
Fast Food Ordering Kiosk

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- ❖ Background
- ❖ Design and Analysis
- ❖ Prototype
- ❖ Test
- ❖ Future Improvements

Background

- ❖ Fast food restaurants are increasingly installing kiosks for the convenience for customers to place their food orders, but now the kiosks show some problems during use and many customers are not willing to use it for both personal and machine reasons.
- ❖ By analyzing some factors including users and tasks, the project is trying to improve the ways kiosks interact with customers, address some of the issues experienced by customers, and make it show better performance.

User Analysis

Target audience

The target audience of the kiosks are customers who are going to place their food orders in this restaurant.

Where to be used

The kiosks are mainly used in a relatively empty place inside the restaurant, and sometimes it can be placed outside the restaurant or along the drive-thru way.

Contexts and environments

The kiosks are used for the convenience of placing order, so customers would choose this way when the counter is busy at that time, or when they think it more efficient compared to interacting with staff at the counter. Besides, those choosing the way of drive-thru could use the kiosks outside the restaurant as well as ordering online.

Frequency

The frequency that the kiosks be used depends on some factors. If the kiosks show enough convenience, most of the customers might use it every time they place their orders. Besides, when the restaurant business is good and there are many people in it, newcomers would prefer ordering in this way.

Task Analysis

1. Start order

The Kiosk system will have an animated rotation of advertising items when no customer is using the Kiosk. To start an order, the user touches anywhere on the screen, and the system will stop playing advertisement and show the main menu page. The main menu page separates the food and drinks into different categories on the left side bar. The right side section will have the default category's items with image, price and a plus icon. The restaurant would be able to adjust the default page to reflect current hot deals and new recipe items.

Task Analysis

2. Ordering process

Once the user starts the ordering process, the user has two choices to add items to the order. First step: the user first touch the name of the category on the left side bar, the system will show the category's items on the right side of the screen.

First method: Once the touch the plus icon, the system will add the touched item to the order.

Second method: If the user touch the item image, the system will redirect the user to an independent page of the selected item. Despite of the additional information provided by the page, the user could touch the plus icon in this page. The system will add this item to the order accordingly.

Task Analysis

3. Changing order

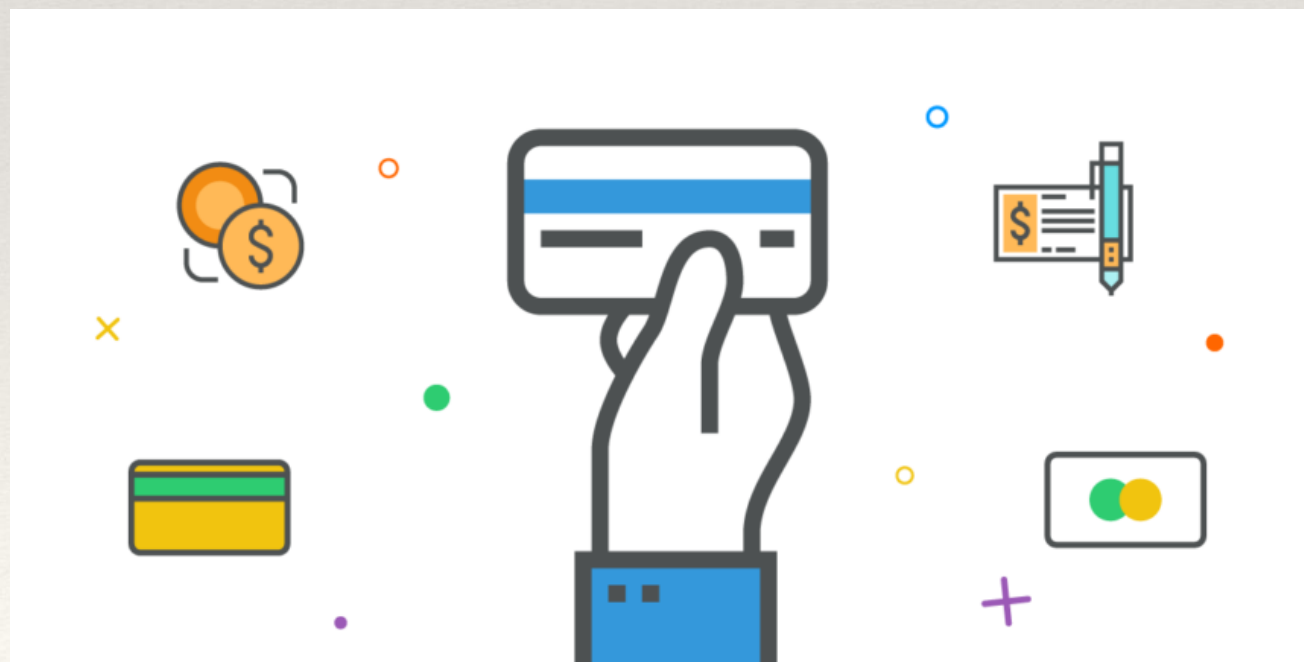
The user could touch the shopping cart icon to access it. Once touched button, the system will redirect to the order page showing all selected items in the current order. When user touches the plus or minus sign on the order quantity of a specific item, the system will reflect the change of the quantity of that item. Once the user touch the trash can icon on the side of one item, the system will delete that item from the order. There is no confirm button to cause confusion, any press of button will reflect on price and quantity change at the moment.



Task Analysis

4. Submit order and make payment

Once the user finishes its ordering, the user could touch the submit order button at the bottom of the screen. Once touched, the system will redirect to an order submission page with detailed item listing with price and total price. The user then touch submit button, and the system will redirect user to the payment selection page to select payment type among: mobile payment(apple, android pay, etc), credit/debit card, and cash payment. In the meantime, the order won't show on kitchen system until paid.



Design and Analysis

Conceptual Model

Attributes: price, recipe, flavor, nutrition

Actions on object: order the food in the kiosk;
delete the food from the kiosk.

Actions on attributes:

- The price of the food may change.
- The recipe of the food may be improved.
- The flavor of the food may change.
- The nutrition of the food can be calculated.



Restaurant:

Person (Customer):

Menu:

Food item:

Order:

Relationships:

