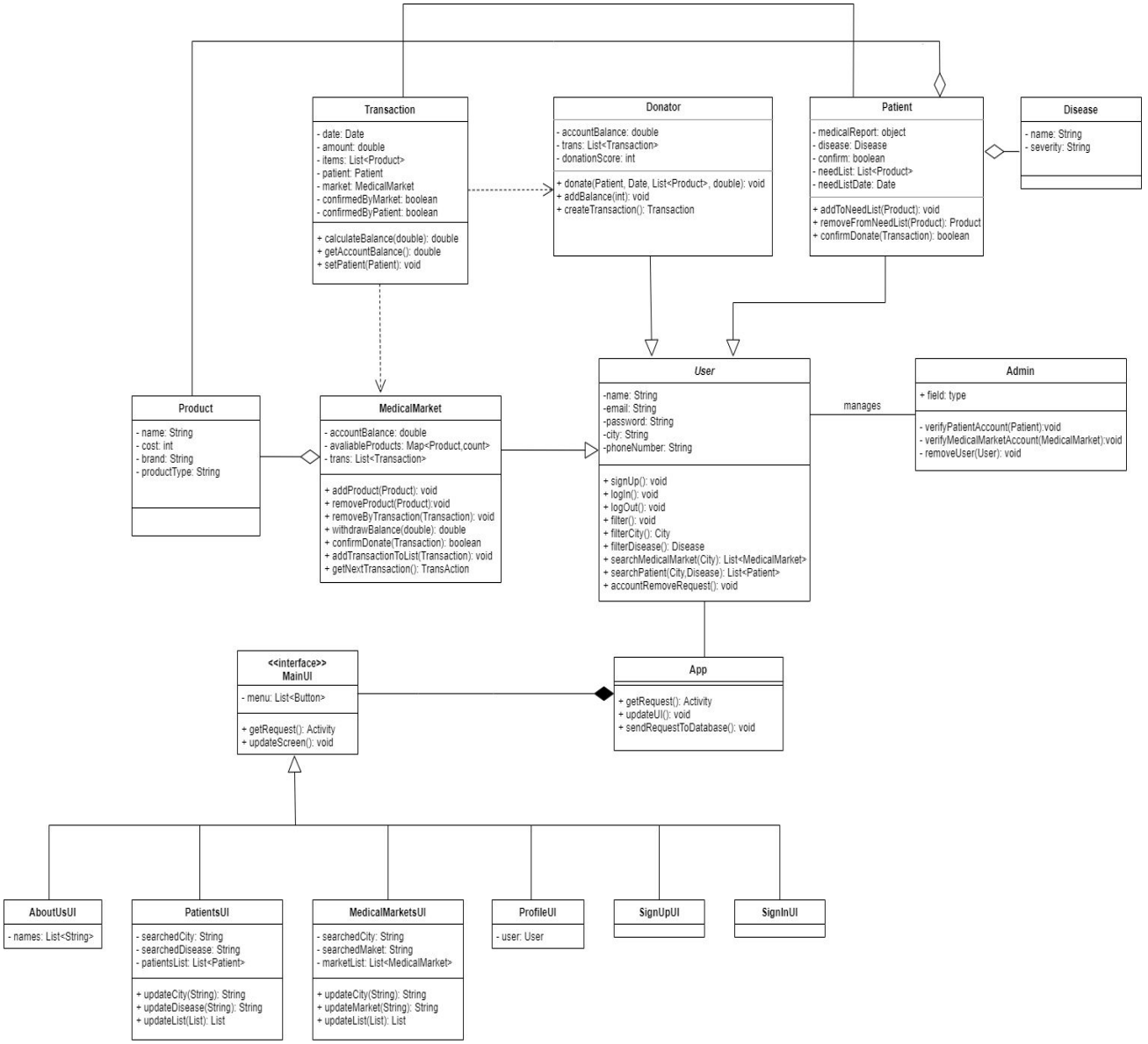

Figure 2: Object and Class Model

3.5.4 Dynamic Models

3.5.4.1 Sequence Diagrams

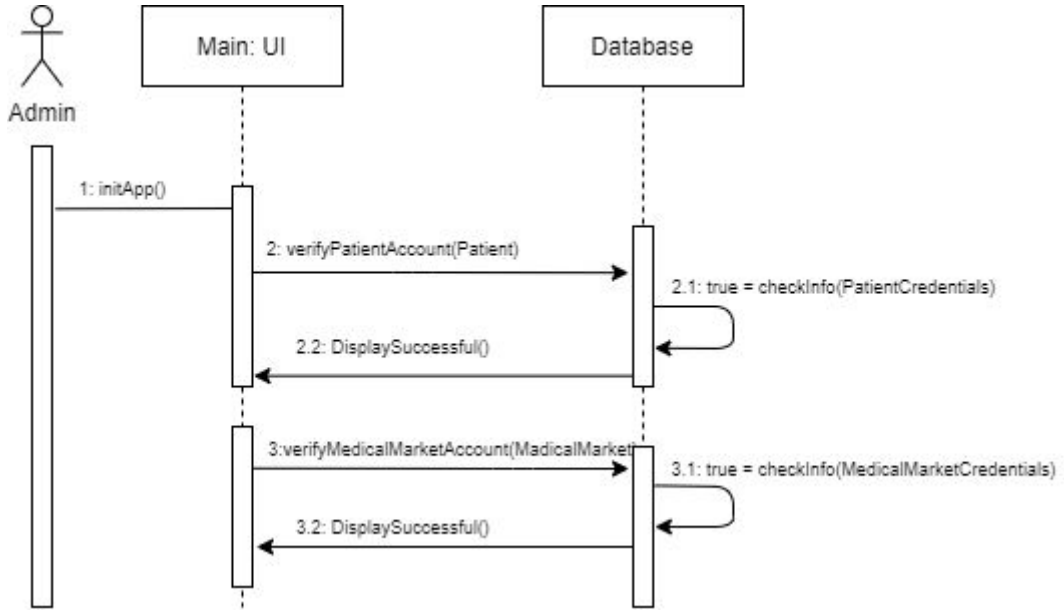

Figure 3: Sequence Diagram for Admin

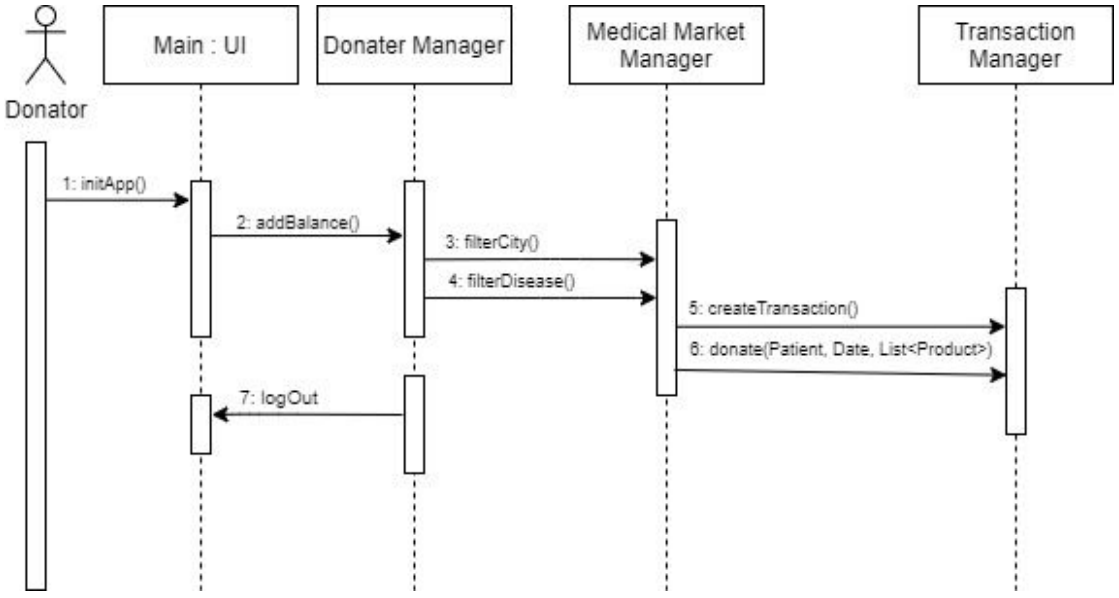

Figure 4: Sequence Diagram for Donator

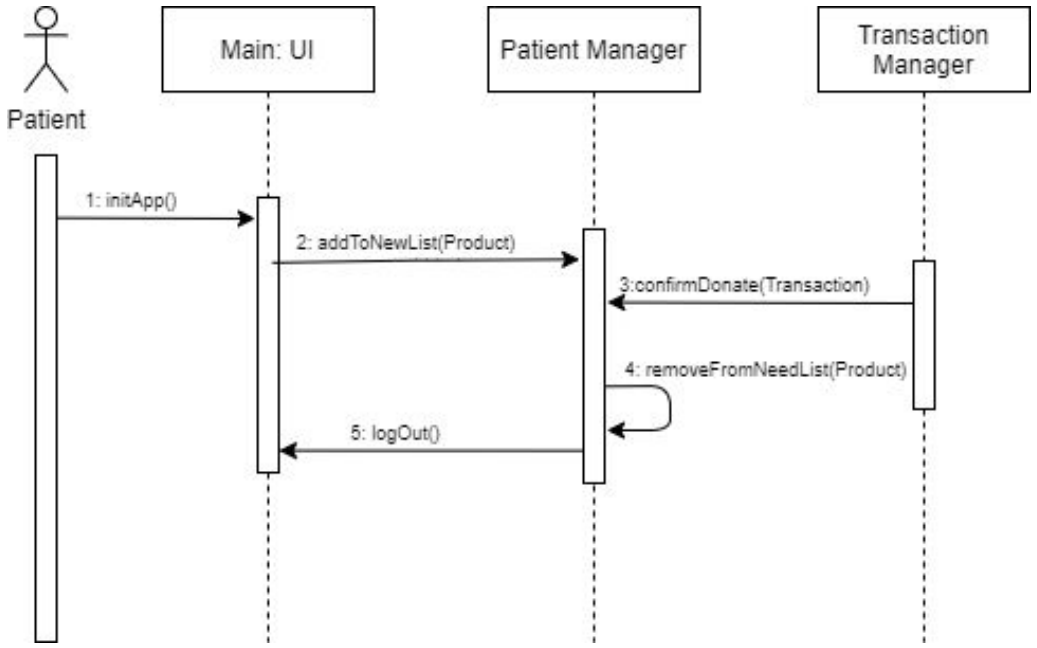

