

CSE 440 Section AD
Fall 2018

SnapCart : Final Report

The accessible shopping experience.

Team

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Problem And Solution Overview

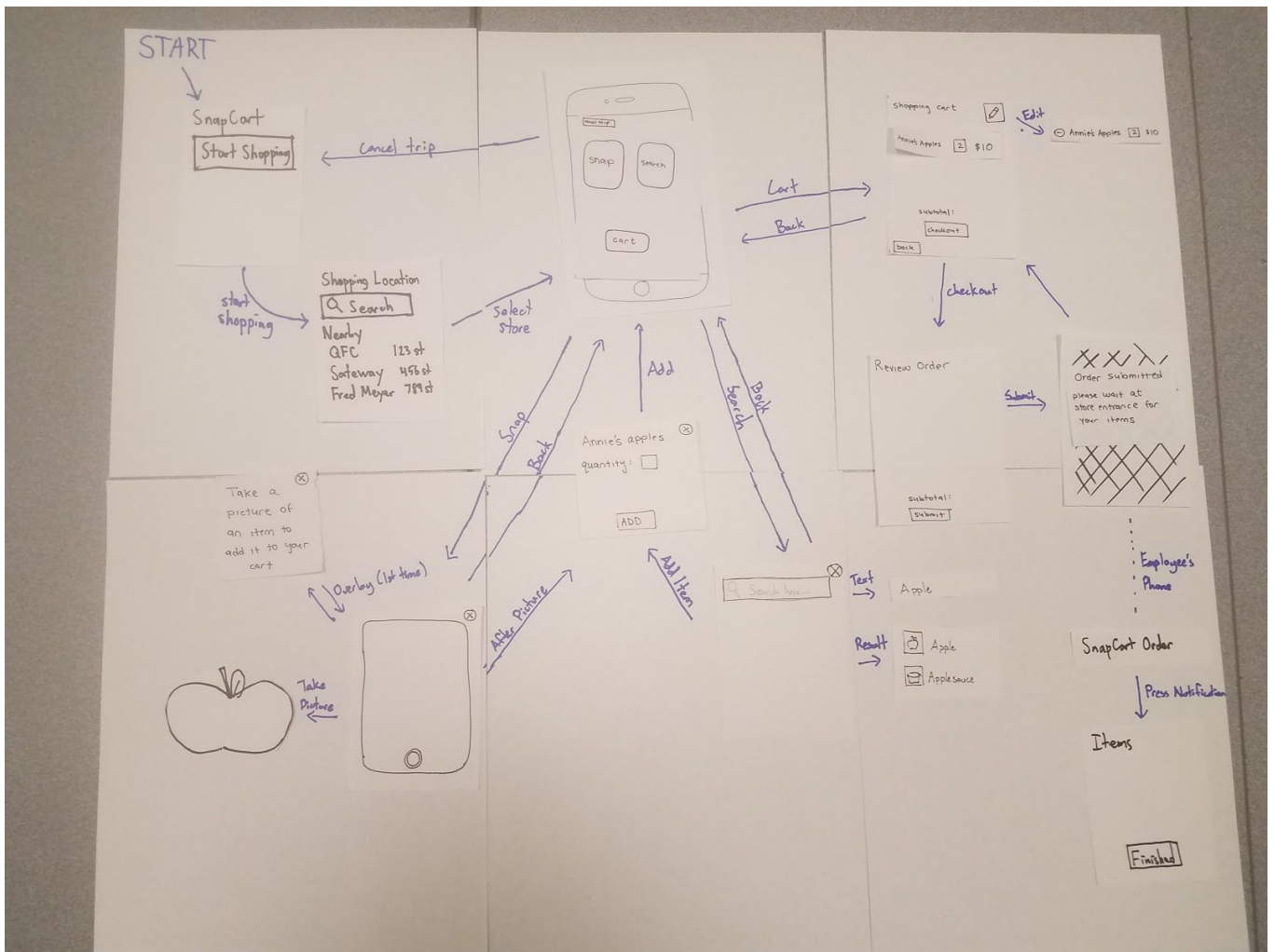
There are 1.6 million wheelchair users living in the USA, meaning approximately 1 in every 200 people require the use of a wheelchair. One of the difficulties that this community faces is grocery shopping. For wheelchair users, regular shopping trips are an inconvenience and time consuming. That being said, there are still users who want to be able to enjoy the experience of shopping at a physical store. That is why we propose the use of our app SnapCart. Our app will allow users to keep track of items they want to buy in a virtual shopping cart as they move through the store. They can add items to their cart by taking a picture of the item or by searching that item on the app. When finished shopping, the user can then pay and checkout through the app. At the exit, an employee will be waiting for the shopper with their items. Primarily, the app allows wheelchair users to shop in a physical store independently.

Initial Paper Prototype

Our initial paper prototype focused on the phone application that will eliminate the need to carry a bin on one's lap and thus create a more comfortable shopping experience by allowing the user to add items to a virtual cart. This design came to be in order to achieve the following goals:

- 1) Adding out-of-reach items to cart
- 2) Shopping for a large amount of items

The critical aspects of this design centered on being able to select one's shopping location, and start shopping by adding to cart through taking a picture of the item (using the snap feature), or by searching for the item (using the search feature). Throughout the process it was also critical that the user will be able to always check what is in their cart and edit it constantly as they went along their grocery shopping as well as checkout from it.



Testing Process

The usability test was conducted in the same way and same place for each participant. We made a list of the process the user was expected to follow for each task so that as we watch the user interact with the app to complete the asked tasks, we are aware of which step exactly was confusing and which was good. For the environment, we decided to do it in a grocery like area that is convenient for our user and that would also allow us to sit down and test the product, so we chose the hub shopping store. Below are the two tasks we asked them to complete, as well as the steps.

Task 1 : Grab items

- Step 1: click yes if they are at the suggested location / click no if they are not and search for their desired location
- Step 2: (situation: you want to grab an apple but it is out of reach) select the scan/search to look for it
- Step 3: scan/search the item
- Step 4: select the quantity desired and add it to cart
- Step 5: be able to access and look at the cart
- Step 6: edit the cart if desired (remove items/undo removal)

Task 2 : Shop for week's worth of items (more specifically a lot of heavy items)

- Step 1: (situation: you want to grab 10 big cans for the week) select the scan/search to look for it
- Step 2: scan/search the item
- Step 3: select the quantity desired and add it to cart
- Step 4: be able to access and look at the cart
- Step 5: edit the cart if desired (remove items/undo removal)
- Step 6: check out

The script we read out loud to the users changed along the testing process since we discovered that some of the wording we used was foreshadowing what we expected them to do. We also discovered that some of the steps were not organized correctly so we had to reformat their structure so that our testing process is more clear.

Our first participant was an interaction design major that is in her last year. This specific participant has had to design for accessibility many times throughout her career as an interaction design student. Our second participant is someone that is an infrequent grocery shopper, which we felt would be similar to many wheelchair users using this app in a store for the first time. Our third participant was a student that goes grocery shopping weekly at Trader Joe's, a more compact store than the alternatives. She mentioned that with carts in the way and people walking around, even she faces some difficulty getting around sometimes. Our fourth participant was a university student who lives with several roommates, and thus goes shopping on a very regular basis at a large grocery store like QFC. In addition, this participant does know some wheelchair users so she has a fair understanding of the types of difficulties they face when shopping.

Testing Results

Heuristic Evaluation

After creating our initial prototype, we paired up with the group of Nathan Lee, Rui Wu and Siyu (Pency) Pan to do heuristic evaluations. Two people from their team tested our product, and their evaluation helped us catch many issues with the app in regards to consistency and the visibility of system status. Some of the most important changes included:

- The ability to see your shopping cart after you submit an order for pickup by an employee.
- A popup confirming that an item has been added to the cart after pressing the "add" button.
- Clarifying the "Shopping Location" screen (we added a pop-up that asks if you are at a nearby store).
- Adding "back" buttons to many of the screens in the app.
- Adding a popup that informs a user what the app does when they first open it up (specifically in regards to the "Snap" and "Search" options).

Usability Test 1

Our first user walked through most of the main tasks well, but ran into some confusion when dealing with the cart. Some of the things we revised included:

- Making the Edit icon on the cart actually say "Edit", instead of just having a pencil.
- When editing, changed to button to say "Back to cart" to make it clear that is how you finish editing
- Revised the look of item amounts when editing the cart, to make it more clear that they can be changed
- The user was also confused by the "nearby store" popup we added from the Heuristic Evaluation. We decided to remove it, and just let the user pick the location themselves.

Usability Test 2

This user ran through the tasks pretty smoothly, but did run into some difficulty by not knowing what certain buttons did. Some of the changes that resulted from this test include:

- When clicking "cancel" , we let the user know what it would do and ask them for confirmation if they would like to cancel their order and shopping trip
- We added a "Help" option to the screen while a user is waiting for their order to be fetched. This will allow them to contact an employee or cancel an order if there is a problem or they are waiting too long.

Usability Test 3

This user had some questions about how the camera functions when "Snap"-ing an item to add it to the cart. We needed to consider some of the real-world cases that might arise:

- If the photo is blurry or unclear, we added a message tell the user that the picture could not recognize the item, and to please take a new picture.
- In the case where there are multiple items in a photo, we added a popup lists all the items shown, and allows the user to select the one they would like to add.

