Sprite

Low-fi Prototyping & Pilot Usability Testing

CS 147 Fall 2018

Julea C, Clara K, Amanda S, Chloe T

Introduction:

Value Proposition:

Bring your smart home device to life.

Mission Statement:

Make interacting with a smart home device engaging and fun.

Problem/Solution Overview:

Smart home device owners rarely take advantage of their smart home device's full capabilities. Sprite is an app that personifies your smart home device, making it easier and more engaging to use your device. Your Sprite depends on you, fostering a sense of responsibility and creating a relationship between you and your device.

Sketches

Initial Design Directions

We brainstormed 6 different design directions, centering around mobile apps, desktop applications, and physical transformations.

Figure 1. Smart Home Device Projector of Emotion.

Figure 2. Family Activity Feed

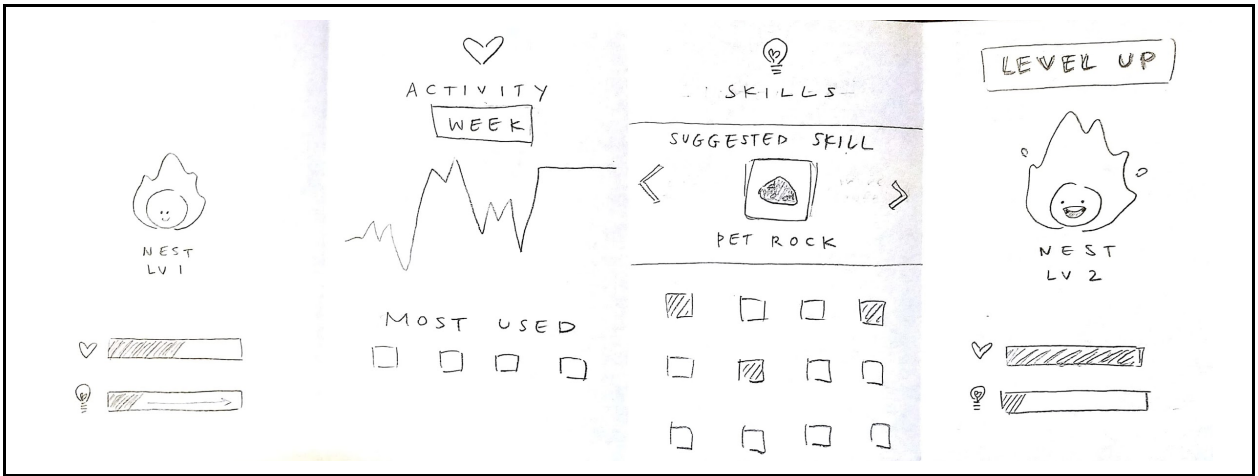


Figure 3. Phone app activity usage monitor.

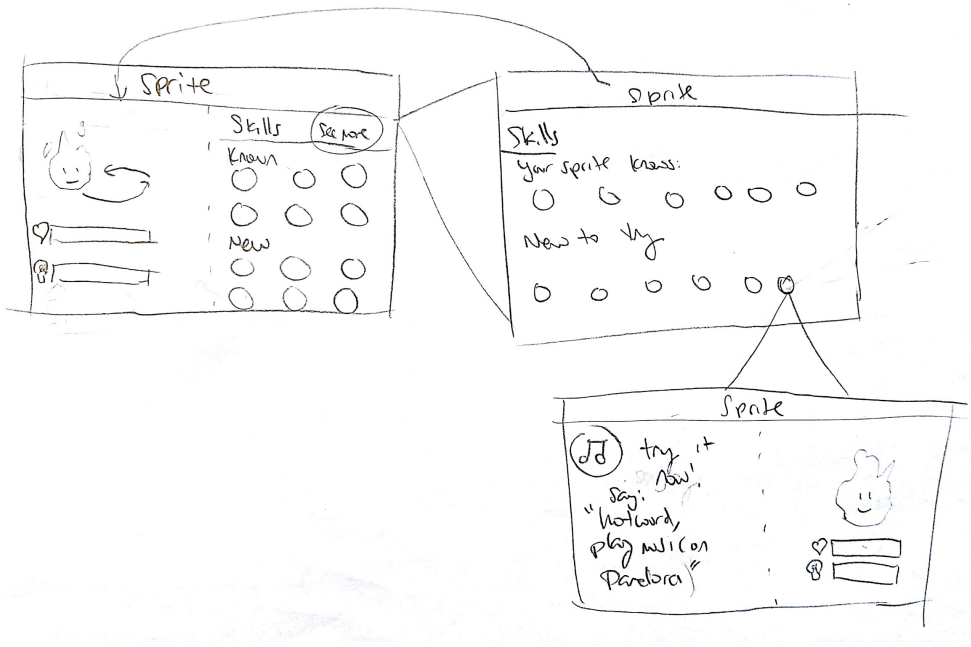


Figure 4. Sprite desktop website.

Figure 5. Voice push notifications of emotion.