Figure 5: Sequence Diagram for Patient

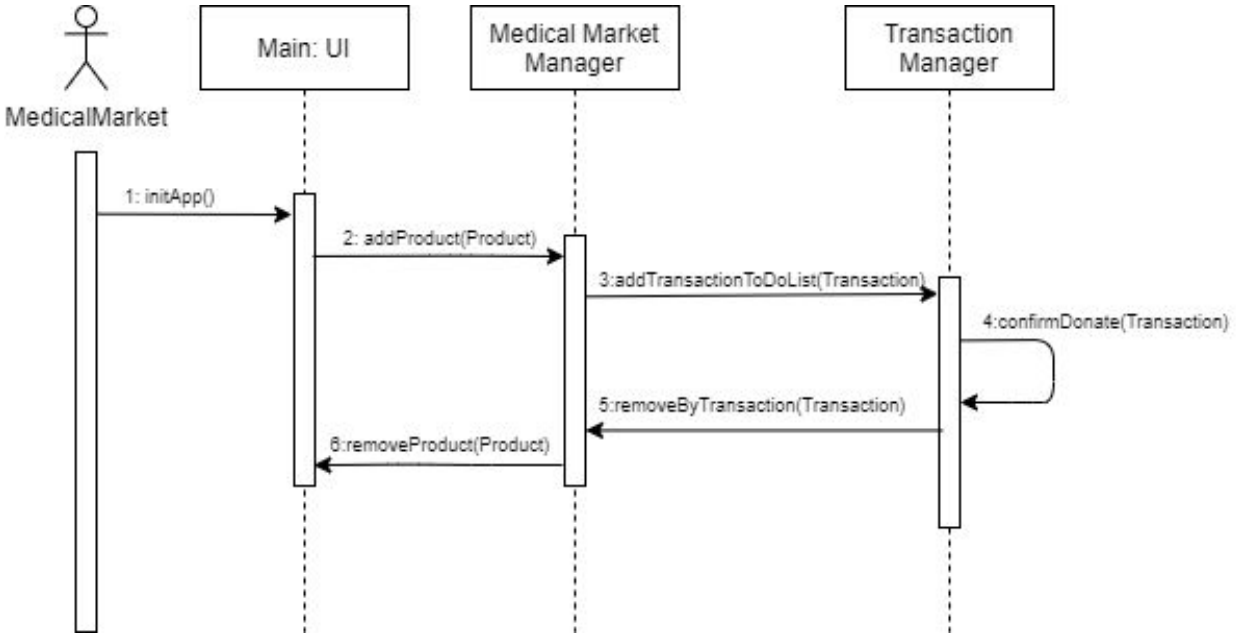

Figure 6: Sequence Diagram for Medical Market

3.5.4.2 State Diagrams

First state diagram illustrates the states that patients will follow.

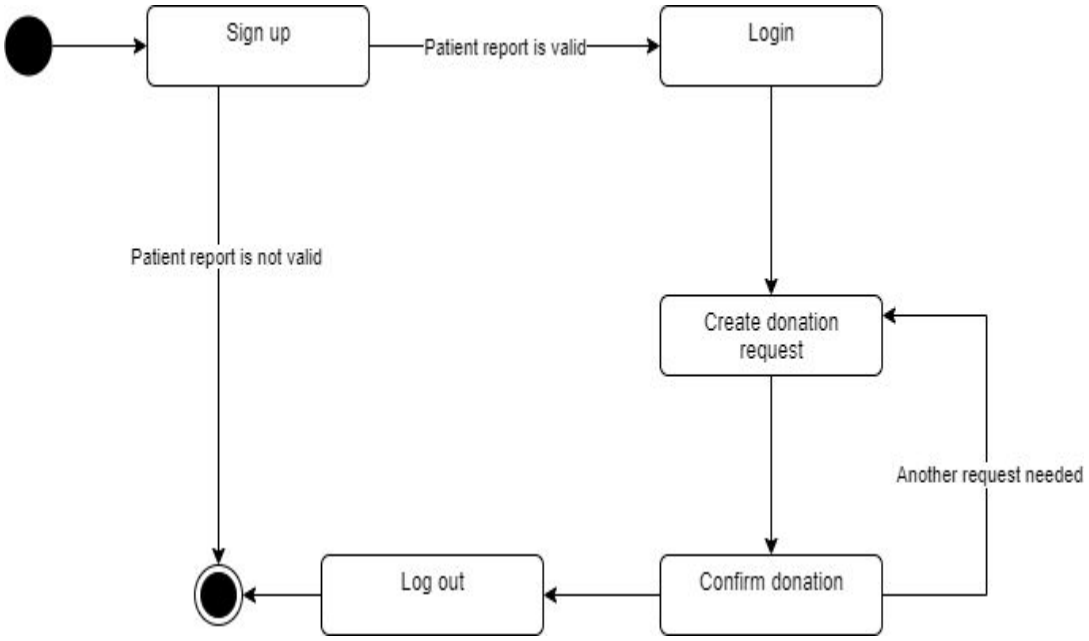

Figure 7: State Diagram for Patient

