Avant l’appétit: An augmented reality interactive menu that elevates the gourmet food experience

Emili Koui
ek7710@rit.edu

Follow this and additional works at: https://scholarworks.rit.edu/theses

Recommended Citation

This Thesis is brought to you for free and open access by RIT Scholar Works. It has been accepted for inclusion in Theses by an authorized administrator of RIT Scholar Works. For more information, please contact ritscholarworks@rit.edu.
Avant l’appétit:
An augmented reality interactive menu
that elevates the gourmet food experience

By:
Emili Koui

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 Imaging Arts & Sciences

Rochester Institute of Technology
Rochester, NY
August 19th, 2017
Approvals

Title
Avant l’appétit: an augmented reality interactive menu that elevates the gourmet food experience

Author
Emili Koui

Submission Date
August 19th, 2017

Committee Members

Daniel DeLuna
Chief Thesis Advisor, Associate Professor
Visual Communication Design
School of Design

Chris Jackson
Associate Thesis Advisor, Associate Dean
for the College of Imaging Arts and Sciences
Visual Communication Design
School of Design

Shaun Foster
Associate Thesis Advisor, Associate Professor
Visual Communication Design
School of Design
Abstract

Restaurant businesses try to come up with ways to increase and maintain their clientele. In many restaurants, images of food often misrepresent the quality and quantity of the menu item. The results are a disappointment on the customer side, and a loss of clientele on the business side. Gourmet restaurants have the ability to provide consistency, which helps in maintaining their client numbers. However, new customers are hesitant in trying this experience due to reasons of portion size accuracy, ingredient identification, language barrier and dietary preferences.

This thesis investigated how the digitization of a traditional printed menu, can better enhance the experience of a customer at a fine dining gourmet restaurant. The proposed solution was the introduction of a tablet interactive menu, that would contain an augmented reality feature. The digital menu would provide a dietary filter option and include a language choice button. The augmented reality feature would provide accuracy in portion size and ingredient placement. The meals that would be portrayed in the augmented reality feature, would be reproduce in 3D with the use of the photogrammetry method.

This thesis wanted to showcase the ease of use in creating and updating this digital menu. It also wanted to show how the merge of technology and culinary arts, can assist in building trust between customers and restaurateurs.

Keywords
User Experience Design, User Interface Design, Photogrammetry, 3D Modeling, Augmented Reality, Interaction Design, Gourmet, Food Plating, Menu Design
Acknowledgements

In this section, I would like to acknowledge and thank everyone who has been a part of my journey at RIT.

First, I would like to thank my thesis committee: Daniel De Luna, Chris Jackson and Shaun Foster. Thank you for all your guidance, advice and patience throughout my thesis. I would also like to acknowledge my advisee, professor and dear friend Lorrie Frear, for her input and support during this thesis project.

Thank you to all my classmates and friends for helping me and for inspiring me with their uniqueness. I would also like to acknowledge everyone that has dedicated a few minutes of their time to help in creating this thesis. Special thanks to the amazing ceramics artist Kyle Lascelle. Your ceramic plate creations have helped me achieve the elegant and luxurious feel I was intending for my thesis.

My gratitude goes to my family. Thank you for loving, supporting and believing in me and my design skills.

Last but not least I would like to thank my wonderful boyfriend. You have been my inspiration and my biggest supporter from the start. I could not have been where I am now if it weren’t for you.

Thank you.
Introduction

Summary

The visual composition of food on a plate is the key element that affects the human perception of liking and willingness to pay. Expectation and actual enjoyment of food is influenced by our sense of sight.

Nowadays, visual depiction can be valued as a way of keeping customers distracted as they patiently await their meal\(^1\). Some customers might find it challenging when ordering, if their food or language knowledge is limited. Others might be struggling to choose a meal that will not affect their health, religion or ethics. By visually preparing a customer before ordering, any such worries will less likely occur. A visually translated menu will also eliminate portion issues that subconsciously connect with pricing.

This thesis investigated how to elevate a customer’s gourmet food experience by increasing their expectations visually with augmented reality. On one hand, the proposed solution is directed at gourmet restaurateurs. It explains the benefits of incorporating a digital menu to elevate the gourmet food experience. It suggests that visual depiction can help build trust between customer and restaurant owner. On the other hand, the proposed thesis solution is targeting the elimination of issues that may arise for first-time fine dining customers. As mentioned earlier these issues include, dietary preferences, portion sizes, food knowledge and language barriers.

This purpose of this thesis is to contribute to the world of design, by introducing a merge of design technology with culinary arts. This thesis aims to take into advantage of existing or progressive design technology, and demonstrate through a proof of concept how to easy utilize and produce a cost efficient, profitable and visually appealing digital menu. The proof of concept can be seen in short promotional video that demonstrates a walkthrough of the application and emphasizes the benefits of its augmented reality feature. It promotes the immersion of the digital design field in the culinary and business world, and showcases how it elevates the gourmet food experience.

---

Statements

Problem Statement

How can the gourmet food experience be visually elevated with the use of an interactive augmented reality menu?

