CS-570 INTRODUCTION TO HUMAN-COMPUTER INTERACTION
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PROJECT 2: EMBODIED INTERACTION

TEAM 25: ZIJING MA, SHUTONG LIN, RUICHEN ZHAO

Enhanced Gordon Dining Experience with AR

PROJECT 2: NOVEL INTERFACES

INTRODUCTION

In this project, we aim to study students' dining experience in the Gordon Dining Hall here at UW-Madison. Restaurants are important in almost every people's lives, making them ideal subjects for ethnographic research. Furthermore, as students of UW-Madison, this allows us to obtain a deeper knowledge and understanding of all the experience in the dining process and identify significant breakdowns or inefficiencies for which we may create a creative solution.

As far as our study of the Gordon dining hall, we spent 4 days on field research tours, doing background, environment and students dining fly-on-the-wall observations, and alsoninterviews with users. We chose the viewpoints and places that allow us to easily observe how eaters interact with each other inside Gordon, and the large open environment in Gordon eases us the process of seeing the dining behaviour of students. The main activities we observed include checking in, grabbing the food and eating the food. In this kind of research, participant observation and interview are the two main data collection methods.

Ethnographic research takes longer than other types of research because it requires long-term participation and observation to understand community attitudes, beliefs and behaviors. For this project2 we observed how students behave in the Gordon dining center, closely observed the eaters' motion, choices, interactions and communications. We have focused on some particular students to get more details, and we have also paid attention to groups of students as a whole for a bigger picture.

