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Healthy Grocery Shopping Experience via Augmented Reality

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Healthy Grocery Shopping Experience
via Augmented Reality

By
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A Thesis Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Fine Arts in Visual Communication Design

School of Design
College of Arts and Design

Rochester Institute of Technology
Rochester, NY
May 9, 2023

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Abstract

This paper presents how augmented reality can facilitate the modern grocery shopping experience in a fast-paced environment. Grocery shopping customers are facing several problems. Firstly, filtering necessary information by eyes while shopping in grocery stores. Secondly, being distracted by overwhelming information leads to time-consuming deviation in an unfamiliar shopping environment. Thirdly, losing track of purchased food at home and buying the same ingredient repeatedly. Fourthly, neglecting ingredient lists that contain allergic or unhealthy food. To solve these problems, increase the efficiency of decision-making, and achieve shopping goals, this project aims to utilize augmented reality as the primary tool to complete a shopping list efficiently and demonstrate essential information end-to-end from navigation, comparing different products to the checkout stage. Augmented Reality (AR) applications have become more widely used in various aspects of lives worldwide. As it provides the ability to view the information in a three-dimensional space, users can understand complex concepts faster and more efficiently with highlighted animated information with readily available devices (e.g., smartphones, tablets) or futuristic wearable devices (e.g., HoloLens, Oculus). Usability testing, including online surveys and interviews, is planned to be conducted as the project's next step to evaluate the effectiveness and ease of use of this visual design solution. The demo video can be viewed at Imagine RIT via the following link https://designed.cad.rit.edu/vcdthesis/project/iq_great?preview_id=10053&preview=true

Keywords

1 Introduction

Although in-store visual signs are available to guide customers, they often feel lost because of the difficulty in searching for certain products (Cruz, *et al.,* 2018). Not only more precise navigation is needed during grocery shopping, but a handy digital shopping list is also necessary for customers to keep track of their storage status at home to reduce and avoid food waste. Meanwhile, in an era where business is competing to attract customers' attention, Augmented Reality(AR) allows them to reach the audience in a novel and exciting way (Amorim, *et al.,* 2022). As an innovative trendy technology, it has been utilized in various fields, including retailing, manufacturing, tourism, education, entertainment, etc. (Lee, *et al.,* 2020), given its ability to visualize information with the context in real-time and enable users to conduct desired communication through interacting with the system in three-dimensional space. Moreover, the worldwide market for AR is predicted to grow from $3.5 billion in 2017 to $198 billion in 2025 by Statista, indicating how many potential and business opportunities within this area (Amorim, *et al.,* 2022). This market has also been recognized by giant tech companies, such as Apple, Microsoft, Google, Facebook, etc. (Xie, *et al.,* 2022). In short, the emerging AR technology has a large potential to be applied in a traditional service to increase efficiency and reduce waste.

2 Problem Statement

Grocery shopping as a routine task has existed for hundreds of years. However, there are still pain points during this process. First of all, shopping in a large retail store or an unfamiliar one can be overwhelming and time-consuming to detect useful information within a short period of time. Moreover, being distracted or deviating from planned routes makes the customer spend more time in the store and lowers shopping efficiency. In the short term, the shops obtain a higher profit by keeping customers staying longer in store. However, in the long term, customers may go to a more clearly designed store that saves their time or, instead, purchase online. In addition, losing track of current food storage is another problem. Customers either bring a physical shopping list, which has become less common, or take notes on smartphones. People who adopt no measure but have a busy life occasionally purchase duplicated ingredients or waste some of the food. As little focus has been given to the HCI community (Ganglbauer, *et al.,* 2013), ecological sustainability is still worth discussion. The last problem this project is trying to solve is that people with allergies may accidentally purchase items that contain ingredients that are not edible to them. Last but not least, the covid-19 pandemic brings efficiency and safety to a higher level during grocery shopping (Rindasu, *et al.,* 2022).

3 Current Technologies and Evaluation

Current AR technologies can be divided into two large groups. One is on readily available devices (e.g., smartphones, tablets), and the other is futuristic wearable devices (e.g., HoloLens, Oculus) (Cruz, *et al.,* 2018). Some AR frameworks on smartphones are Vuforia, ARCore, and MAXST. According to Juhwan Lee's research, Vuforia is relatively superior to the others after testing four metrics, including maximum recognizable distance, minimum recognizable viewing angle, maximum recognizable occlusion, and the maximum number of simultaneous recognition and tracking (Lee, *et al.,* 2020). On the other hand, some popular AR frameworks on wearable devices are Microsoft HoloLens™, Google Glass™, Epson Mover™, Vuzix Blade™, Magic Leap™, and GlassUp F4 Smart Glasses™ (Xie, *et al.,* 2022). Additionally, more recent research by Vahideh Arghashi in 2022 reveals that AR apps trigger many positive media features (e.g., awe, novelty, and inspiration) and low negative media features(e.g., distraction and information overload). However, compared with non-AR apps, AR apps lead to less pleasant shopping

motivation and purchase intention (Arghashi, 2022). Considering both groups' feasibility, this project mainly focuses on visual presentation rather than technology availability assuming the product is compatible with readily available devices and wearable devices.

