FunPod

Helping children manage diabetes in a fun and stress-free way

Team

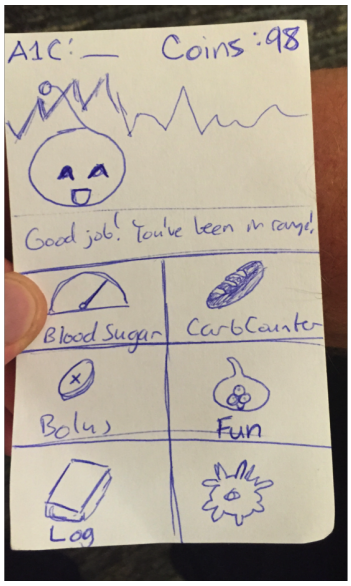
Manager/User Testing - Harshitha Ramesh
Development/Documentation - Henry Tran
Design - Janette Cheng

Introduction

For many children with diabetes, managing their condition is very scary and daunting. Diabetes care can be a flurry of self-administering insulin shots, pricking and testing blood, visiting the doctor, etc. Our hope is that by minimizing these fears and simplifying these processes, children can be more relaxed and learn more in depth on how to manage their health better. Currently, many children manage their diabetes through a Personal Diabetes Manager (PDM), which is not user-friendly, and definitely not kid-friendly as the interface is not intuitive. Our mission is to help children to *easily* manage their diabetes in a fun and engaging way. We are improving the Personal Diabetes Manager by designing a kid-friendly interface that combines reminders, metrics, and positive reinforcement through the integration of a point system and a virtual pet. The goal of the following experiment was to use a low-fidelity prototype to determine whether the user interfaces we created were intuitive and easy to use, which is important for reducing stress and confusion.

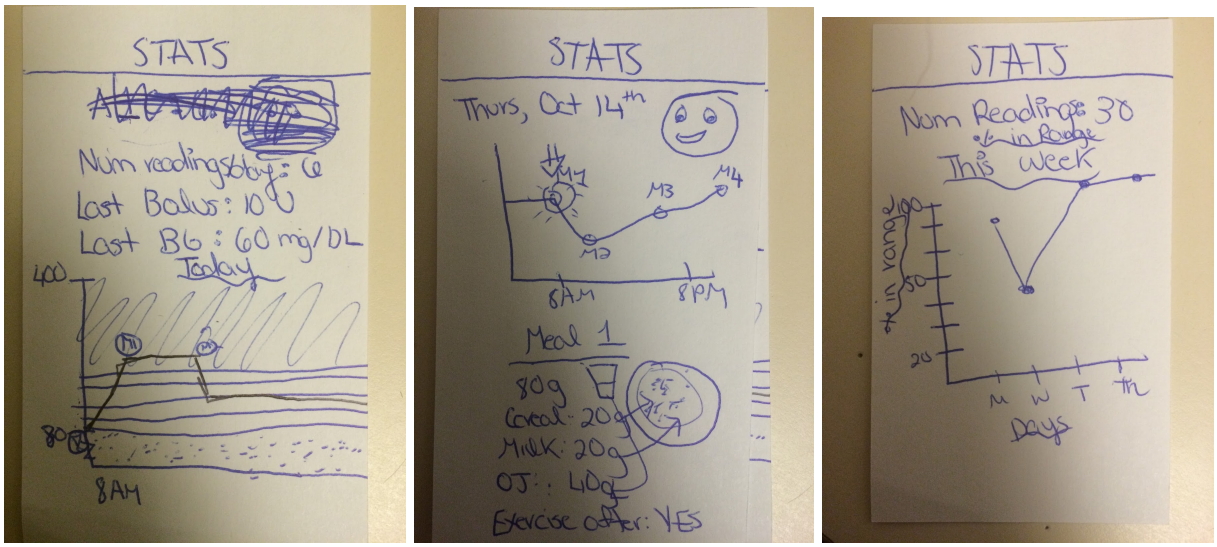
Prototype

Our prototype consists of index cards that serve as screens for the app or dedicated PDM they would have. Whenever the user taps a button on the “screen”, someone switches out the old card with a new one. We currently have screens so a user test their blood sugar, observe trends, count carbs, and bolus (Figure 1).



