# Project Deliverable F:
# Mealtime Food Tracker
# Prototype 2
# "Mealtime"

**GNG 2101D**
**Team D1**
**Due Date: Mar 7, 2021**
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## List of Acronyms:

| | |
|---|---|
| ADD | Attention Deficit Disorder |
| BOM | Bill of Materials |
| IDE | Integrated Development Environment |
| iOS | iPhone Operating System |
| MIT | Massachusetts Institute of Technology |
| OS | Operating System |
| UI | User Interface |
| WiFi | Wireless Fidelity |

## **Abstract:**

This deliverable entails the team's feedback obtained from the third client meeting for the first prototype, the design and construction of our second prototype, alongside its testing results and target specifications, and lastly an updated Wrike project plan. First the client feedback from the third meeting was stated, and using that information, our team was able to construct a second prototype, albeit not many changes could be made due to the fact that the client meet took place only two days before this deliverable's submission date. This meant our second prototype, designed using MIT App Inventor, consisted of just three screens; the home screen, food input screen, and past meal history screen. The functionality of each of these screens was tested to ensure that each part completed its designated tasks (i.e. food input allowing the user to enter a certain number of foods which is then stored in the past meal history section). Then the prototype was tested, analyzed, and evaluated alongside the product's target specifications. Finally a snapshot link for the updated Wrike project plan was attached that when clicked, takes one to see the specific plans for each of the future deliverables to come. All in all, our team has developed a thorough and detailed project plan which will allow us to create a final prototype that will be a suitable application for our client.

## 1. - <u>Introduction:</u>

The primary goal of this deliverable is to utilize the feedback from the third client meet where the first prototype iteration was showcased, and then construct a second prototype that improves the functionality of the current features being implemented.  Using the feedback from our client we can better adjust and alter aspects, designs and function of the current prototype to render the second iteration of the prototype. This will ensure the client's needs are maintained and met to the utmost of our abilities. With the ability to test prototype II and then compare the results to the target specifications, that will establish a set of guidelines to follow for prototype III and will guarantee the final product will satisfy all target specifications. Finally, a snapshot link for the Wrike project plan will be attached that will illustrate the specific plans and subsequent tasks to be completed for the final prototype and other deliverables to come.

## 2. - <u>Client Feedback:</u>

Summarized Comments

- Omit the scrollable food menu on the home screen, so it does not falsely suggest that our application is that of a recipe app, and then make the four home screen buttons full size.
- Have an information tag underneath each button, which briefly states what each screen does and its specific functionality.
- The client liked the overall app interface and its simplistic design, describing it as user-centric.
- He liked that the food input buttons are editable.
- Keep the manual entering of data because it will build the client's personal and medical database.
- In the meal history menu, the client liked the horizontal bar graphs because he could visually and cognitively view the types of carbs for each meal. This allows him to figure out what causes a spike in his blood sugar levels and then can forward that information to his health care practitioners.
- Personalized background colours should be implemented, so each screen can be differentiated from the next.
- In the meal entry; change "Meal" to "Food" input instead. This is because the meal type is already selected, and the user is inputting the specific food for that meal.
- Change the number of food inputs from 5 to 10. This is because of condiments (i.e. mustard, ketchup) that may be added to the meal.
- The client wants to be able to edit, store and share his input data, even when not using the app. He suggests using a .txt file to perform these functions.
- There should be a message at the bottom of the food input screen that says that the user is entering quantities for one portion of a meal. Something akin to "Remember to enter these values for one portion, these values will calculate the quantity for one meal."

