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Smart Tracking for Healthier Lifestyle

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Fine Arts in Visual Communication Design

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Smart Tracking for Healthier Lifestyle

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Abstract

Smart Tracking for healthier lifestyle is an interactive prototyping application to monitor sugar intake. For most individuals, their amount of sugar intake is much higher than the amount they need per day. Many people like sweet food as they find that it makes them satisfied and relaxed. People tend to consume sugar unconsciously eating cakes, candies, drinking soft-drinks, juice, and even coffee. Regular consumption of these foods substantially increases the amount of sugar people consume. It has been found that people are less conscious of their sugar intake in regard to drinking liquids than eating solid foods. Parents are very worried about this situation as they realize that their children follow unhealthy diets. Many kids are addicted to sugary drinks which are bad for of their health. It is hard to track the amount of sugar intake especially in drinks, and many parents find it difficult to make their children reduce the amount of sugar intake.

This project aims at contributing to the motivation of individuals to make healthier choices in a more convenient way. Also, it is an attempt to create a digital interactive system that helps track sugar intake. The approach used to solve this problem is to design a digital interactive system to make the inputting process more accessible. Hence, people will be aware of the amount of sugar they consume with what they eat and drink, making the sugar amount more meaningful to the user by designing the information and visualizing the statistics. Also, it will provide an opportunity to hold the application to get the amount of sugar for the products before a person buys it in the grocery store by using the emerging Augmented Reality technology. The app will attract more individuals because of the easy use, recording process, as well as more meaningful and accurate statistics. This data will be visualized on the smartphone, providing an overview idea of the sugar intake amount. Based on the statistics, it will suggest some dishes,
drinks, snacks and recipes for user.

The essential goal of the thesis project is to make a user aware of the overall amount of a daily sugar intake, provide accurate statistics about food, and help users reduce the amount of sugar intake.

The project results will enable to open a new market to help users make healthier decisions and making their healthier choices more convenient through the rapid data input. Moreover, the AR integration and data analysis will assist in leading a healthier life, combining and connecting both interaction design and product design.

**Keywords:**
sugar intake, healthy diet, smart tracking, user experience
Introduction

1. Background

People were consuming over 60 pounds (28kg) of added sugar per year and this does not include fruit juices. Today, it is very common that people take excessive sugar amount during a day. Sugar consumption is extremely high and it may lead to a number of diseases. According to the American Heart Association, the safe amount of sugar intake for men, is 150 calories per day (37.5 grams or 9 teaspoons), while for women it equals 100 calories per day (25 grams or 6 teaspoons).

The situation causes a lot of potential problems as consuming too much added sugar, especially from sugary drinks may lead to overweight, increasing the heart disease risk factors and high blood pressure, result in the development of acne. Excessive sugar consumption can substantially increase the risk of diabetes, cancer, and depression, accelerate the skin aging process, contribute to cellular aging, as well as drain energy.

2. Problem Statement

For most individuals, the sugar intake amount is much higher than the amount they need per day. People tend to consume sugar unconsciously while eating cakes, candies, and drinking soft-drinks, juice, even coffee. Hence, most individuals eat too much sugar a day and have no idea of this disastrous habit. It is hard to notice the problems as these people do not know anything about the sugar containment. Consequently, it is hard to track sugar intake. Also, people are too lazy to

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input all food data to get detailed information about the sugar amount they consume every day. It has been found that there are more than 76 dangers associated with excessive sugar intake\(^3\).

Hence, sugar intake is considered to be a huge problem in the society. Even when some individuals want to keep a healthy lifestyle and are eager to know what they have eaten, they find it is very hard to get the exact amount of sugar they have in the consumed food. Also, some users tend to read the OCR bar on the packaging of the snack or drinks. For most situations, it is referred to as a list of numbers on the package. Moreover, it is hard for the users to understand, preventing them from getting the meaning of these numbers. Some people subconsciously think that some foods, for example, candy or real sugar contain a lot of sugar. People tend to consume sugar unconsciously, while having cakes, drinking soft-drinks juice, etc.

Hence, the main objectives of the project are:

1. Motivate individuals to make healthier choices.
2. Provide users with a more convenient way for the input process.
3. Try to provide the accurate sugar intake date to the users.
4. Visualize the data to make it more understandable to the individuals.

**Application Implementation**

The implementation of the application to achieve the goal is as follows:

- Scan a QR code/trigger and record the food;
- Visualize the sugar amount for the scanned food;
- Alert the user when the sugar amounts exceed daily intake;
- Remind users to make healthier decisions.

\(^3\) Ibid.
Based on the research and design implementation, these approaches were applied in the project to accomplish the objectives.

