



Augmented Reality Mobile App

Interaction Design

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Executive Summary

Our initial high-level goal for this project was to design a product that would help create a sense of community between people, including those whom had never met before. We performed several rounds of ideation and brainstorming to arrive at our final concept for “pARk,” an augmented reality smartphone game to be played in public parks.

At the onset of our project, we used several types of research methods to better understand the factors involved in our concept. We performed a survey of potential users to learn more about what causes people to feel a sense of community, to obtain feedback on general issues with multiplayer games, and to gather initial impressions of our concept of interacting with strangers in public parks.

We also reviewed relevant literature to understand if and how video games can have a positive social impact on people so we could better understand what factors to consider when designing our game. We also performed market research, including a competitive analysis of other augmented reality and/or multiplayer smartphone games, to better understand the current market landscape.

While we spent some time on the initial research, the bulk of our project was spent on prototyping and user testing. We developed low-fidelity wireframes that enabled us to test the concept of playing an augmented reality game in a public park and demonstrate the potential for interacting with strangers. Based on user feedback, we iterated on the designs to create mid-fidelity and high-fidelity prototypes that we then tested using *UserTesting.com*.

The high-level concept for our game involves:

- The ability for players to build their own communities in augmented reality
- Gameplay being limited to dedicated spaces in public parks to encourage players meeting and engaging with each other
- Players using their existing Bitmojis or being able to create an avatar to have a representation of themselves in the game
- The ability to virtually “friend” other people and help each other with tasks to build a sense of community
- Advancement through the game (i.e. increased abilities, skills, resources, and challenges) to be based on a player’s willingness to help others
- Players defending their community from outside threats (i.e. dragons) rather than a competitive environment against other users.

Our final user testing indicated that while we may have some small design issues to address, people seemed intrigued by the storyline and augmented reality concept.

Initial Concepting

Our initial goal for the project was to create a product that would create a sense of community across diverse groups of people. We originally considered submitting a project for the student design competition at the 2018 Conference on Human Factors in Computing Systems (CHI), which required a project submission focused on “engaging communities.” This was a broad concept that

we narrowed down to our final idea through a series of brainstorming exercises. In our first meeting as a group, we wrote down the many words that came to mind when we thought of the word “community.” See a word cloud of our brainstorming in Figure 1a below.

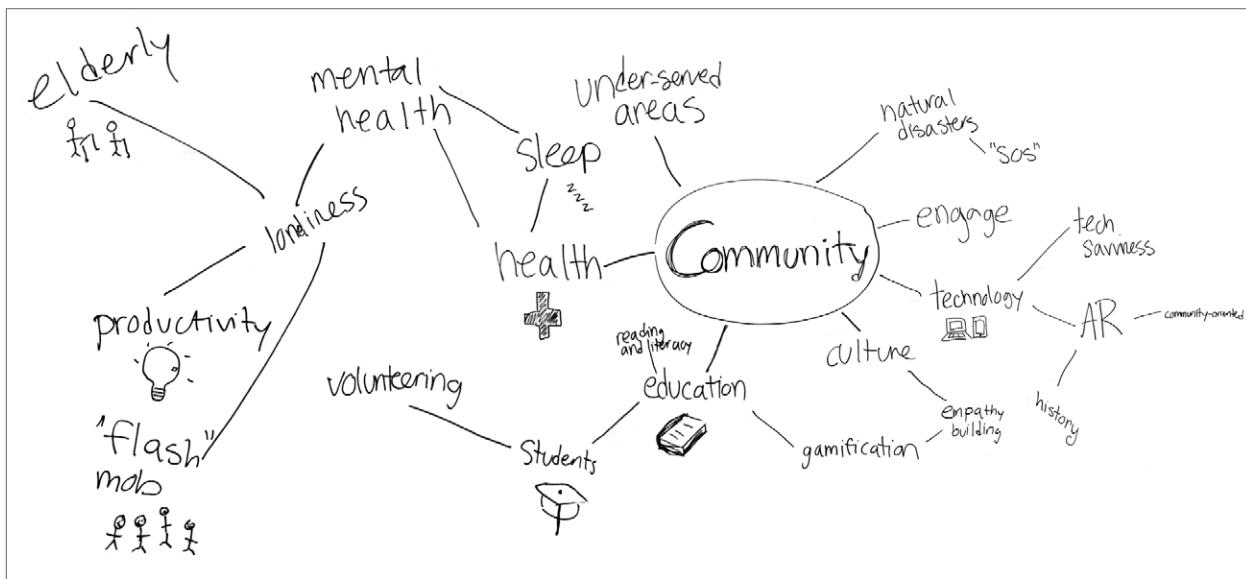


Figure 1a. Word cloud from group brainstorming session on October 10, 2017

Initial Concepting continued

Once we had identified and discussed a wide range of areas relating to community, our group performed two rounds of individual “Crazy 8s” brainstorming exercises where we each sketched out eight project ideas related to community. After the second round of

individual brainstorming, we posted our ideas on a whiteboard and voted for our favorites (see Figure 1b below). We combined several of the favorite ideas into one general concept, which was an augmented reality game to bring individuals together in physical spaces.

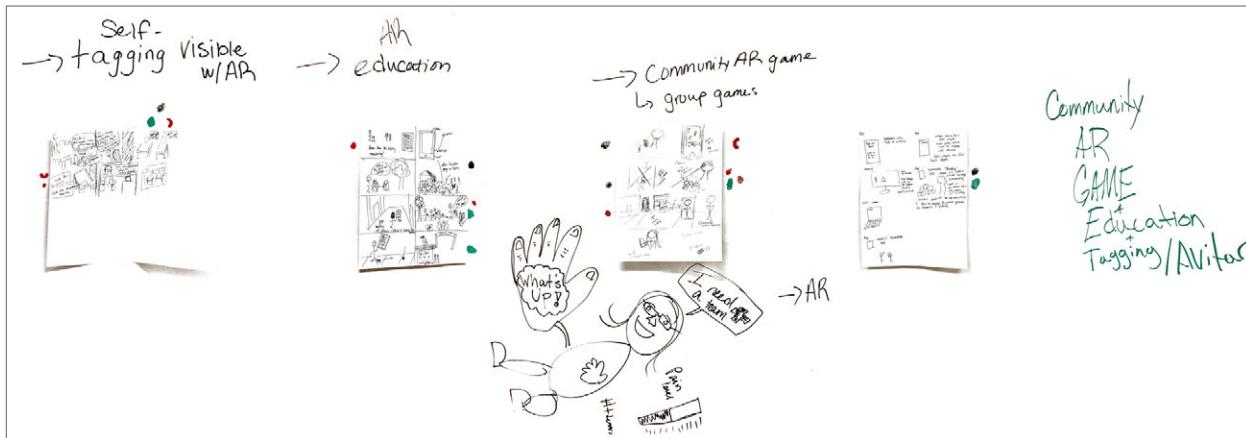


Figure 1b. Initial ideation whiteboard sketches and concept votes

We continued to develop and refine our initial idea in following worksessions. While video games are known for creating a sense of community in virtual spaces, we wanted to use an augmented reality smartphone game to bring people together in public spaces to collaborate and work toward common goals. Other augmented reality games such as PokéMon GO have encouraged players to venture out of their homes to play the game. We aimed to improve upon that concept by bringing players together in safe, dedicated

game spaces. We determined public parks would provide ideal locations for the setting of our game for the following reasons:

- They already function as centers of community and spaces for public use
- They are intended as safe spaces for children
- They are located near most city-dwellers (approximately 70% live within a 10 minute walk of a park)¹

¹ “The 2017 City Park Facts Report.” *The Trust for Public Lands*

Initial Concepting continued

In addition to determining the setting of the game, we needed to determine the general types of tasks and goals that the game would focus on. We wanted to create a sense of community among strangers while also ensuring individuals could feel a sense of ownership and agency over their gameplay. We wanted players to be able to work together but also not have to entirely rely on others to advance in the game.

Initially, we thought users would collaborate in building an augmented reality community (i.e. a virtual town) together. This community would be limited to the confines of a public park, and anyone would be able to enter and build in the community. We ended up changing this concept for several reasons. First, players who initially created their own communities may become frustrated with

other players who enter their worlds and take actions that go against the initial players' wishes. They could limit a player's sense of ownership and agency within the game. Instead, we decided to allow players to maintain full control over their own worlds, but still be able to virtually "friend" other people in the park to get their help with game-related tasks. Additionally, players could advance in the game by helping other players in some way (i.e. allowing their avatar to enter the world of another player and help the second player with tasks).

The logistics of the interactions between players was one of the most challenging aspects of the game we had to deal with and has continued to evolve throughout the various stages of our project.

User and Market Research

To further examine the viability of our concept, we performed a user survey, reviewed relevant literature, and performed a competitive analysis.

Survey

There were several aspects of our concept that we wanted to test through a survey of potential users. Here are our main research questions:

- What activities make people feel like they are part of a community?
- What aspects of multiplayer games do players like and dislike?
- How do people feel about the idea of interacting with strangers to play a game in a local park?

Due to time and resource limitations, we used a convenience sample of students at the School of Information at the University of Texas at Austin. Since our goal was to create a sense of community among diverse groups of people, we hoped to attract people new to multiplayer and/or augmented reality games. We did not want to limit our research to only those who already engage in those games. Additionally, we examined the demographics of Pokémon GO players, which indicated

that while almost half of players are between the ages of 18 and 29, the majority of the remaining players are almost evenly distributed between the ages of 13 to 17 and the ages of 30 to 50.² This data suggests that the game has appealed to a wide range of people, so we did not want to limit our research to any specific age ranges.

Our survey, (see Figures 2a and 2b on page 29-30 of the appendix), first asked participants to describe what activities make them feel like they are part of a community. While not everyone responded to this open-ended question, the over 25% of those that did, mentioned parks, meeting and interacting with people, or playing games. Statistically significant conclusions can not be drawn from our survey given that our sample size was limited to the 44 respondents who completed the survey. However, these responses reassured us that our concept was relevant for creating a sense of community.

² Mac, Ryan (2016). "More Women Than Men Are Playing 'Pokémon GO'--By A Lot." *Forbes*

Survey continued

After asking respondents if they enjoyed playing multiplayer games, the survey asked what they liked specifically about playing multiplayer games. Based on the 28 responses to this open-ended question, teamwork, cooperation and spending time with others stood out as more popular topics than competition and winning. This

reinforced the notion that our game should focus on collaboration and working toward shared goals as opposed to competition. The quotes below (in Figure 2b) are responses to our survey that demonstrate the community aspects that people enjoy about playing multiplayer games.

“ It makes each game/round different and dynamic, and you have the opportunity to **work together as a team.**”

“ They often give you **opportunities to learn** things about your friends or the people you play them with.”

“ [I enjoy] playing with other people in the same room, locally. If it's online and I'm playing with friends that's fun too, but **playing by myself online doesn't have the same benefit as playing with others locally**”

“ I enjoy communicating with others and **sharing experiences.**”

Figure 2b. Quotes from surveys that focused on community aspects of multiplayer games

Survey continued

We also asked respondents what they disliked about multiplayer games to understand and plan for any potential pitfalls. Several respondents mentioned games are no longer fun when other players become too competitive.

A serious issue that several respondents mentioned focused on the toxic communities that sometime develop, which can include name-calling and a lack of inclusion of diverse audiences. Again, these responses reinforced our efforts to make the game more collaborative rather than competitive, and to ensure that our game avoided the negative aspects of multiplayer games.

We also wanted to understand how people might feel about interacting with strangers in public spaces as a part of playing a game. Two thirds of respondents answered that they either felt comfortable, neutral, or unsure about this idea, while a third indicated they felt uncomfortable (see Figure 2c below).