This thesis is aiming to elevate the experience of gourmet dining by altering the menu ordering process. It’s directed at eliminating the discomfort customers might face when ordering because of food and language knowledge gaps. The gourmet food experience can be accessible to a broader audience if a visual representation can justify a high bill with a high food expectation.

With the use of a well-executed user experience design and the introduction of augmented reality, the food ordering process can be more than just ordinary. The gourmet experience should begin even before the meal arrives in front of the customer. By visually preparing the customer, there will be no confusion as to what the meal deliverable is. The worry about not receiving a meal worthy of its price will be eliminated. As a result, an increased new clientele will have the desire to indulge the wonders of gourmet food with no negative presumptions.

Thesis Statement

This thesis is introducing how interaction in combination with augmented reality can visually prepare and affect the perception of the consumer, when ordering at a gourmet food restaurant. The visual composition of a dish may influence the liking and willingness to pay for that meal. This will improve customer loyalty and increase business clientele. People who would like to experience gourmet food will not be restricted by their ingredient knowledge, language and dietary restrictions.
Research

Situation Analysis

Gourmet food can be best described as “edible luxury”. Luxurious rich courses of balanced meals, prepared and presented in an aesthetically visual contrast. It is the definition of the combination of fine food and drink as a refined cultural idea.

Despite the fact that gourmet food has always been expensive and not as accessible to everyone, a growing food gourmet movement in the United States is strongly contributing to this food industry\(^2\). This has led to a price decline in gourmet food restaurants

However, discounts and promotions are no longer an appealing way for restaurants to attract new customers. Nowadays restaurant goers are more open and looking into trying out new things\(^3\).

An increase in restaurant visits has been observed, for the ones closest to Pokestops. AR games is a recent trend that restaurateurs seem to take advantage in order to increase their business traffic. Pokemon themed events is a positive way of using Augmented Reality to increase clientele while Pokemon hunters eat up before their next hunt\(^4\).

Another good example of using technology in restaurants, is the Chipotle’s game application “The Scarecrow”. Apart from keeping their customers busy and entertained while they wait for their meal, it educates them about the origins of their food\(^5\).


In today’s world, the incorporation of technology in restaurants has had owners get rid of paper menus. Some of the benefits of using a digital menu, rather than a traditional paper one is, the multiple language support and the electronic waiter call.

Some restaurants have already embraced the idea of using iPad menus instead of the traditional paper ones. One of the benefits of a tablet menu is, the amount of content it can display, compared to that of a paper menu. Another pro is, the availability to update the menu’s content online, anywhere and at any time. It can also provide more detailed information on dishes, get a waiter’s attention or even request to speak to the chef and management. In certain locations, there has been an increase in sales. With the tablet menu, customers were able to identify ingredients they had no prior knowledge of. However the biggest issue is that, tablets can be tempting thief targets.

An immerse food and theatre experience was brought to life with virtual reality, by Michelin-star Spanish chef Paco Roncero. Sublimotion was described as an “emotional experience” and “theatre of senses”. The price for this gastro-sensory venture is well justified by the quality of food and the staff. As Ibiza is a popular tourist destination, Sublimotion is a one of a kind dining experience that most people would pay to attend before they depart. This virtual reality experience would direct the audience into a digital world whereas augmented reality would add to the physical world rather than replacing it.

Augep is a startup company that has suggested to tie the worlds of food and augmented reality. It is a mobile application that assists in visually seeing food on an empty plate by using Augmented Reality. Their mission is addressed to customers who would visually like to see their meal before ordering. Their phone prototype is

---


inaccessible and in development. Their motion videos do not show any sort of user interface design but it indicates what their project’s goal is about9.

Customer dining expectations put the bar up very high when it comes to gourmet restaurants. Gourmet food restaurants typically have a very limited meal selection which can lead to first-time gourmet food customers judging their money’s worth based on the size of the menu. Portion sizes can be surprising to people who are not aware of fine dining. Even if Chefs believe that large portions can cause a weight control problem, they should encourage and promote portion sizes based on energy requirements. This could avoid future customer complaints regarding portion sizes10.

A very popular customer complaint in restaurants is that portions are too small. Customers feel cheated if the dish they ordered does not resemble the picture that is referring to the specific dish. Presenting the customer with an unrealistic photo of a dish, often results in high expectations which are never met11. Every dish should be consistent in size and look in order to have manageable expectations and avoid size complaints.

---


Literature Review

Gourmet Food Perception

This article explains how gourmet food can be determined by the high quality of ingredients, the technical, accurate preparation and the way a plate is artistically presented. They are identified by ingredients that are mostly seasonal, unobtainable and used for dishes with expensive prices.

Visual Composition Experiment

This journal questions why the visual presentation of our food is essential when it comes to choosing our meals. They were answered with reported Online experiments. The plating of the food had a significant effect to the consumer’s liking and willingness to pay. Participants were willing to pay more when the dish was placed in the upward orientation at 0°. Even though the food looked and tasted exactly the same, the plating and position of the ingredients within the plate is what had consumers prefer a way of “eating first with their eyes”.