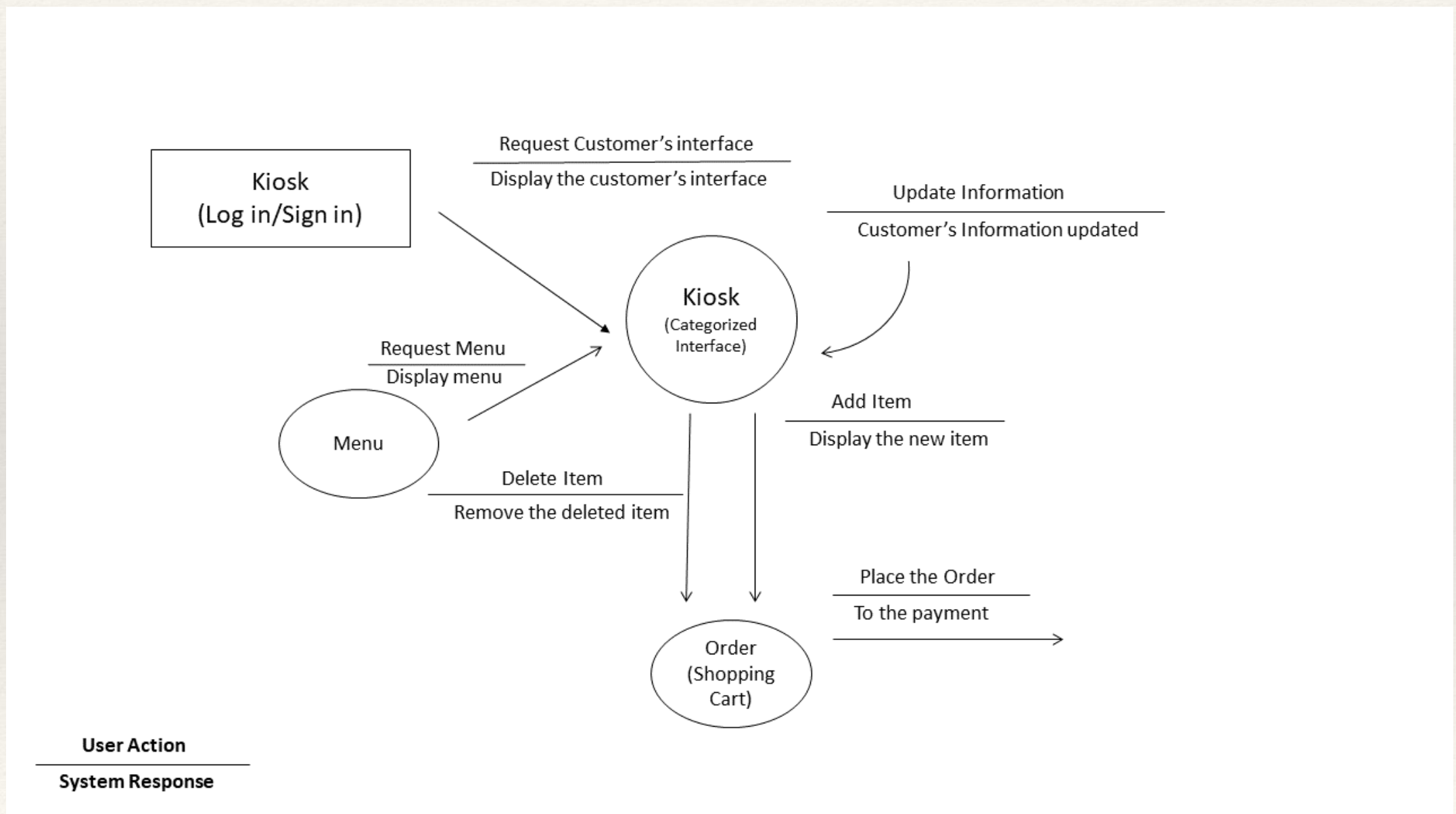
Design and Analysis

Semantic Level Design

Function Name	Parameters	Description	Feedback	Errors
Customer's information update	Customer's name, etc	Updates a customer's name, etc	A dialogue with an "Customer information updated successfully".	If there is no more memory on the system a dialogue appears. If the text information exceeds the text limit a dialogue appears.
Order food	Item name.	Adds an item to the order.	The sign indicating the amount of items in the order increases by one.	If the item is sold out, a dialogue message appears.
Place the order	Order number and a list of items included in the order.	Finishes the ordering process.	A dialogue with a "Order placed"	If the price of the order exceeds the limit of the amount available on the kiosk, a dialogue message appears.
Delete item from the order	Item name.	Deletes an item from the order.	The entry of the deleted item disappears in the order list.	If there is no more item in the order, a dialogue appears.

Design and Analysis

Syntactic Diagram



Design and Analysis

Lexical Model

Add Item (Customer)(“+”):	Customer adds an item to the order.
Delete Item (Customer)(“-”):	Customer deletes an item from the order.
Kiosk(Log in/ Sign in Page):	The initial page shown to user to log in or sign in or go as a guest.
Kiosk (Categorized item list):	This interface displays the menu of the restaurant to the customers. Customers can also view their shopping cart (their order).
Menu:	The list of available items provided by the restaurant for customers to purchase.
Order (Shopping Cart):	Items that customers have already purchased, each price and total prices.
Update Information (Customer):	Customer updates a customer’s name, etc.

Design and Analysis

Design Principles

Metaphors - remind you something familiar.

Direct Manipulation - straight and easy.

Error Prevention - with fewer troubles the better.

Visibility of Status and Feedback - see what you're doing.

Consistency and Standards - consistent all the way.

Aesthetic and Minimalist Design - pretty and simple.

Design and Analysis

Features

- ❖ **Touch to start the order:** The ordering process can be started by touching anywhere on the screen and the system will redirect to the main menu page showing both categories and details of the chosen category.
- ❖ **Choose what you want:** You can view the detailed information of the item by simply clicking the image of it in the main menu, and to add it to the shopping cart, you can click the “+” sign either in the main page or in the detailed page. Anytime you can check the total cost in your shopping cart at the bottom right corner showing related information. After choosing all the items and add them to the shopping cart, you can go to the shopping cart page to review your order and make any changes.
- ❖ **Different ways to make payment:** Kiosks support most regular payment methods including Apple pay, WeChat pay, credit card and cash. You can simply choose a payment method on the screen and use your phone for scanning, use the pos machine, or by cash.
- ❖ **Get support easily:** Kiosks are easy to use for customers of all ages. You can get supported during your order from images, icons, and tips on the screen. And you can call our staff by simply clicking the relating button anytime you need help with the whole ordering process.



KLM Analysis

Task-Command	Formula	Estimated Execute time
Continue as Guest Option	$M+P+K+R$	$1+1+0.2+0.1=2.3s$
Sign In – Face ID/	$M+P+K+R(\text{face recognition})$	$1+1+0.2+3 = 5.5s$
Sign In – Type	$M+P+K+M+(\text{type, 15s})+ K+ 2*R$	$1+1+0.2+1+15+0.2+0.2 = 18.6s$
Sign Up	$M+P+K+M + (\text{type, 15s})+ K +M +P+K +3*R$	$1+1+0.2+1+15+0.2+1+0.2+1+0.3 = 20.9s$
Main Menu(huge difference base on user)	$M+P+K+R+3*(M+P+K+R)$	$2+1+0.2+0.1+3*(1+1+0.2+0.1)=10.2$
Single Item Page	$M+P+K+R+3*(M+P+K+R)$	$1+1+0.2+0.1+3*(1+1+0.2+0.1)=9.2s$
Shopping Cart & Payment	$(M+P+K)*2 + R + R2(\text{payment usually take longer})$	$(1+1+0.2)*2+0.1+3 = 7.5s$

