



IMMERSE

LOW-FI PROTOTYPE

CS 147 Winter 2021

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INTRODUCTION

MISSION STATEMENT

Our mission is to provide English-as-a-second-language (ESL) speakers with simulated conversations for real-world application.

PROBLEM AND SOLUTION OVERVIEW

After our user interviews, we discovered that many ESL speakers struggle with context-specific conversations—such as going to the doctor’s office or completing government paperwork—that are often not taught in English classes. By helping ESL speakers practice these conversations virtually, we hope to improve their confidence when encountering these situations in real life.

SKETCHES

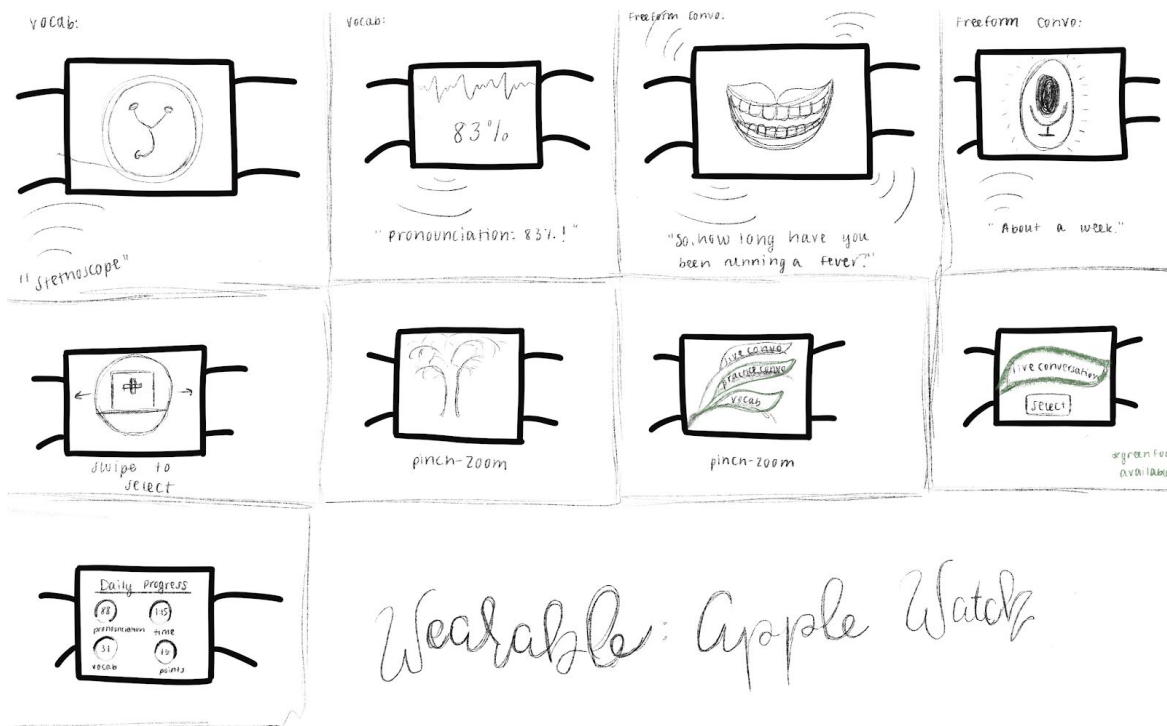


Figure 1. This is an Apple Watch realization with small icons, voice, and haptics.

VR App

→ phone
→ calibrated hand sets

→ use colors to highlight engagement type

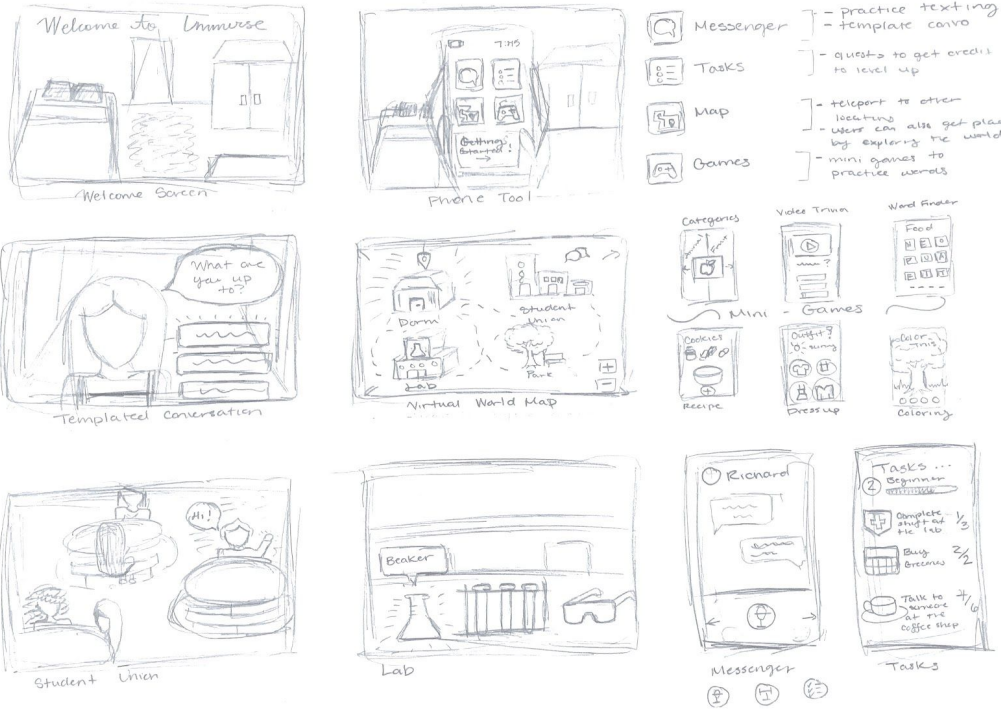


Figure 2. This is a VR app realization with lifelike visuals.