PROJECT 2: NOVEL INTERFACES

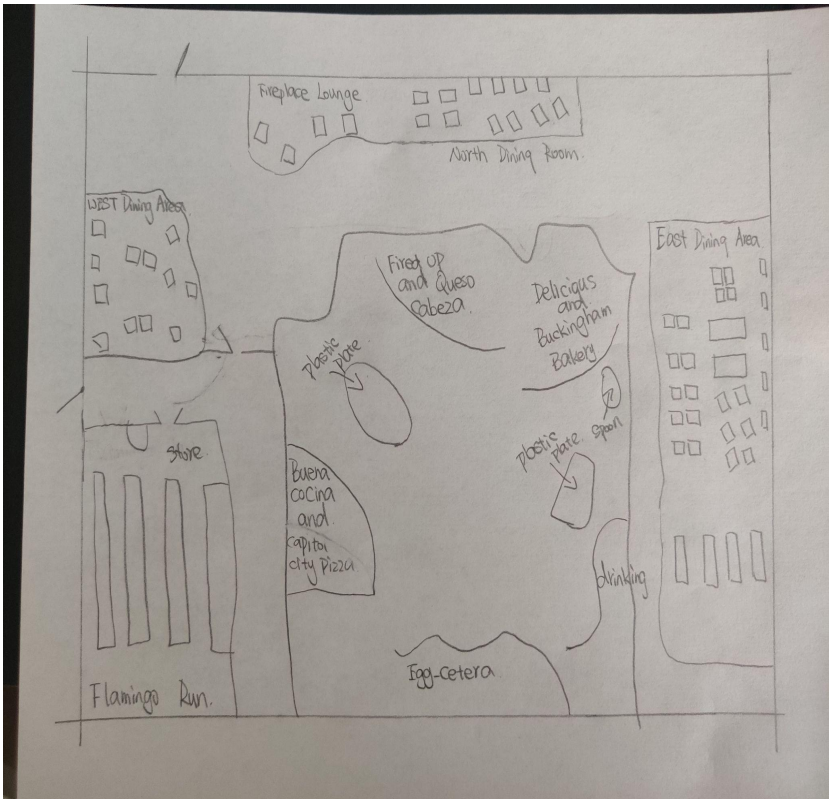
UNDERSTANDING

Snapshots of Fieldnotes

Fieldnotes

time	behaviour	ideas, interpretations & breakdowns	Open Coding		
12:00	enter into the Gordon dining hall			Me enter into the dining hall	
	quite a lot of people already				
	check-in: Give wiscard to the cashier, cashier clicks on the screen, cashier swipes wiscard, cashier returns wiscard back to me	waste of time: could swipe the wiscard by students themselves	employee helps to check-in		
12:01	walk to the food area. only 1-2 people per food section (Sunday)				
	some food sections are help-yourself type, some food sections have employees get the food for you		not fully help-yourself mode		
12:05	a student grabs a banana from the basket	convenient		Grabbing the food and the environment (a particular student)	
	a student goes to a food section but finds no food there	some food sections are not open on weekends	only partial food sections open on weekends		
12:08	a student walked to a food section He looked at the food lable for more information skim and decided for a second which food to order asked the employee to get a bowl of stir fry vegetables while saying the food name he was also pointing at it the employee served some amount of food the employee handed the food to the student over the bar student got the food and turned away	inconvenient waste of time: students could help themselves, instead of letting the employee get for them employee doesn't know the amount of food student would like. each student varies. only students themselevs know best there is a shield in front of the food, so has to hand the food over the shield, which is inconvenient	employees serve the food for students: hard to determine the right amount		
12:09	a student got a cup and serve himself a cup of milk the first time he failed to pushed the milk as the milk container is empty he then pushed another one and got the milk	some milk box is empty			
	there are two big containers in the middle area, while they are all empty		some spaces not utilized		
12:10	he went to the stir fry section but it is empty	some food sections are not open on weekends			

Snapshots of Physical Model



PROJECT 2: NOVEL INTERFACES

UNDERSTANDING

Findings

During three of our ethnographies we wanted to make sure we had a complete understanding of every detail of our activity in its setting so we made it a main goal to stay at the Gordon for around 1 to 2 hours taking notes on every detail we noticed. To embrace the fly on the wall style of observations we went into the Gordon trying to keep a very low profile and look like we were a normal customer, drawing the least amount of suspicion. To accomplish this, we decided to take notes on our phone or tablet opposed to bringing in a notebook and pencil. Since our activity involved a lot of monitoring of the students and workers, we took a seat at one of the sitting areas, however this was difficult at Gordon as it was often too busy to find a seat right here at noon. We were able to interview three students who come here for lunch a lot. Trying to interview a student at Gordon was hard to accomplish because they were busy for lunch and had a later class to catch, but is crucial for us to address our leftover questions generated during the fly-on-the-wall observation process..

After the interview with three students and based on our fly on the wall observations, we found four breakdowns in the user's dining experience. The first is that in the fired up food counter, students need to spend a lot of time waiting to order the food they want. And since the chief cooks the food in front of students, it is always making a loud noise that makes it hard for the chief to hear what the student just said. Also, if you are new to the Gordon dining center, you may not know what kind of food is served today.

Secondly, many students report the problem that it is hard to find a seat when it is lunch time. Even though the Gordon dining center has three sitting areas, it is usually full at lunch time. It's not uncommon for students to find out that there are only a few seats left when they come.

Thirdly, we found that many students pay particular attention to the food labels, trying to see the ingredients and the calories and maybe also the nutrient facts. They are typically healthy eaters so they pay a lot of attention to their diet.

However, currently the food labels only show the calorie index and some food sections like salad bar and stir-fry section even do not have food lables.

Finally, in the market next to the Gordon dining center, because of the limited space, the number of customers, and the only 1 cashier, students have to wait for a long time for checking-out.

PROJECT 2: NOVEL INTERFACES

IDEATION

Design Idea 1: online food order system

Since there is a long-waiting-time problem in the fired up food counter, to develop an online order system will be able to reduce the time that students waste on lining up. Also, in the peak time period, a line up in the middle of the food area will cause more clogging problems. The order online system can remind the student of the food he/she just ordered in the fired up counter when it's ready, so that students can wait on their seats doing other things until the food is ready, and reduce the clogging problem. Students can also order the food several minutes before they arrive at the dining hall, so they can have their food immediately once they arrive, saving their waiting time.