We recognize that people are not capable of accurately predicting their feelings about experiences they have not yet had. Thus, we chose to not heavily rely on the survey data for determining whether people would be interested in our concept. Instead, we chose to focus on other areas of research and prototyping and testing.

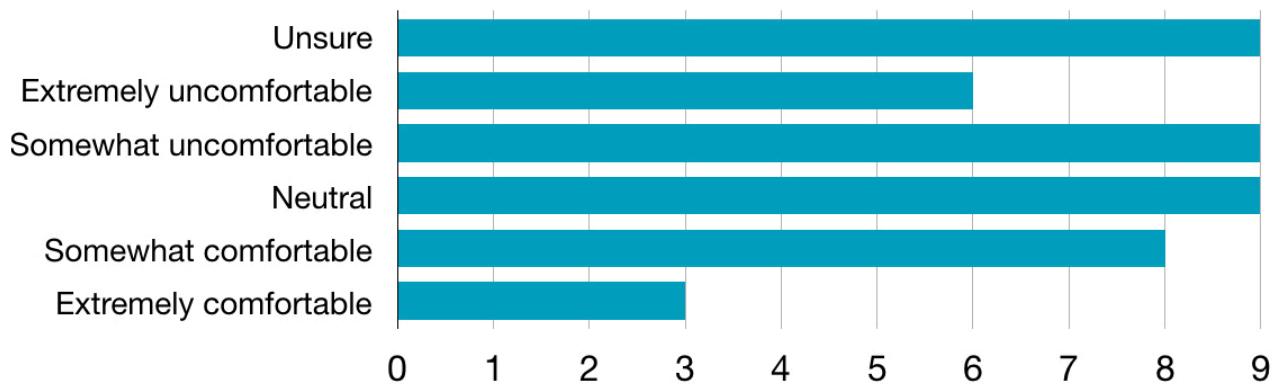


Figure 2c. Survey responses about the comfort level of interacting with strangers

Literature Review

To better understand how games can help create bonds between people, we reviewed relevant research on the topic. In addition to searches on the University of Texas Libraries website and Google, we also looked at research by Jane McGonigal, to whom a colleague had referred us.

Through these searches we found several articles regarding the positive social aspects of video games. First, Adachi and Willoughby (2012) argue that video games foster positive development in youth, including “cooperation, problem solving, and reduced in-group bias.” They reference previous research that shows organized activities are positive for children because they “involve three elements: (1) intrinsic motivation, (2) concentration and cognitive effort, and (3) cumulative effort over time to achieve a goal.” Adachi and Willoughby believe video games incorporate these same three elements and therefore are likely to also be a positive activity for youth development.³

Some of the most interesting research we found indicates that playing video games with others increases the ability of people to empathize with one another. While interacting with strangers may create stress and reduce empathy in some situations, a research study found that having strangers play the Rock Band video game together increased their ability to empathize with strangers when they were subjected to a painful experience together (putting their arms in ice cold water).⁴

Additional research shows the impact on testosterone of winning against strangers versus friends in a game, and luck versus skill-based games. This research provided other considerations for the development of our game. Other online research showed that when players beat strangers in a skill-based game, their testosterone (and aggressive behavior) increases.⁵

On the other hand, the losing player’s testosterone decreases and they will be more likely to leave the game. However, testosterone levels do not appear to change in either winning or losing players when the game is luck-based. Therefore, losing players are more likely to try and play again, and winners do not display the same aggressive behavior as when they win skill-based games. Because of this, winners also do not receive the same joy from winning as they do in skill-based games, and it is hard to keep strangers engaged against one another in luck-based games. Since the purpose of our game is to try and create a sense of (positive) community between strangers, this research indicated that we should avoid pitting strangers against each other in any skill-based task. Again, this research reinforced our idea to develop a game where strangers can collaborate toward common goals.

³ Adachi, P. and Willoughby, T. (2012). Do Video Games Promote Positive Youth Development? *Journal of Adolescent Research*

⁴ Dean, Jeremy (2015). “The Surprising Reason That Empathising With Strangers Can Be Hard.” *PsyBlog*

⁵ Cook, Daniel (2009). “Testerone and Competitive Play.” *Lost Garden*

Competitive Analysis

In addition to the survey and literature review, we also performed a competitive analysis to understand the features of other augmented reality and multiplayer smartphone games currently in the marketplace.

- Cooperative gameplay (multiple players working together to solve a mission)
- Communication (internal messaging)
- Avatars
- Cost
- Languages
- Luck versus Skill-Based

The table below in figure 3 shows a comparison of six games: Ingress, Minecraft, Pokemon Go, Words with Friends, and Stack AR. We compared these games based on the following multiple aspects of interest to us:

- Social features (i.e. sharing results on social media)
- Leaderboards (tracking own skill in comparison to others)
- Player Stats Tracking (tracking own performance over time)
- Badges

	Ingress	Minecraft	Pokemon Go	Words with Friends	StackAR
Cooperative gameplay					
Messaging					
Avatars				Profile	
Cost	Free	\$6.99	Free	Free*	Free*
Languages	15	11	9	6	1
Type	Skill	Skill	Luck	Skill	Luck
Social sharing					
Leaderboards					
Player stat tracking					
Badges					

*In-app purchases

Figure 3. Table of features examined in competitive analysis

Based on the competitive analysis, we learned that features such as leaderboards are especially popular in augmented reality and multiplayer games. The ability to keep the game social through features, such as messaging and social sharing, is also relevant. The majority of the games were

skill-based which was an interesting element for our research. Overall, surveying these various games and their features allowed us to see how they were meeting user needs and how we could potentially fill in any product gaps.

Design and Prototyping

We began sketching our high-level ideas after our brainstorming sessions and during user and market research. Our initial sketches focused on showing the ability to have an avatar (either through using a player's existing

Bitmoji or creating a new one), showing that gameplay would be limited to a park, and demonstrating the ability to have “friends” in the game.

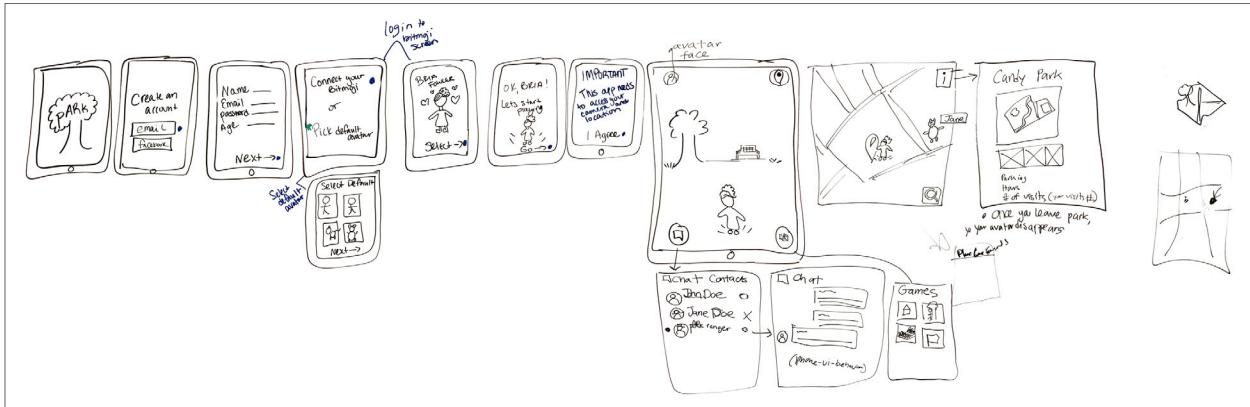


Figure 4b. Initial sketch of game concept on November 8, 2017

Low-Fidelity Prototype

After our initial sketches, we created low-fidelity wireframes to test our concept. We wanted feedback on the basic interactions and elements of our game before incorporating more detailed visual design. To simulate an augmented reality perspective, we used transparency film for the low-fidelity prototype (see Figure 4g below). This allowed users to visually understand how the game would be played at a park.

After we created the screens in Sketch, we printed them, cut out the elements and glued them onto the transparency film. Some of the screens were not meant to be shown in augmented reality such as the player account screens, so they did not require any transparency films. We created low-fidelity

wireframes of the avatar set-up process, either through creating an avatar or linking a Bitmoji account to the game. Avatars are a major element of our design for user representation, so we wanted to incorporate both options for the user.

The usage of Bitmojis was a strategic move—not only for business and marketing reasons, but because it would shorten the process for users to quickly access an existing avatar they've already created to represent themselves. While we did create wireframes of the avatar set-up process, we did not see the value in testing it with users because it's a common interaction that's already been proven successful in other products such as Snapchat.



Figure 4g. User testing round 1 with low-fidelity wireframes with transparency film

Low-Fidelity Prototype continued

At this point in the game development, we had established a few interactions we wanted to test. The first interaction was choosing a “world” for the user to build their community. The worlds are represented by various themes that would determine the type of structure and design within the world the user chooses. For testing purposes, we created the flow for a Forest Magic world which included resources like wood and structures like cabins and huts. We wanted to see if users would understand that they could create their own world or enter the world of another user and that the resources in the game would depend on the theme they chose.

The second interaction to test was resource gathering. Our game is intended to be interactive both with other game players and the physical space around them, so we wanted to make sure it incorporated people moving around and exploring the park. Having players walking around to collect resources to build their community was one of the best ways we thought we could meet that need. Users were tasked with choosing the location to build their structure (cabin), and finding the wood needed to build it.

To make the game collaborative, we considered requiring two players in order to pick up larger piles or resources. This would give the user an incentive to interact with other players at the park— whether they knew the player or not. The third and final task for the user was to find a larger pile of resources that would require the help of a stranger to collect it. This was one of the most important tasks we tested because it would give us an indication of how people felt about the idea of interacting with strangers in the game.

Once the wireframes were ready, we went to a nearby park and conducted guerilla testing on our target audience. We did this over the span of two days which turned out to be a very valuable experience. Overall, the first round of testing included six participants (four adults and two children accompanied by their parents). Our goals were to see if participants were successful in completing the tasks, the challenges they faced, and their satisfaction with the interactions. We received a mixture of feedback from participants during testing. The next page includes a summary of the feedback.

Low-Fidelity Prototype continued

Here is a summary of the feedback:

Participants wanted more context to play the game such as a storyline for motivation.

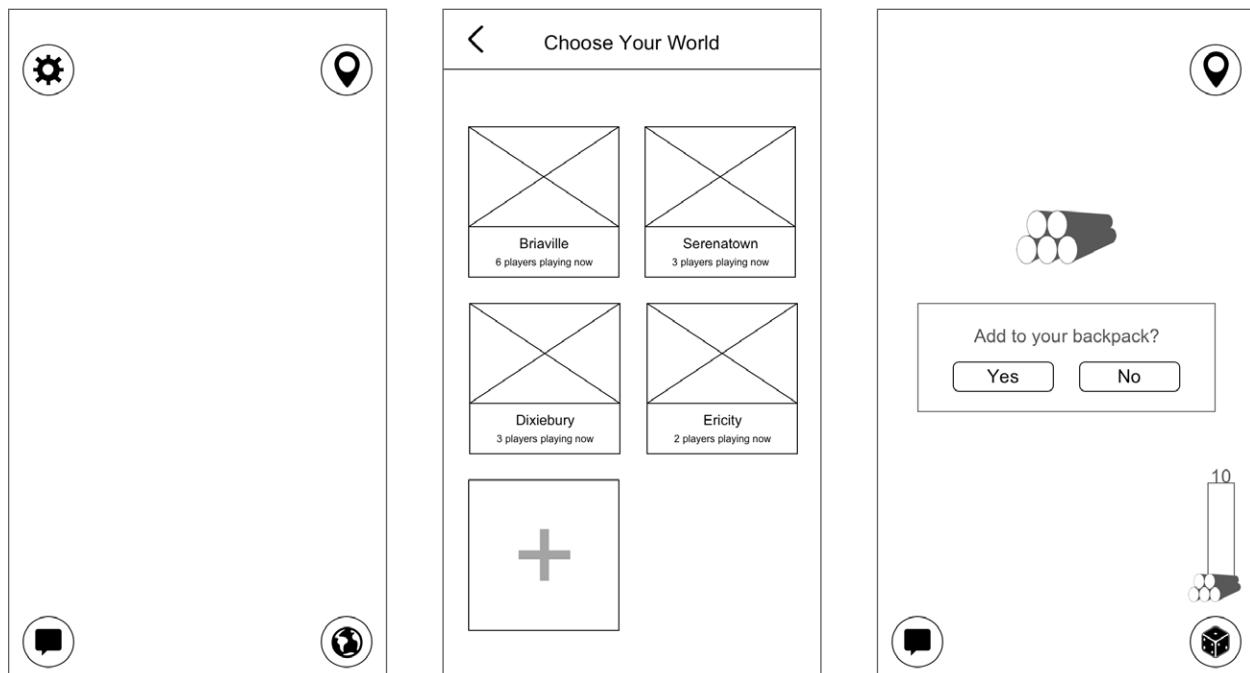
- They desired some sort of challenge (such as monsters or dragons) to make the game more complex instead of solely gathering resources.