Usability Test 4

This user worked through the tasks quickly and easily, but had a lot of questions about how the app functions with respect to the purchasing process when a user checks out. This is not a part we had designed for our prototype (because it was outside the core of our tasks), but we did need to consider and design more infrastructure around the app. These changes included:

- Adding a "Create Account" page, where a user creates their SnapCart account and links a credit card to it that will be charged when they purchase items
- Adding an "Edit Account" page that allows the user to edit things about their account
- Adding an option to see past shopping trips. This way they can review what they bought before and where they went
- Added a message to the screen after a user pays. The message says that a receipt has been sent to their email. This is a common practice with many apps that charge credit cards/

Design Critique

The Design Critique in class helped us iron out some of the visual design elements to better convey what our app was trying to accomplish. These changes included:

- Making the size of buttons consistent across different screens of the app.
- Changing the locations of Back/Cancel buttons to make them consistent across the app
- Clarifying that the camera in our app is a part of the app. It is not opening up a separate camera app on the phone.
- Added a confirmation screen when you cancel an order,. We had this for some screens, but not everywhere

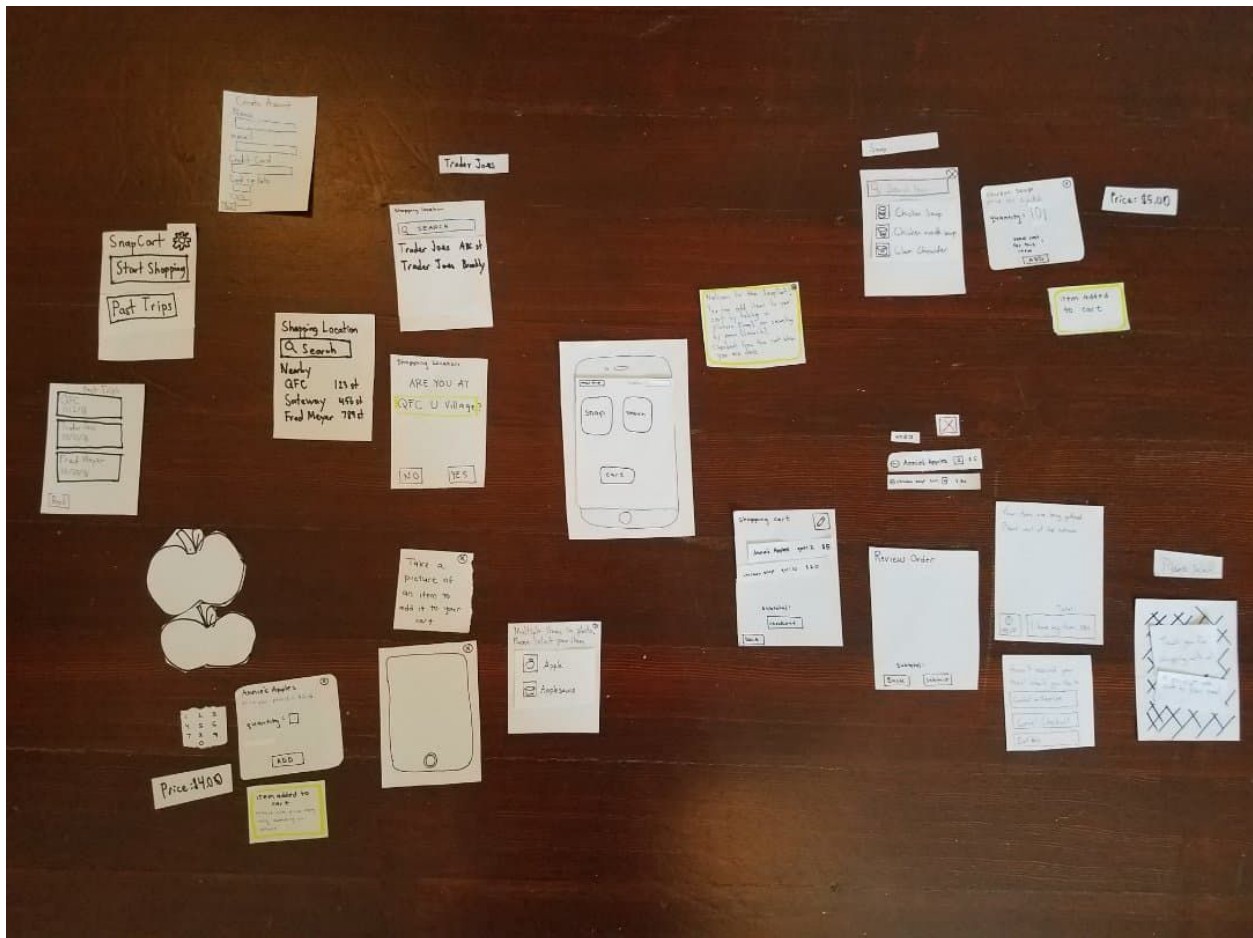
Final Paper Prototype

Our final design retained all the critical aspects of our initial design. From our test results, we found that the process for completing the tasks was sound. However, our buttons were confusing or unclear on some screens. So, the goal for our final prototype was to give the user more visibility into the system status. We added in multiple screens and popups that give the user visual feedback. These include a notification when an item is added and a post-checkout screen. Additionally, we added some error prevention screens. The “Help” popup allowed a user to cancel the entire trip in the case that their items were never delivered to them. An “Undo” button when editing the cart let users re-add items that they did not mean to remove.

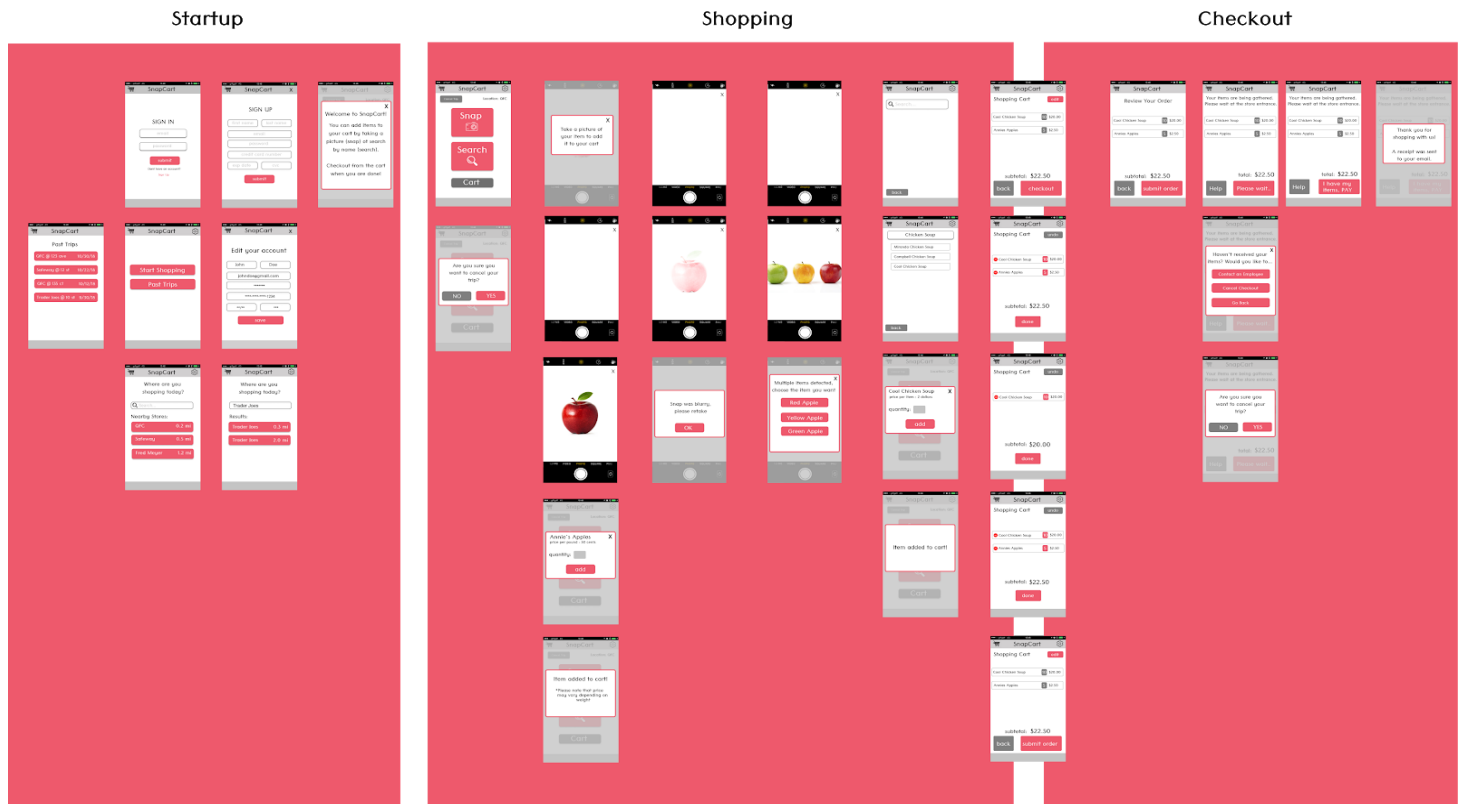
Our two tasks remained the same:

- 1) Adding out-of-reach items to cart
- 2) Shopping for a large amount of items

This design features registering one’s information into the app, selecting a shopping location, and shopping. Shopping entails either taking pictures or searching for items to add to a cart, reviewing the cart, and purchasing the items.



Digital Mockup



For our digital mockup, the biggest changes that we made were cleaning up the design from our paper prototype. We added color and a logo at the top of the app. We also fleshed out portions of the app that were not included in the original design. Some of these included the account create screens (sign up, sign in, edit account), and the past trip screens. We also had to redesign some of the screens to fit properly in a vertical phone screen. One example of this is the screen with "Snap", "Search", and "Cart". The design critique helped with consistency in button design and font across our app. We also needed to clarify that the camera mockup screens are part of an in-app camera, not a separate application.

To support the first task of adding an item that is out of reach, we have the "Snap" feature with the camera. The design shows how the user would see a camera, and be able to take pictures of the items they wish to add. The process is intuitive, as users are familiar with using photo cameras. With the digital design, we also added the cases where the photo is unclear, or multiple items are in the image.

To support the second task of adding a large amount of heavy items. We have the search feature and checkout process. Searching in the app is similar to searching in apps in general. The design shows how a user can easily add a multitude of items. Checking out through the app and then waiting for an employee to bring them the items helps the wheelchair users in such a way that they don't have to carry those heavy and or large amount of items around the store and to the register.

Discussion

We took 2 main lessons from the process of iterative design. First was that this process allows us as designers to develop the best product we can for our target audience. There is a difference between what people say about how they behave and how they actually behave in certain situations. By putting them across from a product and letting them test it allows us to see how they actually behave with that product. The more iterations that we do, the better we understand the users' behavior and thus the better the product will be at the end. The second lesson we took from the iterative design process is that it allows us to quickly understand and resolve any misunderstandings within the project team and establish clarity early in the development lifecycle. If we didn't prototype often we wouldn't know what each person had in mind for the design.

The iterative design process shaped our final design. At first, we had a very vague prototype, where we implemented the basic parts of the app we thought were necessary without thinking about too much detail. As we went along the iterative process, we discovered more and more details that we missed, or found details that we wanted to include. And thus, in each iteration we added more functionalities to our application which at the final iteration resulted in our final product.

The way we chose to implement our two main tasks in the app did not change after usability testing. What did change, however, was the clarity of these implementations. We chose to use two main features, snap and search, to allow our target audience to shop more comfortably by being able to shop for a long period of time and for grabbing out of reach items more easily. Some users were a little confused by how each feature is supposed to be used so they didn't use them, but when we explained at the end what the purpose of each one is and how to use each of them, users actually found them to be great. Therefore, we realized that it wasn't our implementation that was not working well, but it was the documentation that was lacking as we expected too much of the user. Therefore, we added tooltip type pop-ups that explain how to use each feature.

