Xi'an Jiaotong-Liverpool University

西交利物浦大学

Semester **2**, **2022/23** **Final** Exam

Undergraduate - Year 3

Human-Centric Computing

Exam Duration: **2** Hours

Crash Time Allowed: **15** Minutes

Instructions to Candidates

1. This is an open-book examination with invigilation. You are allowed to take one-page notes with you. Please complete the assessment independently and honestly.

2. Total marks available are **100 marks**. This exam consists of **three questions** in total. The mark allocated for each question is indicated at the end of the question.

3. Answer **ALL** questions. There is **NO** penalty for providing a wrong answer.

4. Write down your solutions on the answer booklet. Clearly indicate the **question numbers** before your solutions. Submit your notes together with your answer booklet.

5. Only **English** solutions are accepted. Make sure your writings are clear to read.

6. All materials must be returned to the exam supervisor upon completion of the exam. Failure to do so will be deemed academic misconduct and will be dealt with accordingly.

7. The duration is **2 hours**.

Question 1 Design (40 marks)

(a) Draw the interaction design life-cycle model. How does it differ from the double diamond of design? Give **two** specific examples to show how you have followed them in your group project. [10]

(b) Is the CPT208 learning mall page a good design or a bad design? Please justify your answer using at least **two** design principles. How do design principles inform the interaction design? [9]

(c) What are the **three** principles of a user-centred approach? How did you follow the principles in your group project? [9]

(d) What are the differences between usability and user experience? Please give **two** specific examples for each and explain how you addressed usability and user experience goals in your own project. [12]

Sol:

a) Differ: 1. Life-Cycle Model is Linear and sequential, with clearly defined stages that a project progresses through in order. Double Diamond of Design is Iterative and flexible, emphasizing both divergent thinking (exploration) and convergent thinking (refinement). 2. Life-Cycle Model broadly applicable to any project management context, from software development to construction. Double Diamond of Design specifically tailored to the design and innovation process, focusing on problem-solving and creativity. 3. Life-Cycle Model focus on overall project management, ensuring the project moves from start to finish efficiently. Double Diamond of Design focus on detailed focus on the design process, from understanding the problem to developing and delivering a solution.

Group project: My group project designed an AI-powered to-do list application. It strictly follows the Life-Cycle Model: 1. The project begins with discovering requirements, focusing on understanding user needs and pain points. We mainly use questionnaire and face to face interview to collect users requirements. 2. Based on the requirements gathered, the first design phase is undertaken. This stage involves planning and creating initial design alternatives to meet user needs. 3. After that, I choose one alterniative from designs and the first prototype is built based on the initial design. 4. The first prototype undergoes evaluation to assess its effectiveness and gather feedback. Those feedback was used to start a new round of iteration.

b) 略

c) 3 Principles: 1. Early focus on users and tasks; 2. Empirical measurement; 3. Iterative design;
Group project: 1. Our design - an AI-powered to-do list application: 1. Early Focus on Users and Tasks: The project starts with a phase dedicated to discovering user requirements. This involves studying the cognitive, behavioral, and attitudinal characteristics of the users. By understanding how users think, behave, and feel about task management, the project ensures that the design is tailored to meet their specific needs. 2. Empirical Measurement: During the evaluation phases, user reactions and performance are observed, recorded, and analyzed. This involves testing the prototypes with real users, simulating scenarios they might encounter, and using manuals to see how effectively users can interact with the system. Feedback also gathered during these evaluations is empirical and helps in identifying specific areas for improvement. 3. Iterative Design: Our project includes multiple cycles of prototyping followed by evaluation. When issues are identified during user testing, they are addressed in subsequent design iterations.

d) Differ: Usability refers to the ease with which a user can interact with a product or system to achieve their goals effectively, efficiently, and satisfactorily. User experience encompasses all aspects of the end-user's interaction with the company, its services, and its products. It is a broader concept that includes usability but also extends to other factors. There is no clear cut between them, but Usability is more objective and User experience is more subjective.
Group project: Usability: 1. Efficiency: Developing project that aim to streamline the task management process, making it quicker and easier for users to arrange and prioritize tasks. 2. Learnability and Memorability: Our project focus on creating intuitive designs that are easy to learn and remember, followed the design principles of "reduce memory load" and follow user's mental model, ensuring users can quickly become proficient and retain their proficiency over time.
User Experience: 1. Satisfaction: By continuously refining the prototype through multiple iterations, the project aims to maximize overall user satisfaction. This includes both functional aspects (usability) and emotional and aesthetic aspects (user experience).

Question 2   Prototype   (30 marks)

(a) What are the **three** main characteristics and **three** main functionalities of proto- [10]
typing? Please give an example of how you used prototype in your group project.

(b) Please describe the breadth and depth dimension in a prototype. Why is it im- [10]
portant to balance these two dimensions? What is the name of the strategy that
focuses on the breadth dimension of the prototype? Please give an brief introduc-
tion of this strategy and describe how it could be used in the development of a hotel
booking system.