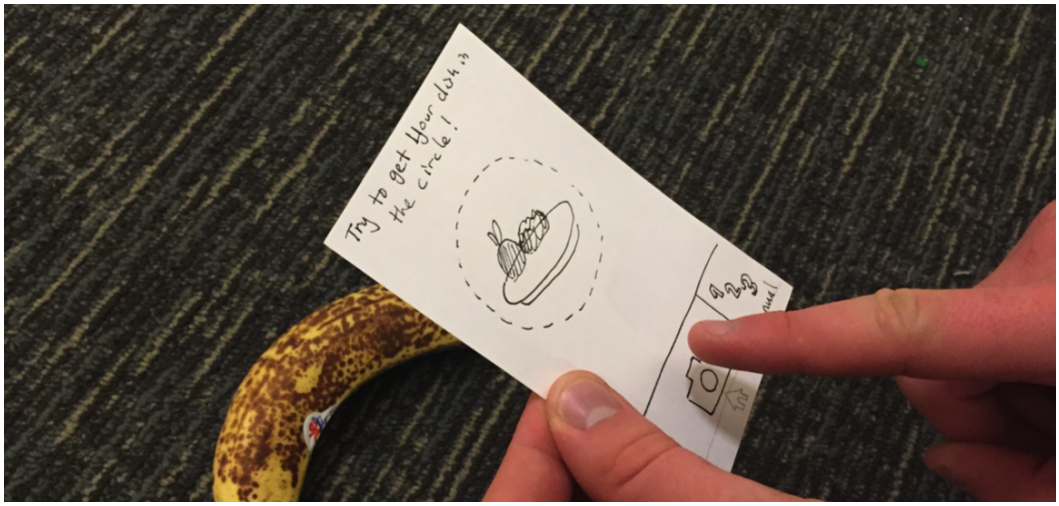
(Figure 1) Main Screen to check blood sugar, count carbs, & bolus

The screens to check blood sugar and observe blood sugar trends consist of a short list of statistics as well as a variety of graphs that illustrate long-term trends (Figure 2).



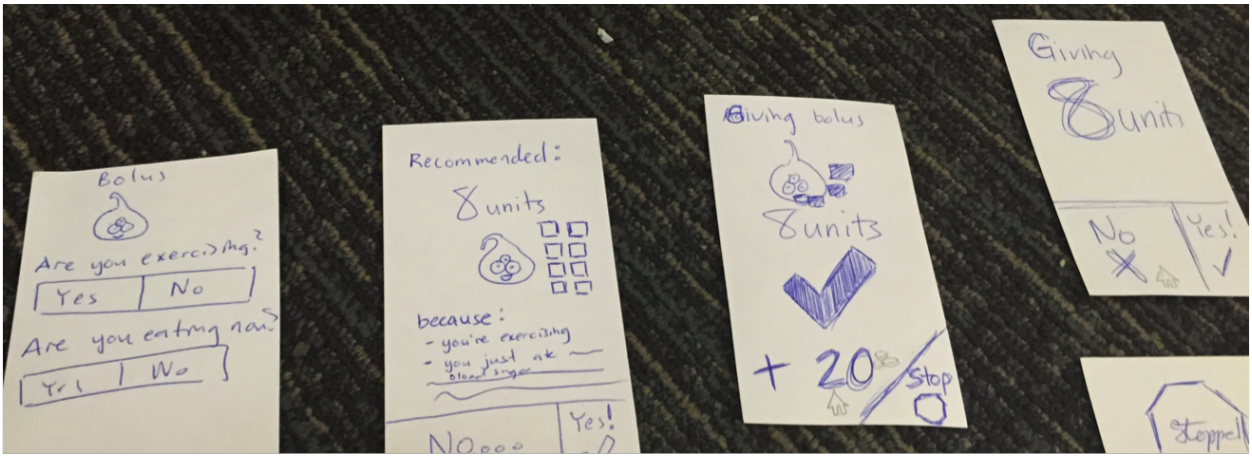
(Figure 2) Screens for checking blood sugar and observing trends for a specific day/week (tapping on dots that represent meals on the line graph gives more specifics about a given meal)

To count carbs with this prototype, we have the user take a picture of their food, which allows the system to calculate the carbs in their meal for them (Figure 3).