We believe that we had the right number of iterations for our design, more iterations would have had little impact on our design, and less iterations would have prevented us from catching all the small details we missed. We did very thorough research to understand our target audience, what they need, and how we can develop an app based on those needs. Based on this research and findings, we constantly talked about features we should implement but we never got to accomplish those either because we forgot, or we thought they were irrelevant. However, once we started iterating through our design, we were able to catch a lot of those features we discussed about and our last iteration actually finalized all the details we hoped to include in our design. Therefore, we believe that the number of iterations we went through was a correct amount.

Appendix

Test Script (Introduction) - Please note that the line crossed out is what we got rid of

Thank you for taking your time to test our prototype. Our prototype is an app made to help wheelchair users shop in grocery stores easier, since they sometimes experience difficulty carrying and reaching for items. ~~Our app lets you search for items or take pictures of them.~~ We are not testing your ability to understand our design. Our prototype is incomplete and may be difficult to use. So, feel free to ask questions as you use the app.

Pretend you are in a grocery store. Use this prototype to purchase a few items to the store.

Usability Test Prompts

Note: These prompts may not have been followed word for word, and not each user had all additional scenarios.

Task 1: You want to purchase some apples, but they are out of reach

Task 2: You want to purchase 10 cans of chicken soup

Additional Scenario: You want to cancel your trip

Additional Scenario: Multiple items were caught in the photo

Additional Scenario: The item could not be identified (blurry)

Additional Scenario: You want to remove a few cans of soup from your cart

Additional Scenario: You want to checkout your items

Additional Scenario: Your items haven't arrived after a long wait

Expected Task Steps (for reference during tests)

Task 1 : Grab items

Step 1: click the start shopping button

Step 2: click yes if they are at the suggested location / click no if they are not and search for their desired location

Step 3: (situation: you want to grab an apple, but it is out of reach) select the scan/search to look for it

Step 4: scan/search the item

Step 5: select the quantity desired and add it to cart

Step 6: be able to access and look at the cart

Step 7: edit the cart if desired (remove items/undo removal)

Task 2 : Shop for week's worth of items (more specifically a lot of heavy items)

Step 1: go back to the scan/search page

Step 2: (situation: you want to grab 10 big cans for the week) select the scan/search to look for it

Step 3: scan/search the item

Step 4: select the quantity desired and add it to cart

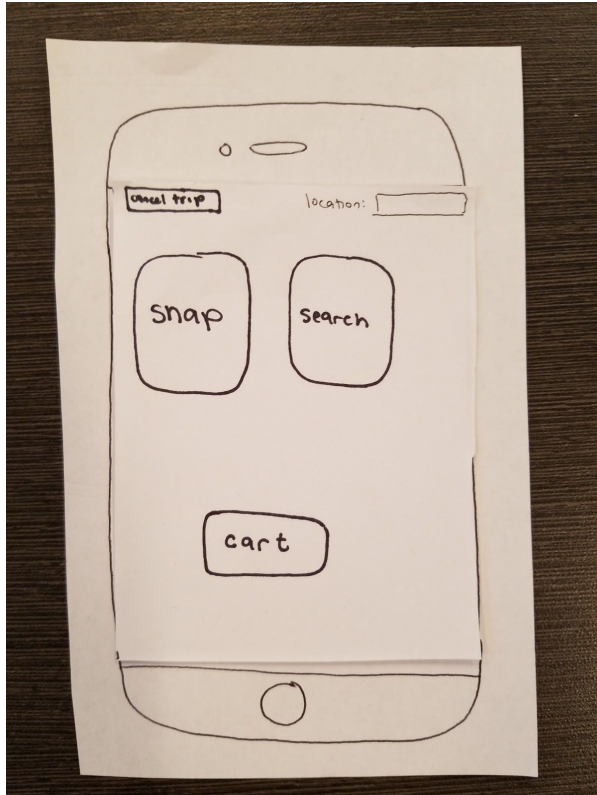
Step 5: be able to access and look at the cart

Step 6: edit the cart if desired (remove items/undo removal)

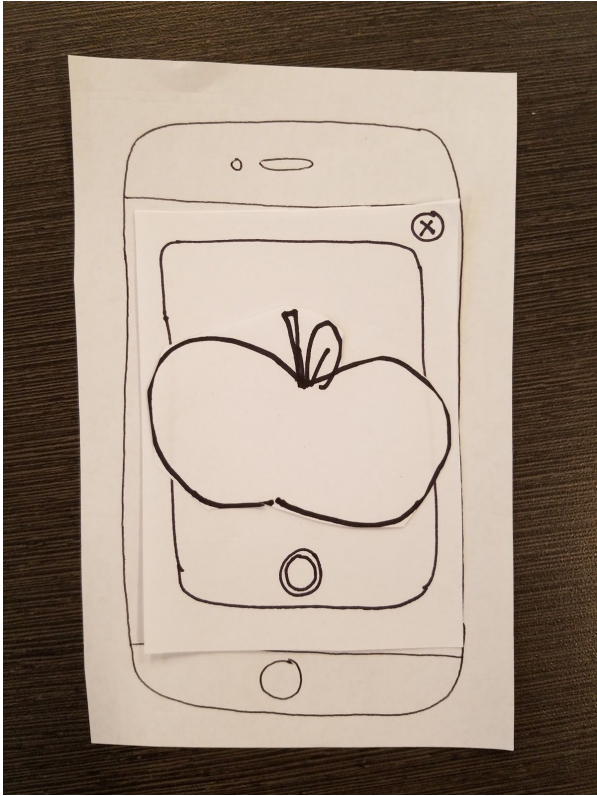
Step 7: check out

Paper Prototype Tasks

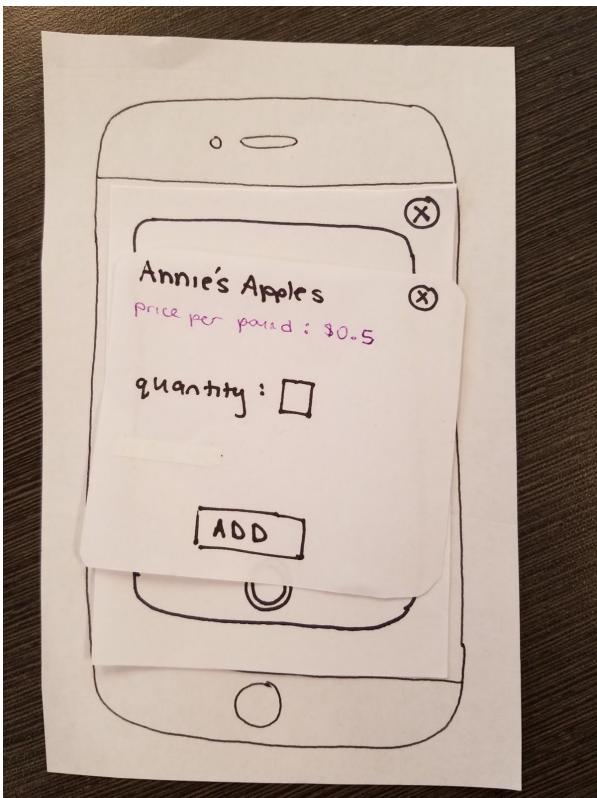
Task 1: Fetching an Item from a high shelf



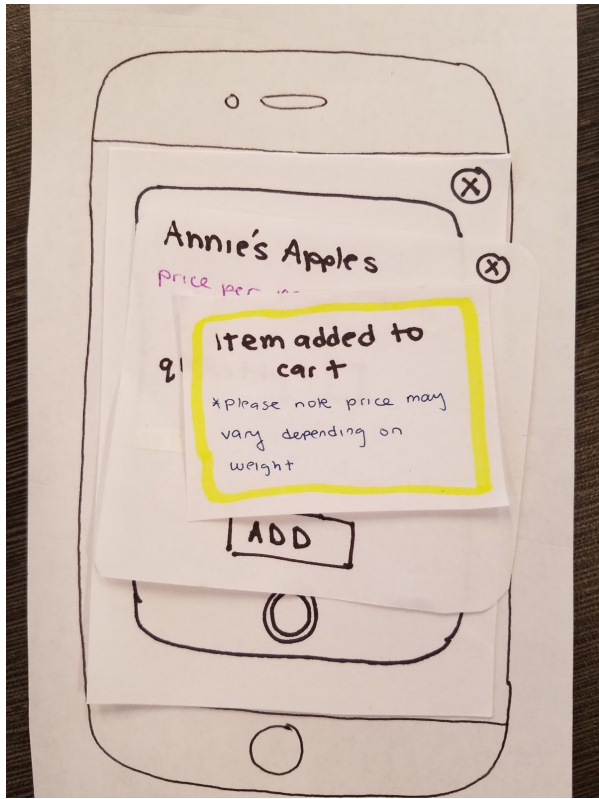
When at a store, the user may find an item that they want which is out of reach, so they decide to use the snap feature.



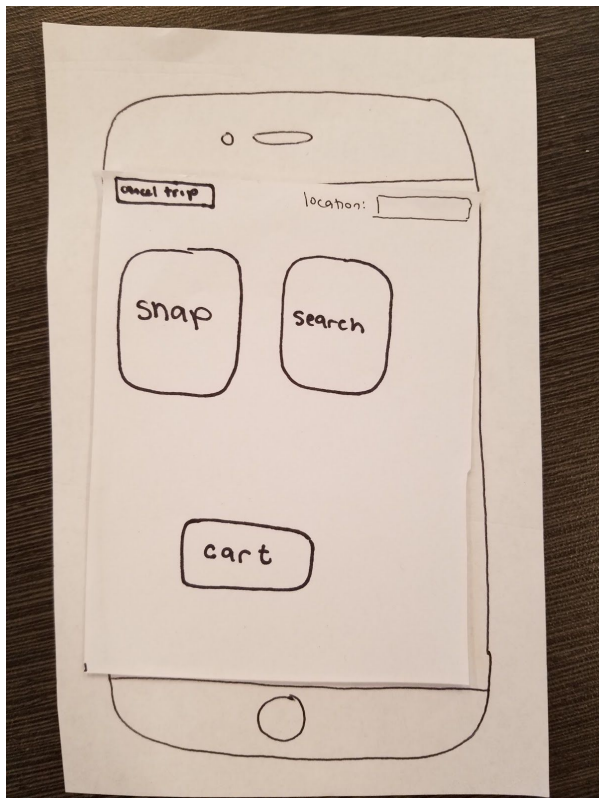
The user is prompted to take a photo of the item.



The app identifies the item and lets the user choose how many they want in their cart.