### 3. - <u>Updated Prototype 2:</u>

With the knowledge learnt from the third client meeting, we were able to start the design of our second prototype, which is of medium fidelity, however only few changes were made. The objective of this prototype is to fully complete the home screen, food input menu, and meal history menu screens, with the central idea being around the storage of the user's data. This is considered the underlying principle of the app because the user does not want to manually enter the same meal over and over again. This monotonous task will make the user not want to utilize our application whatsoever. When the user clicks on the food input menu, they must be able to enter up to 10 meals, save each one, and then go click on the meal history screen to view all meals consumed in the past dates. All of the meal history should be saved in a .txt file, that can be shared to the user's health care providers if needed. Another function that our prototype must have is color-coordinated bar graphs that represent the various meal categories and signify the carbs amount consumed per meal.  In addition to this, there will be a notification system that reminds the user periodically of any information they wish to know, whether it's to consume a meal or to take one's insulin dosage at a specific time. A detailed user flow analysis of prototype II is clearly illustrated in **Figure 1** below. Note that the SmartDraw watermark may make it a bit hard to read, but there is no way for the team to remove this part.
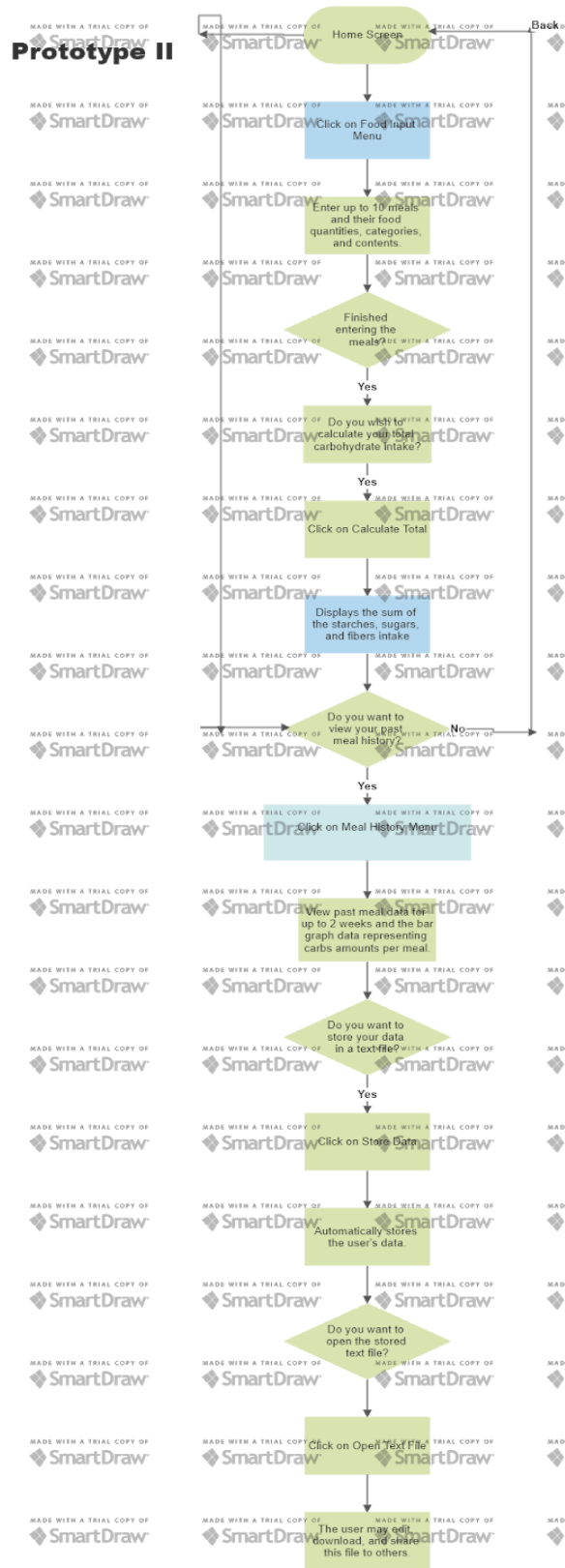
**Prototype II**

Home Screen

Back

Click on Food Input Menu

Enter up to 10 meals and their food quantities, categories, and contents.

Finished entering the meals?

Yes

Do you wish to calculate your total carbohydrate intake?

Yes

Click on Calculate Total

Displays the sum of the starches, sugars, and fibers intake.

Do you want to view your past meal history?

No

Yes

Click on Meal History Menu

View past meal data for up to 2 weeks and the bar graph data representing carbs amounts per meal.

Do you want to store your data in a text file?

Yes

Click on Store Data

Automatically stores the user's data.

Do you want to open the stored text file?

Click on Open Text File

The user may edit, download, and share this file to others.

**Figure 1: User Flow Diagram of Prototype II**

Looking at prototype I's home screen, as shown in **Appendix 1**, it includes a scrollable menu that displays images of various foods. However the client wished for that feature to be omitted because he could not eat those illustrated foods and it would be misleading to other users of the app into thinking it is a picture-type application in which one takes images of foods, and then calculates the carbohydrate intake based on that process. Our client also suggested that the four buttons must be made full size and a "WELCOME" sign should be placed at the top of the screen. These changes were successfully implemented as shown below in **Figure 1**. Note that the app was tested using MI2 App Companion, which is an Android app downloadable from the Google Play Store that allows one to test their App Inventor project by scanning or entering a generated QR code, and that allows the project to be used on the Android mobile device.