(Figure 3) Counting carbs by taking a picture

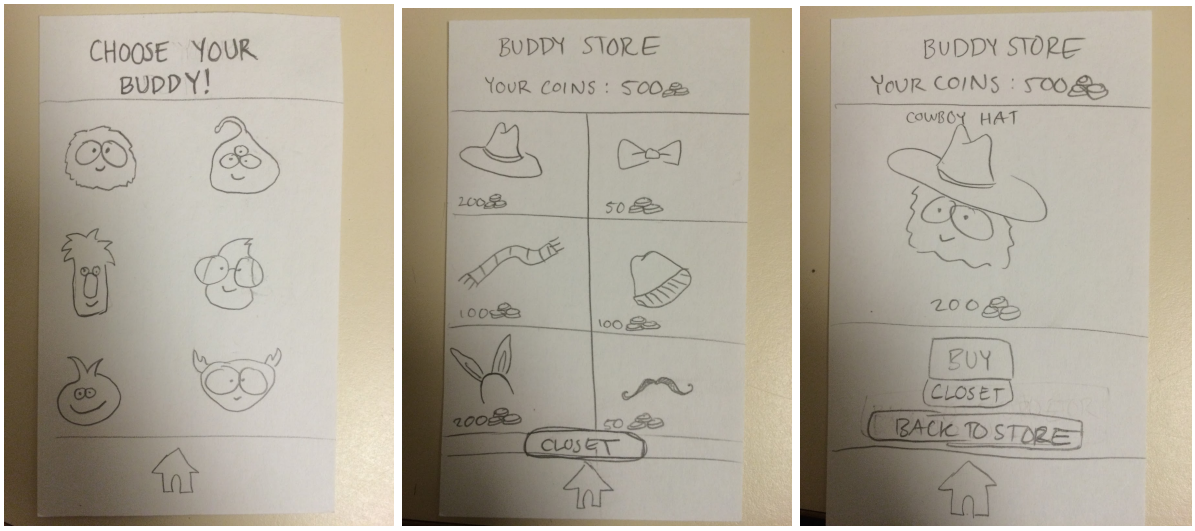
For bolusing, we have a screen that allows the user to enter in information such as carb counts from the carb-counting portion of the app, and when they will be exercising. The process of bolusing also involves several steps of verification as well as an option to cancel to ensure that the user wants to administer insulin (Figure 4).