There was mixed feedback on forcing users to interact with other players in order to complete a task.

- Half of the participants mentioned they would prefer not to interact with strangers at the park without a direct incentive or motive to do so—and even then felt hesitant about the action. They didn't want to feel like they were bothering other players.

- One suggested preferred alternative involved sending an avatar to complete the tasks instead of having to personally interact with another player.
- The other half of users were fine with interacting with strangers in order to complete the task of resource gathering.

Overall, participants did say they enjoyed the concept of the game and if the stated changes were implemented, would be interested in playing. This feedback gave us actionable steps to move forward as we progressed to our medium fidelity mockups and prototype.



See more low-fidelity wireframes in pages 36-37 of the appendix

Medium-Fidelity Prototype

Our team met multiple times to generate ideas based on user feedback that would be both entertaining and a reflection of our research. The most prominent feedback we received was related to the storyline. Challenges such as defending against monsters was popular in games we had investigated during our initial research.

So to meet this need, we developed a storyline about the player inheriting an estate from their great aunt. She bestows the land to the player and they are assigned the duty to rebuild it, develop a community, and protect it from monsters that have taken over the area.

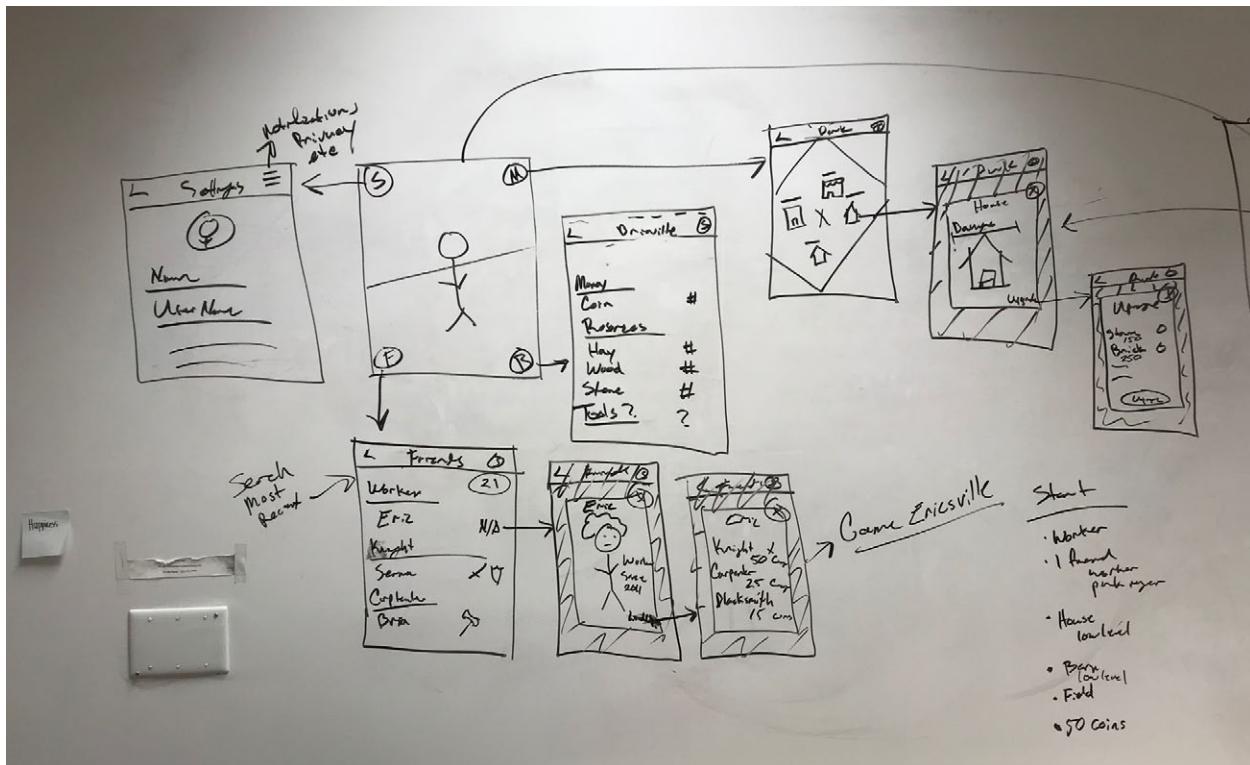


Figure 4e. Whiteboard sketches of our storyline and gameflow on December 2, 2017

Medium-Fidelity Prototype continued

We were weary about the mixed feedback we had received from previous user testing on interacting with strangers at the park in order to complete a task. Although we wanted to ensure the aspect of community building was evident in the player's interactions, we didn't want to make it so forced that they wouldn't want to play. To find middle ground, we came up with a new solution. Players could friend other players at the park and interact with their avatars instead of forced face-to-face interactions. After friending another player, their avatar would become a member of the original player's community, allowing them to control that avatar. For example, Player 1 friends Player 2. Player 1 now controls Player 2's avatar and can ask it to complete tasks such as fighting off dragons.

The interaction of friending other players would be incentivized with the use of coins (i.e. Player 1 would pay Player 2 to become friends in the game). Coins were another motivation in terms of resource gathering—the more coins you got from completing tasks, the more you could upgrade your house, and the more resources you'd have to fight off dragons. We also considered adding the concept of leveling up—your avatar would start as a basic laborer and with continuous resource gathering, would level up to a blacksmith and work their way up the economic ladder. This would add a level of complexity to our game, motivating users to play over longer periods of time. Because of time constraints, we weren't able to add this element into the game during the medium fidelity mockups.

Based on this progress, we decided to focus our second round of testing on the following:

- The storyline—did it make sense? Was it compelling? Did users have an idea about what interactions they would be doing in the game based on the introduction?
- Setup of the game—were the functions of the icons what the user expected?
- Asking your avatar to complete tasks such as building on the estate with available resources.
- Upgrading your hut—this time with your avatar's coins.
- Spending your coins in order to friend an avatar and have them in your community.

We also hoped to observe if users had a general understanding of what physical interactions (such as tapping the avatar for commands) were possible and if they aligned with the users' expectations.

This round of testing was completed using UserTesting.com. This allowed us to reach a wide range of participants outside the UT Austin School of Information. Our specifications for users were broad—the only requirements we added were that the users needed to be located in the U.S and be able to test on a smartphone. We chose to keep this broad because we want our game to be marketable for all ages and players. From our testing, we received feedback from six participants ranging in age from 18 to 33.

Medium-Fidelity Prototype continued

Here is a summary of the feedback:

- Participants were confused about the lack of functionality. Although not critical, we did learn to be very specific about the limitations of a prototype. We also needed to think through any holes that may occur during an unmoderated usability study and find ways to address them before spending time and money on the test.
- The concept of spending coins to add friends was not liked. Participants didn't understand the overall value of spending money to add a friend and how it would benefit their community.
- They wanted to see their available resources before sending resources to their friend— some sort of inventory list they could monitor.
- Consistency—from the introductory scroll, people expected to encounter a dragon to fight in order to protect their land and were underwhelmed this was not the case.

Overall, there was a general consensus that the game had potential and could turn into something more enjoyable if some of the features and interactions were polished up.



See more medium-fidelity mockups in pages 37-39 of the appendix

High-Fidelity Prototype

Our final step was to develop the high-fidelity mockups. We incorporated the feedback from testing and started to make detailed decisions about each interaction of the game. Along the way, we realized how challenging this was to do in a game—one missed interaction would throw the entire flow of the game off balance.

Due to the solid feedback we received on resource gathering and friending during the first two rounds of testing, we dedicated our attention to the dragon interaction. As

mentioned beforehand, the avatar of the user's friend is meant to assist with various tasks in the user's world. We had not tested this interaction yet and needed to do so to determine how users felt about this part of the game. The images below (Figure 4f) show how we initially thought out the process—the user commands their friend to build a wall to protect against the dragon. Then the dragon arrives and their new task is to fight off the dragon. To keep the flow simple, we removed the aspect of building a protective barrier.

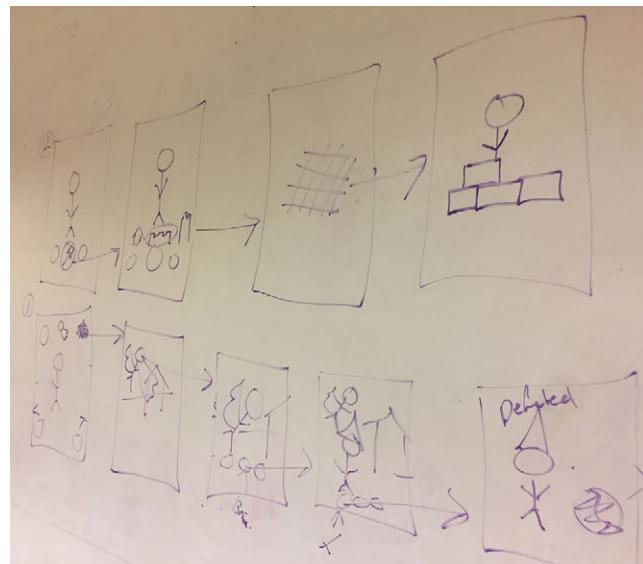
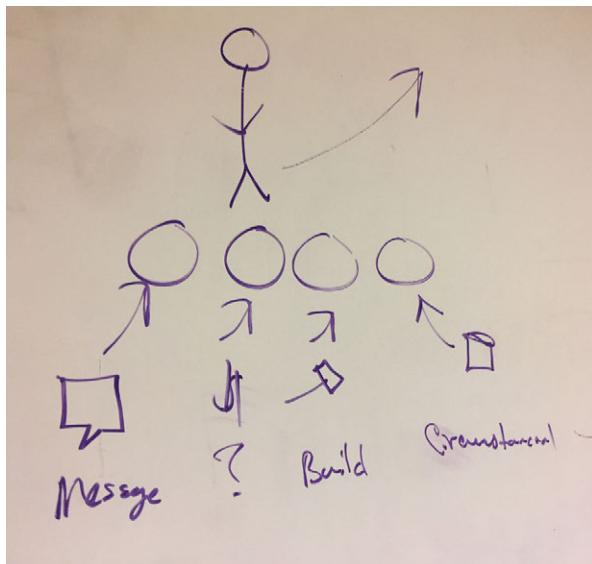


Figure 4f. Iterations on dragon interactions on December 7, 2017

The main tasks for the third round of user testing included the following:

- Finding a friend to help fight the dragon
- Repairing your damaged hut from the dragon attack
- Gathering resources to repair your damaged hut

High-Fidelity Prototype continued

We used *UserTesting.com* to conduct six more usability studies for the prototype. The participant requirements remained the same to maintain consistency. Again, we encountered some errors we did not initially notice that turned the focus of the study away from the prototype to the system errors. Participants struggled to move forward on the app because they needed to double tap on the notifications—a lot of the feedback revolved around this pain point. Other participants mentioned they wanted more in-depth interactions since it was augmented reality—not clicking and expecting an action to happen.