In **Appendix 2**, it displays prototype I's food input menu where the user can input the meal name, category, and the three quantities of starch, sugar, and fibers which can be inputted as decimal values. Then if the "ADD A MEAL" button is clicked, a user could enter up to five meals, and calculate the total carbohydrates intake at any point by clicking on the "Calculate Total" button. The client mentioned that the word "MEAL" should be changed to "FOOD" and the reason for this is because the meal type is already selected due to the category option. This change was made as shown below in **Figure 2**, and the secondary change made was that the background colour switched to pink, in order to provide a high contrast between the text and the background. When the user selects the category button, it takes them to another screen which lists all four meal types, breakfast, lunch, snack, and dinner, as shown in **Figure 3**.

In **Figure 2**, a sample meal is calculated for toast with a quantity of 1, category is breakfast, and the carbohydrates amounts are starch = 2.2g, sugar = 0.5g, and fiber = 3g. Then the "Calculate Total" button is clicked which gives the total sum of the starch, sugar, and fibers amounts. The method in which App Inventor stores these values is in a list format where the first input is the food name, and then the next three inputs are the carbohydrates values. This repeats four more times since there is a maximum input of five meals, and the rest are computed to be 0 since we have only calculated the intake for one meal. Although the bottom part of the image is cut off, there is a button that states, "Enter New Meal (Refresh)" which clears the current meal that has been inputted.

If the user were to click on the meal history menu, that would take them to another page, as shown in **Figure 5**, which displays a set of bar graphs that represent the four meal categories (in units of grams) and signify the amount of carbs consumed for each meal. This feature was added to provide a visual component for the app, which allows the user to determine where their blood sugar level spikes may be, and then that newly found information can be shared to one's health care provider if need be.
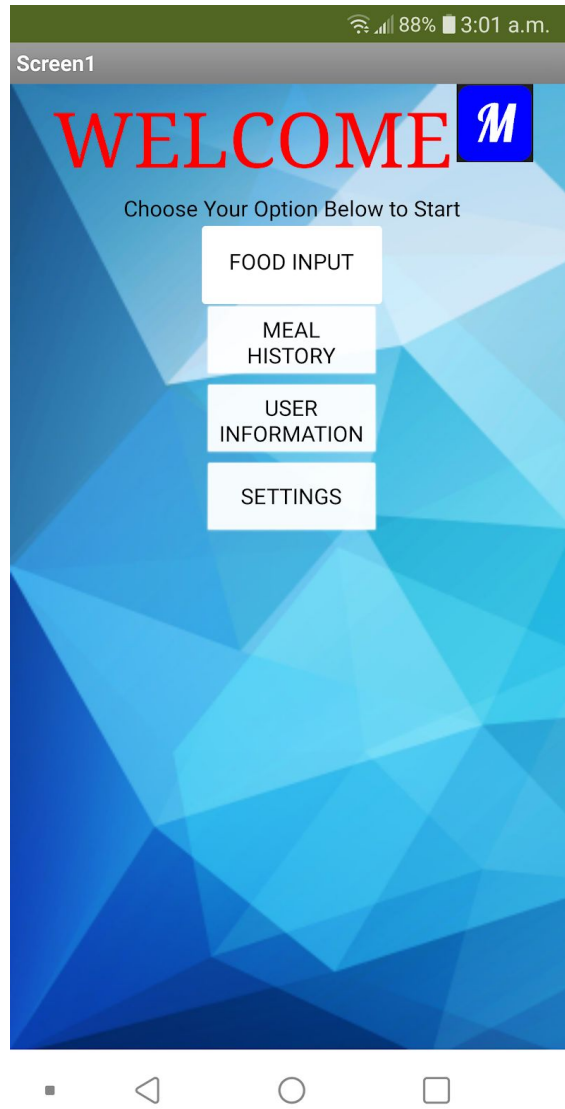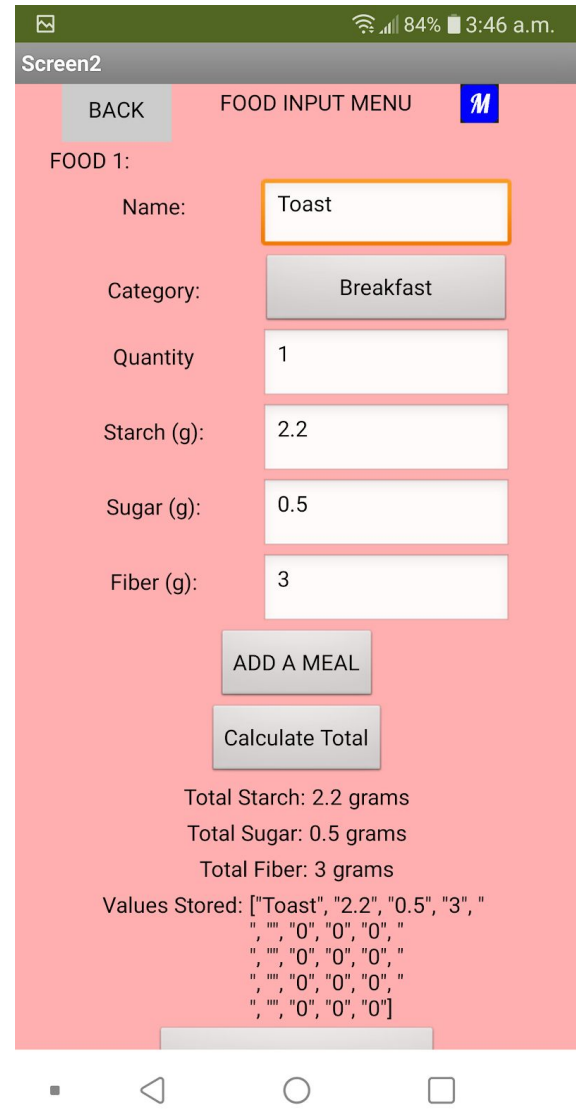
**Figure 2: Mealtime Home Screen**



