Mealtime Insulin Calculator

Group E-12
Deliverable J
User Manual

Eric Pitts 300108476
Spencer Wilimek 300152342
Muhammad Owais Tabassum 300137880
Matthew Lannigan 300131694
Tanish Swarnan 300120872
John Zhou 300066864

Abstract

The design team was tasked with creating an app in order to calculate insulin dosages at mealtimes. However, as the team consisted of students participating in a class project, a possible source of future improvement on the application exists. In case of this scenario coming to occur, the team has created this document in order to guarantee a simple transition from this team's work to a potential next team.

In this document, the design team included detailed information on each feature of the application, notably the calculation function, and on the overall application and its functional mechanics. Also included is a detailed analysis on each prototype. The purpose of this analysis is to provide a clear description of how the team progressed through the creation of the application in order to allow for the possible future improvements of each function of the app to take place in a logical, organized fashion that follows the structure of the app's construction.

The design team included a list of functions and capabilities of the app and explained how to use them. This section is important to the user in order to ensure that each function of the app is completely understood in both its functionality and in the process to use said function. With this functionality section, the team works to make each possible function of the app maximized in order to achieve the most positive results from use of the app.

The team also added health and safety considerations into the document. As the app deals with the dosage information of a drug necessary for the livelihood of some diabetics, it is important to be positive of the accuracy of the recommended dosage the app provides. Thus, the health and safety section provides details on the safety of use of the application.

Finally, a section on troubleshooting was included. In the case of possible error within the application, this troubleshooting section provides information on how to return functionality to the app.

Table of Contents

List of Figures

Introduction

Many people around the world suffer from diabetes and many diabetics are required to take mealtime insulin in order to control their blood sugar spikes. The amount of insulin that a patient needs to take depends on multiple factors including: what one eats, how much they eat, and how often they exercise. For many patients, the solution to calculating how much insulin they will need before a meal is done through medical applications or websites. Using simple benchmarking techniques, the group found that existing solutions have many flaws. Current calculators are far too complex and are not designed with simplicity in mind. Taking this into consideration, the team received a problem that needed to be solved.

The team was assigned to a client who is both diabetic & suffers from attention deficit hyperactivity disorder. This disorder, commonly referred to as ADHD, can cause someone to be severely disorganized, talk excessively at times, or find it hard to focus on more than one task at a time. With the client's use of mealtime insulin, he found the need for an insulin calculating platform unlike current solutions. Further analysis of the problem given allowed the team to determine that many existing insulin calculators are too complex as they are not designed for the average diabetic patient. Current solutions are made for medical professionals and require extensive knowledge to operate. Ultimately, the team determined that to solve the problem at hand, the market and more importantly, our client, is in need of a simple but functional insulin calculator that is easy to operate/navigate, supports many different inputs, and gives precise insulin calculations. To achieve this result, the team decided an application, called Mealtime Manager, which can run on a smartphone, is the most effective solution.

The team's solution Mealtime Manager is the most effective on the market as it is made with the average user in mind. The intuitive design of the application allows users with no medical knowledge to input simple values and receive an accurate insulin dosage calculation. Overall, our empathetic design is what makes our application an effective solution to the given problem.

Functions & Capabilities

Important features of the insulin calculating app include its ability to take minimal inputs from the user and output an accurate insulin dosage. This is the main function of the app. It will ask for the user to input their current insulin level, the target insulin level, the meal that was eaten, their weight in kg, their carb coverage ratio and total daily dose. After the app computes these inputs into its functions it will output a reading for the insulin dosage needed to be taken by the user. This app is capable of calculating accurate insulin dosages, it has a very extensive list of foods to make the inputs as easy to provide by the user as possible and lastly it will store past meal history so the user is able to backtrack as they wish and view previous meals and insulin dosages.

Prototyping

Prototype 1

The prototyping of the insulin calculating app initially began with some brainstorming to identify the main functions that should be implemented. The first prototype was created by sketching multiple designs for the same kind of pages by different group members. This was done to take the best designs and put them together, this is a strategy to possibly consider things that a single person may not think of on their own. The final designs of the app include many different pages to accommodate for the many functions that could be implemented into the app.

