Sugar Sense

Software Requirements Specification

Prepared By-

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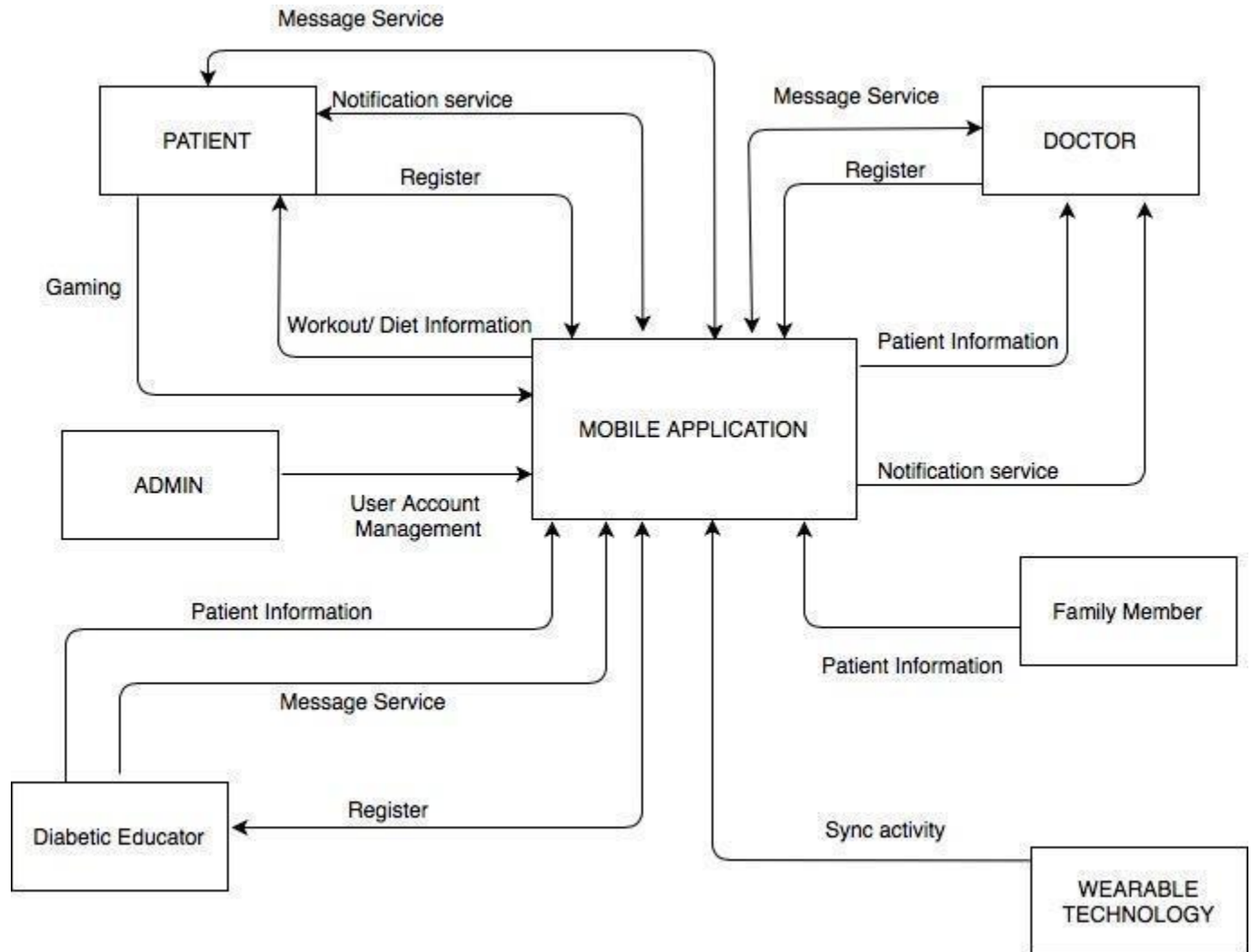**Aishwarya Athreya**
Sathwika Varma Kalidindi Chaitanya

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1. Project Description

1.1 System Scope

1.2 Stakeholder Description

1. **Doctor**
   Doctor Smith is a user who has put forward the idea of developing the application. He will primarily use the app to examine the health records of patients with diabetes. He is accountable for providing the requirements that will help in the development of an error-free and easily accessible application.

2. **Patient**
   Patient is a user of the application to be developed. She/he will primarily use the app for recording her glucose levels, diet and exercise habits. She/he is mainly responsible for providing the requirements that will help develop a secure and user-friendly application.

3. **Diabetes Educator**
   Diabetes Educator is a health professional who possesses comprehensive knowledge of and experience in diabetes prevention. He/She will primarily use the application to access patients medical information. He/She is responsible for answering patients queries if the doctor is unavailable.

4. **Family member**
   Family member is a caretaker of a patient who would assist the patient in using the application. He/She will primarily be able to perform limited operations on behalf of the patient.

5. **Admin**
   An admin helps to maintain the users of the application and manages the application based on the requirement.

6. **Developer:** A developer is an individual that builds and creates mobile applications. He or she writes, debugs and executes the source code of the application. He/she is mainly responsible for mapping the business requirements to technical aspects of the application.

7. **Tester**: A software tester is an individual that tests software for bugs, errors, defects or any problem that can affect the performance of a computer application. He/she is mainly responsible to make sure that the application is meeting the quality standards.

1.3 Process Description

Dr. Smith, an Endocrinologist at a hospital observed the widespread use of smartphones and wearable technology. Inspired by the use, he is interested in using a mobile app that helps physicians with the treatment of their patients with diabetes. He also wanted to better support his patients manage their condition using the application.

Currently, Dr. Smith monitors the blood sugar records of the patients upon their visit to make sure that prescribed medicines help them control their glucose level and maintain a healthy lifestyle. Dr. Smith provides his patients with a paper-based form to help them maintain the record of their glucose reading

taken multiple times in between the visits. He also verbally asks his patients about their diet, exercise habits and would encourage them to have a healthy lifestyle.