**Figure 3: Mealtime Food Input Menu**

**Figure 4: Four Types of Meal Categories in Food Input Menu**
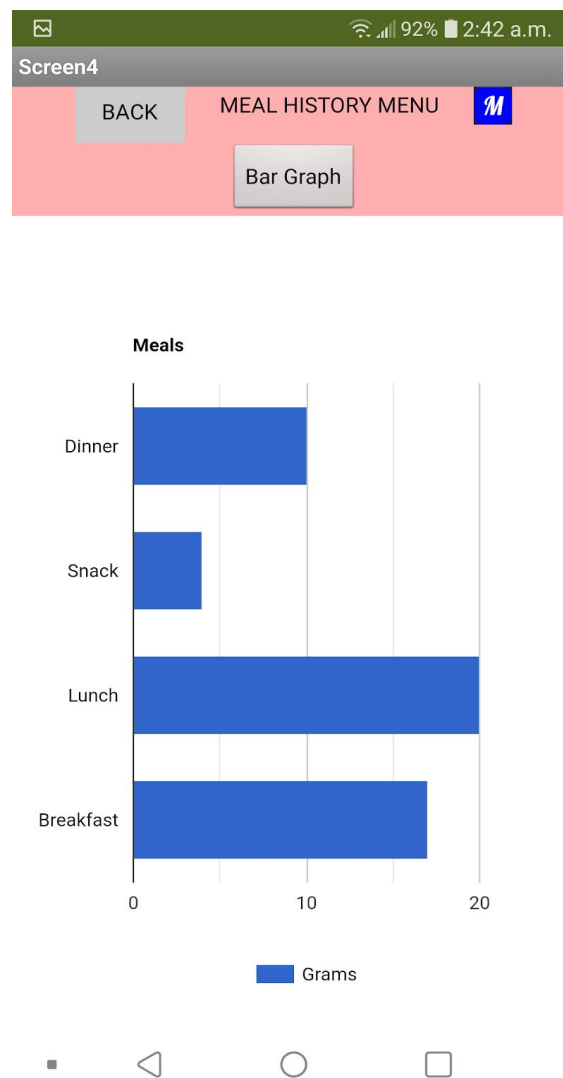


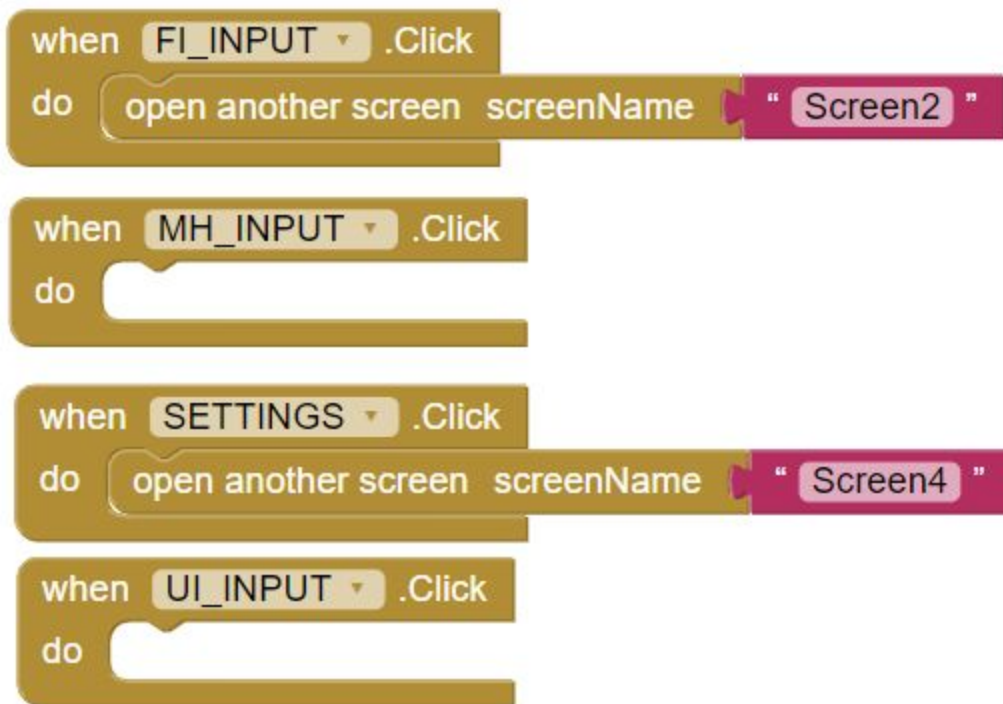**Figure 5: Meal History Menu (Bar Graph Display of Carbs per Meal)**