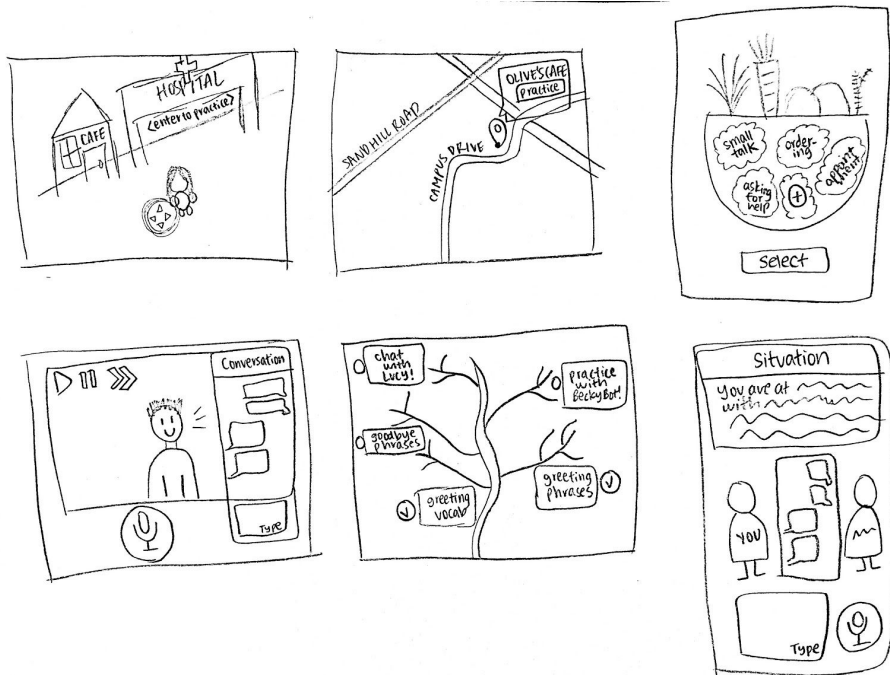


Figure 3. This is a native tablet app realization with a large visual interface.

AR Glasses + APP

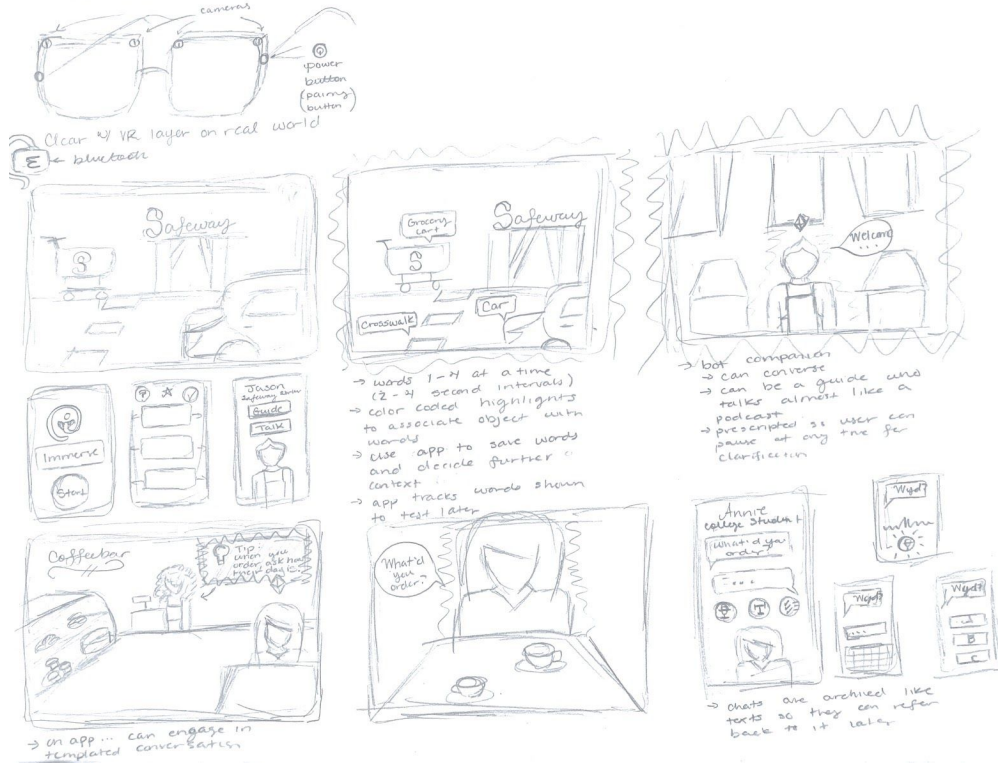


Figure 4. This is an AR app and glasses realization with real-life interactions incorporated.