We completed two in-person usability tests with a more detailed flow of the process. This allowed us to put all the pieces together and understand how participants felt about the overall game and its interactions.

The test included the following tasks:

- Finding resources (wood)
- Friending another player
- A dragon attack and commanding the friended avatar to fight the dragon
- Finding resources (water) to repair the hut
- Upgrading the hut to a house
- Planting seeds to develop the community

High-Fidelity Prototype continued

Overall, we received positive feedback from this last round of testing. Participants liked the idea of an augmented reality game and the concept of walking around the park to collect resources and thought it would be a fun challenge. However, key takeaways indicated we needed to add a detailed inventory of resources so they users are aware of how many resources they are collecting and using during the gameplay. Participants also wanted the interaction with the friend's avatar fighting off the dragon to be more interactive and engaging, instead of just clicking on the dragon and having the friend's avatar disappear. While all of the comments we received were helpful, some were based on the limitations of prototyping

an augmented reality app. For example, the issues people encountered with using the arrows to move in the right direction would not be encountered with a developed game because the arrows would not be needed in augmented reality; instead, the user would just turn their phone. Even with these issues with the prototype, it was clear that participants understood they needed to move their phone to different screen (i.e. park area) to play the game. Participants also commented that they wanted to see the avatars and dragon actually move around in a more life-like fashion. Again, this is due to the limitations of this prototype and would be resolved in a fully-developed game.



See more high-fidelity mockups in pages 40-43 of the appendix

Lessons Learned and Conclusion

Developing a game is a challenging process. Researchers and designers need to be detail-oriented and consistent throughout the entire process in order to create an enjoyable interaction for the user. It's easy to brainstorm new ideas, but crafting an entire game to be fun, intuitive, and challenging enough to motivate users to play consistently is difficult. Game development requires storytelling, challenging gameplay, appealing graphics, and a variety of other elements.

User testing is extremely valuable, and also has its own challenges. We did four rounds of testing and each time we received new feedback. All the testing allowed us to quickly gain insight on areas we had not considered. We also learned about the difficulties of different types of user testing methods. Unmoderated user tests require more careful consideration and attention to detail because a moderator is not present to guide participants when things go wrong with the prototype or the user encounters issues. For future considerations, we would run one or two practice tests before publishing our study. This would allow us to catch alarming errors and potentially save time and money.

Additionally, prototyping an augmented reality experience incurs additional difficulties. It is hard to mimic an augmented reality environment in prototypes and users can get distracted by aspects that would not be present in a finished app. For example, our prototype requires users to click on the screen in order to get the next actions to occur, whereas in a working app these actions would happen naturally. This is another reason that moderated testing may be better than unmoderated testing for testing augmented reality prototypes.

Due to time limitations, we were not able to incorporate all feedback that we received from user testing. If we had more time, we would find ways to develop leaderboards, include character advancement, and add the ability for users to see other player's world.

Overall, this project allowed us to experience the entire process of interaction design. From the initial research to the final design, this was a great opportunity for both our researchers and designers to strengthen skills.

Timeline

Here is a visualization of our project timeline, which consisted of several key phases including initial concepts, user research,

design and prototyping and implementation and testing. Please see the below image for further details.

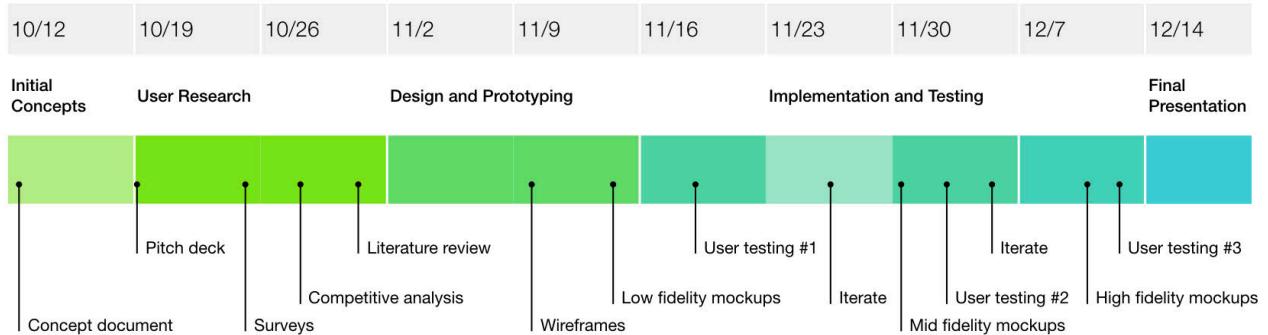


Figure 5. Project timeline

References

- ¹ “The 2017 City Park Facts Report.” The Trust for Public Lands
- ² Mac, Ryan (2016). “More Women Than Men Are Playing ‘Pokémon GO’--By A Lot.” Forbes
- ³ Adachi, P., Willoughby, T. (2012). Do Video Games Promote Positive Youth Development? *Journal of Adolescent Research*, 28(2), 155-165.
- ⁴ Dean, Jeremy (2015). “The Surprising Reason That Empathising With Strangers Can Be Hard.” PsyBlog
- ⁵ Cook, Daniel (2009). “Testerone and Competitive Play.” Lost Garden