4 Design Methodology

4.1 Proposed Design Concept

To maintain the motivation of customers' in-store grocery shopping and increase the efficiency of completing their shopping tasks. I proposed an Augmented Reality-based shopping application that can be utilized on both readily available devices (e.g., smartphones, tablets) and futuristic wearable devices (e.g., HoloLens, Oculus) for AR applications' ability to decrease distraction when purchasing grocery items. The primary user flow covers a general shopping experience from navigation, main information gathering, item reminders, and allergy warnings, to checkout acceleration based on personalized needs. The demo video will showcase scenarios of wearable devices solving previously described problems during grocery shopping.

4.2 Proposed Research Methods

By conducting semi-structured interviews, pain points are discovered and prioritized as the baseline of this design project. The interview recruited five people aged from 21 to 65 years old, including three females and two males.

4.3 Evaluation of the Design

The effectiveness and usability of the design are evaluated in an agile design mode. Several iterations are made after receiving feedback from users and instructors, and more iterations will be created through the next semester before completion.

5 Conclusion

With the development of augmented reality technology, the grocery shopping experience can be improved by filtering helpful information, providing navigation, auto-reminder for health concerns or missing items in the visited area, and speeding up to reduce illness spread. AR allows users to interact with systems and products in three-dimensional space, which traditional devices are limited to provide so.

The limitation of this project is to conduct usability tests after the completion of the prototype. Gathering honest and objective feedback from users is crucial and beneficial for crafting practical design.

Appendix A

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Appendix B

grEAT
AR in-store

Your AR healthy eating habits facilitator

Analysis

Our Mission

At grEAT, we improve people's health by **simplifying** cooking and grocery shopping process. We leverage the power of technology and design to enhance user experience.

The Problems

Have you ever **deviated** in the grocery store and bought food exceeding your consumption limit?

Have you ever **taken too long to think** about what to buy? What are the best options? Calories? Expiration date? Ingredient list? Food allergy?

Have you ever **forgotten** food that you bought a while ago? Only to find out it went rotten when discovered in the corner?

The Solutions 1/3

Deviate in store ⟶ **Minimalist navigation** & **Straightforward shopping list**

↖ Onion
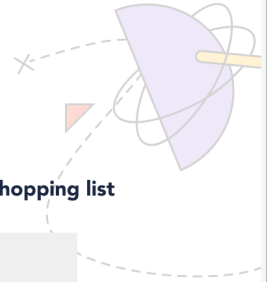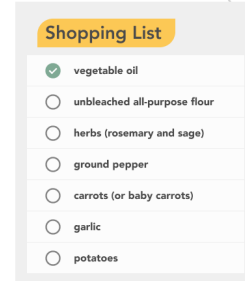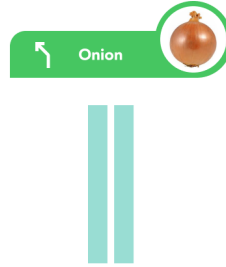
Shopping List
- ✓ vegetable oil
- ○ unbleached all-purpose flour
- ○ herbs (rosemary and sage)
- ○ ground pepper
- ○ carrots (or baby carrots)
- ○ garlic
- ○ potatoes

The Solutions 2/3

Think too long ⟶ **Personalized recommendation** & **Highlighted important information**

highly-rated
low cholesterol
low calorie

sell before 12/12

The Solutions 3/3

Forget and neglect → **Visualized reminder & warning**

ALLERGY WARNING
Gluten
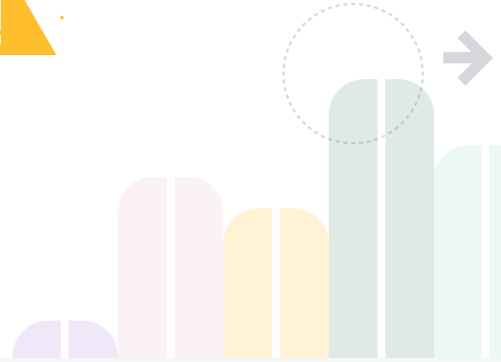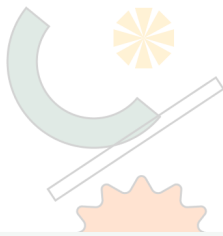
Target User

grEAT AR in-store aims to...