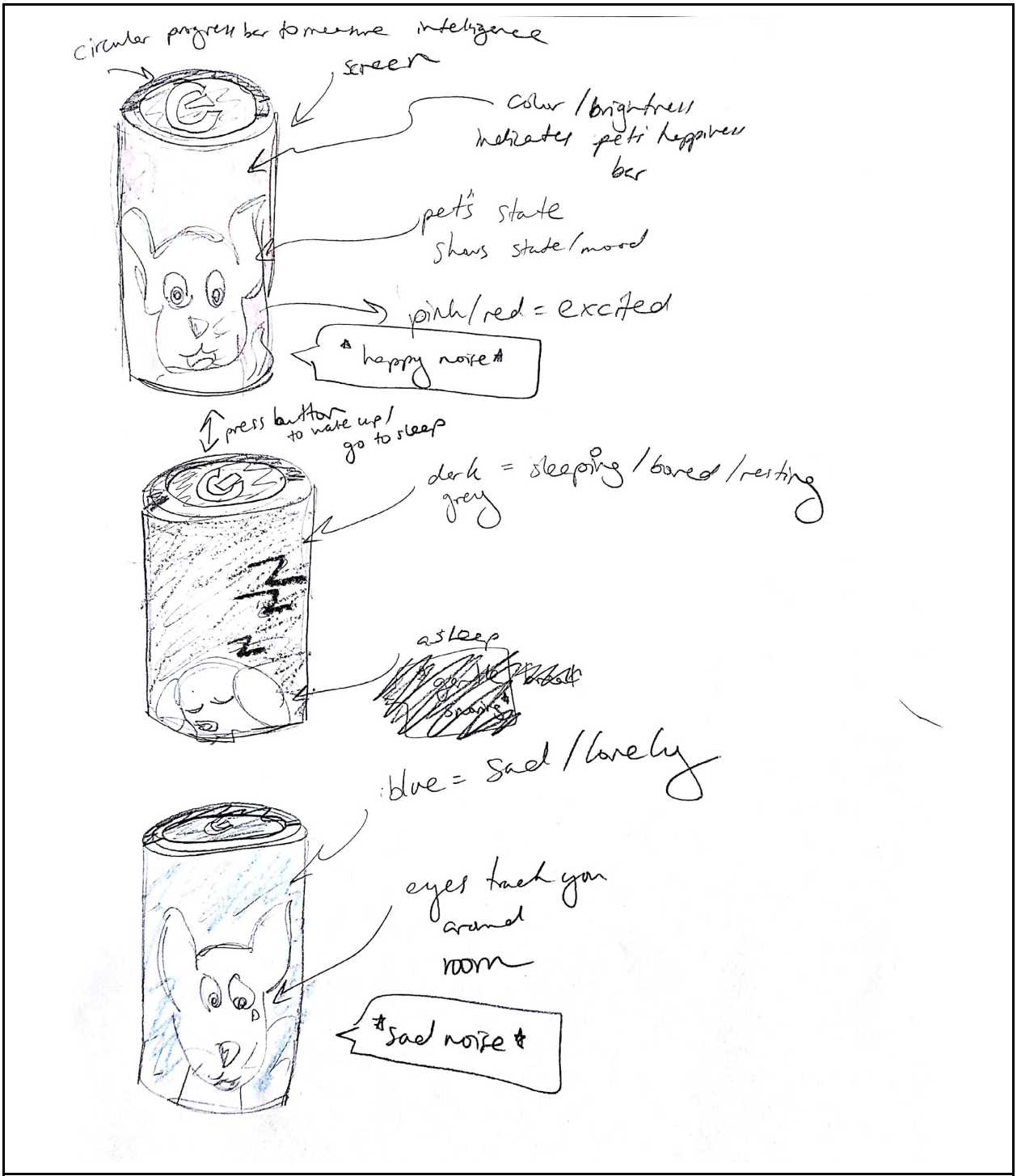


Figure 6. Device emotion display on outside screen of device.

Top 2 Designs with Further Storyboarding

We decided to move forward with our speech-based UI idea and our mobile app idea.

Design 1:

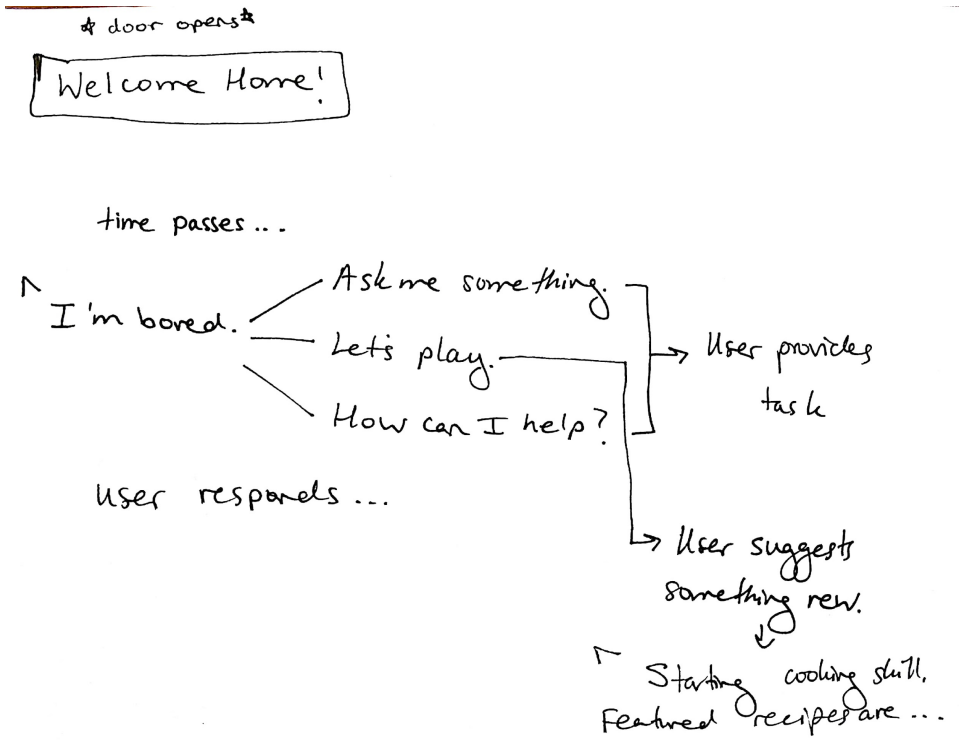


Figure 7. Speech-Based UI.

