



# MetaGrocer

**Crowdsourcing Grocery Shopping App**

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## Problem and Solution Overview

Grocery shopping is something that almost everyone has experience with, typically of the negative kind. When shopping, it can be infuriating to come into a store and see the prices of the items you want to buy be either more expensive than they were the last time you came in, or cheaper (meaning you wasted money). Almost everyone knows that coupons and other ways to save exist, but few people actually go out of their way to use them due to the incredible inconvenience of clipping out physical coupons or printing out PDFs from poorly designed coupon websites. As we found during our research, college students and young people tend in general to not bother with these coupons, even though paradoxically they are the people who could benefit from them the most. While some grocery stores do now have apps that allow customers to save more conveniently, it's not in the interest of the grocery store to make these apps that useful so frequently they are lacking and (of course) only deal with one store at a time.

Our solution to this problem, MetaGrocer, is an app that uses crowdsourcing to maintain a database of current product prices and coupons across all major and local grocery stores. In conjunction with a shopping cart phone holder, this app's database allows for quick price and coupon retrieval for any item that a customer might want to buy. This allows the customer to scan items and automatically receive any applicable coupons, while also enabling them to contribute to the database with just a couple clicks.



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## Design Research Goals, Stakeholders, and Participants

### Research Goals

We used contextual inquiry for our design research. This was done for a couple reasons, based upon how people go about their shopping trips. There are two phases. First is the planning phase, where the participant makes some sort of list tracking what items they need and where they can go to buy them. After that comes the execution of the trip, where the participant may sometimes deviate from their plan and make impulsive purchases or discover an item is no longer in stock. It is for the second step that we used contextual inquiry, as it was useful to observe the spur of the moment actions that the participants sometimes took. However, the first phase is more difficult to observe as it often takes place in the home, if at all. To gain some information about the preparation that the participants do for shopping trips, we asked questions before or during the start of the contextual inquiry about any preparation that may have been done for the current trip. Through this, we get a sense of both stages of a shopping trip.

### Stakeholders

We chose to conduct our design research on students living off-campus without a dining plan. We did this for a couple reasons, in addition to them being readily available. The first is that students are particularly interested in saving money. Quite often, students try to live very frugally. Given that many do not have a regular form of income, they try to cut expenses where they can. Even when they do come into money, student debt looming over their shoulder provides encouragement to save it. As such, saving money regularly on grocery trips would be of interest to them. Secondly, students are often short on time as well. Handling coursework leaves little time to squeeze every cent of savings out of each shopping trip. Combining this with other activities such as clubs or part-time jobs worsens the problem. Both of these factors lead to students being particularly interested in our design.

### Participants

Our first participant, Kyle, is a biology student at the University of Washington. He shops once a week and has no access to a vehicle. He uses the Safeway app on his phone to find coupons as well as create a sort of makeshift shopping list based on currently available deals. We observed Kyle's grocery shopping routine at the Safeway on Brooklyn, less than 2 blocks away from where he lives. We observed him as he traveled around Safeway choosing the items he wished to buy, searching for in-store deals and clearance items in the process.



Our second participant, Mandy, is also a senior at the University of Washington. She is majoring in Public Health, and normally shops at Safeway or Trader Joe's. When asked why she chose the grocery stores that she did, her main reasons were travel convenience and price. We also noticed that Mandy did not have brand loyalty, but was generally concerned with finding the cheapest products that were also on her mental grocery list. Mandy told us that though she received paper coupons on a regular basis, she did not use them because she always forgot to bring them, and found them to be a hassle. She told us that she would be willing to contribute to crowdsourcing grocery data if it meant that she got better deals because of it.

Our third participant, Hiep, is a senior at University of Washington, majoring in Computer Science. He does not own a car. He normally shops at Safeway because of its convenient location. He also shops at Uwajimaya for their wide variety of Asian foods. Like our other participants, Hiep also chooses grocery stores based on travel convenience and price. During the contextual inquiry and interview, he told us that he did not think looking up coupons was worth the time for the money it saved.



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## Design Research Results and Themes

### **Time vs. Money**

A large influence on the participant's decision of where to shop was the store's physical location. Naturally, the shoppers chose to buy items at stores that were close to where they lived. The participants would also save time in other ways, such as shopping at clusters of stores in a single trip. Participants also had the desire to save money. This was accomplished through price comparisons between stores, comparisons between brands, or through the use of electronic coupons. What differed amongst the participants was in what order these two aspects were prioritized. Some chose the closest store and then took actions within that store to save money. Meanwhile, others would forego a closer store of a similar type to instead shop farther away at a store with generally cheaper prices. How these needs are prioritized varies from participant to participant

### **Large Stores Get the Business**

All of the participants shopped at relatively large grocery chains as opposed to smaller, more local stores. There are two aspects to this decision. The first is that a large store is more likely to have all the items that a shopper is looking for. Local stores don't have the shelf space or the funds to stock as much of a selection of items as a bigger store. Due to this, in order to maximize the chances that a store has what is wanted, participants will shop at the larger store. The second area in which larger stores have an advantage is advertising. Larger stores are able to better communicate with the customer what they are selling. As such, in cases where the shopper is making a decision on where to go for an item, they may not even know that a local store is selling it. Both of these aspects make it difficult for shoppers to decide to go to local grocery stores, and there is room to improve the shoppers exposure to these local businesses.

