Senior Design Project

SurePa

Project Analysis Report

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1. Introduction

Forgetfulness is a crucial problem when it starts to occur often in daily lives. Forgetting something unnecessary is good for your health and helps you learn and remember new and vital things [1]. However, forgetting things like taking medicines, drinking water, walking, and any other daily routines complicates and adversely affects the lives of those particular people.

Forgetfulness targets elders primarily. Occasional lapses in short-term memory are a normal part of the aging process, such as forgetting which medicine to take and their daily doses. So, many older adults need new ways to remember to take their medications and know which medicine to take [2].

People with certain diseases, for instance, tumors, blood clots, and thyroid, also suffer from forgetting in their daily lives [3]. While having a disease, daily routines like not forgetting to take medicines, drinking water becomes more critical than usual. In the search for finding a solution to these problems, we came up with SurePa. It is an application for mainly offering solutions to not taking medicine problems resulting from forgetfulness targeting primarily older adults and other people. In addition, different from other applications, SurePa aims to provide their users with some image-recognition-based solutions to their problems. Such solutions aim to ease the life of these patients by providing intuitive ways for remembering and tracking their medication use. SurePa consists of convenient tools for anyone who carries a mobile phone to help its users undergo a smooth recovery process.

This report aims to provide a comprehensive analysis of the SurePa project. Firstly, current systems which are similar to SurePa will be discussed. The proposed systems section, which includes an overview of SurePa, functional, non-functional, pseudo requirements, and system model sections, will be given. After these, other analysis elements such as Consideration of Various Factors in Engineering Design, Risks and Alternatives, Project Plan, Ensuring Proper Teamwork, Ethics and Professional Responsibilities, Planning for New Knowledge and Learning Strategies will be provided. In the end, a glossary section will be provided for terminologies that are used in the report, and a references section will be given.

2. Current System

There are programs serving similar purposes that are being used for healthcare. Together with the evolution of the healthcare industry, healthcare applications are also advanced and specialized. SurePa will not necessarily provide all functionalities in these applications. Instead, it will give a more specialized, functional, and easy-to-use service targeted at people having diabetes. Just like various industry verticals, applications categorized in healthcare have played a crucial role in the digitalization of the healthcare sector. Several benefits have been linked to such apps, some of which are increased access to medication and reduced (or at least optimized) burden of governments due to health expenditure related to the treatment of minor health conditions. The main motives of SurePa are to provide smooth and clear clinical communication between patients and caregivers, display detailed statistics, and make basic suggestions on the data provided by the patient.

Diabetes: M

- Users can record blood sugar levels.
- The application calculates insulin doses for users.
- The application keeps track of food intake, carb, protein, fat taken in a day.
- The application can make graphs of all the data it collects.[4]

mySugr

- Users can record meals they ate.
- Users can connect smart devices like smartwatches.
- The application creates diabetes reports about blood levels.
- The application gives challenges to the customer to motivate them.[5]

Glucose Buddy Diabetes Tracker

- Users can record blood sugar levels.
- The application records users' steps.
- Users can record the carbs amount taken.
- The application uses a barcode reader to add a meal entry.
- The application gives exercise tips for users.[6]

Dakik - Uzaktan Hasta Takip Sistemi

- Doctors can create treatment plans for their patients.
- Doctors and patients can chat via the app.
- Patients can enter the result of tests and medicine taken to the system.
- Doctors can see the data entered by patients.[7]

DiabTrend: Diyabet Yönetimi

- Users can keep a diabetes daily which day records their pill, meals, and glucose level.
- The app has meal calories estimation via image recognition.
- It is capable of using other applications and devices such as Google Fit and Amaz Fit Bip.
- There is a useful tips page.[8]

SocialDiabetes

- It has a carb calculator.
- Users can get automatic insulin bolus recommendations for user parameters.
- Users can add more detailed information like glucose, food, exercise, and mood.
- The user can set up reminders.[9]

3. Proposed System

3.1. Overview

SurePa is a mobile application that will help mainly the old patients and their caregivers. The primary purpose of the development of SurePa is to make the medicine use process easy and traceable for people willing to use the application. The application will notify when a patient should take medicine, walk, drink water, etc. It also will help caregivers to keep track of the medicine usage of the related patient. In addition, by using image recognition and machine reading features, the application provides its users with a new and innovative way to get informed about their medicines. This innovation is especially crucial for older people since it is hard to learn new medicines' names, which generally have complicated words to remember.

3.2. Functional Requirements

3.2.1. Caregiver Functionalities

- Caregivers will be able to edit patients' account settings if the patient lets them edit.
- Caregivers will be able to receive notification in case the patient did not provide the information that they had taken medicine.

3.2.2. Patient Functionalities

- Users can add a caregiver to notify them automatically. Caregivers can be anyone who can care for the patient or elder. While adding a contact, users can tag them such as “Nurse,” “Child,” or “Neighbor.”
- Patients could monitor their daily workout routine.
- Patients will get notified to walk.
- Patients will get notified when it’s time to take medicine.
- Patients will be able to find the correct pillbox by using their phone’s camera.

3.2.3. Common Functionalities

- The patient and caregiver will be able to see their medication schedule.
- The patient or his caregiver will be able to input the patient’s physical measurements like weight, height.
- The patient or caregiver will be able to save the patient's blood pressure, blood sugar.
- Patients and caregivers will be able to see a detailed tracking system of the patient’s physical measurements and blood test results.
- Patients and caregivers will be able to monitor patients’ statistics of taking medicines in time.
- Patients and caregivers will get notified when the patient is close to running out of medicine to buy a new one.

3.3. Nonfunctional Requirements

3.3.1. Reliability

Whether the medicine is taken by the patient should be accurate. Taking medications multiple times or forgetting to take them could cause serious health problems.

3.3.2. Usability

The application appeals to a wide range of audiences, and not everyone has to have a good understanding of technology. Therefore, interfaces should be easy and understandable to use.

3.3.3. Accessibility

The program should support the use of everyone, such as blind, low vision, photosensitive, limited movement, and a combination of these because all of them can be our users. W3C [10] rules will be considered for accessibility issues, and the application will support voiced notifications and use simple color palettes for sensitive people.
The program must be suitable for different operating systems and different smartphones because of the variety of phones used by the users.

3.3.4. Efficiency

Since our main users are elders and most of them will use SurePa using old devices, the efficiency of our application is essential. Since image processing will be used in the application cloud computing services must be fast enough.

3.3.5. Scalability

Since our user base is people who take medicines, the project should be scalable to handle many users. The server and database should be able to process a large amount of data.

3.3.6. Security and Privacy

The user's private information such as contact, health, or medical history will be sent and stored encrypted. Also, sensitive information such as passwords and emails will be secured.

3.4. Pseudo Requirements

- Front-end will be implemented with React.
- Backend will be implemented in Python.
- Firebase will be used as the primary data storage.
- GitHub will be used as version control and issue tracking.
- TensorFlow will be used for object detection.

- Python FPDF2 library will be used to create pdfs.

3.5. System Models

3.5.1. Scenarios

3.5.1.1. Scenario 1

Use Case: Patient Registration

Primary Actor: Patient

Entry Condition: The patient opens the app for the first time and clicks the “Register” button.

Exit Condition: The patient either registered successfully, clicked the “Cancel” button, or closed the app.

Main Flow of Events:

1. The patient opens the app.
2. Then the patient clicks the “Register” button.
3. Patients have to fill in the empty blanks and click the “Register” button, or they can cancel the process.

3.5.1.2. Scenario 2

Use Case: Caregiver Registration

Primary Actor: Caregiver

Entry Condition: The caregiver opens the app for the first time and clicks the “Register” button.

Exit Condition: The caregiver either registered successfully, clicked the “Cancel” button, or closed the app.

Main Flow of Events:

1. The caregiver opens the app
2. Then caregiver clicks to “Register” button
3. Caregivers have to connect to the “Create New Account” button
4. Caregivers have to fill in the empty blanks and click the “Register” button, or they can cancel the process.

3.5.1.3. Scenario 3

Use Case: Password Reset

Primary Actor: Patient and Caregiver

Entry Condition: The client should click the “Forgot my password” button on the login screen.

Exit Condition: The client exits the password renew screen without writing a valid new password.