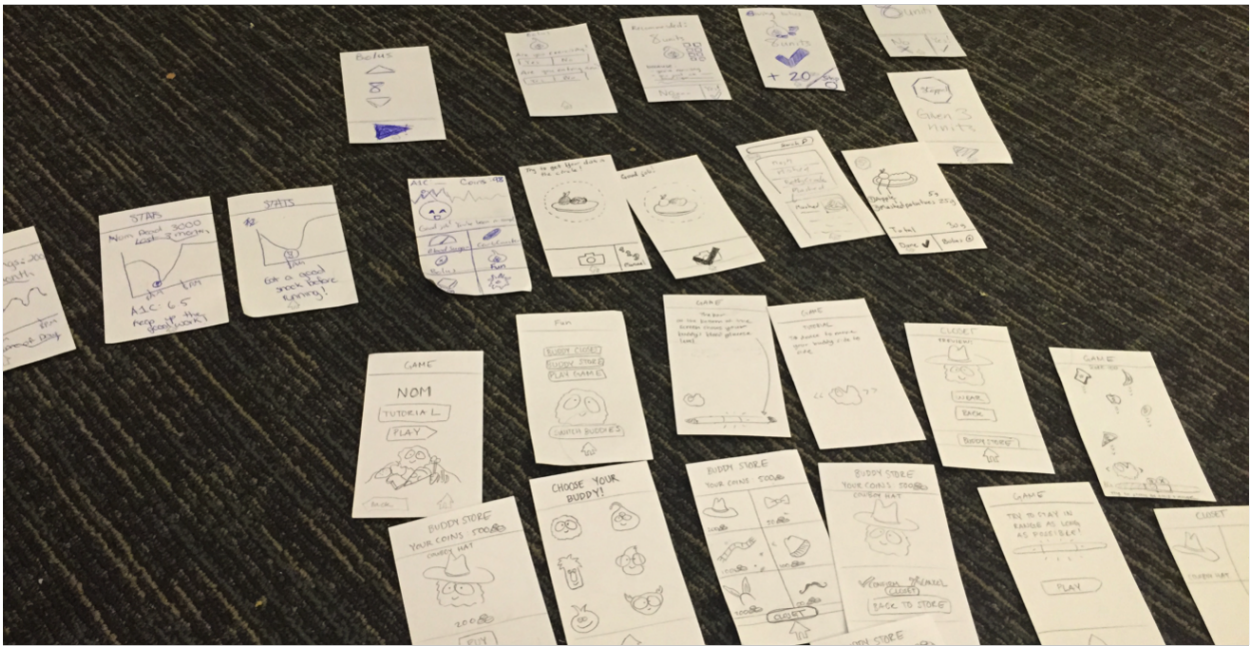
(Figure 4) Bolus Screens

The prototype also integrates the idea of points/coins awarded for in range blood glucose levels and bolusing. In this prototype, we moved away from our original idea of including a Mario Brother's style game, and instead decided to prototype a game that focuses more on taking care of a virtual pet (Figure 5). In this game, you have a pet that you take care of by taking care of yourself (i.e. when your blood sugar is low, your pet is hungry and you have to

feed yourself to feed your pet). With the points/coins you earn for taking care of yourself, you can then buy accessories for your pet.



(Figure 5) Screens to choose your "buddy" and buy accessories from the buddy store with the coins/points earned for in range blood sugar levels and bolusing.



(Figure 6) Lo-Fi Prototype Screens Laid Out

Method

All three participants were read the same script introducing them briefly to the application and experiment before asking them to complete three tasks ((1) checking their blood sugar, (2) counting carbs for a meal, and (3) bolusing). To complete the tasks, participants tapped on “buttons” and the next “screen” (card) would be placed in front of them after the old one was taken away. After the experiment, the participants were asked if they had any questions or overall suggestions. Any questions asked by the participants beforehand were also answered by the experimenter(s). For each task, the time it took to complete the task was recorded as well as any errors that occurred. Afterwards, each task was given a rating from 1-4 describing the severity of the problem(s) associated with that task (for some of this data, the rating from 1 to 4 does not correspond to a specific error on the part of the user, it just describes a general complaint).

The first participant was found through a friend of someone on the team. He is a white 23-year old male who was diagnosed with diabetes when he was 10. He is currently a second year PhD in Geology. In this case, the experiment took place outside behind Tresidder Union at a table (Figure 7), and the participant was compensated with a breakfast sandwich from Starbucks afterwards. This experiment was conducted by Janette (due to difficulties in scheduling, two of the experiments had to be conducted by one group member).

(Figure 7) Table behind Tresidder where experiment was conducted with Participant 1

The second participant is a 21 year old male majoring in STS who was diagnosed with diabetes when he was 13. He was found through an informal diabetes network on campus. This experiment took place at a table outside near Coupa and the participant was compensated with coffee from the cafe. This experiment was conducted by Harshitha.

(Figure 8) Location where participant three was interviewed

The third participant is a 21 year old male majoring in Computer Science who was diagnosed with diabetes at the age of 12. He is a friend of someone in the group and was asked to participate in the experiment as a result of difficulties in finding other diabetic participants. This interview took place in the lobby of Arrillaga dining (Figure 8) and the participant was compensated with a chai latte at Coupa. For this experiment, Henry collected data and Harshitha was responsible for facilitating the experiment and switching out the cards.

Results:

Participant 1:

Tasks:

1. 17.68s took a little bit/prompt to find which number was blood sugar
2. 58.11s didn't understand to take a picture of the food, needed prompt/explanation
3. 34.98s went very smoothly, no snags, no prompts

Suggestions:

- Basal rate, instead of hidden under settings, should be it's own thing, like a bolus
- Pinching to see more graphs -- maybe not intuitive for everyone; wasn't clear that there were more graphs to see
- Carb counter -- plausibility, would be more tempted to enter in things manually; concerns about plausibility

Participant 2:

Task Completion Times:

1. 5.6 s
2. 78.9s, knew to take picture right away

3. 30s, no snags

Suggestions:

- Sharing pet with others, numbers with others
- Having a tab bar controller instead of relying on pinch gesture to toggle between graphs.
- Give points for doing any task, not just for good numbers.

Participant 3:

Task Completion Times:

1. 10.4 s, easy click
2. 61 s, knew to take picture but was put off by “done button” on the counting carb screen
3. 20.8 s to bolus, easy

Suggestions:

- Don’t have a check mark to go back home screen from counting carb. Have it next to button for bolusing Bolus might be too technical of a word for kids.
- Graphs are helpful but average blood sugar might be better than percentages.
- Make sure young children can’t change basal rate/insulin-to-carb ratio without parents’ intervention

Discussion:

Based on our data and the suggestions and questions we received at the end of the experiments, the areas we have to focus on the most are the carb counting portion of the application as well as the presentation of long-term data in the blood sugar screens.

