EasyGlucose

CMPT 276 – Group 01 – Glucinators
Assignment 5 – Requirements Document

Website: https://sites.google.com/view/cmpt276-summer2018/

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1. Table of Contents

2. Revision History

Revision	Status	Publication/Revision Date	By
0.0	Rough draft created with requirement for each category	July 11, 2018	Henry Yip
1.0	Design document created	July 11, 2018	Everyone
1.1	Added rough writing with each part	July 12, 2018	Henry Yip
1.2	Assigned sections of plan for each group members	July 12, 2018	Everyone
2.0	Added "Introduction" & "Intended Audience List"	July 12, 2018	Everyone
2.1	Added "Features"	July 13, 2018	Anmol Bajaj
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3.1	Added "Non-functional Requirements"	July 14, 2018	Faisal Atif
3.2	Added "Example Tutorial"	July 15, 2018	Everyone
3.3	Added "Glossary"	July 15. 2018	Tony Liu
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4.1	Formatted the file	July 17, 2018	Zhixin Huang
5.0	Changed to fit version 3 requirements.	July 30, 2018	Henry Yip

3. Introduction

The mobile application EasyGlucose by Glucinators will provide a seamless blood glucose tracking experience for the diabetic community on an iOS phone or tablet. The core fundamental services that EasyGlucose will provide include[*]:

1. Recording blood glucose data from any blood glucose meter.
2. Provide a health analysis of the recorded data and present results graphically on a timeline.
3. Allow users to log their meal diary with pictures, events, tags, and personal notes.

For those with diabetes, it is absolutely essential for them to be able to track their blood sugar levels and share them with medical professionals for analyzation and consultation. The application is advantageous to accelerate the consultation process because of its smooth and straightforward recording and exporting features.

In addition, personal meal diaries with pictures, events, tags, and notes significantly expands the scope of captured data for health professionals. User's reaction to foods, portions, and supplementary information may help users pinpoint sources of causality and general health trends.

Lastly, EasyGlucose will emphasize on ease-of-use and an intuitive design to encourage and simplify usability as the app's main target audience is the elderly population, where diabetes is most prevalent. It will also include multilingual support to capture a wider market. An aesthetic timeline graph with meal pictures integrated seamlessly will serve as portal to viewing the specific entries of the diary. It will also encourage users to use the app more often because of its inviting appearance, simple learning curve, and minimal clutter.

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[*] Footnote: a complete, detailed, and exhaustive features list is provided on page 8

4. Intended Audience List

EasyGlucose aims to promote and develop a healthy community. The target audience is the population who suffer from diabetes (Type 1, Type 2, and gestational) and hope to find a way to manage it, track it, and improve their health.

The audience scope is not limited by age. However, this application will be developed with the intention of simple use for the elderly people. The application will be easy to use and shall not require more than 10 minutes of training for an average elderly user to be able to use it to its full potential, thus minimal experience with a mobile application is required.

In greater Vancouver, the two of the most dominant languages include English and Chinese. In response to this, our app will be available in both the English and Chinese (simplified) language to include the Chinese speaking population.

1) Tech-savvy Seniors within Canada

The intended audience for EasyGlucose grows everyday as the senior population of Canada grows to be more tech-savvy and familiar with smartphones. With the Senior's increasing appetite for longevity and healthy-living, we aim to make our application the "go-to" app for tracking blood glucose. Today's seniors are more willing to learn and adapt to new technology. They may not have much experience, however, their willingness to learn is high when where there is an "ecosystem of support" [1] around them. We aim to personalize our app and guide them every step of the way. We assume that their goal is to enhance their standard of living.

	Canada (excluding territories) [3]			
	Both sexes			
	Diabetes [4]			
	Number of persons		Percent	
Age group	2015	2016	2015	2016
	Number		Percent	
Total, 12 years and over	2,077,300	2,146,500	6.9	7.0
12 to 17 years	11,900 E	9,800 E	0.5 E	0.4 E
18 to 34 years	72,500	77,900	0.9	1.0
35 to 49 years	307,400	277,700	4.4	3.9
50 to 64 years	714,700	774,600	9.6	10.3
65 years and over	970,800	1,006,500	17.7	17.7

Figure1.a: Highlighted age group is our primary audience and also the largest proportion of population with diabetes [2]