### **Trip Preparation**

Of our three contextual inquiry participants, only one began their shopping trip with a recorded shopping list. We also noted as we moved around the grocery stores, that most people did not have a shopping list in their hands or in their cart. For this reason, we expect that most people come to shop without a written pre-defined list. Even Kyle, who did have a predefined list in the form of saved coupons in the Safeway app, deviated from it on a few occasions to get items that he decided were good deals. Meanwhile, both Mandy and Hiep had mental lists, giving them some sense of direction as they entered the store. Mandy even chose not to buy a jar of salsa because even though she wanted it, it was not on her mental list.



## **Little Brand Loyalty**

All our contextual inquiry participants displayed a lack of brand loyalty. They all chose to consider price over brand when selecting an item to buy. This was the case for a wide variety of items purchased, from yogurt to tofu. This helped us understand what people do and do not value when determining what to purchase, and emphasized the importance of a good price.



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## Answers to Task Analysis Questions

### 1. Who is going to use the design?

Primarily, we envision young adults and college students using our design. They frequently tend to want to save money while shopping, and are not generally averse to trying out new technological solutions to their problems.

### 2. What tasks do they now perform?

Based on our research, the majority of the tasks our participants perform either before or during shopping are price-related. They compare price tags of similar items to find the cheapest ones, walk through the store comparing sale prices to normal prices and use various grocery stores' apps (such as Safeway) to acquire coupons and prepare a shopping list.

### 3. What tasks are desired?

Our research indicates that tasks that have the potential to save people money without consuming much time are desired. Such tasks include easily finding stores that have a person's desired items, finding where to buy an item cheapest, and receiving coupons without having to go to the effort of clipping them out of coupon books or printing out coupon pages from websites.

### 4. How are the tasks learned?

The tasks are primarily learned from participants watching their parents shopping while growing up. While some may also learn about sales and new apps from their friends / roommates, it seems that formative experiences shopping growing up strongly impact how people shop.

### 5. Where are the tasks performed?

Some people prepare for their shopping trip at home beforehand by using apps, sites, and other methods of research to find deals. Additional "research" is performed at the store by looking at prices. From our research, it seems that many people feel that the time cost of preparing for their trip (clipping coupons, etc.) is not worth the reward of



slightly cheaper groceries, so many just try to save as much as they can while they're at the store.

## **6. What is the relationship between the person and data?**

The purchase history and a person's contributed information about grocery prices are collected to personalize their experience by showing them more relevant information.

## **7. What other tools does the person have?**

Some shoppers use individual store chains' apps (such as the Safeway app) or websites in order to create a shopping list and find savings, or coupon booklets. Other than that and word of mouth regarding sales (via friends or other acquaintances), there isn't really much out there.

## **8. How do people communicate with each other?**

It seems that people generally don't communicate much with each other about shopping for groceries right now. Sometimes friends will tell each other about sales or limited edition items that are currently available, but otherwise it seems to be generally a personal matter. People usually don't tell each other what they buy, and they don't have a reason to.

## **9. How often are the tasks performed?**

The task of shopping is typically performed somewhere between once and twice a week. Our participants tend to prepare for shopping pretty much exclusively on the same day that they shop (if they even prepare at all).

## **10. What are the time constraints on the tasks?**

Most importantly, checkout time cannot be increased. If our method of saving our customers money inconveniences other shoppers, it is not viable. Additionally, data input for our crowdsourced price/sale/product database should be logged within a day of purchase in order to ensure that our data does not get stale. Data collection must also be easy and rapid (basically instant) in order to encourage participation, since it's vital to the core of our application. If this ends up being impractical and data entry requires more time, we will have to reward participants more heavily (which is something that we could do, but obviously is not desirable). To this end, we integrated part of our abandoned





smart-device design (the phone clip for use with shopping carts/baskets) into our app to make the process of scanning items and coupons as fast as possible.

## **11. What happens when things go wrong?**

Sale information is only useful when it is up-to-date. If it is not, people might waste time going to stores that don't have what they want or waste time looking for deals that don't exist. Since the information our app provides will be heavily relying on the contribution from our users, our team needs to ensure that users are motivated enough to crowdsource prices quickly and frequently either through rewards or an extremely elegant method of recording this data.

