Final Project Report

Human-Machine Interaction
Interactive 3D Product Presenter (I3PP)

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Chapter 1

Introduction

1.1 Project Name and Value Proposition

Project Name: H2T Electronic Store
Value Proposition: "We don't just bring you technology; we bring you higher, better technology." Our platform aims to highlight smarter choices and advanced tech to ensure users achieve the perfect purchase.

1.2 Team Members and Roles

- **Nguyen Thi Thanh Hang:** Researcher, Analyst

- **Bui Hanh Trang:** Designer, Presenter

- **Nguyen Thu Huong:** Developer, Prototype Engineer

1.3 Problem/Solution Overview

Problem: Users face challenges in choosing the right electronic devices due to an overwhelming variety of options, which complicates balancing features, budgets, and personal preferences.
Solution: The H2T Electronic Store simplifies this process with an AI chatbot offering personalized recommendations, enabling informed and enjoyable technology shopping experiences.

Chapter 2

Needfinding

Recognizing and comprehending user requirements is critical in the design process as it assists in the development of a valuable and usable product. This chapter details the methodology of interviewing subjects with varying degrees of potential and exposes their activities, prejudices and expectations. It also describes how we synthesized the obtained insights so as to come up with conclusions that could be put into practice.

2.1   Interviews

We conducted interviews with six participants representing a wide variety of backgrounds and experiences with online shopping platforms to gain insight into the different needs that potential users may have. The participants were divided into three groups: general users, expert users, and extreme users.

First, the group of three general users took part-office workers and students. These users are able to use simple shopping functions like browsing through products or adding items to a cart but do not interact in depth with more advanced features. This group provided valuable feedback from the point of view of the average consumer, who wants things simple and easy to use.

A group consisted of two expert users, an IT professional, and a streamer: individuals in contact with technology most often; the functions of strong filtering, customization, and speed mean most to them. It shows further that such feedback could be sought about how existing platforms might best be optimized to save their time and enhance their workflows.

Finally, we added one extreme user: an older individual with minimal experience in online shopping. This participant's perspective was very valuable to discover barriers to accessibility and trust. For example, the participant showed difficulty in managing complicated interfaces and shared concerns about the reliability and security of online platforms.

2.1.1 Recruitment Process

We managed to get participants both online and offline. Online, it would involve connecting through Messenger or other forms of social media, such as Zalo, with those fitting the participant profiles. We also used face-to-face interactions, taking the time to visit HUST campus to invite subjects who could provide new insights. These methods ensured balanced participant demographics.

2.1.2 Interaction Approach

These interviews were semi-structured, allowing room for flexibility regarding any topics that might arise in the course of the discussion. We used open-ended questions to learn about participants' experiences, frustrations, and expectations. For example, we asked about their most recent online shopping experience, how that went, and what they'd like to change. During these sessions, we listened attentively to non-verbal signals such as body language and tone of voice to capture their emotions and frustrations.

2.2 Synthesis

Following the interviews, we analyzed and looked for patterns and insights in the data collected. This was done in two major ways: through an empathy map and an affinity diagram.

This was classified into four dimensions using the technique of empathy mapping: *Say*, *Think*, *Feel*, and *Do*. For instance, general users always spoke about wanting simple interfaces; their actions revealed sometimes frustration if interfaces were cluttered. Similarly, expert users indicated a preference for faster ways to filter data out; in practice, their frequent usage of advanced filtering tools expressed that well when dealing with challenging tasks in a short span of time.

Next, affinity diagrams were drawn to group similar findings to obtain overarching themes. It did help us move from personal anecdotes to broader trends.

2.2.1 Key Findings

From the synthesis process, there were three main insights.

First, simplicity plays a huge role in the case of general users. Participants from this group showed the need for clear, intuitive interfaces that are characterized by a low cognitive load. Overload with elements on layout and undefined ways of navigation frustrated respondents who eventually abandoned their purchases.

Second, professionals value speed and functionality. This group emphasized advanced features, such as more precise filtering tools and settings that could be tailored to one's preferences. For example, the IT professional mentioned how slow-loading filters or redundant options most often obstruct his shopping experience.

Trust is a big concern for older users. The extreme user in our study was extremely skeptical of online platforms, feeling that these are not transparent. Specific pain points include uncertainty about refund policies, extra hidden fees, and the inability to determine from an online description if a product will work or not. This finding suggests the importance of features that help build trust, such as detailed reviews, secure payment options, and easy returns.

2.2.2 Conclusion

Through the needfinding process, the needs of the users range from simplicity and ease for the general user to the need for advanced features among expert users, down to mechanisms to foster trust among older users; thus, we will design some solutions based on these insights.

Chapter 3

POVs and Experience Prototypes

3.1   POV Statements

Based on the insights gathered from needfinding and user research, the following Points of View (POVs) were identified:

1. **Normal Users**: Normal users need minimalistic and user-friendly designs that allow them to navigate the platform quickly and confidently while ensuring product reliability.

