Final Year Project Report

Full Unit – Final Report

A study of Human Computer Interaction

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A report submitted in part fulfilment of the degree of

BSc (Hons) in Computer Science

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Declaration

This report has been prepared on the basis of my own work. Where other published and unpublished source materials have been used, these have been acknowledged.

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Student Name:

Cheukwing Lim

Date of Submission:

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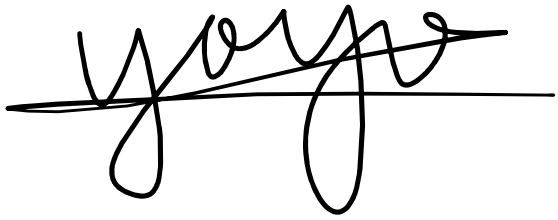
Signature:



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Abstract

In the later 1970s, the emergence of software and computing such as text editor made everyone a potential computer user. Computers and humans are becoming more tightly integrated. As opposed to the days when they were only able to talk to each other in person, to the present day, most have become bow-headed individuals, constantly interacting with the Internet. They found the usability limitations of computers. Thus, studying the human-machine interface becomes necessary to improve its usability.

Interaction between people and computers is known as human-computer interaction (HCI) and focuses on human-computer interaction as an interface. Human-Computer Interface can obverse several types of people to create technologies to facilitate innovative interactions. That enhances the overall usability, productivity and reduces the risk of the system. For example, using the internet is not only for teenagers but also for elderly people. As a group, the elderly tends to have inadequate proficiency in a variety of functions. Since they rarely handle electronics and are unfamiliar with many operations. Despite this, HCI studied their weaknesses to improve the interface's operation and design for the desired property.

Human-Computer Interface includes three components: human, computer, and the relationship between them. About humans, they will have several types of memory, perception, speech, and voice. The computer has a screen for human visuals, a trumpet for human auditory, and input devices for human tactile. This relationship between them is essential for Human-Computer Interface. Therefore, Norman's model of interaction (HCI execution-evaluation cycle) is for designing an efficient system process. During the model, we can improve the system following three conflicts, gulf of execution, gulf of evaluation, and human error. For HCI, ergonomics also is one of the components to design the best performance for users such as display function and colors catering color blind.

Norman's model of interaction: Establish the goal, Formulate the intention, specify actions, execute action, perceive system state, interpret system state, Evaluate system state

In this project, I will design and implement three different software interfaces such as websites and databases with one topic small online shopping. During the design, I will follow Norman's model of interaction. For the step of the design process, I will do research of user who will use the software and its requirements analysis. Building some specific guidelines for the design can efficiently meet the requirements of those users. Afterward, I will start designing the idea followed by the analysis of statistics and solve the issues of each different user. Finally, evaluate the whole product that has been built to meet the goal of the website and the requirement of users.

Following HCI design, I will compare different interfaces and so some survey for different type of user on HCI about software and hardware interfaces. Each content will directly record inside the report and the statistic sheet I will build inside my Gitlab.

Project Specification

Name of the project: A study of Human Computer Interaction (HCI)

Aim:

(1) Learn about Human Computer Interaction by comparing user interfaces and researching.
(2) To design several software for achieving the theory of Human usability.
(3) Evaluate by the actual user and improve that software.

Background:

Due to the advance of technology, user interfaces design is necessary to keep making improvement for cater the human usability. Thus, considering the usability of the user, human started to study about the relationship between computer and human call Human Computer Interaction for developing the following software smoothly and perfectly. The aim of this project is to study the theory about HCI through my personal user interface developments and evaluation.

Development in term 1:

(1) Layout of the first two software
(2) Some interaction of software 1 and 2
(3) Do some improvement from design rules

Development in term 2:

(1) Finish 3-4 software
(2) Do an improvement from myself
(3) Make a survey to evaluate the software
(4) Find some user from different age group to evaluate my software

The report will include:

(1) Overview and design achievement of those user interfaces
(2) Process of those user interfaces
(3) HTA diagram of those user interfaces
(4) Evaluation of those user interfaces
(5) User manual of three user interfaces
(6) Comparison of user interfaces and the theories achievement inside the software

Chapter 1: **Introduction**

1.1 What is Human Computer Interaction

Human Computer Interaction is a study of designing computer interaction to adapt human's perception, behavior, cognitive. To improve the quality of life and productivity, the main reason for the HCI exploration is to improve the usability of using technology. Aside from this, it promotes the advancement of the Internet and its practicality. It is studying the relationship and interaction of human and interaction including memory, visual, movement etc. Therefore, the core concept of HCI is user-centered and usability. HCI researchers found out sets of design processes, principles and methods for guiding the future designer to create advanced software.

1.2 Aims and Goals of the Project

Human Computer Interaction is an essential part of the future software design. This project is a clever way to deeply study the relationship between humans and computers. Plus, I could be an advanced designer to design the best software for user to use. The aim of this project is to learn about the design rules of HCI and build three or above software following the structure of what I learnt and improve the usability of the software continuously until an advanced website. Each software will be evaluated by the actual user through an interview or survey.

1.3 Survey of Related Literature

See Bibliography section.

1.4 Milestone Summary

Week 2

I was starting to do the planning of the project 'Human Computer Interaction'. I have searched some details about the HCI on the internet, HCI is about the relationship between Human and Computer. There are several similar elements which connect the interaction of a software. The main reason for studying HCI is improving the usability of software following the advancement of internet and technology.

Week 3

I learnt more about the software process, execution and the evaluation when designer creating a software. There are several principles and design rules we can follow to guarantee the usability of the software. I considered some of the risks of doing this project and prearranged precautions or workarounds.

Week 4

I read the book 'Human Computer Interaction' which can deeply be learnt about the relation between human and computer such as visual channel with the computer screen. I listed the principle of HCI for the process of creating the software and the evaluation when creating the software which is a checklist for me to evaluate the elements of usability is completely achieved or not such as flexibility or learnability.

Week 5

I started picking up the file in GitLab which add some notes, planning of the project and the software file inside the GitLab. I planned to design two software be a restaurant ordering, one for teenager, one for elder people. The difference between them is about the font size and the picture size for elder people would be bigger and clearly and the website for the teenager would be simpler which would not spend too much time for the ordering progress since it does not need the step of showing food bigger and clearly. I partial finish the layout of the ordering website in the paper.

Week 6

In this week, I learn about the computer and interaction between human and computer from the book and finished the layout of the ordering app either for teenager or elder people. According to the supervisor's advice in the meeting, I started designing the website by HTML file with some HCI theory for drafting the report. I realize the time management is not doing well such as the report are not started yet. I did the high time estimation.

Week 7

I had done the layout of ordering app for teenagers and partially finished the layout for the elder people. I had used some CSS for highly presenting the feature of button and the food display in the webpage for the elder people. I had done some CSS for the vision when user using the website through mobile phone.

Week 8

I learnt about the design process of Human Computer Interaction. I realized it is difficult for me to compare this two software which is same topic with different user (teenager and elder people). However, I changed the topic of the software which is shopping website. I did the plan of ordering app and shopping app according to the design process I learnt. The tools I am using (HTML) are quite old. Therefore, I changed to use react tools to create software which is more advanced and easier. It is a challenge for me since I have not used it much before.

Week 9

I did the layout of an ordering app this week. I created several components in the ordering app which is home '`Home.js`', order '`Order.js`', cart '`Cart.js`' page and learned about the usage of react-route-dom. React Route can create its own path for each component and add a link path to a button to connect the other component. In addition, I did more knowledge about HCI through the creation of ordering app. I use a better way for starting to create the shopping app and created several components which is home '`Home.js`', search '`Search.js`', type '`Type.js`' page.

Chapter 2: **Developments**

2.1 Overview

Software 1: Website for restaurant customer ordering

In the restaurant, ordering by waiters is outdated. The mode of restaurant ordering is changing to be ordered online though a QR code. This software would be for customers, whoever is a teenager or elderly people.

The ordering page should be used by mobile phones, Design should match to website and mobile (width). To elder customers, the designer will consider catering to the issue when they use it.

Client: The boss of the restaurant

User: Customer (doing as the teenager or elder people)

Software 2: Website for shopping

Shopping in a real store is traditional, the general lifestyle is changing. Online shopping would be a trend for people saving time to buy what they want. The main customers would be teenagers and busy office staff.

The shopping page should either be used by mobile phone or computer. Design should match the website and mobile (width and effects). According to the aim of webpage, the design would simple and easy to use.

Features:

- Clothing display: the system can display clothes with some associated metadata.

- Shopping cart: the user manages a shopping cart that is always accessible.

- Sorting, filtering, and searching: the system can display items in different orders and according to several filters, including a search mechanism.