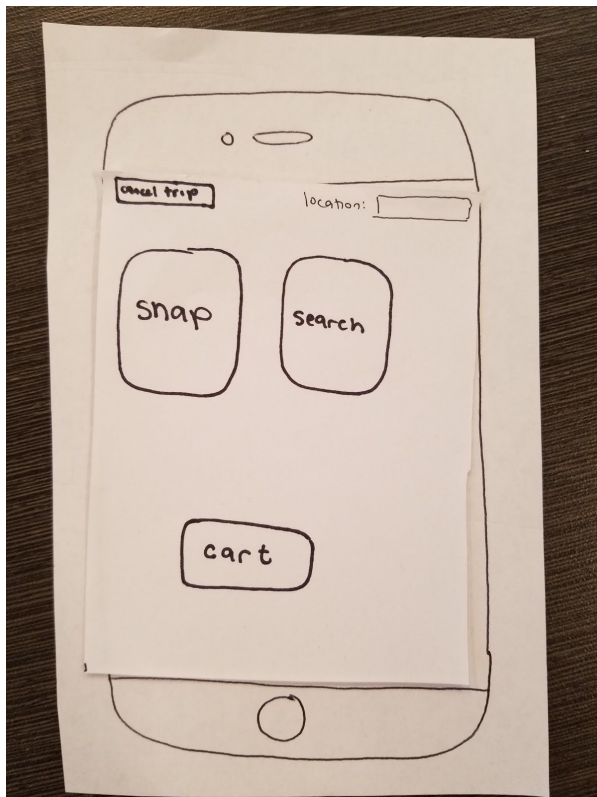


The user inputs an amount, then clicks "ADD" to add it to the cart. The app gives a notification to indicate that the item has been added.

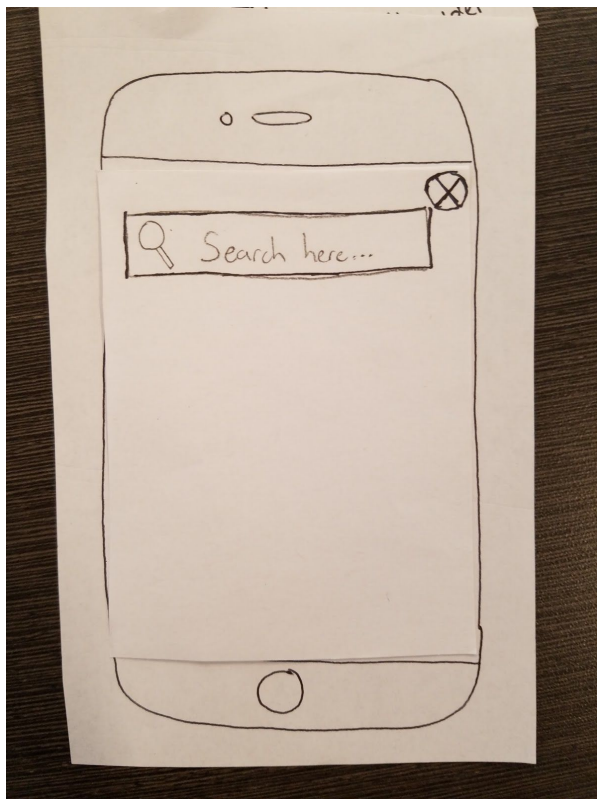


The user is taken back to the main page, where they can add more items. At the end of their shopping trip, they can checkout and these items will be fetched for them.

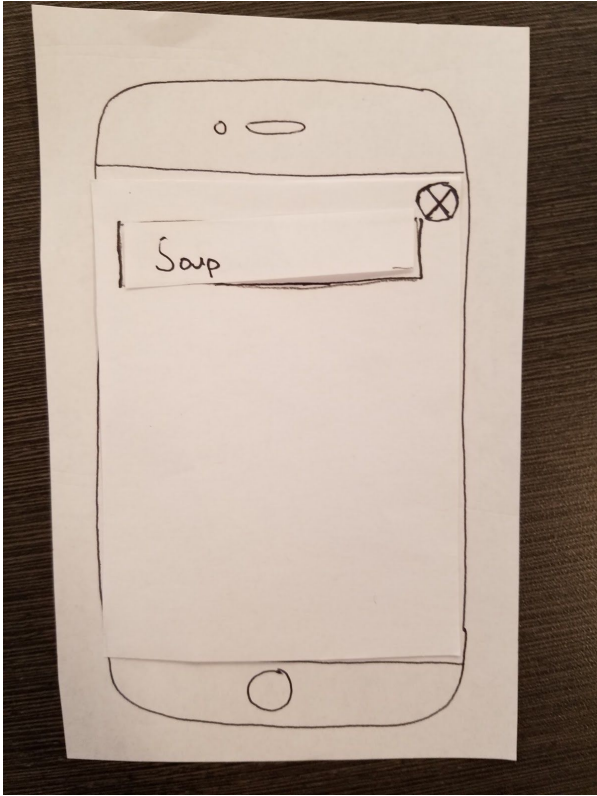
Task 2: Shopping for a week's worth of food



SnapCart allows the user to add as many items as they want to their virtual cart. This user decides tap on "Search" to use the search feature.



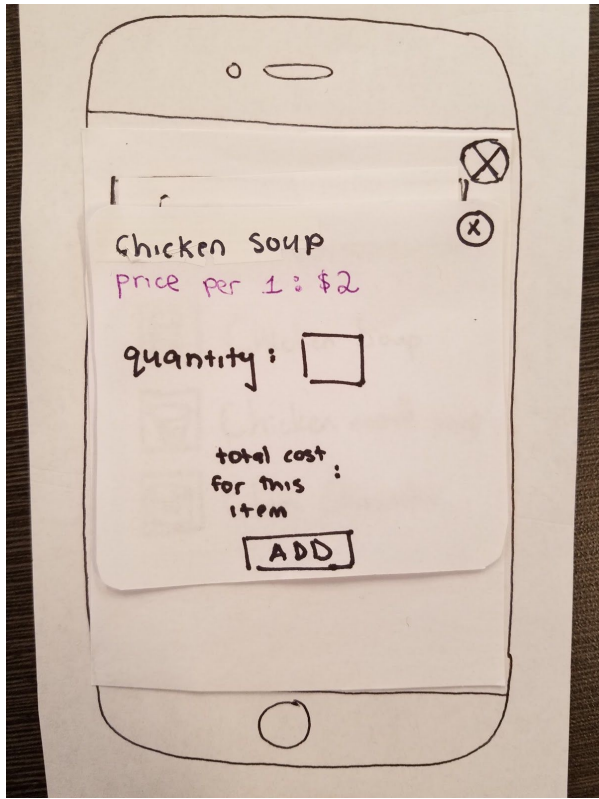
The app changes screens to a search page, where the user can look up an item.



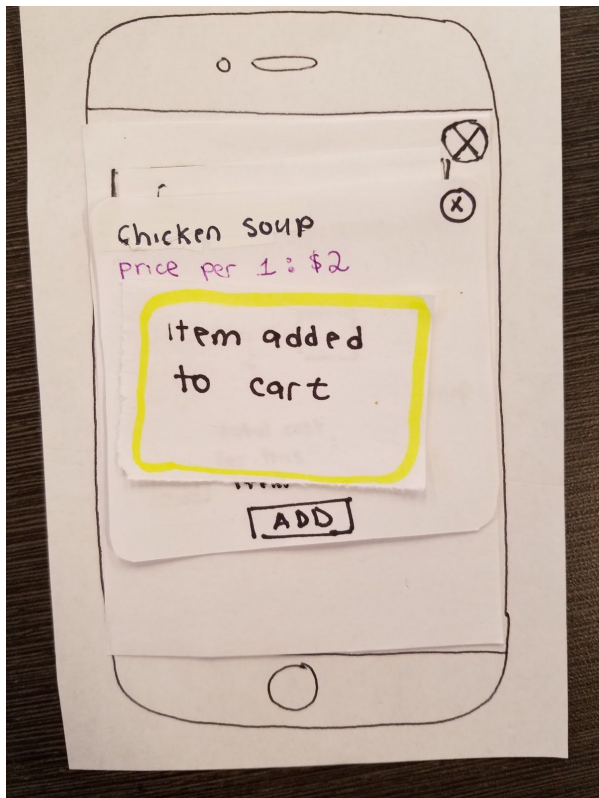
The user enters in "Soup" in the search bar.



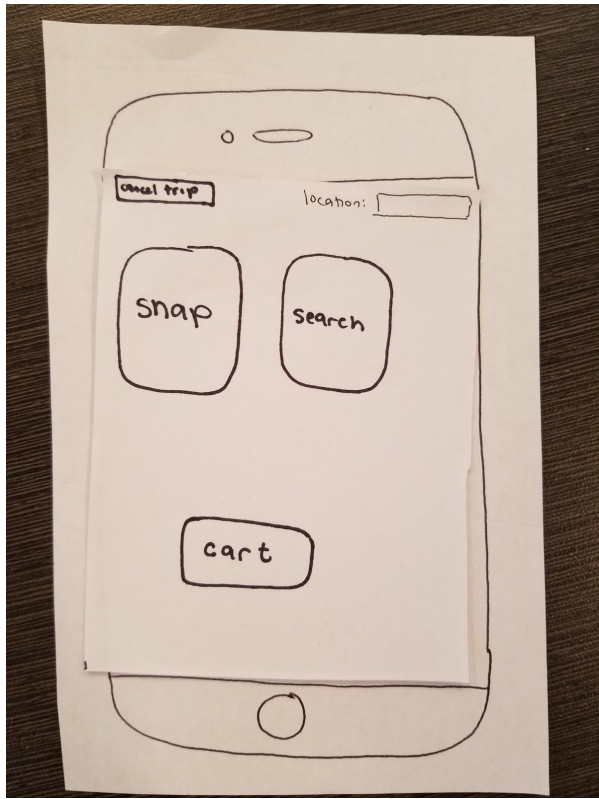
The results come up for different types of soup in the store.



The user selects "Chicken Soup" and is prompted to add a number of cans to their cart.