Main Flow of Events:

1. The user will click the “Forgot my password” button.
2. Users will receive a link through email.
3. The user connects to the link.
4. In the opened screen, Users have to enter a new valid password to reset their existing password.

3.5.1.4. Scenario 4

Use Case: Caregiver Edits Patients Account

Primary Actor: Caregiver

Entry Condition: Caregiver will click the “Edit” button.

Exit Condition: The caregiver clicks the “Complete” or “Cancel” button.

Main Flow of Events:

1. Caregivers have to navigate to the Patients List page.
2. Caregivers will click the “Edit” button located on the right side of each patient.
3. After changing the patient’s settings, the caregiver should click the “Save” or “Cancel” button.

3.5.1.5. Scenario 5

Use Case: Patient Link Caregiver to His Account

Primary Actor: Patient

Entry Condition: Patient clicks the “Add Caregiver” button.

Exit Condition: Patient clicks the “Add” or “Cancel” button.

Main Flow of Events:

1. Patients have to navigate to the Caregiver List.
2. Patients have to click the “Add” button.
3. Patients have to write the invitation number of the caregiver and should select caregiver types which are “Nurse,” “Child,” or “Neighbor.”
4. Patients should click the “Add” or “Cancel” button.

3.5.1.6. Scenario 6

Use Case: Find Pill Box

Primary Actor: Patient

Entry Condition: Patient clicks the “Find” button.

Exit Condition: The patient clicks the “Exit” button.

Main Flow of Events:

1. Patients have to navigate to the My Pills page.
2. Patients have to select a particular medicine.
3. Patients have to click the “Find” button.
4. Patients click the “Exit” button.

3.5.1.7. Scenario 7

Use Case: Edit Profile

Primary Actor: Patient and Caregiver

Entry Condition: The user clicks the “Edit” button.

Exit Condition: The user clicks the “Save” or “Cancel” button.

Main Flow of Events:

1. Users have to navigate to his profile page.
2. Users have to click the “Edit” button.
3. The user will change the information that he wants to change.
4. Users should either click the “Save” or “Cancel” button.

3.5.1.8. Scenario 8

Use Case: Keeping track of data.

Primary Actor: Patient or Caregiver

Entry Condition: Users have to click the “Update Data” button.

Exit Condition: Users click the “Update” or “Exit” button.

Main Flow of Events:

1. Users have to navigate to the patient's profile page.
2. Users have to click the “Update Data” button.
3. Users are able to enter various data such as blood pressure, blood sugar, discomfort, flow, and physical measurements like weight and height.
4. Users click either the “Update” or “Exit” button.