2) Intended Audience Globally

The desire for health management apps, and specifically for diabetes management app is a worldwide phenomenon. With year over year of increasing demand, we believe that the comprehensive logging and analytical features of EasyGlucose is primed to meet the goals of a worldwide audience.
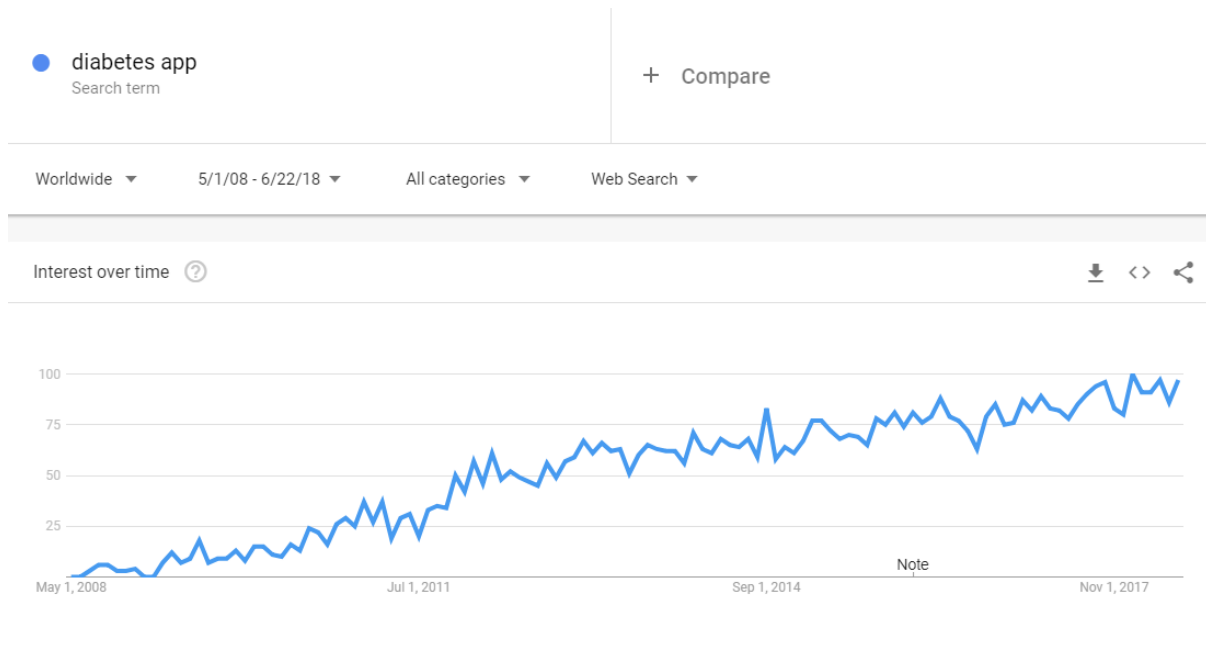

Figure 1.b Worldwide searches for the term "diabetes app" on Google Trends [3]

3) Pregnant Women with Gestational Diabetes

We assume that this is the first pregnancy for the pregnant women with gestational diabetes. They are inexperienced with gestational diabetes and need a comprehensive set of intuitive features to guide them in their journey. They are on the younger side of the diabetic population, with most of them being in the ages 20-40. These women are extremely concerned about the harm that high levels of gestational diabetes can cause to their baby. They are millenials, and thus, familiar with smartphones apps to a confident degree. Their goal is to manage their gestational diabetes, track any uncertainties, and to make sure that their blood glucose levels remain within the physician recommended levels.

4) People with prediabetes

The people with prediabetes are highly self-conscious of their health and lifestyle choices. They are younger, much more familiar with technology, and extremely motivated to track their blood sugar on a daily basis. Their goal is to prevent prediabetes from becoming type-2 diabetes. We assume that they will use our "Report" feature a lot, as they generally have physicians and dietitians to help them navigate out of the prediabetes phase.

5) Professional athletes

This is an extremely small subset of population. However, there is a huge opportunity in having popular, professional athletes use EasyGlucose. Professional athletes could potentially act as Brand Ambassadors for our application and promote the ease of use on their public social media accounts.

We assume that they need to track their blood glucose levels on a very regular basis due to intense training regimes. Professional athletes also have experienced dietitians and physicians who need to able to access the athlete's blood glucose information on a regular basis. We assume that they are quick to learn new iOS apps. They are also familiar with the idea of tracking blood glucose and the benefits it entails. Their goal is to stay within the range of their optimum glucose levels so they can fulfill their goal of performing at their best ability.

5. Features and Functional Requirements

EasyGlucose will offer the following services as application features:

Core features:
1. Blood glucose level measurement entry (via touch screen) and storage.
2. Dietary log entry with pictures, tags, events, and personal notes.
3. Production and illustration of scalable timeline graphs containing glucose measurements and log entries.

Utility features:
4. Application home screen with navigation option to other features.
5. Scrollable blood glucose level entry table and diary entry table.
6. Blood glucose level analysis with mean and range.