Pros	Cons
• All integrated - don't have to add another service • More responsive - more likely to facilitate interaction • Lower barrier to interaction • Intuitive verbal feedback - interpret tone of voice naturally	• Jarring - interrupts daily activity • Tricky timing to get right • Potentially creepy rather than cute • No visual feedback • Lack of team interest

Design 2:

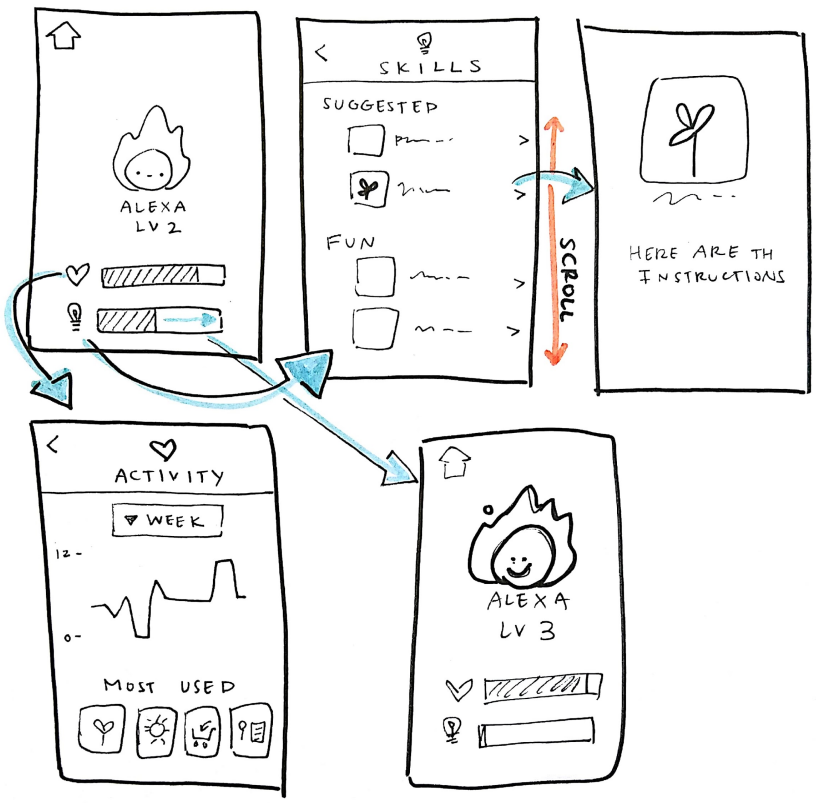


Figure 8. Mobile App.

Pros	Cons
• Visual character elicits empathy • More information - representation of all possible skills • Activity tracking easily available • Progress bar motivating • Sense of responsibility • More customization options	• Depends on user to check app • Not built-in, must be setup • Longer setup time • Possibly annoying - another thing to take care of

Selected Interface Design

Rationale

We were ultimately more excited by the mobile app UI and decided to move forward with developing it. We felt that the mobile app was more innovative and would be more likely to elicit an emotional response from the user than the pure speech UI. We also thought that it would be more engaging for the user to be able to visually track their progress and to customize their Sprite.

Task Storyboards:

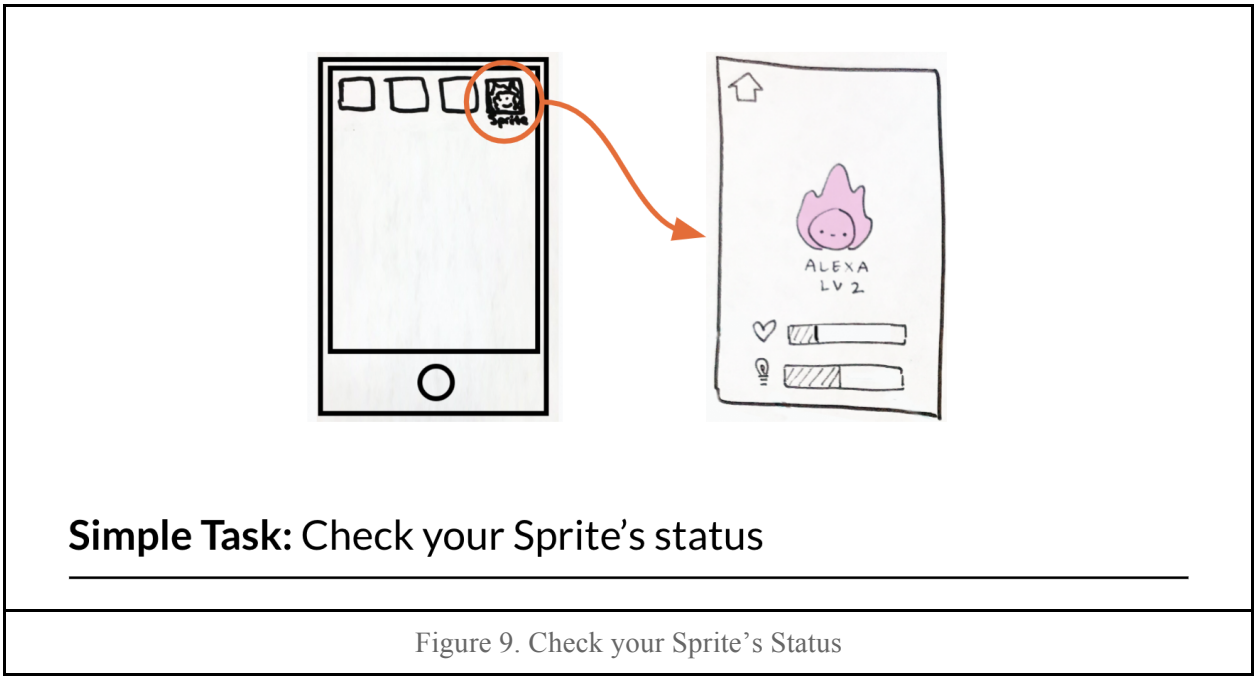
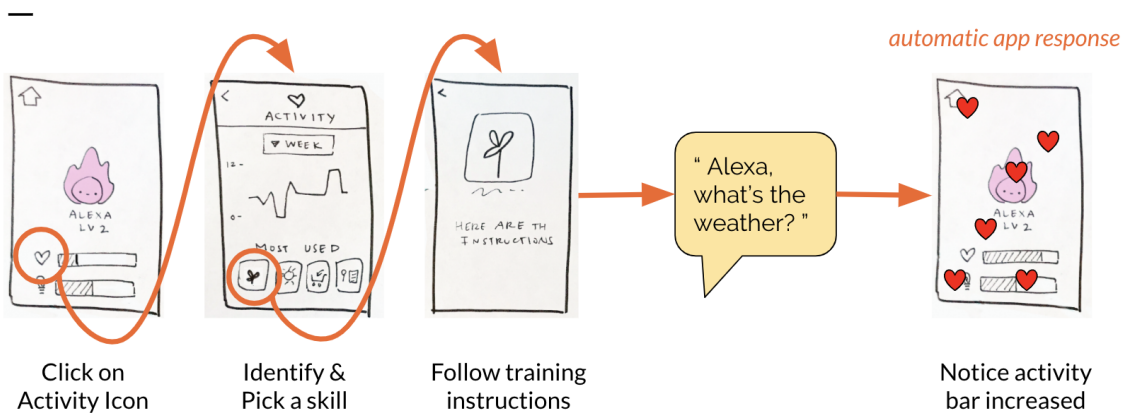
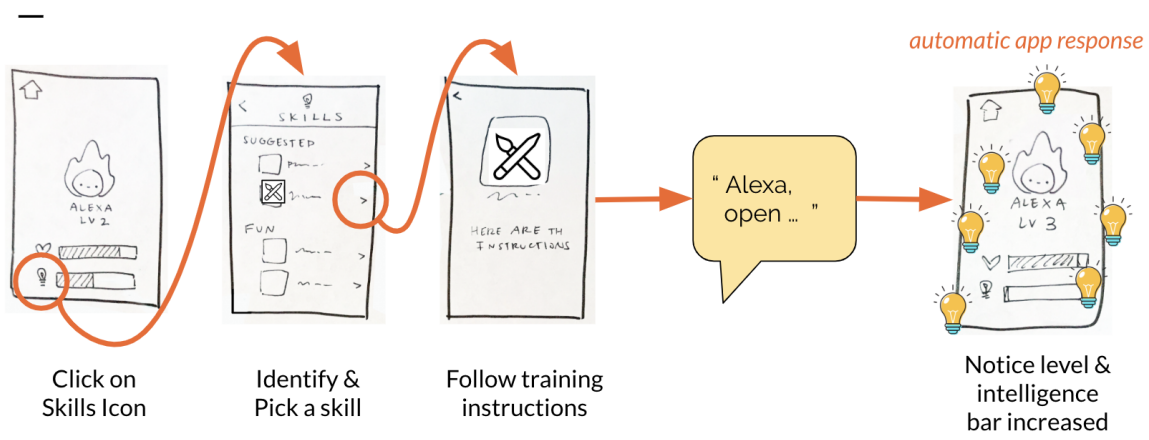