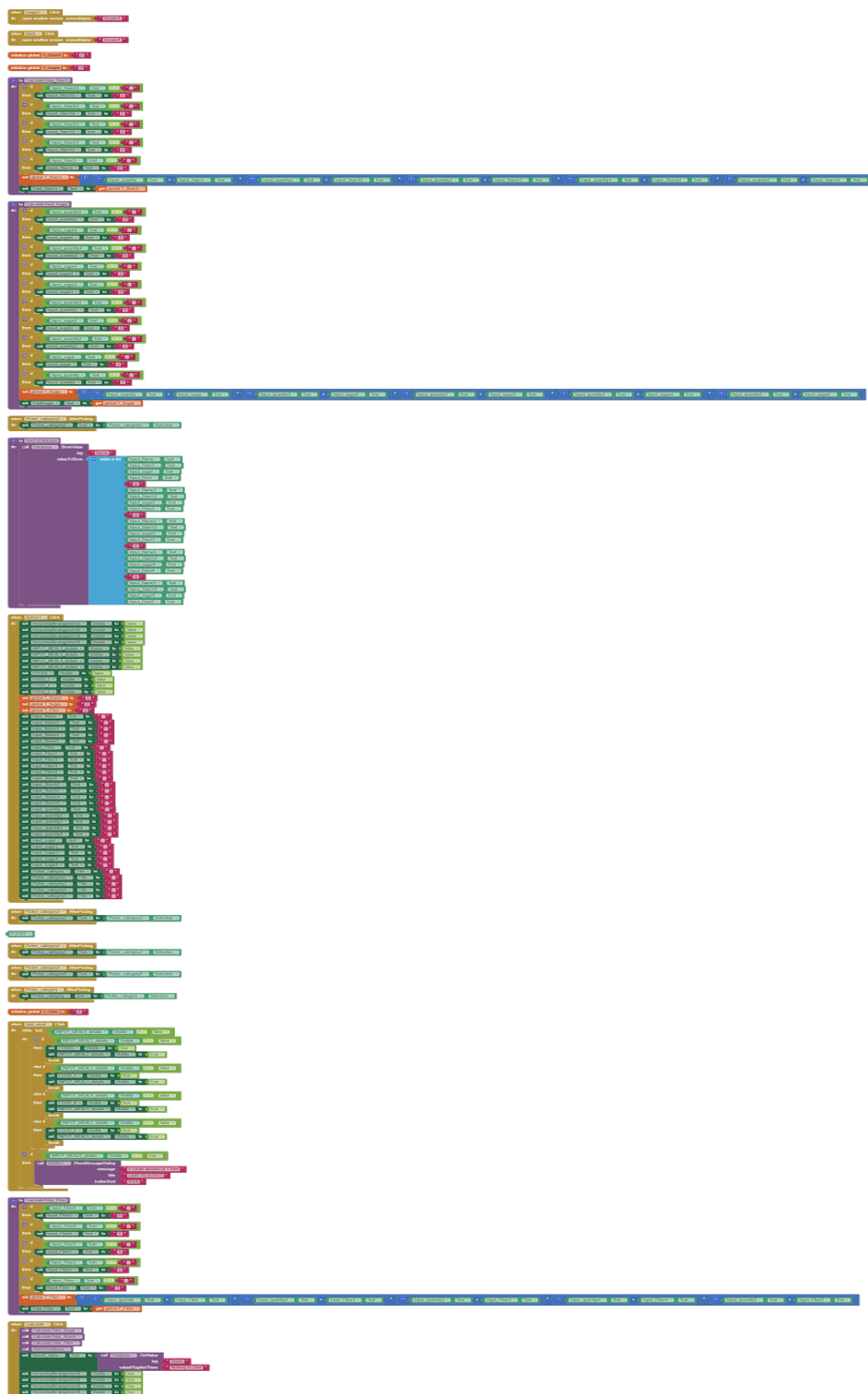**Figure 6: MIT App Inventor Code for Home Screen**
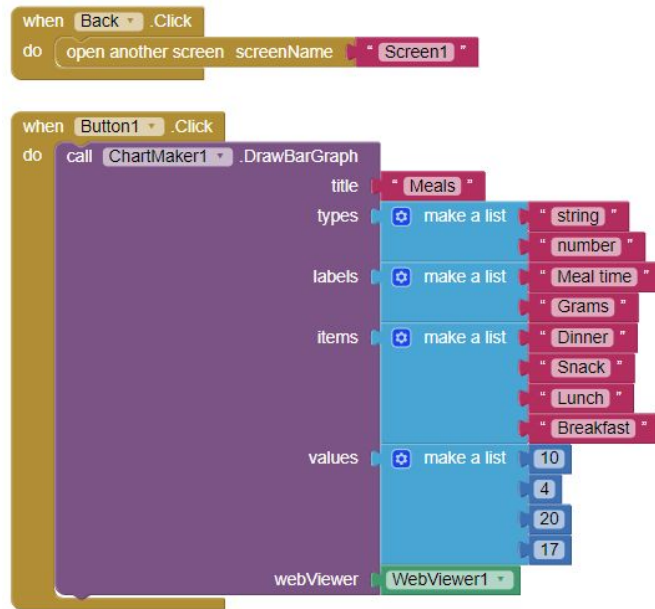
**Figure 7: MIT App Inventor Code for Food Input Menu**

**Figure 8: MIT App Inventor Code for Meal History Menu**

## 4. - <u>Product Assumptions, Analysis, Testing, and Target Specifications:</u>

### Product Assumptions

There were a list of five product assumptions made about prototype I in Project Deliverable D, and they were as follows;
1- The application is accessible via Android devices.
2- The app should accurately calculate the total carbohydrate intake.
3- History must be accessible throughout the application.
4- The user can edit and add their meal of choice.
5- It is ADD friendly and has a simple UI.

All of these assumptions were successfully validated and going through each of these starting with the 1st assumption, our mobile app is only accessible to Android users since .apk files cannot be downloaded onto iOS devices. Moving onto assumption 2, as can be seen in **Figure 2**, it showcases the food input menu where the carbohydrate intake for a sample food (toast) has been calculated. This is done through the user inputting the starch, sugar, and fiber amounts, and the sum of these three respective contents are displayed at the bottom of the screen. Moving onto the third assumption, this is partially validated because as seen in **Figure 3**, when the meal history menu clicked, it showcases various bar graphs which represent the total carb amount consumed per meal. However there are no past meal history dates that are stored, which will be developed in this prototype. Going forward to the 4th assumption, in **Figure 2**, the food input menu is displayed where the user can add and edit five foods of their choice, however the

quantity is only for one portion of a meal. In the fifth and final assumption, as noted by the client during the third meeting, he gave high praise for the app being user-centric and having a simple user interface that is ADD friendly.