Customization and personalization features:
7. User profile initialization.
8. User profile display and modification.
9. System settings

Feature 1: Blood Glucose measurement entries via Keyboard

Feature description:
- The purpose of this feature is to allow the user to store their blood glucose level measurements in the local Realm database. This will be the most frequently used feature. As a result, it is our focus to make this feature as quick and easy to use as possible. With regards to display of entries, the user will be able to view the entries as a graph (feature 3), and through an editable detailed table (feature 5).

Functional requirements:
1. All entry fields for the glucose measurement entry must be located within in same screen.
2. Each blood glucose entry should include the following data:
   - Blood glucose level
   - System built-in tag related to the entry (e.g.: before dinner, after workout, etc)
   - Date and time of measurement
3. The user should have the option to input the entry fields in requirement 2 through the touchscreen with each field following a specific input method listed below:
   3.1. Blood glucose measurement should be inputted by the on-board keyboard.
   3.2. The current time and date should display as an entry for this field by default; however, users are able to edit the time and date by scrolling the entry subfields (month/date/hour/minute).
   3.3. The tag field should be a drop down menu containing a list of pre-entered tags, with the last tag being "custom tag".
   3.3.1. If user chooses "custom tag", a new text field will appear for the tag entry. This entry should be completed by use of on-board keyboard.
4. After filling up all the entry fields, the user must be able to save the entry to a local database by press of 1 button.

Feature 2: Dietary log entries with pictures, tags, events, and personal notes.

Feature description:
  ● The purpose of this feature is to allow the user to store their diary log entries in the local Realm database. This feature is intended to be frequently used, as a result, it must be quick and easy to use. With regards to display of entries, the user will be able to view the entries in feature 3 as a graph, and be able to view entries in detail and edit them through feature 5

Functional requirements:
1. The user should be able to complete the diary text and tag entry in 1 scrollable screen
2. The user should be able to complete the diary picture entry in 1 screen that is different from requirement 1.
3. Each diary entry must contain a subject title, diary entry body, and associated tags. If the user chose to fill these using touch screen, they should be able to fill each field according to methods listed below
    3.1. The subject title should be inputted by on-board keyboard.
    3.2. The diary entry body should be inputted by on-board keyboard .
    3.3. The associated tags should be inputted by a selection menu of pre-entered tags.
    3.4. The user should be able to add multiple tags by tapping a "+" button located beside the last added tag.
4. The picture entry should be initiated by pressing a "Add picture" button, which gives the user the option to choose an existing image from system image gallery, or take a new image with on on-board camera.
5. After filling up the desired entry fields, the user must be able to save the entry in local database in press of 1 button.

Feature 3: Production and illustration of scalable timeline graphs containing glucose measurements and log entries.

Feature description:
- This feature will provide user a graphical representation of their blood glucose trend over the selected time period.

Functional requirements:
1. A graph showing glucose measurement over a default time period of 30 days should be shown when the user first enters the graph illustration screen.
2. The user should be able to see a different period of selected time frame by selecting a time range.
3. The user should have the option to manually select time period to be displayed by using a selection menu.
4. The user should be able to filter graph data by the following criterias, which are selected from a selection menu.
    4.1. Only show data where diary entries are entered on the same day.
    4.2. Only show data where measurement is above or below certain limit.
    4.2.1. The user should be able to enter the numeric limit using built-in keyboard.
5. Actions applied to the graph must have no effect on any saved data.

Feature 4: Application home screen with navigation options to other features.

Feature description:
- This feature will serve as the home screen for EasyGlucose. All of the core features, and some of the utility features will be accessible from this screen. As the user will see the home screen every time they open the app, the home screen must be unclustered and aesthetically pleasing.

Functional requirement:
1. The app should be directed to this screen upon loading, except when opening the app for the first time, where a preliminary survey will load instead.
2. This screen must have large buttons labeled (or similarly labeled):
    2.1. "Enter glucose level"
    2.2. "Enter dietary diary entry"
    2.3. "Display glucose level trend"
        2.3.1. There will be a "?" bubble beside this button. Tapping this bubble will show a pop-up describing the what this feature does. The pop-up will disappear after being tapped
    2.4. "Send report as Email"
    2.5. "System settings"
    2.6. "Profile settings"
    2.7. Upon touching any of the aforementioned buttons, the application should redirect the user to the corresponding screen.
3. The home screen should not be visually clustered and must not have overlapping visual elements.
4. There must be a minimum distance of 50 pixels between boundaries of buttons.

Feature 5: Scrollable blood glucose level entry table and diary entry table.

Feature description:
- These two tables will allow the user to view and edit previously entered glucose level measurements and diary entries.