Appendix

Brainstorming

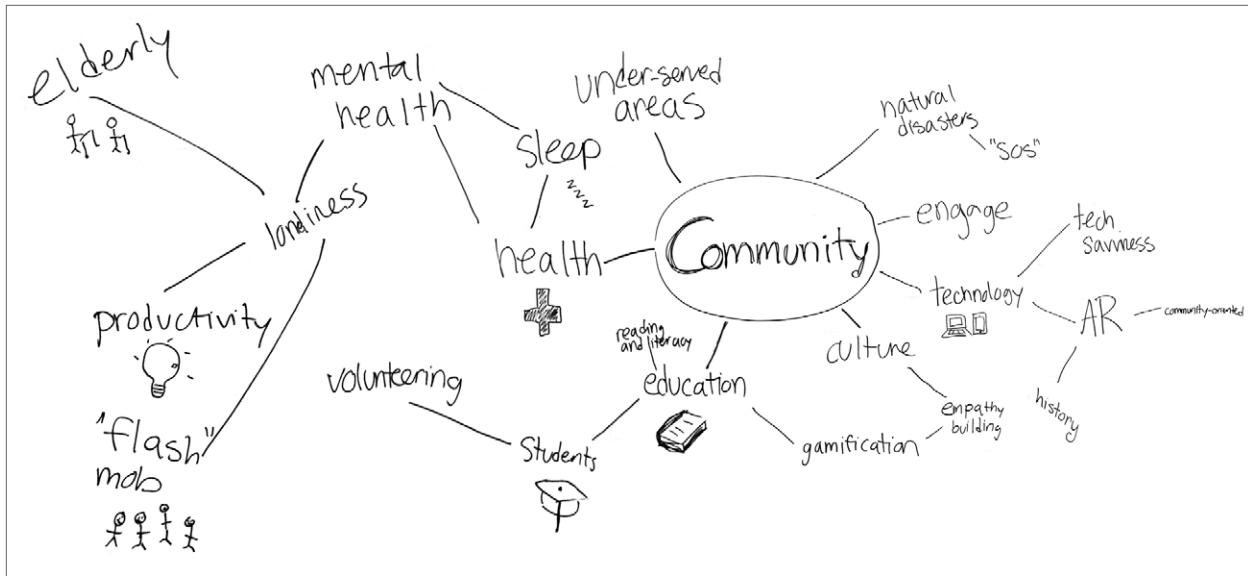


Figure 1a. Word cloud from group brainstorming session on October 10, 2017

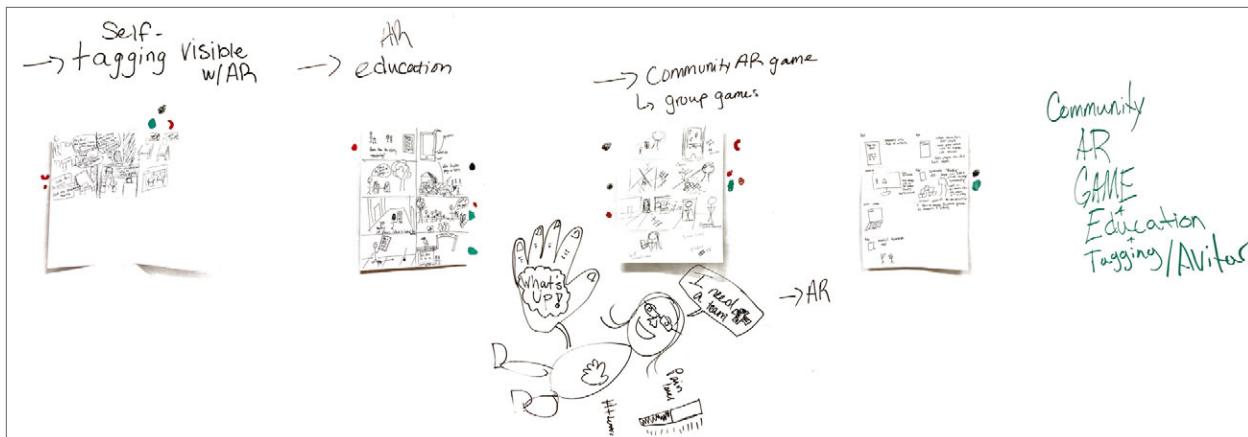


Figure 1b. Initial ideation whiteboard sketches and concept votes

Brainstorming



Figure 1c. Serena's sketches from the initial brainstorming session

Brainstorming

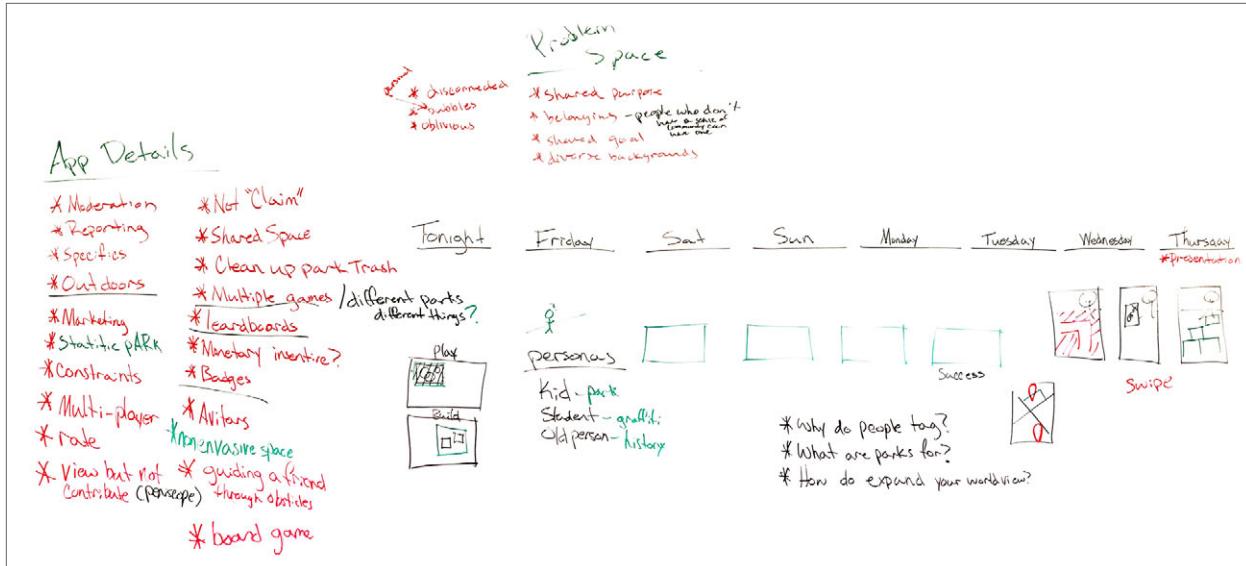


Figure 1d. Idea for app from second brainstorming session on October 12, 2017

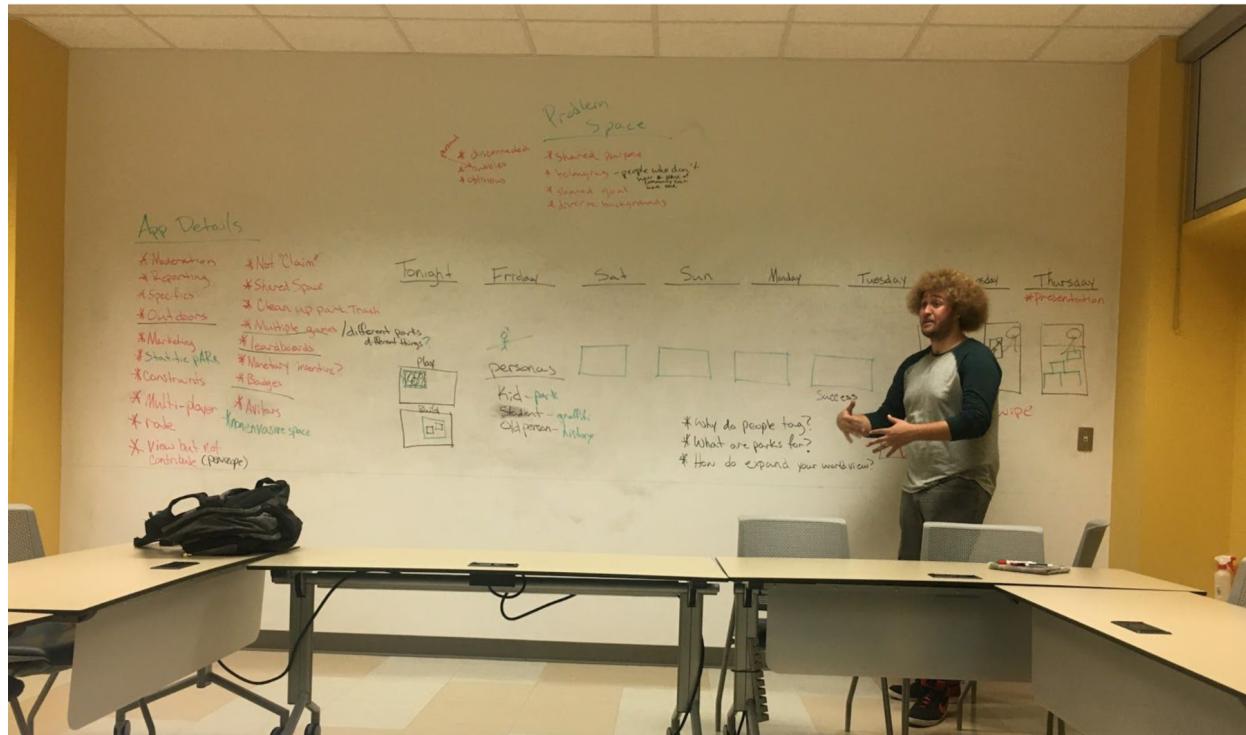


Figure 1e. Photo from second brainstorming session

Survey

Thank you for agreeing to participate in our study. This survey will take approximately 5 minutes of your time.
Your answers will remain anonymous and are used strictly for our study.

What (if any) activities make you feel like you are part of a community?

For each activity you listed, please tell us why/how it makes you feel like you are part of a community?

Do you enjoy playing multiplayer games?

- I don't play them
- It depends
- Yes
- No

Please explain why you don't enjoy playing multiplayer games

What multiplayer games do you play?

What do you like, if anything, about playing multiplayer games?

What do you dislike, if anything, about playing multiplayer games?

How frequently do you go to a public park?

- Never
- Less than once a year
- 1 to 5 times a year
- More than 5 times a year

Figure 2a. Survey (page 1 of 2)

Survey continued

Why do you generally go to parks?

Do you ever go to the park by yourself?

Yes

No

Why don't you go to parks?

How comfortable do you feel playing multiplayer games with people you don't know in a public space?

Extremely comfortable

Somewhat comfortable

Neutral

Somewhat uncomfortable

Extremely uncomfortable

Unsure

Is there anything else you'd like to share?

If you would be interested in participating in a brief, follow-up interview, please provide your email.

Powered by Qualtrics

Figure 2a. Survey (page 2 of 2)

Survey continued



Figure 2b. Quotes from surveys that focused on community aspects of multiplayer games

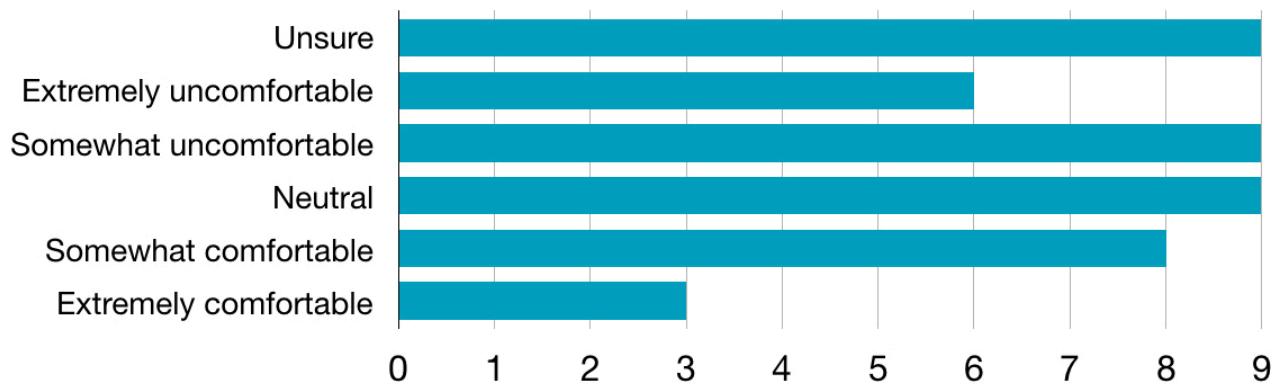


Figure 2c. Survey responses about the comfort level of interacting with strangers

Competitive Analysis

	Ingress	Minecraft	Pokemon Go	Words with Friends	StackAR
Cooperative gameplay					
Messaging					
Avatars				Profile	
Cost	Free	\$6.99	Free	Free*	Free*
Languages	15	11	9	6	1
Type	Skill	Skill	Luck	Skill	Luck
Social sharing					
Leaderboards					
Player stat tracking					
Badges					