Figure 9. Check your Sprite's Status



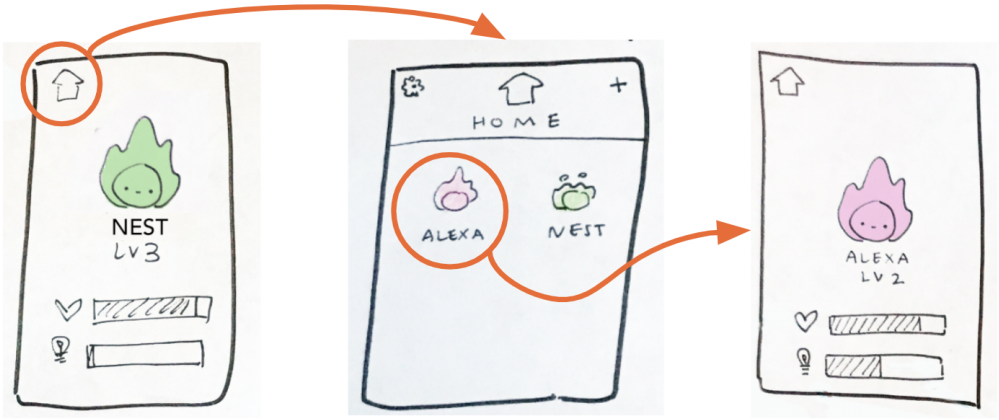
Moderate Task: Find and select a skill you already know

Figure 10. Find and select a skill you already know.



Complex Task: Discover and try a new skill

Figure 11. Discover and try a new skill.



Moderate Task: Toggle between smart home devices.

Figure 12. Toggle between smart home devices.

Low Fidelity Prototype

We created a paper prototype on top of a foam phone mock-up. We drew screens on sheets of paper, and used color/boxes to denote buttons.

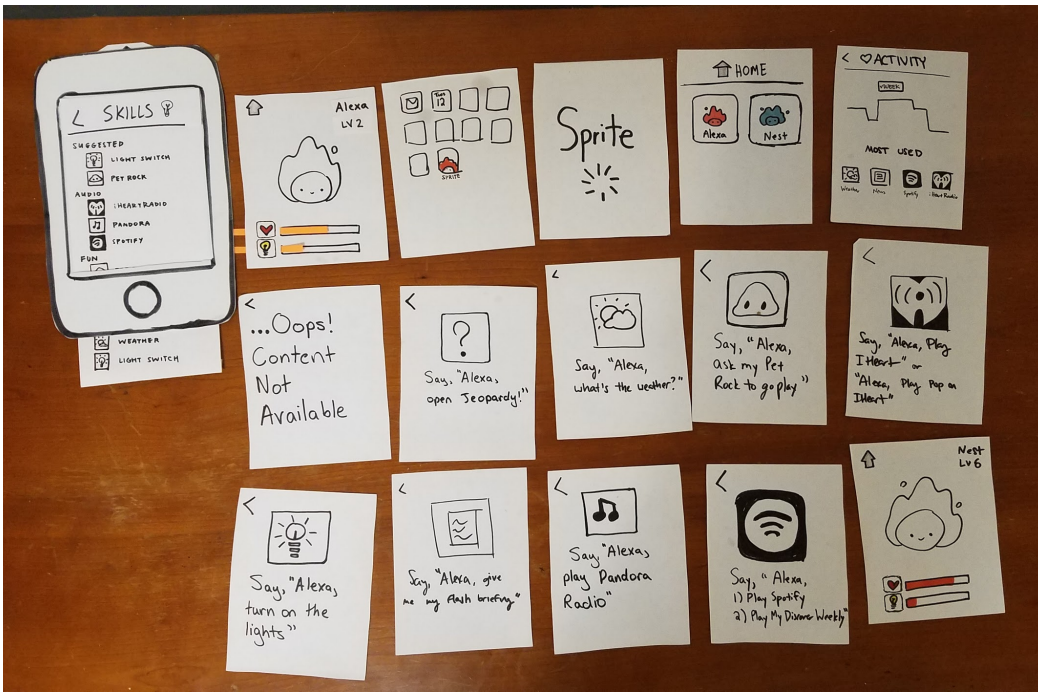


Figure 13. All screens of paper prototype.