Functional requirements:
1. 2 selectable tabs labeled "glucose level entry" and "diary entry" will be located above the scrollable table.
    1.1. Tapping the "glucose level entry" tab should replace the content in the scrollable table with past glucose level entries.
    1.2. Tapping the "diary entry" tab should the replace the content in the scrollable table with past dietary diary entries.
2. The glucose level entry table should have the option to be sorted by ascending or descending order for value of glucose measurement, and by ascending or descending order for date measured.
3. The diary entry table should have the option to be sorted by ascending or descending order for date entered, alphabetical order by subject title, alphabetical order by tag.
    3.1. The diary entry table should also have the option to filter entries by tag.
4. Each entry on the entry table should be shown as a horizontal rectangular bar.
    4.1. Tapping on the rectangular bar will lead to the specific entry page.

Feature 6: Blood glucose level analysis.

Feature description:
- The application will generate and record the mean blood glucose level for each month and extract specific dates of outlying blood glucose levels.

Functional requirements:
1. The application will generate the mean blood glucose level for each month, beginning on the first day of each month until the day before the next month, and record it within the local database.
   a. There will also be separate mean calculations for all blood glucose levels tagged before or after a meal.
   b. For the concurrent month, the mean will be updated at the end of every day, with the range from the first day of the month to the current day.
2. The date of deviating glucose levels that significantly exceed the average for an "after-meal" or "before meal" blood glucose level will be recorded in the local database. The method to detect dangerous levels is as follows:

$$Low \leq 79$$

$$High > 110$$

$$80 \leq moderate \leq 99$$

Feature 7: User profile initialization.

Feature description:
- The profile initialization will be used to gather information required to provide analysis for glucose measurements. This feature will only launch when opening the app for the first time.

Functional requirements:
1. The user profile initialization should be only initiated when opening EasyGlucose for the first time.
2. Upon opening EasyGlucose for the first time, the user should be presented with a series of questionnaire screens which ask for the user to enter their name, date of birth, and type of diabetes, in the respective order. The method of input will be as follows
    2.1. Date of birth will be entered using selection menu with month, day and year fields
    2.2. Type of diabetes will be entered using circular selection options.
3. Each questionnaire screen should ask the user to enter 1 required information.
4. The user should not proceed to the next screen unless they have inputted the required information on the current screen.
5. There should be a "return to previous button" on each of the questionnaire.
    5.1. Tapping this button will allow the user to return to the previous questionnaire and modify their answer.
6. All of the information entered should be saved to the local database as entries in the user profile.
    6.1. All of the information entered must only be saved after all questionnaires are complete.

Feature 8: User profile display and modification.

Feature description:
  ● The profile display and modification will allow the user to view and modify their entries entered for the user profile initialization.

Functional requirements:
  1. The profile settings should display the following profile page information that is entered by the user: date of birth, and type of diabetes.
  2. The profile settings should allow the user to change the above mentioned information based on methods as follows:
      2.1. Date of birth will be entered using drop down menu with month, day and year fields
      2.2. Biological sex and type of diabetes will be entered using circular selection options.
  3. The profile settings should have a button labeled "Save settings", where upon tapping this button, all the user information that are modified will replace the current entries in the local database.
  4. The original profile settings entries in the database should not be modified unless the "Save settings" button is pressed.

Feature 9: System settings.

Feature description:
- This feature will allow the user to modify various functional and aesthetics elements of EasyGlucose based to the user's preference.

Functional requirements:

The system settings will have the following setting options:
1. Changing the system language to the following, which are shown from a selection menu.
    a. English
    b. Chinese (simplified)
2. Unit of measurement for displaying glucose levels. The options are as follows:
    a. Metric units
    b. Imperial units
    c. Glucose measurement in mmol/L (millimoles per litre) or mg/dL (milligrams per decilitre)

6. Non-functional requirements

The design of EasyGlucose does not impose significant performance concerns. As a result the developers should focus more on improving usability and convenience. The following list of non-functional requirements are written with the aforementioned objective in mind, and will serve as useful guidelines in the development process. Also, the order of this list has no relation to the priority of each listed requirement.

1. The complete app should not crash under regular use.
2. There must be no unintended loss of data that has been previously saved by the user under regular legitimate use or when the app crashes.
3. The app must be compatible with all current (June 2018) officially supported[4] iPhone devices.
4. The app must comply with the App Store guidelines [5]
5. The user interface must be visually unclustered with 0 overlapping on screen elements
6. The app should be easy to learn and use.
    6.1. The average user should take less than 10 minutes to learn how to user the core function of EasyGlucose
    6.2. The average user should not make more than 5 errors when using any core feature of EasyGlucose
7. The analysis of glucose measurements must be clinically correct.
8. If the the app is unable to give correct analysis, the app must not issue message that will lead the user to harm themselves.
9. The local database for the app should not have any unused entries.
10. All user information must be available without an internet connection.
11. Glucose measurement data, tags, pictures, notes, and user information saved by the user must be stored locally on the device and be retained for as long as it is not deleted by the user, or unless the device itself is compromised.
12. Internet connection must be attained before the user is able to use the email function of the app.