Storyboard

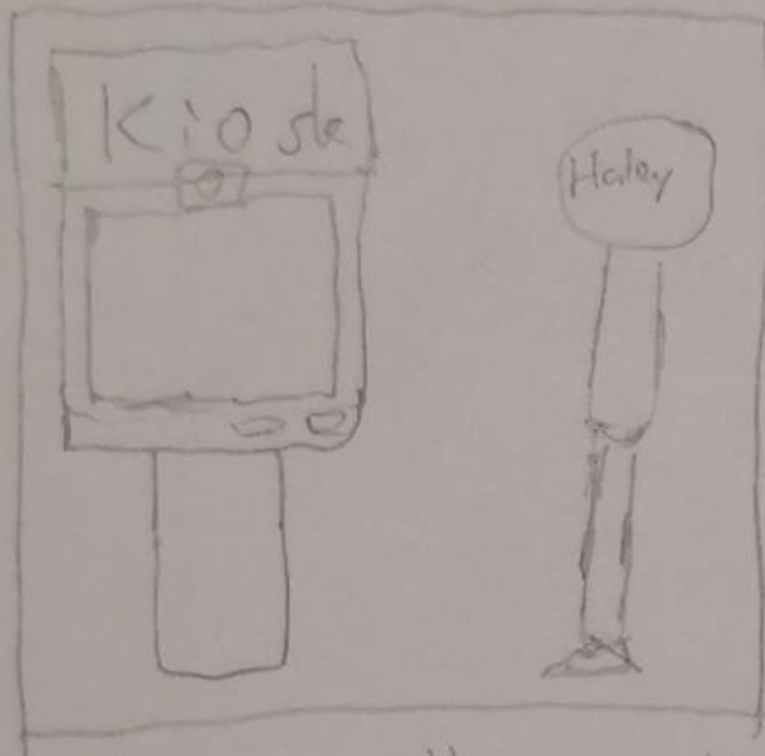
Haley is a 20-year-old who is undergoing a strict diet. She carefully checks the calories of the food in the single item page so the food she is ordering whose calories will not exceed her requirement.

Hailey.