Dr. Smith would like to have a mobile application that will assist patients in recording their data of sugar levels easily and an application that will reduce the chances of data being forgotten to record. The application would help Dr. Smith avoid misreading the patients' handwriting. This application will help Dr. Smith to get prior access to this record so that he could identify the issue in advance and can plan the treatment accordingly for effective consultation. The application will help patients track their diet and exercise habits precisely by incorporating wearable technology so that Dr. Smith can figure out whether certain diet and exercise habits correlate with patients' ability to maintain their glucose level. The application will include social as well as gamification aspects like a competition between peers/other patients that encourage them to push themselves harder to maintain a healthy lifestyle.

2. User Requirements

2.1 User Requirements Documentation

User Requirement ID: 1
User Requirement description: The app shall allow new users to create an account by adding their name, age, security number, past diabetes history.
Stakeholder providing this requirement: Doctor
User Requirement type: Functional

User Requirement ID: 2
User Requirement description: The app shall allow doctors to retrieve records of patients.
Stakeholder providing this requirement: Doctor
User Requirement type: Functional

User Requirement ID: 3
User Requirement description: The system shall record blood glucose levels and diet of the patients.
Stakeholder providing this requirement: Doctor
User Requirement type: Functional

User Requirement ID: 4
User Requirement description: The app shall fetch the step count, exercise information from wearable devices.
Stakeholder providing this requirement: Doctor
User Requirement type: Functional

User Requirement ID: 5

User Requirement description: The app shall allow users to book appointments with the doctor.
Stakeholder providing this requirement:
User Requirement type: Functional

User Requirement ID: 6
User Requirement description: The app shall allow family members to update a patient's glucose levels and diet.
Stakeholder providing this requirement: Patient
User Requirement type: Functional

User Requirement ID: 7
User Requirement description: The app shall provide users with gamification to motivate him/her.
Stakeholder providing this requirement: Patient
User Requirement type: Functional

User Requirement ID: 8
User Requirement description: The app shall allow the patients to exchange messages with Diabetes Educator.
Stakeholder providing this requirement: Doctor**,** Patient
User Requirement type: Functional

User Requirement ID: 9
User Requirement description: The app shall display the patient's diabetes information only to the doctor.
Stakeholder providing this requirement: Patient
User Requirement type: Non-Functional

User Requirement ID: 10
User Requirement description: The app shall provide the functionality to choose what information can be shared
Stakeholder providing this requirement: Doctor
User Requirement type: Non-Functional

User Requirement ID: 11
User Requirement description: The app shall be available to all the users at any point of time.
Stakeholder providing this requirement: Patient
User Requirement type: Non-Functional

User Requirement ID: 12
User Requirement description: The app shall allow users to use the application very easily
Stakeholder providing this requirement: Patient
User Requirement type: Non-functional

User Requirement ID: 13
User Requirement description: The app shall respond to the users of the application very quickly
Stakeholder providing this requirement: Patient
User Requirement type: Non-functional

User Requirement ID: 14
User Requirement description: The app shall require the user to internet at least once a day to back-up all the daily progress.
Stakeholder providing this requirement: Doctor
User Requirement type: Constraint

User Requirement ID: 15
User Requirement description: The app shall allow users to search for people to share and view profile information.
Stakeholder providing this requirement: Patient, Doctor
User Requirement type: Functional

User Requirement ID: 16
User Requirement description: The app shall allow users to add them as friends
Stakeholder providing this requirement: Patient
User Requirement type: Functional

User Requirement ID: 17
User Requirement description: The app shall allow the system to directly fetch date and time
Stakeholder providing this requirement: Patient
User Requirement type: Functional

User Requirement ID: 18
User Requirement description: The app shall alert the doctor in-case of abnormal glucose readings from patients.
Stakeholder providing this requirement: Doctor
User Requirement type: Functional

2.2 User Requirements Analysis

User Requirement ID: 3

User Requirement Description: The system shall record blood glucose levels and diet of the patients.

Assumption: Assumption made while writing the requirement is that all the users have the blood glucose measuring device.

User Requirement ID: 7

User Requirement Description: The app shall provide users with gamification to motivate him/her.

Ambiguity: The details (outdoor/indoor activities) to be considered for gamification is ambiguous.
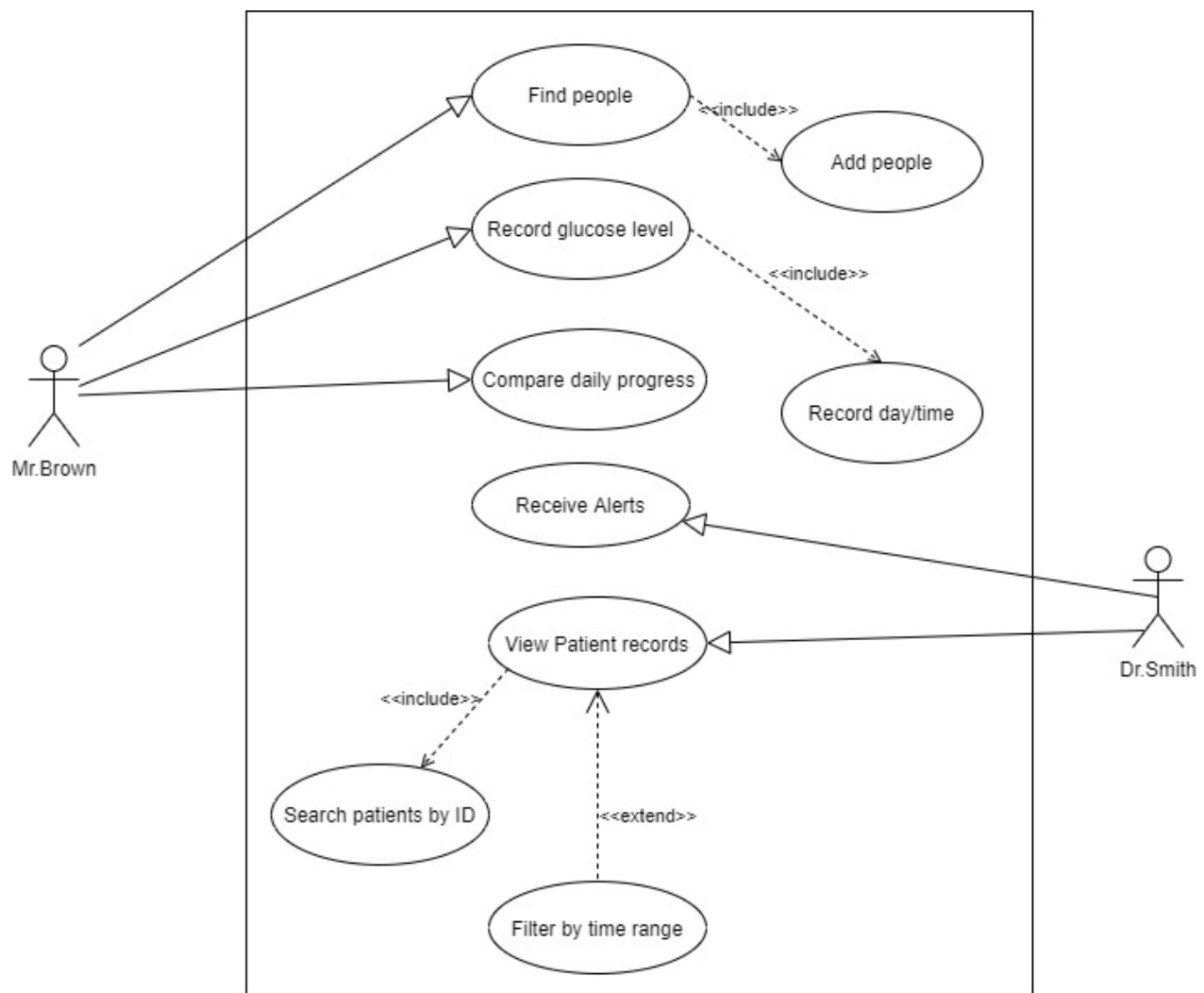