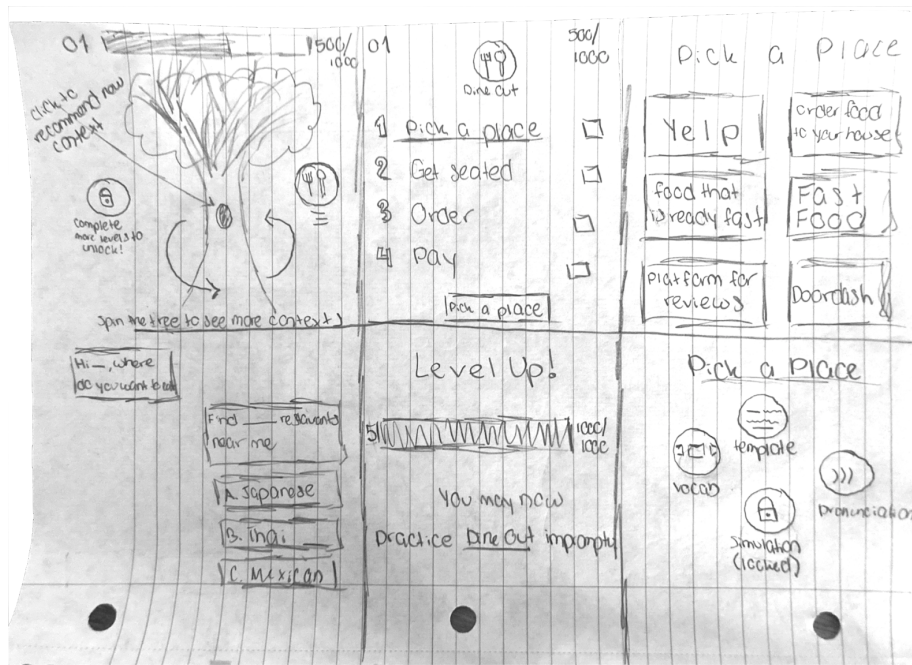


Figure 5. This is a native mobile app realization with a tree-based theme.

SELECTED STORYBOARDS

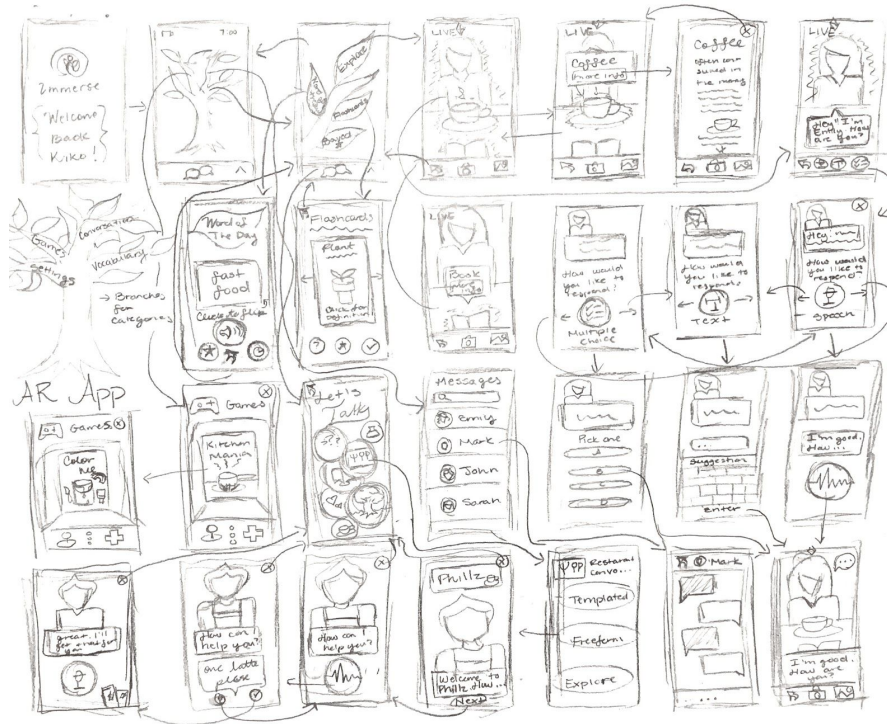


Figure 6. This is an AR app storyboard with real-life conversations incorporated.

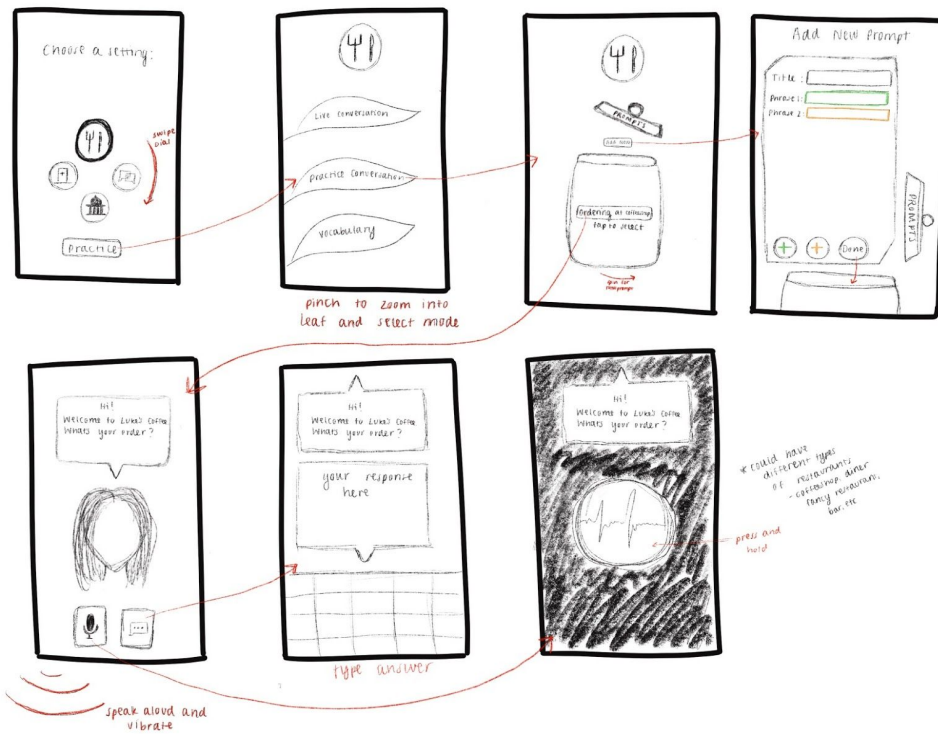


Figure 7. This is a native mobile app storyboard with a cookie jar visual.