2.2 Components and Interaction

Software 1: Website for restaurant customer ordering

a) View menu
- the default is to display food item type and each individual items including (1) price. (2) allergies. (3) picture. (4) description
- show the current quantity selected of each item
- add or remove item into the cart
- notification and effects show the user added or removed the item

b) Ordering items

- display how many did they chose
- display the total price
- remove the item that they do not need
- confirm button for customers to confirm the order

c) Order tracking

- Status of order (received -> preparing -> delivered)
- show the items they ordered

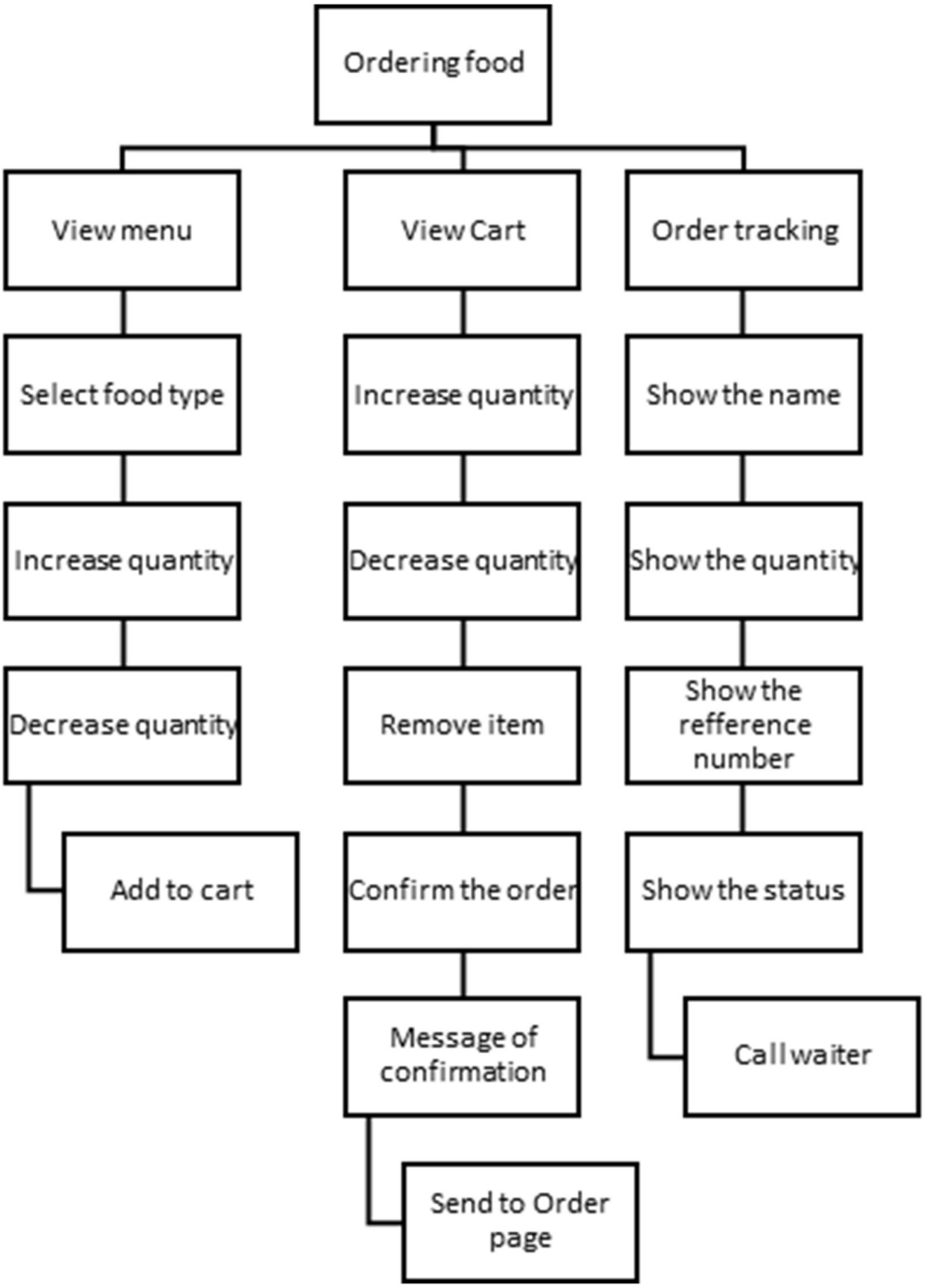
d) Calling waiters (button)

Software 2: Website for shopping

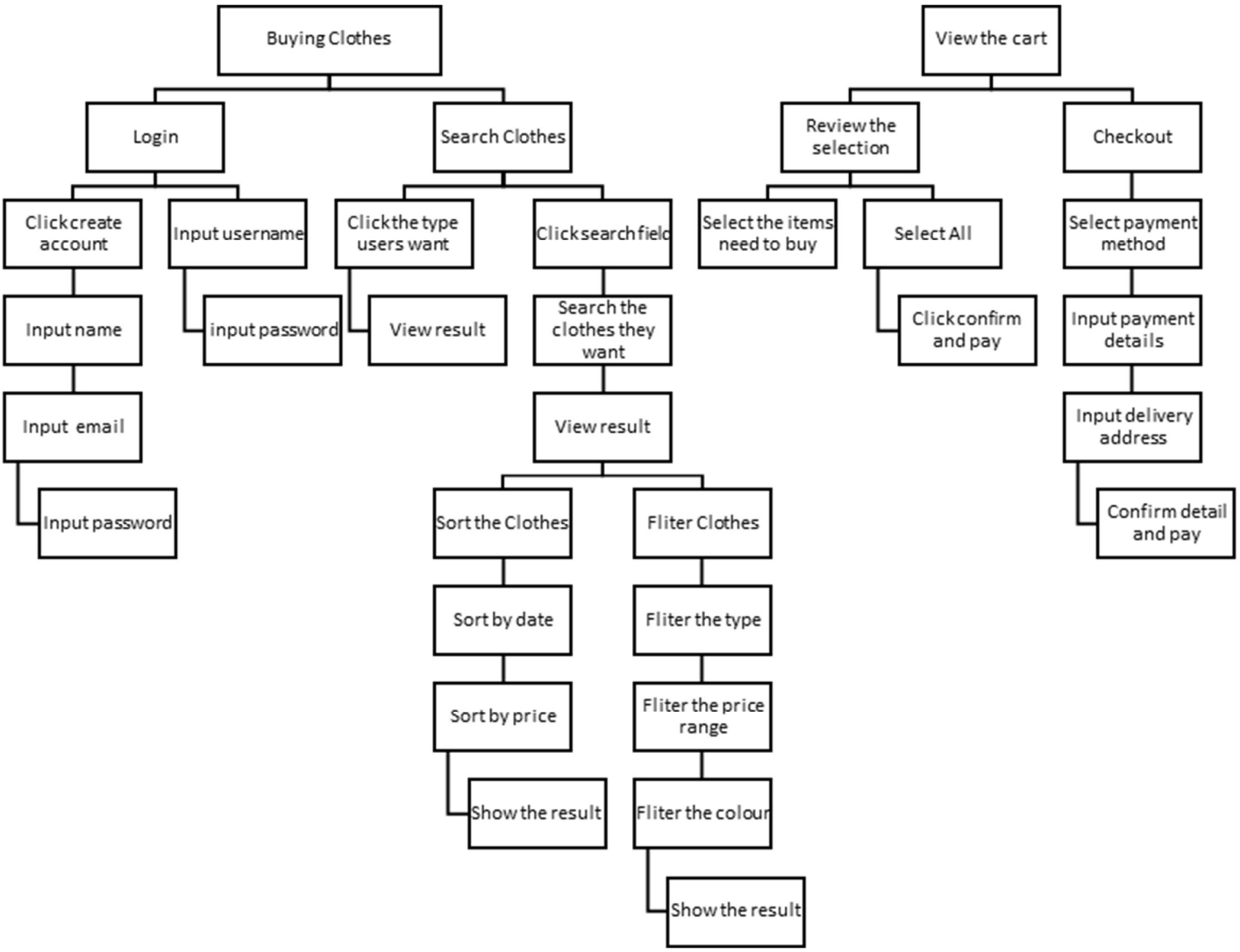
a) Login and create an account
   - Login the account which saved their items
   - Create an account
b) Home page
   - Recommend clothes depend on the user favors
   - Different type of recommendation
c) Clothes type
   - Separate the clothes of men and women
   -
d) Display clothes
   - Display the price
e) Clothes details
   - The description and size-fit
   - Display the price, size (S, M and L) and colors
   - Add to the cart
f) Filter and sort clothes
   - Filter: price range, size, color, date of creation range
   - Sort: price high to low, price low to high, most popular, newest
g) Cart management
   - Show the items which customer chose
   - The total price of items
   - Add and remove the item
   - Select the items that they want to buy
   - Pay button
h) Cart confirmation
   - Show the item they selected to buy
   - Confirm button
i) Payment detail
   - Payment detail (card holder name, card name)
   - Total number of payments
   - Pay button