User Requirement ID: 11

User Requirement Description: The app shall allow patients to update privacy settings accordingly.

Conflict: Updating privacy settings for each user for gaming makes the user information more secure but conflicts with the user-friendly aspect of the application.
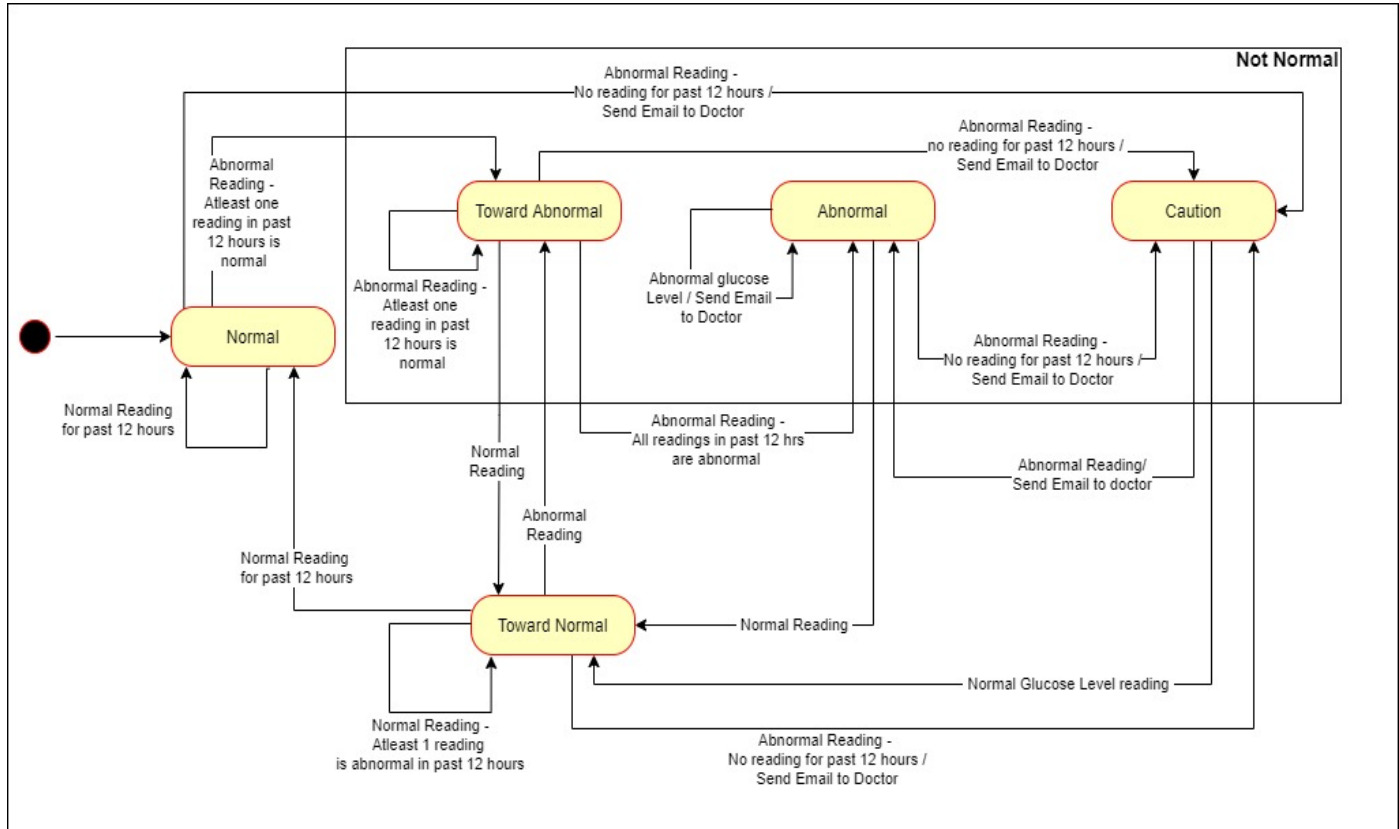
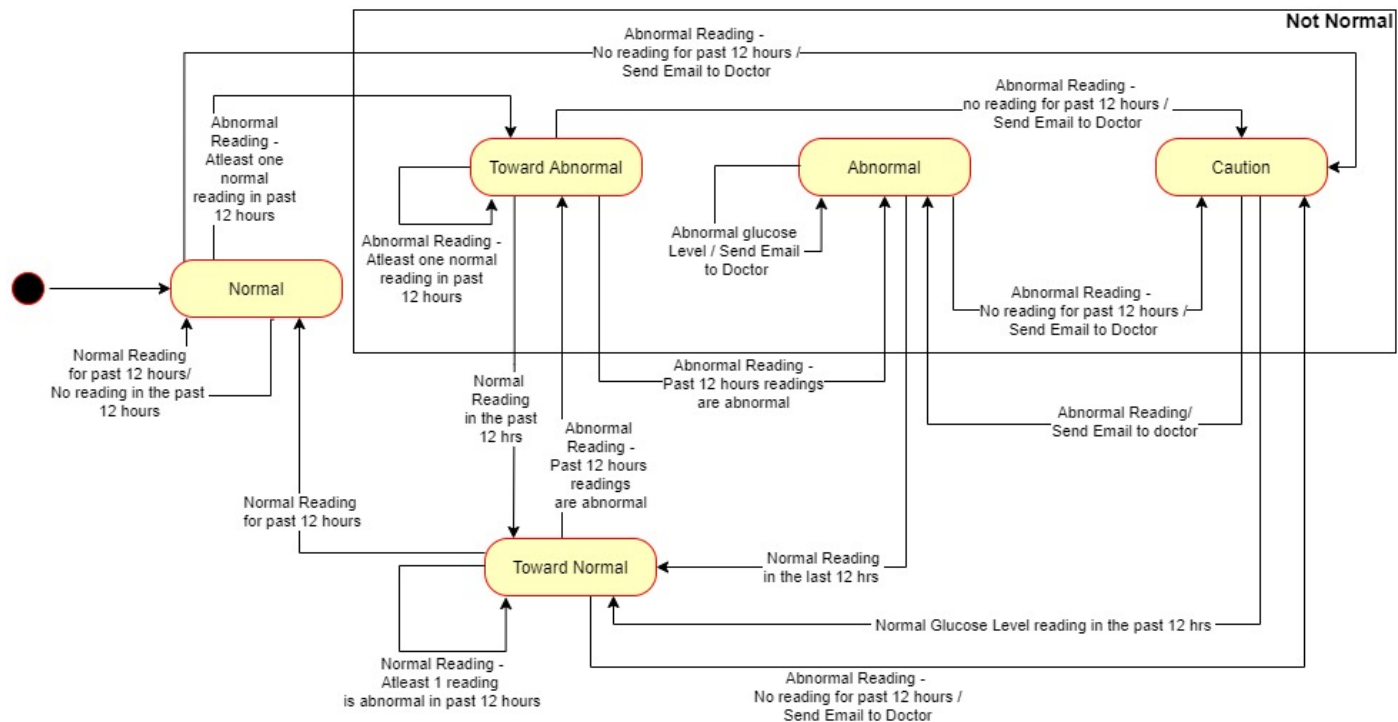# 3. Use Cases
3.1 Use Case Diagram
Corrected Use case diagram :