3.5.2. Use-Case Model

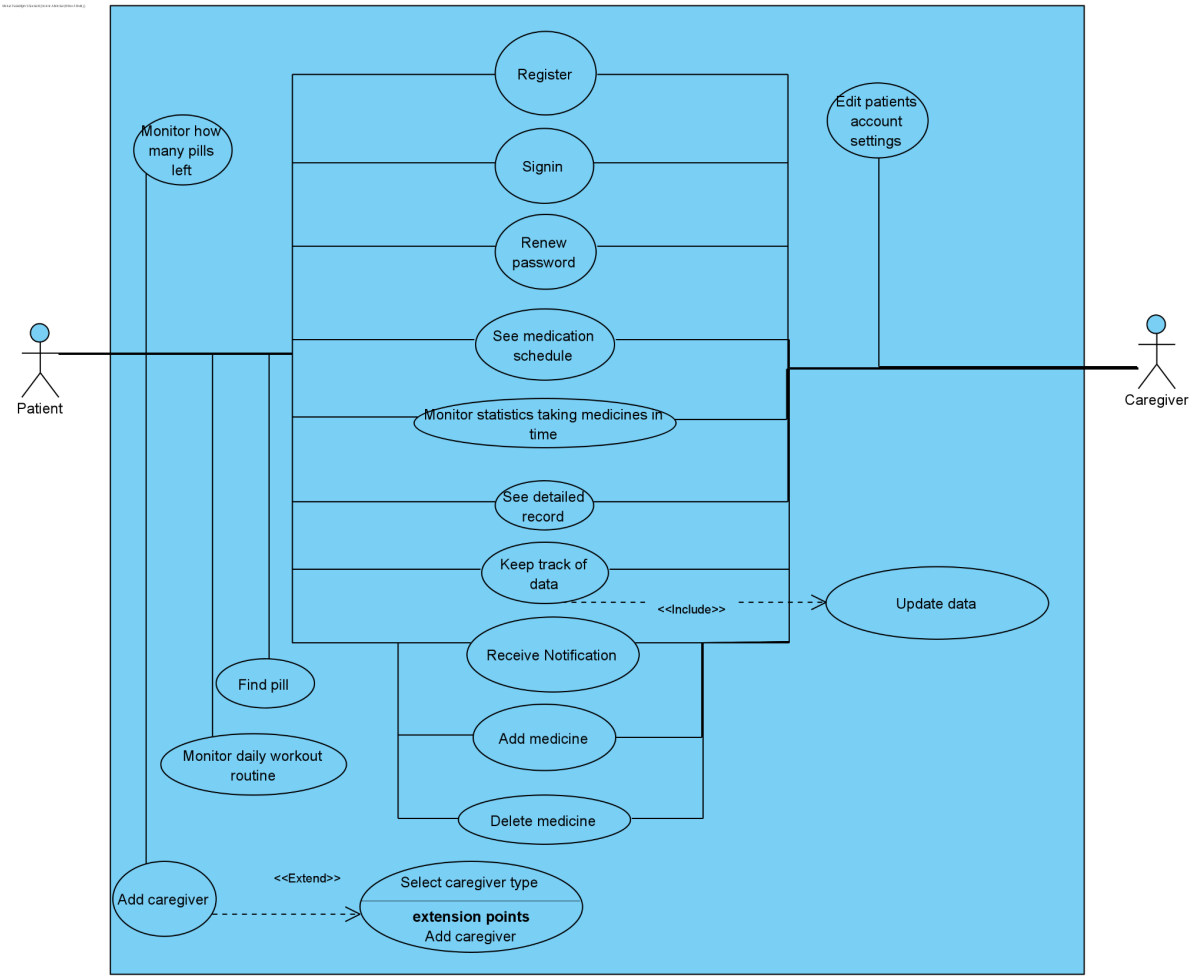

Figure 1: Use case diagram

3.5.3. Object and Class Model

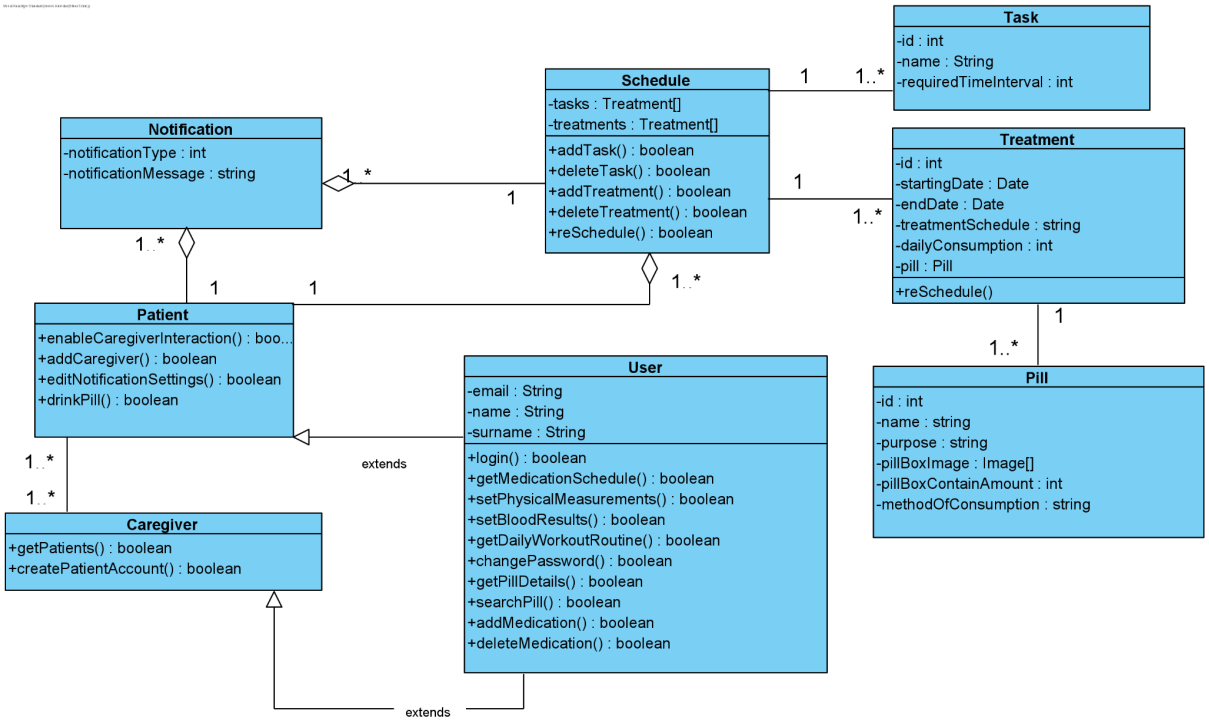

Figure 2: Class and object diagram

3.5.4. Dynamic Models

3.5.4.1. Activity Diagrams

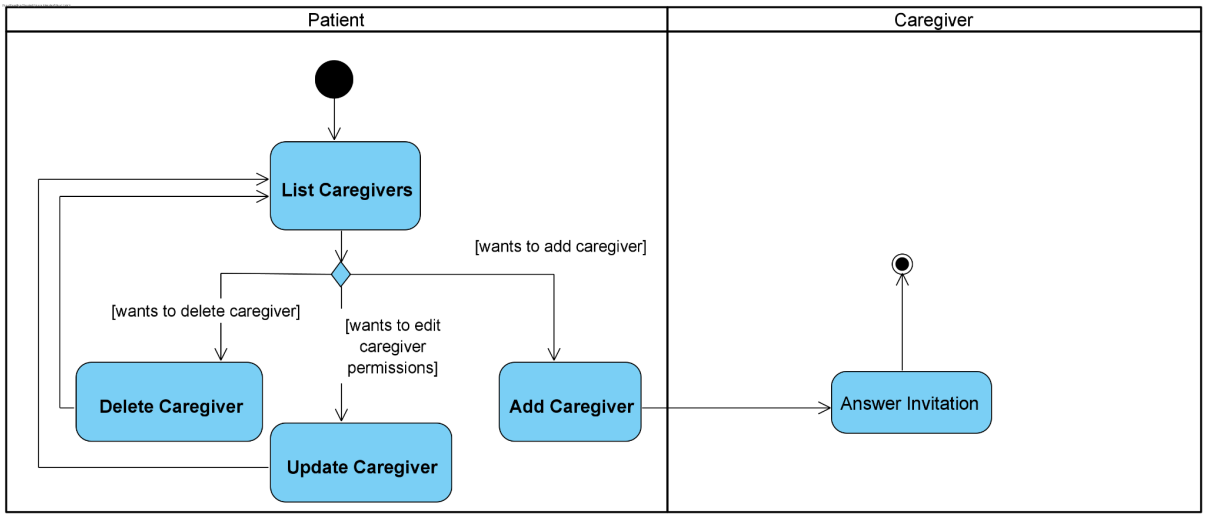

Figure 3: Adding caregiver activity diagram

The Flow of Activity: This activity diagram shows the flow of the management caregivers. Patients will be able to delete the caregivers. The patient will select a caregiver and delete them. Also, patients will be able to update caregiver information and permissions.

Patients will not be able to add a caregiver themselves directly, but they will be able to send an invitation. After the caregiver responds to the invitation, the activity will end.

3.5.4.2. State Machine Diagrams

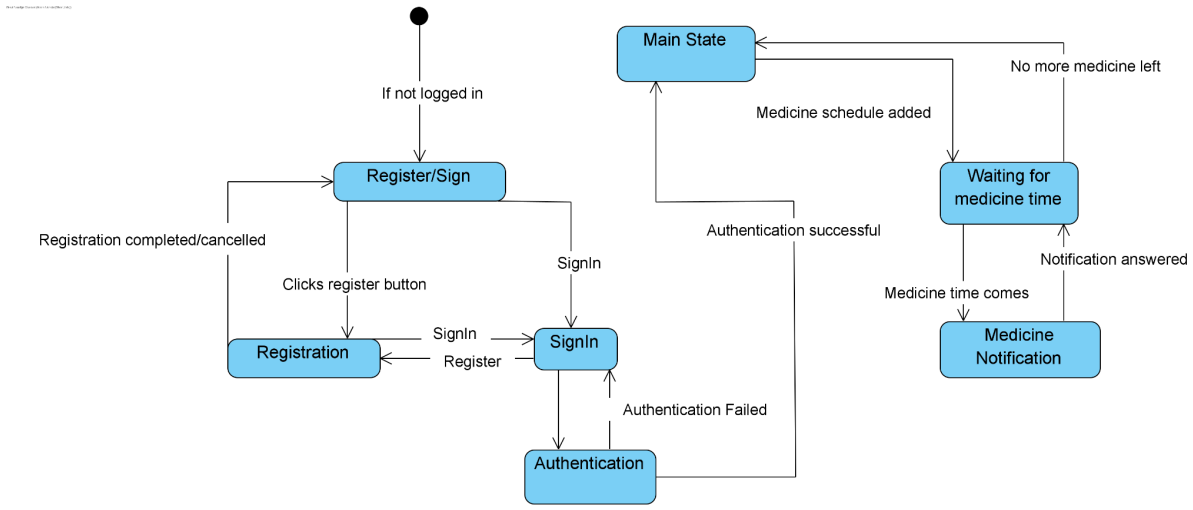

Figure 4: State machine diagram of the system

Initial State: After the user launches the application, if the user is already logged in, the state will direct the user automatically to the Main State. In the other case, the user logs in the first time, then the authentication state will present two choices.

Register: The user will indicate their information, password, etc., and then if all inputs satisfy the conditions (min length of the password, etc.) application will direct the user to Sign In Page.

SignIn: If the user doesn't have an account yet, they can go to the Register Page or continue with the SignIn stage. After needed inputs are filled in, the authentication manager will check the account from the database. If the account exists in the database, the authentication manager will lead the user to the main page.

Main State: The main state will check whether it is time to take medicine; the program will be directed to the Medicine Notification state. The program will repeat the process.