2.3 Task Analysis

Software 1: Website for restaurant customer ordering



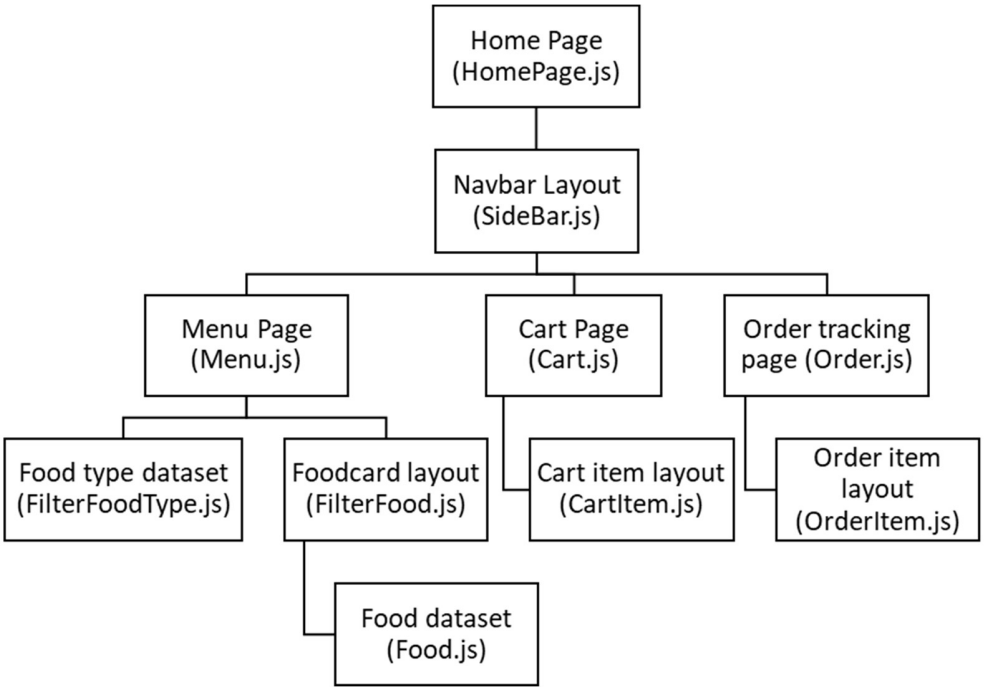
Software 2: Website for shopping



2.4 Documentation

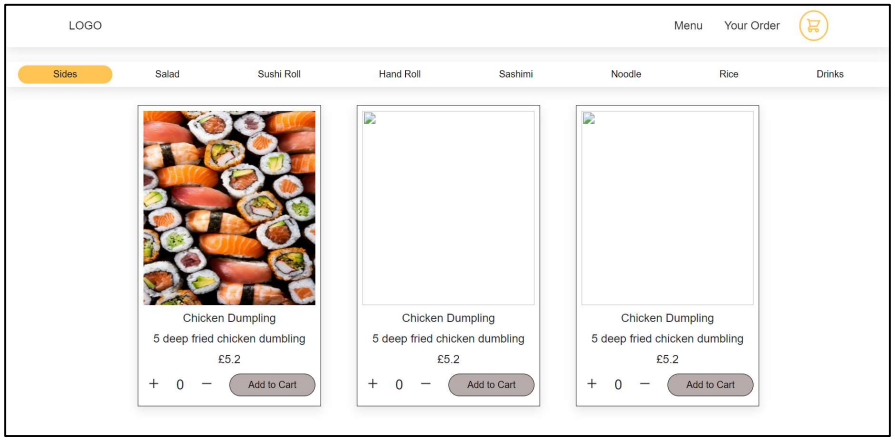
Software 1: Website for restaurant customer ordering

Website design:

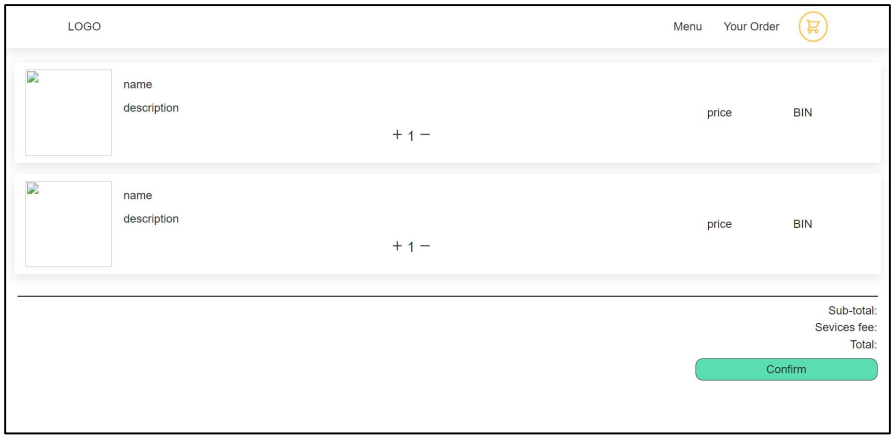


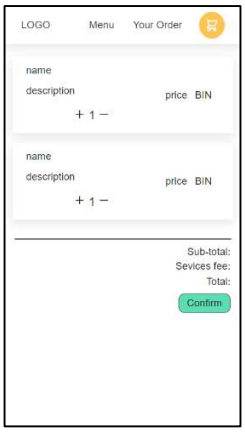
Home Page: Path: http://localhost:3000/

Menu Page with nav bar: Path: http://localhost:3000/menu

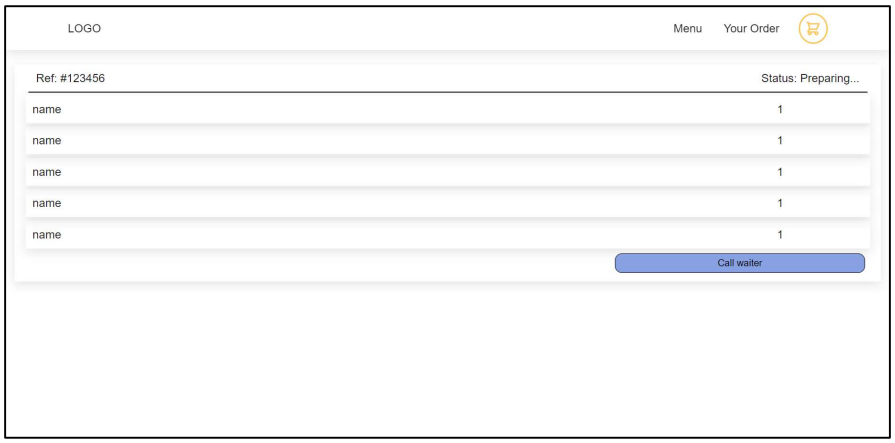


Cart Page with nav bar: Path: http://localhost:3000/cart

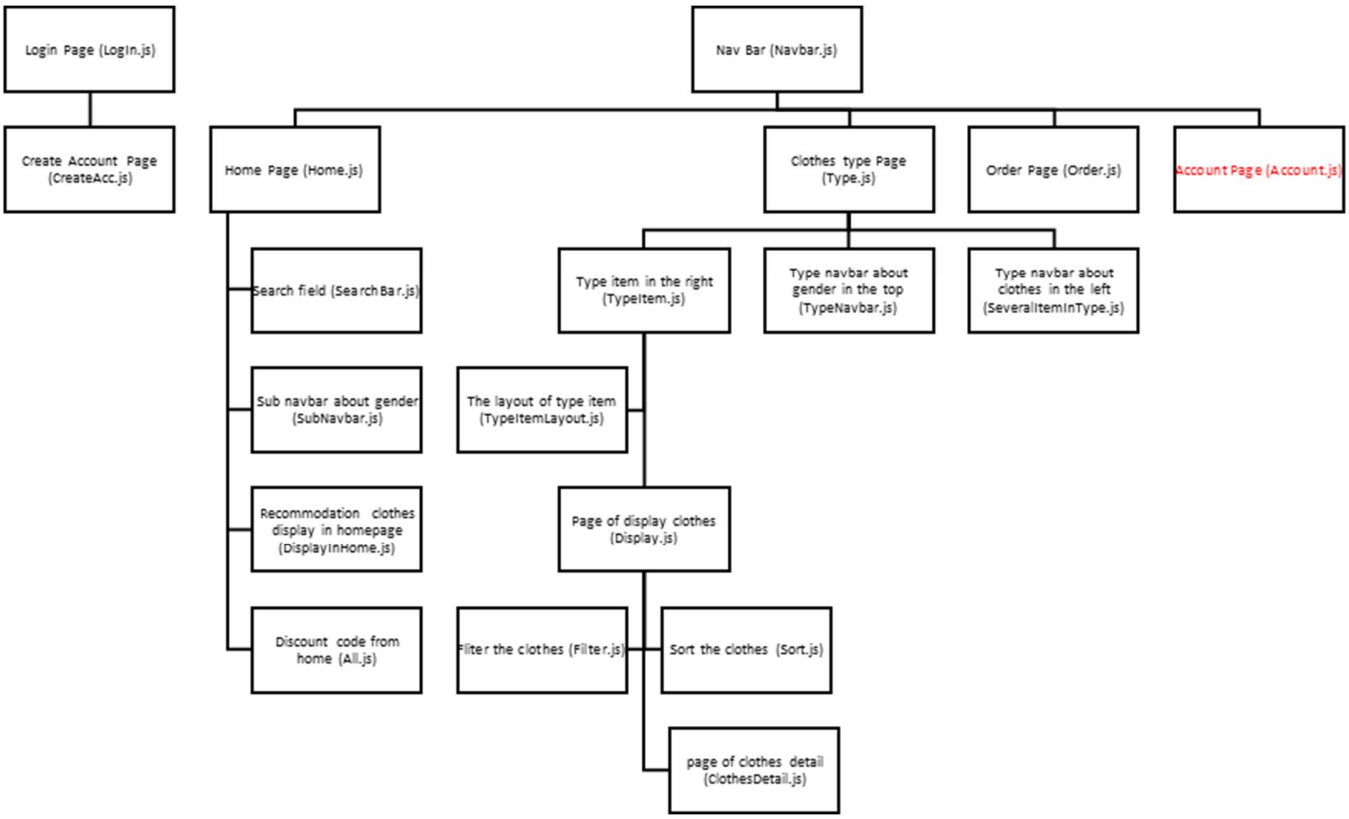




Order Page with nav bar: Path: http://localhost:3000/order

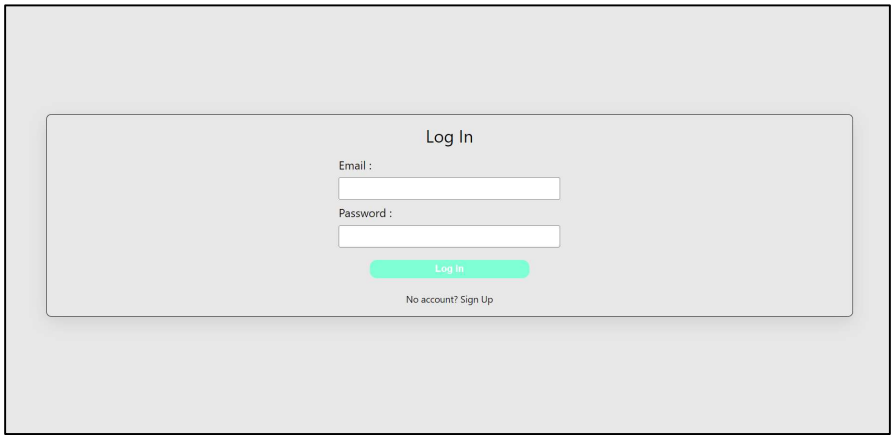


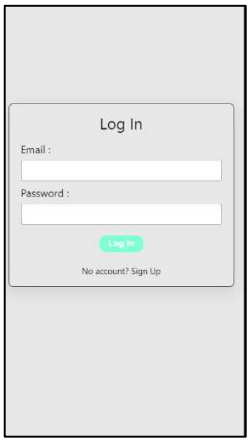
Software 2: Website for shopping



* Red font: Not implemented yet

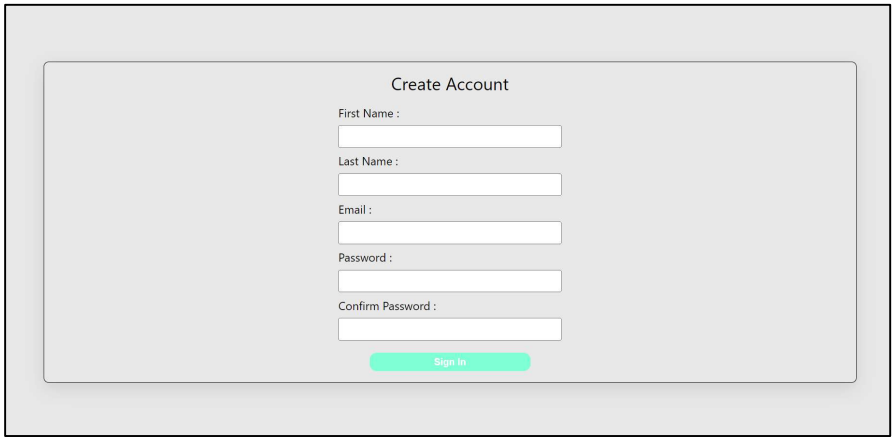
Login Page Path: http://localhost:3000/





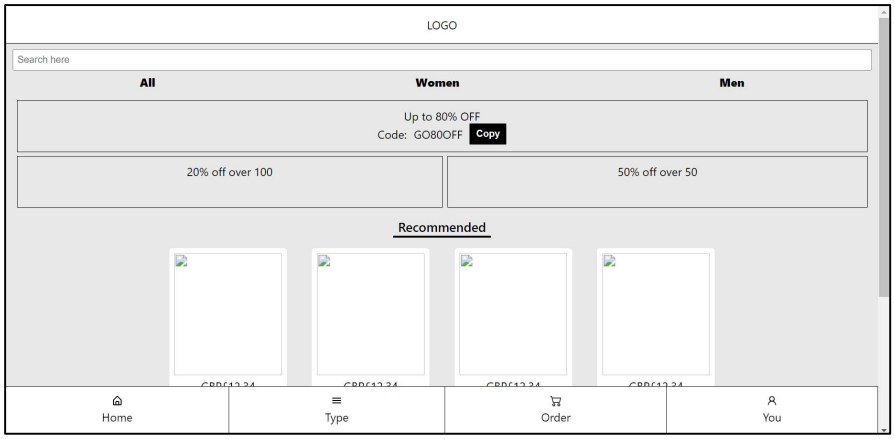
Create Account Page

Path: http://localhost:3000/ceate



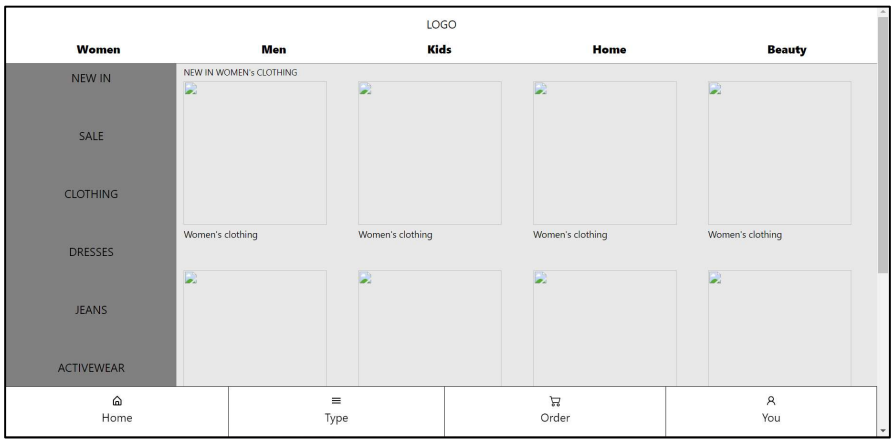
Home Page

Path: http://localhost:3000/home

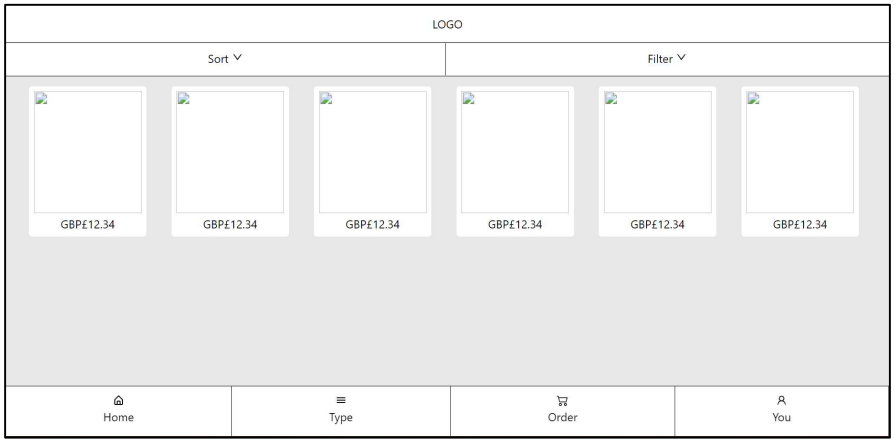


Type page

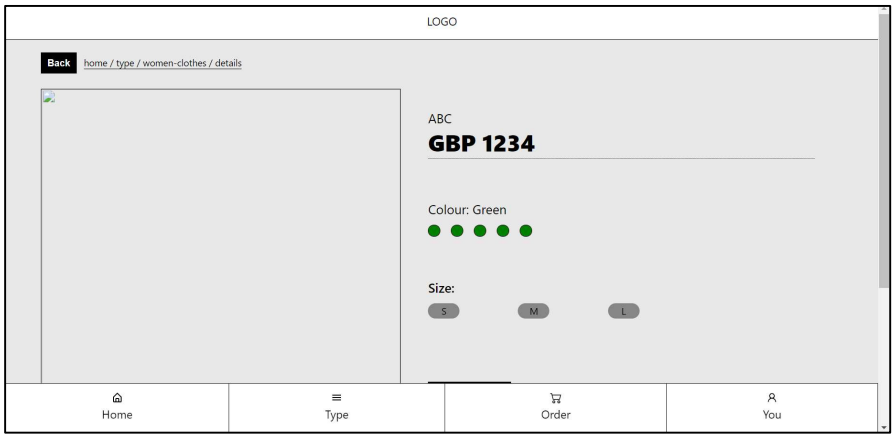
Path: http://localhost:3000/type

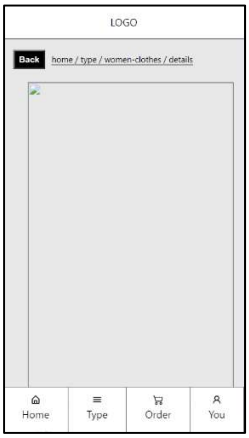


Clothes Display page Path: http://localhost:3000/type/display

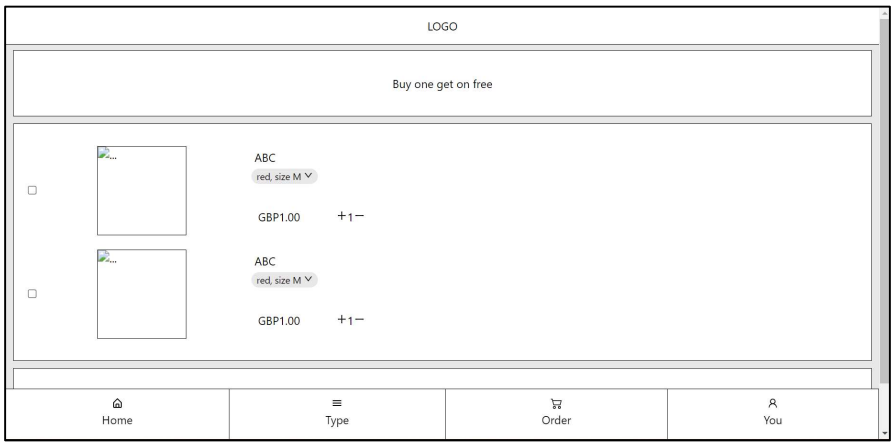


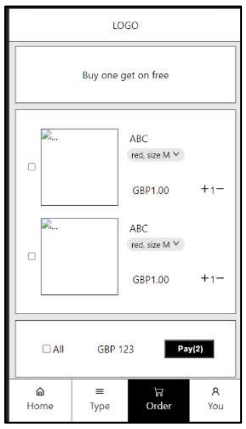
Clothes Detail page Path: http://localhost:3000/type/display/detail





Cart Page Path: http://localhost:3000/order





Chapter 3: **Architecture**

3.1 Software 1: Website for ordering

3.1.1 Proof-of-concept Development and Justification

Home Page (`HomePage.js`)

The first proof-of-concept development, which represents the first page of the user using, Home Page. The home page in the ordering app which I designed is a welcome page. The page at the beginning of the software is the first impression of the user.

- A welcome message not only can improve the satisfaction of user experience, but also can make customers know they are going into the right website.
- Customers can follow the guide on the page that click to start ordering.
- Using the background color of green and font color for black is catering to people with color blindness. Even if they are red, green, blue, or colorblind. They can see the cover of grey and the word with black color.
- It will first show the navigation bar including all the components of the software after clicking start.

Menu Page (`Menu.js`)

The second proof-of-concept development, which represents the page after clicking start, Menu page. Menu page shows all the food by filtered food type and display all the food by display card which include the name and the description of food, the quantity of the customer selected and the button for adding the item into the cart.

- Adding a feature in the right corner of food cards about the quantity of customer selected. It can make user check the selected item clearly even if full of food card over the whole page.
- Clear the quantity of item after click ‘add to cart’

Cart Page (`Cart.js`)

The third proof-of-concept development, which represents the order items selected by customers. Each order items show the picture, name and the description. Customer can edit the quantity of the item or remove the whole item from the cart. In addition, there is a summary of price and service fee and a button of confirm.

- A pop-up message ‘Thanks for ordering’ which can make customers feel satisfied to use this website.
- After clicked the ‘OK’ of the pop-up message, it will send the user to the order page automatically. It can reduce the step of finding or clicking the order tracking page.

Order Page (`Order.js`)

The fourth proof-of-concept development, which represents the page after clicking confirm order in the Cart Page, Order page. The order page shows the order which customer ordered. Each order card will sequence the name and the quantity of order in each single order with a reference number and status. Customer can click 'Call the waiter' for each order.

- Record a unique reference number of each order which is convenience for the customer tracking their order
- A message 'Waiter is coming, please wait' below the call waiter button can make user knowing their progress of action clearly and a kindly interaction with users.
- Status of tracking order: received, preparing, delivered

3.1.2 Work Log

9th November

I change the tools I use from HTML file to React file, and create a branch call `ordering-app-menu` for doing the base of ordering app.

10th November

I create the navbar `SideBar.js` and the food type bar `Menu.js` using a loop by the other JS file which saving the name and the path of the menu `FliterFoodType.js`. That is more useful than HTML file which can easier create a page.

11th November

I created the layout of food display card which includes the name, description, add and minus button for editing the quantity and the button of add to cart. This display food card also uses a loop from the other JS file which saves the different type of food `Food.js`.