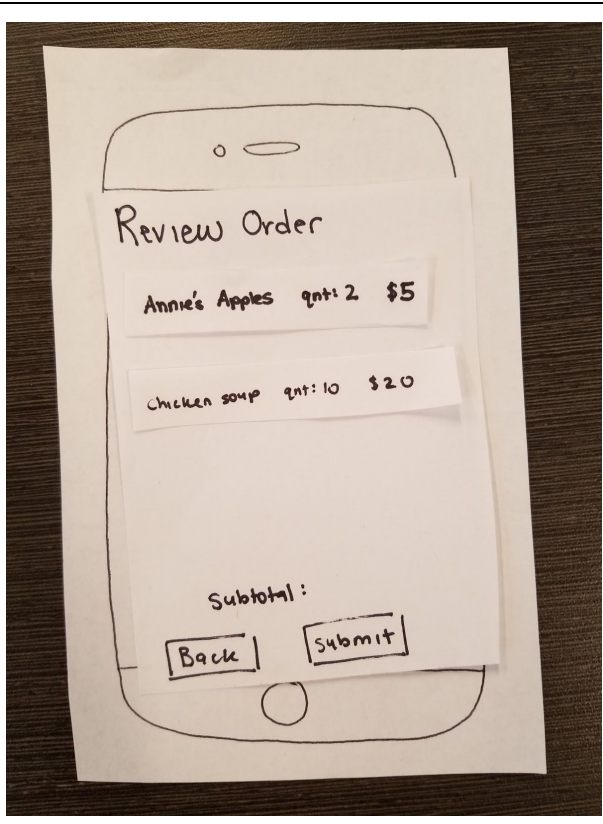
After entering a quantity and hitting "Add," the app notifies the user that the item has been added.



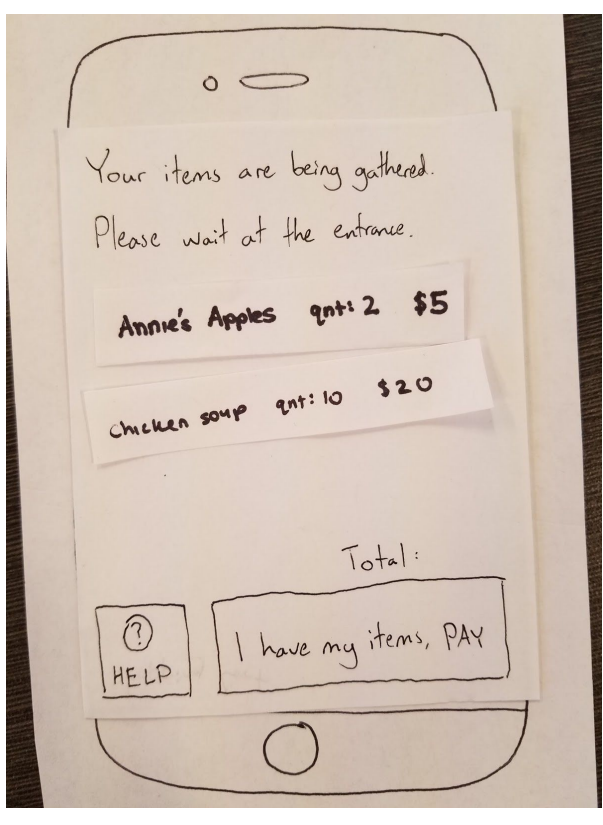
The user is taken back to the main page. From here, they could use the “Snap” feature to get some apples (see Task 1). Like this, the user can use both the “Snap” and “Search” feature to add as many items to their virtual cart as they want. After finding all the items they want, the user can tap “Cart” to view their items.



Seeing all the items there, the user will checkout by hitting the “Checkout” button.



From there, they can review their order and "Submit" it. An employee will go around and retrieve all the items in a basket or cart.



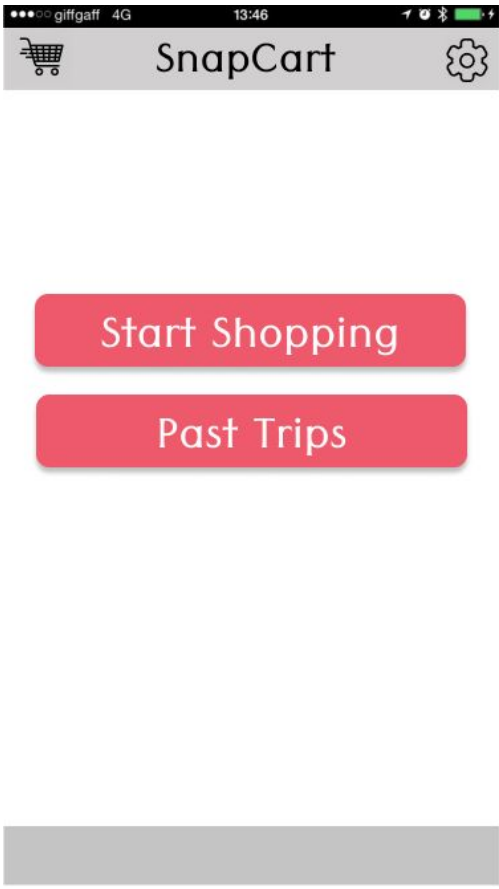
When the items have been retrieved, the user pays by hitting the "I have my items, PAY" button.

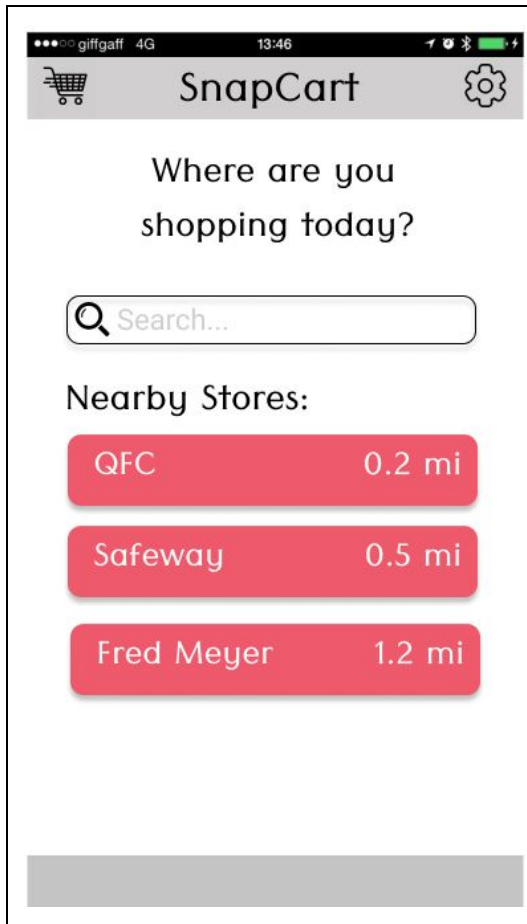


Now, the user has all the items that they wanted without worrying about carrying that volume of items through the store

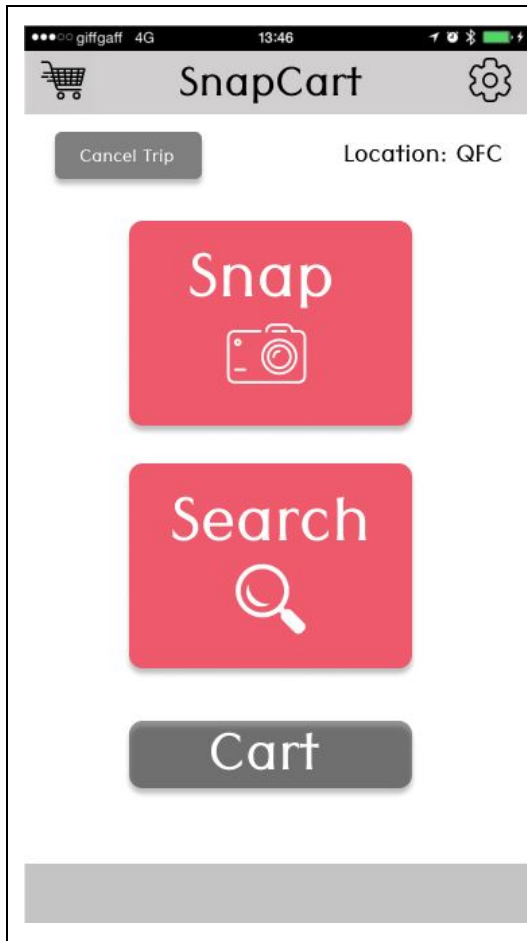
Digital Design Tasks

Task 1: Fetching an Item from a high shelf

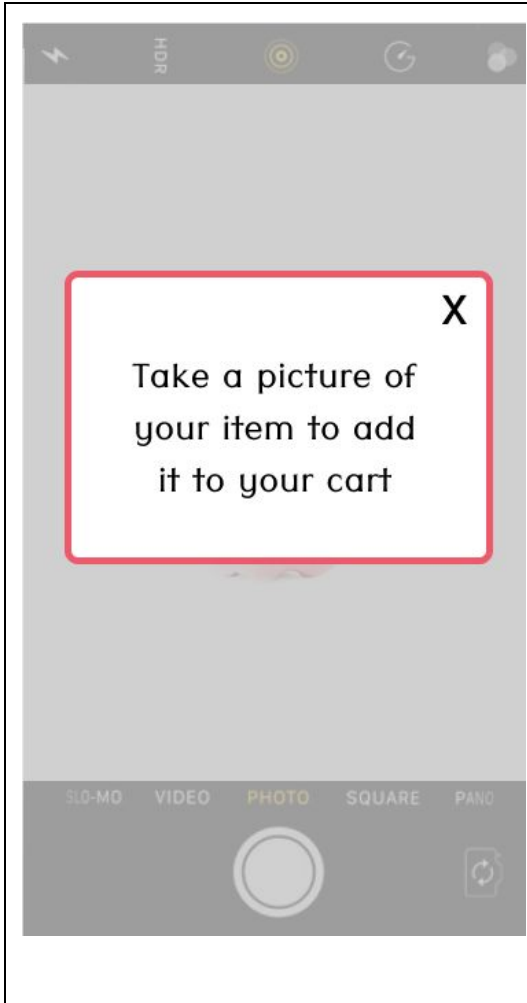
 <p>The image shows a mobile application interface for 'SnapCart'. At the top, there is a status bar with 'giffgaff 4G', the time '13:46', and various system icons. Below the status bar is a header with a shopping cart icon, the text 'SnapCart', and a settings gear icon. The main content area features two prominent red buttons: 'Start Shopping' and 'Past Trips'. At the bottom of the screen, there is a grey horizontal bar representing a mobile home indicator.</p>	<p>The user arrives at the store, and selects the option to Start Shopping</p>
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They see the option to search for a store, as well as a few that are listed nearby based on their location. They select the QFC as the store they are at.