3.5.4.3. Sequence Diagrams

3.5.4.3.1. Medicine Usage Sequence Diagrams

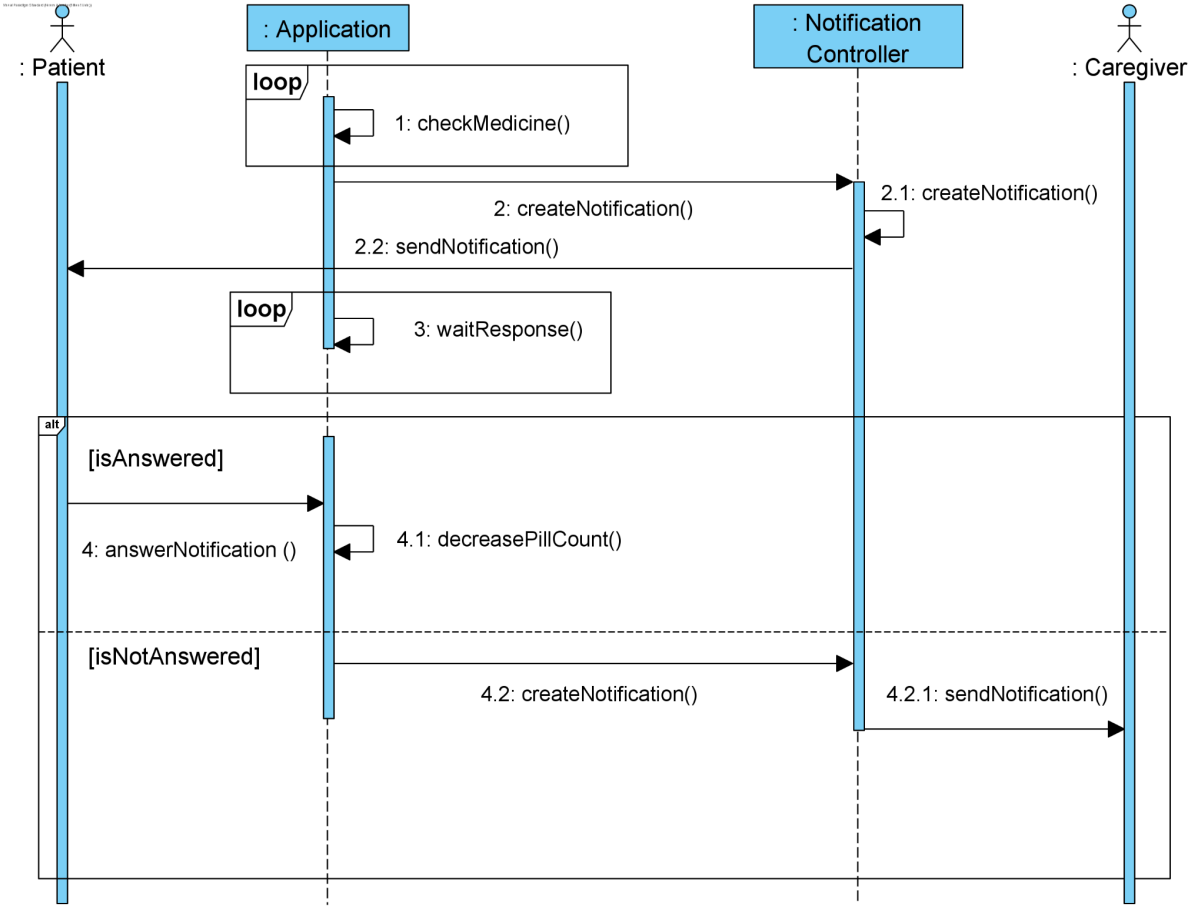

Figure 5: Sequence diagram of the medicine usage

- Application checks whether it is time to take medicine or not.
- If it is time to take medicine, a notification is created, and the notification controller sends a notification to the user.
- If the user took his pill, the remaining number of pills in the box stored in our system decreased by 1.
- If the user does not take his/her pill, the caregiver receives a notification.

3.5.4.3.2. Getting Pill Information Sequence Diagrams

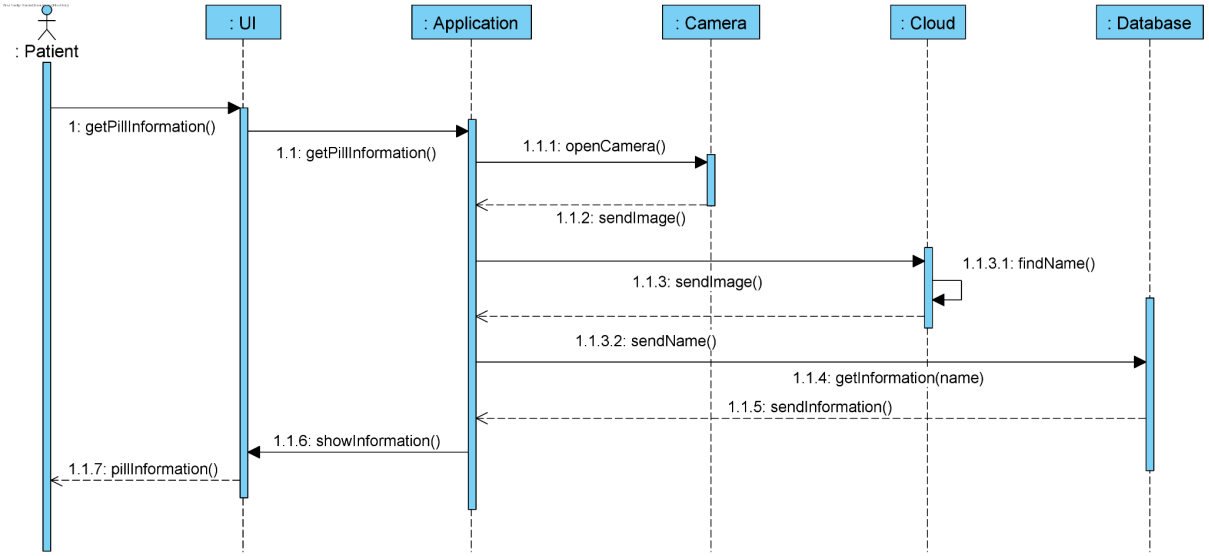

Figure 6: State machine diagram of the medicine recognition

- The user clicks the pill information button, and the application opens the camera.
- The image received from the camera is sent to the cloud for image processing.
- The name of the pillbox is found in the cloud and sent back to the application as a response.
- The application sends this name to our database to get the relevant information about the pill.
- Response from the database is shown in the UI to the user.