State Transition Diagram :

Updated State Diagram :

Conflicting requirements after analyzing Activity diagram and state transition diagram:

It was mentioned in the description that the application shall send an email to the physician when the new glucose level reading puts the patient's glucose level in abnormal or In-caution state. It is also said that Mr. Brown should be able to enter the information into the application when the device is connected to the Internet using WI-FI. If the patient's records an abnormal reading and is not connected to WI-FI, the application will not be able to send an email notification to the Physician.

Assumption:

User Requirement 15: "The app shall allow users to search for people to share and view profile information."

In the user requirement 15, we are assuming that the people the user is searching for is already registered into the application

3.2 Use Case Description

Use Case 1: Compare Daily Progress
Reference to Originating User Requirement 7
Actors: Mr. Brown

Pre-Conditions: Mr. Brown successfully completes the exercise routine of the day
Triggering Event: Mr. Brown wants to compare his daily exercise routine with his friends
Steps:
1. Mr. Brown enters his exercise details in the application
2. Mr. Brown requests to view exercise routine of his friends
3. The application compares the exercising details of Mr. brown and his friends and displays the data
Post-Conditions: The application successfully compares daily progress with his friends

Use Case 2: Record Glucose Level
Reference to Originating User Requirement 3
Actors: Mr. Brown
Pre-Conditions: Mr. Brown takes the test to check his glucose level
Triggering Event: Mr. Brown wants to update his daily glucose level
Steps:
1. Mr. Brown opts to enter his glucose levels
2. Mr. Brown enters his glucose level details
3. The application uses Fetch date and time
4. The application saves Mr. Brown's glucose details to profile.
Alternative steps:
   2a. Mr. Brown wants to edit the date and time of the glucose level entered.
   2b. The application uses Record date and Time.
Post-Conditions: The application has successfully recorded glucose level.