Now a new set of product assumptions must be made for prototype II which is currently in development. These assumptions are as follows;

1- There will be a "Calculate Total" button that when clicked, will take the user to a separate page and display the different carbohydrate intake amounts.

3- The past meal history dates must be accessible through the application.

4- The app will have a reminder function that notifies the user of past and upcoming meals.

5- The user is able to save their meal of choice and store this information in a .txt file.

6- We assume that the bar graphs in the meal history menu will accurately display the correct amount of carbs consumed per meal.

Given this list of developed assumptions, our team has a clear vision of what features to implement in our app. The team is now able to conduct the testing of different functions in the second prototype to determine which assumptions are successful. This ability creates a huge difference in prototype development, which will be utilised to its full potential to create a final product.

## Testing

The first prototype was tested over the course of a couple of days by the team members' friends and family members. These testers were shown a presentation of the app, and then asked to share their thoughts about it on a short five minute Google Forms survey consisting of ten questions in real live time. The questions on the survey ranged from short answers to yes/no types, and the testers were asked things like, "What do you think can be improved about the aesthetic display of Mealtime?" and "Are the carbohydrate intake amounts accurate enough for a diabetic patient?" These feedback responses were documented and we received the following feedback:

● The app has a simple UI and seems ADD friendly but it's not very aesthetically pleasing to view. Many suggested changing the text font and screen background colours.

● Another user said that the bar graphs don't always update automatically after adding a new meal.

● One user said that the app will be useless if there is no storage component involved in it.

● All of the testers mentioned that the number of meals should be much more than 5, some even want more than 10.

● Almost all users pointed out that the buttons on the home screen are not evenly spaced, and that not having it uniform will distract the user from utilizing the application to its fullest capability.

● One diabetic user stressed the importance of having a notification system in place because she has ADHD and sometimes forgets certain tasks to complete.

The second prototype will be tested using a very similar procedure in which a certain number of people (i.e. family members, friends) will be given a short two-three minute presentation on the app, and then fill out a fifteen minute Google Forms survey that entails twenty questions. These questions will be randomized and consist of yes/no and short answer ones. Some of the questions that will be asked are "Is it practical for a text file to record all meal history information?", "Should there be any other visual representation of the data besides the bar graphs", "Is all of your meal history data saved on the app?", and much more. These questions will be fully developed once prototype II has been completed. The testing will take place from March 16th to March 22nd and after this period has completed, we can use these results and compare them to our list of product assumptions in order to determine which ones have been validated or not.

Table 1: Performance of Prototype II with respect to Target Specifications

| # | Target Specifications | Prototype 1 |
|---|---|---|
| 1 | Accuracy of calculating the total carbohydrates intake, and sugar and fiber intake. | The main concept of our second prototype is to store the user's data and improve the calculation of the total carbs intake. It is very accurate because of the implementation of various calculations from the user's inputs and outputs. These values may be inputted in a decimal format for each of the three types of carbs, therefore providing appropriate results for the diabetic patient. |
| 2 | User feedback | This feature is not a part of the second prototype, and will come into fruition when the settings menu will be introduced in prototype III. |
| 3 | Ease-of-use | Prototype II has a user-friendly environment with a simple interface and bar graphs to display the carbs for each meal which makes the prototype |

| | | |
|---|---|---|
| | | aesthetically pleasing to the user. The app will also allow the user to observe their past meals in the meal history menu. |
| 4 | Software application testing | The client will test the second prototype anywhere from March 16 to March 22nd, by integrating it into his daily life. |
| 5 | Cost | The app is completely free, since it is being created with MIT App Inventor. Therefore the app has a price of $0. |
| 6 | WiFi dependency | This feature is not a part of prototype II, and will be created when implementing the settings menu in prototype III. |
| 7 | Product quality | The prototype is created in such a way that it is easily available to the Android user through a .apk file that is downloaded to their mobile device. |
| 8 | ADD friendly | Four radio buttons on the home screen with primary background colours and carb bar graphs which provide the user with an ADD friendly environment. The color coordinated graphs will come in prototype III. |
| 9 | Data storage | Data will be stored in a .txt file for the purpose of small-sized storage and accessibility. The user will be able to open this .txt file from any location, regardless of whether they are using the |

| | app or not. |
|---|---|
| | |

## 5. <u>**Project Plan Update:**</u>

A snapshot link of the Wrike project plan is attached below. This is our complete project plan with all changes made until today's date (March 7th 2021).