*In-app purchases

Figure 3. Table of features examined in competitive analysis

Timeline

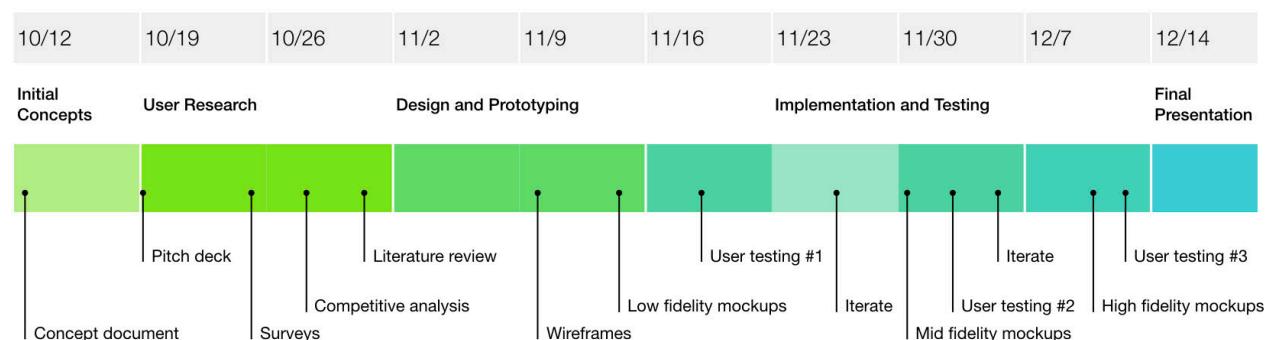


Figure 5. Project timeline

Worksessions

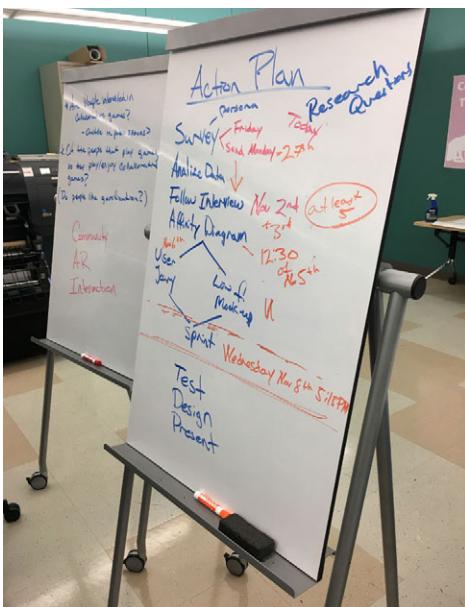


Figure 4a. Initial project plan on October 17, 2017

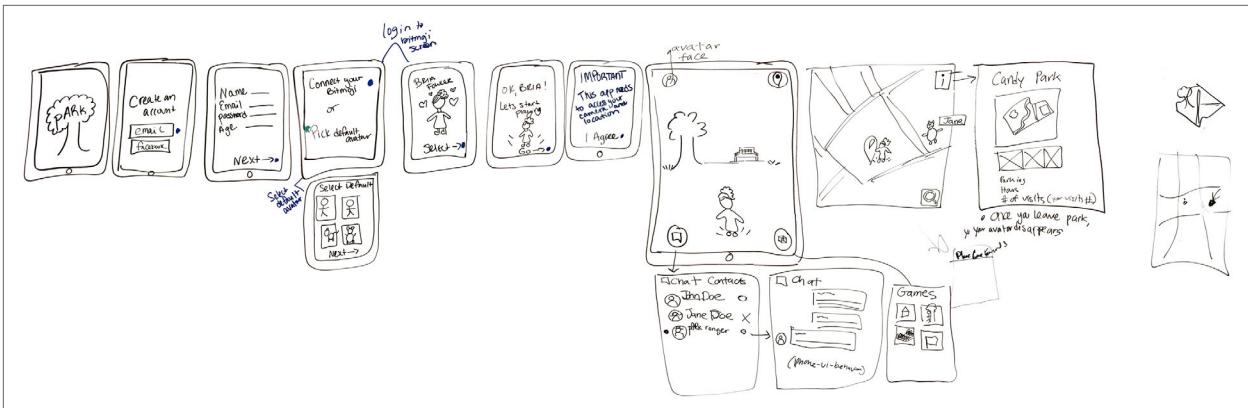


Figure 4b. Initial sketch of game concept on November 8, 2017

Worksessions

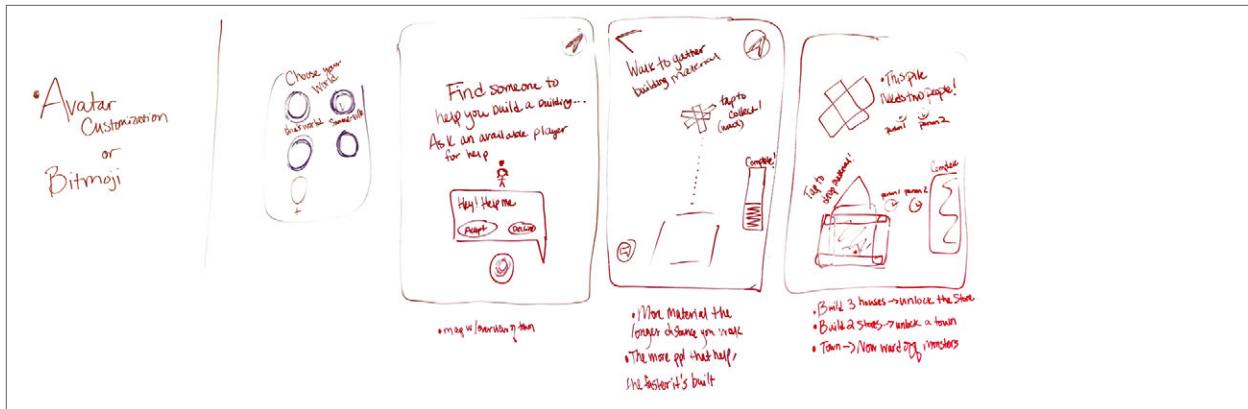


Figure 4c. Additional sketches of app on November 15, 2017

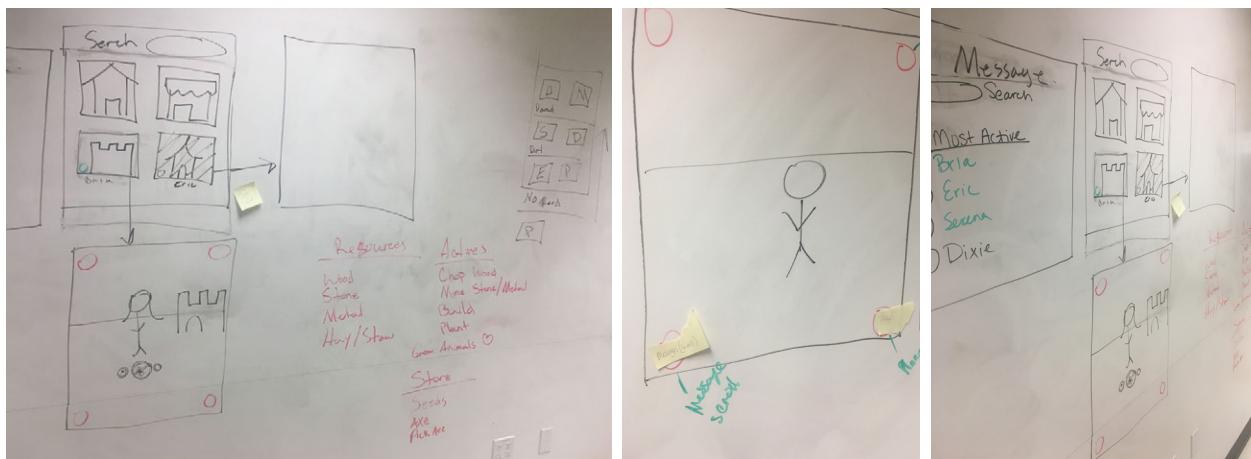


Figure 4d. Iterations on app concepts November 26, 2017

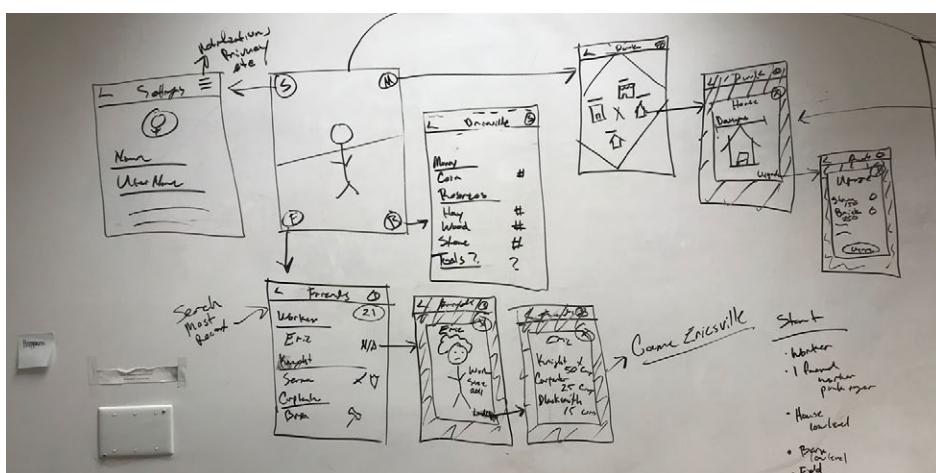


Figure 4e. Whiteboard sketches of our storyline and gameflow on December 2, 2017

Worksessions

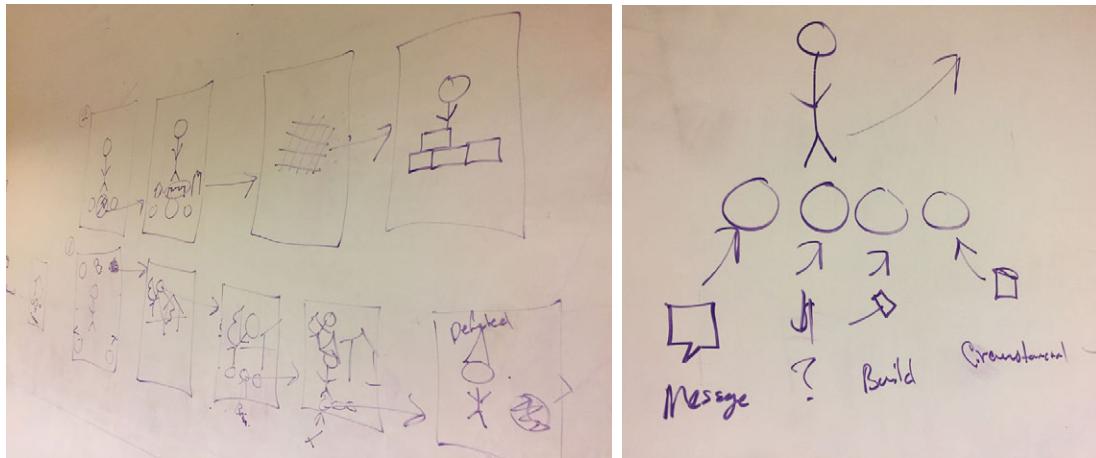


Figure 4f. Iterations on dragon interactions on December 7, 2017

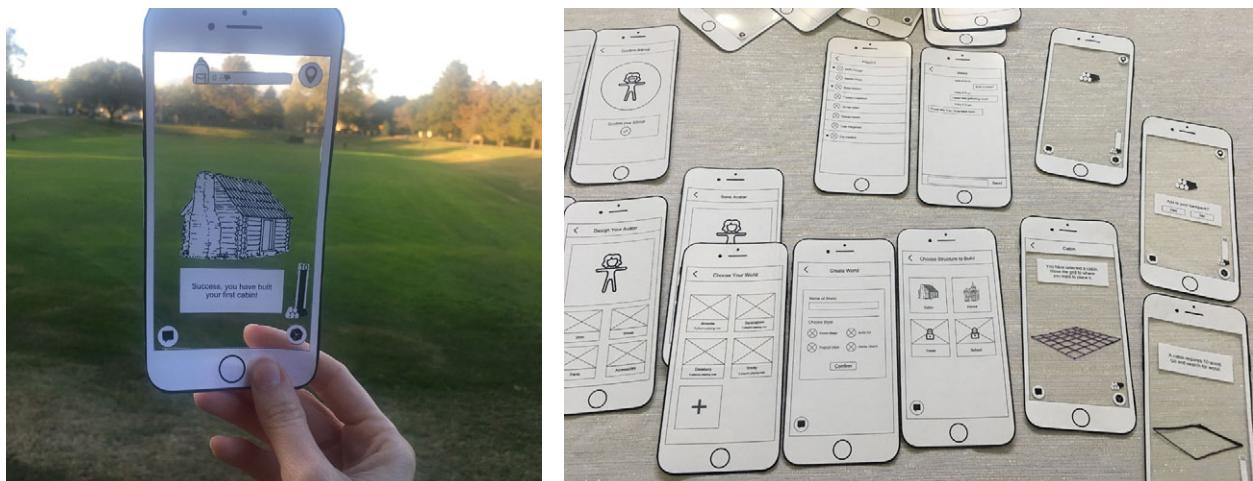


Figure 4g. User testing round 1 with low-fidelity wireframes with transparency film



Figure 4h. Images from taping final concept video on December 14, 2017

Low-Fidelity Wireframes

Choose Your World

Create World

Mini-Games

Settings

Edit Profile

Players

Blake

Map

Pease Park

Log in/Register

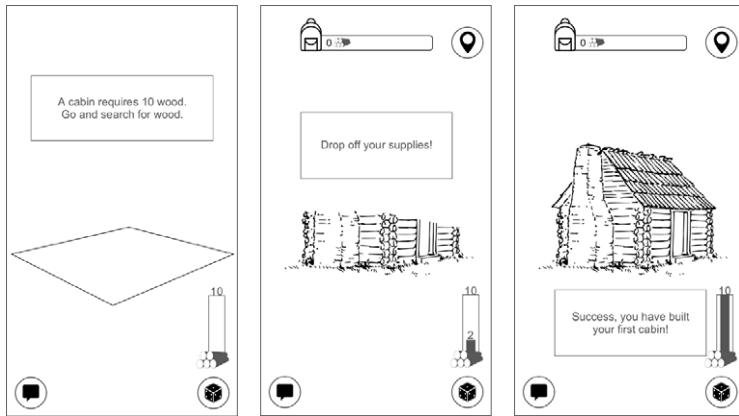
Add to Backpack

Build Site

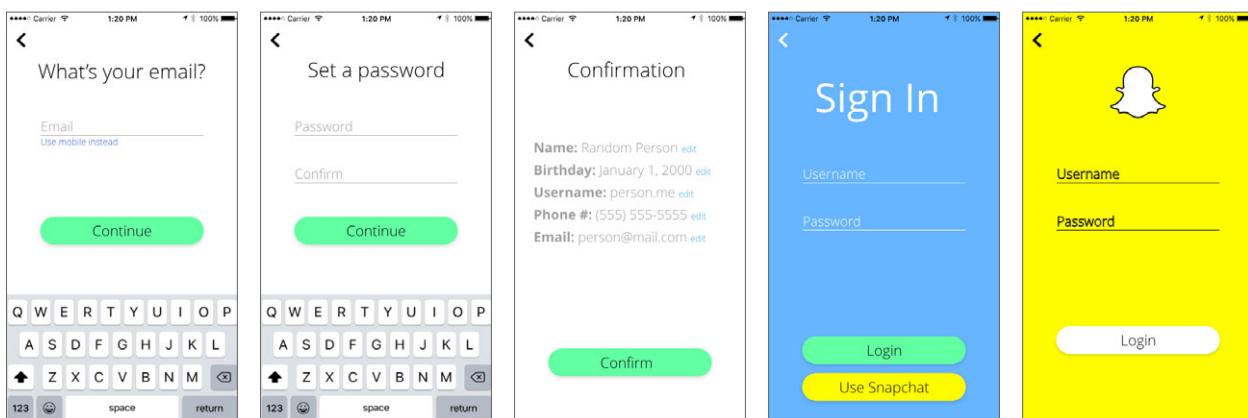
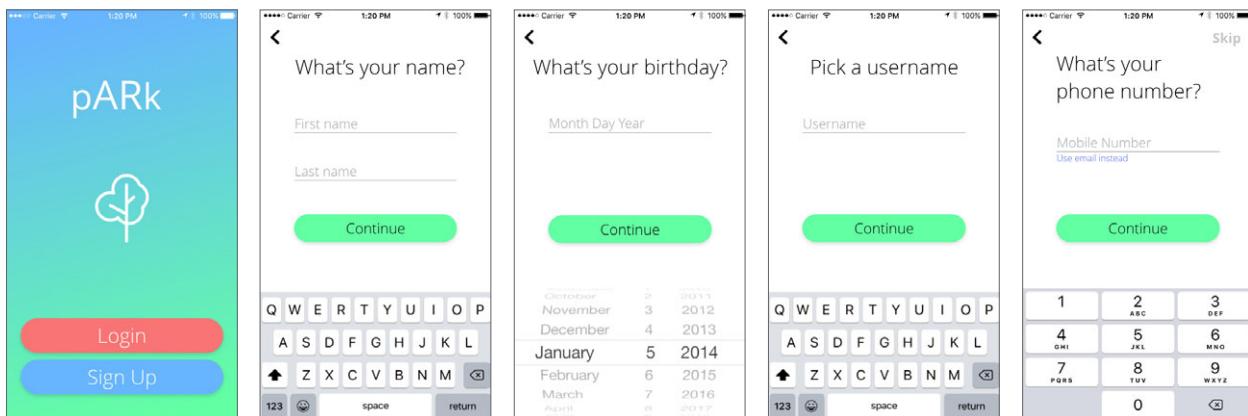
Choose Structure to Build