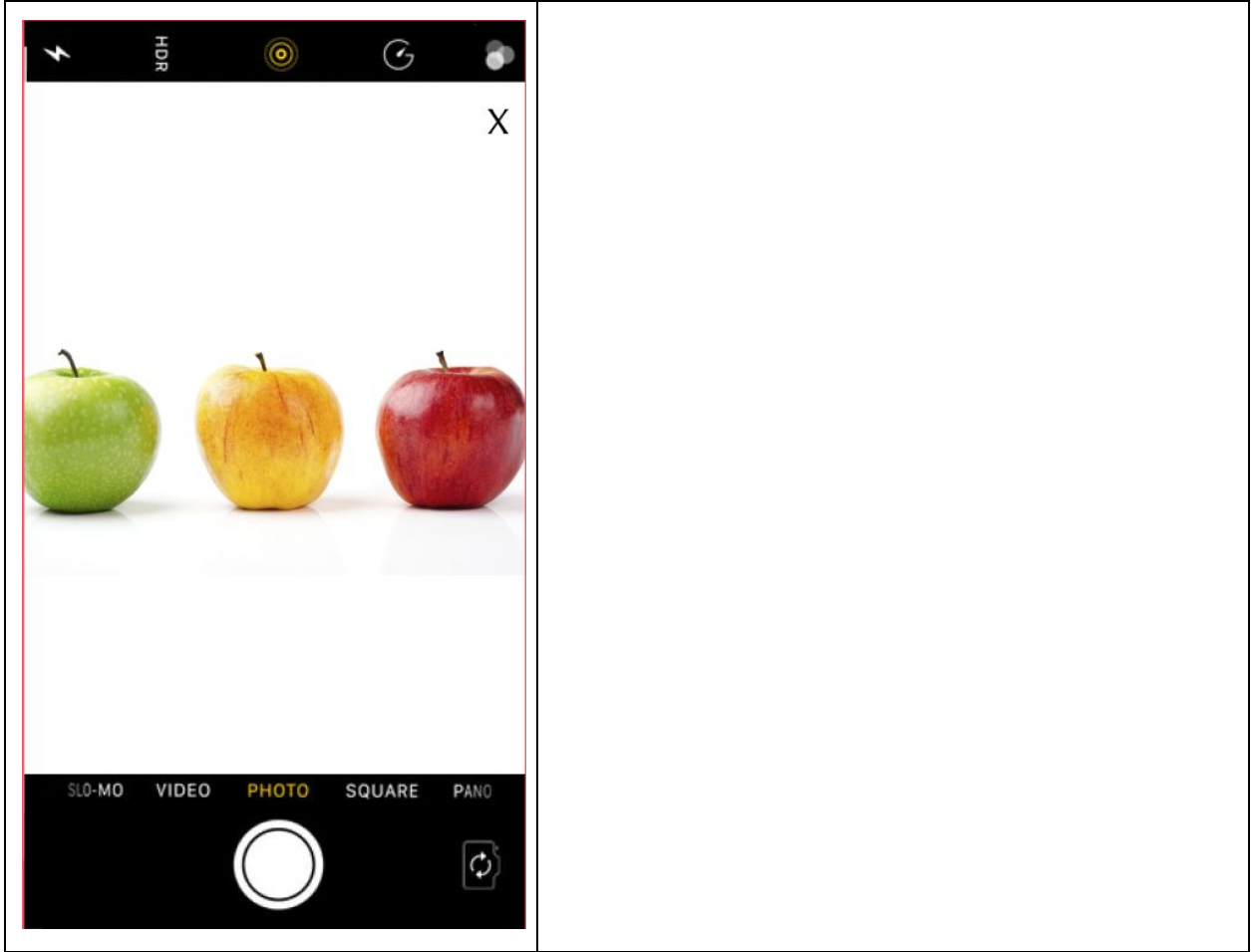


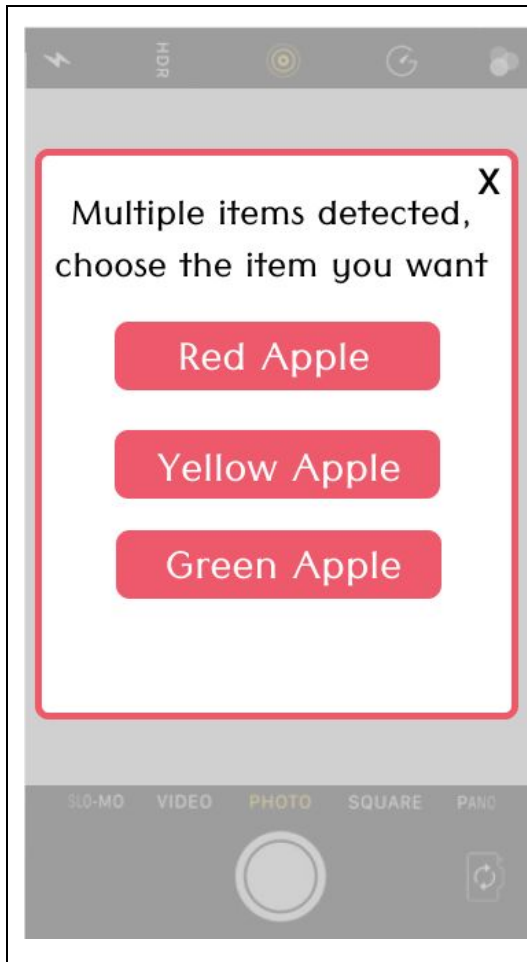
They are taken to the main page of the app. From here, they can choose to “Snap” or “Search” to lookup an item. For this example, the user hits “Snap.”



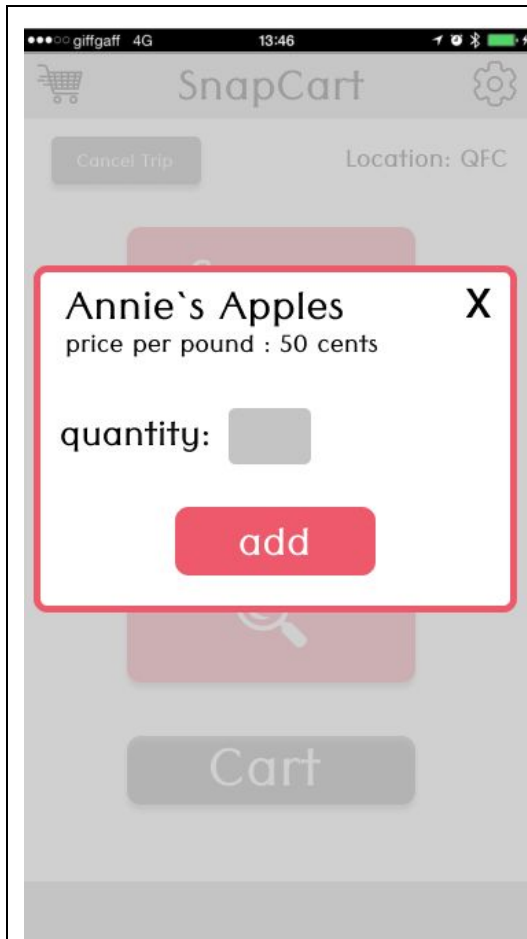
The user is prompted to take a photo of the item.

(continued)





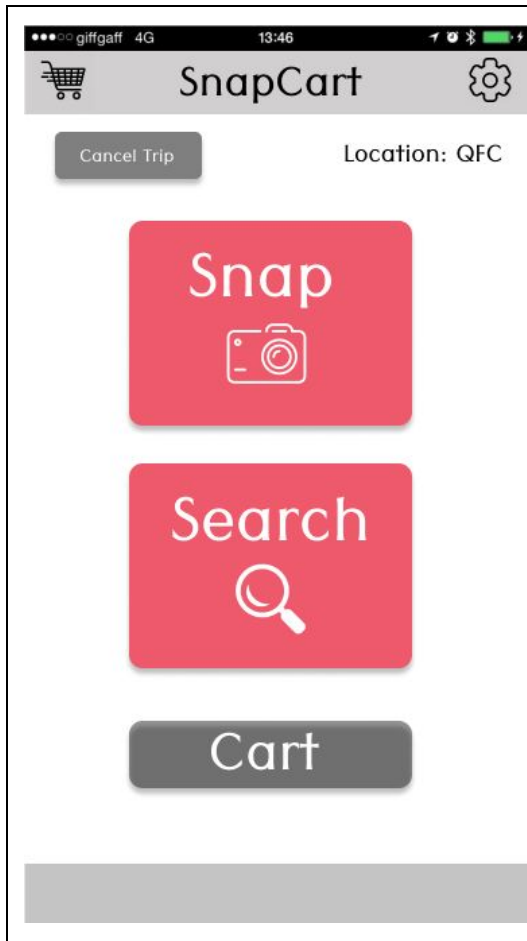
However, in this picture the user took, there were multiple items. The user is prompted to select the correct item from a list of items in the photo



The user is then prompted to choose how many they want in their cart.

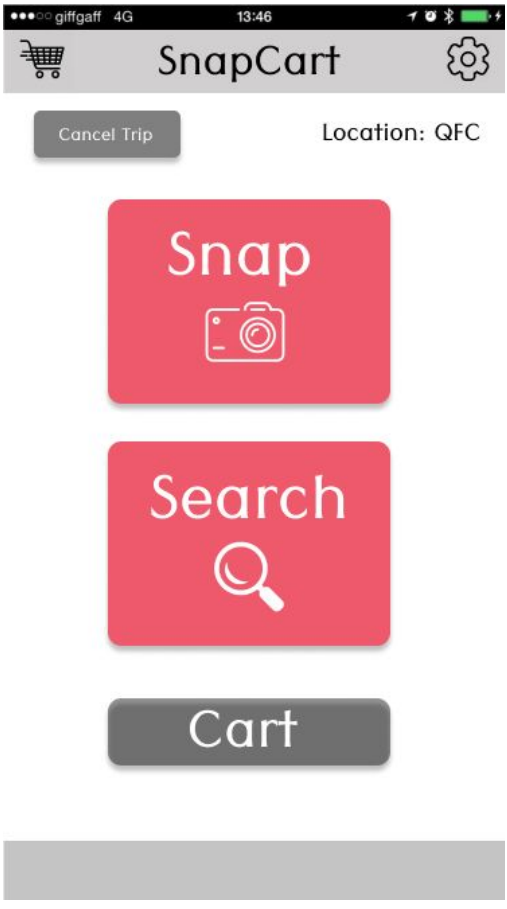


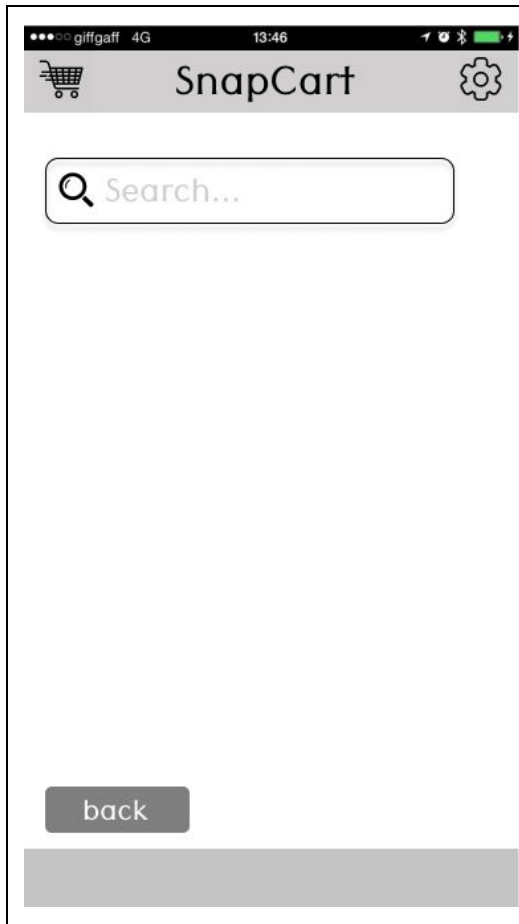
The user inputs an amount, then clicks “ADD” to add it to the cart. The app gives a notification to indicate that the item has been added.