Design Idea 2: Self-checkout with AR

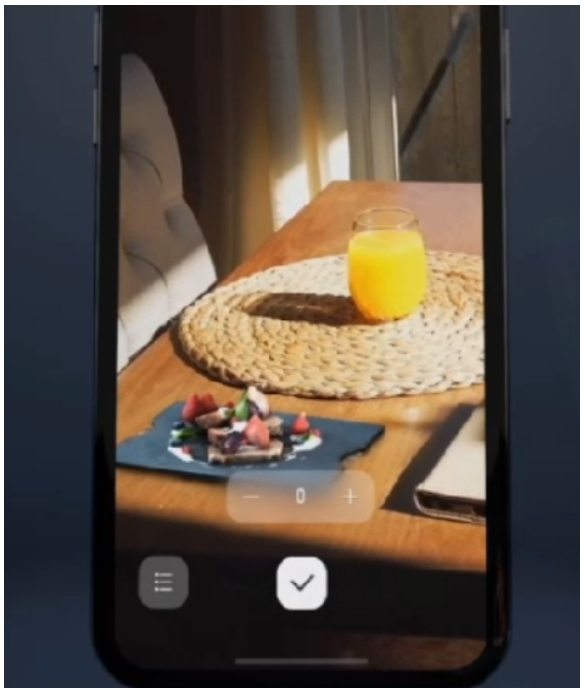
The food store does not have a large space and so cannot hold too many people during the peak period. So a AR technology self checkout app could help with this situation, which means that people can simply walk into the store and pick up what they want to eat, then check the food with their PDA (personal digital assistant) or any online personal devices having a camera. The device with AR support will connect to your UW wiscard and the payment will be done through it. That means the current UW-Madison students and employees could grab things they want and go out without checking via the cashier, just check out with AR.

Non-UW students may still can check out with the shop clerk for their convenience or connect their AR device with their credit card. This self checkout model with AR technique will reduce the congestion during the peak period. Besides, the check-in for the main dining hall can also be done without employees. Students can just swipe their wiscards themselves when they enter instead of letting the employee swipe the card for them, which

could save a lot of time. Or do it with the AR technique too. While a prerequisite for that would be the system can automatically detect if the wiscard holder is a university housing resident by reading the wiscard, as the dining price is different among residents and non-residents.

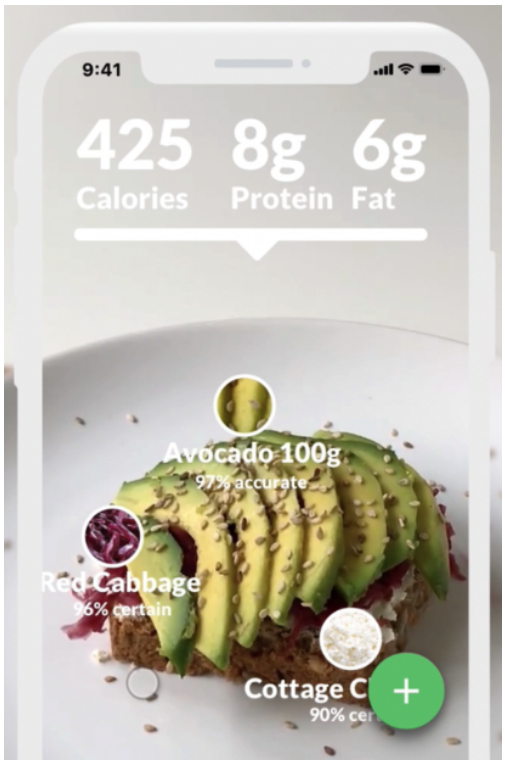
Design Idea 3: AR table for discovering your food in dining hall

When your having meal in the dining hall, you may not catch out all the food in there. When you sit on your table, you can discover other today special food with our AR table. People can see additional information, like pictures and descriptions of dishes, as well as information on ingredients, allergens, and sustainability practices. The experience is based on Web AR technology, meaning that diners don't have to download any apps to see the menu.