7. Example Scenarios

Use case: Logging blood glucose level.

1. To save a glucose level entry, the user will travel to the EasyGlucose home screen by swiping right. Once the user reached the home screen, they will locate a click a large button named "Enter glucose level". (see figure 1)
2. The user is then directed to the glucose entry screen where the following data entry fields are shown as in the figure 2. The data entry fields correspond to figure 2, containing the following:
   a. Glucose level (keyboard/voice input)
   b. Time of entry
3. The user will enter their measured glucose level in data entry field (a) using either keyboard or by voice input.
4. If the user want to record the current time as time of entry, they don't have to modify the "Time of entry" option. Simply tap "Save entry" to complete the glucose level entry.
5. If the user want to record a different time as time of entry, they must select the "another time" option from the drop down menu (b). The screen will be modified to the 3rd figure if the user chooses to do so.
6. After choosing "another time", the user will enter the time of entry according to the drop down menu options and tap "Save entry" to complete the glucose level entry.
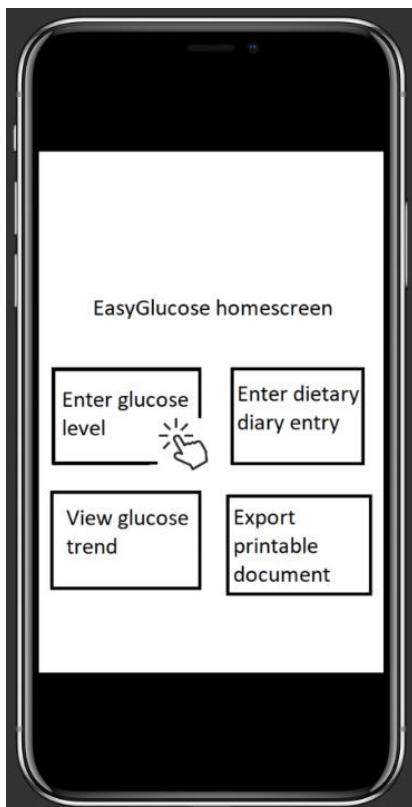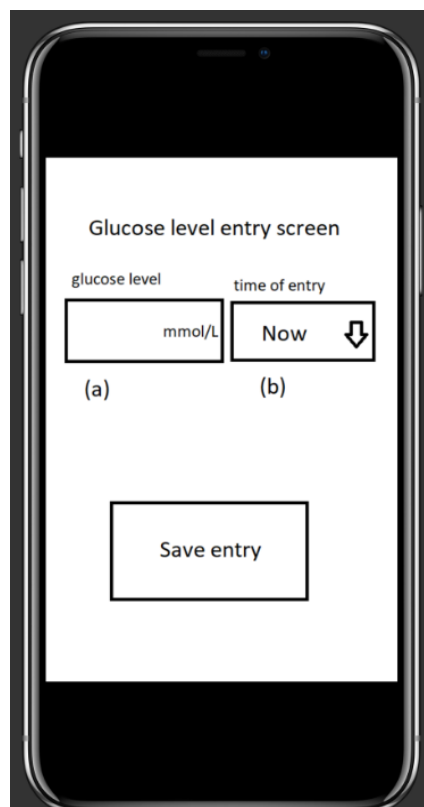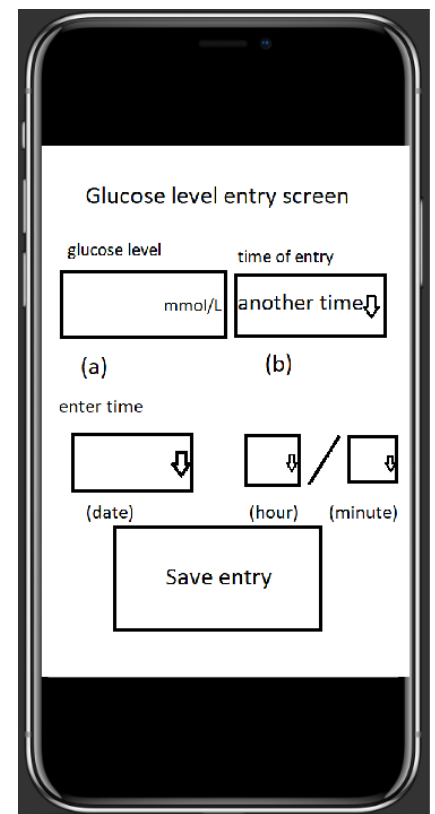
Figure 1	Figure 2	Figure 3

Use case: View long term glucose trend in form of graph.