- on strict diet

①

XXX Restaurant



Hailey walks up to
Kiosk

②



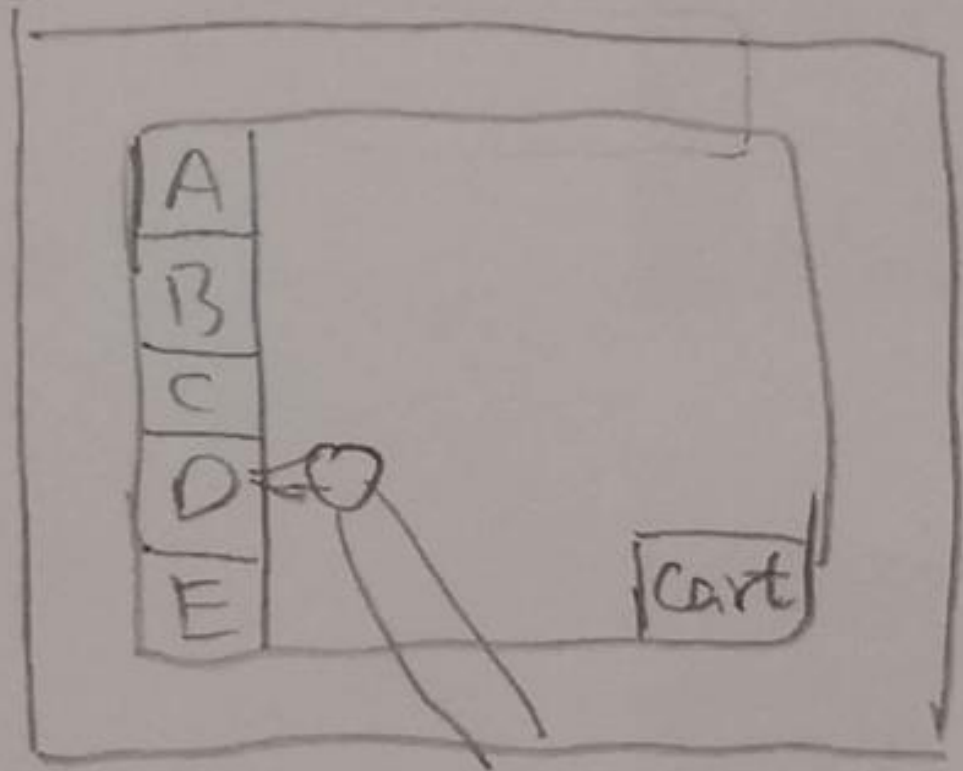
login use FaceID

3



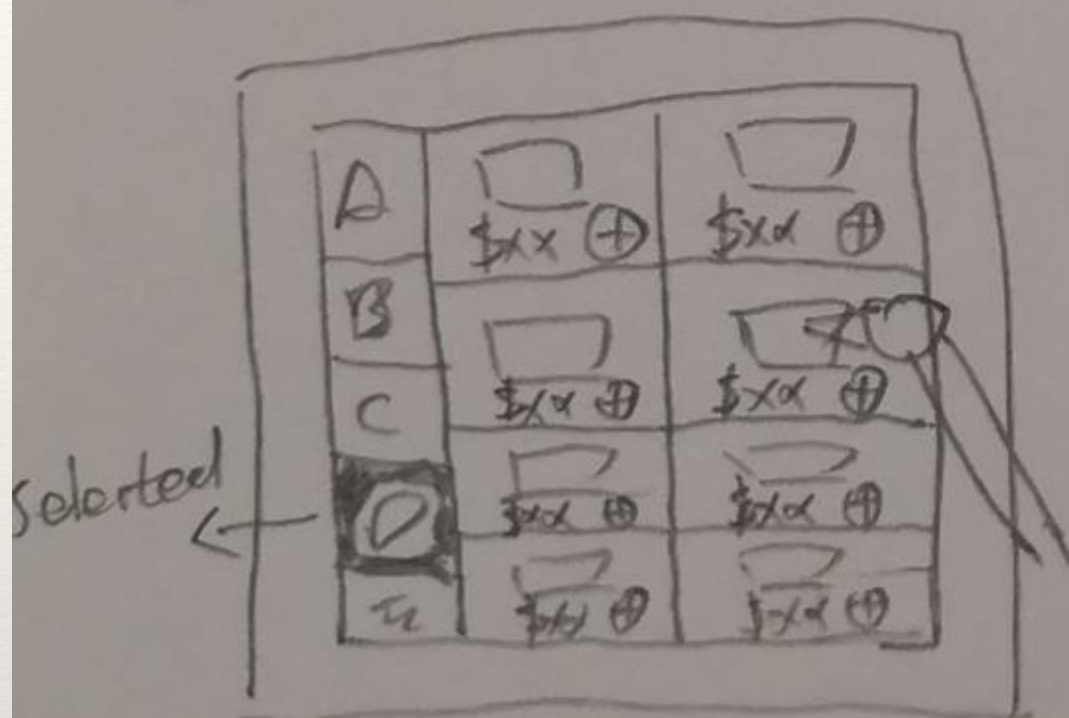
Tap Dine-In

4



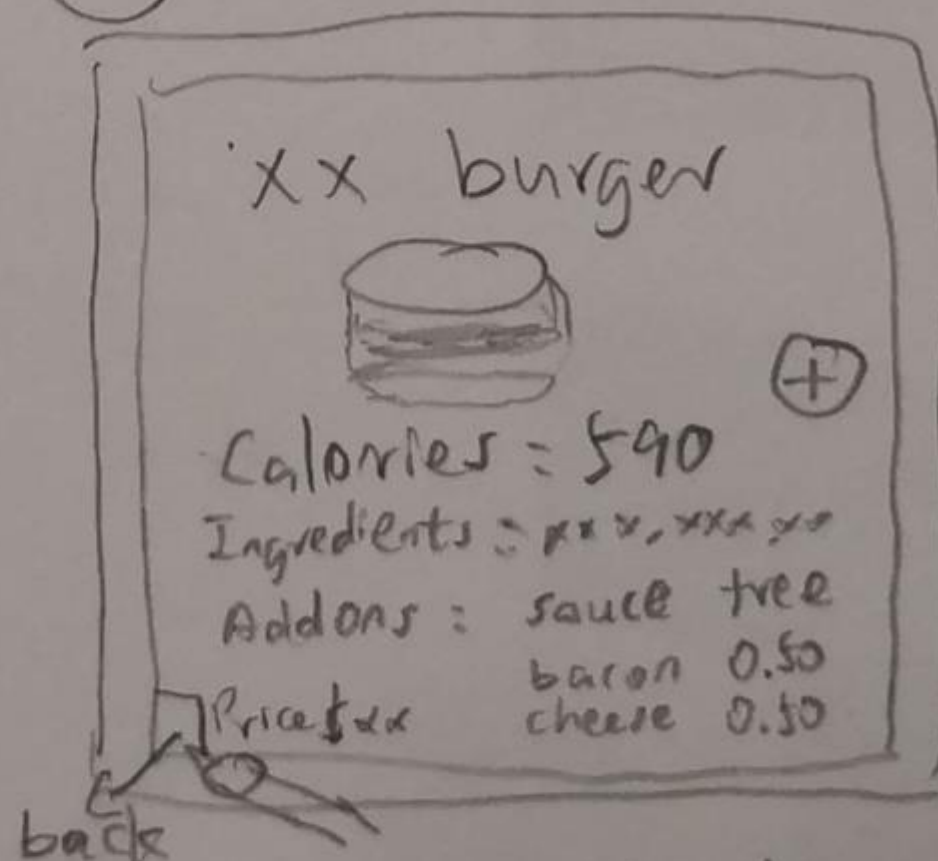
Select Category

5



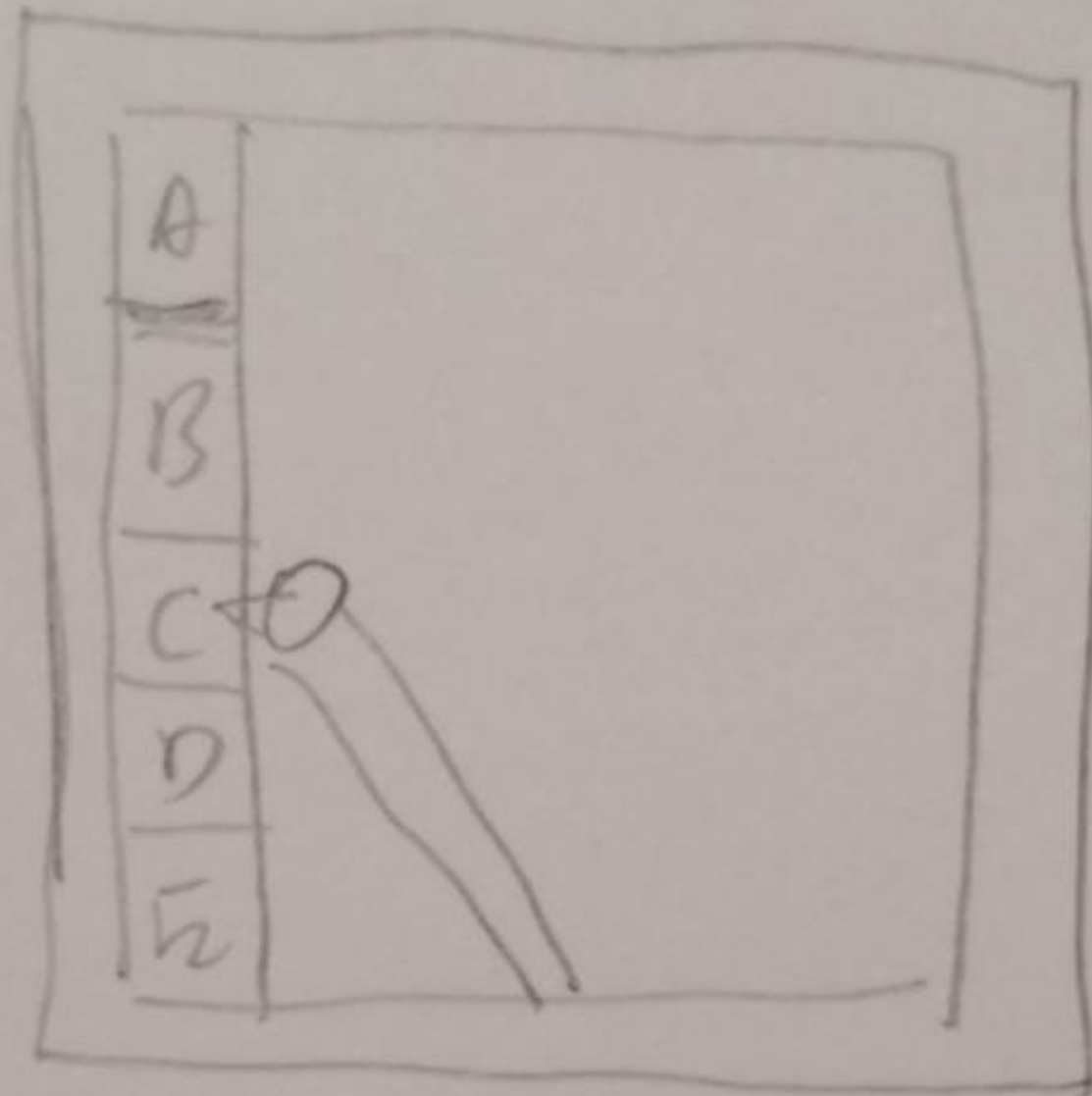
Tap on one image
to check more details

6



