Assignment-3

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Full Design and Specification

Design Specification

Conceptual model:
Restaurant:
Attributes: age, menu, address

Actions on object: the restaurant can update its information in the kiosk.

Actions on attributes:
· The restaurant's age goes up by one every year.
· The restaurant can show its cuisine in the kiosk or change it.

· The restaurant may move and change the address.

Person (Customer):
Attributes: age, food preference, address.

Actions on object: store the person information in the kiosk; delete the person information from the kiosk.

Actions on attributes:
· A person's age goes up by one every year.
· A person may change his/her favorite food.
· A person may move or change his address.

Menu:
Attributes: the number of items, specials, food recommendation

Actions on object: modify the menu; add item to the menu; delete the item from the menu;

Actions on attributes:

· The restaurant can change the number of items in the menu.

· The restaurant can provide different specials for different time.

· The restaurant can add food recommendation or delete them.

Food item:

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.

Order:

Attributes: the total price, the items.

Actions on object: place the order in the kiosk; add or delete items before you place the order.

Actions on object:

· when you add or delete items, the total price will change.

Relationships:

· The restaurant has the menu, which contains the information of the food.

Actions: The restaurant can modify its menu, to change the specific food item, like price or flavor.

· The customer can order the food in the kiosk.

Actions: The customer can add or delete food item in the kiosk. After that, he can place the order.

Semantic Level Design

Function Name	Parameters	Description	Feedback	Errors
Customer's information update	Customer's age, favorite item and address.	Updates a customer's age, favorite item and address.	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.

Syntactic Diagram
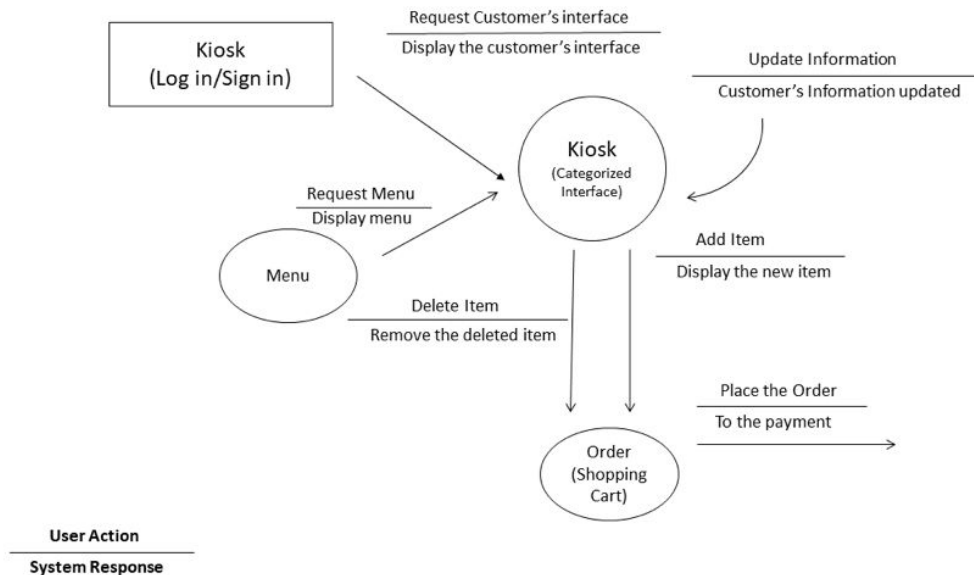
Lexical Model

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 basically 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 price.

Update Information (Customer):
Customer updates a customer's age, favorite item and address.

Documentation and Guidelines

Documentation

Fast food ordering kiosk is a modern and user-friendly ordering machine, where customers can easily place food orders without going to the counter to communicate with staff. Kiosks are set in the restaurant and customers can use the touch screen to operate them.

- **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.

Guidelines

1.Goals Section

The guideline is designed to offer developers and designers a set of recommendations for producing beautiful, usable, and consistent user interfaces for kiosk system. The aim is to improve the experience for customers by making the system user-friendly, convenient and more consistent.

2.Design Principles

Metaphors

Metaphors are important for users to be reminded of familiar experiences so that they can learn the whole ordering process more quickly, especially for the old and child who may have difficulty using the product. Metaphors work well in kiosks because users physically interact with the screen continuously.

Direct Manipulation

The direct manipulation of onscreen content engages users understanding. Users experience direct manipulation when they click on the content on the screen. Through direct manipulation, they can see the immediate, visible results of their actions.

Error Prevention

When designing kiosks, potential errors should be kept to a minimum. Users would get confused and unsatisfied when they come across some unexpected errors during the order process.

Visibility of Status and Feedback

Users should always be informed of system operations with easy to understand and highly visible status displayed on the screen within a reasonable amount of time. Interactive elements need to be highlighted briefly when tapped, progress indicators communicate the status of long-running operations, and animation and sound help clarify the results of actions.

Consistency and Standards

Interface designers should ensure that both the graphic elements and terminology are maintained across different pages. The system should incorporate functions and outputs in standard ways.

Aesthetic and Minimalist Design

All unnecessary information competes for the user's limited attentional resources, which could inhibit user's memory retrieval of relevant information. Therefore, the display must be reduced to only the necessary components for the current tasks, whilst providing clearly visible and unambiguous means of navigating to other content.

Task-Command Analysis

To analyze the task-command of designed Improved Fast Food Ordering Kiosk, the Keystroke-Level Model (KLM) is selected to predict total execution time of each task. The KLM model estimates the execution time for a task is done by listing the sequence of operators and then totaling the execution times. [1] Its execution part is described in four physical-motor operators: 1. K keystroking/ keypressing, 2.P pointing with a mouse to a target, 3. H homing the hand on the keyboard, 4. D drawing a line segment on a grid, 5. M the time a user has to mentally prepare to do an action, and 6. R system response time. The formula is T(execute) = Tk + Tp + Th + Td + Tm + Tr.