1. Scan in Mobile Application

The individuals use their phones to scan the QR code to pay, get information, make orders, and perform many other tasks. With the swift increase of the number of mobile device users, more wireless information services and mobile commerce applications are needed. Since various barcodes have been used for decades as a very effective means in many traditional commerce systems, people are looking for the innovative solutions to apply barcodes in the wireless world\(^4\). With the technology development for both artificial intelligence and augmented reality, scan has enabled to recognize the product, the size, and the amount of the stuff that the users have just scanned.

The benefits of using scan in the mobile application include the improvement of business intelligence, getting real-time information and feedback, efficiency improvement, and productivity increase. While in a real situation scanning still has many limitations, for example, it may be hard for recent technology to recognize the food in the dish at the restaurant, it might take a little time to analyze the product that just scanned.

It is hard to track the sugar intake amount especially for the users who do not like to type or record the food they consume. In the modern society, people tend to use social media to upload pictures they take and record their life. Since 2006, blogging has dropped among teens and young adults while simultaneously rising among older adults. As the tools and technology

embedded in the social networking sites change, and use of the sites continues to grow, youth may be exchanging macro-blogging for micro-blogging with the status updates. What if they use the camera to record what they eat and the system will provide real time sugar amount and tell you what the amount means.

In this project the scan will be used in both bar code scanning (Figure 1) and real product scanning. However, there are some technical limitations. Once a user scans the dish it will show the suggested items (Figure 2), and based on the AI technology the system will automatically memorize the food (Figure 4), and the geo-location (Figure 3), as well as provide more accurate suggestions next time.

Figure 1, 2, 3, 4: Item Scanning

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2. Data Visualization

Data visualization is a general term that describes any effort to help people understand the data significance by placing it in a visual context, patterns, trends, and correlations that might go undetected in text-based data can be exposed and recognized easier with data visualization software\(^6\).

The idea of data visualization has been applied in many areas like dashboard, business intelligence, information design, and others. When people think about data visualization, they will think about the line graph (Figure 5), bar chart (Figure 6), pie graph (Figure 7), or even box graph (Figure 8). These are common ways to present comparative data in design while applying these figures in the mobile application is not appropriate.

Figure 5: Line Graph  
Figure 6: Bar Chart  
Figure 7: Pie Chart

These basic graph strategies are extremely useful in information design especially for comparative statistical graphic design. The biggest issue for the project is how to collaborate the statistical design into mobile application. Using data visualization in the mobile application can provide a user with the opportunity to absorb and recognize the information more easily, interact

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https://searchbusinessanalytics.techtarget.com/definition/data-visualization
with the data directly, and make the complex data in a vivid way. As mobile visualization is increasingly used and new mobile device form factors and hardware capabilities continuously emerge, it is timely to reflect on what has been discovered to date and to look into the future. Therefore, the main goal of using data visualization in the mobile application is to bring the target users closer to making an effective use of ubiquitous mobile devices as data visualization platforms.

While the most common nutrition fact bar on the food package (Figure 9) is text based, which definitely convey a lot of data information such as calories, serving size, cholesterol, sodium, total carbohydrate, and others. Using data visualization (Figure 10) instead of text based can surly make a user to absorb the data better and the visual style can catch users’ eyes. Furthermore, a user can interact with the data not only just read the data from the nutrition facts bar. In this way, it makes the data on the nutrition facts bar more meaningful to the user. Also, it provides an interactive combination for the product in real life and mobile device. With the difference of Figure 9 and Figure 10, a user can clearly understand the visual attraction about data visualization.

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3. Reminder and Suggestion in the Mobile Application

A reminder in the mobile application is very common these days. People set the alarms to wake us up, set calendar memo to remind what time to do what, how many times you just forget to set a reminder to remind you to do something. The application tends to become a personal sugar limit reminder, and it is not necessary to set the reminder every day, based on the goal a user sets and the personal information he or she fills, it reminds the user when the sugar intake amount is out of limit for the day.

Methods-Design Process

1. Define the Problem Analysis

The primary concept of the project is to involve data visualization into the mobile application to provide the user with a better understanding of sugar intake and do proper decisions based on the feedback. The biggest problem is when the user feels that it is hard to notice and track the sugar intake amount. Another issue is related to the fact when the nutrition fact bar is hard to understand and when an individual tries to record the sugar intake as he or she finds that it is difficult to do it continuously. Furthermore, when users try to type all the food consumed they just get a number, but they do not know what to do next. Meanwhile, technologies like AI (scan function needs to generate with the database, then analyze the food a user has just scanned) can help the camera to recognize the food and the amount of the food. Moreover, based on the geo-location even in the restaurant, a user can still get the sugar amount of the food.
2. User Research and Competitive Analysis

The target audiences of the application are users who want to record the daily sugar intake amount, and those who want to live healthier, diabetes patients, and the people who want to lose weight. In 1999, Alan Cooper created the notion of “personas”, an emerging user-centered design method. As defined by Cooper, a persona is a fictitious, specific and concrete representation of target users. The Inmates are running the Asylum, Macmillan. The goal of building persona in this project is to help a reader and designer get a better understanding of the user, which helps to improve the development of the application. Based on the research, two personas were made (Figure 11 and Figure 12). In conclusion, a user wants an application that can easily input the data and get visualized feedback. Moreover, users seek to get personalized suggestions based on their information.