3.5.5. User Interface

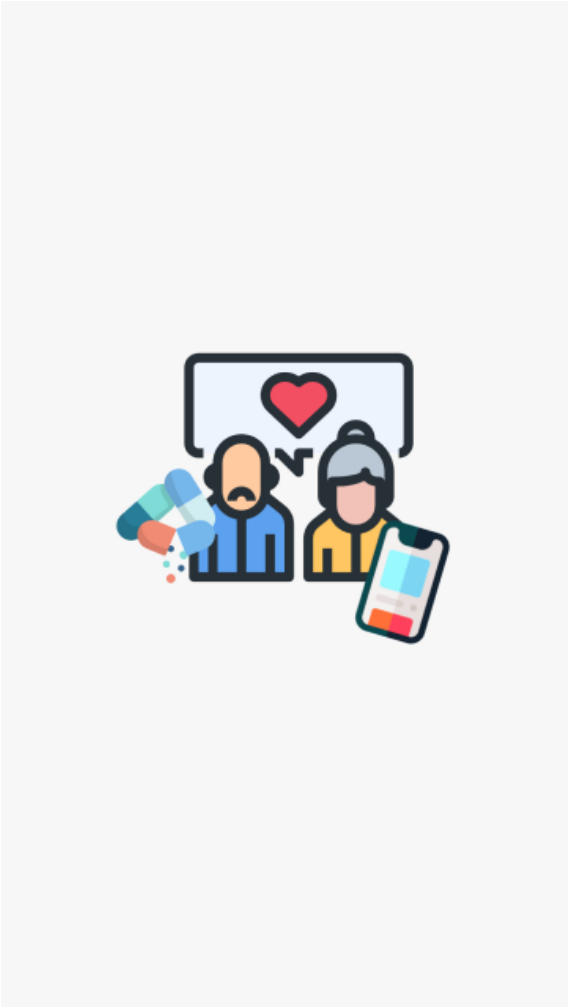

Figure 7: Splash screen

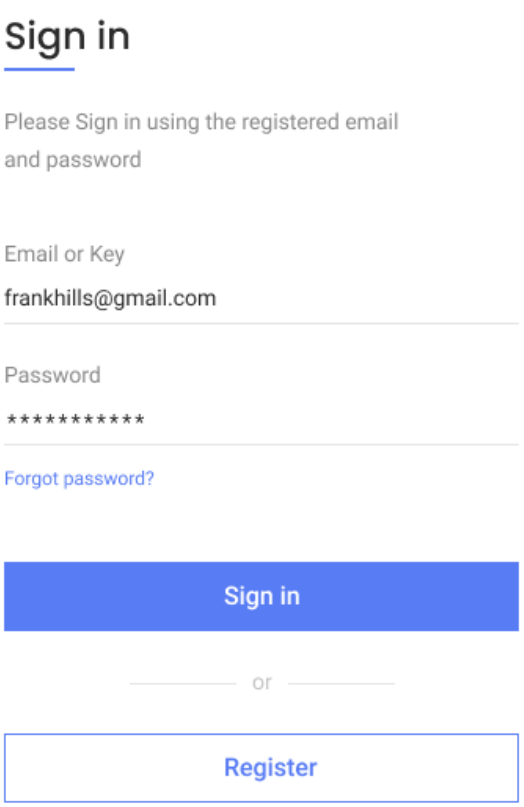

Figure 8: SignIn screen

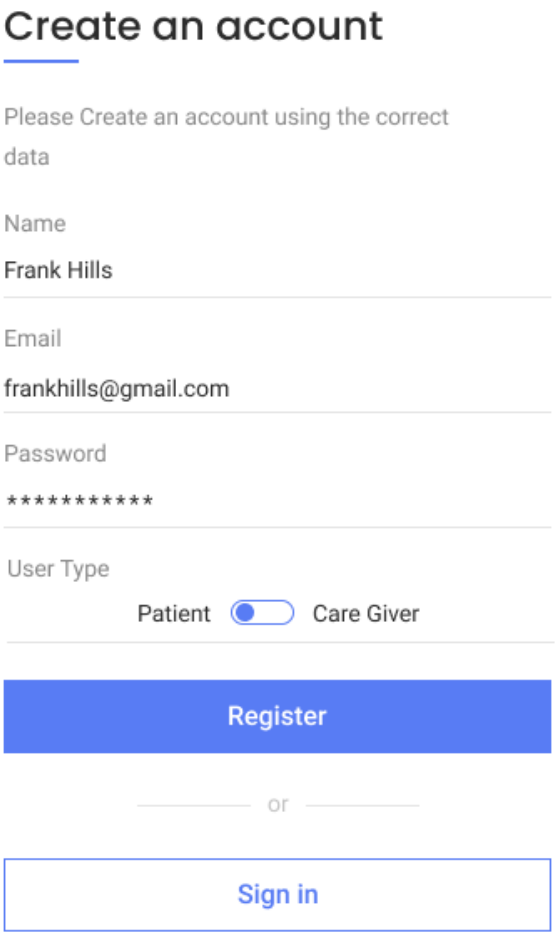

Figure 9: Register screen

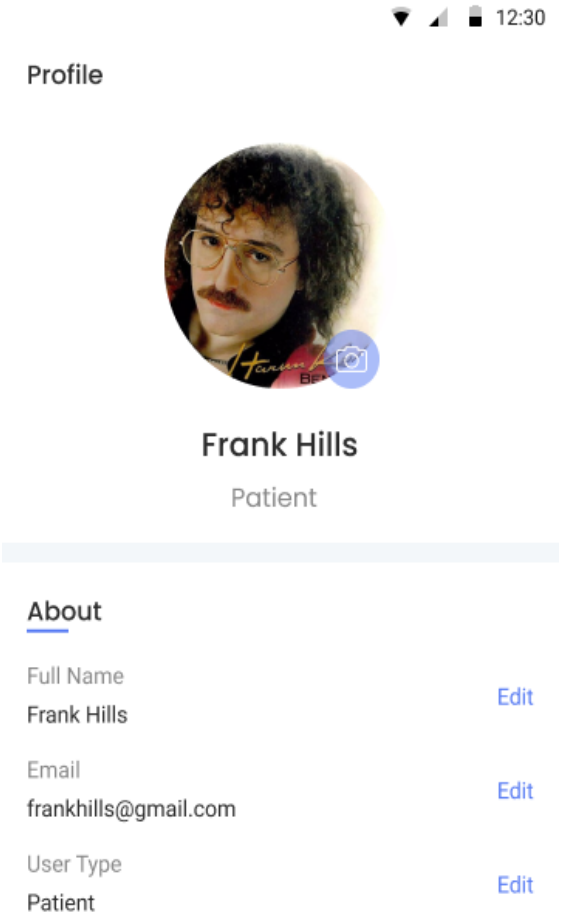

Figure 10: Profile screen

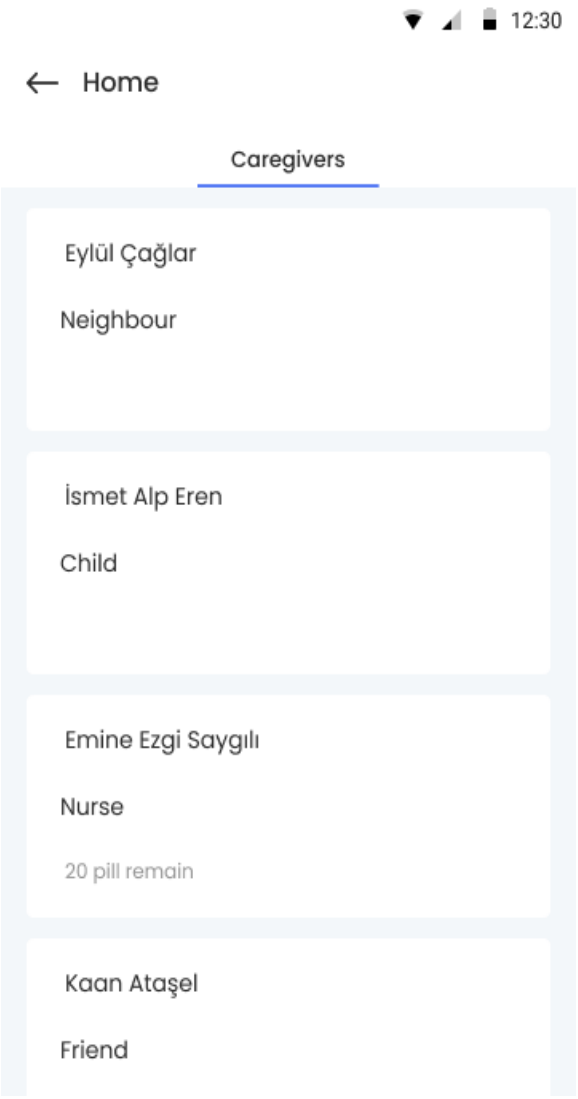

Figure 11: Caregivers screen

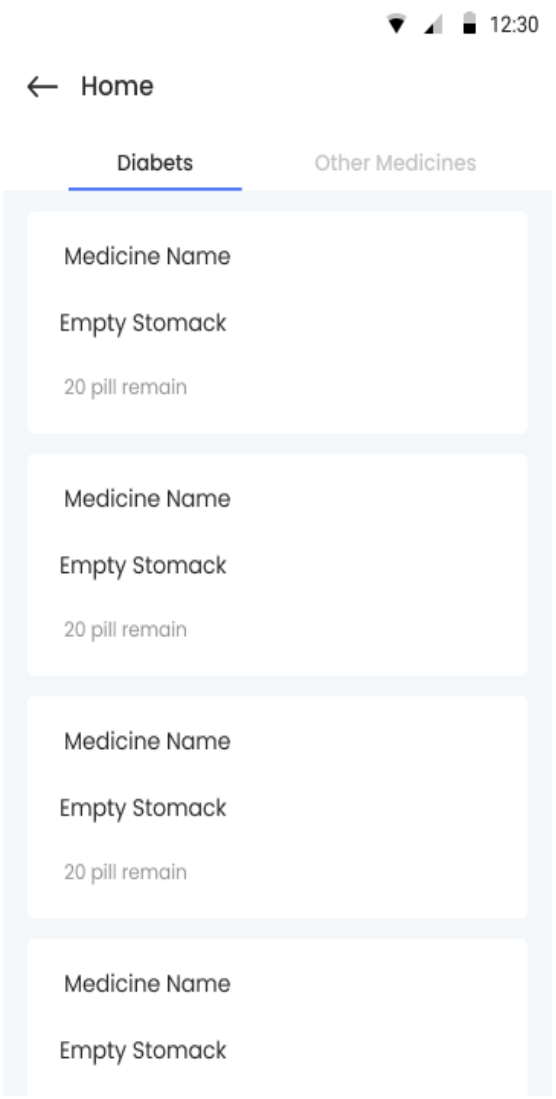

Figure 12: Medicines screen

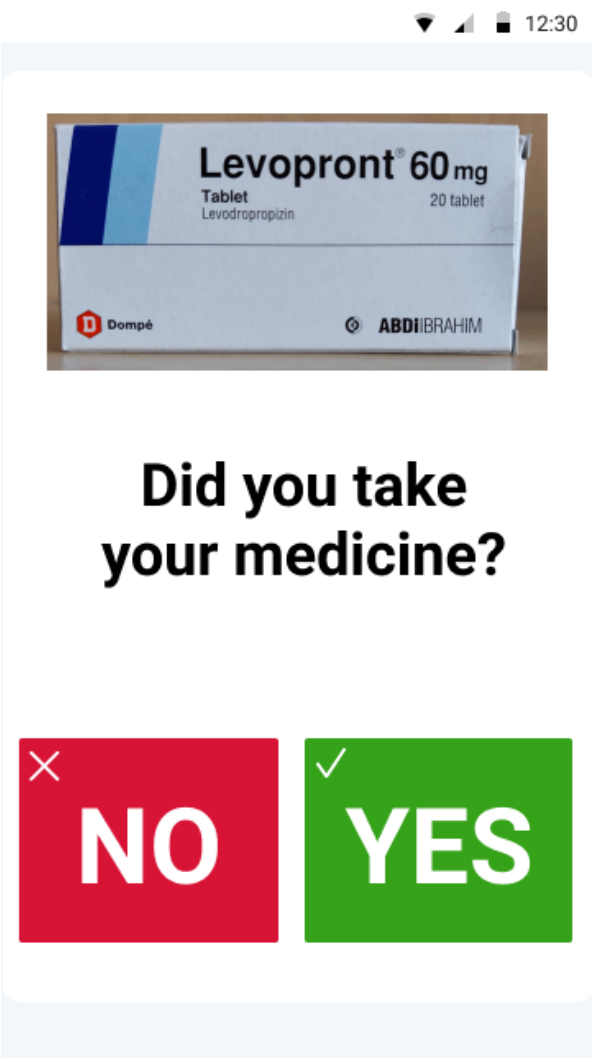

Figure 13: Notification screen

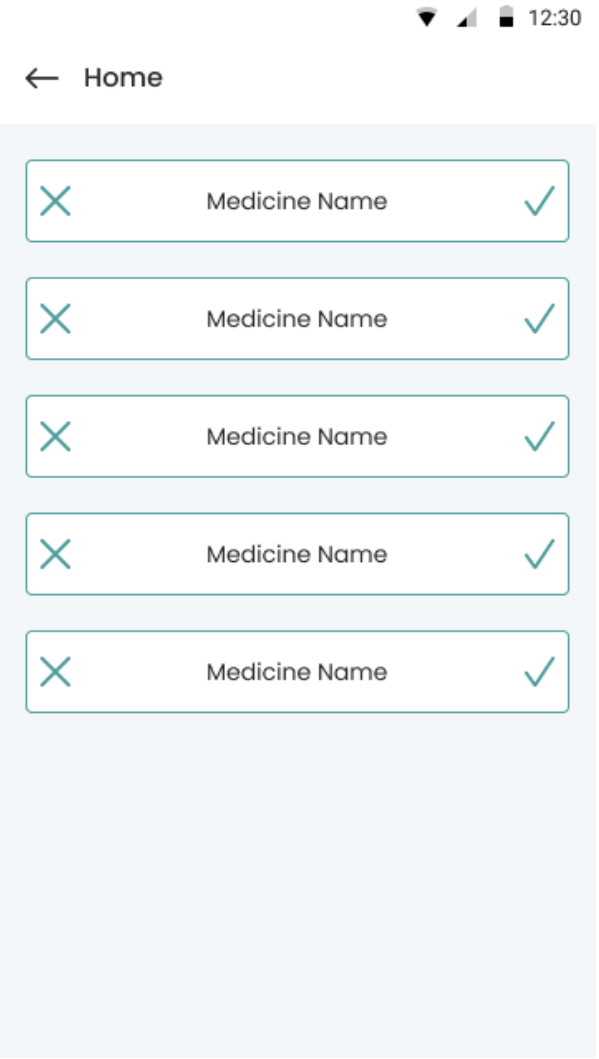

Figure 14: Notifications screen

4. Other Analysis Elements

4.1. Consideration of Various Factors in Engineering Design

Public Health: Improving the medication process of the patients is the motivation of our project, which focuses on strengthening the communication between the patient and caregivers and providing patients with helpful features, easing keeping track of their medicines' doses and schedules. Therefore, it is expected to enhance public health.

Public Safety: Taking into consideration the ongoing pandemic, it is essential to stay isolated and keep a distance from others. Since SurePa is targeted at establishing contact between the patients and caregivers about the medication process of the patient, it is projected to have a positive effect on public safety.

Public Welfare: SurePa aims to provide a medical service for the elderly worldwide without requiring any payment. Since SurePa will be free to use and accessible, it is expected to have a positive contribution to public welfare.

Technological Factors: Management of rapid technological development for sustainable development is an important issue to be considered in the implementation of SurePa. In order not to have SurePa obsolete in a few years, the development of new technologies should be tracked, and such technologies should be easily applicable to SurePa. For this purpose, SurePa should be implemented considering the maintainability issues.

Cultural Factors: Concerns and practices regarding privacy issues differ from culture to culture. For example, the European Union implements strict regulations about data protection, whereas Turkey does not enforce that authoritarian rule about privacy. Therefore, in the implementation of SurePa, the privacy boundaries of different cultures should be respected.

Social Factors: The potential users of SurePa are the elderly, which could have different deficiencies. So, SurePa is expected to provide both visual and auditory directives to meet the needs of its users having different deficiencies.

Global Factors: SurePa aims to provide a medical service to be used by people worldwide. For this purpose, considering that potential application users should have enough English proficiency to use such an application, SurePa will support both English and Turkish languages.

Table 1: Factors that can affect analysis and design

	Effect level	Effect
Public Health	10	The motivation of our Project
Public Safety	10	The motivation of our Project
Public Welfare	5	Accessibility and Purchasing Power
Technological Factors	10	Maintainability of the system Design and Implementation

Cultural Factors	4	Privacy and Data Protection
Social Factors	7	Availability of Visual and Auditory Directives
Global Factors	5	English Language Support

4.2. Risks and Alternatives

After discussing with the group members, some risks that might occur during the project phases were envisioned, and alternatives that could be applied were estimated.