13th November

I add a picture in the public and try to put the path in the JS file which saves the food items `Food.js` for testing the code is work or not.

14th November

I create the home page `Home.js` which is for user can see after they scanned the QR code of ordering and download a package of `react-router-dom` for using the `Link` and `Route` element for creating the path of each page. I edited the main JS file `App.js` to create the path of Home.

15th November

I deeply learn about how to use the `Route` in the `App.js`, so I fix the path of Home and Menu page in the main. In the Addition, I create a feature for user to see how many quantities they add for each food item. It is an interaction of the user and software.

16th November

I added a button hover which can let user know which food type they are looking for.

17th November

I create the cart `Cart.js` for user to confirm their selected order and create an order page `Order.js` for user can track the status of their order. I had almost done the layout and the interaction of the restaurant ordering app.

3.1.3 Proposal of the End system

Home Page:

- A Logo of the restaurant in the top
- A welcome message with animation in the middle (Done)
- Background color: green (Done)
- Font color: Black (Done)

Menu Page:

- Navbar of filtering the food type (Done)
- Showing the type which they are selecting in nav bar (Done)
- Add all detail od food in the datafile and showing in the food card
- Notification of added item into the cart
- Showing the item quantity which they added next to the cart icon
- Select the color and font size for elder people
- Function:
  - ✓ Add the item to the cart
  - ✓ Clear the quantity after added to the cart
- Error:
  - ✓ Add item which haven't selected to the cart (pop up error warning)

Cart Page:

- Layout of each selected item (Done)
- Thank you message after ordering
- Add the bin icon
- Confirm button connecting a confirm page
- Function:
  - ✓ Connect to the menu selected item
  - ✓ Count all the price
  - ✓ Remove item
- Error:
  - ✓ Confirm order when no item selected

Confirm page:

- Showing their order
- Time limitation for checking the order is correct or not
- Cancel button

Order page:

- Layout of order card (Done)
- Call waiter button (Done)
- Message of calling waiter (Done)
- Connect to the cart page item
- Function:
  - ✓ Update the status
  - ✓ Give them a different reference number

3.2 Software 2: Website for shopping

3.2.1 Proof-of-concept Development and Justification

Login and Create Account page

The first proof-of-concept development, which represents an initial component of the software, Login page.

- Login: providing input fields for user to enter their email/username and their password for validating their account of this shopping app
- If the users have no account registered before. The end of the login area has a registration link for user.
- Create Account: providing input fields for user entering their name, email and password.

Home page

The second proof-of-concept development, which gathers all the component of the shopping app, Home page.

- A navigation bar (*Home, Type, Order, Account*) gather all the component of the shopping app
- Search field for user to search the clothes they want.
- Discount code for user to use at their shopping. I created a copy button for user can be easier to use the discount.
- A notification of copying the code which make user can know the action they did clearly
- Choose a gender before looking at the clothes recommendation

Display clothes

The third proof-of-concept development, which displays all the clothes by the type of user selection. Each clothes will show the price in the beginning and the detail will show after clicking the clothes card. Filtering and sorting are necessary for user to choose the clothes.

- Filter by date, type, style, brand, color, size and price range
- Sorting by date, price and recommendation

Clothes detail

The fourth proof-of-concept development, which represent the detail page of clothes. Detail includes the name, description, price and the size fit of clothes. Customer can select the size and color that they want and add to the bag.

- Added a path, make the user can remember what they have clicked before for reducing short term memory load
- Back button which connects the previous page
- Choose the size and color from user

3.2.2 Work Log

18th November

According to the experience of creating the ordering app, I learned that I should first add all the components I needed on the website and create the route into the `App.js`. It would be present the page clearly when I do the design. You can know the path and see the change I made. I finished a login page `Login.js` and the page of create account `CreateAcc.js`.