Food Preferences in Different Cultures

This journal shows the results of a cross-cultural study among US, Italy and Japan on comparing how food presentation on plates contributes to human relationships with food. Some of the similarities between the countries were: using three colors per plate of food and have the main component of a meal, on round plates, be situated on the lower- or right-half of round plates. The connection between visual preferences and hunger only enhances the French saying that “You taste first with your eyes”.

Healthy Grocery Shopping via AR

This journal researched how an implementation of augmented reality in food was done with the creation of a mobile grocery-shopping application\textsuperscript{16}. This application would help shoppers make healthier choices during their grocery shopping. One of it’s features was to highlight products to avoid health concerns, such as allergies to milk or nut products. It would also highlight food that was low in sodium or low fat and calculate the calories intake of a product. The result of their Online and in-person survey was that, the AR overlay tagging of products reduced the search time consumed to find healthy food items.

Identify Potential Food Allergens

This study was conducted to examine how augmented reality can help identify potential food allergens\textsuperscript{17}. The participants were intellectually disabled. The result of the study was that the participants were able to maintain their food allergen identifying skills even after the period of six weeks.

Styling For Camera

This book explains and informs how to properly stylize food for a photo shoot\textsuperscript{18}. It is a process that requires research and planning. This book includes great tips on how to handle, treat and maintain food, in order to keep it fresh looking and appealing, until the photo shoot.

Digital Kitchen Table for IKEA

This article talks about a digital interactive table concept that was created by students at Lund University and Eindhoven University of Technology with the collaboration of IDEO, for Ikea’s Concept Kitchen 2025\textsuperscript{19}. A


team of students have created a dining table that suggests cooking recipes based on the ingredients placed in the surface. The ingredients are identified via a camera and image-recognition technology. This was an innovative futuristic approach that would put their quote “We want to get people more engaged with their food..” to good use. The projection and identification of ingredients was a way of increasing the consumer’s food knowledge, and the interaction was the way of keeping it memorable.

**Business Proposition**

This article describes how discounts and promotions are a thing of the past. The technology of augmented reality restaurants can produce an immersive and interactive experience for consumers. The implementation of this technology can transform a conventional menu and help create brand loyalty. Augmented reality blends new information and displays the virtual result in real time. This is how it can produce an extraordinary experience for consumers. Innovation is the key to standing out from the crowd.

**Transparent Tablet**

This article talks about how designers Liu-Wei, Yao Kai-Chi, Hong Ruei-Hong and Cheng Ya-Fang, have come up with a futuristic concept that might not seem too far away to come to life. The Fujitsu Iris Tablet PC was created with the concept of a transparent tablet and the use of an OLED display. In its how-to-use video, it is placed in futuristic situations where augmented reality is highly suggested. The transparent screen concept works as an additional barrier breaker between the interaction of the real and augmented world.

---


AR Popularity

This article elaborates how ever since the successful launch of “Pokemon Go” appeared in the market, more consumers are now aware of the augmented reality technology. The blend of the digital and physical world. Companies such as Google and Magic Leap Inc. are working in incorporating augmented reality as part of people’s daily lives with their devices. The adoption of augmented reality in businesses is becoming more and more popular. From virtual car showrooms, to 3D building models and holographic images.

Augmented Reality Applications

This article describes how AR is a way of enhancing a consumer’s interaction with the real world. The technology of augmented reality does not have to be strictly applied to specific display technologies such as head-mounted displays. AR can potentially be applied to other senses such as, augmenting smell, touch and even hearing. Major display types are head mounted displays (HMD), hand held and spatial displays. Video-see-through, that are not mobile, are cost efficient display screens since the only function requirement is standard PC equipment.

Augmented reality can be directly displayed onto physical object surfaces allowing more than one user to experience the same thing.

Photogrammetry Scanning Method

In this journal the authors propose a precise, rapid and cost effective photogrammetric scanning system with a rotary table suitable to scan small parts with complex surfaces and sub-millimeter features. This approach allows to scan small free form objects and have a high aspect ratio, with high depth of field. Major limitations highlighted for this instrument are the need to scale the digital model through an additional measuring instrument and the need to study the calibration process to eliminate any distortions in the model.

---


Digitization of Small Parts

This study was done\textsuperscript{25} to figure out how to reduce the scanning time and obtain a result which would showcase the real texture of the object. The investigation of the accuracy and precision of 3D scans started with CMMs. Their disadvantage was that they were large in size and expensive. Another way was with conoscopic holography and X-ray tomography, which cannot return 3D models with their natural texture. An important process parameter when it comes to 3D scanning, is the rotation step angle between each shot. A small step angle, would produce a large number of shots with a complete rotation. When the majority of the photos are overlapping, it would increase the time for scanning and the photogrammetric processing of photos on the computer. However, this would enhance the form features visibility and quality of the photogrammetric reconstruction of pictures into 3D models.