After defining the target user and analyzing the situation, the market research (Figure 13) was made to analyze the strength, weakness, opportunity, and trends. A competitive research in the marketing and strategic management is an assessment of the strengths and weaknesses of current and potential competitors. To sum up, the data for the current application is way too hard to understand. Therefore, users cannot feel involved in the data and information and they do not understand the meaning of the data. Moreover, the input process in the current market is too complex. In most situations, users just need to type all the food-related information they take into the application. Also, most applications do not suggest a user what to do next after getting the data, lacking of the data interaction.

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User Persona

Fiona Lynn

23 / Graduate Student / USC/ San Francisco

"I love share my life especially through instaram, especially to shot some delicious food."

Fiona Lynn is a graduate student majors in artistic design, she likes fancy images and record her life. She is so addicted to sweet food and wants to change this situation. She tried to understand the nutration facts but she failed, she download several app to record and understand the calories and sugars for the food. She is pretty busy about her course work and busy with she life.

David Louis

28 / Graduate Student / RIT / Rochester

"I love share my life especially through instaram, especially to shot some delicious food."

David Louis is a senior student majors in Computer Science, he is a big fan of being healthy, he always eat healthy, exercise a lot. He likes to count every amount likes fancy images and record her life. She is so addicted to sweet food and wants to change this situation. She tried to understand the nutration facts but she failed, she download several app to record and understand the calories and sugars for the food. She is pretty busy about her course work and busy with she life.

Figure 11, 12: Persona One and Person Two
3. Design Goals and Ideation

The design goal of the project is to provide potential users with a simple, empathic situation that can enable them to have a better understanding of the limitation about the daily sugar intake. It is common to think of statistical graphics and data visualization as relatively modern developments in statistics.\(^{11}\)

This sugar amount case presents the most important comparative data is the sugar amount that users take and the daily sugar amount that users need. Several iterations have been made to present the comparison. Hence, Figure 14 is a design extenuation of a bar graph. Two different colors and direction represent two different sugar types, meaning that the bar graph does not contain enough interaction for user to interact with just showing the statistical data. Figure 15 and Figure 16 are two other exploration of the data visualization. While the design metaphor for Figure 17 is a balance, two different sliding weight of the steelyard stand for the proper sugar intake amount and the sugar amount that user take. In this case the metaphor works well but the

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graphic is too specific and complex for the user to interact. With the exploration of balance, the final ideation was launched. Figure 18 represents the needs and the consumption. When the sugar limit is out of the day, it will bleed the circle out, the dashed line stands for the time now and user can easily click and drag to the different time ring.

Figure 14, 15, 16: Visualization

Figure 17: Steelyard Stand for Sugar Intake

Figure 18: Needs and Consumption
4. Information Architecture and User Story Scenarios

Information Architecture (IA) is the structural design of shared information environments; the art and science of organizing and labeling website, intranets, online communities, and software to support usability and findability, as well as an emerging community of practice focused on bringing principles of design and architecture to the digital landscape.\(^\text{12}\)

Figure 19 represents the ideal architecture of the application. The information about the architecture demonstrates the overall structure of the application. There are four significant parts of the application, including scan, visualized data, reminder, and suggestions.

There are four case scenarios to present the design solution of the application. In the first scenario (Figure 20), it is shown how a user applies the application for the first time. The user can login to the app, fill the information, and set up the goal. In order to match the data visualization concept, the design uses a more visualized and vivid way to represent the feature and information.

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In the second case (Figure 21), let us suppose that the users are now in a restaurant and have already ordered a dish. They want to know the sugar amount that is present in the food and open the app to scan it. They get the information about the dish by using the location of the restaurant, and the application automatically loads the menu of the restaurant and analysis the sugar amount.

The third use case (Figure 22) is for scanning the bar code, after a user finishes food consumption, he or she buys a drink, scans the nutrition bar, getting a visualized sugar amount instead of carefully reading the number from the chart. Moreover, it enables to easily get the information that a certain drink contains, for example, 210 grams of sugar and it is almost 80% of the recommended daily sugar intake.

The forth use case (Figure 23) is when a user adds the drink to the amount, getting the overall sugar intake record on the main page. It provides an opportunity to wonder what an individual
consumed several hours ago through clicking and dragging to different color ring sections to view the sugar amount for a certain period.