Use Case 3: Record Date and Time
Reference to Originating User Requirement 17
Actors: Operating System
Pre-Conditions: Mr. Brown has his measured glucose levels to be entered.
Triggering Event: Mr. Brown chooses to enter his glucose level
Steps:
1. The application obtains the date and time information automatically from the internet
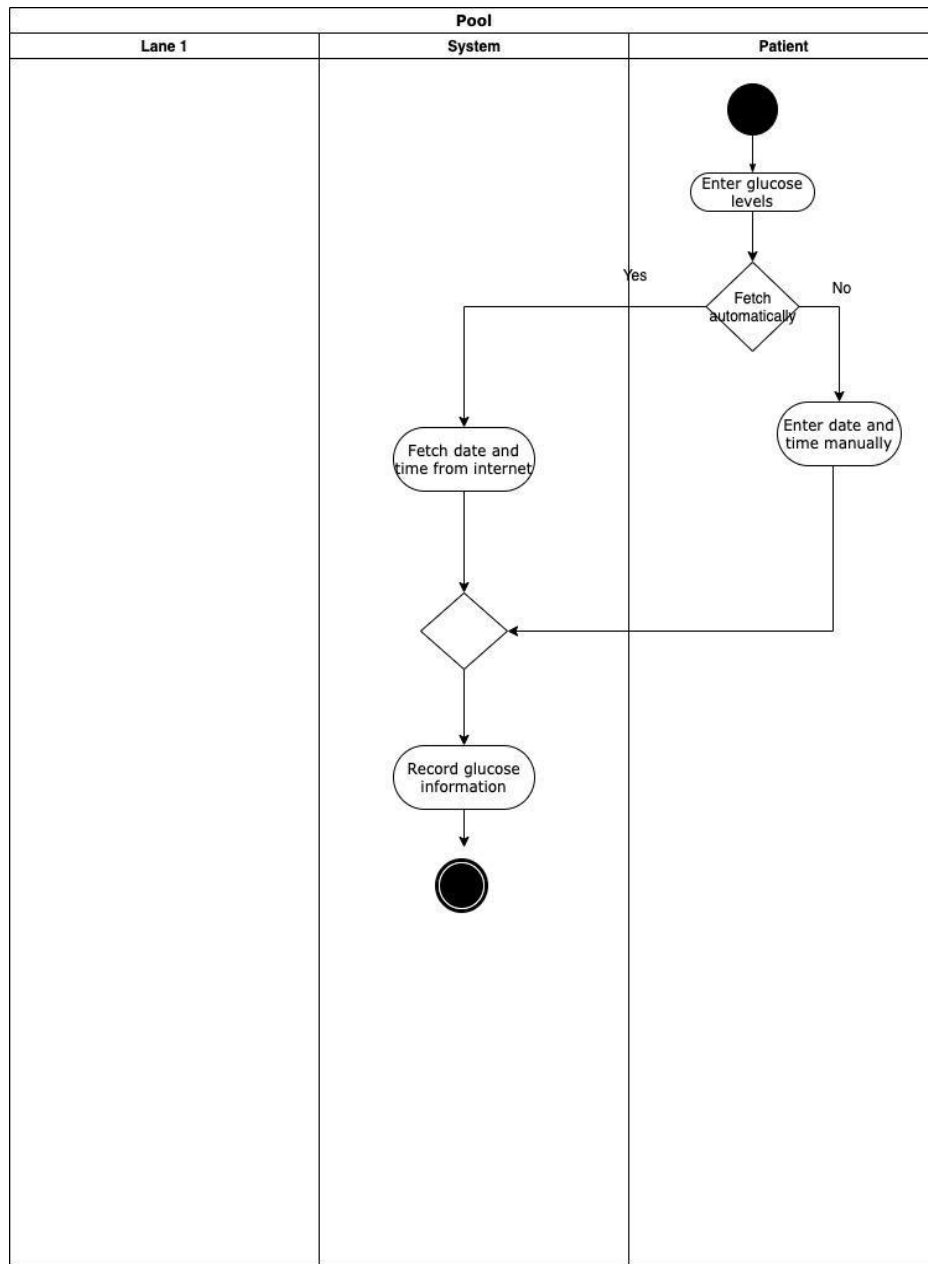2. The application displays the date and time to Mr. Brown
Alternative Steps:
1. The patient chooses to enter the date and time manually
2. The patient enters the date he has taken the glucose test
3. The patient enters the time of the day he has taken the glucose test
4. The application saves data and time that the patient has entered
Exception Steps:
   1a. The application is not connected to the internet
Activity Diagram:

Pool		
Lane 1	System	Patient

Enter glucose levels

Fetch automatically
Yes / No

Fetch date and time from internet

Enter date and time manually

Record glucose information

Updated Activity diagram:

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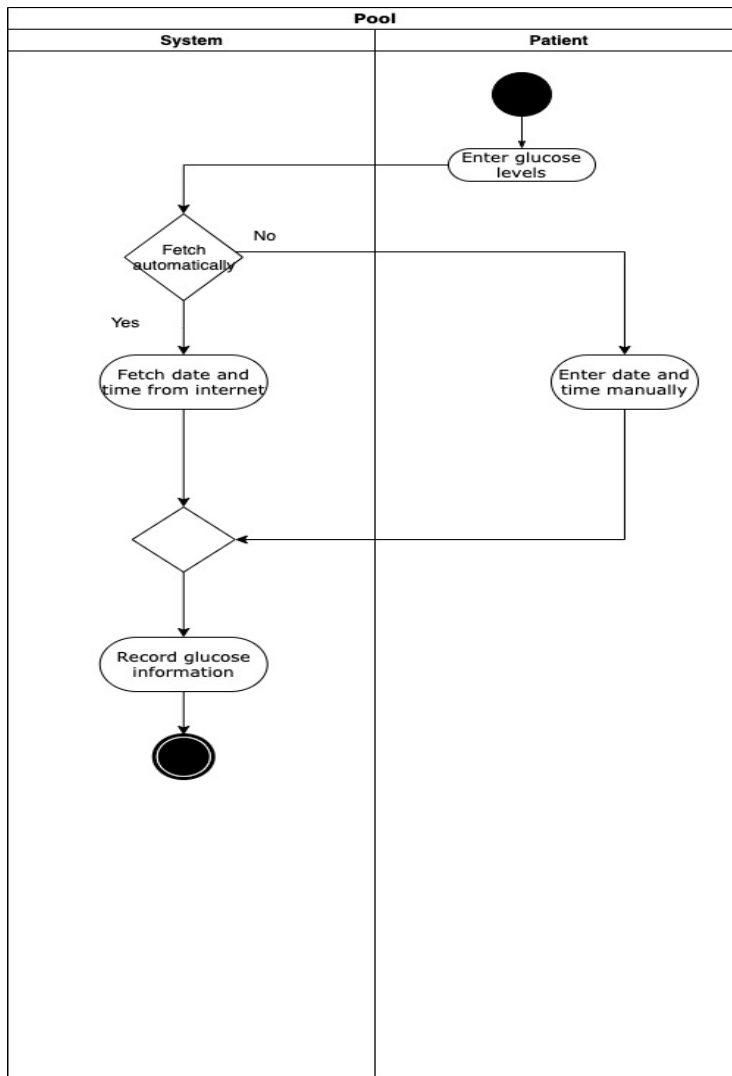
Post-Conditions: The application successfully fetched date and time of the entered information

Use Case 4: Find People
Reference to Originating User Requirement 15
Actors: Mr. Brown.
Pre-Conditions: The user searching for people is already registered to the application.
Triggering Event: The user wants to search people.
Steps:
1. The user chooses to search people to add to the friends list.
2. User enters the name of the person in the search bar.
3. The application displays a searched profile.

Exception Steps:
3a. The application fails to find the searched profile.

4. The application displays a message when no user is found.

Post-Conditions: The application successfully allows to find people.