## Proposed Design Sketches - “3x4”

### Time Saving App

This design saves the user time by suggesting a grocery store that is on the way to the user’s destination and has all the items on the user’s shopping list as can be seen below for task 4. Instead of looking through paper coupons before going to the grocery store, the user can quickly scan items with the phone’s camera while putting them into the shopping cart and access the coupons at checkout in order to apply them and save money. The simple design for this is shown under task 2. To prevent the user from wasting time going from store to store in search of a rare item, the app allows the user to see where the closest store is that has that item in stock, as can be seen below task 5. If the item is very far away, the user will be given a warning. To ensure that the user does not buy bad produce that will need to be thrown out, the app will give a warning if the item being scanned has been rated poorly by previous shoppers, as can be seen under task 6.

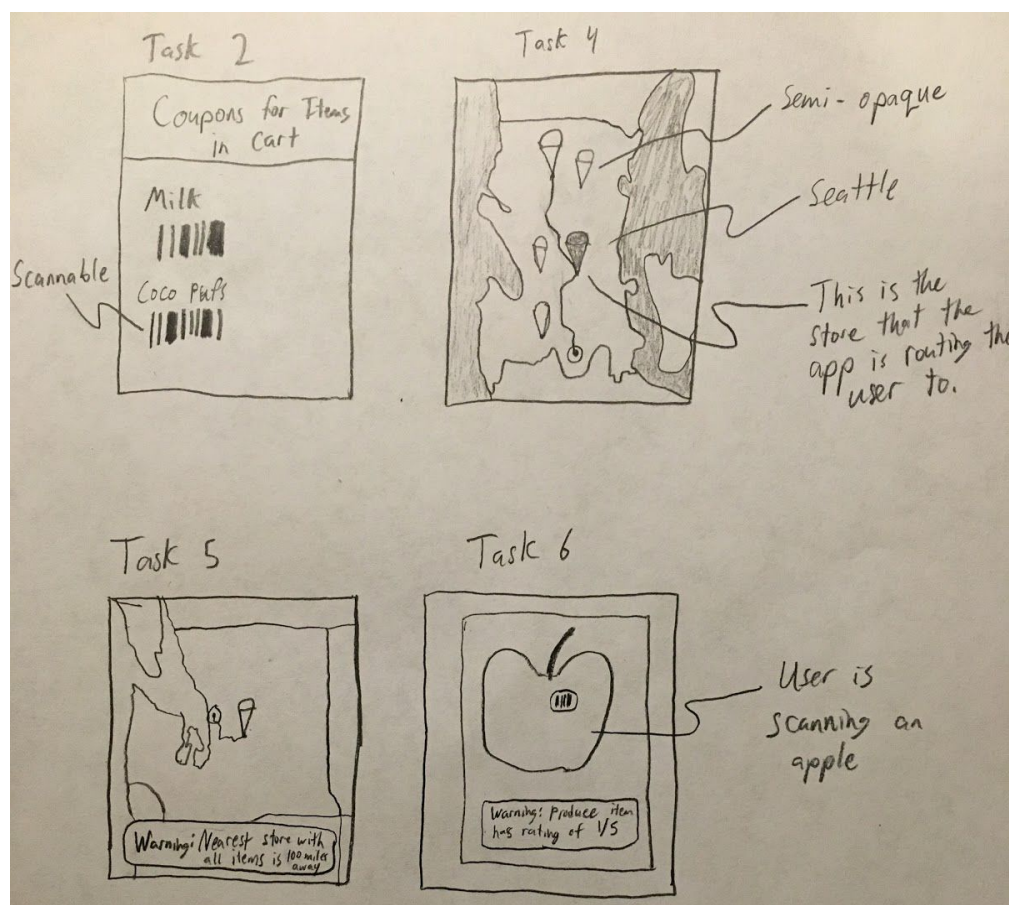


Figure 1. Time saving app design

## Smart shopping clip + Website

Our second design contains two components: (1) a smart shopping hardware that can be clipped onto shopping cart or basket, (2) a web interface that allows users to input information. The shopping clip has a display, buttons to select and confirm, a barcode reader, a gps, and a buzzer. It communicates with website through wifi. This design allows users to get coupons based on their shopping lists, which are entered into the website by the user. The user enters their shopping list into the website. Based on what the user chooses for the grocery store locations, the website then returns a list of available coupons to the user. The list can be emailed to user to be printed. The design can also fit a shopping trip into a day. The user enters their shopping list AND their list of destination locations into the website. Then they use the smart shopping clip to select a destination from the list of destination locations. The clip suggests the best store between the current location and destination to shop at.

When the user puts an item into their shopping cart or basket, the smart clip scans the item and records the item availability at the store. When the user logs into their account on the website after their shopping trip, they will be notified that they have contributed to our item availability database.

Lastly, this design supports reviews functionality (as shown in Figure 2c). When the user scans an item in store, the clip will warn them if the quality is bad. The warning also takes place on the website when they add a bad quality item to the shopping list. The user can rate previously scanned / purchased items on the website.