The second state diagram shows that states followed by donator accounts.

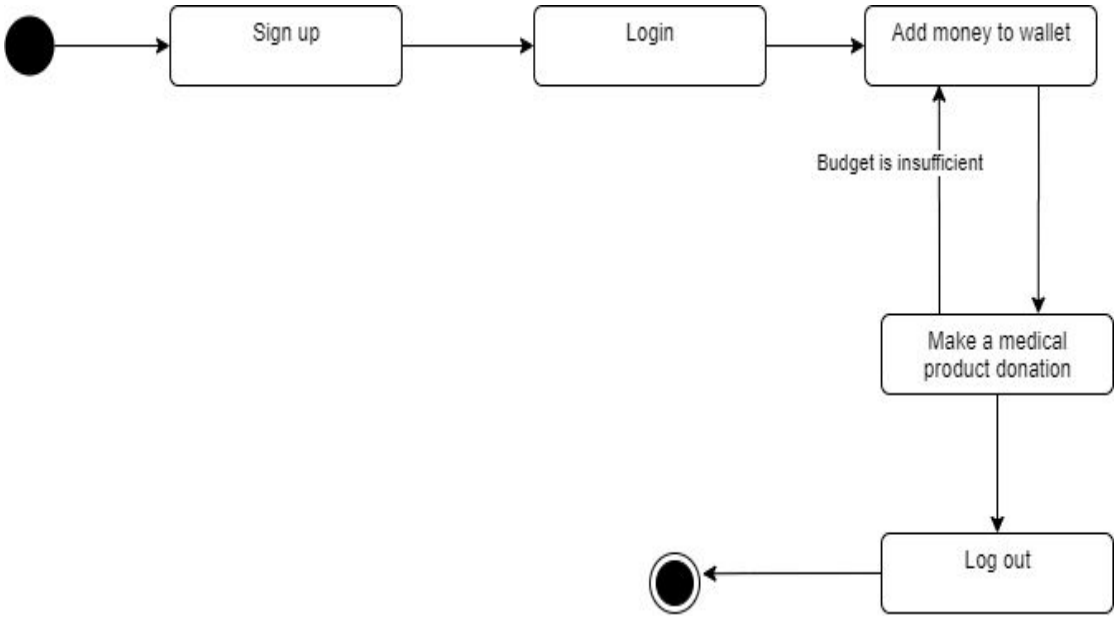

Figure 8: State Diagram of Donator

3.5.4.3 Activity Diagram

The following is the representation of our activity diagram. The diagram illustrates the activity flow of our application from the user's perspective.