Interface Element	Functionality
Home Button	Brings user back to home screen, where all connected smart home device Sprites are
Sprite “pet”	Shows the happiness of your Sprite based off its facial expression.
Heart Button	Button that leads user to the activity feed.
Heart Progress Bar	Progress bar that shows the user their Sprite’s activity level.
Activity Screen	Screen shows the user how much they’ve interacted with your Sprite this week, month, etc. Also shows the user the icons of their top used “skills”.

Light Bulb Button	Button that leads user to the Skills screen.
Light Bulb Progress Bar	Progress bar that shows the user their Sprite's knowledge level.
Skills Screen	Skill list with skills will be divided into categories like "Suggested", "Audio", "Fun", and "Lifestyle"
Any skills icon	Prompts user to say a specific phrase to their smart home device to achieve that specific function.

Images:

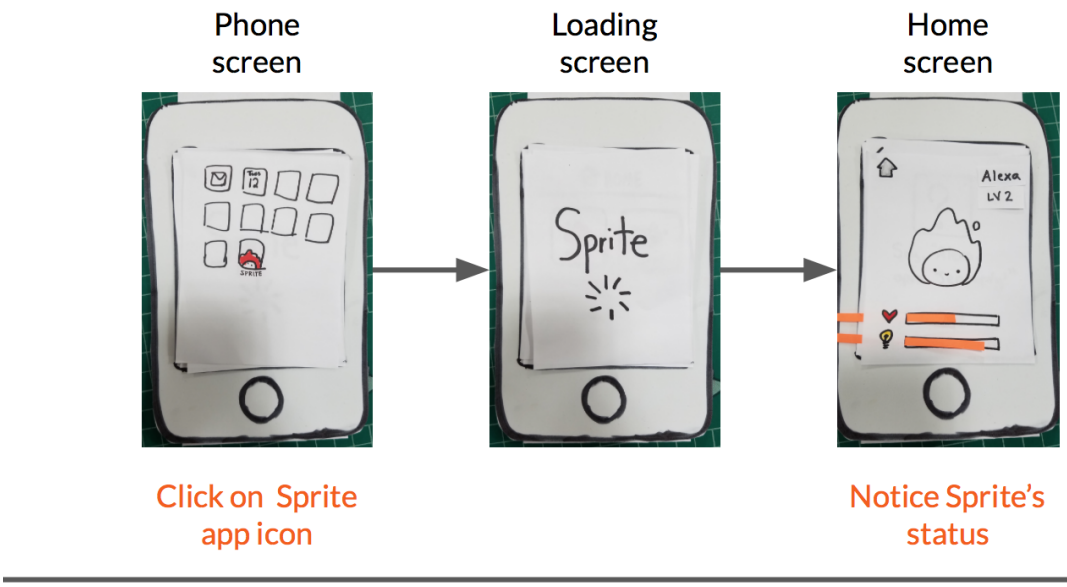


Figure 14. Welcome to Sprite. Check your Sprite's status.

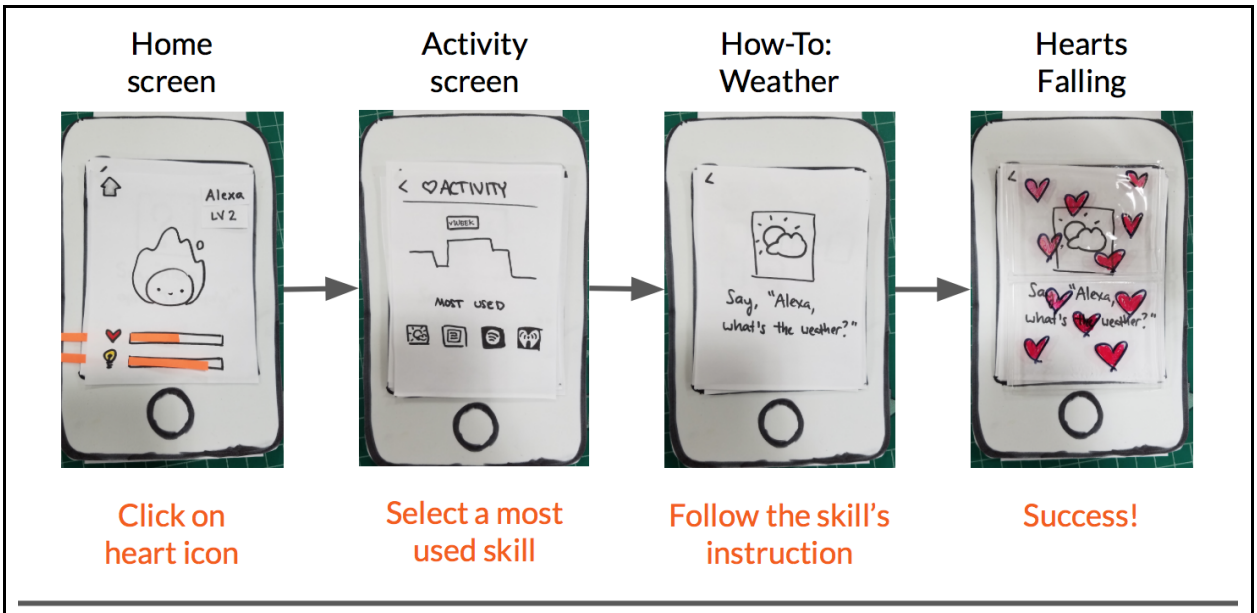


Figure 15. Find and use a skill you already know.