FINAL INTERFACE

After our initial sketches, we narrowed down our interface options to an AR app and a native mobile app.

AR APP

Pros	Cons
<ul style="list-style-type: none">• More interactive and visual, helping our users see conversation practice as directly applicable to real life• Integrates more naturally with speech	<ul style="list-style-type: none">• Users may feel uncomfortable using AR app in public, as doing so requires the user to point their camera as if taking a photograph• As AR apps are still uncommon, the learning curve may be steep

MOBILE APP

Pros	Cons
<ul style="list-style-type: none">• Highly visual interface• Combination of audio, speech, and haptic interaction allows for highly interactive and engaging interface• Integrates more easily into users' daily lives, allowing them to interact both out and about and at home• Common usage through the world makes for a lower barrier to entry	<ul style="list-style-type: none">• Difficulty of designing for different operating systems• Less lifelike visual component than AR

Ultimately, we selected a mobile app interface. Our interface consists of multiple screens with text-based buttons, a dial for selecting a conversation context, options to read aloud and hear vocabulary words, and the choice of responding to prompts via text (keyboard) or voice (audio recordings). We also include haptics, programming the phone to vibrate when the bot speaks aloud.

LOW-FIDELITY PROTOTYPE

We sketched our low-fi prototype on an iPad and uploaded the sketches to Figma. We wired up our sketches such that clicking on specified areas (i.e. buttons) would bring the user to the following screen.

The prototype begins with a main menu where the user chooses a context and then selects a task to practice. The first task involves practicing vocabulary. The second involves a templated conversation with a bot. The third involves engaging in a freeform conversation with a bot, with an option for users to contribute their own scenario for the conversation.