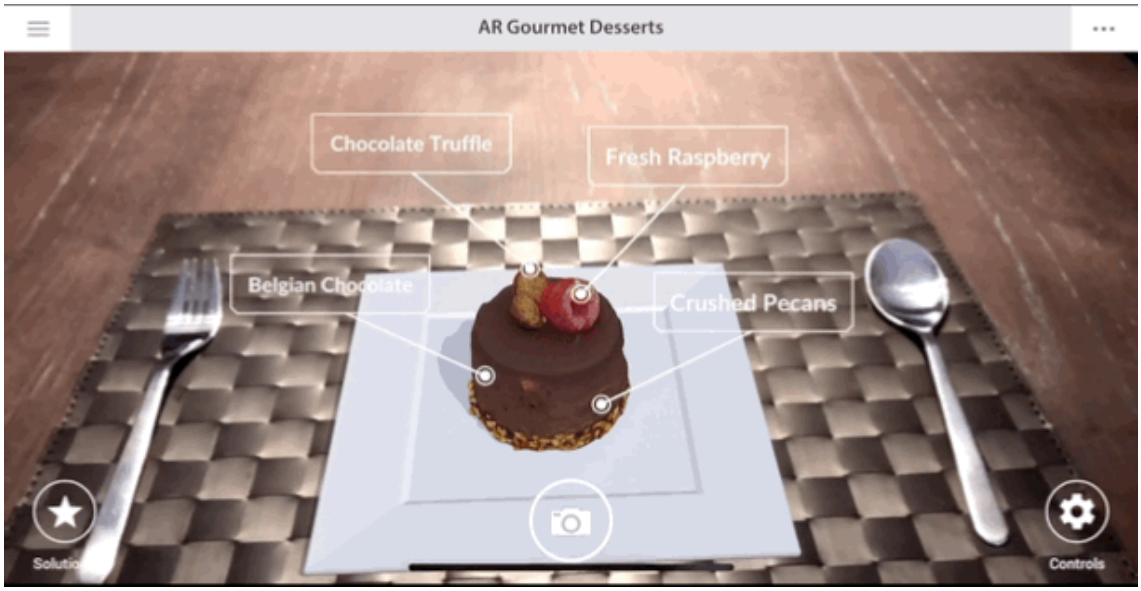
PROJECT 2: NOVEL INTERFACES

IDEATION



Design Idea 4: Analyzing nutrient facts of food using AR

Lastly, we hope to have an AR technology that enables the checking of food information (analyzing of food ingredients). You will be able to see the nutrient facts of your food which you are interested with by staring the food at the table for a few seconds and then you shall see the calories, ingredients list and the size of the food, which helps customers to judge whether the food is sufficient and healthy to eat, and prevent wasting of food in a buffet.



PROJECT 2: NOVEL INTERFACES

PROTOTYPING

Persona and Vignettes:

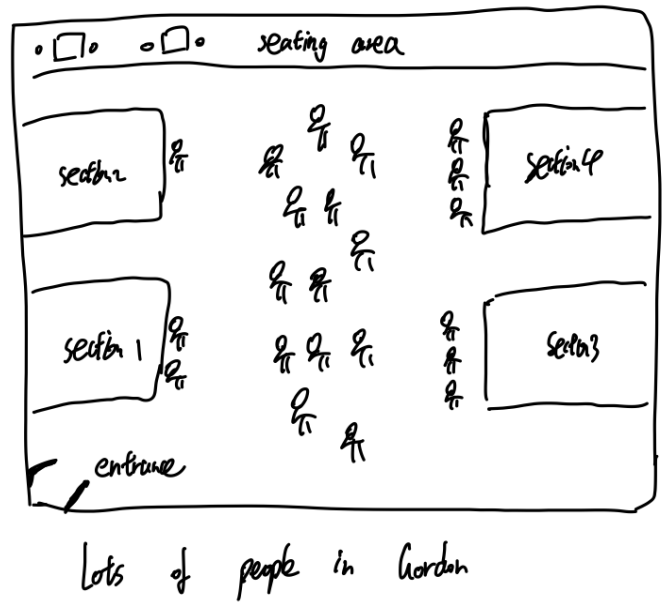
Our persona is current UW-Madison undergraduate and graduate students who go to Gordon for dining. They are expected to be comfortable with using modern technology. Their main need is eating lunch/dinner and buying some groceries. Typical days include every days in a week as Gordon opens 7 days a week. Their current frustrations include long waiting time, unknown of food ingredients and so on. As they are students and often have classes to catch up they have many related needs like a shorter waiting time. They also pay attention to their health so they care about the ingredients in the food.

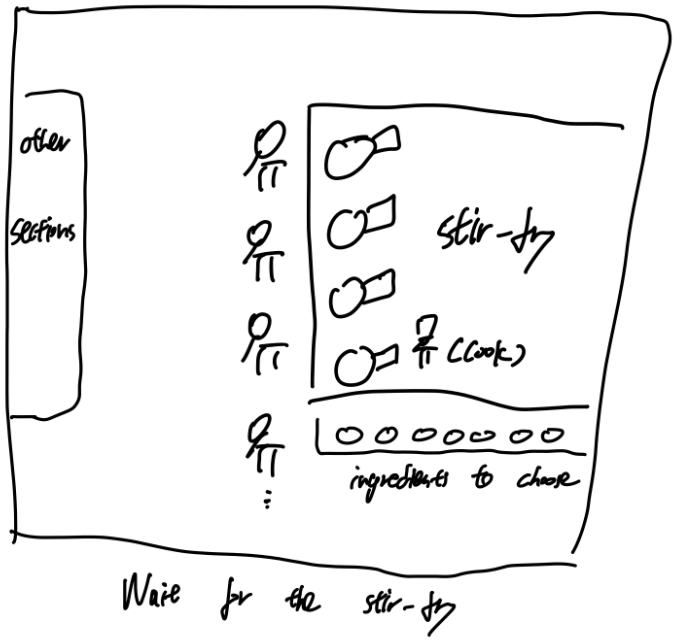
Script:

Bob is a junior here at UW-Madison. He is 21 years old, born at Madison and majoring in computer science. In his spare time Bob likes to work out and have parties with friends. On weekdays, Bob usually would like to go to Gordon for dining after taking the last morning class ending at 11:50am. He usually walks from the CS building to Gordon with his CS classmate and often arrives at 12:00pm. When he arrives, he usually finds that there are already a lot of people waiting outside the Gordon, probably 30 people, and it often takes him 5 minutes before being able to check-in. After checking in he would first go to the sections to see which food offered today best suit his taste. He usually prefers to have a stir fry first. While, there are usually a lot of people waiting for the stir fry as it tastes really good. The stir fry section is fresh-made, and there are only 4 pots, and each serving takes about 5 minutes. So it means that 4 people can be served in 5 minutes. Bob often finds that there are 10 more people waiting for the stir-fry, so it takes him about 10 minutes to wait for it. Bob often does work-out and pays careful attention to his diet, and so after getting the stir-fry he will usually grab some salad and a

cup of milk. Then after getting all the food he would go to find two open seats with his friend. However, there are many people in Gordon especially during lunch time so he needs to wait like 2 minutes for the open seat. After finding the seat he will eat while chatting with his friends. During the eating he sometimes wonders how many calories are and what is the nutrition fact for the stir-fry, as he pays attention to his diet, but he seems can't find the answer as there is no food label for the stir-fry (the ingredients are personalized so each serving is kind of personalized). After eating he usually would like to go to the Flamingo food store inside the Gordon to grab some snacks and water for the afternoon classes. But there are often many people in the store, and have only one cashier, so waiting can be up to 5 minutes. Bob has an afternoon class starting at 12:50pm so he doesn't have too much time for lunch, and because of the long waiting time in Gordon and the food store he sometimes is late to class and is sad about that. He has hoped the waiting time could be shorter for many times.