(c) What is the best choice of prototyping method if a designer would like to show **a** [10]
series of scenarios related to design tasks? Please give a short description of this
prototyping method. Use this method to provide a prototype for a hotel booking
system, describing at least **four** key scenarios.

Sol:
a) Group project: 1. Understanding: Prototypes are developed based on the gathered requirements and user feedback. These prototypes serve as tangible representations of user needs and how they might be addressed. By creating prototypes, the team can better understand the specific functionalities and features that will meet user requirements. 2. Communication: Prototypes act as visual and interactive tools that facilitate communication among stakeholders, including designers, developers, and users. They provide a clear and concrete way to demonstrate design ideas and concepts, making it easier for all parties to understand and discuss the proposed solutions. 3. Prototypes are tested with real users to observe their interactions and gather empirical data on usability and user experience. These tests help identify any issues or areas for improvement in the design.

b) Hotel booking system: 1. Create wireframes for the main screens of the hotel booking system, such as the home page, search results, hotel details, booking form, and payment confirmation. Ensure each screen represents the core functionalities without detailed backend processes. 2. Develop a clickable horizontal prototype using tools like Figma, or PS. Include navigation links and basic interactions to simulate the user journey through different parts of the system. 3. Conduct user testing sessions where potential users interact with the horizontal prototype. Observe their interactions, gather feedback on usability, and note any pain points or confusion. 4. Analyze the feedback from stakeholders and users. Prioritize the features and design elements that need further development or refinement. Use this feedback to inform the next steps in the development process.

c) StoryBoard.
Scenario 1: Searching for a Hotel: 1. User Opens the Hotel Booking App; 2. Entering Search Criteria; 3. Viewing Search Results; 4. Selecting a Hotel;
Scenario 2: Viewing Hotel Details: 1. Hotel Overview; 2. Room Types and Prices; 3. Checking Amenities and Services; 4. Reading Reviews;
Scenario 3: Booking a Room: 1. Selecting a Room; 2. Payment Details; 3. Confirmation;
Scenario 4: Managing Booking: 1. Accessing Bookings; 2. Viewing Booking Details; 3. Modifying Booking; 4. Canceling Booking;

Question 3   Evaluation   (30 marks)

(a) What are the **three** types of evaluation methods? What are their differences and similarities? Discuss **one** of the types in detail and explain how you have implemented it in your group project. [10]

(b) You are asked to conduct an experimental design to evaluate the usability of two online quiz systems. What are the steps you need to follow to prepare and conduct the experiment? Specify the alternative hypothesis, your proposed study design, the independent and dependent variables, and give as many details as you can. [10]

(c) As a student in XJTLU, you have used many XJTLU systems, such as learning mall, eBridge, XJTLU official website, the sports centre mini-program, and the library book-borrowing system, etc. Choose one that you are familiar with, and discuss what, where, when and how can you evaluate the design. Please provide as many details and examples as you can. Make it clear if you are making assumptions and claims. [10]

Sol:
a) Controlled settings, Natural settings, Without users
Natural settings: 1. Identify Target Users: Select a diverse group of users who represent the target audience for the app. This include professionals, students, and others who need to manage daily tasks efficiently. 2. Define Scenarios: Develop realistic scenarios that users would encounter in their daily lives. These scenarios reflect common tasks such as scheduling meetings, managing deadlines, and organizing personal errands. 3. Deploy the App in Natural Settings: Provide the selected users with the app and ask them to use it in their natural settings, such as their home, office, or while on the go. Ensure that users understand they should integrate the app into their daily routines as naturally as possible.

———— End of Questions ————

4. Observe and Record User Interactions: Use methods like screen recording, diaries, or direct observation (with permission) to capture how users interact with the app. This can include noting the context in which they use it, such as during meetings, while commuting, or at home. 5. Gather User Feedback: Conduct follow-up interviews or surveys to gather qualitative feedback on the app's performance. Ask users about their overall experience, any difficulties they encountered, and suggestions for improvement. 6. Analyze Collected Data and iterate: Review the recorded interactions and feedback to identify patterns, common issues, and areas for improvement. Pay particular attention to how the app's features are used in different contexts and whether it meets user needs effectively. Based on the analysis, make necessary adjustments to the app's design and functionality. This could involve refining the user interface, adding new features, or simplifying existing ones.

b) 1. Identify a research hypothesis 2. Specify the design of the study 3. Run a pilot study to test the design, the system, and the study instruments 4. Recruit participants 5. Run the actual data collection sessions 6. Analyze the data 7. Report the results

c) Assumptions:
Assume that the target audience has varying levels of internet proficiency.
Assume users will access the website from different devices and browsers.
Assume the website's primary goal is to provide information and/or convert visitors.

Claims:
A well-designed website should be easy to navigate, aesthetically pleasing, and functional.
Good usability and accessibility directly contribute to a positive user experience.
Regular user testing and feedback collection are essential for continuous improvement.