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=ONPdPnebu3MexBMo4CPDbvTdn6KApCh9%7CIE2DGNBYGQ3DELSTGE3A
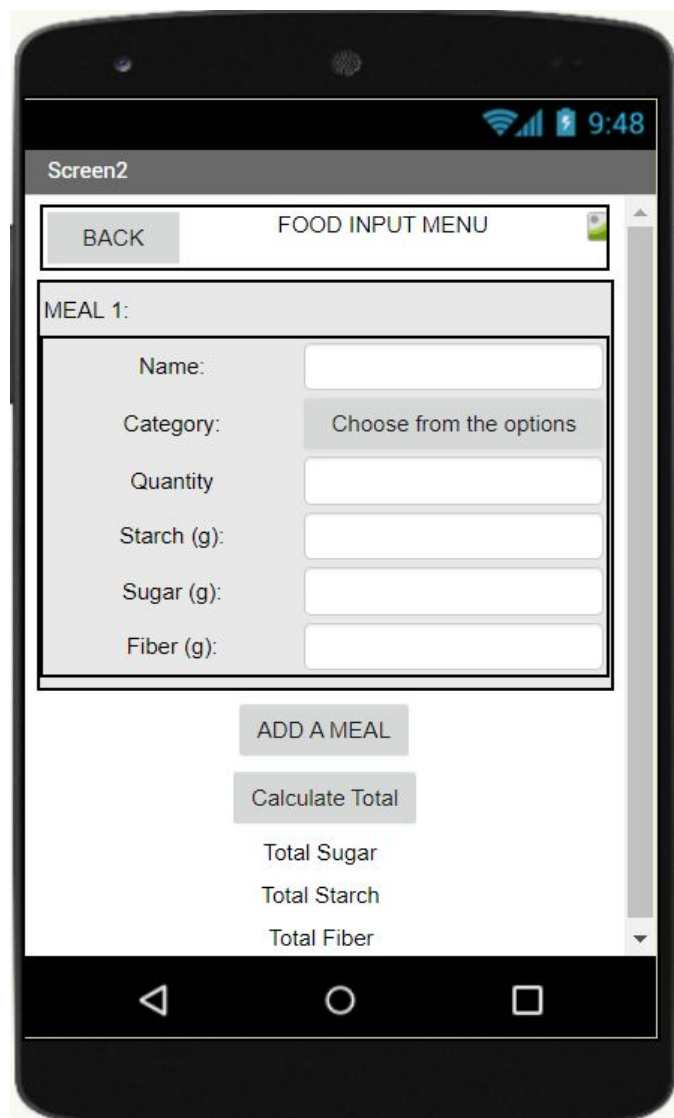
## 6. <u>**Conclusion:**</u>

In Deliverable F, the team has started the development of the second prototype by reviewing our client's feedback. Next, we made the relative changes to it and narrowed our plan to prototype II. Prototype II is the secondary prototype of the application. It consists of the Home Screen, Food Input and Meal History, and aims to improve the functionality of these features. All of this information was obtained from the third client meeting that helped better our understanding of his viewpoints and concerns. To add on, the client was very pleased with the graphical representation of the meal data and the simplistic food input design, but wanted the scrollable food pictures omitted from the screen, as it would mislead new users of the app. The food input meals were temporarily stored, however a permanent option for data storage must be implemented within the next prototype. Without teamwork and tenacity it would be impossible to complete this project deliverable. Our team has also updated our Wrike project plan and set deadlines for finishing the tasks on time. Now, the team is preparing for PD G - Business Model and Economics Report that is coming up. Overall, this deliverable helped the team members to create and analyze our second prototype using client feedback. The group will use the work in this deliverable as a stepping stone for the third prototype and the business model and economics report will come to fruition in a fortnight.

## Appendix



**Appendix 1: Prototype 1 Home Screen**



**Appendix 2: Prototype 1 Food Input Menu**