The first risk is the broadness of the scope of the project. Each member will be assigned to a particular work, either an individual or a collaborative work, and will need to acquire new knowledge and skills, get used to new tools and technologies in a limited time. However, the learning process could be tedious and more complex than expected. This may cause delays in the transitions between the project phases and may even lead to the incompletion of some features. In such a case, implementing an extension to a similar medical application could be considered rather than implementing it from scratch.

The second risk is the scheduling problem. In software development, it is hard to estimate the time required to allocate for individual tasks. Underestimation of the time needed for a task might delay or hinder the progress of other tasks. Thus, revision of the project plan would become necessary. Adopting an agile project management approach would overcome this problem. Several iterations or incremental steps towards completing a project could be followed using the agile project management approach, promoting velocity and adaptability.

The third risk is the absence of a team member. Due to a pandemic, a member may contract coronavirus and would not participate actively and effectively. Additionally, a member may withdraw or fail the course, affecting the work division between group members. An alternative could be to change or remove some features promised to be implemented in the application. Another option is to redistribute the work among the remaining team members.

The fourth risk is failure due to the adaptation process. As we release our application, the users will undergo an adaptation process to learn and use the application. To ease this transition, we plan to finish implementing SurePa as early as possible to get feedback from the users and update and improve the software accordingly. In this way, the risk of people not adopting SurePa could be reduced; hence the risk of failure of the application would be diminished.

The fifth risk is failure due to competing apps serving similar purposes. Current systems are serving similar purposes having a considerable amount of users. To avoid failure due to not accumulating a large enough user base, SurePa should offer a more specialized, functional, and easy-to-use service. It could be tested and improved according to the feedback on advertising.

Table 2: Risks

	Likelihood	Effect on the project	B Plan Summary
The Broadness of the Scope of the Project	Medium	Delays in the transitions between the project phases and incompletion of some features	To implement an extension to a similar medical application
Scheduling Problem	Medium	Delays or hindrance to the progress of other tasks, rendering the revision on the project plan necessary	To adopt an agile project management approach
Absence of a Team Member	Low	Hindrance to active and effective participation and changes in the work division between group members	To change or to remove some features, or to redistribute the work among remaining team members
Failure Due to the Adaptation Process	Low	Application not being adopted by the users	To get feedback from the users and to update and improve

			the software accordingly
Failure Due to Competing Apps Serving Similar Purposes	High	Application not having a large enough user base	To offer more specialized, functional, and easy-to-use services and test and improve the application according to the feedback on advertising.