Cabin

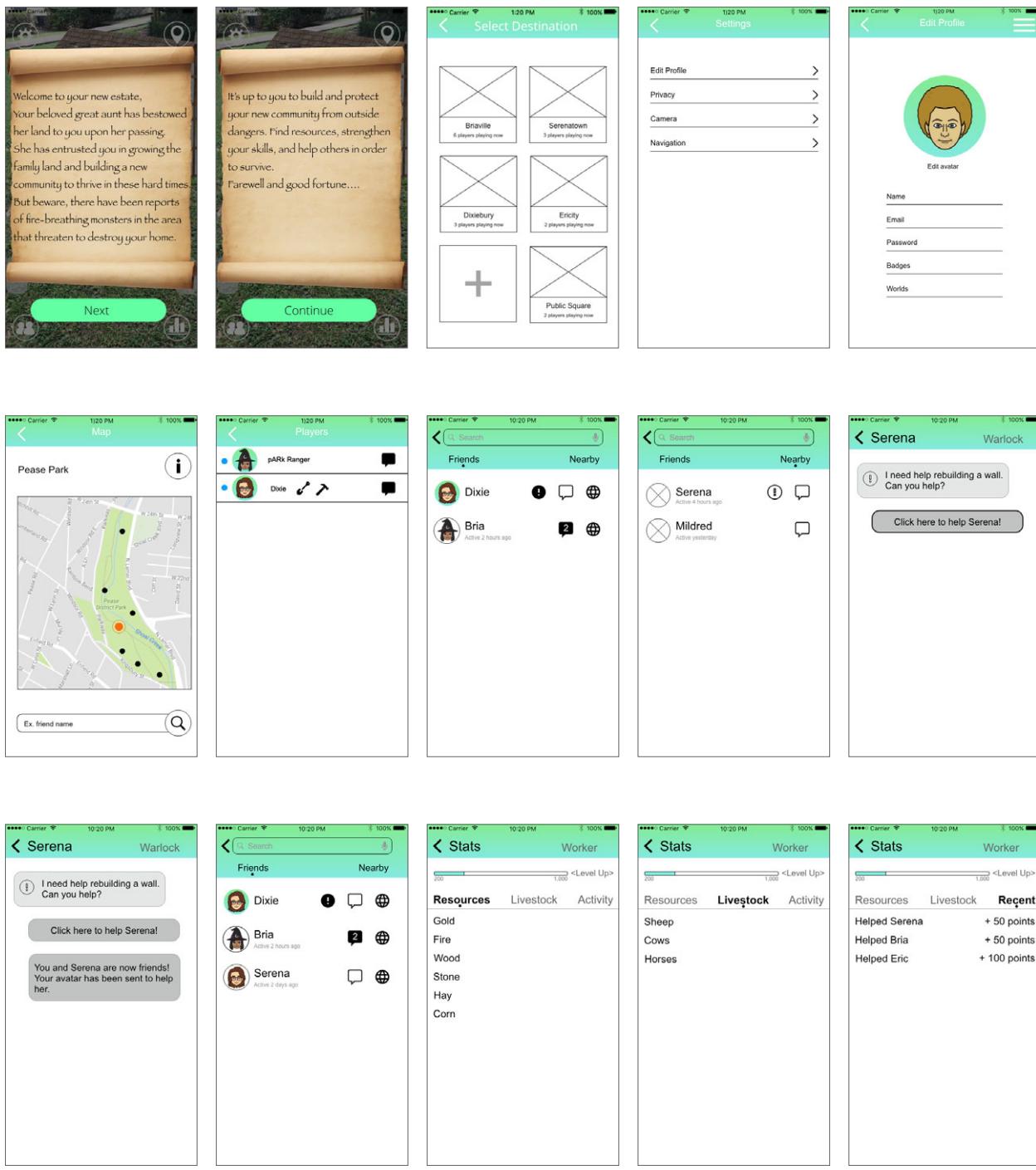
Low-Fidelity Wireframes continued



Mid-Fidelity Mockups



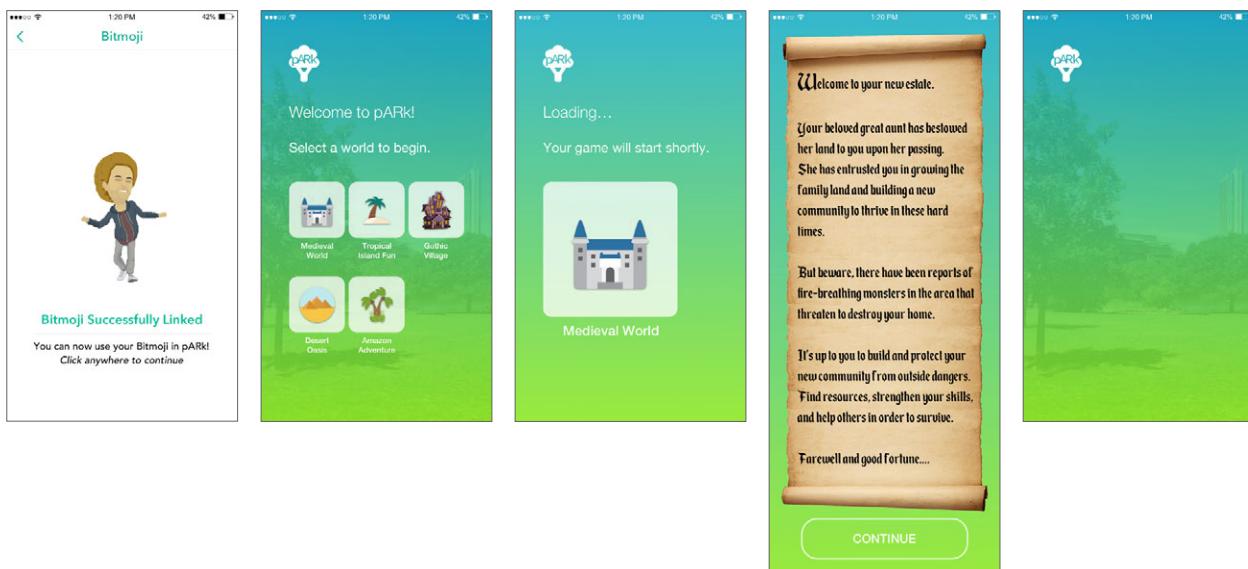
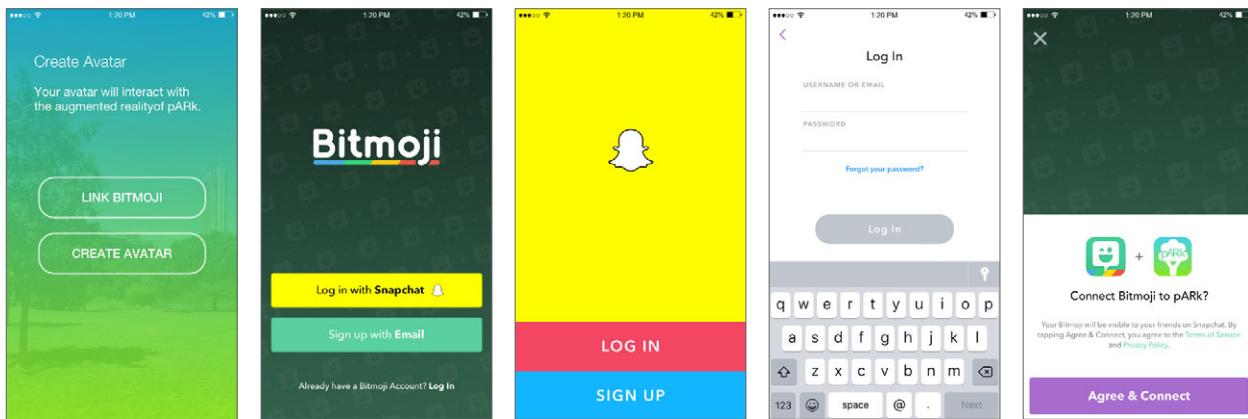
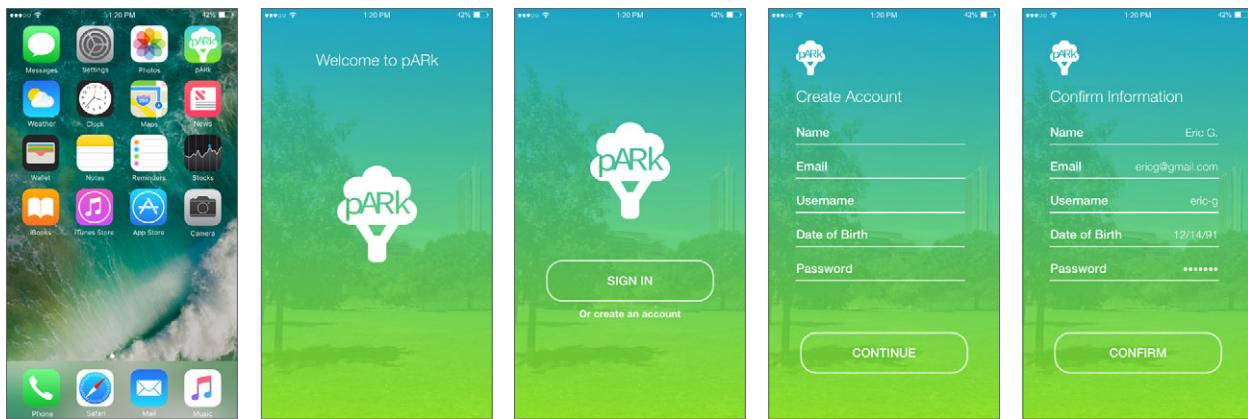
Mid-Fidelity Mockups continued