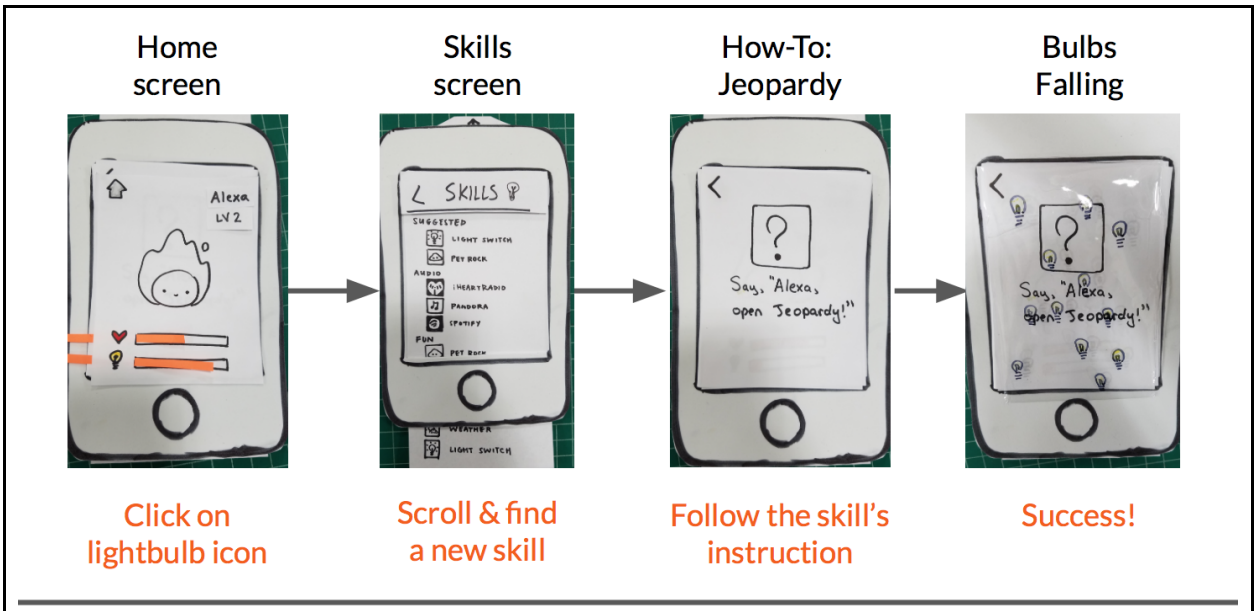


Figure 16. Discover and try a new skill.

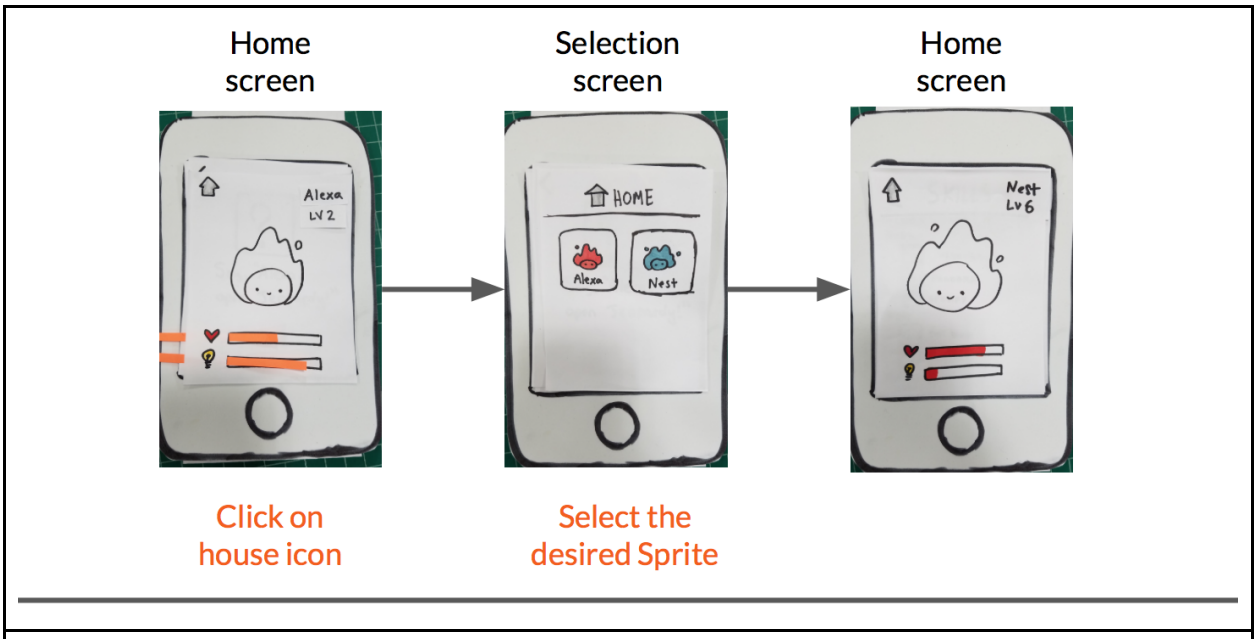


Figure 17. Toggle between smart home devices.

Usability Testing Method:

Participants + Environment:

We recruited a variety of participants. We found one ideal user, an Australian anesthesiologist, who owned multiple smart home devices, but never used the devices. We also found one user, a recent graduate in robotics, who had used a friend's smart home devices, but didn't own one himself. Lastly, we also tested on two people, a female undergraduate and a European visitor, who were not familiar with smart home devices, to see how intuitive solely the app is.

We conducted our testing in Tressider Union and the Stanford Bookstore.

Tasks:

1. **Simple:** Check on your smart home device.
2. **Moderate:** Find your most used skill.
3. **Moderate:** Use a skill that you already know.
4. **Complex:** Try teaching the skill Jeopardy.
5. **Complex:** Switch to your Nest Sprite.

Procedures:

We began by asking participants whether they have a smart home device, and if not, whether they've ever interacted with one. We also asked them what brought them to Stanford that day, as a proxy for discovering if they were a student, faculty/staff, or visitor. We then gave participants an overview of our idea, and explained the situation and context they were in using the app. We asked participants to complete 5 tasks, and recorded their behavior, shown in the incident log found in the appendix. Afterwards, we thanked our participants, and answered any remaining questions they had.