Use Case 5: Add People

Reference to Originating User Requirement 16

Actors: Mr. Brown

Pre-Conditions: Mr. Brown has searched for the person whom he wants to add
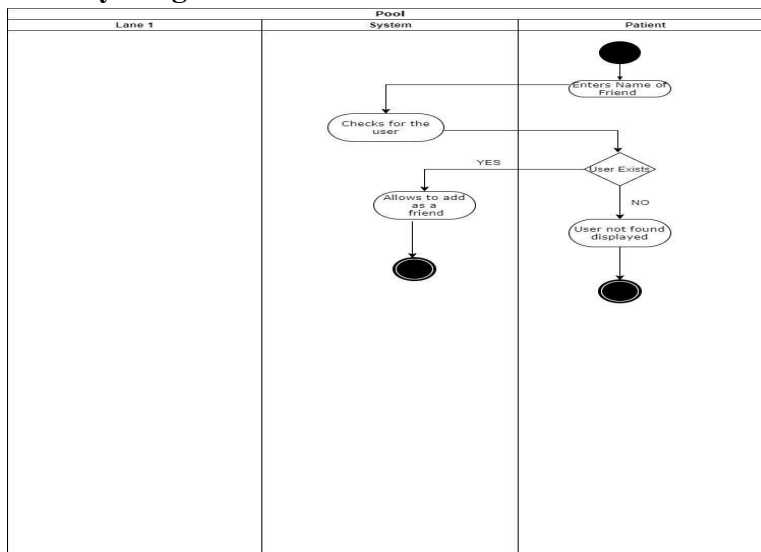
Triggering Event: Mr. Brown wants to share his daily progress with other users.
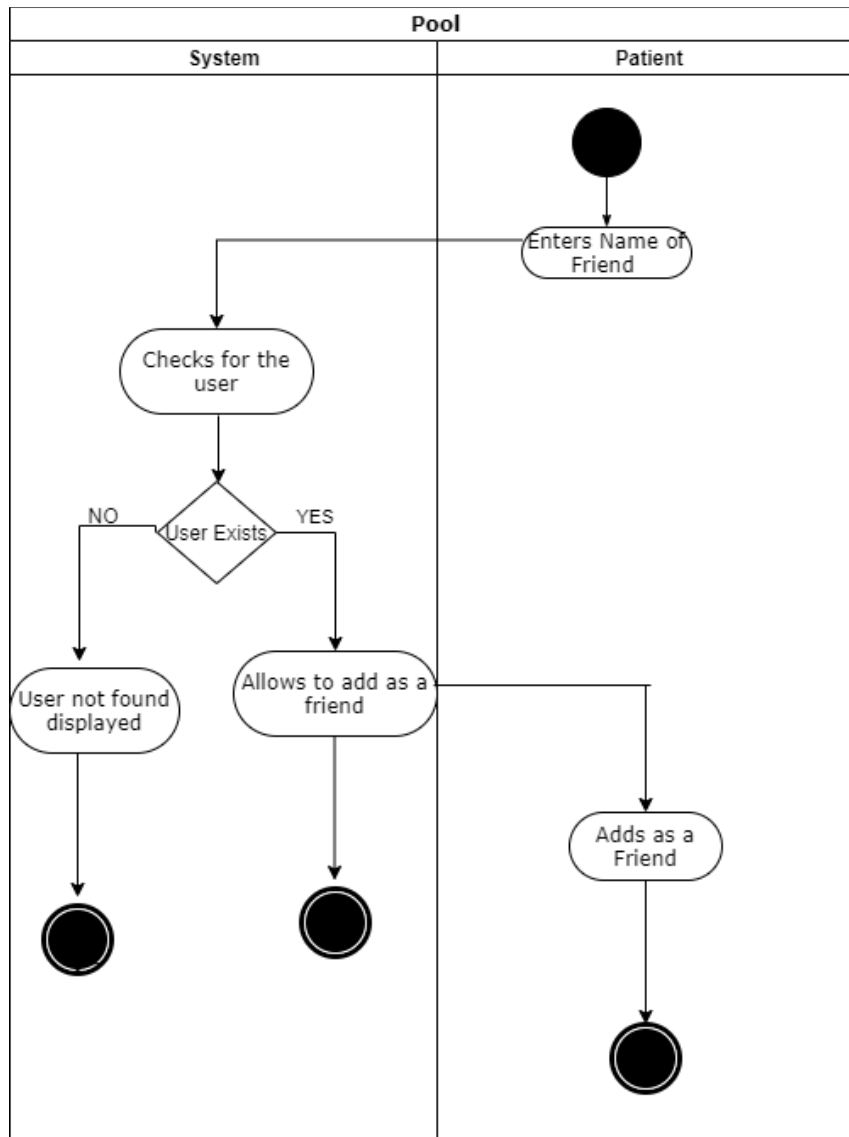
Steps:

1. Mr. Brown requests to add people to their friend's list
2. The application will give an option to respond to the request
3. The application will display the information to compare

Post-Conditions: The application allows users to add as friends.

Activity Diagram:

Updated Activity Diagram

Use Case 6: Receive Alerts

Reference to Originating User Requirement 18

Actors: Doctor, Mr. Brown

**Pre-Conditions:** Mr. Brown has recorded his glucose levels on a daily basis

Triggering Event: Mr. Brown must have abnormal glucose levels for 2 consecutive days

Steps:

1. The application checks if the entered glucose level is above the threshold.
2. The application monitors if the glucose level has crossed the threshold for 2 consecutive days
3. The application notifies the doctor about the patient's abnormal glucose levels.
4. The application continues to notify the doctor everyday till the glucose levels return to normal.

Post-Conditions: The application stops alerting the doctor once the glucose levels turn normal.