20th November

I started to create the home page of the shopping app. I did the Search field `Seacrch.js`, navbar `Home.js` of the whole app and the sub navbar `SubNavbar.js` for user choosing the clothes by gender. Considering the display can be flexible, I created an area which is some recommendation in the home page. Also, I did the Type component `Type.js` which can give user to see the clothes by the type that they are looking for.

21st November

I created the layout of the cart `Cart.js`.

22nd November

I created the page for displaying all the clothes `Display.js` when the users click the type they are looking for and add the layout of filtering `Filter.js` and sorting clothes `Sort.js` inside the display component.

23rd November

I finished the layout the showing the details of the clothes `ClothesDetail.js` but there are some issues for the layout of mobile vision. It does not look good when using the mobile vision.

24th November

I finished doing the mobile vision of the display clothes pages.

3.2.3 Proposal of the End system

Login page:

- The layout of login (Done)
- Enter email and password (Done)
- Function:
  - ✓ Connect to the home page after login
- Error:
  - ✓ Email is invalid
  - ✓ All field should be filled in

Create Account page

- The layout of creating an account (Done)
- Enter the name, email and password
- Function:
  - ✓ Connect to login page after signing up
- Error:
  - ✓ Email is invalid
  - ✓ All field should be filled in

Home page

- The layout of Home page (Done)
- Background color: grey (Done)
- Information section including the discount code (Done the layout)
- Copy button for copying the discount code
- Choose their gender in the beginning
- Function:
  - ✓ Clothes recommendation using cookies
  - ✓ Clothes recommendation card connect to the detail page

Type page

- The layout of type page (Done)
- Choose the gender
- Function:
  - ✓ The type can connect to the clothes display page

Clothes display page

- The layout of clothes display (Done)
- Sorting option (Done)
- Filtering option (Done)
- Function:
  - ✓ Sorting
  - ✓ Filtering
  - ✓ Clothes recommendation card connect to the detail page

Detail page

- The layout of detail page (Done)
- Select the size and color (Done)
- Add to bag button (Done)
- Description and size fit (Done)
- Path of previous pages (Done)
- Back button for previous page (Done)
- Several picture
- Function:
    - ✓ Path clicking
    - ✓ Back button
    - ✓ Add the item to the cart
- Error:
    - ✓ Add item which haven't selected to the cart (pop up error warning)

Order page

- The layout of order (Done)
- Checkbox of select the order item
- Select all item
- Clear item
- Reselect the size and color
- Total price
- Pay button
- Function:
    - ✓ Select the item to update the price
    - ✓ Reselect the size and color
    - ✓ Connecting to the confirm order page
- Error:
    - ✓ Add item which haven't selected to the cart (pop up error warning)

Confirm page

- The layout of the confirm page
- Showing all item, they selected to buy
- Confirm button
- Function:
    - ✓ Connecting to payment page

Payment page

- The layout of the payment page
- Showing the price
- Enter all the detail of payment (Card detail, card holder etc.)

Account page

- The layout of the Account page
- Tracking their order (Status)
- Showing what they bought
- Setting icon for notification
- Showing their name (would be default for all)
- Function:
  - ✓ Update the status

Chapter 4: **Software Design and Implementation**

4.1 Principles

The principle of Human Computer Interaction is mainly covering behavioral sciences, per and Shneiderman's 8 Golden Rules.

Behavioral sciences

Understanding how people interact with computer interfaces can help us understand human behavior in general. Human Computer interaction and interaction design studies creating a interface to have a conversation between a technology product and user. However, the focus of HCI is not the interaction of computer. It would be the reaction and behavior of human when using the computer. Behavioral science includes

Psychology: Provides a scientific perspective on how to design effective systems based on human abilities and limitations

Economics: Represents applications, interfaces, and devices in an intuitive and natural way

Perception

Individual preferences or needs rarely dictate the exact details of an interface. Creating something suitable for a broad audience requires the input and opinions of many people, rather than just the designer, when creating an interface. UIs are designed in a way to go with the majority whilst keeping it as simple as possible. Although opinions will differ on UIs, the majority are designed with a more general approach and go with the majority, keeping it as simple as possible. To ensure that arena goers can use the device effectively, perceptions of the UI are critical.

Shneiderman's 8 Golden Rules

These design rules were published by an American scientist, Ben Shneiderman, who has designed countless works and derived the principles of Human Computer Interaction design. Shneiderman developed these set of principles derived from his experience, which are applicable to interactive systems once they are further refined, developed, and explained. Designers can improve the usability of their design by these collections of principles.

Strive for consistency

Layout is the feature of software that should always affect the perception of the user. Including the color, the tone, the style of the webpage, it is essential to make it consistent between all pages throughout the site. The layout is the first impression of each user when browsing the site which I am designing.

Enable Frequent Users to Use Shortcuts

Shortcuts make the software easier to use for all users. The structure of each page better to have good hierarchy to click on in the other pages. It is important to keep the website flexible, each page is related

to each other. However, we should consider universal usability such as elderly people or color blindness. Advanced design should require catering to the disability.

Offer Informative Feedback

Notification of each action is not only useful for user to clear what had they done recently, but also make effective interaction between user and the software. It is better to pop up informative feedback or notification showing their current process.

Design Dialog to Yield Closure

Satisfaction of the user experience is always satisfied by the detail of software. Interaction between each stage of action can improve the user's experience using the software. Design should require organizing a message with user such as thank you message which makes user feel satisfied and accomplish. The path of user action should be included in the page that makes the user using it clearly and flexible.

Offer Simple Error Handling

Human error is one of the considerations during the interaction design. The best design should avoid error tile users have no path to cause the error such as pop up a warning when facing human error. It is the better way for user to understand the problem and solve it easily.

Permit Easy Reversal of Actions

Facing an error in the webpage should make user feel a sense of anxiety. However, if there is a guideline that can easily solve the problem immediately such as undo action 'Ctrl + Z,' it should reduce the stress of using it. It can deal with UI design in every single operation.

Support Internal Locus of Control

Being "user friendly" as a design requirement, control is the power to determine outcomes by directly influencing actions, people, and events. Keeping the user in control makes them satisfied and means they are more likely to continue using the software in question, even recommend it to others. Design should consider giving user a flexible setting of the software. It can make user feel they are controlling all the operation and function in the webpage.

Reduce Short-Term Memory Load

Humans should be using short term memory when using software. They would not remember the path or specific action from the software. Designers should require staying straightforward design to the website. Clear navigation is an effective way to guide the user to connect to another site or a path shortcut for user to remember each process and click to the site they want to go flexibly.

4.2 Methodologies

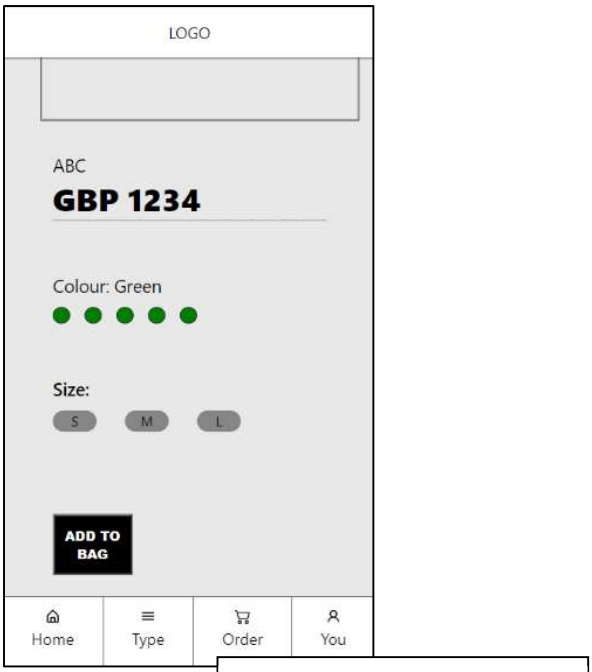
Strive for consistency

Development from now:

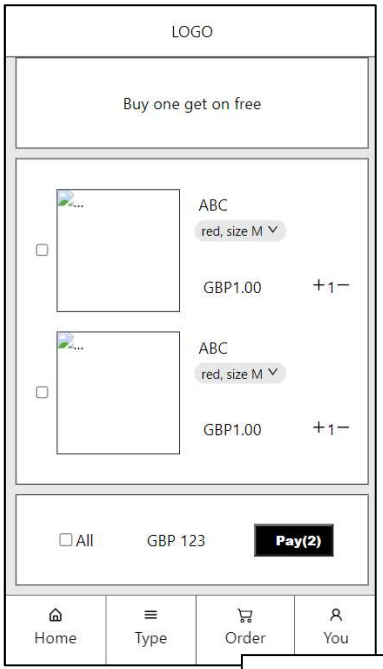
In web design, a CSS stylesheet controls the layout and look of a page. It not only can simplify the code of styling the same element, but also can make all sites follow the same style. It is advantageous to be able to control several areas with one instruction.

```css
body {
    background-color: rgb(232, 232, 232);
}

button {
    background-color: black;
    color: white;
    width: 80px;
    padding: 5px 20px;
}

button:hover {
    background-color: rgb(143, 143, 143);
}

a {
    text-decoration: none;
    color: inherit;
}
```

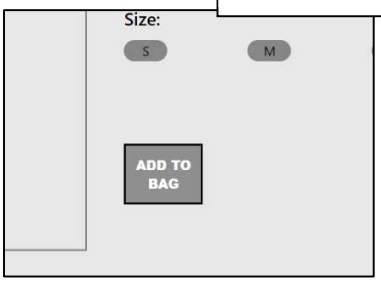
Picture 1 and picture 2 show the style of all the button in the shopping app is consistent with all site. It is all displaying by black and change to grey when the mouse on. For the background of website, all component is grey and same as the desciption of css style sheet. It can clearly recogize these site is from the same webiste.