1

Help **busy** grocery shoppers who want to finish grocery tasks faster, eat healthier, and reduce food waste.

2

Keep **health-oriented** grocery shoppers who want to choose the most suitable food for their body management fit.

3

Guide elderly grocery shoppers who have **vision impairments** quickly gather essential information they need for decision making.

Design

DESIGN

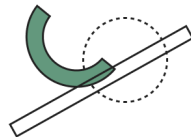# Design Principles
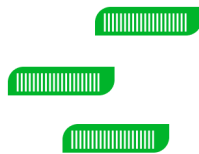The Gestalt Principles

Symmetry

Proximity
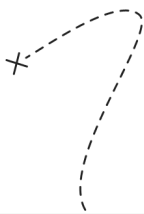
Figure/Ground

Similarity

Continuity

Closure

Common region

Common Fate

Moodboard

Styleboard
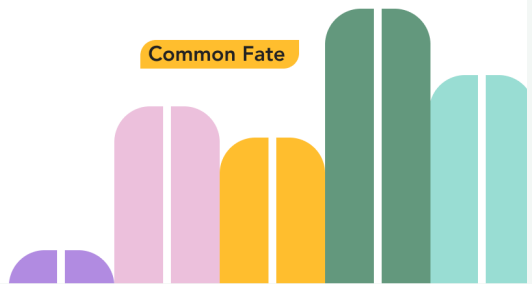
Typography

Avenir is the versatile typeface used for all header, subtitle, and body text.

A a

Color Palette Primary

Green

00B42A

Dark Blue

2C374B

White

FFFFFF

Color Palette Secondary

Lightning Yellow

FFBE2E

Water Leaf

99DDD3

Danger

BC2406

Prototype

Nestle
Fitness Cereal

$ 5.68   18 oz

Low calorie

Cheerios
Gluten Free

$ 5.98   18 oz

Low-cholestrol

DESSERTS
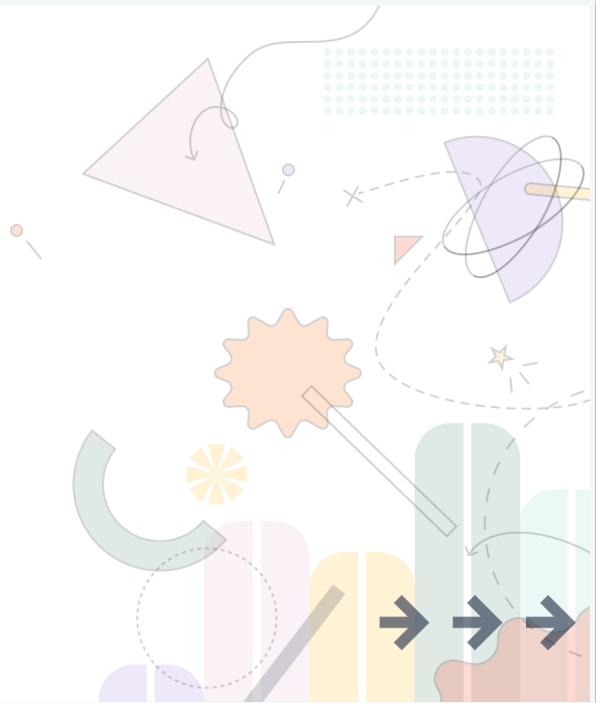
Sell by 12.05
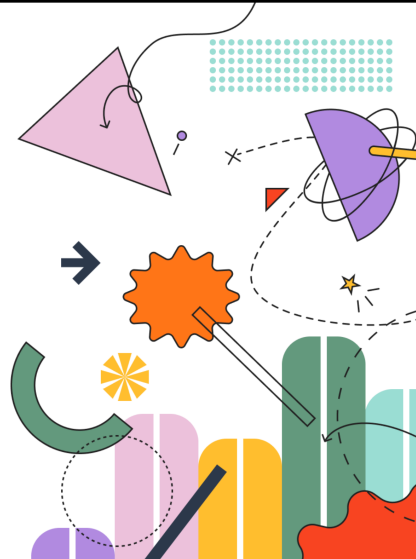
Sell by 12.12
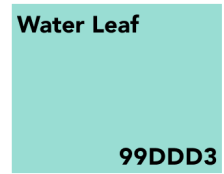
NEXT STEP

1 Revamp Design

2 Build On User Flow

3 Conduct User Testing

Appendix C

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Analysis

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