Activity Diagram:
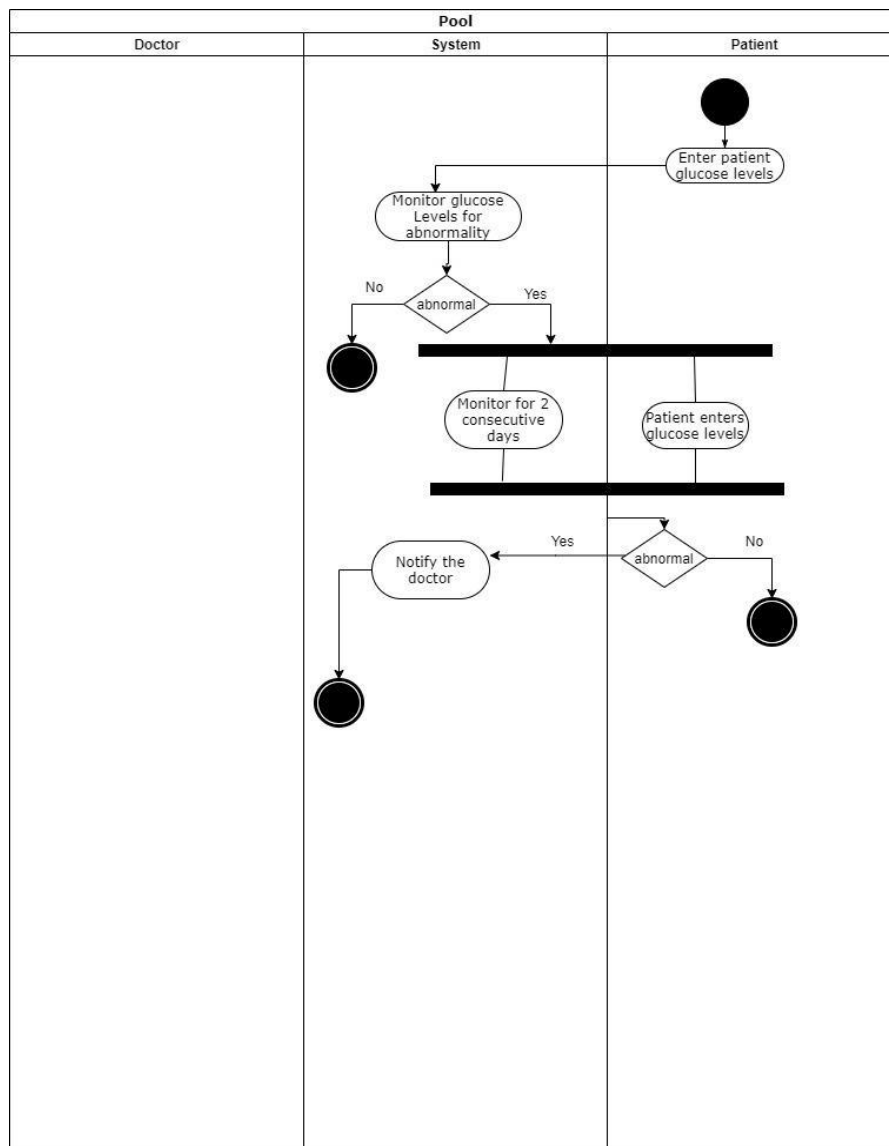
Updated Activity diagram:
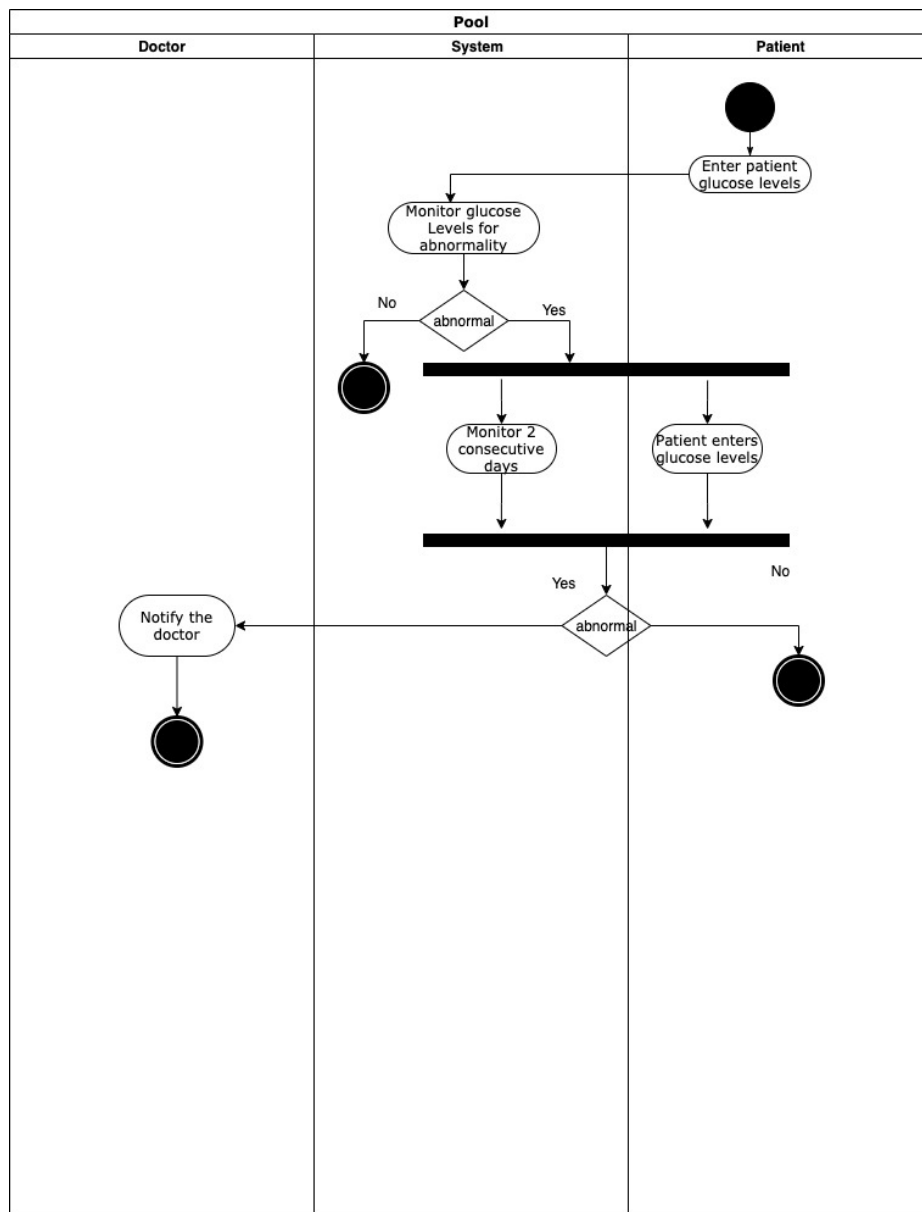
Use Case 7: View Patient Record
Reference to Originating User Requirement 2
Actors: Doctor
Pre-Conditions: Doctor has entered patients ID to search
Triggering Event: Doctor wants to check the history of his patients.
Steps:
1. The doctor chooses to check the glucose history of the patient
2. The Doctor perform "Search patient by ID" so search for specific patient

3. The product will display all the glucose level readings along with the time of the reading and the mealtime
4. The doctor can also perform "Filter by time range" for the time he wants to check the glucose levels.