4.3. Project Plan

Table 3: List of work packages

WP#	Work package title	Leader	Members involved
WP1	Project Specification Report	Kerem Alemdar	All Members
WP2	Project Webpage	Kaan Ateşel	Emine Ezgi Saygılı
WP3	Innovation Expert Interview	Eylül Çağlar	Kaan Ateşel, Kerem Alemdar, İsmet Alp Eren
WP4	Analysis Report	İsmet Alp Eren	All Members
WP5	Front-end Implementation	İsmet Alp Eren	All Members
WP6	Rest API Service and Database	Kaan Ateşel	Kerem Alemdar, İsmet Alp Eren
WP7	High-Level Design Report	Emine Ezgi Saygılı	All Members
WP8	First Prototype and Testing	Kerem Alemdar	All Members

WP9	Mid-Presentation and Demo	Eylül Çağlar	All Members
WP10	Image Recognition & Machine Reading	Eylül Çağlar	İsmet, Alp Eren, Emine Ezgi Saygılı
WP11	Low-Level Design Report	Kerem Alemdar	All Members
WP12	Final Implementation	Emine Ezgi Saygılı	All Members
WP13	Testing	İsmet Alp Eren	All Members
WP14	Final Report	Kaan Ateşel	All Members
WP15	Final Presentation and Demo	Emine Ezgi Saygılı	All Members

WP 1: *Project Specification Report (Done)*			
Start date: *07.10.2021* **End date:** *10.10.2021*			
Leader:	*Kerem Alemdar*	**Members involved:**	*Kaan Ateşel, Eylül Çağlar, İsmet Alp Eren, Emine Ezgi Saygılı*
Objectives: *Describe the project goals and explain the constraints, ethical and professional issues, and functional and non-functional requirements.*			
Tasks: ***Task 1.1 Goals:*** *Determining the primary goal of the project.* ***Task 1.2 Requirements:*** *Determining the functional and non-functional requirements.* ***Task 1.3 Constraints:*** *Determining the constraints.*			
Deliverables ***D1.1:*** *Project Specification Report*			

WP 2*:* *Project Webpage (Done)*			
Start date: *09.10.2021* **End date:** *10.10.2021*			
Leader:	*Kaan Ateşel*	**Members involved:**	*Emine Ezgi Saygılı*
Objectives: *Creating a webpage that will include reports of the project.*			
Tasks: ***Task 2.1 Creation Of Github pages:*** *Github page will be created, and a template will be downloaded.* ***Task 2.2 Configuration of GitHub pages:*** *Page will be configured according to the project web page's needs. The page where the documents will be displayed will be made ready.* ***Task 2.3 Uploading reports to the web page:*** *A folder will be created in the project, and the reports will be uploaded there.*			
Deliverables ***D2.1:*** *Project Webpage*			
WP 3: *Innovation Expert Interview (Done)*			
Start date: *12.10.2021* **End date:** *12.10.2021*			
Leader:	*Eylül Çağlar*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, İsmet Alp Eren*
Objectives: *Explaining the project goals to an expert and taking feedback to develop project qualities.*			
Tasks: ***Task 3.1 Presentation:*** *Preparing a presentation that involves ideas and goals about the senior design project.*			

Deliverables ***D3.1:*** *Brief presentation for an innovation expert*			
WP 4: *Analysis Report*			
Start date: *31.10.2021* **End date:** *07.11.2021*			
Leader:	*İsmet Alp Eren*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, Eylül Çağlar, İsmet Alp Eren, Emine Ezgi Saygılı*
Objectives: *Making a detailed analysis of the project.*			
Tasks: ***Task 4.1 Current System Analysis:*** *Finding systems that are similar to the project and explaining these systems.* ***Task 4.2 Requirements Analysis:*** *Review aforementioned functional, non-functional, and pseudo requirements.* ***Task 4.3 System Models Analysis:*** *Creating scenarios, use case model, object and class models, dynamic models, and expected user interface draft.*			
Deliverables ***D4.1:*** *Analysis Report*			
WP 5: *Front-end Implementation*			
Start date: *15.11.2021* **End date:** *14.03.2022*			
Leader:	*İsmet Alp Eren*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, Eylül Çağlar,*

			İsmet Alp Eren, Emine Ezgi Saygılı

Objectives: *Creating the front end of the project and further implementations.*

Tasks:

Task 5.1 Setting up the environment: *Required programs will be downloaded, and projects will be created and uploaded to GitHub.*

Task 5.2 Outline of front-end: *Creating a base of the front end by implementing basic pages.*

Task 5.3 Development: *Further development of the project, a step towards a visible end product. Caregiver and patient pages will be implemented simultaneously.*

Task 5.4 Issue and bug fixes: *Bugs and issues focused step, aiming to reach bug-free front-end.*

Deliverables

D5.1: *An easy-to-use interface, especially for older users.*

WP 6: *Rest API Service and Database*			
Start date: *15.11.2021* **End date:** *14.03.2022*			
Leader:	*Kaan Ateşel*	**Members involved:**	*Kerem Alemdar, İsmet Alp Eren*

Objectives: *Integrating Rest API Service to the project and establishing a connection to a database.*

Tasks*:*

Task 6.1 Setting Up A Firebase Project: *A Firebase account will be created besides the new project. Primary functionalities of a rest API will be implemented.*
Task 6.2 Developing Authentication Endpoints: *Login, and registration functionalities of both caregiver and patient will be implemented.*
Task 6.3 Developing Object Storage System: *Integration of an object storage system.*

Task 6.4 Developing Patient Functionalities: *Patient-specific functionality implementation.* ***Test 6.5 Developing Caregiver Functionalities:*** *Caregiver-specific functionality implementation.*
Deliverables ***D6.1:*** *An object storage system* ***D6.2:*** *A Firebase application and data storage ready to use for both caregiver and patient functionalities.*
WP 7: *High-Level Design Report*
Start date: *24.11.2021* **End date:** *24.12.2021*

Leader:	*Emine Ezgi Saygılı*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, Eylül Çağlar, İsmet Alp Eren*

Objectives: *Having a comprehensive design of the project by analyzing the high-level system structures, subsystems, and data handling and considerations of various factors in engineering design.*
Tasks: ***Task 7.1 Subsystem Decomposition:*** Decomposing the system into cohesive, well-defined subsystems that are easier to understand, program, and maintain. ***Task 7.2 Data Management:*** Determining separate layers for the data management and how each system will process the data. ***Task 7.3 System Architecture:*** Describing the structure and behavior of subsystems and other components. ***Task 7.4 System Model:*** Developing abstract models of the system and representing the system using UML.
Deliverables **D7.1:** *High-Level Design Report*
WP 8: *First Prototype and Testing*

Start date: *25.11.2021* **End date:** *7.01.2022*			
Leader:	*Kerem Alemdar*	**Members involved:**	*Kaan Ateşel, Eylül Çağlar, İsmet Alp Eren, Emine Ezgi Saygılı*
Objectives: *Although the magic of the UI has not come to an end, the purpose is to create a product that will perform basic functionality.*			
Tasks: ***Task 8.1 Assessment of the current situation:*** *All of the program components will be controlled and combined to form a product.* ***Task 8.2 Tests:*** *Functionality and bug testing will be done.*			
Deliverables ***D8.1****: First prototype*			
WP 9: *Mid-Presentation and Demo*			
Start date: *15.12.2021* **End date:** *End of the Fall Semester*			
Leader:	*Eylül Çağlar*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, İsmet Alp Eren, Emine Ezgi Saygılı*
Objectives: *Presenting commercial and technical sides of the first prototype.*			
Tasks: ***Task 9.1 Demo:*** *Commercial demo will be recorded.* ***Task 9.2 Presentation:*** *Preparing prototype presentation.*			
Deliverables ***D9.1:*** *Presentation and demo*			
WP 10: *Image Recognition & Machine Reading*			
Start date: *31.01.2022* **End date:** *01.03.2022*			

Leader:	*Eylül Çağlar*	**Members involved:**	*İsmet Alp Eren, Emine Ezgi Saygılı*
Objectives: *Implementing image recognition and machine reading.*			
Tasks: ***Task 10.1 Outside source research:*** *Libraries that provide image recognition and reading text will be researched.* ***Task 10.2 Implementation:*** *Selected libraries in task 1 will be configured and implemented in our project.*			
Deliverables ***D10.1:*** *Image recognition system.*			
WP 11: *Low-Level Design Report*			
Start date: *31.01.2022* **End date:** *21.02.2022*			
Leader:	*Kerem Alemdar*	**Members involved:**	*Kaan Ateşel, Eylül Çağlar, İsmet Alp Eren, Emine Ezgi Saygılı*
Objectives: *Detailing the high level design to component level design.*			
Tasks: ***Task 11.1 Module Specifications:*** Describing the logic for every system component and further specifying each module. ***Task 11.2 Design Choices:*** Evaluating design trade-offs. ***Task 11.3 Packages:*** Specifying packages used in subsystems. ***Task 11.4 Identifying classes:*** Identifying class methods and properties.			
Deliverables ***D11.1:*** *Low-Level Design Report*			
WP 12: *Final Implementation*			
Start date: *7.01.2022* **End date:** *14.03.2022*			