Pros and Cons of 123D Catch

This journal analyzes the use of 123D Catch. An image-based free, low cost and open source software. It is able to process data with the use of cloud computing. Automatic 3D reconstruction from images used to be a long process that required heavy hardware. The user would not have the possibility of interacting with the software to improve the outcome. The architectural heritage digitalization example\textsuperscript{26} (Santagati and Inzerillo, 2013), showed how 123D Catch was easy to use. It demonstrated the visual quality of a scanned reconstructed scene and how it was possible to interact and develop it. This software is a free package that has no need of specific expertise and is far less time consuming than laser scanners and lighting systems. The visual and metric accuracy of the software was compared to the resolution of a terrestrial laser scanner.


Steps

- Capturing a photographic sequence of an object with an overlapping angle of 5-10 degrees. The pictures should be taken in a path of continuity around the object.
- Using an iPhone, iPad, web or desktop app to upload the photos to the Autodesk cloud to convert them into a 3D model.
- Manual stitching is available in case the 3D reconstruction is unsatisfactory.
- 123D Catch is a great tool when it comes to Image Based Modeling. However, some advantages and disadvantages have come up with the completion of this research.

Pros

- Low processing time.
- Processing on Autodesk cloud.
- Metric accuracy for elements applications in the order of mm.

Cons

- The number of pictures is depended on the size and level of detail of the object. This is according to parameters that regulate photogrammetry.
- Some photos dataset must be structured.
- The object should be shot in its completeness. 123D Catch is not able to manage the overlapping between two frames in height.
Design Ideation

Logo

With the help of my consultant, I decided to name my project “avant l’appétit”. It’s in French and it roughly translates to “before appetite”. The definition of avant also means something original or innovative (avant-garde) I decided to give this logo a literal meaning that was somehow also conceptual. This thesis will provide the visual experience before the arrival of the customer’s meal. The augmented reality visuals aim to increase the appetite and expectation beforehand. I decided to use the French term because most chefs start their culinary training and fundamental cooking techniques from French cuisine.

As I was working on my logo samples, I have decided to keep the name in a simple clean form. I have used the weight of the typeface, to differentiate the two words. The roundness of this typeface imitates the curve of a plate. People seem to prefer rounder plates when it comes to plating their food. I have selected a serif typeface to provide a minimalist, elegant and luxurious feel to the application design.

avant l’appétit

A vue cuisine
Cuisine Visuelle
Cucina Visiva
Avant
Avant Gastronomie

avant l’appétit

Figure 1: Final Logo Design

---

PERSONA

Isidoro Cassano

Age: 52
Hometown: Sicily, Italy
Location: Firenze, Italy
Occupation: Chef and Restaurateur

Isidoro was born and raised in Firenze, Italy. He is the Chef and restaurateur of the 2-Michelin-star restaurant Finezza Visswa. He developed his cooking interest from watching his grandmother prepare family meals. He got his culinary training at Le Cordon Bleu.

“I am Isidoro Cassano. I cook with my heart and eat with my eyes. The case of satisfaction is what I look for.”

Frustrations

Dirty customers
Too many questions

Goals

Create new recipes
Win another Michelin star
Keep my restaurant unique

Technology

IT and Internet
Software
Mobile Apps

Likes

Food
Cycling
Jogging

PERSONA

Gale Eberhardt

Age: 38
Hometown: Kairakau, New Zealand
Location: Wellington New Zealand
Occupation: Writer

Gale was born and raised in Kairakau, New Zealand. She is the author of many best selling books. She has participated in many cooking classes. She loves to go to new Gourmet restaurants at least twice a month.

“Eating is a necessity, but cooking is an art”

Frustrations

Nervous environments
Chaos

Goals

Learn about new ingredients
Discover new gourmet restaurants
Share new experiences with others

Technology

IT and Internet
Software
Mobile Apps

Likes

Food
Gadgets
Art
Questionnaire

I have conducted a questionnaire to help enhance the business aspect of my thesis. This questionnaire was answered by a variety of people with no specific age limit. This was done to understand customers perceptions when it comes to ordering food.

34 responses

Summary

How often do you go to restaurants?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regularly (3-4 times per week)</td>
<td>1</td>
<td>2.9%</td>
</tr>
<tr>
<td>Often (3-4 times per month)</td>
<td>22</td>
<td>64.7%</td>
</tr>
<tr>
<td>Rarely (0-1 times per month)</td>
<td>11</td>
<td>32.4%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Do you prefer eating at your usual favorite restaurants or like to try out something new

<table>
<thead>
<tr>
<th>Preference</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Favorites</td>
<td>2</td>
<td>5.9%</td>
</tr>
<tr>
<td>New</td>
<td>3</td>
<td>8.8%</td>
</tr>
<tr>
<td>Both</td>
<td>29</td>
<td>85.3%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Favorites</td>
<td>2</td>
<td>5.9%</td>
</tr>
<tr>
<td>New</td>
<td>3</td>
<td>8.8%</td>
</tr>
<tr>
<td>Both</td>
<td>29</td>
<td>85.3%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
What would attract you to try out a new restaurant?