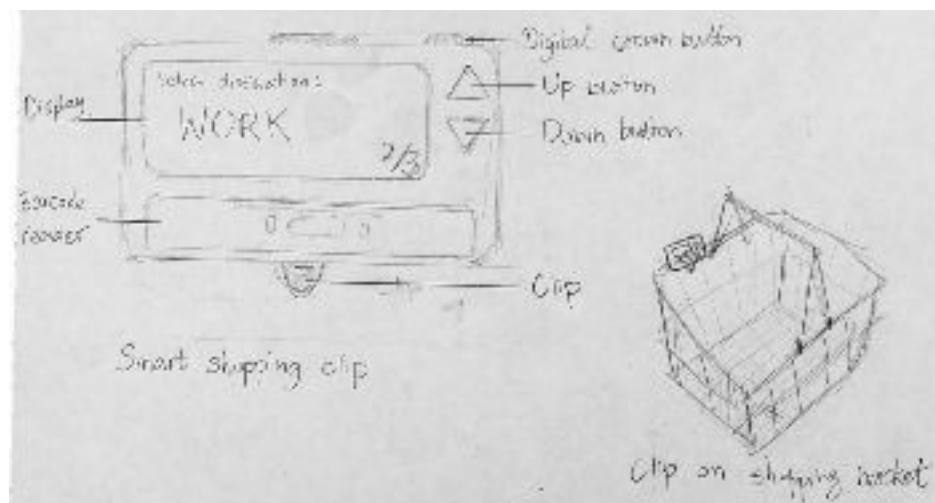


Figure 2a. Shopping clip design