1. To view the long term glucose trend, the user need to travel to the EasyGlucose home screen by swiping right. Once the user reached the home screen, they will locate a click a large button named "View glucose trend". (see figure 1)
2. The user will be directed to the graph displaying screen, where a graph showing glucose measurement for the last 30 days is displayed by default. (see figure 2)
3. If the user want to see different period of default time frame (30 days), they can drag the graph to the left or to the right to reach their desired time frame.
4. If the user want to view the graph in a different time frame, they can modify the time frame by pinching or expanding the graph by a two finger gesture.
5. On the graph viewing screen, there will be a button on the top right corner named "show diary". (see figure 2) Selecting this button will show bubbles on the graph, which contain pictures of diary entries entered by the user. These bubbles will be located vertically aligned with their date of entry. (see figure 3)
6. The user can tap the bubble to view their diary entry.
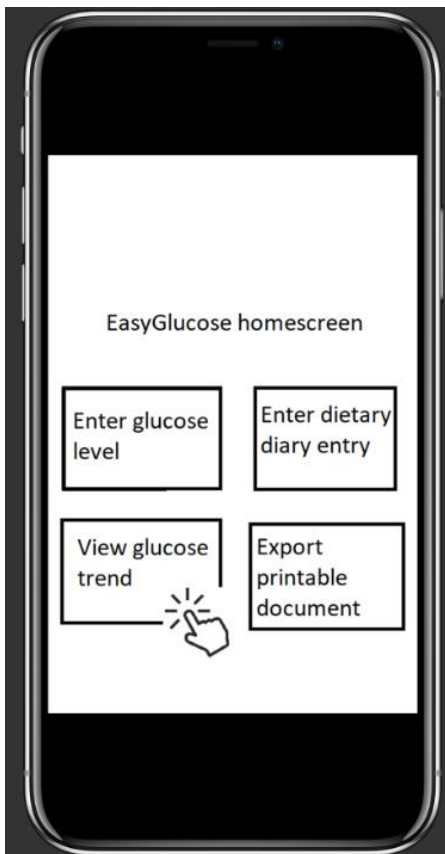7. The user can swipe left to return to the EasyGlucose home screen.
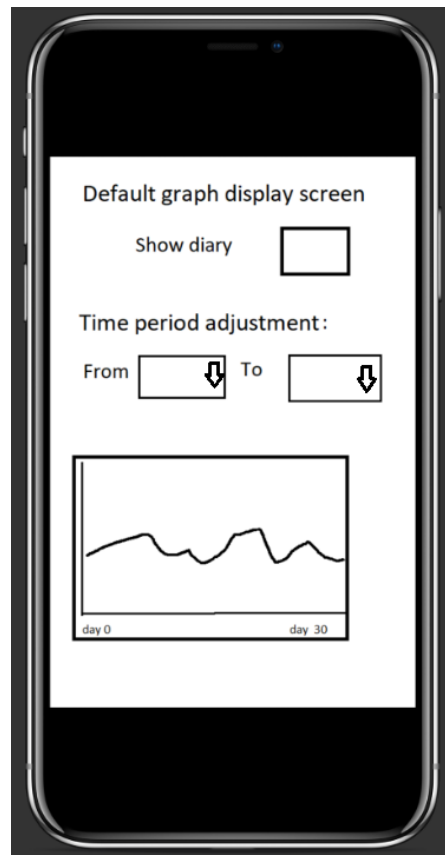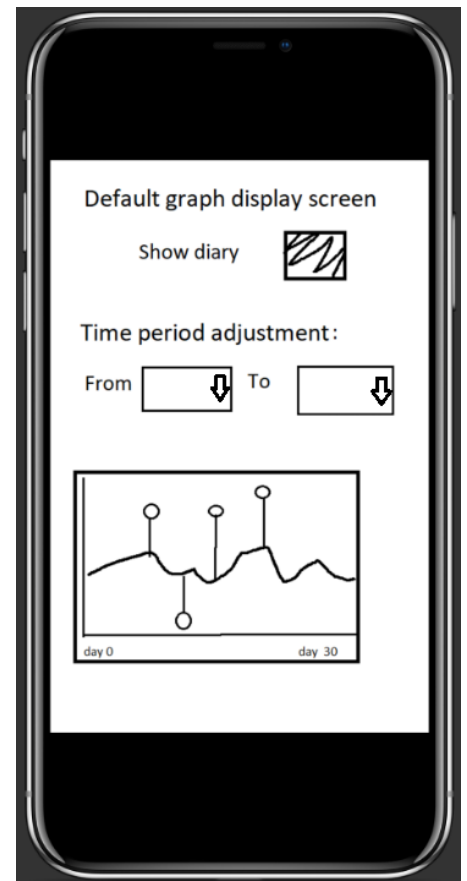
Figure 1   Figure 2   Figure 3

Use case: Add dietary diary entry with pictures and tags.

