

Assignment M3: Brainstorming and Prototypes

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Abstract— In this report, I will discuss a wellness app that collects and analyzes user health-related data. In particular, user input will consist of dietary choices, medical measurements such as blood pressure and glucose level readings as well as other data that may have an impact on their health. The data will be used for the following purposes: (1) establish baselines of their medical measurements (2) monitor and alert the user regarding deviations from the established baselines and (3) provide dietary and lifestyle recommendations. I will focus exclusively on the data input interface.

1 BRAINSTORMING PLAN

I will set aside an hour on multiple days to focus on brainstorming ideas. I will start by writing down the core problem that I intend to solve. It should be concise and solvable. The rules I will set for myself are (1) I will write down whichever ideas come to my mind even if they seem “off” and (2) the ideas need to be implementable with existing devices and technologies, as my goal is to focus on the creation of the interface and (3) I will try to come up with at least 20 ideas for solving the core problem. Finally, I will utilize the method of *divide and conquer* in the sense of dividing the core problem into multiple constituents and try to find solutions to them. The standard I will set for my ideas is that they must be implementable based on my knowledge and experience.

2 BRAINSTORMING EXECUTION

2.1 Core Problem

Insufficient recording and analysis of health-related data. For the purposes of this assignment, I will only focus on the *data recording* part.

2.2 Ideas

1. Print paper notebook with pre-printed fields on its pages for the user's data recording needs.
2. Print a customized paper calendar with pre-printed fields for the user's data recording needs.
3. Build a customizable mobile app that resembles a paper notebook
4. Build a customizable mobile app that resembles a paper calendar
5. Print sticky notes with pre-printed fields for the user's data recording needs.
6. Build a mobile app that will utilize voice interaction for data recording.
7. Users will utilize a dry-erase board to record the data; at the end of every recording period (e.g., day), users will take a picture of the board and upload it to the mobile app that will use text-recognition software
8. Smartphone's built-in voice recording app; recordings will be uploaded to the wellness mobile app
9. Print customizable scantron forms for the user's data recording needs.
10. Users will utilize the built-in notepad app on their smartphone to create notes with recorded data; these notes will be uploaded to the wellness mobile app
11. Create an xlsx spreadsheet template for users to modify as per their needs; spreadsheets will subsequently be uploaded to the wellness mobile app.
12. Create a desktop software that could be customized for the user's data recording needs.
13. Users will utilize a wearable device to record the data via voice interaction.
14. Users will utilize a augmented reality device to record the data.
15. A family member will record the user's data via a mobile app.
16. Users will utilize a game interface on either a mobile device or laptop to record the data.
17. Audio recording devices will be installed in frequently visited places by the user. The user will dictate the data to those devices.
18. Create a customized mobile app that will have separate pages for users to record their data.

19. Attach a small hidden camera to users' clothing to record their interactions with the world. Upload recordings to video processing and image recognition software.
20. Users will utilize pre-printed sheets of paper to record their data, put them into an envelope, and mail them for analysis.

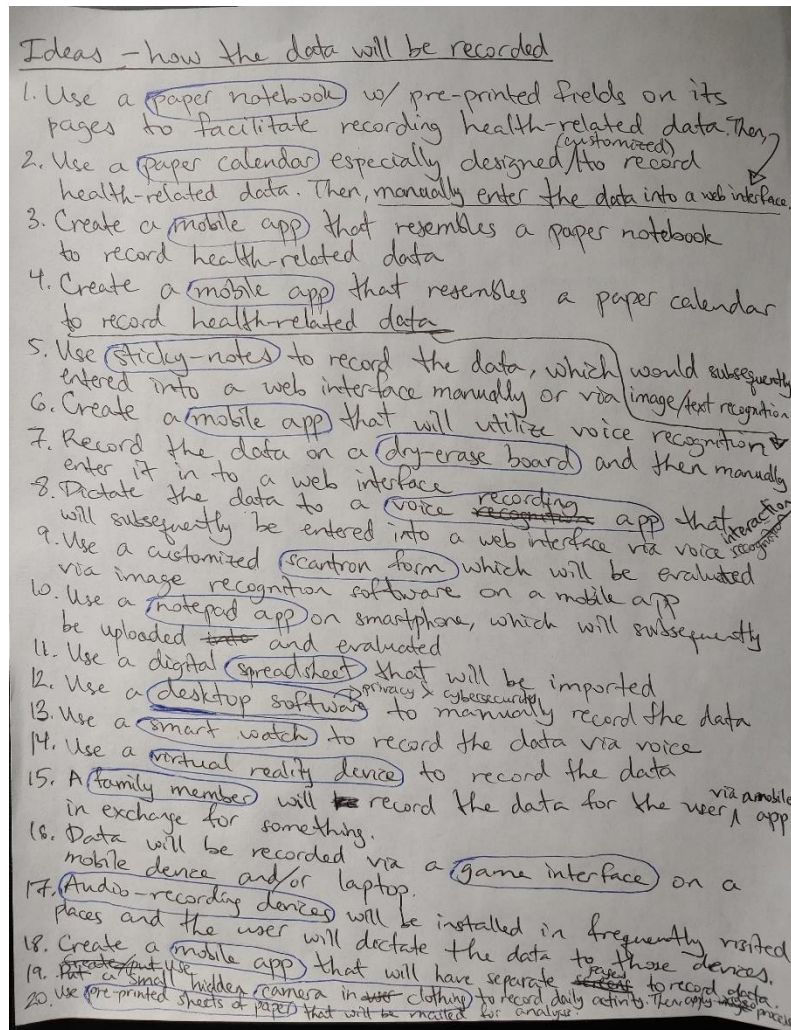


Figure 1— Image of original brainstorming document.