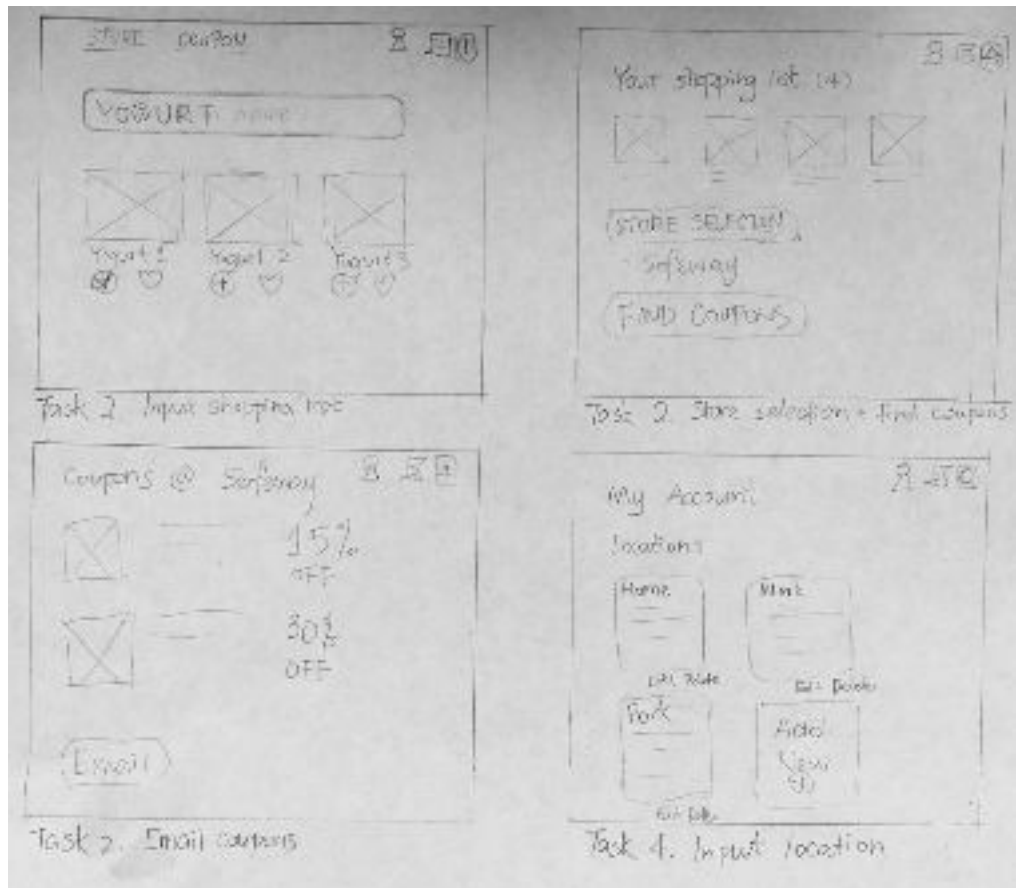


Figure 2b. Shopping clip design - tasks

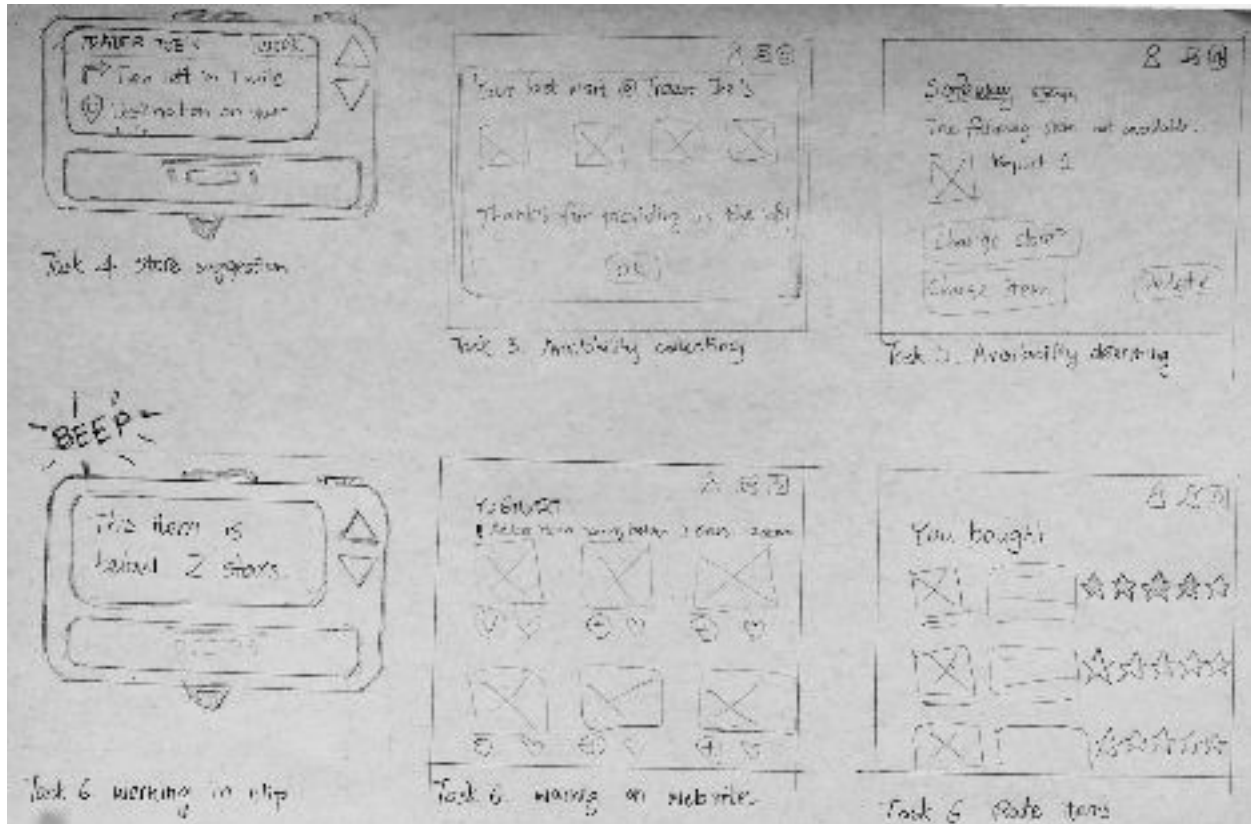