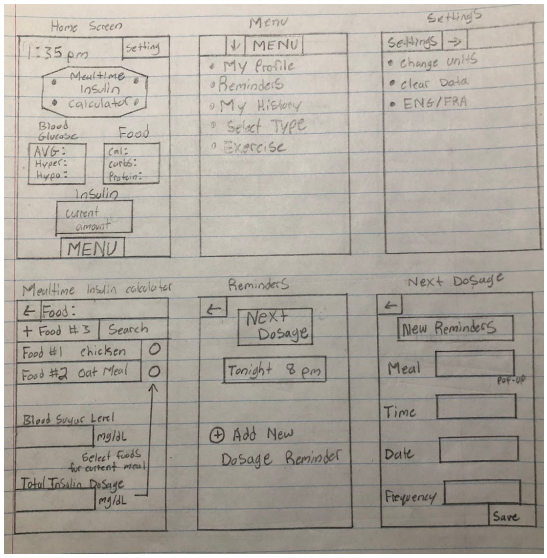

Figure 1. Prototype 1 - Screen Set 1

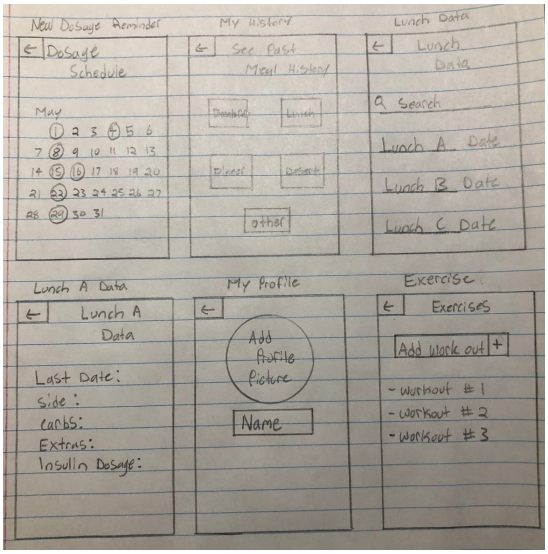

Figure 2. Prototype 1 - Screen Set 2

Prototype 2

After receiving feedback on the first prototype during client meeting two, the process for the second prototype began. The client was content with the appearance of the app from the first prototype, allowing for time to be spent on different components of the app. The second prototype was made as a medium fidelity prototype as the goal during the creation of this prototype was to complete the functionality component of the app. It was decided that python should be used to create a code that would ask the user for inputs that could then be computed into the equations to calculate the insulin dosage.