Calories is too high,
Haley touch back to find more
healthy food

⑨



Halley keep searching for
low calories food.

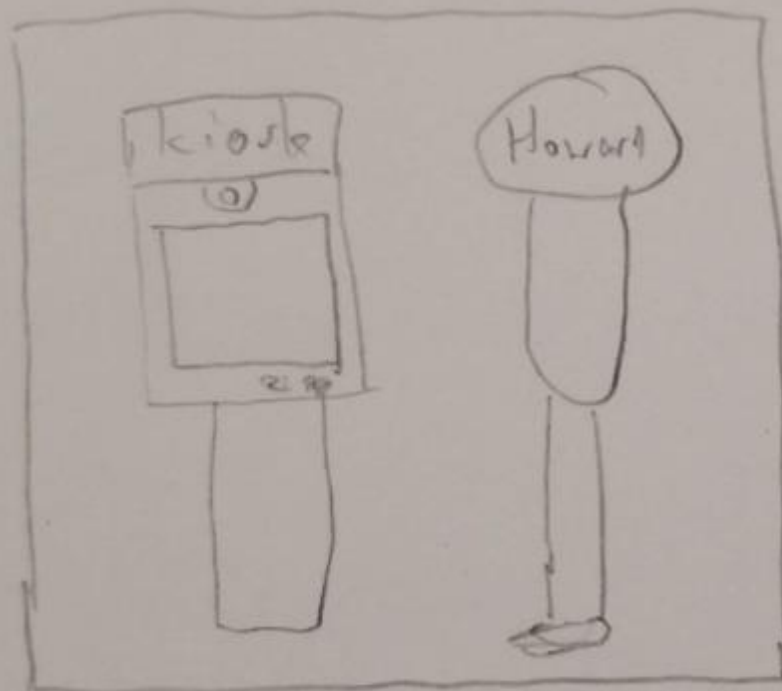
Howard is a 30-year-old who is severely allergic to nuts. He checks the ingredients in the single item page of the item he is ordering to ensure everything he orders is safe to eat.