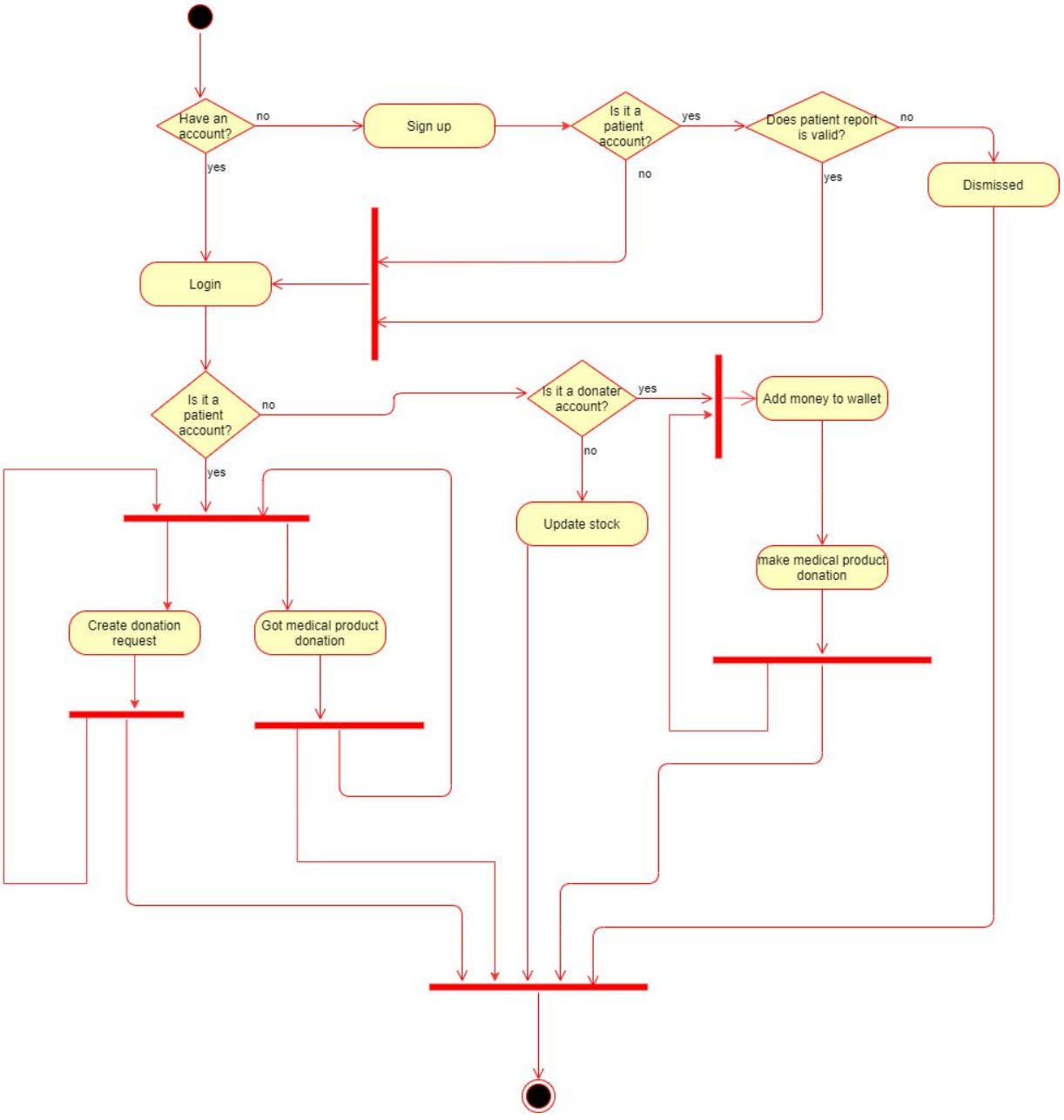

Figure 9: Activity Diagram of User's

3.5.5 User Interface

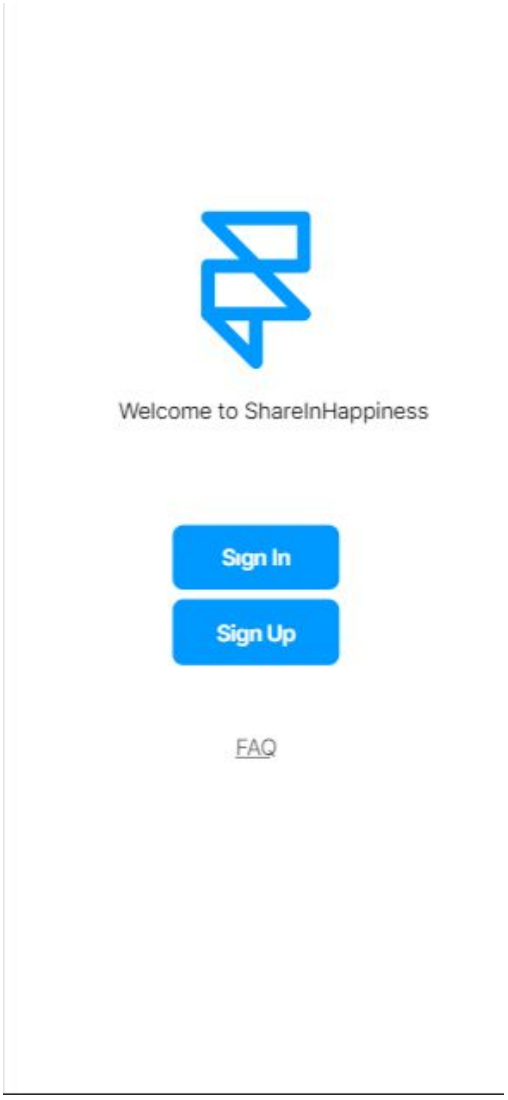

Figure 10 : Sign In/Up Screen

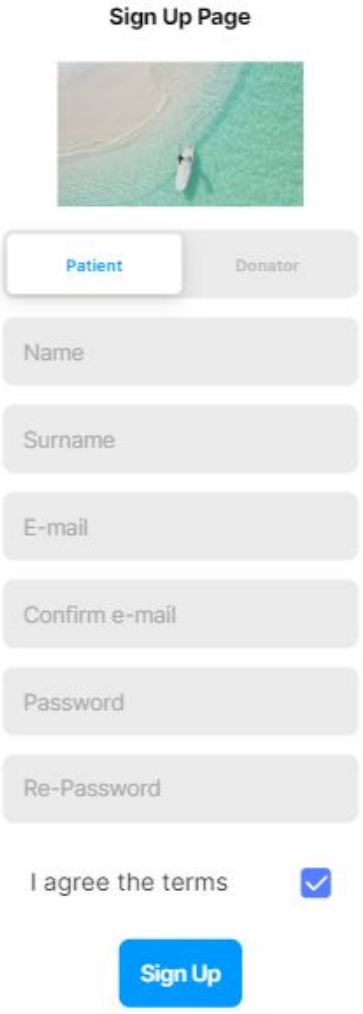

Figure 11 : Sign Up Screen

Figure 12: Log In Screen

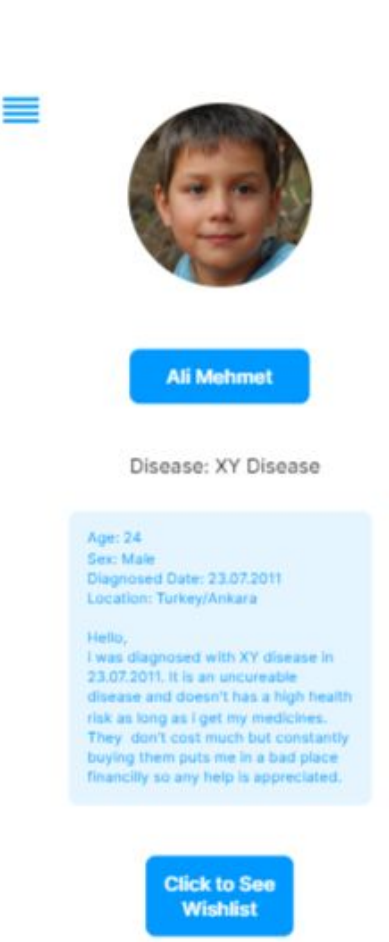

Figure 13: Patient Profile Screen

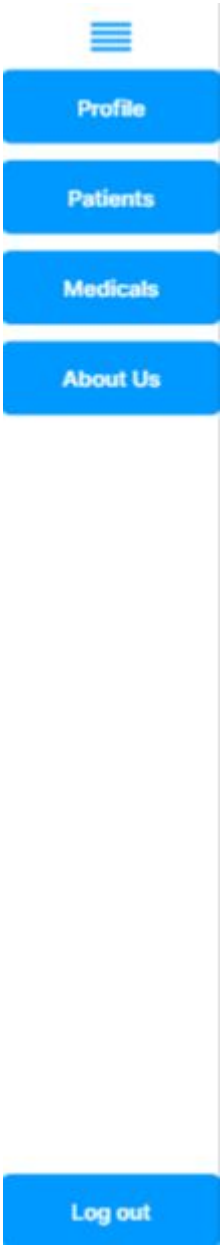

Figure 14: Sidebar Menu

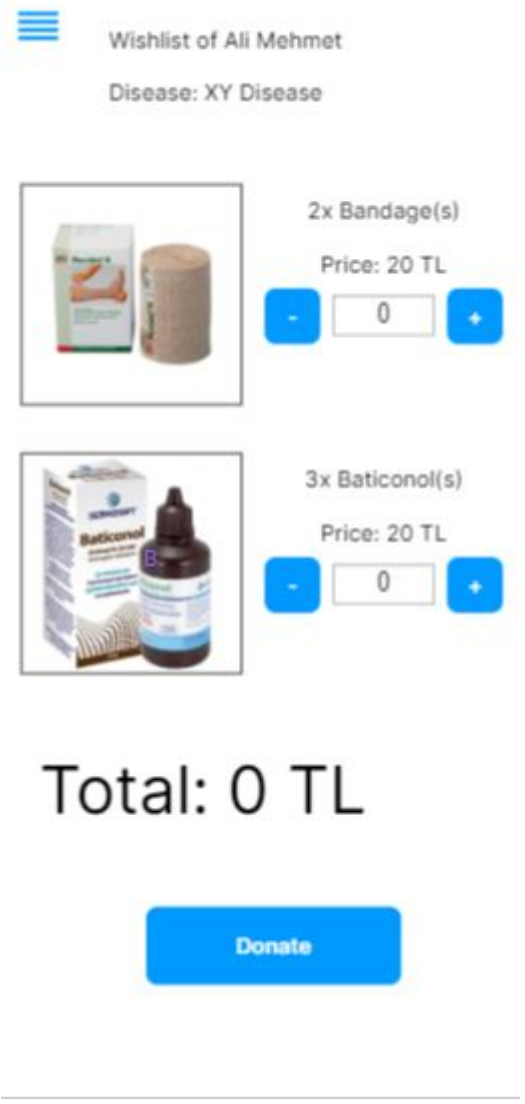

Figure 15: Patient's Wishlist

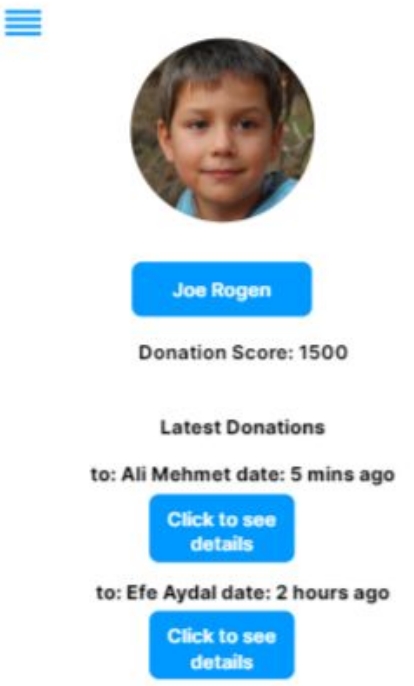

Figure 16: Donator Profile

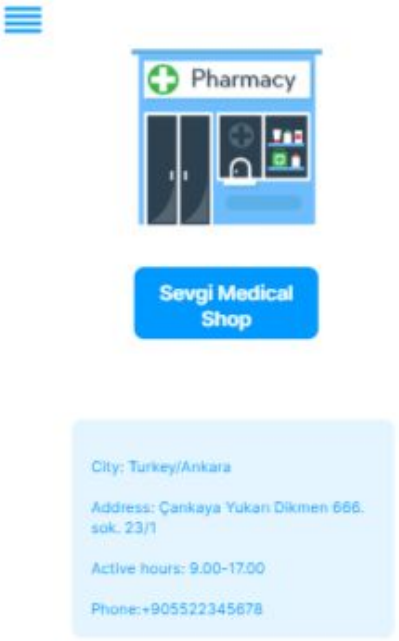

Figure 17: Medical Shop Profile

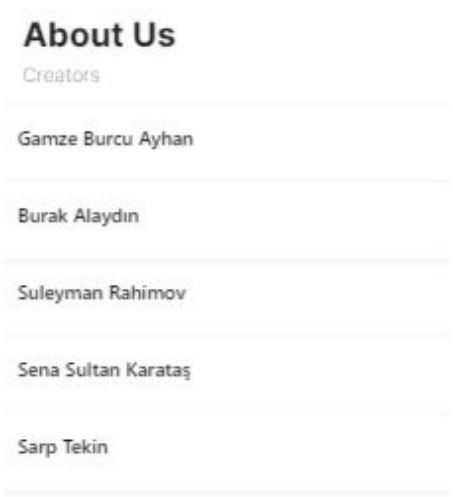

Figure 18: About Us Page

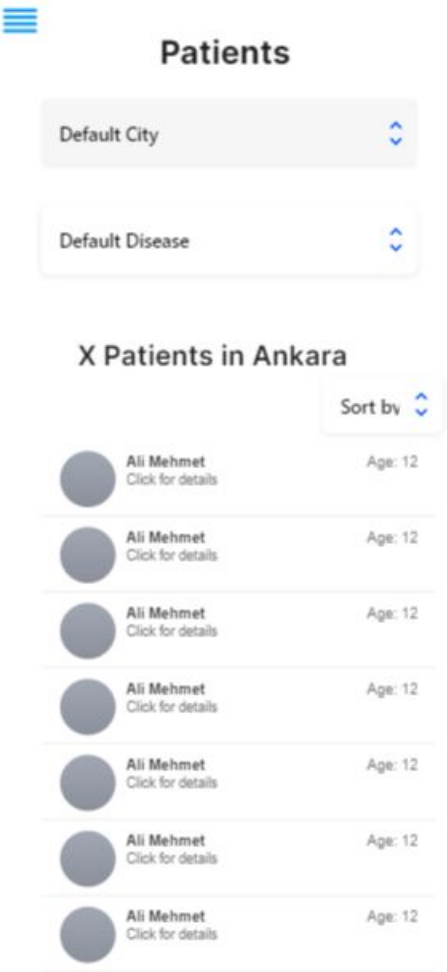

Figure 19: Patient List Screen

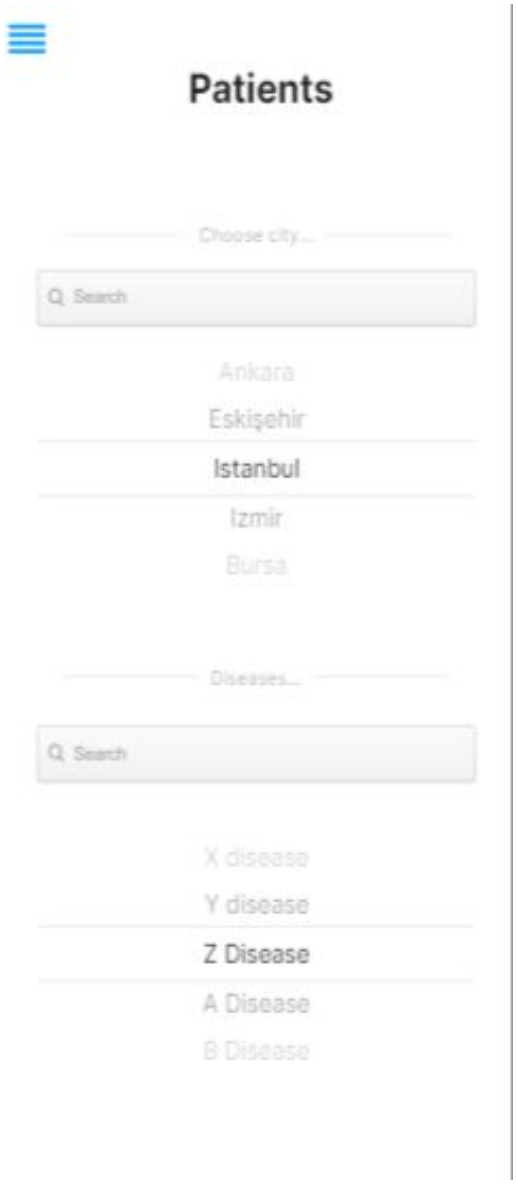

Figure 20: Patient Filter Screen

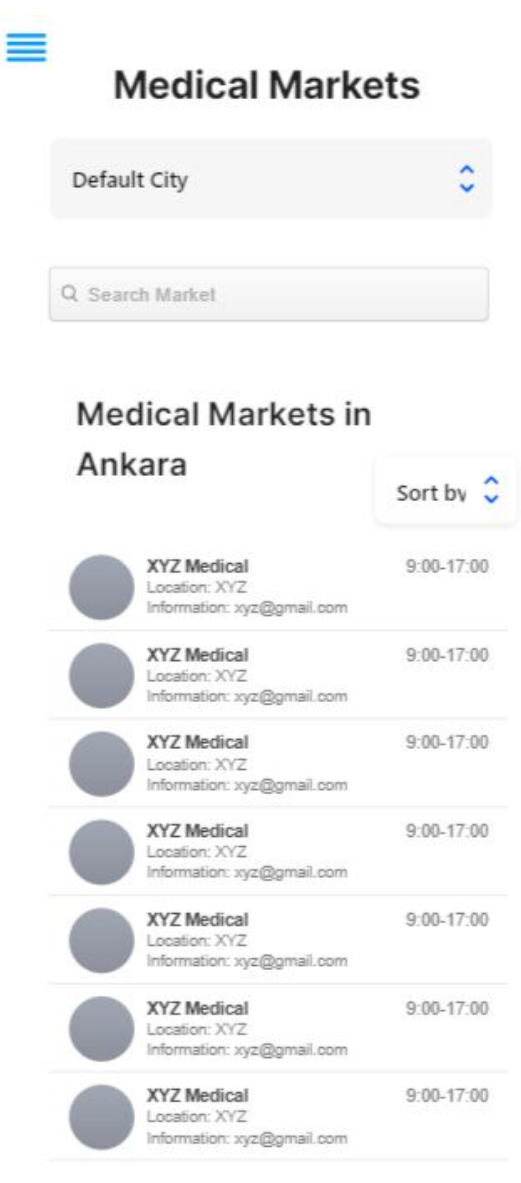

Figure 21: Medical Shop List

4 Other Analysis Elements

4.1 Consideration of Various Factors

Several factors may affect our project in the process of analyzing

Below you can see various tables that you will make.

	Effect level	Effect
Public health	9	*ShareInHappiness* is a platform that directly supports and affects the health of the public. It aims to extend the life of the patient thanks to the medical needs conveyed to the patient. In fact, the practice directly affects the increase in public health. The patient will be able to specify his own needs and ensure that it is provided to the patient by the person willing to donate. In this way, it is aimed to meet the needs of patients and contributes to the decrease in the number of patients.