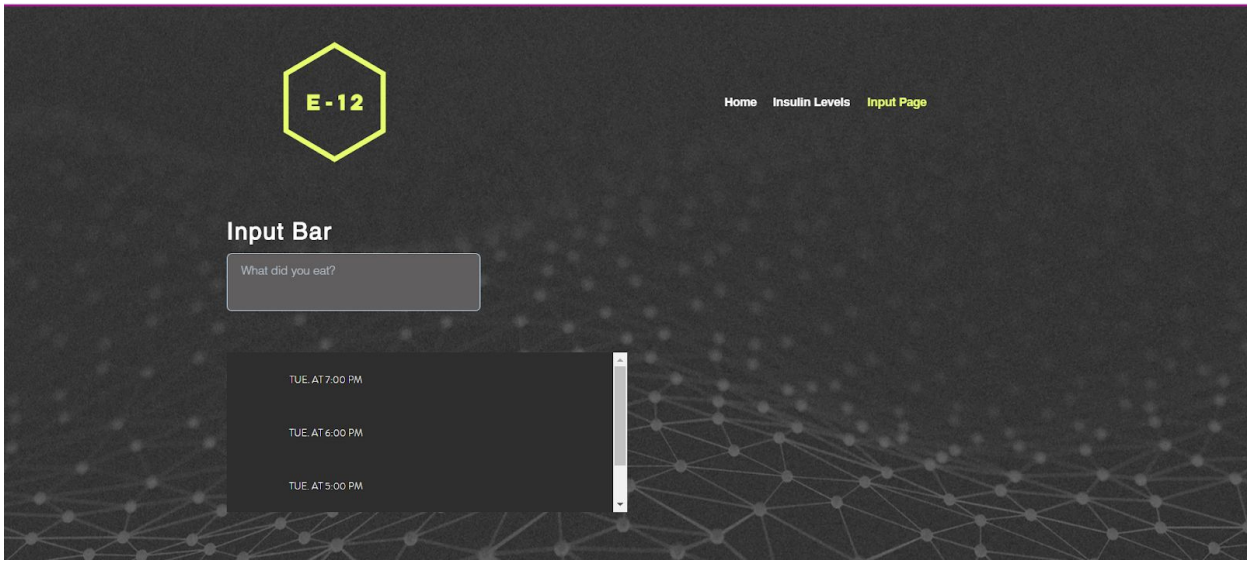

Figure 3

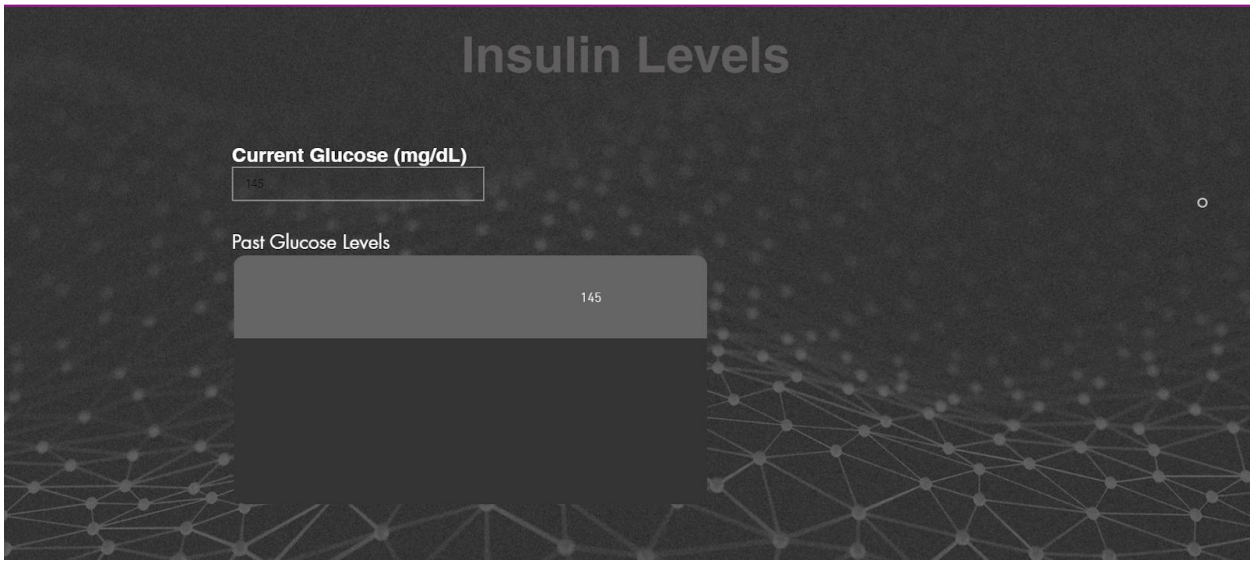

Figure 4

Final Prototype

After the third client meeting the client had identified a few changes he wanted made with the phrasing used in the questions for the inputs, the changes were made on the spot. Moreover, the third prototype is the one where everything had to be brought together. The designs and aesthetic from the first prototype along with the functionality of the second prototype allowed for the third prototype to be created using Thunkable. Although the use of the website was limited as the previously created code could not be implemented using the features of thunkable. It was made possible to create an insulin calculating app with efficient functionality using different features of Thunkable. The third prototype is an ADHD sensitive

design, to further accommodate for the ADHD this prototype was made to be very simple to use, also it is capable of calculating an accurate insulin dosage reading from the few inputs that are required from the user.