We may have to make it clearer that to count carbs, all the user has to do is take a picture. The confusion surrounding the carb-counting task may have partially been caused by the limitations of the prototype (in the real application, the camera would turn on, making it more obvious you are supposed to take a picture); however, taking a picture is an unfamiliar way of counting carbs, so clearer instructions may be necessary. It may also be good to replace the “done” button with an “add meal” button or a home button if the user doesn’t actually want to add the meal.

We also have to work on making it easier for users to navigate the graphs presented in the blood sugar-checking portion of the application. It might be good to have users choose whether they would like to see average blood sugar or the percentage of time they are in range. Also, we have to make it easier to transition between graphs for a day, week, and month. To do this, we might take one of the participant’s suggestions and use tabs instead of a pinching motion to zoom in and out.

Lastly, we hope to incorporate the general suggestions we got from the participants after they completed the tasks. For example, we may add another button on the home screen that allows users to adjust their short term basal rate. Additionally, we should make the application more kid-friendly by avoiding technical terms (like bolus) and putting in place more restrictions as far as what the user can change by him or herself (need a parent's passcode to change basal rate).

There were limitations in that the given tests were not sufficient to objectively rank how "fun" different features were, as we were focused on the ease-of-use portion of our mission statement. However, the lack of questions we received about the character that was present on several screens indicates that we may have to make the character/game a bigger presence within the application. One participant's suggestion that we allow users to share their pets and numbers with others might be a good way to do this.

Appendix:

Script:

Thank you for agreeing to test our prototype. For this Personal Diabetes Manager aimed at kids, we will assume that the user has a Continuous Glucose Monitor and an insulin pump.

You interact with this system like it is a smart phone with a touch screen. For example, if I want to choose my “buddy” which is the character here on the main screen, I can go to fun, tap the buddy I want, and then go back to the home screen.

First, can you please test your blood sugar with this app?

Next, you’re about to eat a meal. Count the number of carbs in your meal.

Now your third task is to bolus. For this task, assume you will be exercising soon, but not eating.

Feel free to play around with the app.

Any suggestions overall?

Thank you for your time!

Task Completion Times:

	Task 1	Task 2	Task 3
Participant 1	17.68s	58.11s	34.98s
Participant 2	5.6s	78.9s	30s
Participant 3	10.4s	61s	20.8s

Severity of Problems:

	Task 1	Task 2	Task 3
Participant 1	1	3	0
Participant 2	2	0	0
Participant 3	1	2	1

Number of Errors:

	Task 1	Task 2	Task 3
Participant 1	1	1	0
Participant 2	0	0	0
Participant 3	0	1	0

Participant 1 Profile:

Age: 23
Age of Diagnosis: 10
Major: Geology- Second year phd
Compensation: starbucks breakfast sandwich
Location: Table outside behind tresidder