Test Measures:

We wanted to measure successes and confusion to find the pain points of our interface. Successes helped us identify where the core components of our project would be most useful, and confusion helped us determine what components and language need to be simplified and clarified.

Team Member Roles:

- Greeter / Facilitator: Amanda
- Computer: Chloe
- Alexa/Notetaker: Clara

Results:

With each participant we gained more valuable information about how to improve our interface.

- 3 testers struggled with heart and lightbulb icons as pressable
    - Even when we added a box around them to make them recognizable as icons
- 3 testers accessed “home” screen when unnecessary for task
- “Skill” is a confusing word for anyone who has not interacted with an Alexa before, had to explain concept to 2 testers
- Voice interaction connection is intuitive
- 2 users attempted to click on Sprite character itself, for which we had no interaction
- Context and tasks in conflict - your “most used” skill is irrelevant if you have not used the app, switched to a “your friend handed you this app” context for simplicity
- Activity graph has enigmatic meaning, 2 participants were confused on its relevance
- 1 tester had an immediate emotional response, called character “boy” and attributed emotion to it
- Ranking of most used skills was a barrier to understanding
- Skills screen with labels and scrolling tested okay
- 1 tester bypassed skill learning task flow by using only voice interactions

Discussion:

We discovered that the design had many issues, but users were able to grasp the concept of the app quickly and navigate through some tasks easily.

The largest areas for improvement are adding functionality to the Sprite figure and making the purpose of the heart and lightbulb buttons more clear. All users were confused about the purpose of the icons, and several didn't recognize them as buttons at first glance. Several attempted to click on the Sprite figure, with no success. This slowed down the user from completing their tasks and made them confused. We plan to make the Sprite figure expressive so that you can see how it's feeling at a glance. Thus, it may be helpful to make the main screen of the app more intuitive by changing the button designs to clearly represent the actions that they allow you to accomplish.

We also received some positive feedback that indicated that our project purpose is still valid. Each participant expressed an understanding of the purpose behind the project without a complete explanation of our concept. Participant 4 additionally expressed an agreement with our identification of the problem, mentioning several friends with smart home devices (sometimes multiple) who rarely use them, save for music or weather.

During the testing, each participant that accessed the “skills” screen successfully completed the complex task without issue. Participant 2 also expressed curiosity about new skills from this screen. The voice interaction portion of the skill instruction was intuitive, and no participant failed this step. Participant 3 expressed interest in the idea of “leveling up” and was enthused by the Nest sprite’s higher skill level. The “home” button interaction and the task of switching sprites was easily accomplished by each participant, who intuitively understood that they needed to go “back” to change characters. Participant 3 additionally attempted a swiping gesture to change characters—a feature we plan to incorporate.

We realized that we may need to ensure that our app isn't perceived as creepy, and to clarify to users the benefits of interacting with their smart home device.

One limitation we faced was the lack of an actual smart home device. Since we were interviewing people around campus, we had one of our team members act as the device. It's possible that people interacted with the team member differently than they would have with a physical device.

Appendix:

Word Count: 1467

Testing Script:

Hi! Thank you for taking part in our study. We're students taking a human computer interaction class at Stanford, and are testing a companion app named Sprite, for a smart home device such as a Google Home, an Alexa, or a Nest. As you test our app, we'd like you to participate in the "talk aloud" process, where you say everything you're thinking as you perform actions.

For this scenario, imagine that your friend Julea has been using the Sprite app with her Alexa. Clara will represent the Alexa for this experience. You're trying to figure out how the Sprite app works, and you're welcome to tap, swipe, or scroll anywhere on the screen. There are no wrong answers, we're just trying to learn how people interact with our app.

To start off, your first task is:

1. **Simple:** Check on your smart home device.

The heart button shows your Sprite's happiness level and the lightbulb shows your Sprite's knowledge level.

2. **Moderate:** Find one of Julea's most used skills
3. **Moderate:** Use a skill that Julea already knows.
4. **Complex:** Try teaching the skill Jeopardy to the Sprite.
5. **Complex:** Switch to your Nest Sprite.

That's the end! Thank you so much for participating, and feel free to contact us if you have any more questions.

Critical Incidents Log:

Red text denotes errors (4 = usability catastrophe), green text denotes successes (0 = no problem)

Participant 1

Incident	Severity Rating
"Most used skill? I don't know... I don't see just one skill" held up on home screen	2
Pressed home and switched to Nest sprite while searching for most used skill	3
"Level 6, but lower" Identified Nest's knowledge level, but confused that the knowledge bar was lower than that of the Alexa (with level 2)	2
"Alexa is the most used skill?" Confused skills with format	4
Returned to iPhone home screen in search of most used skills, attempted to press calendar app in the interest of looking back in time	2
Realized "heart" was a measure of happiness when seeing the increase, "Ah!" reaction	0
Blocked by "ranking" of Most Used Skills, left-right or right-left, picked leftmost	2
Read instruction text, then spoke it aloud	0
Framed as training device, when hearing about third task, "New to device, not to me?"	0
Identified "Thermostat" as "new" skill	4
"I look at the screen, none of these are jeopardy" then "I need to install something, but no such option"	2
Back button first choice when identified a dead end on "home" (both sprites) screen	0
"Last thing to try" pressed lightbulb in search of new skills	0
Scrolled intuitively on skills screen	0

“Ah, got more skills-light” reaction to knowledge bar increase	0
Activity graph confusing, ask if it lined up one to one with Most Used Skills	1
Understood voice interaction as connected to app use	0

Participant 2

Incident	Severity Rating
Tapped sprite looking for most used skills (not a button)	4
Tapped lightbulb next looking for most used skills (instead of heart)	3
Thought most used was the same as suggested skills	2
Said “Neither lightbulb nor heart would be helpful” for first task	2
Thought that the app seemed creepy	1
intuitively understood that she needed to talk to Alexa	0
understood that the purpose was to increase your interaction with your smart home device	0
back button intuitive	0