Figure 5

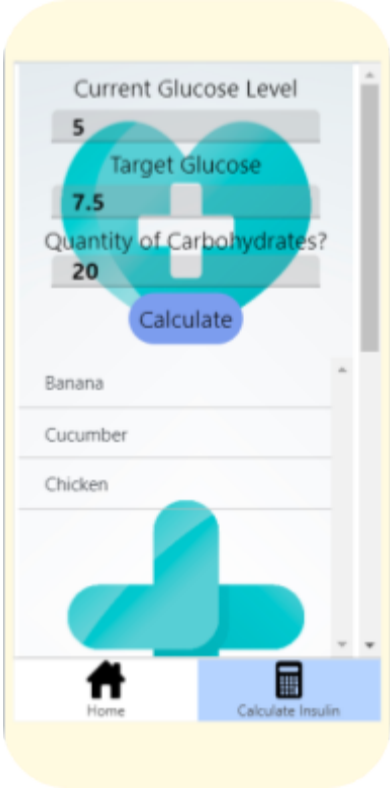

Figure 6

Figure 7

Instructions

The team has successfully created a working final prototype. Although the usage may be well understood to the team members, it is likely that a client may struggle to utilise the app correctly. In that case, the team has included the following section, which clearly illustrates the proper use of the app for the client.

1. Once the app has loaded, press “Calculate Insulin” to go to the next screen.
2. Begin by inputting personal information in the bottom portion of the page; this is where the user’s constant data will be stored for ease of use. Slide the switches to the off position if the data point is unknown for the user’s personal case. Once all data has been set, press the update button.
3. The next step is needed for future inputs. Put user glucose levels into the correct slot.
4. Next put total meal carbohydrates into the input and press the calculate button. Under the list view for a future iteration, the calculated insulin dosage will present itself.

Health and Safety

The main health and safety precaution considered during the designing of the app was the ramifications of a miscalculation. An improper calculation could lead to a detriment in the user's health, or even others around the user. Insulin allows the user to have more stable glucose levels in the blood; with an improper dosage, the user will not be able to function as usual. Drowsiness and fatigue are some of the faults of a miscalculation on the app; while operating machinery these could end in bodily harm causing life threatening events. These possible events were taken very seriously during the creation of this app, directing the creators to research for functions that could calculate the most accurate insulin dosage to further decrease the chance of unfortunate events. These functions were implemented into the functionality components of the app. To decrease the chance of inaccurate insulin readings it is highly recommended for the user to be attentive to the inputs they have entered into the app as the insulin dosage calculation completely depends on these inputs.

Troubleshooting

The overall design of this application is relatively simple compared to other software products. However, as the app consists of software that has undergone minimal testing solely by members of the design team, there exists a large number of possible sources of error on the part of the application. As it can be frustrating to troubleshoot new software on one's own, the team has included the following instructions in order to provide a clear procedure for the app user so that they may easily troubleshoot and calculate their insulin dosage for the meal they are preparing to eat. While using this app, if any function comes to a halt:

- Start by closing the app and re opening the app.
- Check your values inputted.
    - Ensure that the values hold strictly numbers unless it is the food input.
- Leave all the unknown quantities turned off.
- Try inputting all values again and update.

Conclusion

In Deliverable J, the team has created a detailed user manual for the future clients and students who will be using or analysing the application. By completing this deliverable, the team learned that it is important to thoroughly test all components of a product after completing it. Writing the user manual helped the group put themselves in the customer's shoes, so to speak, to understand what they would see while using the app for the first time. Using this newfound information, the group was able to make additional small changes to the app's design and outline what the most confusing parts of the app would be for clients.

There are many productive avenues that future groups could work on regarding the developed application. An important update that future students can make on the application is to

expand the number of languages. Currently, this application is only in English which limits a potential customer base. Adding languages such as French, Spanish, or Mandarin would grow the app's target market. Another area of improvement that future groups could work on is improving the app software being used. The lack of coding experience within the group led to the app being created in Thunkable which is functional but not as professional as superior softwares such as Android Studio and other app creation programs. Lastly, a third productive avenue for future groups would be to increase the number of features within the app. Some examples of additional features that could be added is compatibility with home assistants, a reminder function and a larger food data table.

Appendix

Item Number	Description	Quantity	Cost
1	Wix.com Web App Building Software	1	Free
2	Python IDE	1	Free
3	Thunkable App Building Software	1	Free
		Total Cost:	$0