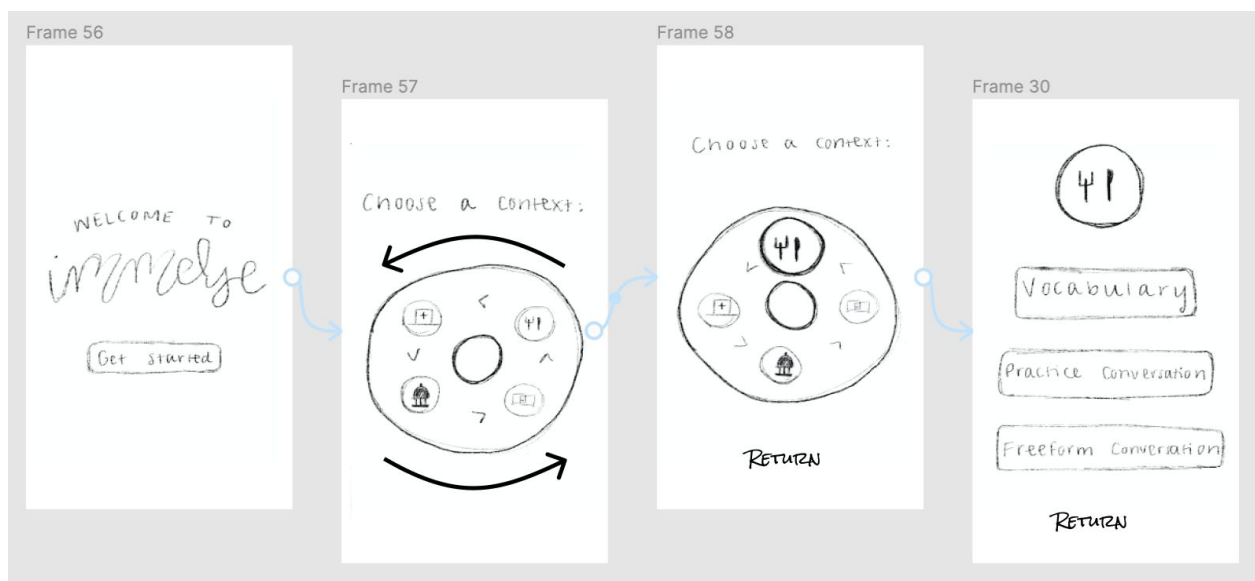


Figure 8. Introductory screens



Figure 9. Vocabulary task flow

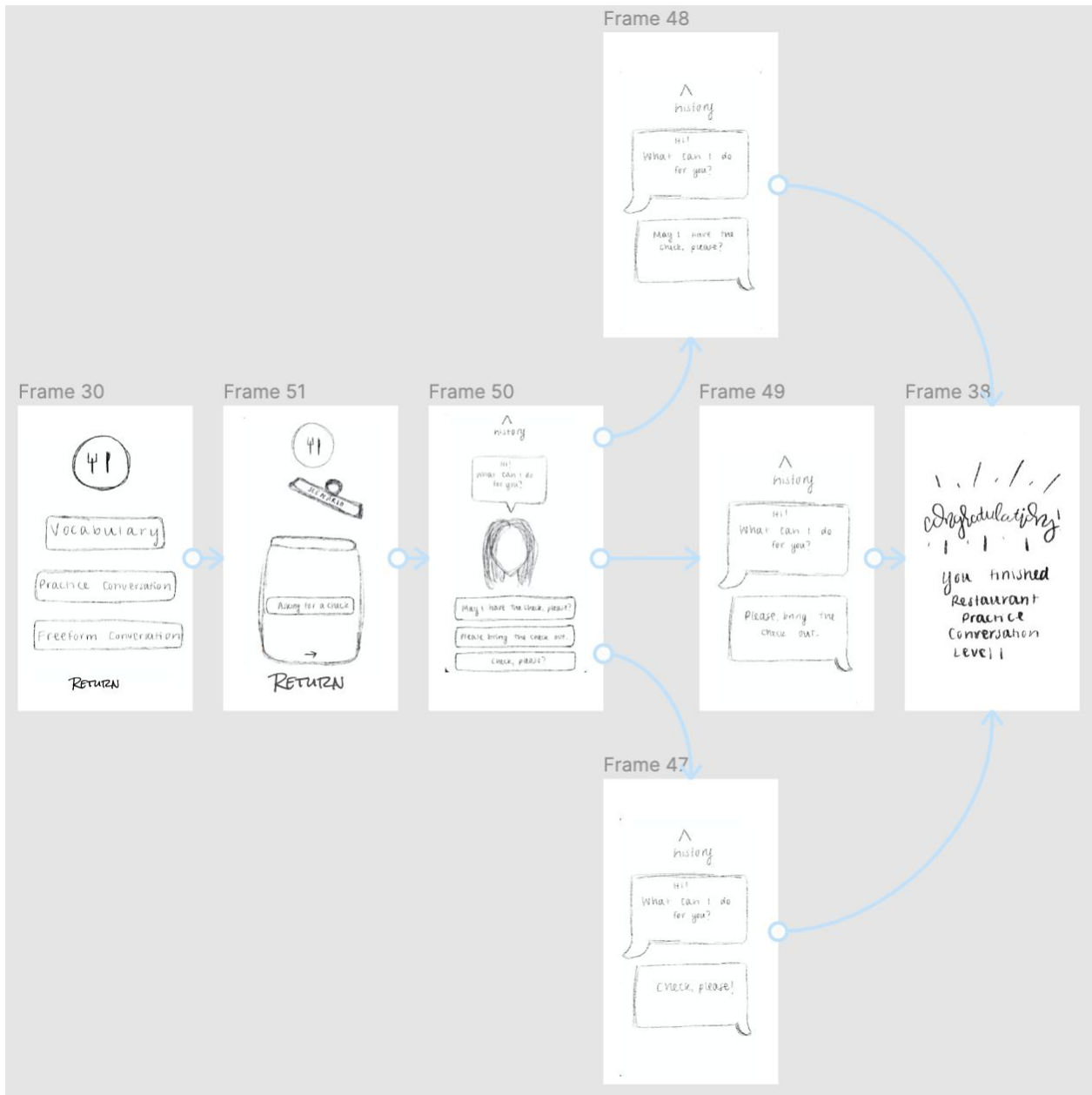


Figure 10. Templated conversation task flow

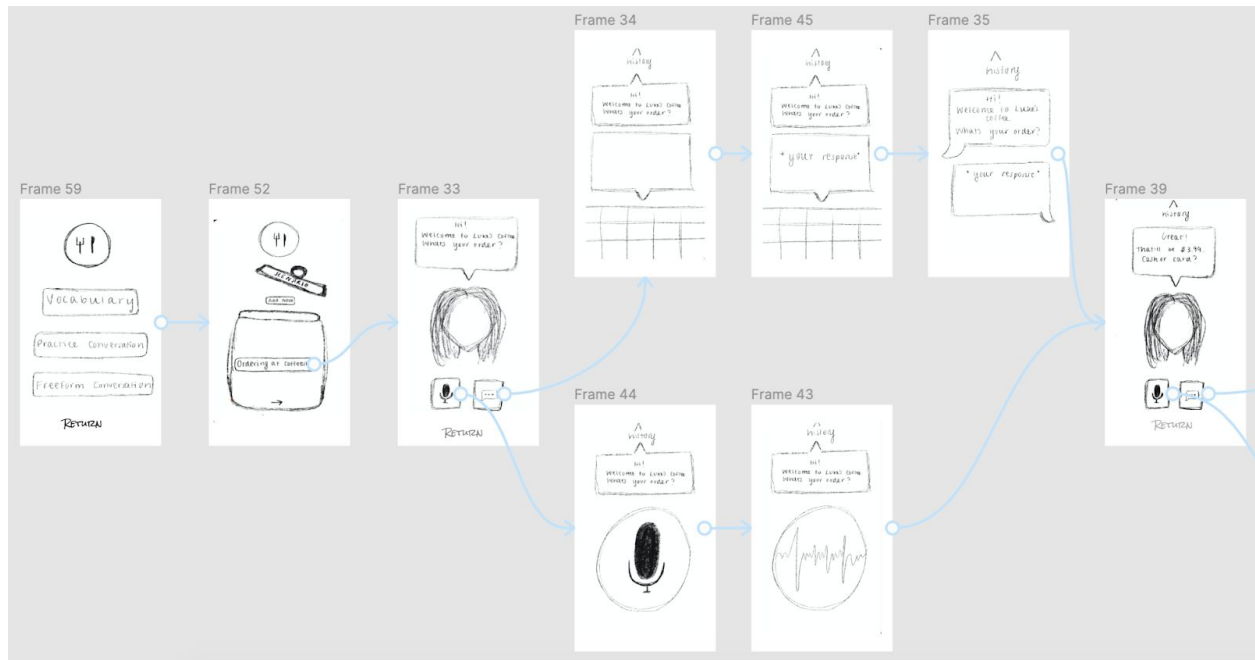


Figure 11. Freeform conversation task flow (part 1)