The following analysis is based on the assumption that the Kiosk system is a touch screen station inside the fast food restaurant. With this assumption, we can ignore D and H in the formula because there is no keyboard and drawing activity involved with touch screen station. The P here could be seen as pointing hand to button's position on touch screen. The formula used should be T(execute) = Tk + Tp + Tm + Tr.

The Kiosk system is assumed to be a lightweight system with limited animation effects on a 24-inch touch screen.

Categorized Main Page On one side of the main page is the product category and the rest of the main page is the specific product included in the category. The entry for the specific product contains the image, the name and the price of the product and a "+" sign for quick addition to the shopping cart.

The user's order process might take several cycles of operation based on the amount of food and drinks he/she is going to order. The execution time here is calculated one cycle. If the order item doesn't have options for size, flavor and customization, it will only take one keypress and one hand movement. However, most restaurants nowadays provide a lot of customization on food provided to create more customer satisfaction. The calculation below provides an average calculation that assumes user need to select the size, flavor and one customization option.

K: Keypress of the touch screen button. Based on design of system and touch screen response time. With lightweight system and limited animation, the K here could be assumed to be 0.1 second.

P: The hand movement speed on a 24-inch touch screen varies among young adults and senior users. It could range from 0.5 second to 2 seconds. The calculation uses 1 second.

M: After browsing the menu, the user should be able to easily determine the plus sign stands for add to order. With this intuitive design, the calculation here uses M of 2 seconds.

*M2: The selection of size, flavor and customization options is fairly intuitive functions. The calculation uses M2 of 1 second since user could easily figure out the pop-up selections.

R: The system response time of user's keypress. As lightweight system with limited animations, R could be 0.2 second.

The actions are: m p k r 3*(m2 p k r)

T(execute) = 2 + 1 + 0.1 + 0.2 + 3*(1+1+0.1+0.2) = 10.2 seconds.

Improvement

The restaurant can create an account for each customer. The kiosk can provide face Id login interface, which can reduce the time for typing the account information. When the customer log in, the kiosk will remember the customer's each action. After getting enough data, the kiosk will generate the recommendation or some default choice. For example, for the customization choice, the kiosk will generate the default one for the customer. These is no need for the customer to input the same information each time, which will save a lot of time and improve the customer's experience satisfaction.

Single Item Page - Except for adding the item directly from the main page, users can click the item image and go to the independent page of the item. This page contains the information including the price of the item, the ingredients of the item, the amount of calories of the item and customization options available for the item. This page also includes a "+" sign for adding the item to the shopping cart.
Once the user enters the single item page, he/she only has two options. After reading more details about the item, the user will either add this item to the shopping cart or exit the page.

K: analyzed in first functionality already. 0.1 second

P: analyzed in first functionality already. 1 second

M: Since users should have seen the plus sign on the main page, the preparation time here is 1 seconds faster than preparation time in first functionality.

R: analyzed in first functionality already. 0.2 second

If add item, T(e) = m p k r 3*(m2 p k r) = 1 + 1 + 0.1 + 0.2 + 3*(1+1+0.1+0.2) = 9.2 seconds.
If exit page, T(e) = m p k r = 1 + 1 + 0.1 + 0.2 = 2.3 seconds.

Improvement

If the customer chooses to add the item, before going to the shopping cart, the kiosk can generate a page which can recommend the combination for this item. The recommended combination includes not only the specific preset combination, but also the combination generated by the data and some algorithm, for example, machine learning.

Also, for the 'exit page' action, we can choose to use multi-touch gesture action, like what in Mac. For example, the customer can exit the page when he/she touches the screen with two fingers and swipe to the left.

Shopping Cart - The shopping cart function is similar to the cart or basket used in supermarket shopping. It can temporarily put selected items into the shopping cart, delete or change the purchase quantity, and carry out multiple items.
Assumption: user couldn't edit size, flavor or customization options in the shopping cart. The user needs to delete it then order again.
Once the user enters the shopping cart page, he/she only has three options.
Option 1: the user wants to order more items, going back to menu.
Option 2: the user checks out

K: analyzed in first functionality already. 0.1 second

P: analyzed in first functionality already. 1 second

M: 1 second to find check out button or going back button

R: Go to payment page, 0.2 second

T(execute) = m p k r = 0.1 + 1 + 1 + 0.2 = 2.3 seconds.

Option 3: the user adjusts the quantity of the item then going back to menu or check out

K: analyzed in first functionality already. 0.1 second

P: analyzed in first functionality already. 1 second

M: 1 second to find check out button or going back button

*M2: analyzed in second functionality already. 1 second

R: Go to payment page, 0.2 second

T(execute) = m p k r 3*(m2 p k r) = 0.1 + 1 + 1 + 0.2+ 3*(1+1+0.1+0.2)= 9.2seconds.

Improvement

The choice 3 cost too much time because of our assumption. Therefore, the improvement is that we can add the functionality that allow the customers to edit size, flavor or customization options in the shopping cart. Then there is no need for the customer to exit the page when he/she want to edit the order. If one customer always wants to edit the order, keeping deleting and ordering again and again is very annoying.

Also, like the improvements for the task 2, we can add more multi-touch gestures operations, like tapping, swiping and pinching. This will definitely save a lot of time.

References

[1] Card, Stuart K; Moran, Thomas P; Allen, Newell (1980). "The keystroke-level model for user performance time with interactive systems". Communications of the ACM. 23 (7): 396–410. doi:10.1145/358886.358895