Public safety	8	The application ensures the accuracy and safety of patients, donaters and markets. Movements other than their intended use will be monitored, accounts can be verified and, in possible cases, accounts will be removed. In addition, the patient's sign-up with the patient report provides safety for users during registration. The sending of the money to the medical market, rather than the direct delivery of the money to the patient, prevent fraudulent use. In this way, the donor will be able to donate in a healthier and more reliable way, knowing that his money goes to a medical need. At the same time, a confirmation notification will be sent when the product is sent to the patient from the medical market and when the product is delivered to the patient.
Public welfare	9	The use of this platform by volunteer donors for patients in need of help will increase the life of the patient's family. Medicals that the family or the patient himself/herself has to use for a

		lifetime or that they can obtain the products that they cannot afford, thanks to this application, provide welfare for these people. makes it easy to support each other socially and contribute to the lives of those people. At the same time, these aids made through medical markets increase the welfare of these markets.
Global factors	5	ShareInHappiness will be able to filter patients and medical shops according to their city. If we expand out of Turkey, we will add other countries and cities so the foreign users will be able to search for patients or medical shops that are in their city or country.
Social factors	7	ShareInHappiness has a donation score feature where a donator will gain points when they help a patient according to how much they helped which will be displayed in their profile and in patients profile people who helped will be displayed which will encourage donors to help more with some kind of a gamification. Furthermore this profile can be shared with others and displayed by others which may give that person social prestige.

Table 1: Factors That Can Affect Analysis And Design

4.2 Risks and Alternatives

For our application we will need to negotiate with as many Medical shops as possible before we go live. Which will be extremely hard and time consuming given the number of Medical shops in Turkey.Apart from being time consuming, this contains a risk as well. Medical shops may not want to comply with us because we are a new Start-up. If we cannot get enough Medical shops to work with us the app simply won't function in some parts of Turkey where we can't reach the products to patients. In order to not have this problem we may assign people just to negotiate with Medical shops and if a patient has no medical shop that is near, we will ship them by paying the shipping as a company until we negotiate with the medical shops near that patient or ship there by themselves.

Furthermore another risk will be the privacy of the patients. In order to prove that their problem and needs are legal we will get all the information from the patient like their address, phone number, id number, doctor diagnosis etc. If these informations are public this would create a risk for the patients. So we will safekeep these information in our database and just share non risky information like name,age and city with the donors.