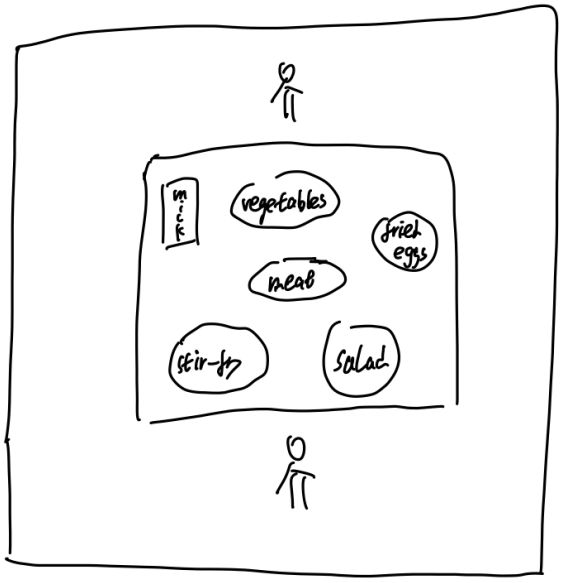
Storyboards:





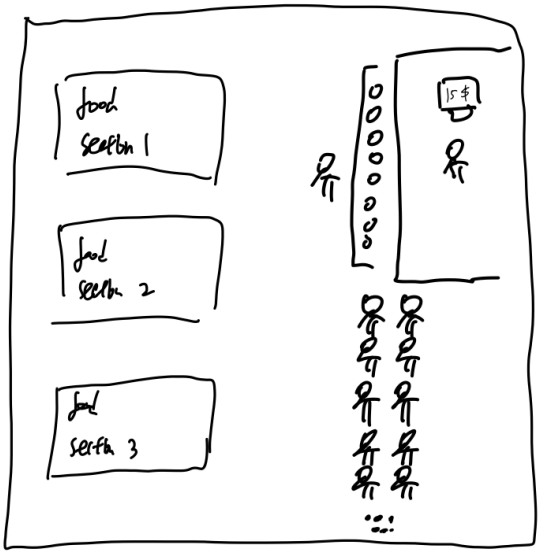
PROJECT 2: NOVEL INTERFACES

PROTOTYPING



Existing.

Wants to know the nutrient facts.



Shopping in the food store

Too many people waiting

Video production process:

Firstly we record lots of the videos inside and outside of the Gordon, to capture its environment and structure. We also recorded some people's behavior for clearer illustration. We take some static photos as well like our food. After sourcing the material we used iMovie, a pre-installed video-editing software from Apple, to edit our video. We added our voice for explanation and also cut some unnecessary video clips to make it to the point. Then we used some special effects and functions from iMovie to create some simulated AR effects. Finally we added some background music and transition to make the overall video prototype more engaging.

PROJECT 3: NOVEL INTERFACES

FINAL SOLUTION

Our final design is illustrated below, supported by AR technology.

Specifically, firstly, in the food store, our AR technology supports self-checkout. When you are ready to pay, the price will show automatically (and can even tell if you are a resident or not), and the amount is deducted automatically from your linked wiscard account. So this process is supposed to be very fast, less than 10 seconds, much shorter than the typical 5 minutes waiting time, solving the user's pain point.

Secondly, our AR system supports the analyzing of the nutrient facts. By scanning the food, our system is able to calculate the ingredients used, the amount and percentage of fat/sugar/sodium/etc., and the total calories. This will benefit a lot to the people who care about their diet and health.