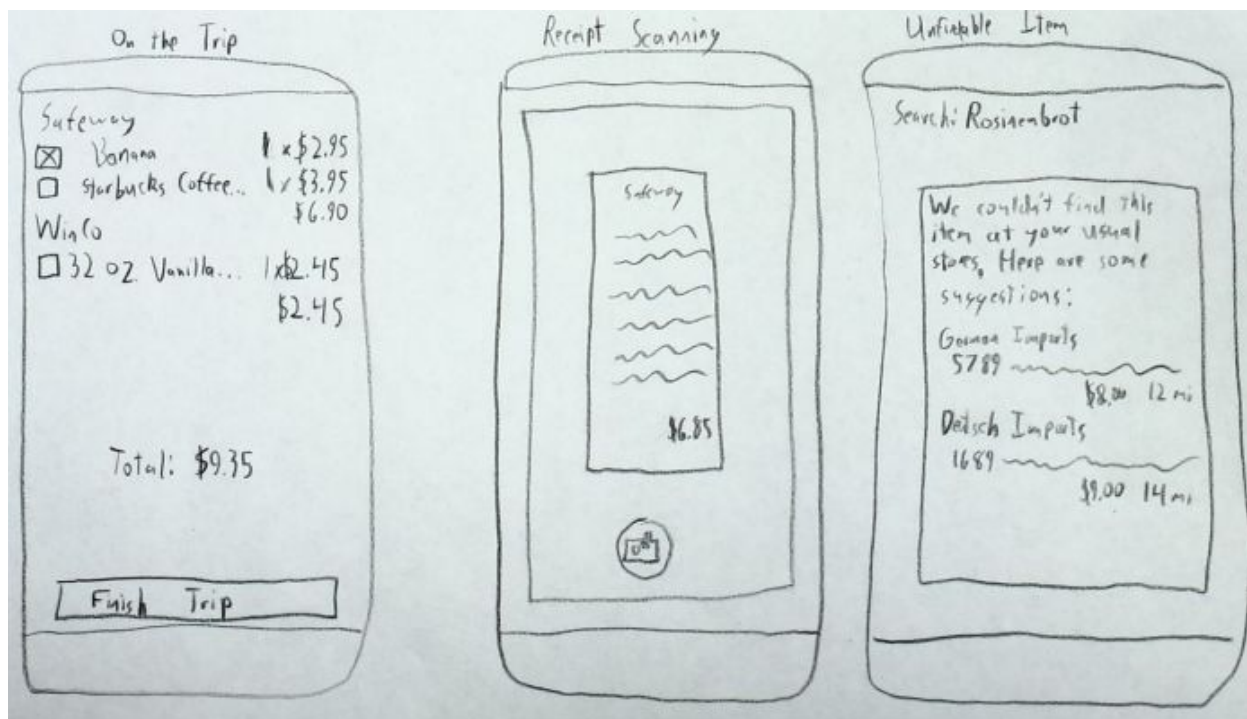
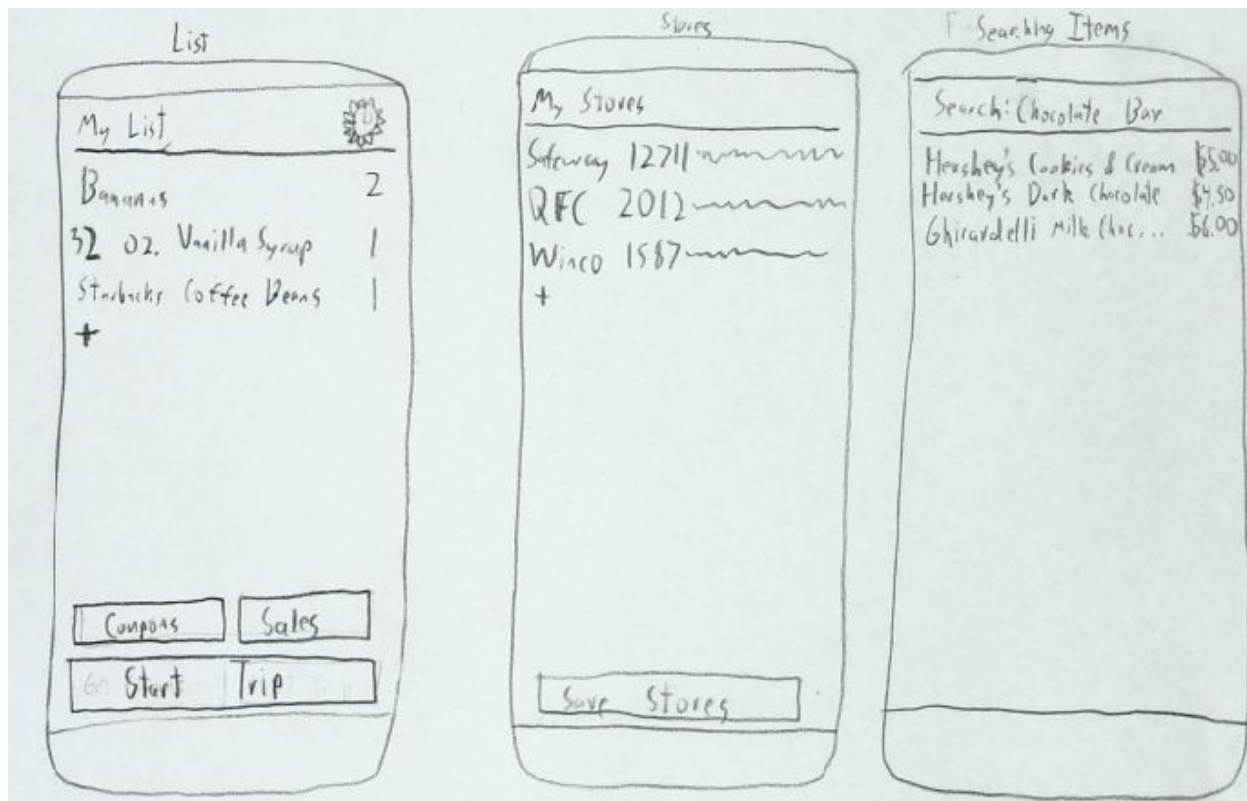