Howard

- allergic to peanuts

①

XXX Restaurant



Howard walks up to
kiosk

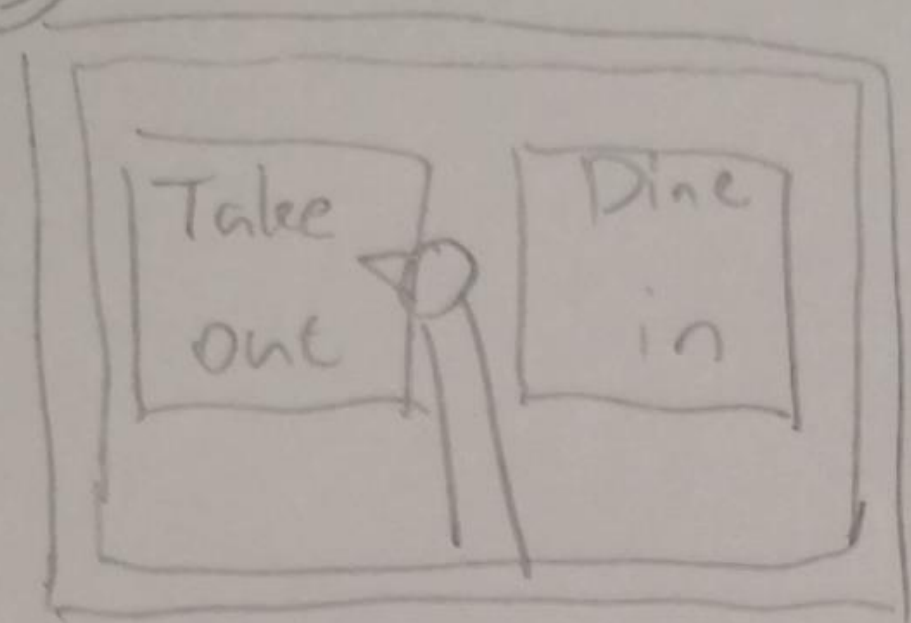
②



username:
password:
login as guest

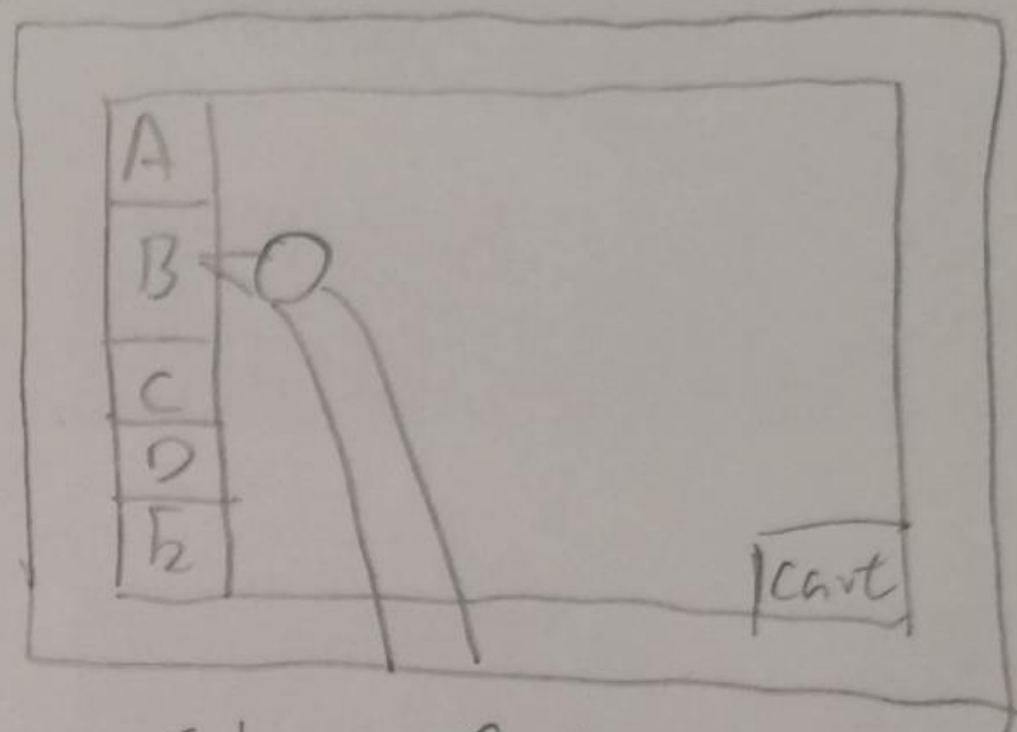
He tap login as a guest

③



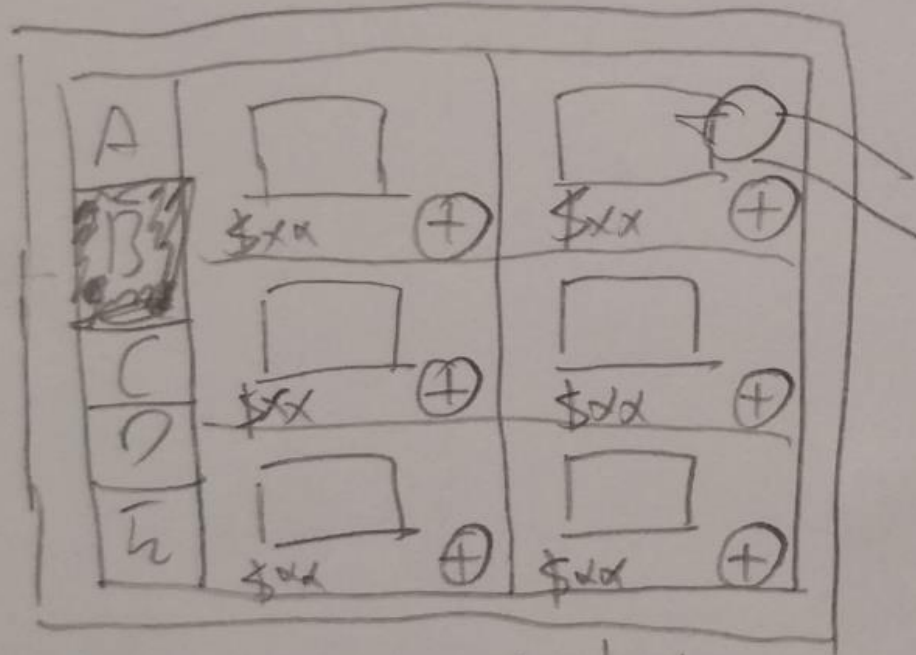
Tap take out

④



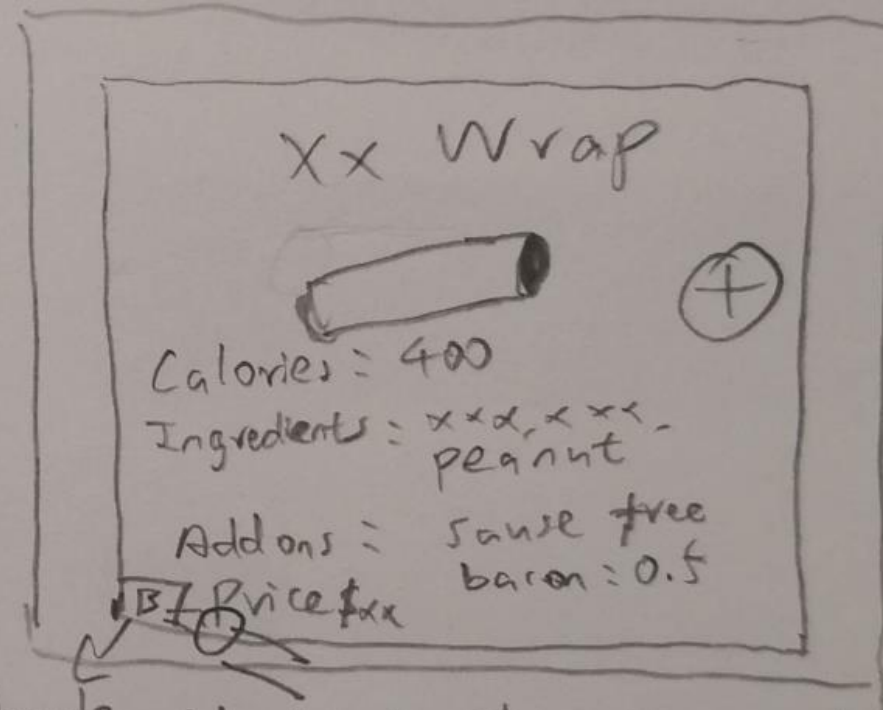
Select Category

5



Tap on image to check more details

6



back button

He finds this wrap has peanuts inside. He tap back to find something without peanut.

Howard then keeps browsing menu to find food without peanuts

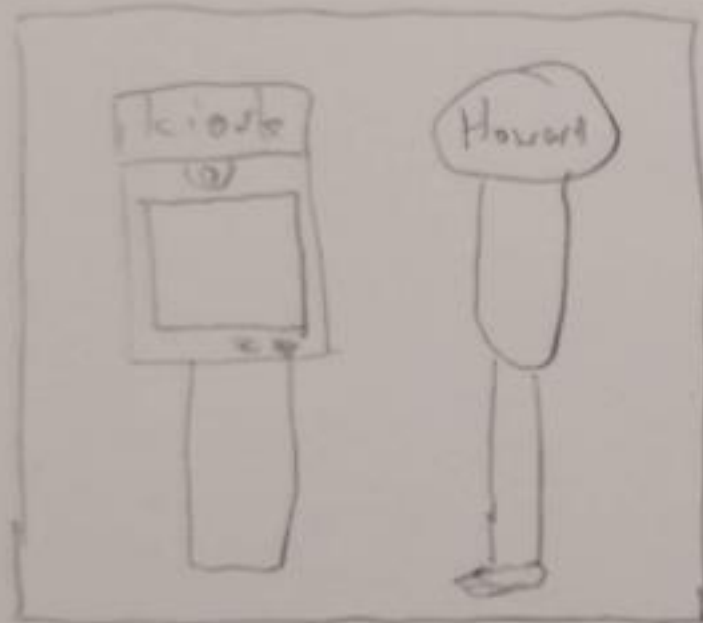
Rafael is a 45-year-old who usually orders onion rings along with the cheese burger. He gets into the cheeseburger's item page to customize a combo of cheeseburger and onion rings without needing to order cheeseburger and onion rings separately.