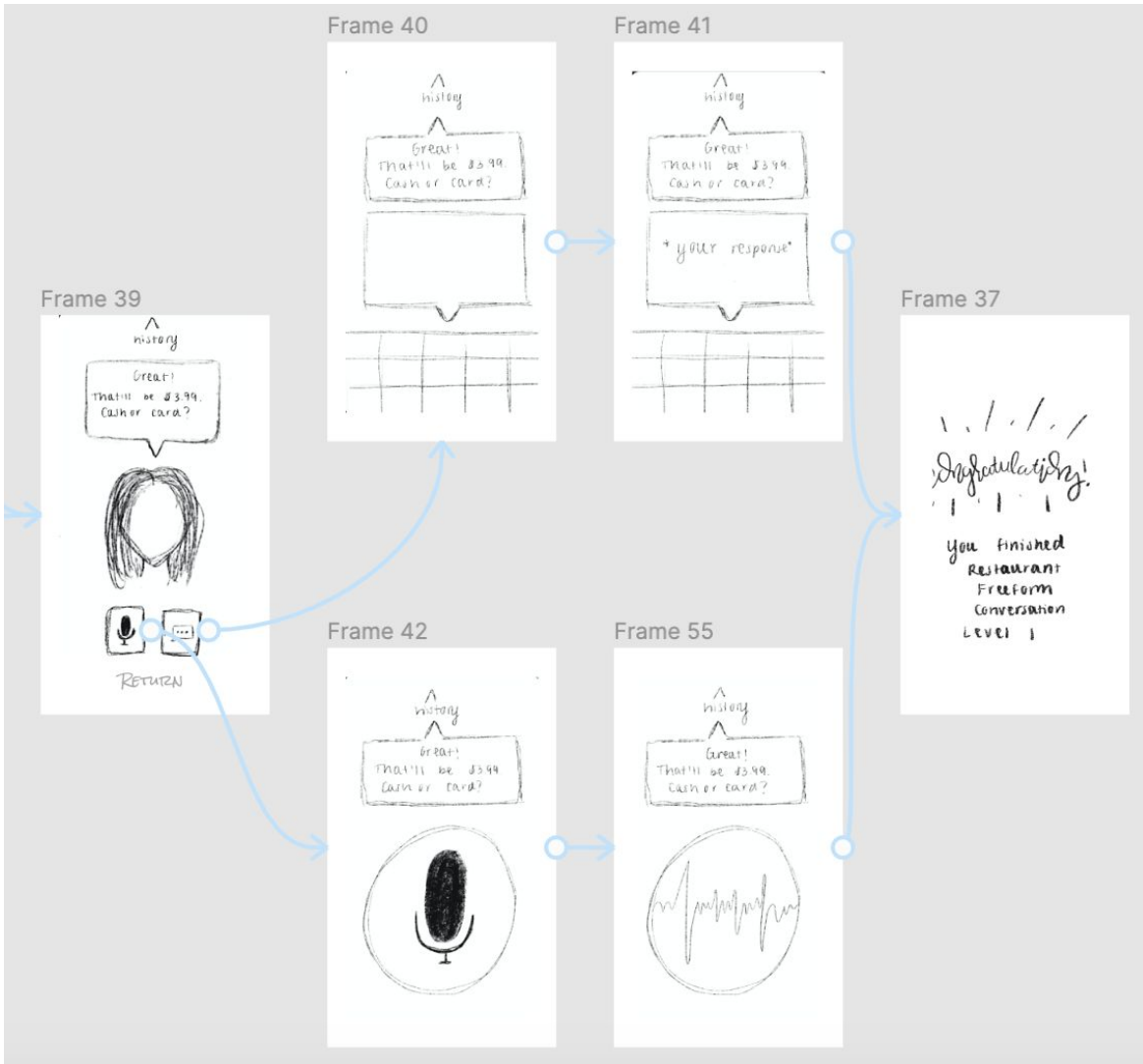


Figure 12. Freeform conversation task flow (part 2)