Another risk is the data from the Medical markets, we will ask the Medical markets about their prices,stocks and expiration dates. If they fail to input the correct datas we may sell products overpriced or cheaper than they are, sell products that do not exist and in the worst case sell expired products. In order to do that we will sign a contract with medical shops that if something like that happens, they will take full responsibility and fix the error. For example if they get money for a product that they don’t own, they will send that money to a shop which has that product.

	Likelihood	Effect on the Project	B Plan Summary
Failing to negotiate with medical shops.	6	Not being able to give the products to patients	Hier people just for negotiation and ship the products to patients by paying from the company's budget until negotiations are done.
Privacy Risk for Patients	7	Patients may be hesitant to share their information with us which will make verifying them harder	Hide the information from other users but safekeep them in database
Medical Shop False Data	6	May sell a product with the wrong price,product that does not exist or expired to the patients.	Sign a contract with the Medical shops

4.3 Project Plan

WP#	Work package title	Leader	Members involved
WP1	Requirements	Gamze Burcu Ayhan	Sarp Tekin Burak Alaydın Suleyman Rahimov Sena Sultan Karataş
WP2	Analysis	Suleyman Rahimov	Sarp Tekin Burak Alaydın Gamze Burcu Ayhan Sena Sultan Karataş
WP3	High Level Design and User Interface	Sarp Tekin	Suleyman Rahimov Burak Alaydın Gamze Burcu Ayhan Sena Sultan Karataş
WP4	Low Level Design	Sena Sultan Karataş	Sarp Tekin Burak Alaydın Gamze Burcu Ayhan Suleyman Rahimov
WP5	Final Development and Testing	Burak Alaydın	Sarp Tekin Suleyman Rahimov Gamze Burcu Ayhan Sena Sultan Karataş