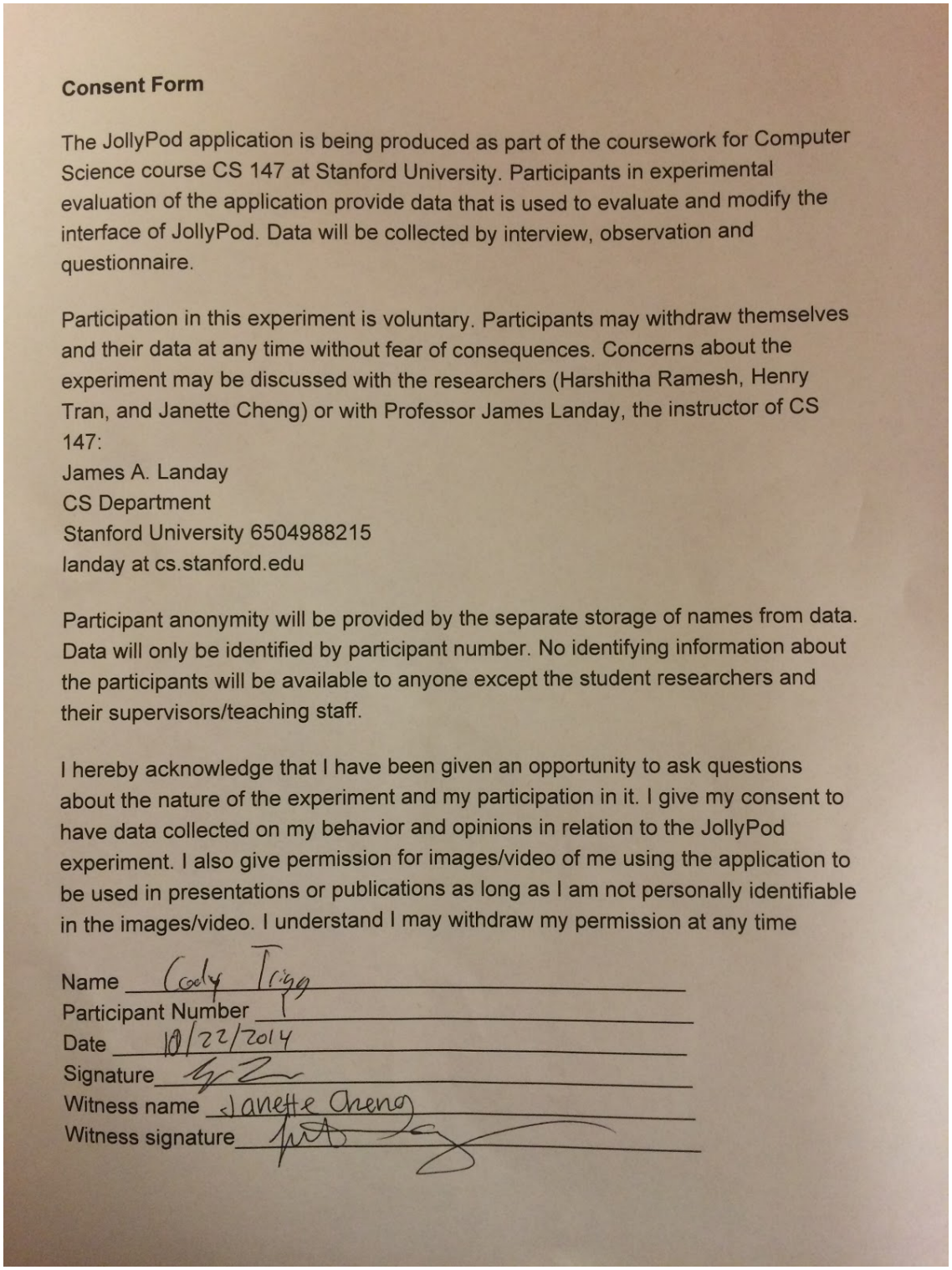
Participant 2 Profile:

Age: 21
Age of Diagnosis: March 1, 2007 (13)
Major: STS
Location: Interview took place in outdoor seating
Compensation: Coffee at Coupa

Participant 3 Profile:

Age: 21
Age of diagnosis: 12
Major: Computer Science
Location: Interview took place in Arrillaga Dining lobby area
Compensation: Chai latte at Coupa

Consent Forms:



Consent Form

The JollyPod application is being produced as part of the coursework for Computer Science course CS 147 at Stanford University. Participants in experimental evaluation of the application provide data that is used to evaluate and modify the interface of JollyPod. Data will be collected by interview, observation and questionnaire.

Participation in this experiment is voluntary. Participants may withdraw themselves and their data at any time without fear of consequences. Concerns about the experiment may be discussed with the researchers (Harshitha Ramesh, Henry Tran, and Janette Cheng) or with Professor James Landay, the instructor of CS 147:
James A. Landay
CS Department
Stanford University 6504988215
landay at cs.stanford.edu

Participant anonymity will be provided by the separate storage of names from data. Data will only be identified by participant number. No identifying information about the participants will be available to anyone except the student researchers and their supervisors/teaching staff.

I hereby acknowledge that I have been given an opportunity to ask questions about the nature of the experiment and my participation in it. I give my consent to have data collected on my behavior and opinions in relation to the JollyPod experiment. I also give permission for images/video of me using the application to be used in presentations or publications as long as I am not personally identifiable in the images/video. I understand I may withdraw my permission at any time

Name Cody Tsay
Participant Number 1
Date 10/22/2014
Signature
Witness name Janette Cheng
Witness signature

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Name Austin Barr
Participant Number 2
Date 10/23/14
Signature Austin Barr
Witness name Harshitha Ramesh
Witness signature Harshitha

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Name Ian Holmes
Participant Number 3
Date 10/23/14
Signature
Witness name Harshitha Ramesh
Witness signature Harshitha