Frame 60



Frame 32

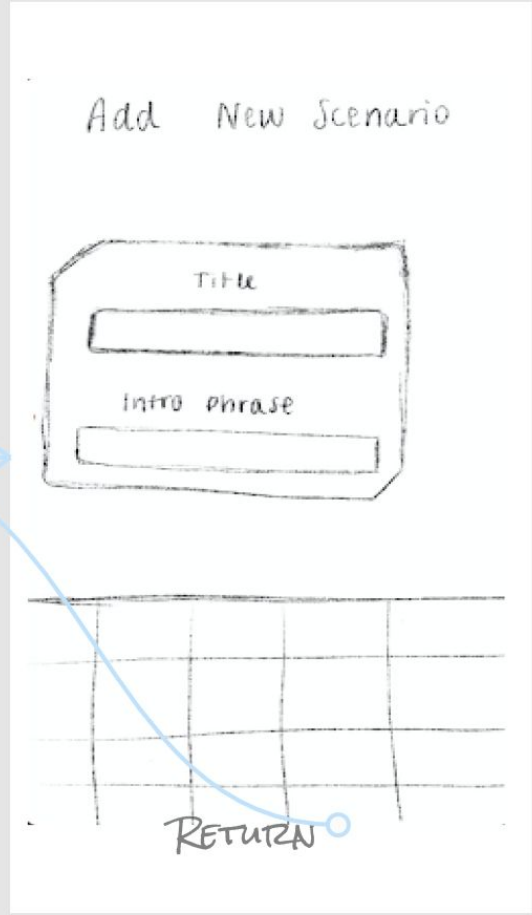


Figure 13. Contribute a freeform conversation scenario

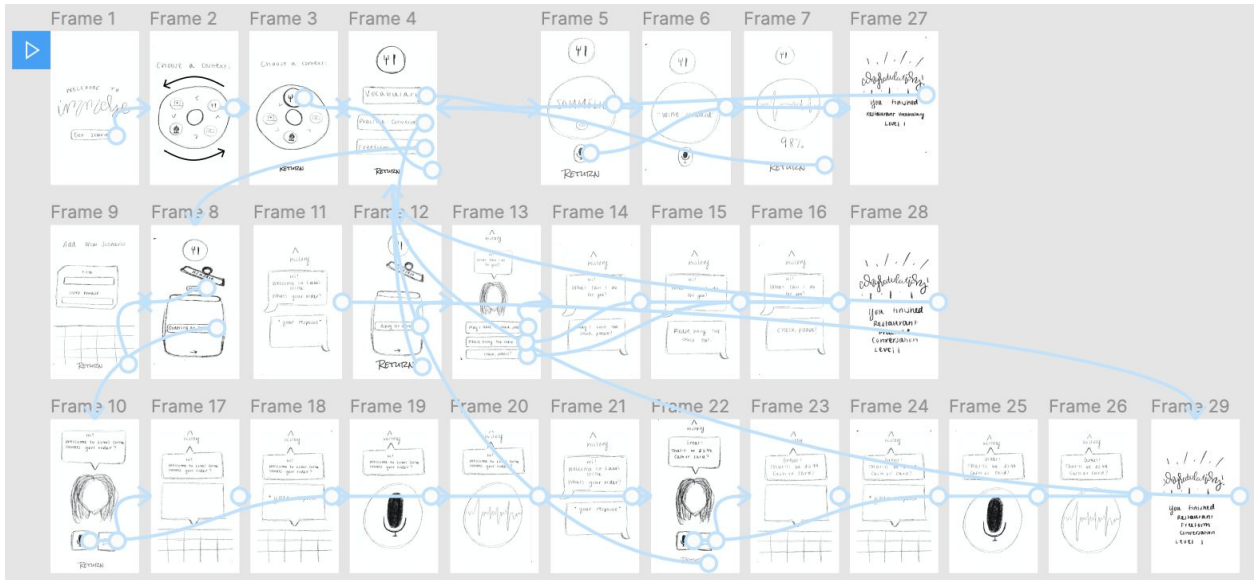


Figure 14. Entire low-fi prototype

TESTING METHODOLOGY

PARTICIPANTS

We interviewed:

- Esteban, 20s, engineer from Colombia (first language: Spanish)
- Jue, 50s, scientist from China (first language: Mandarin)
- Manav, 20s, student from India (first language: Hindi)

We selected these participants for their diversity of linguistic and cultural backgrounds, allowing us insight into their unique English-learning experiences. All participants are second-degree connections. Although participants did not receive explicit compensation due to remote constraints, we made sure to express our gratitude.

ENVIRONMENT

We conducted our tests over Zoom. Each participant interacted with our prototype via Figma while sharing their screen. This enabled us to track their progress with the prototype, as well as any verbal responses and facial expressions.

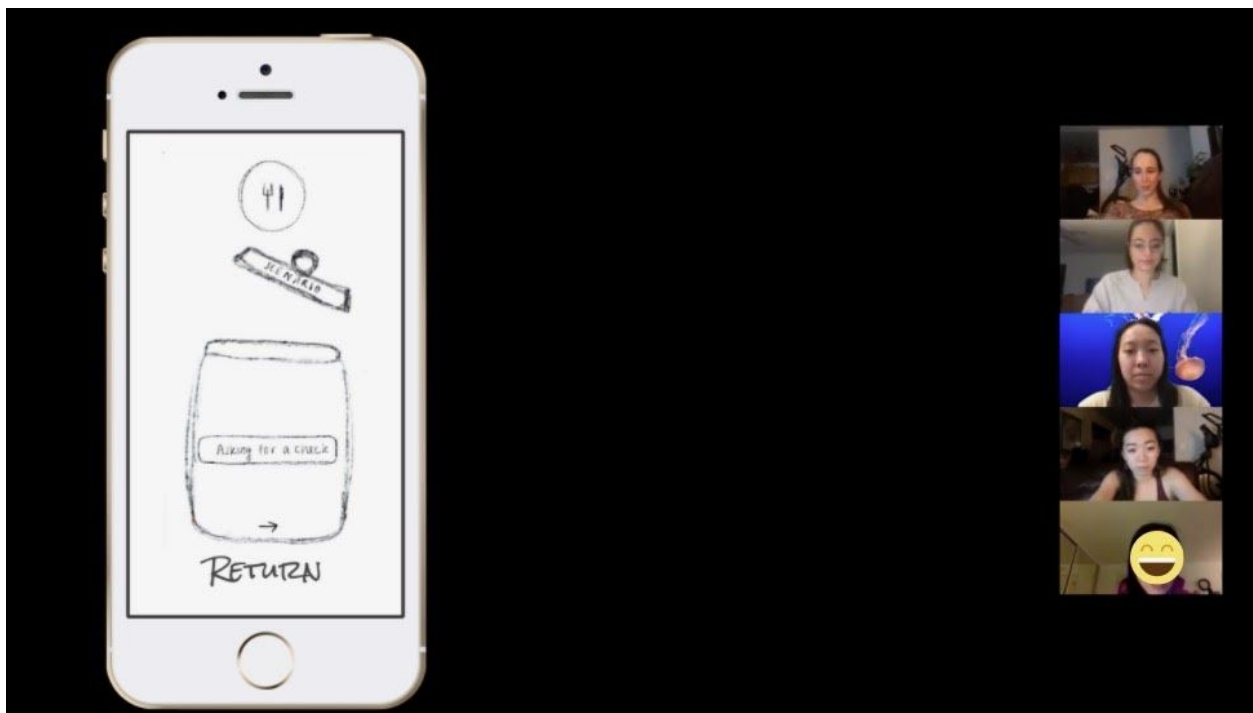


Figure 15. Testing environment on Zoom

TASKS

1. Simple: Allowing user to develop fundamental comprehension by practicing vocabulary
2. Medium: Allowing user to feel prepared for a real-world conversation by practicing with templated conversations based on common conversation patterns
3. Complex: Allowing user to apply theory to action by engaging in freeform conversations

PROCEDURE

1. Introduce ourselves and briefly preface the class and project.
2. Ask for consent to participate and record.
3. Briefly outline the experiment and Figma prototype. Ask the participant to screen share. Encourage speaking out loud as much as possible and emphasize that this is not a test.
4. Have the participant perform each task.
5. After all three tasks are completed, ask the participant for feedback on what they liked, what they didn't like, and anything else they want us to know.
6. Thank the participant for their time and participation.