1. To add a dietary diary entry, the user need to travel to the EasyGlucose home screen by swiping right. Once the user reached the home screen, they will locate and click a large button named "Enter dietary diary entry". (see figure 1)
2. The user will be directed to a diary entry screen with the following data entry fields as shown in figure 2:
    a. Entry title (keyboard/voice input)
    b. Entry tags (drop down select menu)
    c. Entry body (keyboard/voice input)
    d. Date/time entry
    e. Add picture (redirects user to system image gallery to choose a picture)
    Multiple tags can be added by clicking the "+" button beside the tag field
3. After entering each field, the user can tap the "Save entry" button to save their diary entry. (see figure 2)
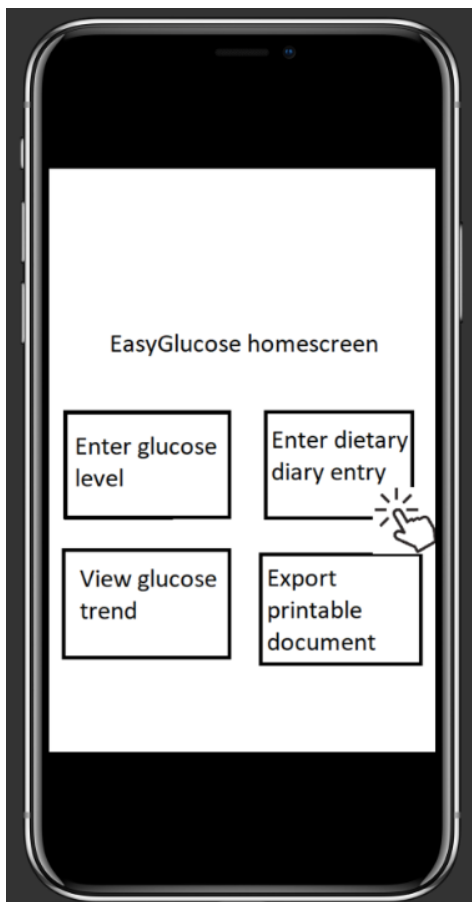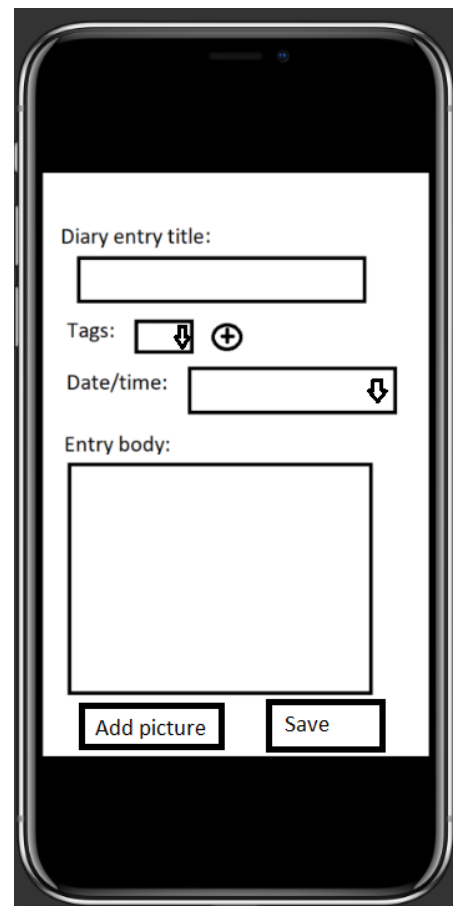
Figure 1

Figure 2

Use case: Application Onboarding

Onboarding experiences are an important aspect of any application. It is a process of integrating a new user into our app. As our application is intended to be used by older and mature population segment, it is important to make the onboarding experience as intuitive as possible. We aim to guide our users through every step of the way within our app.

In order to accomplish our goal of anyone being able to use our app, regardless of technical skills or know-how, we have designed a friendly and personified onboarding experience to the app. This should give our user's the impression that our app is personalized for them.