<table>
<thead>
<tr>
<th>Restaurant Aspect</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>30</td>
<td>88.2%</td>
</tr>
<tr>
<td>Location</td>
<td>10</td>
<td>29.4%</td>
</tr>
<tr>
<td>Price</td>
<td>13</td>
<td>38.2%</td>
</tr>
<tr>
<td>Concept</td>
<td>14</td>
<td>41.2%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Have you ever used a digital menu to order food?

- Yes: 24 (70.6%)
- No: 10 (29.4%)

If yes, on what device?
Would you like to filter out meals on a menu that contain ingredients which you are allergic to?

- Yes 22 64.7%
- No 2 5.9%
- Maybe 10 29.4%

Would you like to filter out meals that contain ingredients which you don’t eat? (Meat, seafood, dairy, etc.)

- Yes 21 61.8%
- No 6 17.6%
- Maybe 7 20.6%

After reading the ingredients contained in a meal, can you envision what your food would look like?

- Yes 22 64.7%
Can you envision the portion size accurately?

- Yes: 5 (14.7%)
- No: 16 (47.1%)
- Maybe: 13 (38.2%)

Do you believe that most meals you have eaten were worthy of their price?

- Yes: 12 (36.4%)
- No: 21 (63.6%)

Have you ever had trouble recognizing some of the ingredients in a meal?

- Yes: 29 (85.3%)
- No: 5 (14.7%)

If yes, what would be your actions towards identifying them?
Do you find it difficult when ordering food from a menu that is written in a different language from your understanding?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>24</td>
<td>72.7%</td>
</tr>
<tr>
<td>No</td>
<td>2</td>
<td>6.1%</td>
</tr>
<tr>
<td>Maybe</td>
<td>7</td>
<td>21.2%</td>
</tr>
</tbody>
</table>

If yes, how would you go about translating it?

<table>
<thead>
<tr>
<th>Approach</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask waiter</td>
<td>24</td>
<td>77.4%</td>
</tr>
<tr>
<td>Search online</td>
<td>11</td>
<td>35.5%</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

How often do you go to restaurants?
Flowchart

START

Dietary Filter

Select/Type Ingredient

Language

Select Language

Main Menu

Select/Add Meal

View in 3D?  YES  Augmented Reality

NO

Review Order

Display/Hide Ingredients

YES  Remove/Replace Meals?

NO

Order Confirmation

YES  Additional Instructions?

NO

Confirm

END
Grid Landscape

The layout of the application was designed in landscape. This was to take advantage of the screen width when a customer would view his/her meal selection in augmented reality mode.

A. Main Navigation Toolbar
B. Secondary Navigation
C. Content Area

Platform: iPad
Dimensions: 2048x1536 px

Visual Style
Typefaces

The typefaces I have selected to use in my UX design are Butler Figure 2.A and Poppins Figure 3.B. I used Butler for big, bold titles and numbers. I complemented Butler with Poppins, for secondary information and text blocks.

Colors

Color choices in food presentations can have an impact. The three colors per plate finding28, influenced my decision to keep my color palette a combination of 3. After studying menus of restaurants owned by Michelin-Star Chefs such as Massimo Bottura and Thomas Keller, I have come up with this color combination Figure 4. These colors are aiming to resemble the rich, elegant and luxurious feel of a fine dining restaurant. The dark navy blue was inspired by the metaphor “blue blood” royalty. The rose gold was inspired by metallics that provide a shiny elegant finish.

These illustrations were downloaded from the collection of ClipArt Etc. where teachers and students are allowed to use the items for a non-commercial, school project without the need of further permission. Figure 6.A, Figure 5.B, Figure 7.

I decided to merge this vintage illustration look with flat vector colors and shapes to show a contrast combination of the two media. The illustrations were edited and colored in the navy blue color from my palette. In the menu, the illustration are associated with the recipe next to them. They are either the main, or one of the main ingredients from the course described next to them. The choice of using these illustrations was also influenced by the culinary arts. Gourmet food is usually the combination of old school basic culinary techniques with non-commonly used ingredients, or the other way around. Commonly used ingredients prepared and cooked in non-common methods.
These are the icons I have created to use for the filter screen Figure 9. Each one of the icons represents an ingredient most people are allergic or choose not to eat. I decided to keep the icon designs minimal and clean. Before I finalized my icon designs, I did a user testing to make sure the icons depict the ingredients as clear as possible. After receiving my user testing results, I redesigned some icons and finalized the filter screen assets Figure 8.

In the filter screen, there is an additional box which allows anyone to type freely any other dietary preferences they have might have.

**Questionnaire**

Can you recognize what the icons represent?