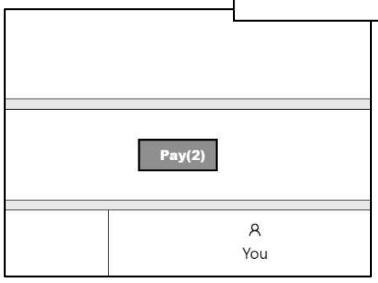


Picture 1: Shopping Detail page



Picture 2: Shopping Cart page



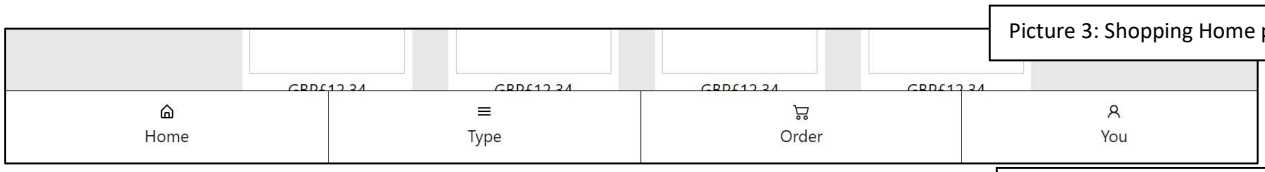


Enable Frequent Users to Use Shortcuts

Development from now:

In each component, there is a navbar for user to have a shortcut conectting to any sites.

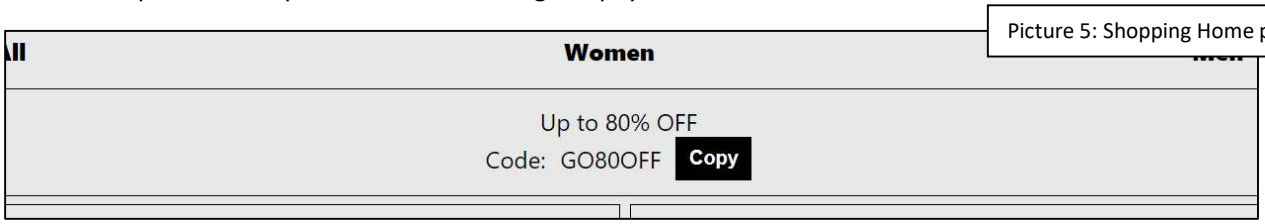
Picture 3: Shopping Home page



Picture 4: Ordering Menu page

In the software of shopping app, there is a field which shows some discount code in the home page. I added a shortcut button for user to copy the code using for shopping. Customer can click the copy button and paste to the promotion field during the payment.

Picture 5: Shopping Home page



Future:

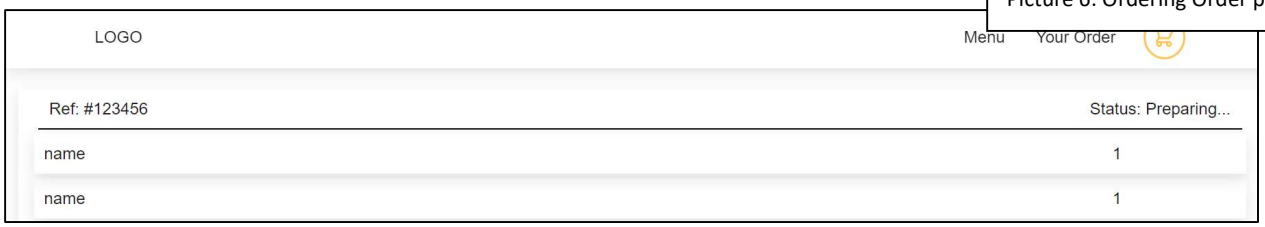
For the users of restaurant ordering will be able to include some elderly people in general, it is necessary to consider some disability from elder people specifically the eyes when using electronic devices. I will add a guideline for user to tune the font size of the website flexibly. For color blindness, I will add a pop-up menu for user to choose the color theme of the webpage which improves the flexibility and usability of the software.

Offer Informative Feedback

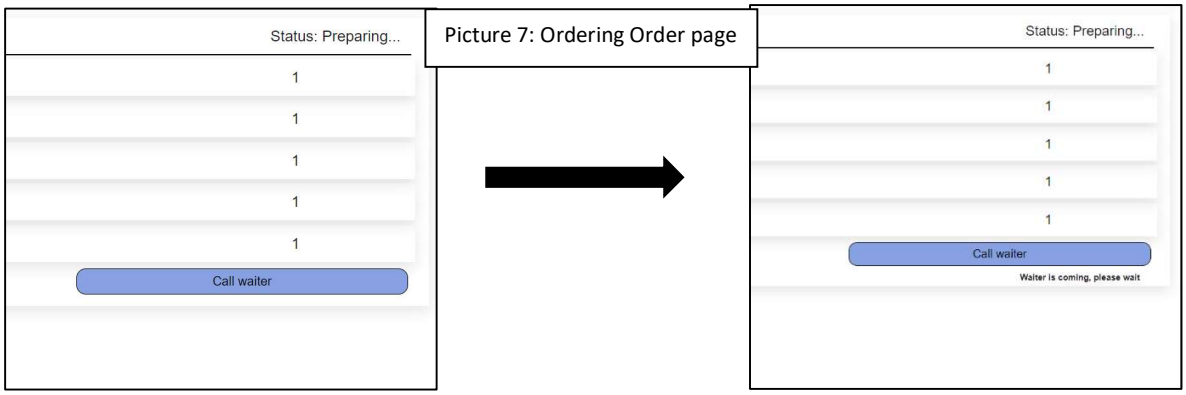
Development for now:

In the ordering app, I will show the status of order after customer ordered the food in the page of order. It lets the customer know the progress of their order.

Picture 6: Ordering Order page

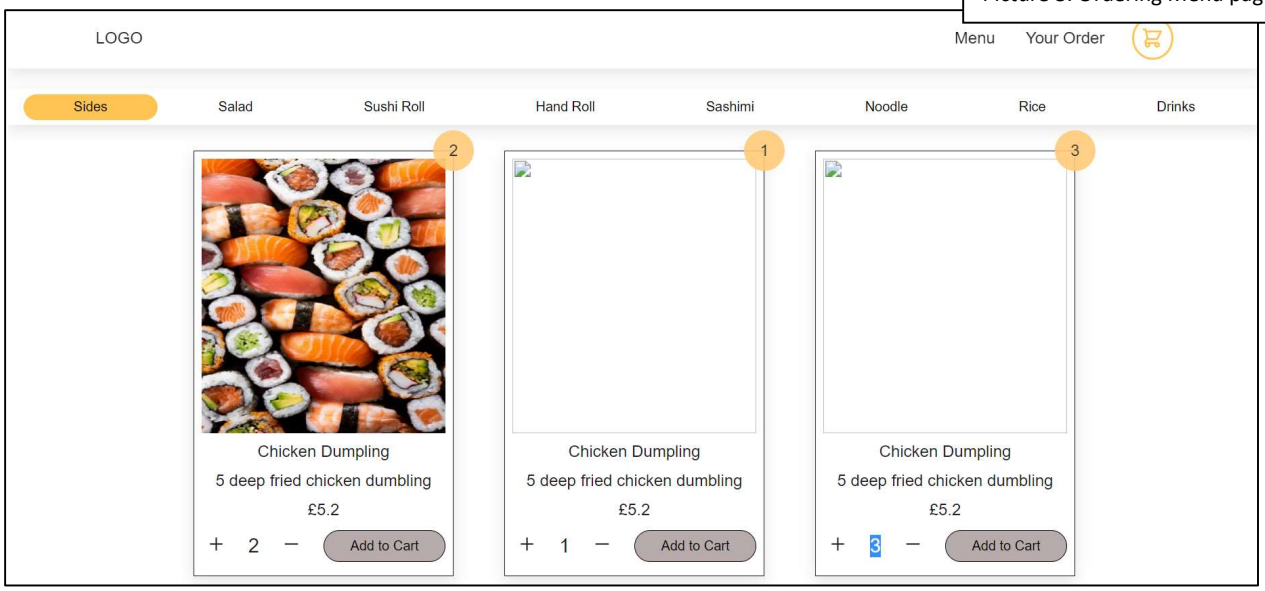


Second, I put a message when customer clicked the button of calling waiter, it makes user knowing they had clicked the button and waiter is heading.