Rafael

— love onion rings, want to customize a
cheeseburger and onion combo

①

XXX Restaurant



Rafael walks up to
kiosk

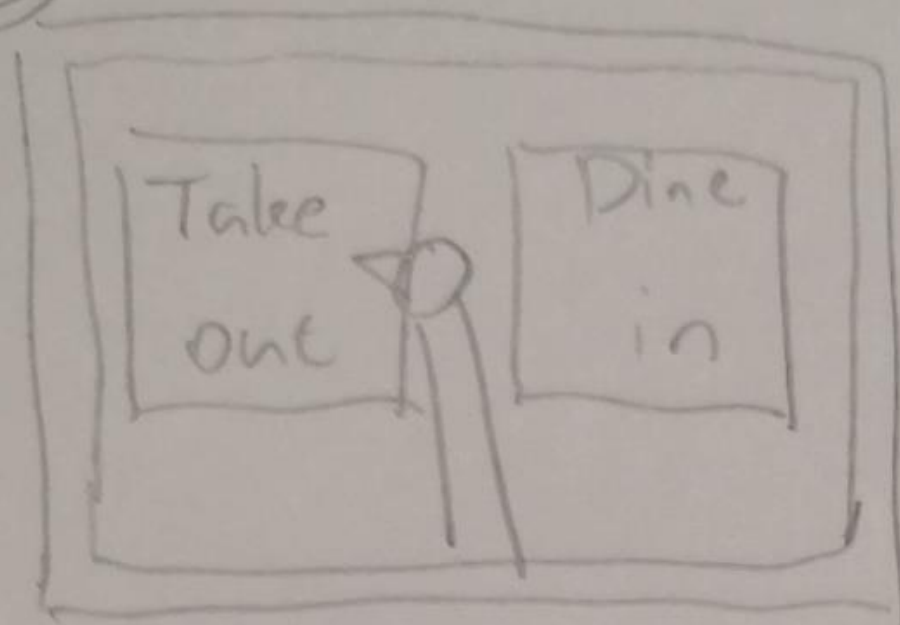
②



username:
password:
login as guest

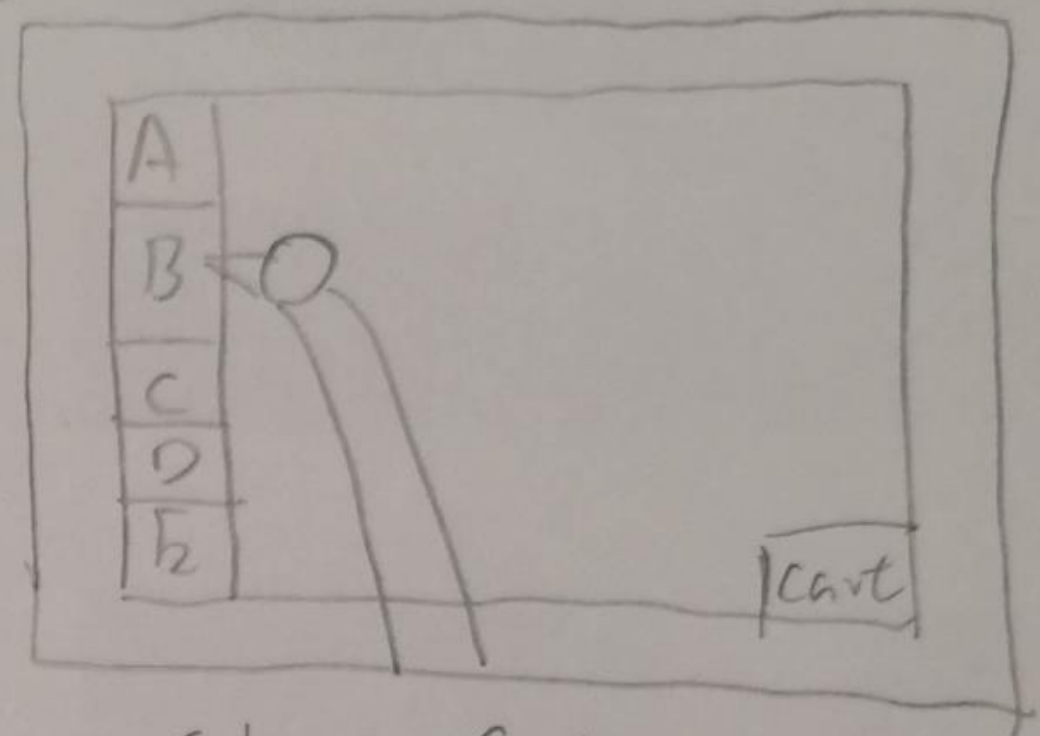
He tap login as a guest

③



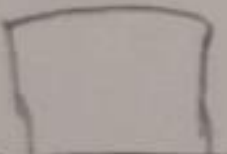
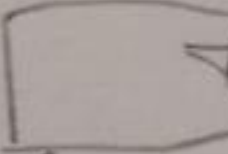

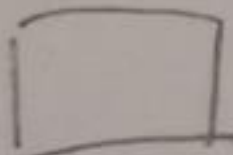

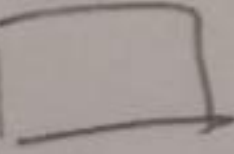
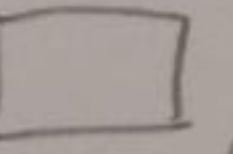
Tap take out

④



Select Category


5

A		
	\$xx ⊕	\$xx ⊕
C		
D	\$xx ⊕	\$xx ⊕
E		
	\$xx ⊕	\$xx ⊕

Tap on image to chede
more details

⑥

cheese burger



Calories: 390

Ingredients: ~~xxx~~, ~~xxx~~, ~~xxx~~

Addons: sauce free
bacon 0.50

Price \$xx


back

make a combo

+

Rafael taps make a combo

7

cheese burger


Side order

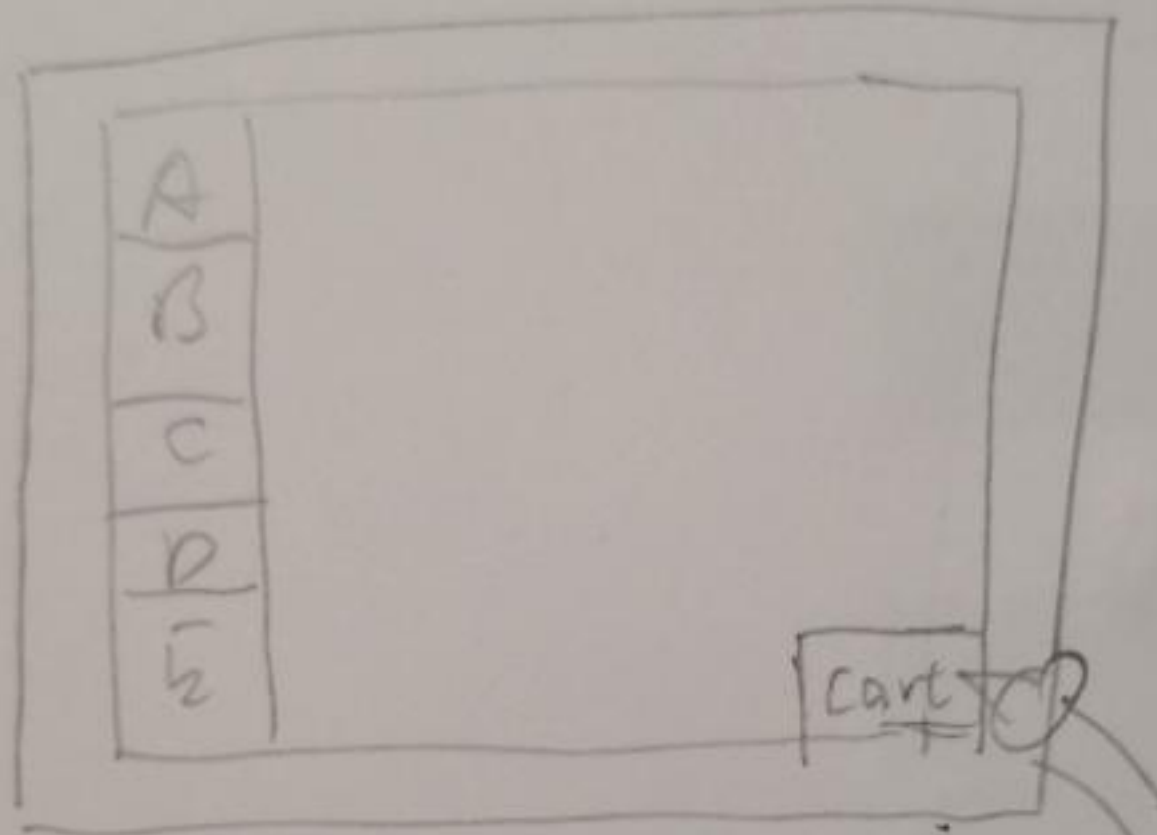
Drinks

fries	(S)(M)(L)	Soft Drink	(S)(M)(L)
Onion Rings	(S)(M)(L)	coffee	(M)(L)
X <		xx	(S)(M)(L)
x <		xx	(M)
L <		<	

Add to Cart

He selects onion rings and drinks to make a combo. And add it to cart.

⑧



After add item to cart, redirect back to main screen. Then tap cart to review cart to check out.

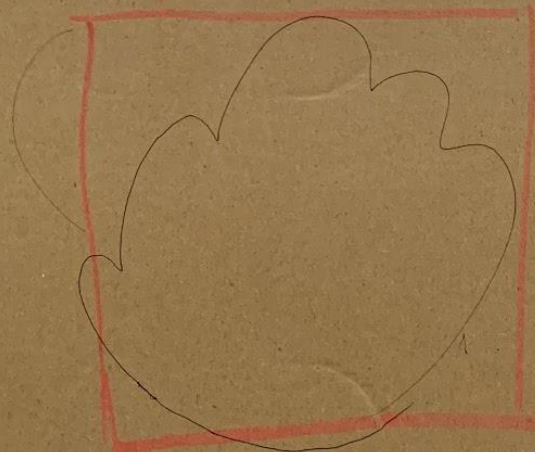
Paper Prototype

- ❖ Paper prototyping is a widely used method in the user-centered design process, to create software that meets the user's expectations and needs.
- ❖ A paper prototype is a non-functioning, low- to medium fidelity mockup that allows limited interaction by replacing or manipulating UI elements.
- ❖ It allows for easy, inexpensive changes to designs, which make them useful in the early design phases.