These represent food allergies and dietary preferences

Please write below each icon what you believe they are.
Discarded Icons

Figure 8: Discarded Icons

Final Icons

Figure 9: Final Icons
Wireframes

Initial Wireframes

Before deciding on a wireframe layout, I created a few designs to choose from. The first layout was in portrait view Figure 10, Figure 11. After user testing, this version was discarded because it contained too much information on one screen.
<table>
<thead>
<tr>
<th>I’m allergic to</th>
<th>I don’t eat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy</td>
<td>Nuts</td>
</tr>
<tr>
<td>Eggs</td>
<td>Gluten</td>
</tr>
<tr>
<td>Peanuts</td>
<td>Corn</td>
</tr>
<tr>
<td>Soy</td>
<td>Fish</td>
</tr>
<tr>
<td>Other</td>
<td>Seafood</td>
</tr>
</tbody>
</table>

Figure 11: First Layout-Portrait-Screen2
This version was created in landscape view Figure 12, Figure 13. After user testing, it was discarded because of negative feedback. The colors were distracting and there was still too much information in each screen. The elements and transitions were also non consistent.
Scallops

Start off your meal with three butter-seared Atlantic scallops, served on a layer of twice cooked pork belly, with purple beet cauliflower mash and rice vinegar pickled chiodini mushrooms.

Figure 13: Second Layout-Landscape-Screen2
Final Wireframes

This is the final selected version *Figure 14, Figure 15, Figure 16, Figure 17, Figure 18*. It has a clean, minimal and elegant feel that suits a gourmet restaurant. There is a limited but important number of elements. After user testing it, it was confirmed that the user experience flow was easy to navigate. The walkthrough was also easy enough that, no help tutorials were necessary to be implemented in the beginning.

Screen 1

Welcome Screen

*Figure 14: Final Layout-Screen1*
Screen 2

Dietary/Allergen Filter Screen

Figure 15: Final Layout-Screen2
Screen 3

Main Menu Screen

![Main Menu Screen](image)

*Figure 16: Final Layout-Screen3*
Screen 4

Review Order Screen

Figure 17: Final Layout-Screen4
Screen 5

Order Confirmation Screen
User Testing

Software

I decided to create my prototype using Adobe Muse. Other software I was considering to use were, InVision and Adobe XD. These software were not selected because their interaction options for a tablet platform were very limited.

User Testers

Number: 15
Age: 20-55
Sex: All
Race: Multiple

Tasks

Free Exploration
Guided Task

Questionnaire

Start
Select eggs and poultry for filters
Add a meal to your order
View a meal in 3D
Review your order
How would you change the language?
How would you go back?
Where would you click to go next?
Do you understand the icon symbolism?
Would you naturally slide or click for next?
Feedback

Likes

This is the general feedback from user testing. The majority of answers influenced my decisions on how to alternate and proceed with my thesis. The User Experience and User Interface were liked a lot. They felt the flow was easy to go through without any assistance. The user testing group also enjoyed the visual style and aesthetics. They all agreed that the typeface, color choices and illustrations gave a luxurious and elegant feel to the application. The most interesting part for the users was the augmented reality 3D view choice.

Dislikes

Some of the dislikes from the user testing were about the main navigation toolbar icons. Some users didn’t understand what they represented unless they clicked on it and saw what the content page included. One user also specified that he/she would have preferred if all the meal options, from each section were visible.
Photogrammetry

Preparation

Before proceeding with photogrammetry, I had to make sure that I had the components needed to do that. Apart from the technical and digital software, I had to figure out what kind of food would be displayed and on what kind of plates they would be placed on.

It was hard to find matte plates that would be minimal, yet artistic enough to have gourmet food plated on them. The plates had to be matte in order to get the best results with photogrammetry. It was hard to find something within my budget. After a helpful suggestion, I decided to get into contact with the ceramics department at RIT. I was able to get in contact with Kyle Lascelle, a ceramics graduate student. He had agreed to collaborate with me. With his help, I was able to use gourmet looking matte plates for my photogrammetry session Figure 19.
Testing and Research

I have gone through extended research as to how to produce 3D textured models for the augmented reality feature within the Avant l’appétit menu. The research was focused on the cost, availability and ease of use. I had narrowed my search to the four following software.

Autodesk 123D Catch

Cost: Free

Hardware: Mac, Android, Windows

This software was easy to use. With no previous experience in photogrammetry, I was able to use 123D catch with success. The free availability in multiple hardware made it easy. I tested the software on a small detailed object to test its capabilities Figure 20.

Figure 20: Photogrammetry Test-123D Catch
Sense 3D Scanner

Cost: $399

Hardware: Windows, PC

The Sense 3D Scanner Figure 21 is a great, fast and powerful tool when it comes to 3d scanning. It was easy to use and work with. However the laser scanning did not portray the texture of the food as detailed as and precise as I would like it to be.

![Sense 3D Scanner Image]

Figure 21: Photogrammetry Test-Sense 3D Scanner

Agisoft

Cost: $179-3499

Hardware: Mac, Android, Windows

Agisoft is a great software when it comes to photogrammetry. It can produce very detailed big surface/landscape 3D models. My meals were too detailed and small to produce accurately using this software. It took too much time to produce/render my 3D detailed models. It was also not as accurate when it came to showing details and textures of the dish.
NextEngine ScanStudio

Cost: $3,000

Hardware: Windows, PC

The NextEngine ScanStudio Figure 22 is paired with a 3D Ultra HD Scanner Figure 23. This software does macro laser scanning measurements. The process was demonstrated by an expert at the Innovation Lab at RIT. It took a lot of time to scan just a small section of a food sample. It was limited to non-glossy and non-reflective objects which was hard, because a lot of food elements have that sort of texture.