Leader:	*Emine Ezgi Saygılı*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, Eylül Çağlar, İsmet Alp Eren*
Objectives: *Finalizing the project implementation.*			
Tasks*:* ***Task 12.1 Perfection Of The Project:*** Finalizing the project and solving the last bugs accounting for the prototype testing results.			
Deliverables ***D12.1:*** *Final version of the application SurePa.*			
WP 13: *Testing*			
Start date: *20.12.2021* **End date:** *14.03.2022*			
Leader:	*İsmet Alp Eren*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, Eylül Çağlar, Emine Ezgi Saygılı*
Objectives: *Testing the system's efficiency, UI usability, and searching for bugs.*			
Tasks: ***Task 13.1 Re-evaluation:*** UI's usability will be examined and will be updated if needed. ***Task 13.2 Searching for bugs:*** Bugs will be found and eliminated.			
Deliverables ***D13.1:*** *Improved UI and bug-free product.*			
WP 14: *Final Report*			
Start date: *18.04.2022* **End date:** *01.05.2022*			
Leader:	*Kaan Ateşel*	**Members involved:**	*Kerem Alemdar, Eylül Çağlar, İsmet Alp Eren, Emine Ezgi Saygılı*
Objectives: *A comprehensive overview and analysis of the project with the latest updates.*			

Tasks: ***Task 14.1 Requirements:*** Last requirement updates and finalize the project requirements. ***Task 14.2 Architecture:*** Last minor changes in the architecture analysis. ***Task 14.3 Process Analysis:*** Details of the development and implementation will be analyzed and given. ***Task 14.4 Testing:*** Results of the application tests will be recorded and analyzed.
Deliverables ***D14.1:*** *Final Report*
WP 15: *Final Presentation and Demo*
Start date: *14.03.2022* **End date:** *End of the spring semester.*

Leader:	*Emine Ezgi Saygılı*	**Members involved:**	*Kerem Alemdar, Kaan Ateşel, Eylül Çağlar, İsmet Alp Eren*

Objectives*:* *Presenting commercial and technical sides of the project.*
Tasks: ***Task 15.1 Demo:*** *Commercial demo will be recorded.* ***Task 15.2 Presentation:*** *Preparing product presentation.*
Deliverables ***D15.1***: *Presentation and demo*

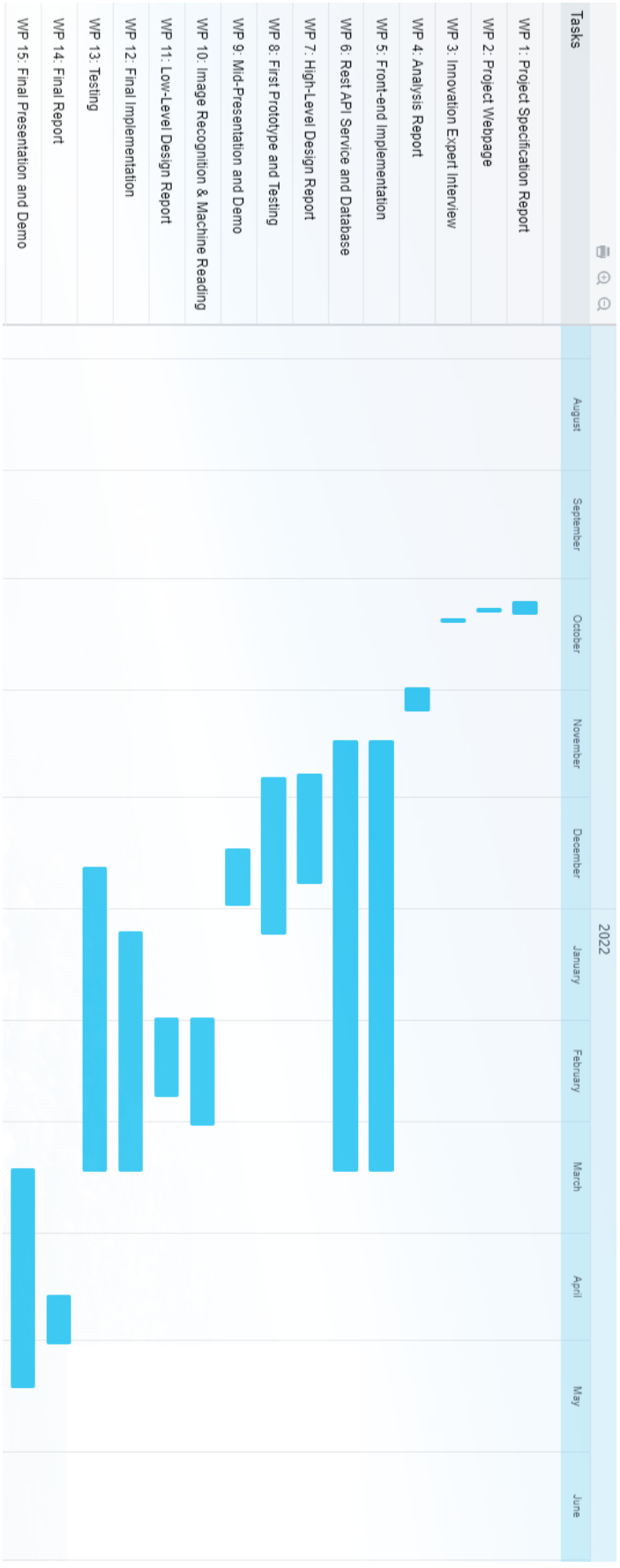

Figure 15: Gantt chart for the project process plan

4.4. Ensuring Proper Teamwork

In order to make sure all group members are part of the development process, first, we will choose a group leader for each work package. The group leader will be responsible for distributing the jobs and checking whether it has been done on time or not in addition to their development work. They also will try to distribute workload equally to group members.

GitHub also has an issue tracking system; this feature will assign the jobs to group members. In addition, GitHub also provides analysis about the amount of work done by users, so this feature will ensure that all group members work equally.

4.5. Ethics and Professional Responsibilities

The SurePa's first main goal is to provide solutions for forgetfulness, targeting primarily elders in the medicine area. Therefore, SurePa can be used for all people worldwide, regardless of country or religion, who suffer from forgetfulness and forget to take pills, but it mainly targets the elders. In addition to that, SurePa will be accessible on both IOS and Android platforms. When the SurePa mobile app is released, We expect the elders' treatment process to be smoother, more convenient, and more reliable.

We believe that taking proper medicine at the appropriate time is essential in the treatment process. It can harden the treatment process or even create unwanted side effects. Therefore, SurePa will be a free platform to be accessible from all people from all income rates.

SurePa will create more reliable healthcare for people all around the world. However, this raises security concerns about data privacy. SurePa will not share any data with any of the third parties. The data of the customer will only be shared with them. In addition, the data application's security level will be kept as high as possible to keep user data safe. In addition, using image recognition may cause uneasiness between users, but SurePa will not store any image coming from the user.

4.6. Planning for New Knowledge and Learning Strategies

Our team members have experience in coding and are aware of coding principles. However, this project requires new skills. Some of the group members have not been

experienced with React, which is a JavaScript library. This application also asks for knowledge about machine learning and image recognition. In addition to that, we also need to learn about Python frameworks. Our plan is to learn these new technologies and skills mainly via online tools (code documentation, online tutorials, example codes) via Bilkent University's lectures and books. Online forms will also be helpful while overcoming bugs and building required skills.

5. Glossary

1. **Blood clots:** The mass of coagulation of blood which includes fibrin and blood cells.
2. **Thyroid:** Thyroid disease occurs when the thyroid gland fails to create the right amount of hormone.
3. **Diabetes Reports:** These reports include information about estimated HBA1C, Blood Glucose level, and Blood glucose deviation.
4. **Medication Schedule:** A schedule that shows which pill will be taken and when it will be taken.
5. **Rest Api:** Rest stands for representational state transfer architectural style, and API stands for Application Programmer Interface. We will create our API according to Rest standards.
6. **Image Recognition:** Computer applications that can identify objects from an image or video. It is a context of computer vision.

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