Figure 2c. Shopping clip design - tasks

## Money Saving App

This design for an app focuses most on the money saving tasks. Users begin by selecting what stores they are willing to shop at. This is done once when the app is installed, although it can be edited later. For each trip, the user creates a list of the groceries they want. If an item isn't offered by any of the selected stores, the app will suggest other stores and display their price and distance. These items can also be selected to view statistics such as price history or current sale percentage. The app uses this list to compile a selection of coupons. These are sent to the user's email to be printed. Once the list is complete, we then use crowd-sourced data to determine the best store to buy each item at. The app then divides the shopping list into sub-lists for each store. When the user begins their trip, a list of deeply discounted items at those stores will be displayed as well. To gather the data that makes the app possible, users take a picture of their receipts. This provides us with store address, item names, and prices. We also use the phone's GPS to verify the location.



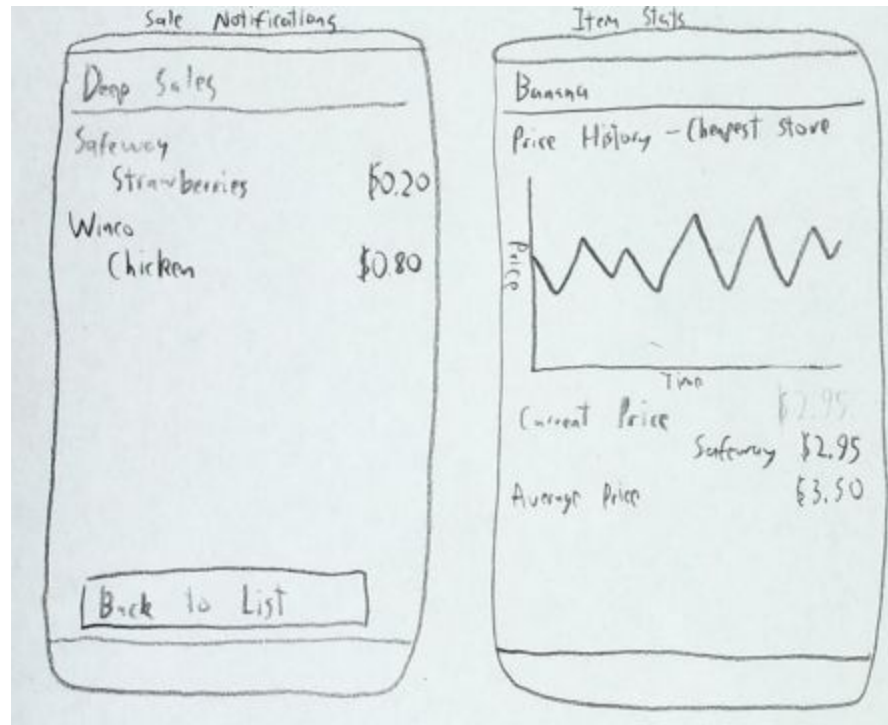


Figure 3. Money saving app design

### Chosen Design - Money Saving App + Ideas From Smart Clip Design

Out of our three designs, we chose to focus on creating an app that allows users to save money on their grocery purchases easily and elegantly. For tasks, we specifically chose to focus on item price comparison between stores and automatic coupon/discount retrieval. Additionally, we integrated some of the ideas from our smart device design into the coupon/discount retrieval task. We chose this design because we ultimately felt that it was by far the most practically useful choice among our three initial designs. We feel that the tasks that we chose both fill needs that are currently not fulfilled by existing apps/devices/websites, and at the same time are very tractable and realistic.

Our design is targeted towards college students and young adults (although anyone looking to save money will benefit from it), and we felt that these users care more about saving money where possible than almost anything else. Research showed that people were unlikely to take significant advantage of an application that saved them time in grocery shopping, and a smart device that worked with a desktop website seemed to be too inconvenient for many users. On the other hand, our research also showed that shoppers are already willing to use apps to save money; unfortunately, those existing apps prove to be fairly limited in scope and are not as fully



featured as we're aiming to be.

Getting users to contribute accurate and useful data to a database is difficult, and one of the aspects that we will have to focus on is finding a way to allow them to do this simply and rapidly. We expect that scanning receipts will work well, but we will need to make this interface easy and inviting so that users use it regularly.



## Written Scenarios - “1x2” & Storyboards

### Coupons

The coupon storyboard below depicts a scenario in which Dan the student is shopping in a hurry. After grabbing all the needed items from the store, Dan gets into line for self checkout. While in line, he quickly scans all the items in his shopping cart with the MetaGrocer app, which adds coupons for the items he scanned to the coupon list in the app. When he gets to the front of the self checkout line, he first scans all his items, and then he scans all the coupons for his items. His receipt tells him that his coupons saved him \$10, so he goes away happy.