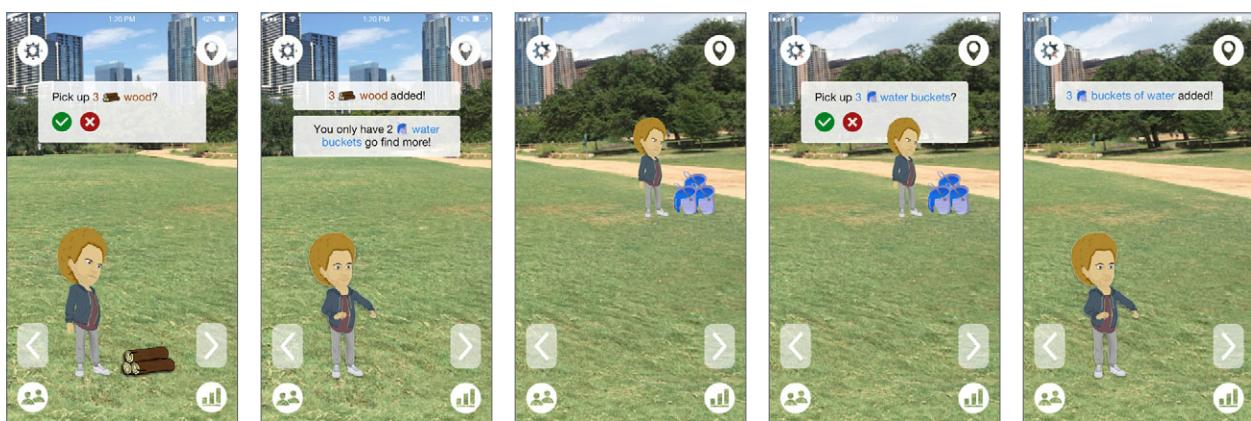
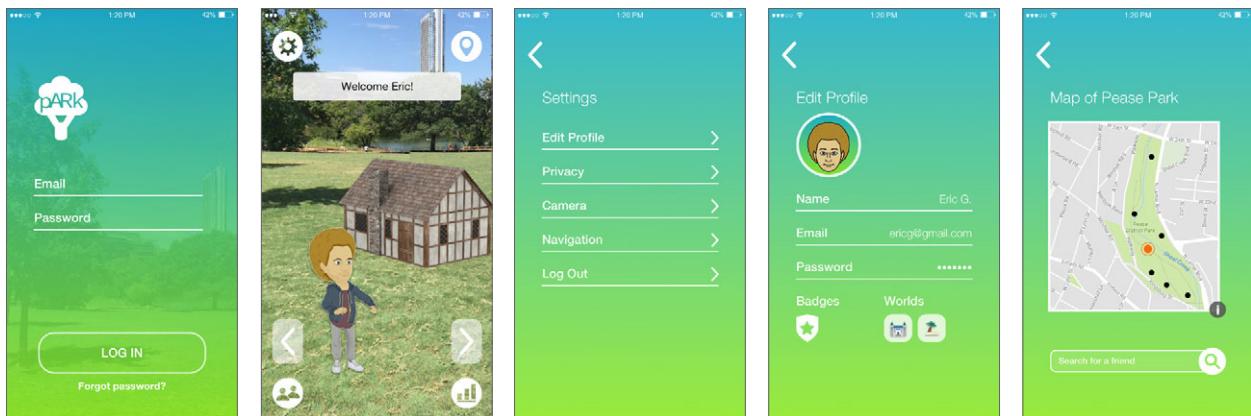
Mid-Fidelity Mockups continued



High-Fidelity Mockups



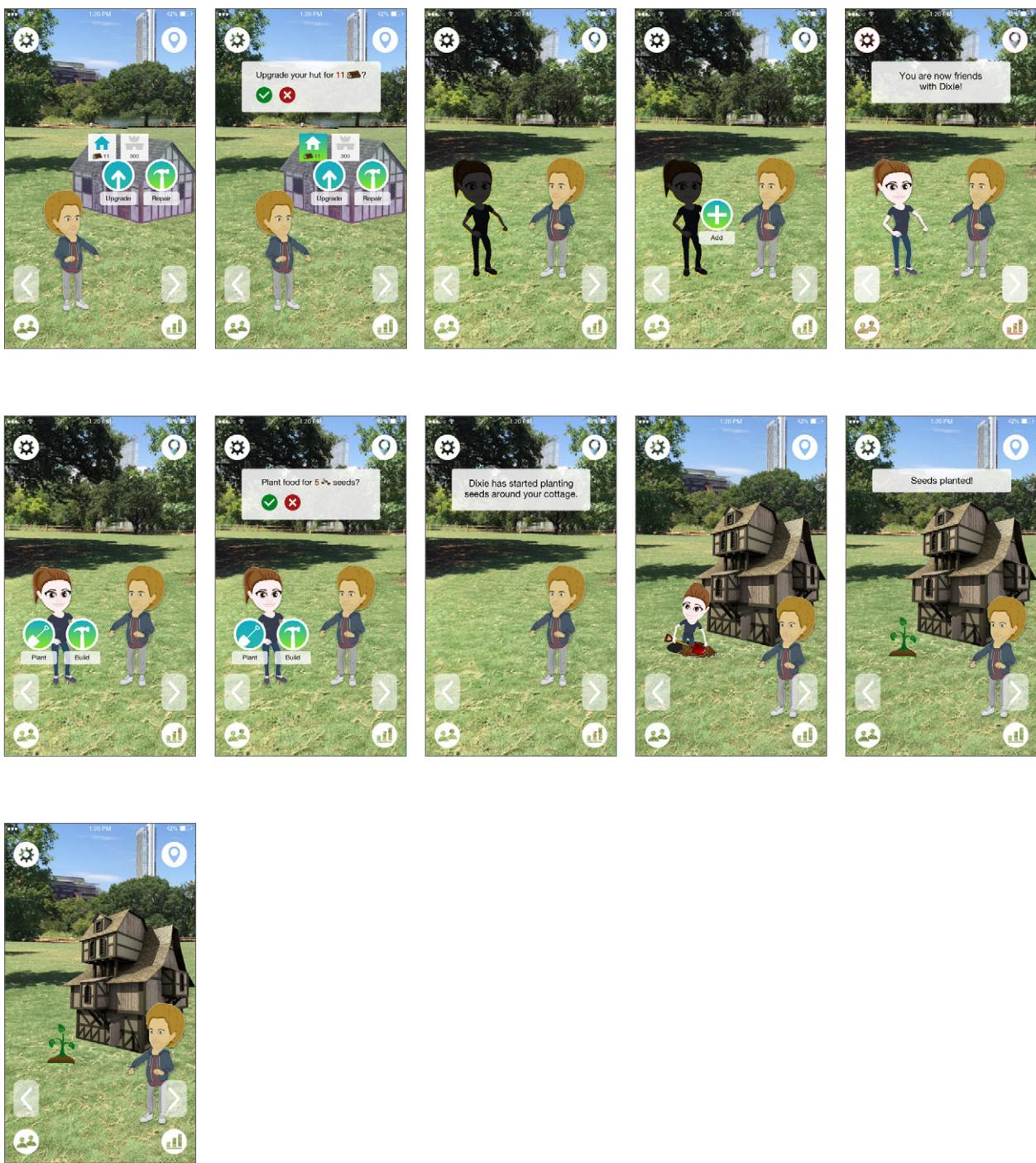
High-Fidelity Mockups continued



High-Fidelity Mockups continued



High-Fidelity Mockups continued



Final Prototype Instructions

Please use the app prototype on a smartphone for best results (Note: the Invision prototype appears to have issues when used on a laptop.)

Task 1 - Create an Account and Start Game

1. Click on pARk App to open app
2. Welcome to pARk: Click twice (this is an added click only for the purposes of animations to work with overlays—it would not exist in an actual app)
3. Click **Or create an account**
4. Click **CONTINUE**
5. Click **CONFIRM**
6. Click **LINK BITMOJI**
7. Bitmoji Login Screen: Click anywhere on screen
8. Snapchat Splash Screen: Click anywhere on screen
9. Snapchat Login Screen: Click anywhere on screen
10. Connect Bitmoji to pARk Screen: Click anywhere on screen
11. Bitmoji Successfully Linked Screen: Click anywhere on screen
12. Click again (this is an added click only for the purposes of animations to work with overlays, it would not exist the actual app)
13. Select World Screen: Click **Medieval World** icon
14. Game Loading Screen: Click anywhere on screen
15. Game Welcome Message: Read through message and click **CONTINUE**

Final Prototype Instructions continued

Task 2 - Gather Resources

1. Welcome Screen, Check Inventory: Click on Inventory Icon (bottom right)
2. Inventory Screen: Click back button in top left corner
3. Find Resource (Wood): Click right navigation arrow to find wood (arrows exist only for the purposes of the prototype, they would not exist in an augmented reality version)
4. Add Resource (Wood): Click on wood logs icon
5. Confirm Selection: Click confirm icon
6. Resource Addition Confirmed: Click on right navigation arrow to find water
7. Add Resource (Water): Click on buckets of water icon
8. Confirm Selection: Click confirm icon
9. Resource Addition Confirmed: Click anywhere on screen

Task 3 - Use Existing Friend Avatar to Fight Dragon

1. Dragon Alert: Click on left navigation arrow (3x) to find a friend to help fight the dragon
2. Get Help from Existing Friend: Click on other avatar
3. Dragon Attack: Click on **Dragon** icon to have avatar fight dragon
4. Confirmation of Avatar Help: Click right navigation arrow to return to hut
5. Existing Friend Fights Dragon: Click anywhere on screen
6. Dragon Retreats: Click anywhere on screen

Task 4 - Repair Hut

1. Hut Damage Alert: Click on hut
2. Select Hut Action: Click on **Repair**
3. Confirm Repair Action Selection: Click confirm icon
4. Avatar Repairs Hut: Click anywhere on screen
5. Hut Repaired Alert: Click anywhere on screen

Final Prototype Instructions continued

Task 5 - Upgrade Hut to Cottage

1. Upgrade Hut Alert: Click on hut
2. Select Hut Action: Click on **Upgrade**
3. Select Upgrade Type: Click on the house icon (costs 11 wood)
4. Confirm Upgrade Action Selection: Click confirm icon
5. Hut Upgraded Alert: No action necessary

Task 6 - Add Friend

1. Find Help to Plant Seeds: Click on left navigation arrow
2. New Avatar: Click on other avatar
3. Add New Avatar: Click on **Add** icon
4. New Friend Alert and Avatar Revealed

Task 7 - Use New Friend Avatar to Plant Seeds

1. Use New Friend Avatar to Plant Seeds: Click on newly added avatar
2. Select Plant Action: Click on Plant icon to have avatar plant seeds
3. Confirm of New Friend Avatar Help: Click confirm icon
4. New Friend Avatar Started Planting: Click right navigation arrow to return to cottage
5. New Friend Avatar Planting: Click on gardening avatar
6. Seeds Planted Alert: Click anywhere on screen

Task 8 - Sign Out

1. Go to Settings: Click on Settings Icon (top left)
2. Log Out through Settings: Click on **Log Out**

Final Prototype Instructions continued

Task 9 - Log In and Explore Other Main Parts of UI

1. Welcome to pARk: Click twice (this is an added click only for the purposes of animations to work with overlays—it would not exist in the actual app)
2. Click **SIGN IN**
3. Click **LOG IN**
4. Welcome Screen - Map: Click on Map Icon (top right)
5. Map Screen: Click back button in top left corner
6. Welcome Screen - Players: Click on Players Icon (bottom left)
7. Players Screen: Click on message icon for Bria
8. Chat Screen: Click on message bar on bottom
9. Chat Screen with Keyboard: Click anywhere on screen above keyboard
10. Chat Screen: Click back button in top left corner
11. Players Screen: Click back button in top left corner
12. Welcome Screen - Inventory: Click on Inventory Icon (bottom right)
13. Inventory Screen: See updated inventory, click back button in top left corner
14. Welcome Screen - Settings: Click on Settings Icon (top left)
15. Log Out through Settings: Click on **Log Out**



Thank you

This document was formatted in Adobe InDesign by Serena Mistry