WP 1: Requirements			
Start date: Week 1 **End date:** Week 4			
Leader:	Gamze Burcu Ayhan	**Members involved:**	Sarp Tekin Burak Alaydın Suleyman Rahimov Sena Sultan Karataş
Objectives: The objective is to agree on what our project needs, determine specifications like functional and non-functional requirements and constraints. This step is to make sure that everyone involving the project knows and understands what kind of an application we will build.			
Tasks: ***Task 1.1*** **Requirements Meeting:** Talk about what kind of features sparked in the project members' head. Discuss the doable best version of the project. Bring ideas about non-functional requirements. ***Task 1.2*** **Discussion with the Supervisor :** Present and explain the project to the supervisor and tell him/her the details. Get his ideas for requirements. ***Task 1.3*** **Specification Report:** Prepare a specification report which includes description of the project, functional and non-functional requirements and constraints.			
Deliverables ***D1.1:*** Assessment of innovativeness ***D1.2:*** Specifications report			
WP 2: Analysis			
Start date: Week 5 **End date:** Week 10			
Leader:	Suleyman Rahimov	**Members involved:**	Sarp Tekin Burak Alaydın Gamze Burcu Ayhan Sena Sultan Karataş
Objectives: The objective here is to decide what kind of dynamics the project will have and how they act. Finalize pseudo requirements, prepare mock-ups, create diagrams and			

models. Lastly, find out other analysis elements which include team wok and potential user concerns.

Tasks:
Task 1.1 **Requirements Meeting:** Talk about what kind of features sparked in the project members' head. Discuss the doable best version of the project. Bring ideas about non-functional requirements.
Task 1.2 **Discussion with the Supervisor :** Present and explain the project to the supervisor and tell him/her the details. Get his ideas for requirements.
Task 1.3 **Specification Report:** Prepare a specification report which includes description of the project, functional and non-functional requirements and constraints.

Deliverables
D1.1: Analysis report

WP 3: High Level Design and User Interface

Start date: Week 10 **End date:** Week 14

Leader:	Sarp Tekin	**Members involved:**	Suleyman Rahimov Burak Alaydın Gamze Burcu Ayhan Sena Sultan Karataş

Objectives: The objective is to decide high level design specifications and start creating a user interface.

Tasks:
Task 2.1 **High Level Design:** Define a design goal for the project. Divide/decompose system into subsystems. Start learning and practicing on required softwares, specifically on database management.
Task 2.2 **User Interface:** Create a user interface with the specified software. Prepare an application which can run without data and database integration.
Task 2.3 **Presentation:** Create and prepare for the presentation and explain what is done so far for the project.

Deliverables
D2.1: High Level Design Report
D2.2: Presentation

WP 4: Low Level Design

Start date: Week 15 **End date:** Week 20

Leader:	Sena Sultan Karataş	**Members involved:**	Sarp Tekin Burak Alaydın Gamze Burcu Ayhan Suleyman Rahimov

Objectives: The objective is to finalize user interface design, create a low level design and start using what we have learnt through previous work plans.

Tasks:
Task 2.1 **Finalize User Interface:** Discuss the final details of the user interface.
Task 2.2 **Low Level Design:** Create a low level design for the project. Find out trade-offs. Come up with packages and class interfaces.
Task 2.3 **Database:** Create a database which includes minor demonstration of the project. That means the database will have different types of user and products.

Deliverables
D2.1: Low Level Design Report

WP 5: Final development and testing

Start date: Week 20 **End date:** Week 30

Leader:	Burak Alaydın	**Members involved:**	Sarp Tekin Suleyman Rahimov Gamze Burcu Ayhan Sena Sultan Karataş

Objectives: The objective is to integrate the database into the system. Handle exceptions and bugs. Create an application that works as intended. Test the application with automated softwares.
Tasks: ***Task 2.1*** **Database Integration:** Integrate the database to the system which is developed. Find out difficulties, errors and exceptions. Handle them. ***Task 2.2*** **Test the application:** Test the application via automated softwares. Find out bugs and fix them. ***Task 2.3*** **Website for the application:** Create or redesign a website for project demo. ***Task 2.4*** **Prepare a presentation:** Prepare a presentation which explains what is done during the development process of ShareInHappiness.
Deliverables ***D2.1:*** Final Report ***D2.2:*** Presentation

Table 2: List of work packages

4.4 Ensuring Proper Team-Work

In order to make sure that every group member actively participates in the development of the project, we have broken the project down into smaller parts and assigned each part to a group member. To make sure that the work distribution is fair, we tried to make sure that the job assigned to each member has similar difficulty. If a member has a difficulty completing the assignment, another member helps him/her to proceed with the assignment so that no one is "left behind". If a member finished the task earlier than the expected deadline, he/she helps another member with the assignment. The contribution of each member will be monitored using GitHub.

4.5 Ethics and Professional Responsibilities

Application database will contain user credentials, medical reports for the patient accounts. No sensitive information of the user will be stored in the database so the system will not violate the privacy of its users. Other users will only be able to view the donation requests created by the patients. No personal information of the user will be shared with other users. Since patient accounts will be verified before they can create donation requests, medication donations made by donators will reach the people who actually need them and possible fraud will be prevented.

4.6 New Knowledge and Learning Strategies

In this project we will use Flutter as an UI kit for mobile and .Net for backend. We don't have prior knowledge about these technologies so the first thing we will do is

learn how to use them. Our learning strategy will be online based, which means we will use online sources to learn. Youtube and Udemy online courses will be our main source for learning but we will search the internet for further information or for problems we experience. 2 of our team members(Sena and Sarp) will focus on learning Flutter to make UI for our mobile part, others(Burak,Suleyman and Burcu) will mainly work on Backend development with .Net. This does not mean that everyone will just learn their part. Because we will need to integrate the project after Backend and Frontend is done everyone will learn both of the sides but one of them will be their main focus.

5 Glossary

.NET Framework: .NET framework is the original implementation of .NET. It supports running websites, services, desktop apps, and more on Windows.

Flutter: Flutter is a free and open-source mobile UI framework created by Google and released in May 2017. In a few words, it allows you to create a native mobile application with only one codebase.

6 References

[1] “What is spinal muscular atrophy(SMA)?”. [Online]. Available: https://www.zolgensma.com/what-is-spinal-muscular-atrophy. [Accessed:11-Oct-2020].