![Figure 22: Photogrammetry Test-NextEngine ScanStudio](image1.png)

![Figure 23: Photogrammetry Test-3D Ultra HD Scanner](image2.png)

Result

As explained earlier, one part of this project target audience is chef restaurateurs. The use of equipment such as Studio Space, DSLR Camera, Tripod, Soft Box Light would discourage future users. By keeping the method of use easy, with just the use of a phone, and at low or at no cost, the implementation of AR within Avant l’appétit for new recipes could be an easy adaptation for anyone. This is why I had selected to proceed in recreating my AR 3D models with the use of 123D Catch.
Food

Cooking

The process of cooking involved a lot of preparation. The purchase of fresh food was a must. Many hours were spent in watching tips and tricks on how to cook each ingredient. Overcooking anything would result with bad food quality which would show during the photogrammetry process.

Styling

The food styling had to occur on the same day the food was cooked. Food plating and presentation was done strategically and with much attention to detail. Color combinations were done based on reading and watching about food plating.

Plating

Most of the recipes that were recreated were not mine. I would get visual inspiration from gourmet food recipes I had found online. I would then adjust the dish by adding or subtracting some of the ingredients. My visual inspiration was mostly found in Instagram.

Meals

For my prototype I decided to recreate a 5-meal dinner course. In a functional application there would be different choices for each meal, but for time efficiency and prototyping purposes I decided to recreate one for each. The 5-meal course consisted of: Appetizer, Entrée, Main Course, Mignardises and Dessert.
Meals

Appetizer - Scallops

Three butter-seared Atlantic scallops, served on a layer of twice cooked pork belly, with purple beet cauliflower mash and rice vinegar pickled chiodini mushrooms. *Figure 24.*

*Figure 24: 3D Model-1-Appetizer*

*Recipe inspiration from:*
Entrée - Beets

Roasted, glazed beets covered with crashed peanuts, accompanied by blue cheese gorgonzola, dried figs, avocado aioli and fresh dill Figure 25.

Figure 25: 3D Model-2-Entree

Recipe inspiration from:
Main Course - Short Ribs

Red wine daphne marinated short ribs, with cipollini onions, grilled lemon glazed artichoke, onion garlic hummus and Italian parsley garnish. \textit{Figure 26.}

\textit{Figure 26: 3D Model-3-Main Course}

Recipe inspiration from:
\texttt{http://theartofplating.com/editorial/chef-lee-wolen-in-chicago/}
Mignardises - Duck

Seared duck breast fillet, charcoal grilled parsnips, fresh figs, pickled beet shavings and pumpkin puree

*Figure 27.*

Recipe inspiration from:
https://www.instagram.com/p/BKeYsR_he_4/
Dessert - French Macarons

Vanilla flavored French macarons, over a thick layer of lemon curd, sea salt caramel chips, crushed cookies almonds and mint leaf garnish *Figure 28.*

*Recipe inspiration from:*
https://www.instagram.com/p/BEhe7VuqSiE/
**3D Models**

**Editing**

After using 123D Catch to produce my 3D models, I had to import them in a 3D editing software. The photogrammetry models just needed a few retouching, which was done using Autodesk Maya *Figure 29.*

**Animation**

For my proof of concept video, I rendered some camera animations I did for my 3D models. In total, four animations were done, but only three were used in the final animation. Two are in perspective view and were animated in a table rotation. The other two were animated in multiple angles, but only their top perspective views were used in the final video.

*Figure 29: 3D Photogrammetry Model-Autodesk Maya*

*Link to the animated model renderings:*
[https://www.youtube.com/playlist?list=PLTXQfhrmVH7YHL1zcUXio6Cmhy-GtLLsP](https://www.youtube.com/playlist?list=PLTXQfhrmVH7YHL1zcUXio6Cmhy-GtLLsP)*
Augmented Reality

Research

Due to limited resources, my research on augmented reality was narrowed down to 3 software options: Aurasma, Blippar and Adobe After Effects.

Aurasma was the first choice to be discarded. When I tried to import my 3D mesh, it kept failing. The reason was that the 3D models had a very complicated mesh. I wanted my 3D models to look as realistic and appealing as possible. So instead of simplifying the mesh I decided to discard the option of using Aurasma.

Blippar had similar outcomes as Aurasma. My 3D model uploads would fail due to the amount of polygons. The limited number of polygons allowed to upload gave me no choice but to discard the idea of using Blippar as well.