The user is taken back to the main page, where they can add more items. At the end of their shopping trip, they can checkout and these items will be fetched for them.

Task 2: Shopping for a large amount of food items

	<p>SnapCart allows the user to add as many items as they want to their virtual cart. This user decides tap on "Search" to use the search feature.</p>
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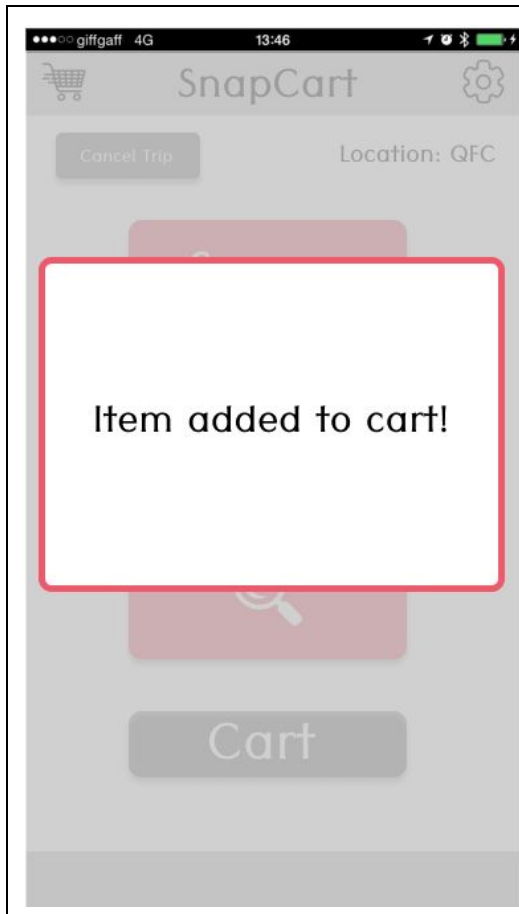
The app changes screens to a search page, where the user can look up an item.



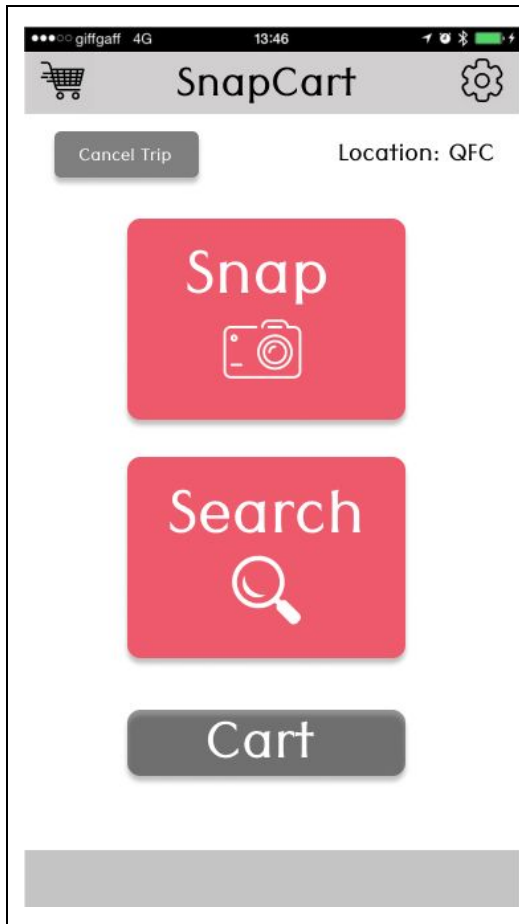
The user enters in "Chicken Soup" in the search bar. The results come up for different types of chicken soup in the store.



The user selects “Cool Chicken Soup” and is prompted to add a number of cans to their cart.



After entering a quantity and hitting “Add,” the app notifies the user that the item has been added.



The user is taken back to the main page. From here, they could use the “Snap” feature to get some apples (see Task 1). Like this, the user can use both the “Snap” and “Search” feature to add as many items to their virtual cart as they want. After finding all the items they want, the user can tap “Cart” to view their items.



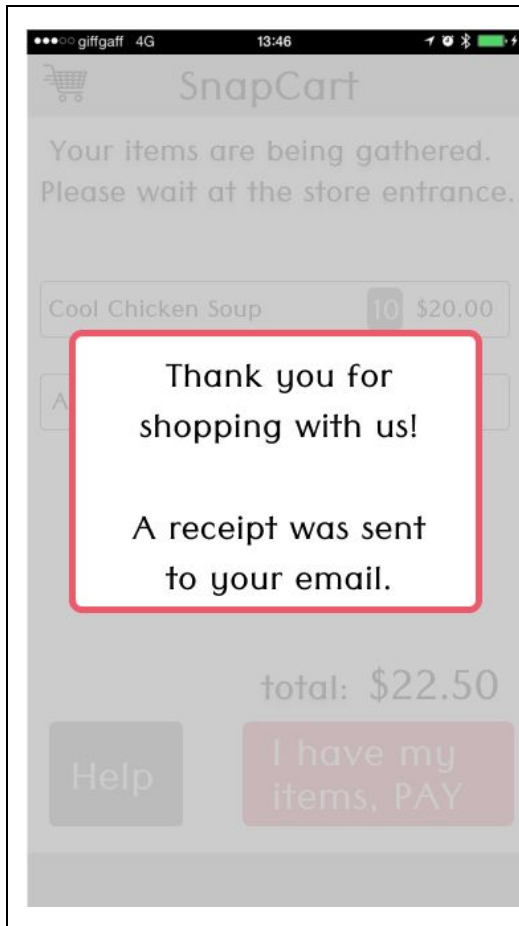
Seeing all the items there, the user will checkout by hitting the "Checkout" button.



From there, they can review their order and hit “Submit order.” An employee will go around and retrieve all the items in a basket or cart.

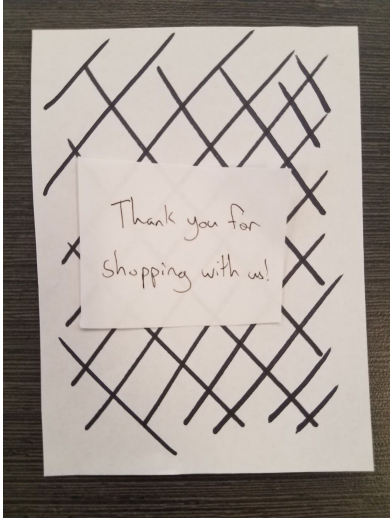
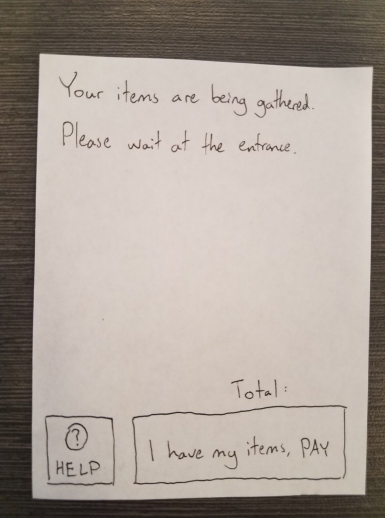
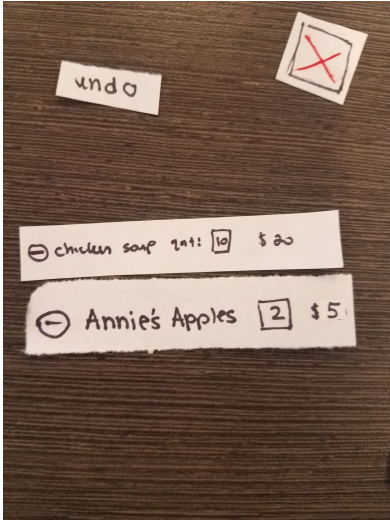



When the items have been retrieved, the user pays by hitting the “I have my items, PAY” button.

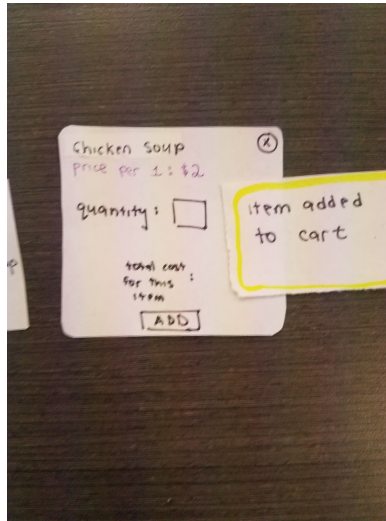


A digital receipt is sent to the user's email. Now, the user has all the items that they wanted without worrying about carrying that volume of items through the store.