3 SELECTION CRITERIA

My selection criteria for choosing which ideas move forward are as follows:

1. The ideas should allow for building a prototype using existing tools and technologies within a reasonable time. That is, the idea should not be too

abstract (e.g., augmented reality device) or complex (too many details to build a prototype within reasonable time).

2. The ideas should permit building a prototype that is easy and quick to modify based on user feedback.
3. I should have some subject matter knowledge, or related knowledge, to the ideas' domain with regard to implementation. For example, my experience in web development can be considered related knowledge to building a mobile app, but I do not have any knowledge of building a chip-brain interface.

4 PROTOTYPE 1 – PAPER/WIREFRAME

4.1 Description

This prototype is based on *Idea 18* in the *Brainstorming Execution* section about a customized mobile app that is utilized to record data about the user's meals, medications, and lifestyle. Once the user logs in to the app, he or she will be redirected to the 'Data Input' page, as shown in figure 2.

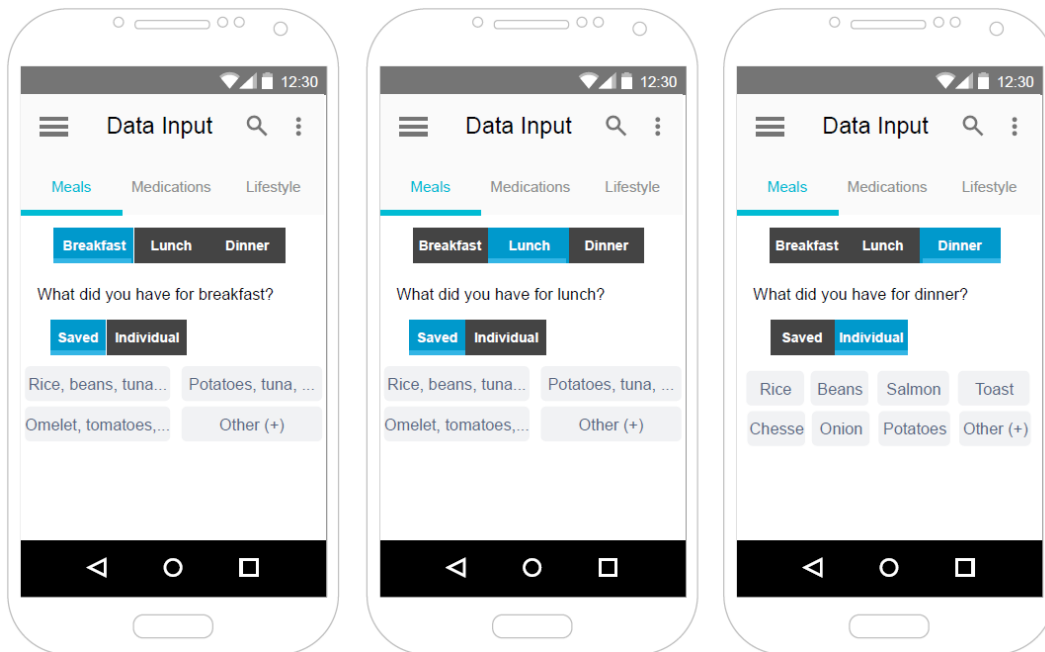


Figure 2 — Meals recording interface in mobile app.

The app will have tabs for switching between breakfast, lunch, and dinner. Also, the user can switch between *saved* meals and *individual* food items.

Figure 3 shows the page to record medications intake. The user will have the option to customize this view; for example, medications could be shown as either 'number of pills' or 'dosage' in grams/milligrams/etc.

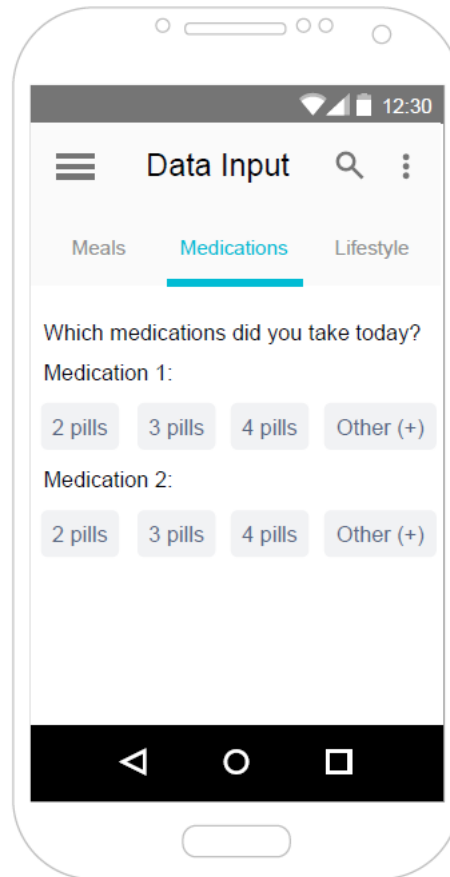


Figure 3— Medications recording interface in mobile app.