This left me with my third and final choice, After Effects. Since this thesis is more about proof of concept that actually producing and recreating this application, I decided that After Effects would be the best fit for that. The 3D models were animated in Autodesk Maya and then imported in After Effects. The other benefit of using this software was that I had the freedom to animate the User Interaction of the application as well.
Motion Video

Storyboard

The video will start with the appearance of the logo. The subtitle will follow. Then an iPad will appear with the opening screen *Figure 30.*

0s-10s

![avant l’appétit](image)

*Figure 30: Storyboard-Scene1*

After clicking to start, it will transition to the filter/allergen screen. Ingredients will be selected and then the screen will proceed to the main menu *Figure 31.*
In the main menu section they will be some scrolling animation. The video will then proceed to showing the augmented reality feature after clicking the “3D view” button Figure 32.

Figure 31: Storyboard-Scene2

Figure 32: Storyboard-Scene3
The main course will be the first meal to be shown in 3D View. Hands holding the iPad will slightly move to show the ingredients popping up. The plate will react and rotate along with the hands Figure 33.

41s-51s

The screen will go back to the main menu. It will show meals being added to be ordered Figure 34.

52s-1.11min

Figure 33: Storyboard-Scene4

Figure 34: Storyboard-Scene5
The second 3D view will show the dessert course on a top view. Hands holding the iPad will move it up and down to show the realistic portion size of the meal *Figure 35.*

**1.12min-1.24min**

![Figure 35: Storyboard-Scene6](image1)

The third 3D model view will show the entree meal in a close up. The camera will slowly zoom out, showing the rotated 3D model *Figure 36.*

**1.25min-1.35min**

![Figure 36: Storyboard-Scene7](image2)
The order screen will appear. After clicking “order” the “order confirmation” screen will appear. After clicking “confirm”, the “order received” screen will appear on top of it Figure 37.

1.36min-1.48min

Figure 37: Storyboard-Scene8
Avant l’appétit

Final Video

The final video showcases the proof of concept for this thesis Figure 38. It navigates the audience through a walkthrough of the application. It has minimal descriptions for each screen and highlights the main feature of the application, the augmented reality screen.

Figure 38: Final Thesis Video Image

Link for my final thesis video here:
https://youtu.be/Uy2LFDOYVqg
Outcomes

Discussion

After exposing my concept to the public at Imagine RIT and at the RIT MFA VCD Thesis show, I have gotten positive critiques. One of the positive comments I received was that the 3D food models looked very appealing and appetizing. People also liked the fact that they could see how each ingredient was placed on plates and that they could see the portion size. Another thing they liked was that this application offers customers the opportunity to see how their order would look like before they order it. Some of the audience was surprised that I have achieved to produce such detailed 3D models with the use of my iPhone camera.

Overall the outcome of this project is successful. It has proven that people don’t have to feel reserved when it comes to trying out gourmet restaurants, because of language, ingredient knowledge or portion sizes. It has also proven that soon enough this technology will be available for restaurateurs to use and get rid of printed menus. A digital menu will help save more money, and increase clientele. Avant l’appetit could be the menu ordering tool that can provide trustworthiness with its augmented reality feature.
Possibilities

Business

The business possibilities of this adaptation are endless. As technology progresses and becomes more and more accessible to the public, applications with augmented reality features will be vastly integrated in people’s lives. Avant l’appetit could be easily adapted in every restaurant, bakery and even coffee shop. By providing accuracy with augmented reality, business owners will have to increase their standards. By providing accuracy, clients and owners can create a trust relationship between them that will benefit both parties. For example, bakeries won’t have to waste amounts of ingredients in creating cakes and baked goods for display cases and then toss them away at the end of the day.

With the increased rise of technology, it wouldn’t be absurd to think that soon enough we will be able to transfer smells via augmented reality. The visuals along with smells will be the best advertisement for any food related product. It will also be very helpful to know that people could travel at any part of the world, and instantly know what they are ordering with a simple language change button.
Conclusion

Grocery shopping is still something that people do in person. Touching, smelling, looking and even reading about food is essential when it comes to buying food from the store. Other purchasing activities also require in person interaction, such as buying a car. Most of humankind has slowly adapted to making their life decisions based on their senses. Even though eyes can be easily deceived, people still make everyday life decisions based on the information their eyes absorb around them.

It is a fact that food is one of the basic human needs. Ever since we started evolving as a species, our taste buds have evolved. We have evolved the way we cook food, plate it and even eat it. It might be time to consider trying out a different way in ordering food. If our mental states are crucial to enjoying our experiences as human beings, we should consider evolving them when ordering. Since our vision plays a huge part in our order decisions, we should consider elevating and advancing the ordering procedure. Instead of being disappointed after having high expectations for a meal, it would be ideal to preview the actual visualization of a meal.

Businesses should consider stopping the use of deceiving advertisement. Poor or false advertising can lead to a business downfall. Augmented reality can be a key feature that could assist with approaching a new advertising method, one that could persuade with the providence of accuracy. As technology continues to advance, it is only a matter of time that anyone would be able to digitally produce anything, without any professional knowledge or heavy cost, but rather with just the use of a phone.
References Bibliography

http://www.foodforthoughtonline.net/