Then, several hours later (Figure 24), a user really wants to drink some coke. However, a notification pops up tells the sugar amount is over limit for the today. It means that there is a need to do something healthy. Clicking the click notification box a user gets a guide and recommendations. A user filters the recipe to know what to cook later. Hence, users can filter their requirement and choose a dish to cook. After dinner, a user can think about doing some physical exercises. This application does not only records what a user eats, but also gives the recommendation related to the user’s goals.

Figure 22 : User scenario 3

Figure 23 : User scenario 4

Figure 24
7. Design Solution

In order to achieve a global design solution, the visual system (color system, icon set, font choices) needs to be defined. Color plays a major part in the correct reflection of the design, it visually obvious yet subtle application has a significant impact on the way a brand is perceived by the public. Figure 25 shows the color pattern of the application, indicating that the primary color of the application is dark blue and red. The set of the color red is to convey vivid, fresh energy, optimism, and bright mood. The secondary level of colors is neutral as it shows the hierarchy.

Icon set (Figure 26) is a momentous part of the application, and it should match the style of the overall design and color system. In order to provide a bright and well organized atmosphere, Gotham became the ideal choice for the design. A video was made to present the overall design solution and to show how a user will interact with the application.13

Figure 25: Color Pattern

Figure 26: Icon Set

13 Shiwen Ding, “FinalWith Audio 4 Converted copy,” YouTube, June 16, 2018
https://www.youtube.com/watch?reload=9&v=2pOBdALbxic
Results and Evaluation

Usability testing is a technique used in the user-centered interaction design to evaluate a product by testing it on the users. This can be seen as an irreplaceable usability practice, since it gives direct input on how real users use the system. During the design development (Figure 27), many attempts were made to accomplish the design goal. During the process of conducting the project, different user feedback have impacted changes and visual improvement. For example, a user case and a user story need to be more specific, adjust the motion UI speed, solve visual screens, and clearly define how a user can implement the geographical location.

The Main testing I’m doing is to get feedback about how user think about the different data visualization (Figure 14-17), for Figure 14 I’ve heard feedback that user think the visual style is too realistic and when the users trying to interact with the dashboard I finally realized there’s not enough room for user to actually interact with the dashboard. While the feedback about Figure 15 is when facing the dashboard user find it’s hard to tell which amount is bigger. The whole point of using the dashboard in the interface is to let user easily compare the take and needs.

Then for Figure 16 user find it’s hard to compare two line chart without any indication and they didn’t get how the line chart can show the daily comparison. The next feedback is about Figure 17, for this dashboard is considered more about the way how user can interact with, they can understand the actually treat it as a rotatable 3D dashboard, in real life user find there’s not enough space for fingers to click and rotate that. After all those process the final version was made and test result turn to be the most acceptable one.

For the final user testing, several tasks (Figure 28) were made to evaluate how a user can navigate the app without instructions. Task 1: walkthrough on boarding screen; Task 2: fill the
personal info and set up the goal; Task 3: scan to add a food for the day; Task 4: filter a recipe; Task 5: check the amount of sugar intake.

Overall, there is a lot of positive feedback from the users as they find the application is pretty easy to use and the structure is clear to understand. Based on the feedback, the project can surely attract users to track the sugar intake amount.

Figure 27: Design Development

Figure 28: User Test
Conclusion

The mobile application became a popular and easily accessible platform to address the needs of a user. The project starts with an existing problem that bothers users and crates a visualized tool to help with the issue. The project has been defined to be a chance for the users to make wise decisions based on their daily sugar intake.

In order to achieve the goal from the problem statement, for motivating individuals to make healthier choices, the healthy recipe and doable exercise was provided to users. More convenient way was provided for the input process by adding scan and type. Also, try to provide the accurate sugar intake date to the users by letting user understand the daily sugar needs and consumption. Last but not least, using dashboard in mobile interface design to visualize the data to make it more understandable to the individuals.

The essential results obtained in the thesis project will provide an opportunity to get information about the overall amount of sugar a user consumes a day. Hence, it will be possible to get accurate statistics about each drink. Moreover, the app will help users reduce the amount of sugar intake and live a healthier life.

Designers should have their own sense of responsibility to change user’s behaviors and provide delightful user experience. In the process of the current research, the author has participated in the sugar research, learned how to live a healthier lifestyle. Consequently, 40 pounds have been lost. This is one more way to present the design change in the user’s behavior in real life. From the researcher’s point of view, design should not only be attractive and creative in the visual part, but also be useful for the users. In the near future, this application might be very useful due to the ability to connect with user’s payment card and remind a user when necessary.
Bibliography