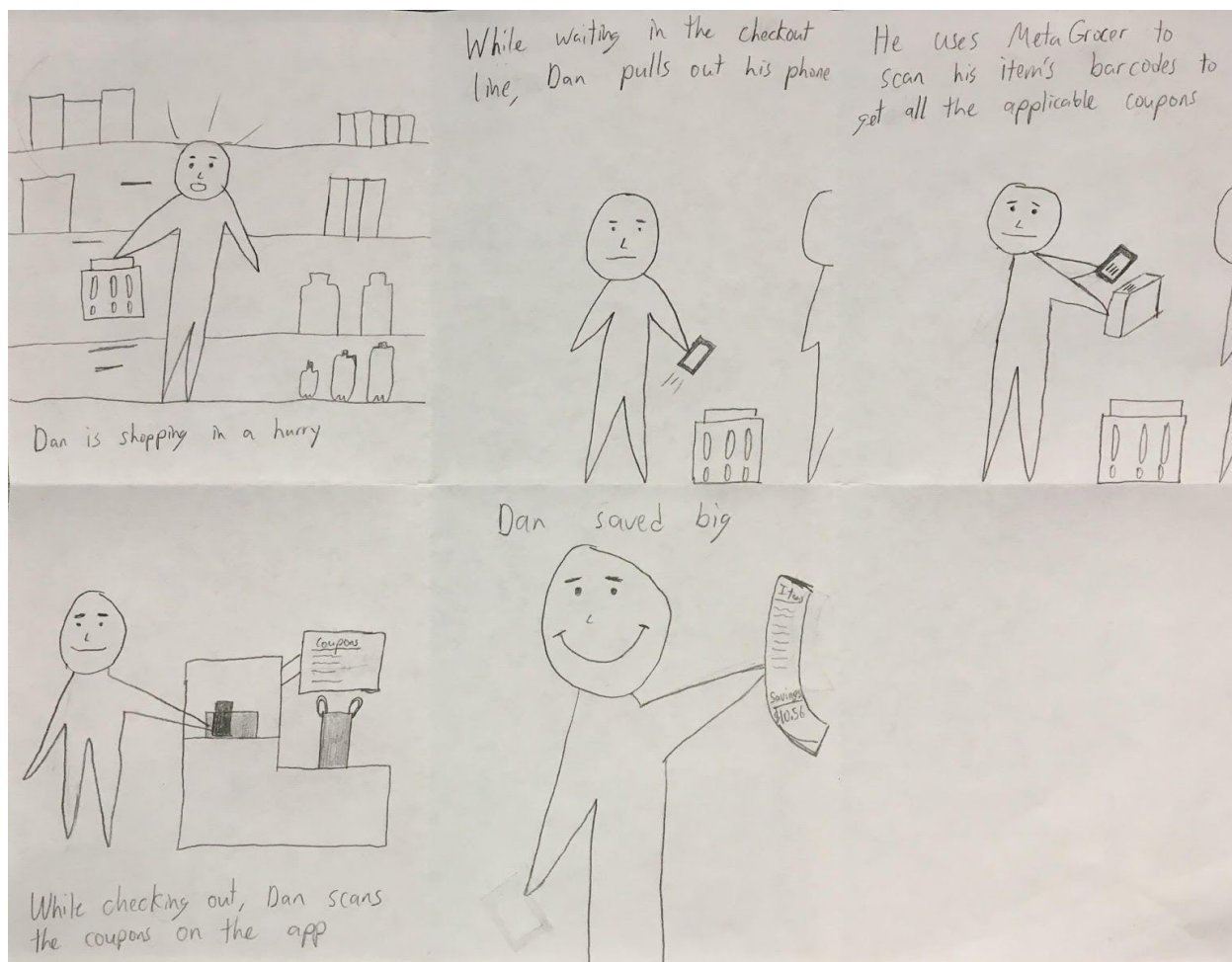


Figure 4. Coupons storyboard

## Comparing Prices between Stores

This storyboard illustrates a grocery shopper who wants to quickly get the prices of an item at different stores. In the given scenario, the grocery shopper Kyle lives far away from the two nearest grocery stores, Half Foods and Safewave, which are located at the opposite sides of his house. This makes physically going into the stores to check grocery items' prices very time consuming.

Today Kyle gets a call from his friend asking him to pick up a tub of honey flavored yogurt on his way to their house. Because Kyle does not buy yogurt for himself, he is not familiar with the yogurt prices in each grocery store. However with MetaGrocer's help, Kyle is able to get the yogurt price information quickly.

As shown in Figure 5, Kyle chooses to do a yogurt price comparison among grocery stores that are near him. He first enters the item name "honey flavored yogurt", and then selects the store locations by checking "Use my location". Because he has granted the app to access his location, he does not need to manually enter the grocery stores' names or addresses to complete his search. The search results come back as a list of side-by-side price comparisons for each of the same brand of honey yogurt. Kyle notices Safewave has lower priced yogurt, so he goes to Safewave and gets the yogurt.





Figure 5. Price comparison storyboard