TEST MEASURES

Successes:

- Tasks completed with ease
- Signs of understanding and pleasure

Errors:

- Signs of confusion and uncertainty
- Incorrect or unexpected actions

TEAM MEMBER ROLES

- Greeter: Cathy
- Facilitator: Andrea
- Computer: Becky
- Observer: Kimberly

RESULTS

We asked our participants to speak aloud as they progressed through the prototype, giving us a good sense for what was working versus what was not. The following is a summary of the feedback we received:

All three testers:

- ...felt confused by the navigation between screens
- ...were confused by our initial dial for selecting between contexts
- ...were confused by the responses options for templated conversations, noting uncertainty on whether all of the answers were valid responses

Two testers:

- ...felt that choosing between voice and text response was intuitive
- ...appreciated the design simplicity
- ...were confused by the difference between freeform and practice conversations
- ...were confused by the cookie jar

One tester:

- ...felt the vocabulary was too advanced
- ...wished there were an option for different dialects
- ...felt that viewing the chat history was confusing
- ...wished there were a way to incorporate streaks for consistent usage
- ...felt the vocabulary should be tested in order to track improvement
- ...appreciated having different scenarios to acclimate to challenging situations

DISCUSSION

Our low-fi prototype testing provided insights into the UI and functionality of our mobile app. For task one, testers mentioned confusion about the microphone button, differentiation between words versus definitions, and expectation of vocabulary tests. Solutions include use of color to differentiate words from definitions, help icons to provide clarification, and mini-tutorials for features.

For task two, testers commented on the cookie jar UI and options provided for the templated conversation. For the cookie jar, we could make scenario options shaped like cookies. While we only included one scenario in testing, adding more scenarios

would clarify how the jar is supposed to be a mix of various scenarios. Regarding templated conversation options, users wanted to practice scenarios multiple times, which suggests we could add a “try again” feature. Overall, there was positive feedback on the intuitive multiple-choice format.

For task three, participants questioned the difference between templated and freeform conversations. Due to Figma limitations, users couldn't interact directly with the keyboard and speech option (which was noted as less intuitive). To improve the speech option, we could display user responses after they're spoken to provide a response log history.

During post-testing reflections, one tester suggested a usage streak to incentivize people to consistently use the app. Another suggestion was to incorporate additional audio features so that participants can hear the words more often to gain increased exposure to proper pronunciation. A third suggestion was to add tests to reinforce new vocabulary.

In terms of design, testers appreciated the simple, intuitive interface. That said, a common point of confusion was the dial at the beginning. The small icons lacked labels, so participants struggled to identify the contexts. One participant suggested we modify the interface since dial interactivity is unclear and does not add functionality. Additional points identified by participants included consistency with return buttons, clarity of where to click on the “congratulations” screens, design of the cookie jar for picking scenarios, and audio interaction features.

Moving forward, we will consider implementing the following:

- Vocabulary tests for users to reinforce understanding and retention.
- Menu bar for consistent and streamlined navigation.
- Re-designed cookie jar for picking scenarios.
- Clarifying the validity of options provided in the templated conversations.
- Audio interactions with clearer access points.
- Continuing usage of a simple, clean design.

Note: With Figma, we faced limitations incorporating audio and speech components that we hope to include in our final product.

Word Count: 1370 words

APPENDIX

CRITICAL INCIDENT LOG

- 1 User progressed without hesitation
- 2 User hesitated or otherwise had to think about the next step
- 3 User had an issue progressing to the next step
- 4 User had to ask for help to progress
- 5 User could not progress

Participant One

Incident	Incident Log
Didn't understand the meaning of the icons in the dial	3
Didn't feel the vocabulary was fundamental	2
Didn't know how to return to the home screen from vocabulary	3
Selected a scenario from the cookie jar	1
Didn't understand the scenario submission option	4
Picked the shortest option for the templated conversation	1
Unsure if all answers to templated conversation are correct	2
Confused by purpose of vocabulary without any way of testing comprehension	2

Participant Two

Incident	Incident Log
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Didn't understand the meaning of the icons the dial	3
Expected sound when she touched the vocabulary card	2
Didn't know how to return to the home screen from vocabulary	3
Unsure if all answers to templated conversation are correct	2
Wanted to try the practice conversation twice to test a different response	2
Unsure of the difference between practice and freeform conversations	2

Participant Three

Incident	Incident Log
Didn't understand the meaning of the icons the dial	3
Confused about where to click on the three tasks screen	3
Felt "back" is a more apt navigation word than "return"	2
Unsure where to click for the keyboard	3
Easily navigated through cookie jar to selected scenario	1
Confused by lack of definitions paired with vocab words	2
Confused by option to add scenarios	2
Confused by history option, tried to swipe up	4

BLANK CONSENT FORM

Consent Form

This student team is interviewing and observing as part of the coursework for Computer Science course CS 147 at Stanford University. Participants provide data that is used to understand the possible opportunities of the design. Data may 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 Andrea Collins, Kim Tran, Becky Weinstein, and Cathy Zhang, or with Professor James Landay, the instructor of CS 147:

James A. Landay
CS Department
Stanford University
650-498-8215
landay at cs.stanford.edu

Participant anonymity will be maintained 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 research and my participation in it. I give my consent to have data collected on my behavior and opinions in relation to the team's research. I also give permission for images or audio/video recordings of me being interviewed to be used in presentations or publications, as long as I am not personally identifiable in the images/video. I understand that I may withdraw my permission at any time.

Name _____

Participant Number _____

Date _____

Signature _____

Witness name _____

Witness signature _____