Exception steps:

3a. The application will display a message when the patient's records are not found.

Post-Conditions: The application has successfully displayed the patient record to the doctor.

Use Case 8: Search patient by ID
Reference to Originating User Requirement 15
Actors: Doctor, Mr. Brown
Pre-Conditions: The application must generate unique id for all the patients
Triggering Event: Doctor wants to search for a patient
Steps:
1. The doctor chooses to search for a patient
2. The doctor enters the ID of the patient
3. The application displays the patient details to the doctor.

Alternative steps:

2a. The Doctor can search for the patient using his/her name

2b. The application will display all the users with that specific name

2c. Doctor can select the patient for which he wants to check the glucose history.

Exception steps:

3a. The application will display a message 'No user found' if the ID is not present in the system

Post-Conditions: The application has successfully searched for patient by ID

Use Case 9: Filter by the time range
Reference to Originating User Requirement 2
Actors: Doctor.
Pre-Conditions: The patient enters his glucose, meal information on a daily basis.
Triggering Event: Doctor wants to filter the patient history in a specific time range.
Steps:
1. Doctor chooses to filter the patient history in a specific time range
2. The doctor enters the time frame he wants to filter the patient record
3. The product displays the history of the patent in the specific time frame

Exception steps:

2a. In case the time frame entered by the patent is not valid the product displays an error message.

3a. The application will display a message if the patient's records don't match the time range.

Post-Conditions: The application allows doctor to filter records by time range.

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4. Requirements Specification

4.1 Functional Requirements
Requirement 1:

Reference to Originating User Requirements 7

Description: The product shall allow the user to view their daily exercise goals.

Requirement 2:

Reference to Originating User Requirements 7

Description: The product shall send the compared results of the activities to both the users.

Requirement 3:

Reference to Originating User Requirements 7

Description: The product shall allow the user to enter his exercise details

Requirement 4:

Reference to Originating User Requirements 3

Description: The product shall allow the users to enter their blood glucose level.

Requirement 5:

Reference to Originating User Requirements 3

Description: The product shall allow the users to edit the glucose level

Requirement 6:

Reference to Originating User Requirements 3

Description: The product shall allow the users to remove the glucose level

Requirement 7:

Reference to Originating User Requirements 16

Description: The product shall display current date and time to the user.

Requirement 8:

Reference to Originating User Requirements 14

Description: The product shall display the user profile of any selected friend.

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Requirement 9:
Reference to Originating User Requirements 14
Description: The product shall allow the users to search people by name to add as friends.

Requirement 10:
Reference to Originating User Requirements 14
Description: The product shall display a message when the user being searched is not found.

Requirement 11:
Reference to Originating User Requirements 15
Description: The product shall allow the user to add people to their profile.

Requirement 12:
Reference to Originating User Requirements 15
Description: The product shall allow the user to respond to the request.

Requirement 13:
Reference to Originating User Requirements 15
Description: The product shall allow the users to view information of friends for comparing.

Requirement 14:
Reference to Originating User Requirements 18
Description: The product shall monitor if the entered glucose levels are above the threshold for 2 consecutive days

Requirement 15:
Reference to Originating User Requirements 18
Description: The product shall notify the doctor about the abnormal glucose levels

Requirement 16:
Reference to Originating User Requirements 18
Description: The product shall continue to notify the doctor everyday till the glucose levels return to normal.

Requirement 17:
Reference to Originating User Requirements 2
Description: The product shall allow the doctor to choose to view the patient's information.

Requirement 18:
Reference to Originating User Requirements 2

Description: The product shall display glucose levels and meals by time.

Requirement 19:
Reference to Originating User Requirements 2
Description: The product shall display a message 'No data found' when the patient has not recorded the glucose levels.

Requirement 20:
Reference to Originating User Requirements 15
Description: The product shall allow the doctor to search a patient by his unique identification number

Requirement 21:
Reference to Originating User Requirements 15
Description: The product shall display a message 'No records found' when the identification number is not present.

Requirement 22:
Reference to Originating User Requirements 2
Description: The product shall allow the doctor to filter the patient glucose history for a specific time frame.

Requirement 23:
Reference to Originating User Requirements 2
Description: The product shall display patient glucose history to doctor in that specific time frame

Requirement 24:
Reference to Originating User Requirements 2
Description: The product shall display a message when there are no records in the system matching the time range

Requirement 25:
Reference to Originating User Requirements 2
Description: The product shall display a message when the time frame entered is invalid.

Requirement 26:
Reference to Originating User Requirements 17
Description: The product shall allow the user to edit the date and time manually to enter past glucose readings being entered.

Requirement 27:

Reference to Originating User Requirements 17
Description: The product shall notify the patient in case the date and time entered are not valid.

Requirement 28:
Reference to Originating User Requirements 17
Description: The product shall notify the patient in case the date and time entered are in the future.

4.2 Non-Functional Requirements

Requirement ID 1:
Reference to Originating User Requirement: 12
The product shall enable any type of users to record their glucose levels within three steps after login into the application

Requirement ID 2:
Reference to Originating User Requirement: 11
The product shall ensure the availability of patient records to users 99% of the time.

Requirement ID 3:
Reference to Originating User Requirement: 13
The product shall respond to the user with in less than 3 sec for every user actions (request)

Requirement ID 4:
Reference to Originating User Requirement: 10
The product shall allow the user to select what part of their Gamification data can be shared to other users of the application

Requirement ID 5:
Reference to Originating User Requirement: 9
The product shall be tightly integrated to the healthcare compliance system to protect privacy, security and integrity of protected health information.

4.3 Constraints

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Constraint 1
Reference to Originating User Requirement: 12
Description: The product shall be compatible with smartphones as well as tablets.

Constraint 2
Reference to Originating User Requirement: 13
Description: The product shall only use WIFI connection for the internet.

Constraint 3
Reference to Originating User Requirement: 9
Description: The product shall allow only the doctors to view patients' medical information.