Abstract
In this paper we introduce MIFresh, a grocery store system consisting of a large display and individual kiosks that aims to increase the demand of local produce. In cities like Detroit, where poverty and health are major concerns, increasing consumption of local produce can help create local jobs, sustain the environment, and improve health. We used rapid contextual design to analyze Detroit’s existing food system and, based on our findings, iteratively design a solution. MIFresh uses proven techniques such as coupons and rewards points programs and delivers education and awareness about the importance of consuming local produce. User testing results among the target population are promising.

Keywords
Kiosk systems, consumer systems, sustainability, human-centered computing, large displays

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction
The production and consumption of food has a significant impact on nearly every facet of society.
Given that the average American consumes 2,028 lbs of food per year[2], consuming local food – with its multiple benefits – is increasingly being recognized as important in the United States. Local produce is not only fresher (and thus more nutritious) than non-local produce, but also helps sustain local economies and conserve energy. In fact, only 25% of the total energy associated with the life cycle of non-local food is consumed and absorbed by us, with the remaining expensed during processing, packaging and shipping [4].

The target for our research and design project is Detroit, Michigan, a declining American rust-belt city facing serious poverty, health, and unemployment crises. Juxtaposed with this dire situation is the fact that in the United States, Michigan is second only to California in the diversity of its agricultural products. In addition, if just 20% of current food spending in Detroit was shifted to purchases of local produce, 4,700 jobs would be created and average earning per household would increase by $400 per year[1]. Our goal is to increase long-term consumption of local produce in Detroit. We propose a sustainable system consisting of public displays and interactive kiosks in grocery stores that provides financial incentives, awareness, and education to create sustained demand for local produce.

**Research and Findings**

The team conducted a comprehensive contextual inquiry process to understand Detroit’s existing food system and how it does and does not support access to local, Michigan produce. In total, we interviewed 34 stakeholders, including Detroit residents, Michigan farmers, grocery store managers and an interest group representative, farmers’ market vendors, and government/non-profit program managers.

We observed and interviewed consumers at grocery stores, convenience stores, and farmers’ markets to understand their shopping behavior and food buying habits. The team also observed government and non-profit programs like Select Michigan and Peaches n’ Greens that promote consumption of local food (Figure 1, 2, 4).

We used contextual design methodology for data analysis and the development of our final prototype. We created an affinity diagram (Figure 3) to capture the major themes and issues of the current system, personas and scenarios to identify major user needs, and a low-fidelity prototype to help with the iterative design and testing process.

**Existing systems**

We surveyed several important existing markets, services, and programs that provide access to and increase awareness and consumption of local produce.

**Farmers Markets** directly connect consumers to farmers who supply affordable and high-quality food products and help educate consumers on food nutrition and preparation. Detroit’s large scale Eastern Farmers’ Market (Figure 4) accepts government issued Electronic Benefit Transfer cards (EBT) and vouchers used by low-income residents, but it services a limited population – those living nearby and those with transportation means, making it difficult to access by the 21.9% of Detroit households that do not have a car[5]. While small neighborhood markets like Eastside Warren Farmers’ Market alleviate transportation issues, they cannot attract a large enough consumer base to be economically sustainable in the long run.
Project Fresh requires low-income families to participate in a nutrition class in exchange for $20 coupons (per growing season) for the purchase of local produce at farmers’ markets. Although Project Fresh provides limited financial aid and only operates seasonally, the knowledge delivered from the program creates substantial awareness of the importance of local fresh produce.

Peaches & Greens is a produce truck funded by a non-profit organization that runs three times a week through four residential neighborhoods. While this is a valuable service for those with limited transportation means such as homebound seniors, it operates at a loss and is not cost-efficient. We rode on the produce truck one afternoon and customers purchased only a small amount of produce because they had already bought food that week at the grocery store.

Select Michigan increases public awareness of Michigan produce by hosting food demonstrations and providing product labels in grocery stores. Although grocery store managers are enthusiastic about Select Michigan, the food demonstrations only occur twice a month for less than two hours per session. The team observed minimal interaction and attention among shoppers who, according to a Select Michigan volunteer, are unfamiliar with free food samples at urban grocery stores.

Findings and Observations

Four key findings emerged from our research:

- Existing venues and programs (e.g. farmers’ markets and Peaches & Greens) have limited impact and are not always economically sustainable.
- Lack of transportation makes it difficult for Detroit residents to shop beyond their neighborhood.
- Low-income residents have limited awareness, education, and exposure to local produce and its health benefits.
- USDA food stamps represent at least half of all food purchases made in the grocery and convenience stores we visited in Detroit. Recipients use their ATM-like EBT cards to make food purchases.

The problem and our focus: increasing demand

Our findings suggest that insufficient awareness and education represent significant challenges that subsequently lead to a lack of demand for local produce. Interviews of government program administrators, market managers, and a grocery store trade association representative revealed that local food was not accessible or strongly promoted because there was insufficient consumer demand. Thus improving the distribution of local food may do little to increase the consumption of local produce. Instead, our solution seeks to increase demand by leveraging awareness, education, and financial incentives in hopes to stimulate a long term, positive supply-demand cycle. We selected the most convenient and distributed shopping hubs - local grocery stores, to exert the optimal impact.

Context for a solution: grocery stores

Local grocery stores are ideal locations for Detroit residents to buy produce: they afford “one stop shopping” by providing a wide range of products and effectively address the transportation issue (the average distance to a grocery store for a Detroit resident is 0.57 miles[3]). They have adequate infrastructure to stock fresh produce and accept EBT. Furthermore, local grocery stores provide a public space for the community to access other services. In stores the team observed, these services included recycling, lottery machines, and community boards.
advertising local services such as house painting (Figure 5).