Here is the onboarding user-interface we have designed as a stepping stone for users before they start using our app:
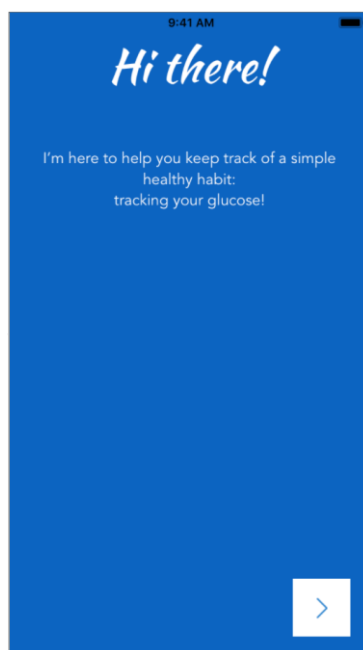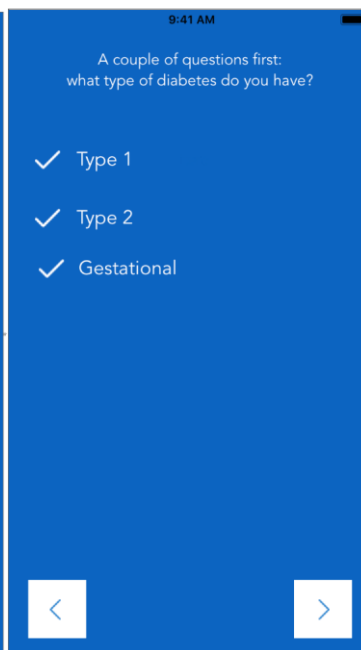
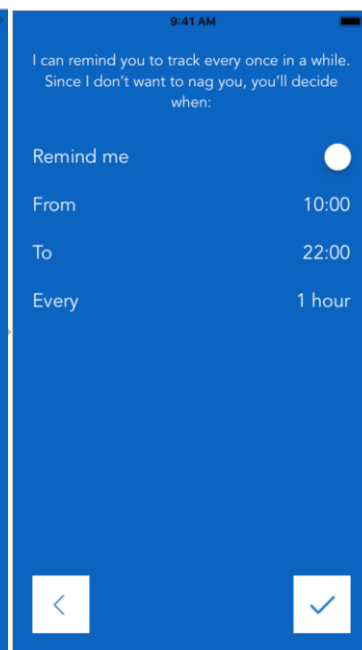Figure 1   Figure 2   Figure 3

8. Glossary

App Store: Digital distribution platform by Apple Inc. where owners of their products can purchase and download applications.

Blood glucose level: Concentration of sugar within the blood.

Drop down menu: A menu list of items that appears when the drop down menu is expanded. Users interact with the items by selecting them by tapping them.

Exporting: The act of converting a digital file into another format.

Functional Requirements: Project requirements that provides the function or behaviour of a system, its inputs and outputs, and the actions the project must execute.

Gestational diabetes: Condition when women develop high blood sugar during pregnancy.

Gestures: A set of various methods to interact with the mobile device's touchscreen. Users operate these gestures by touching the screen (e.g. swiping up, double tapping, etc)

Home screen: The first page that is displayed when the application starts.

Non-functional Requirements: Project requirements that provides criteria to evaluate the system (e.g. security, stability, response/load times, performance, etc)

Onboarding: The action of familiarizing the user to the app.

PDF(Printable Document Format): A file format where documents with text and images are saved such that it could be viewed, and printed.

Pre-diabetes: A condition where the blood glucose level is consistently higher than normal. Typically considered a precursor to type 2 diabetes.

System testing: Procedure in which several components of source code is compiled together and tested together with a sample set of data.

Type 1 diabetes: a genetic condition where the patient's pancreas stop producing, or is producing minimal amount of insulin.

Type 2 diabetes: a disease where the patient's body cells are resistant to insulin.

Unit testing: Procedure in which individual units of source code is applied with a sample set of data to produce results, evaluating the correctness of the results, and fixing errors with the code.

Use case: A description of how a user would typically use certain feature of an application as well as the possible mistakes the use might make.

User interface: How the user interacts with the software

iOS: A mobile operating system used by mobile devices designed by Apple Inc.

iPhone: A mobile device released by Apple Inc on June 29, 2007.

9. Citation

[1]"Diabetes, by age group", *Www150.statcan.gc.ca*, 2018. [Online]. Available: https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310009607. [Accessed: 23- Jun- 2018].

[2]A. Favaro, "Tapping into technology helps seniors stay sharp", CTVNews, 2018. [Online]. Available: https://www.ctvnews.ca/health/health-headlines/tapping-into-technology-helps-seniors-stay-sharp-1.851670. [Accessed: 23- Jun- 2018].

[3]"Google Trends", Google, 2018. [Online]. Available: https://trends.google.com/trends/explore?date=2008-05-01%202018-06-22&q=diabetes%20app. [Accessed: 23- Jun- 2018].

[4]"List of iOS devices", En.wikipedia.org, 2018. [Online]. Available: https://en.wikipedia.org/wiki/List_of_iOS_devices#cite_note-5. [Accessed: 23- Jun- 2018].

[5]"App Store Review Guidelines - Apple Developer", Developer.apple.com, 2018. [Online]. Available: https://developer.apple.com/app-store/review/guidelines/. [Accessed: 23- Jun- 2018].