Welcome to XX Restaurant

Tap To ORDER

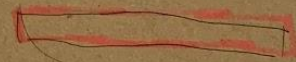
Face ID



Pay

CLC

Insert
Your
Card



User

xxx

Password

log in

log in as a guest

Take
Away

~~Take~~
Dine
in

Hamburger

Fries

Drink

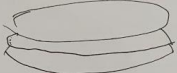
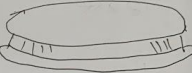

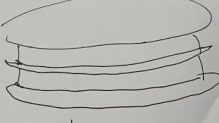
Dessert

Others

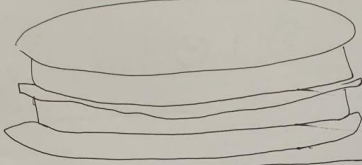
Please
choose

Category

Go to
Cart

Hamburger	Hamburger A	Hamburger B
Fries	 \$ 1.50 (+)	 \$ 1.70 (+)
Drink	Hamburger C	Hamburger D
Dessert	 \$ 2.00 (+)	 \$ 2.30 (+)
Others		

Hamburger D

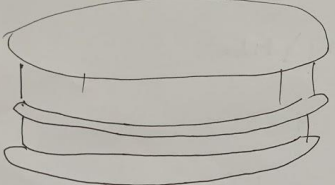



Price: \$ 2.30	Ingredients: Chicken Fillet, Bun ...
Calories: 570 Cal	<input type="checkbox"/> Add Sauce \$ 0.1 <input type="checkbox"/> Add meat \$ 0.5 <input type="checkbox"/> ...


back (+) ~~continue~~

Recommended Combination

Hamburger D + Soda

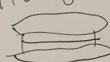



+ Fries



\$ 6.00

Yes No, thanks

	Quantity	Price/ea
Hamburger D 	- 1 +	\$ 2.40
		Total: 2.40

CANCEL PAY

Payment Method

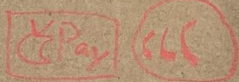
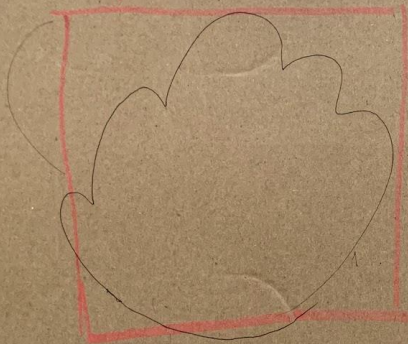
Credit / Debit Card

Cash

Apple Pay

Android Pay

Face ID



Insert
Your
Card



log in

User x x x
Password x x x x x x

log in as a guest

THANK
YOU

<https://youtu.be/zN-VGGsjkT0>

Medium-Fidelity Functional Prototype

Present in AdobeXD

Usability Testing

Test Scenarios

- ❖ Check the sign in part

 - Check if the user can sign in

- ❖ Check the category list

 - Check if user can select food type from category list

- ❖ Check the functionality for single item page

 - Check if the information of specific single item can be displayed correctly after the user click it.

 - Check if the user can add this product to cart and if the user can back to previous page.

- ❖ Check the functionality of shopping cart

 - Check if the user can finish the payment successfully

 - Check if the user can edit the order: add or minus the quantities of specific product.

Test Plan

A.

1. the participant will register the account and use this account to sign in to test if the register & sign in functionality works.
2. the participant will choose a specific category from the list.
3. the participant will click one single item and see the corresponding information.
4. the participant will add one item from single item page and add another item from categorized main page to test if the functionality of adding item works correctly.
5. the participant will check the shopping cart, add and reduce the quantity respectively to see if it works.
6. the participant will do the check out.

B.

Find the disabled people to repeat above tests again and see if they can use the product smoothly.

❖ Consent form:

Consent form for test Participation
NEU IRB #: XXXX
IRB Approval Date: XXXX

Study title	The test of the kiosk prototype
Researcher	Yuzhou Wu, Linyi Gao, Yongliang Tan, Sicheng Wang

We’re inviting you to participate in a test. Participation is completely voluntary. If you agree to participate now, you can always change your mind later. There are no negative consequences, whatever you decide.

What is the purpose of this study?

We want to test if the functionality of our kiosk can work properly.

What will I do?

In our test, you’ll do the implementation guided by our moderator.

Risks:

The personal information may be disclosed. To reduce the risk, we will use de-identified name during the test.

Other Study Information

Estimated number of participants	100 non-disabled people and 10 disabled people
How long will it take?	About 10 minutes
Costs	None
Future research	Your result won’t be used or shared for any future research studies.

What if I am harmed because I was in this study?

If you’re harmed from being in this study, let us know. If it’s an emergency, get help from 911 or your doctor right away and tell us afterward. We can help you find resources if you need psychological help. You or your insurance will have to pay for all costs of any treatment you need.

Confidentiality and Data Security

We’ll collect the following identifying information for the research: your name, gender and age. This information is necessary because we wish each kind of people can use our Kiosk smoothly.

Where will data be stored?	On our computers
How long will it be kept?	Three months

Who can see my data?	Why?	Type of data
The researchers	To conduct the test and analyze the data	The records of user implementations
The IRB (Institutional Review Board) The Office for Human Research Protections (OHRP) or other federal agencies	To ensure we’re following laws and ethical guidelines	The records of user implementations

Give a copy of this form to the research participant

1

Consent form for test Participation
NEU IRB #: XXXX
IRB Approval Date: XXXX

Contact information:

For questions about the research	Yuzhou Wu Linyi Gao Sicheng Wang YongLiang Tan	XXX-XXX-XXXX
For questions about your rights as a research participant	IRB (Institutional Review Board; provides ethics oversight)	XXX-XXX-XXXX
For complaints or problems	Yuzhou Wu Linyi Gao Sicheng Wang YongLiang Tan	XXX-XXX-XXXX
	IRB	XXX-XXX-XXXX

Signatures

If you have had all your questions answered and would like to participate in this study, sign on the lines below. Remember, your participation is completely voluntary, and you’re free to withdraw from the study at any time.

Name of Participant (print)

Signature of Participant

Date

❖ Preliminary Scripts:

Preliminary script read to subjects

Hello, thanks for taking the time to participate in our test! This test will take approximately five minutes. Our project is a fast food kiosk designed for restaurants. During the test, you will be asked to sign in, browse the category list, browse and add the single item, review the shopping cart, and finish the payment process. We will also camera your test process for observational study purpose. Any of your personal information will not be used outside the context of this study, and we will do our best to protect your privacy. Please browse our consent form and we can then start our test.

Payment

Any complaints?

❖ Post Study Survey

Post-study Survey

Test ID: _____

1. Please give a rate for the following statements:

1 - strongly disagree

2 - disagree

3 - neutral

4 - agree

5 - strongly agree

1) I think that I would like to use this application frequently.

2) I found the application unnecessary complex.

3) I thought the application was easy to use.

4) I needed to learn a lot of things before I could get going with this application.

5) I felt very confident using the application.

2. Do you have any suggestions for improving the application?

3. Do you have any suggestions for improving the test process?

Future Improvements

- ❖ QR code scan to connect with Reward Account
- ❖ More features like personal favorites, discount by using reward points, special price for member in holiday/birthday.

Q&A