As shown in figure 4, app users will be able to record data such as *hours of sleep* and *physical activity* in the Lifestyle page.

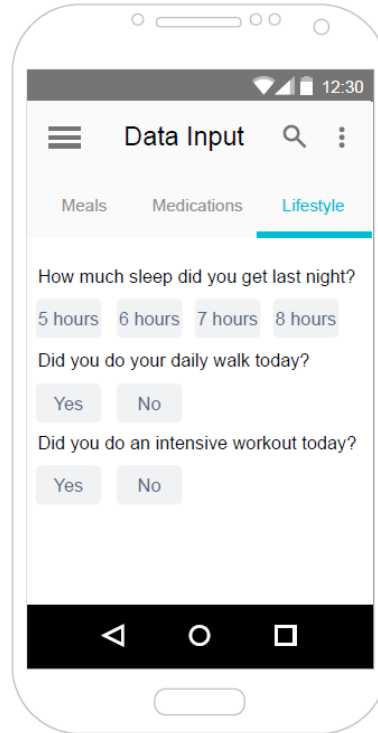


Figure 4— Lifestyle choices recording interface in mobile app.

4.2 Evaluation

The mobile app prototype meets all of the requirements described in Assignment M2. In particular, it meets the requirements of (1) providing a convenient way to record the data (2) being customizable by the user and (3) having the capability of connecting to a remote database. However, the convenience of data recording is only partial. Based on my findings, many users would prefer the process of data recording to be fully automated, which this prototype cannot meet. The device should mesh well with the audience described in the inventory as it meets all of the aforementioned requirements. However, there is room for improvement on making the data recording more automated.

5 PROTOTYPE 2 - TEXTUAL

5.1 Description

This prototype is based on *Idea 14* in the *Brainstorming Execution* section which involves using an augmented reality device to record the data.

The device consists of wearable smart glasses with an augmented reality overlay. The smart glasses can capture images of the user's meals, medications intake, and lifestyle choices. It is necessary for the user to be wearing the smart glasses in order to have the data recorded. However, the recording itself is effortless. For example, once the smart glasses identify a food item that the user is consuming, a notification is displayed via overlay on the glass that the item is being recorded. Unless the user objects to the recording with an eye gesture, the device will automatically record the food item. Similarly, when the user is taking a medication, the smart glasses can identify which medication is being taken and how much of it. Feedback is provided via the overlay display on the glasses; when an item is being recorded: its font weight changes to bold and the item subsequently disappears from the display.

The device uses a sophisticated image recognition software that is constantly improved via learning algorithms. The recorded data can be sent to a remote database via a wifi connection. Data transfer uses an encryption protocol that makes it secure. However, the user may choose to disable wifi connectivity on the device via a small physical switch.

5.2 Evaluation

The smart glasses prototype meets some of the requirements described in Assignment M2. In particular, it meets the requirements of (1) providing a convenient way to record the data and (2) having the capability of connecting to a remote database. However, it does not meet the requirement of (3) being customizable by the user. That is, unlike a mobile app that is easy to customize via a touchscreen, the smart glasses will come pre-programmed by the manufacturer.

The device should partially mesh with the audience described in the inventory because it cannot be customized by the user.

6 PROTOTYPE 3 - VERBAL

6.1 Description

This prototype is based on *Idea 13* in the *Brainstorming Execution* section that entails recording the data through voice interactions via a wearable smartwatch interface.

Imagine being able to talk to your smartwatch about your dietary intake, medications intake, and physical activity. Although this data collection would not be fully automated, it would only require minimal effort. The user will only have to say commands such as “I’m having an omelet with bread and butter for breakfast” to record that data.

Question: Can the smartwatch be customized by the user?

Answer: Although user customization is not a currently available feature, the smartwatch should be simple and flexible enough to accommodate for most users’ needs.

Question: How can the smartwatch understand what the user is saying?

Answer: The smartwatch will initially need to be trained to recognize and understand the user’s voice and speech. However, this training will take less than half an hour, and the sophisticated voice recognition software has an error rate of less than 5%.

Question: What makes this better than just using a mobile app?

Answer: Voice interaction data recording is more convenient than having to use a touch screen. The user does not need to pick up the phone, navigate to the data recording screen, and select the items to record.

Question: What type of feedback does the watch give when an item is recorded?

Answer: The smartwatch displays the items name and flashes a green color on its screen.

6.2 Evaluation

The smartwatch prototype meets some of the requirements described in Assignment M2. In particular, it meets the requirements of (1) providing a convenient way to record the data and (2) having the capability of connecting to a remote database. However, it does not meet the requirements of customizability by the user.

The device partially meshes with the audience described in the inventory due to its inability to be customized by the user.