Issues from Heuristic and Usability Testing

Before	After	Description
 <p>A hand-drawn prototype on a grid background. A central white box contains the text "Thank you for shopping with us!".</p>	 <p>A hand-drawn prototype on a dark background. The text reads "Your items are being gathered. Please wait at the entrance." Below this, there is a "Total:" label, a "HELP" button with a question mark icon, and a "I have my items, PAY" button.</p>	<p>Visibility of System Status (Sev 2) Go back to shopping cart after submitting order.</p> <p>We added another screen after the order is submitted, that shows the user their order after they submit it.</p>
 <p>A hand-drawn prototype of a shopping cart list on a dark background. It includes an "undo" button, a red 'X' icon, and two items: "chicken soup qnt: 10 \$20" and "Annie's Apples 2 \$5". A box is drawn around the quantity "2" for Annie's Apples.</p> <p>The box is the one around the quantity, between the item name and price</p>	 <p>A hand-drawn prototype of a shopping cart list on a dark background. It includes a "Shopping cart" header with an edit icon, two items: "Chicken soup qnt: 10 \$20" and "Annie's Apples qnt: 2 \$5", a "subtotal: \$25", a "checkout" button, and a "back" button. A box is drawn around the quantity "2" for Annie's Apples.</p>	<p>Consistency and Standards (Sev 2) Show box around quantity only in edit mode.</p> <p>In our initial design, items had a box around their quantity. We removed the boxes around the quantity when just in the cart. It will be more clear that items can only be edited when in "Edit mode"</p>

N/A

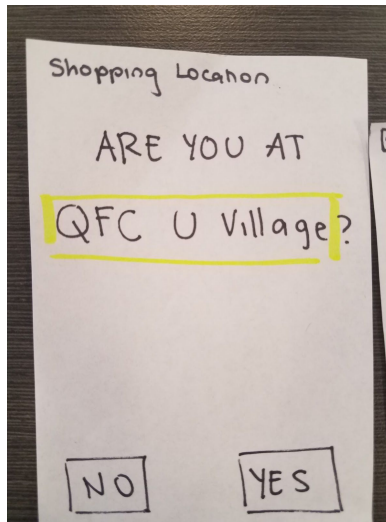
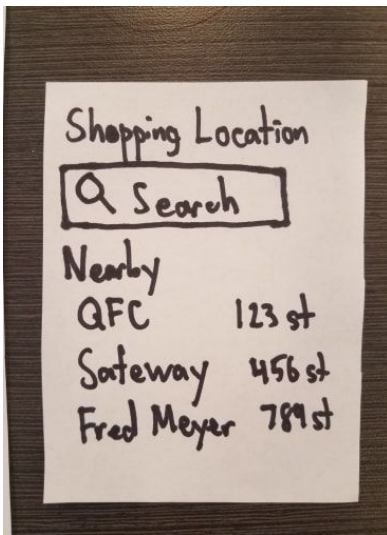


The popup (highlighted in yellow), would appear at the center of the screen

Visibility of System status (Sev 2)

Confirmation when user added an item.

We added a popup that saying that an item has been added after adding it to the cart.





Help and documentation (Sev 1)

Searching location.

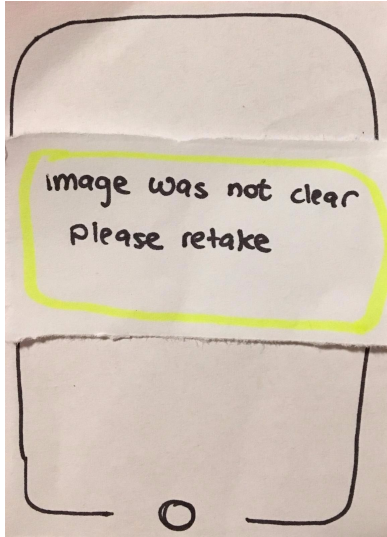
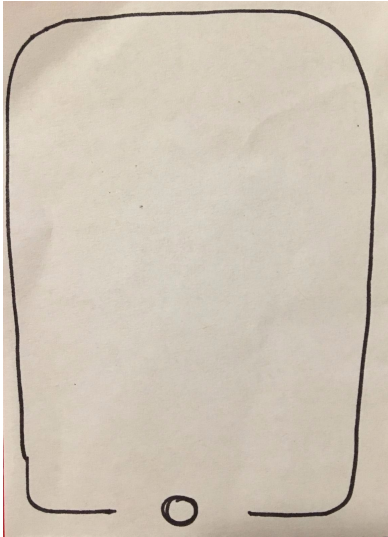
Wasn't quite sure what "Nearby" meant on the search page when selecting a store. Added a message asking you if you are at the location that is closest to you.

	N/A	<p>Flexibility and Efficiency of use (Sev 2) System doesn't allow shopping with app and grabbing items together.</p> <p>So, we thought about this, and shopping for items physically is still possible. The app does not prevent a user from also grabbing items that they may want (like specific fruits and veggies).</p>
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Before	After	Description
		<p>Choosing store location unclear Severity:5</p> <p>User did not know where "yes" and "no" would take her, so she didn't know what to select.</p> <p>Revision: we chose to go back to our original location selector page</p>

<p>Shopping Cart </p> <p>Chicken soup qnt: 10 \$20</p> <p>Annie's Apples qnt: 2 \$5</p> <p>subtotal: \$25</p> <p><input type="button" value="checkout"/></p> <p><input type="button" value="back"/></p>	<p>Shopping Cart <input type="button" value="edit"/></p> <p>Chicken soup qnt: 10 \$20</p> <p>Annie's Apples qnt: 2 \$5</p> <p>subtotal: \$25</p> <p><input type="button" value="back"/> <input type="button" value="checkout"/></p>	<p>Edit icon is unclear (part 1) Severity: 3</p> <p>User was not fully sure the pencil icon was edit</p> <p>Changed icon to the word "edit" so that it is more clear</p>
<p>Shopping cart </p> <p>Annie's Apples qnt: 2 \$5</p> <p>Chicken soup qnt: 10 \$20</p> <p>subtotal:</p> <p><input type="button" value="checkout"/></p> <p><input type="button" value="back"/></p>	<p>shopping cart <input type="button" value="back to cart"/></p> <p>Chicken soup qnt: 10 \$20</p> <p>Annie's Apples qnt: 2 \$5</p> <p>subtotal: \$25</p>	<p>Edit icon is unclear (part 2) Severity: 3</p> <p>User did not know how to go back to regular mode after finished editing</p> <p>Changed the "X" icon to the words "back to cart"</p>

Before	After	Description
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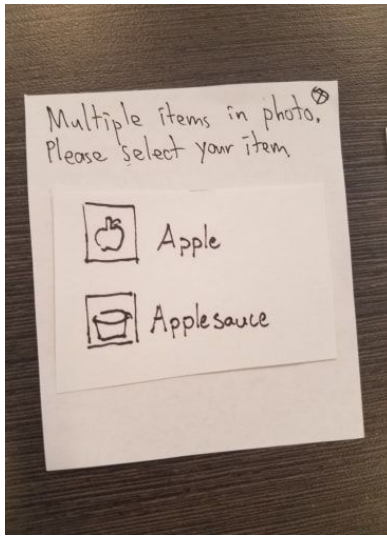
Error Handling

Severity: 3

Catch the error when the user takes a blurry picture that cannot be understood

We revised the product to include a pop up that asks the user to take the picture again

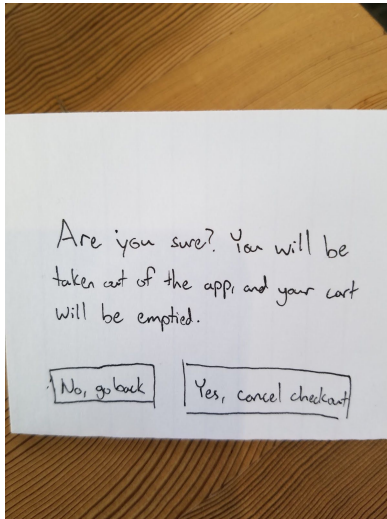
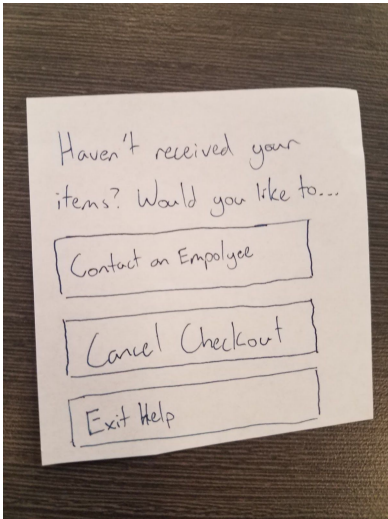
N/A



Error Handling (Positive)

We added a notification to handle the case where the user might take a picture with multiple items inside.

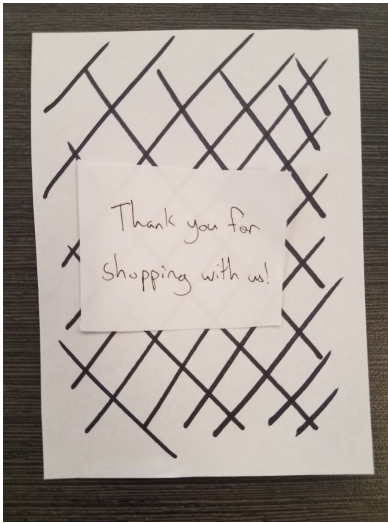
This turned out to be clear, and the user had no problem selecting the item that he wanted to buy.



Error Prevention

Severity: 4

When clicking "Cancel" at any step, we want to let the user know what the button would do, since canceling the trip when the user does not mean to would be very time consuming and frustrating.



**Visibility of System status
Severity: 4**

It is common convention that when you pay through an app with any businesses, you get an email receipt. It is important that we notify the user that they have been emailed a receipt, so they can view their order.

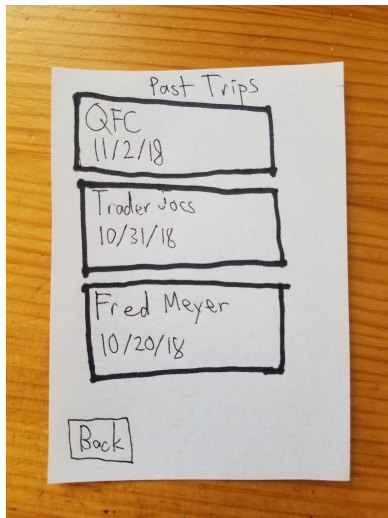
We added to the message after checkout, saying that an receipt has been sent to their email



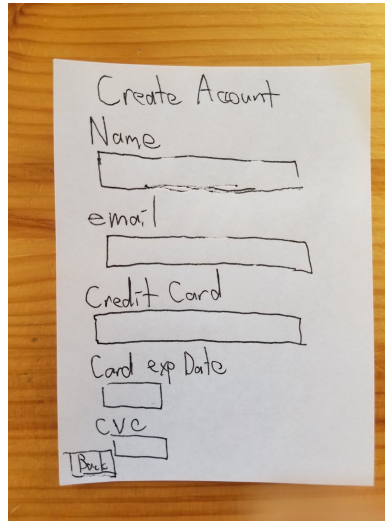
**Recognition rather than recall
Severity: 2**

One of the comments from our participants stated it would be very useful to be able to review past shopping trips from the app. We agree, and initially left out this feature as it was not part of the initial critical path of the app.

We added a mock screen of what the "Past Trips" would look like. This is something that will be fleshed out more in the high fidelity prototype



N/A



**Help and documentation
Severity: 2**

A participant asked about what the sign-up looked like for this app (in regards to how you pay). We initially didn't have this as part of the prototype, as it was built with the assumption as user already has an account, but in our high fidelity prototype we will need that information.

We added a few screens for creating an account. The user would also be able to edit their account from the homescreen.