Participant 3

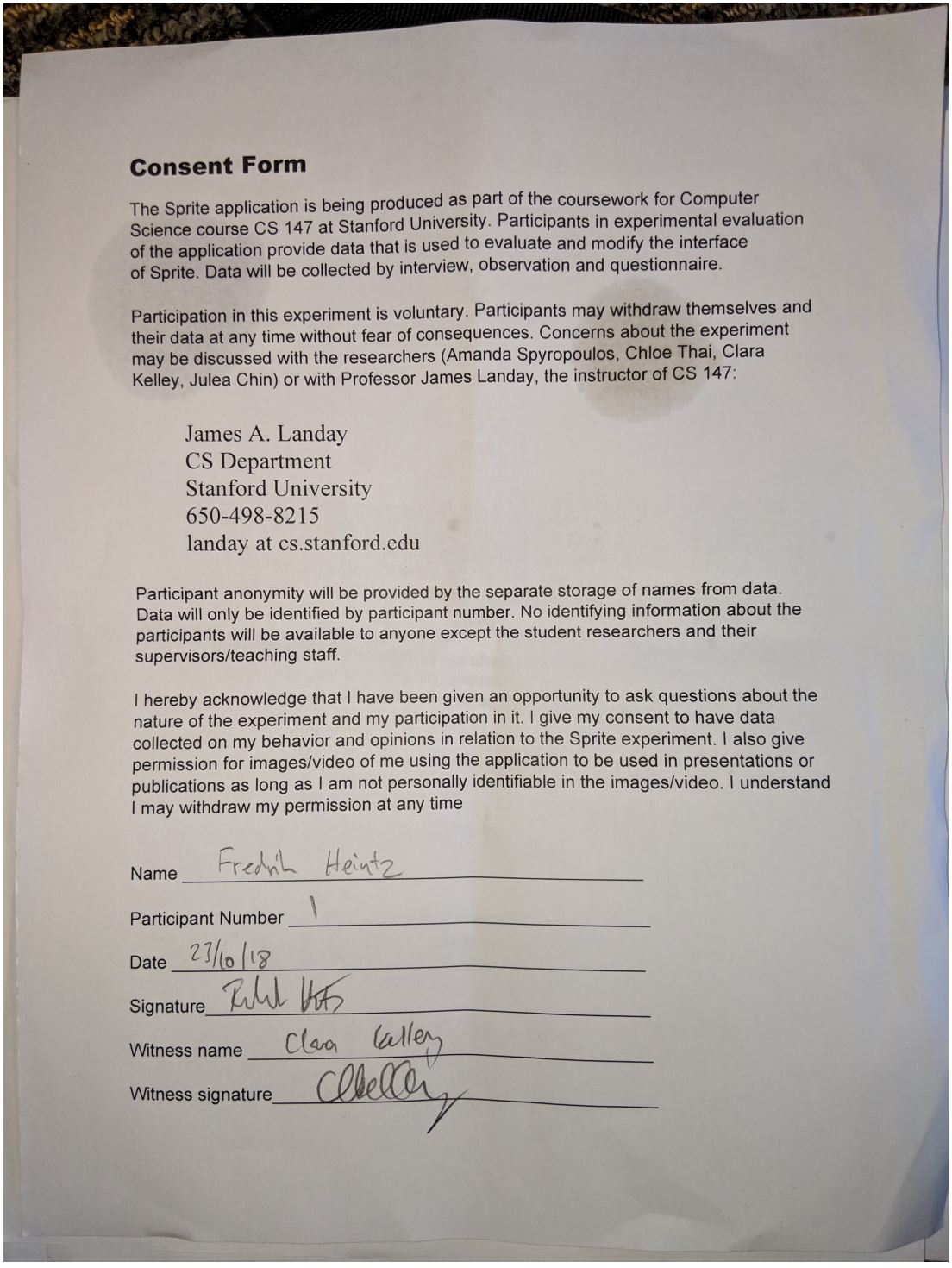
Incident	Severity Rating
“Cute icon” immediately when looking at home screen	0

Understood the “pet” Alexa concept immediately	0
“It’s okay boy” when noticing that Sprite looked unhappy	0
Understood the heart icon as activity and lightbulb icon as knowledge	0
“Cool! I can level up”	0
Tried to swipe to switch from Alexa to Nest	2
Home button looks like a shift key	1

Participant 4

Incident	Severity Rating
“My Sprite doesn’t have much activity or knowledge” after progress bar explanation	0
Went to home button to look for most used skill	4
Kept switching to Nest when trying to find most used skill	4
“Turn lights off” tried teaching Nest new skills, instead of Alexa	4
“I don’t know how to find tasks or skills”	4
“What is level 2”	3
“Are there bars related to activity?” while referring to the activity graph	1
Spoke aloud first command, waited for speech to stop, and read aloud second command (spotify)	0
Reflexively pressed home at start of task	1
Skipped knowledge interaction and completed task without traversing app (voice shortcut)	0

Consent Forms:



Consent Form

The Sprite 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 Sprite. 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 (Amanda Spyropoulos, Chloe Thai, Clara Kelley, Julea Chin) 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 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 Sprite 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 Fredrik Heintz

Participant Number 1

Date 23/10/18

Signature

Witness name Clara Kelley

Witness signature

Consent Form

The Sprite 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 Sprite. 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 (Amanda Spyropoulos, Chloe Thai, Clara Kelley, Julea Chin) 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 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 Sprite 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 Emma Grover

Participant Number 2

Date 10/23/18

Signature E Grover

Witness name Clara Kelley

Witness signature C Kelley

Consent Form

The Sprite 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 Sprite. 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 (Amanda Spyropoulos, Chloe Thai, Clara Kelley, Julea Chin) 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 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 Sprite 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 Max

Participant Number 3

Date 10/23/18

Signature

Witness name Clara Kelley

Witness signature

Consent Form

The Sprite 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 Sprite. 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 (Amanda Spyropoulos, Chloe Thai, Clara Kelley, Julea Chin) 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 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 Sprite 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 JM Denton.

Participant Number 4

Date 10/23/2018.

Signature

Witness name Clara Kelley

Witness signature Ckelley