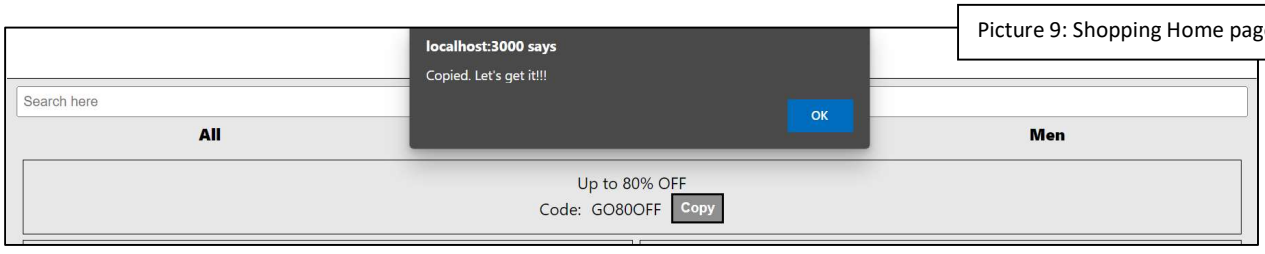
Picture 7: Ordering Order page

Third, I added a feature about the quantity of customers selected which is the right corner of food cards. Customer can see how many they added to the cover of the whole food type. However, I will fix the bug about the feature would not be changed when switching the food type.



Picture 8: Ordering Menu page

In the shopping app, I created a pop-up message after clicking the button of copy discount code which can remind the customer that their action had already been done.



Picture 9: Shopping Home page

Future:

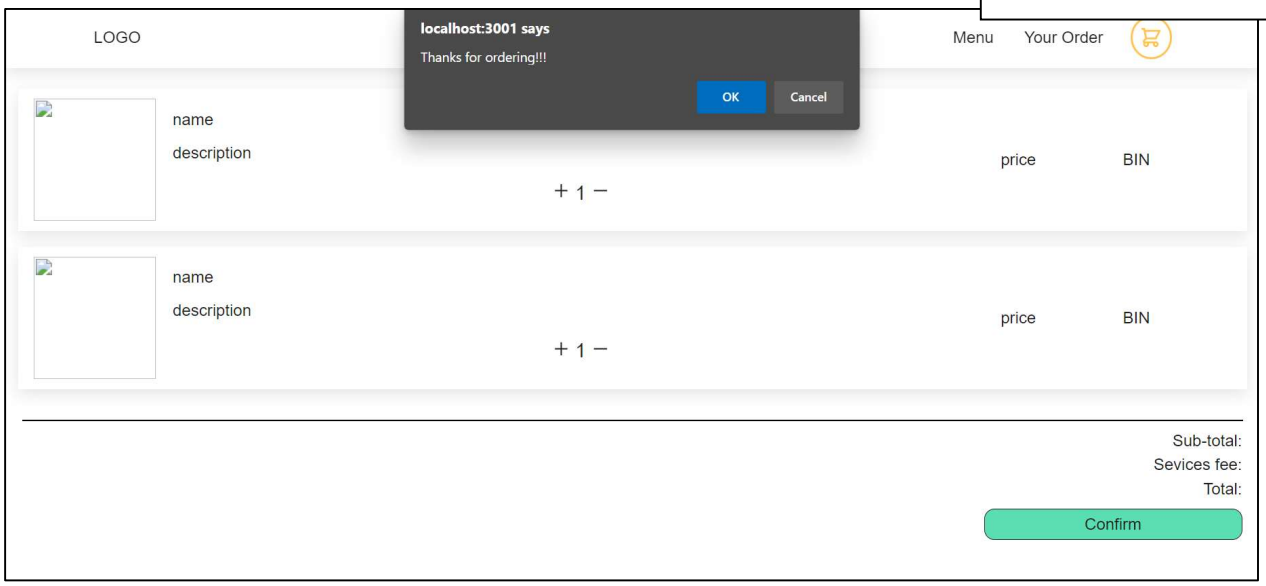
To have a clear guide for customers, I will add the notification when customer adds food into the cart and a feature of the total quantity of food selection next to the cart icon. In addition, I will add a feature or notification for showing the status after adding item to the cart.

Design Dialog to Yield Closure

Development from now:

In the ordering app, I added Thank you message when the customers confirm the food order. After clicking 'OK', the server will go to the page of order page automatically which shows the reference number of the order and the food list they selected.

Picture 10: Ordering Cart page



Future:

In the ordering app, I will add a page of the order summary for user checking before sent to the restaurant order server.

In the shopping app, I will add a summary of purchase and thank you message after paying the order.

Offer Simple Error Handling

Due to the interaction of these software is not completed yet, I will use *try catch* function or *if* condition to pop up error messages into the app

Ordering error:

- Confirm order when no food inside the cart

Shopping error:

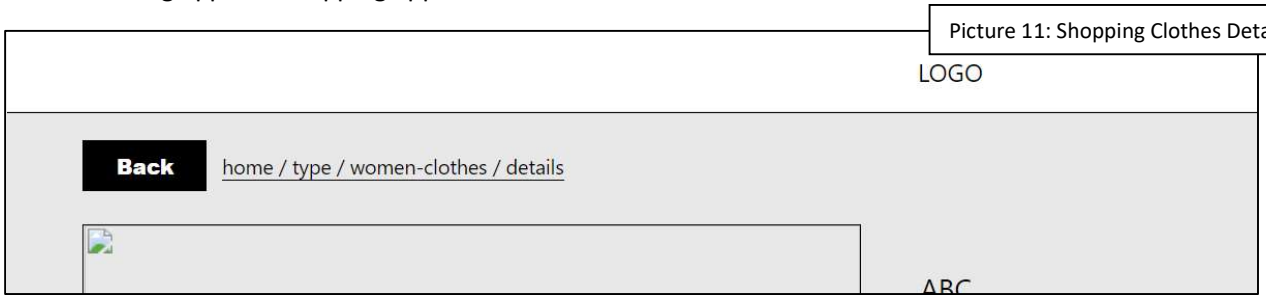
- no login data about the user input in the database
- have not fill in all the field in creating account page

- Confirm order when no food item the cart
- No result of the filtering condition

Permit Easy Reversal of Actions

In the shopping app, I added the back button for customer can go back to the page they went to before in the ordering app and shopping app.

Picture 11: Shopping Clothes Detail page



Future:

In ordering app, I will add a page which shows their order item and limited time for cancelling the order after confirming the order. It makes user can feel satisfied even they make a wrong order.

Support Internal Locus of Control

Future:

In shopping app, I will add setting about the notification for mobile, user can control is the app have notification or not. In addition, I will add the button for user to add or remove or clean all items.

Reduce Short-Term Memory Load

In shopping app, I added the path in the page of clothes detail for user to go through what they clicked before and click on the path direct to connect the site they want to go to.

Picture 12: Shopping Clothes Detail page

4.3 Tools of use

1. React: Quickly and efficiently build interactive user interfaces and web applications using far less code than plain JavaScript
    i. react-icon
    ii. react-router-dom
2. CSS: Style and layout web pages and keep consistency

Chapter 5: **Evaluation**

The main concept of Human Computer Interaction in software is improving usability. There are four fundamentals of usability: Suitability for the task, Appropriate for trained users, Learnability, Error tolerance.

5.1 Software 1 Restaurant ordering

Cognitive Walkthrough

What impact will interaction have on user?

- ✓ All task into the app is clear for user to user
- × Each component interaction is not connecting to each site, such as the selected items are no available to update cart

What cognitive processes are required?

- ✓ No problem of the teenager
- ✓ No problem of the colorblind
- × The improvement about the elder people is not enough. It should add some modifications of font size for elder people

What learning problems may occur?

- ✓ All functional should be clear for everyone

Heuristic Evaluation

- ✓ System behavior is predictable
- ✓ System behavior is consistent
- ✓ Feedback is provided
- × Gulf of execution
- × Gulf of evaluation

5.2 Software 2 Shopping webpage

Cognitive Walkthrough

what impact will interaction have on user?

- ✓ All task into the app is clear for user to user
- × Each component interaction is not connecting to each site, such as the selected items are no available to update cart
- × Many human error is not completed, human error is general.

what cognitive processes are required?

- ✓ No problem of the teenager
- ✓ No problem of the colorblind
- ✗ Mobile vision is need to improve since the busy office worker should use their mobile phone for online shopping

what learning problems may occur?

- ✓ All functional should be clear for everyone
- ✗ Not all the component finish in the software, it should be some of the unclear information

Heuristic Evaluation

- ✓ System behavior is predictable
- ✓ System behavior is consistent
- ✓ Feedback is provided
- ✗ Gulf of execution
- ✗ Gulf of evaluation

5.3 Next Step

1. Evaluate by actual user in different ages (survey or interview)
2. Improvement of elder people using the software of restaurant ordering
3. Improvement of busy office worker using the software of shopping app
4. Third software will learn about creating GUI or a game using my experience

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