The once-a-month allocation of food stamps, though, affects shopping behavior and what grocery stores carry. Many recipients spend the majority of their assistance during a single food shopping trip, buying mostly frozen and dry goods that have longer shelf life (Figure 6). This inhibits the purchase of fresh local food and the surge of allocation day shoppers creates an inventory and staffing challenge for grocery stores.

Design Solutions

Michigan Fresh ("MIFresh") is a pre-and-post-shopping intervention system consisting of a wall-mounted large display and multiple kiosk terminals (Figure 7, 8). Designed to be a persistent reminder and convenient resource to shoppers, MIFresh will be placed in the shared entrance/exit space in grocery stores (Figure 9). The public display provides local food awareness, education and important instructions to promote customer interaction with the individual kiosks, which further promote the purchase of local produce by utilizing familiar shopping features such as coupons and rewards programs. Upon checkout, MIFresh reinforces its message by presenting customers with recipes and information on the savings associated to their purchase of local produce.

Prototype Features

**Big Screen Display:** To capture the attention of incoming shoppers, the MIFresh large screen display will show simple animations and short videos. Farmer profiles, information on deals, and real-time store figures (e.g. animation showing number of Michigan apples sold that week) seek to draw attention to the kiosk and enhance awareness of local food.

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**Individual Kiosks:** Consumers can interact with the kiosk to print out coupons for local food (Figure 7). By swiping one’s EBT, debit, or grocery membership card users can access special features and deals, allowing them to participate in an on-going program that rewards them for purchasing and consuming local produce (Figure 10).

**Produce Pairs:** MIFresh "quick coupons" feature a popular or common produce paired with another less purchased or less familiar one. Nutritional information, cooking recipes, and cost savings will encourage consumers to try new local produce.
**Theme Packs**: MIFresh theme packs offer combined cost savings for consumers who buy local produce used to prepare a themed dinner (e.g. Thanksgiving dinner or Mexican fiesta).

**Personalized Shopping List**: The shopping list feature is an all-in-one recommendation and budgeting system (Figure 12). Shoppers designate an amount of money they wish to spend on local produce and MIFresh populates their shopping list with recommendations based on previous purchases, allowing consumers to create a personalized shopping list while saving money on local produce.

**MIFresh Points/Rewards System**: Shoppers accumulate MIFresh points when they purchase local produce. Accessing their MIFresh accounts at the individual kiosks, consumers can manage their points and redeem benefits including gas vouchers, grocery store credit, and exclusive coupons (Figure 13).

**Check-out**: Coupons for selected discount packs are printed at the kiosks and scanned upon check-out. In addition, recipes, promotional information, and updates on accumulated MIFresh points are printed on the back of receipts.

**Evaluation**

We conducted user testing to evaluate our high fidelity MIFresh prototype. We set up our M1 Fresh testing station in a Detroit grocery store in order to engage users in the real context where they would interact with the system (Figure 14).

Our five participants included 3 females and 2 males. All were African-American as is 84% of Detroit’s population[5]. The testing included pre/post surveys and an hour-long prototype testing session, and we also interviewed the store manager for his feedback.

A member of the team introduced the overall system (big display and individual kiosks) to our users and asked users to complete simple tasks and provide feedback and suggestions as they interacted with the prototype. Another teammate recorded users’ responses and comments. We used a survey to collect demographic data, information on participants’ shopping habits, and their expectations towards our system.

Overall, participants responded positively and were enthusiastic while interacting with MIFresh. The system’s use of coupons proved to be familiar and attractive to our users. For time and convenience sake, users strongly favored printing out coupons directly at the store as opposed to cutting them out of newspapers and ads. Similarly, users claimed that given a sufficient discount they would be likely to buy produce pairs with unfamiliar fruits or vegetables. While some users preferred the simplicity of produce pairs and theme packs coupons, some showed interest in the personalized shopping list. Finally, while all users understood the MIFresh points system, some showed concern about how much they would need to accumulate before being able to receive rewards, indicating that the reward system will need further testing in order to find the right balance of incentives.

Users found the interface visually appealing and were able to complete their tasks without much difficulty. However, users suggested making pricing and discounts more prominent on the system, clarifying some confusing terminology, and making navigation buttons more eye-catching so they would “jump out.”

Users explained that the MIFresh large display (Figure 15) would grab their attention and increase their
awareness of local produce. Suggestions ranged from posting sports scores to using cartoon characters to draw children’s attention (and thus their parents too). One user recognized that timing of expiration for coupons and allocation of EBT credit would encourage buyers to better budget their expenditures throughout the entire month.

Conclusion

Our design seeks to generate long-term supply and demand for local produce; the system builds off existing infrastructure, distribution channels, and business relationships. Incentives exist for both consumers and food producers and vendors. Consumers benefit from the cost savings and improved access to fresh local produce, stores benefit from increased revenues, local farmers will see an increase in the market for their product, and distributors and manufacturers receive increased sales. The State of Michigan will see new job creation in local food related employment, lowered emissions due to decrease of out-of-state food trucks, and, with an increase in health eating, a potential decrease in healthcare spending.

Significantly increasing local food consumption requires a long-term, systematic solution that takes into account consumers pre-existing food shopping behavior. MiFresh is a simple, continuous and interactive system that increases consumer demand through financial incentives, increased awareness and education (Figure 16). The system utilizes proven techniques such as coupons and rewards programs and enhances existing educational and awareness initiatives by broadcasting information via a persistent large display. User testing suggests that the target population finds the system’s planned features desirable and understandable. We believe that MiFresh will expand the market for locally grown produce while creating jobs, reducing carbon emissions, and improving the health of Detroit residents.

Figure 15. MiFresh’s large display shows dynamic information on local produce sold, encouraging other customers to buy local food items too.

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