2. **Experts**: Experts require powerful and customizable tools to compare technical specifications and make informed decisions efficiently.

3. **Older Users**: Older users need simplified, distraction-free experiences with clear trust markers, such as verified reviews and secure payment systems, to build confidence in online shopping.

3.2   Top Solutions

To address the needs of the target users, three solutions were explored:

Mobile App

Pros: High accessibility due to the widespread use of smartphones. Familiar user interface design that requires minimal learning curve. Portable and cost-effective, with lower development costs compared to other platforms. Longer battery life and optimized usability.

Cons: Limited immersion compared to other technologies. Potential distractions from notifications and multitasking. Ergonomic concerns with prolonged use.

Smart VR/AR Glasses

Pros: Provides an immersive and engaging experience. Hands-free usage and enhanced interactivity, such as gesture-based controls and contextual overlays. Suitable for innovative applications, including AR navigation or 3D product modeling.

Cons: High hardware dependency and limited adoption due to the cost and bulkiness of VR/AR glasses. Shorter battery life and potential performance limitations. Steeper learning curve and usability challenges for new users.

Smart Watch

Pros: Highly portable and convenient for quick interactions. Seamless integration with notifications and activity tracking. Always accessible, as users can wear the device throughout the day.

Cons: Limited screen size restricts the amount of information displayed. Complex interactions can be challenging on such a small device. Lower adoption rates compared to smartphones.

Selected Solution: Mobile App

After evaluating the pros and cons of each solution, the Mobile App was chosen as the primary platform for development due to its accessibility, familiarity, and cost-effectiveness. It provides a balance between usability and practicality for all user groups, including normal users, experts, and older users.

3.3   Low-Fi Prototype Development and Testing

Based on the selected Mobile App solution, a low-fi prototype was developed. The prototype included the following features:

- **Simple:** A chatbot interface for personalized recommendations.

- **Moderate:** A product view feature to display key details and comparisons.

- **Complex:** A purchase process, including adding items to the cart and completing a transaction.

3.3.1   User Testing Process

The prototype was tested with three participants representing different user groups:

- **Dinh Trong Minh (21 years old):** A doctoral student at the Department of Computer Science, Dartmouth University. **Issues:** Confusion about the purchase

procedure, difficulty in describing needs to the chatbot, poor multilingual support, and challenges rating products using the star system.

- **Ngan Pham Hoai Phuong (22 years old):** A student at the FAMI Department, HUST. **Issues:** Difficulty finding the chatbot function, feeling overwhelmed by too many choices, and initial confusion about the AR camera feature.

- **Nguyen Quoc Sy (58 years old):** An engineer. **Issues:** Confusion about payment methods, lack of feedback after completing a purchase, uncertainty about discounts, and the absence of sorting options.

3.3.2 Testing Results and Key Measurements

Some keen observations were made in testing. Strengths this application possesses include easy navigation across sections, clear product details are well-explained, intuitive layout, and an extremely smooth process right till checkout for making simple purchases. This also pointed to the limitations that come along with a chatbot: it lacks multilingual support, and older users are suspicious of chatbots. There were also visibility issues, mainly regarding icons and AR camera tutorials, besides variations in loading speed when the task at hand was complex. Below are some of the improvements based on test results and feedback from users.

The chatbot will be enhanced with multilingual support to make it more usable, and recommendations should be clearly explained to build trust with the user. The design will be further worked on, including icons, and will continue to provide wider step-by-step tutorials on how to use AR camera modes. Finally, add-ons such as sorting options are needed to be integrated for easy browsing. These changes should make this mobile application solution easier to handle. In a nutshell, the app has great potential that could be refined iteratively for the best usability and accessibility.

Chapter 4

Design Evolution

4.1 Final Solution

4.1.1 Description

The final solution is a mobile application that will grant users easy access to browse, compare, and buy products. Some of the key features of the app include a navigation bar containing intuitive icons that enable users to switch between main sections with ease, thus guaranteeing a smooth and user-friendly experience. The app also contains an account page where settings and preferences can be managed by the user. Some other enriching features that make it even more functional are password recovery, 3D viewing of products, and assistance based on chatbots for an overall, rich, and smooth shopping experience.

4.1.2 Rationale for the Selected Solution

Insights into user needs and testing results have been fundamental in determining the mobile application as a final solution. Among these, accessibility was paramount because, given the wide diffusion of smartphones, the app would prove to be an easy choice for a wide circle of people. Moreover, familiarity was very great due to the fact that users are already accustomed to mobile interfaces with navigation bars, which helps minimize the learning curve.

Another important consideration was cost-effectiveness. Compared to other alternatives, like VR/AR glasses or smartwatches, developing and maintaining a mobile app is much cheaper, hence more viable for sustainability. Finally, evidence from testing confirmed the suitability of the mobile app. Feedback from prototype testing highlighted the usability of the app and its potential for future iteration, reinforcing the decision to move forward with this platform.

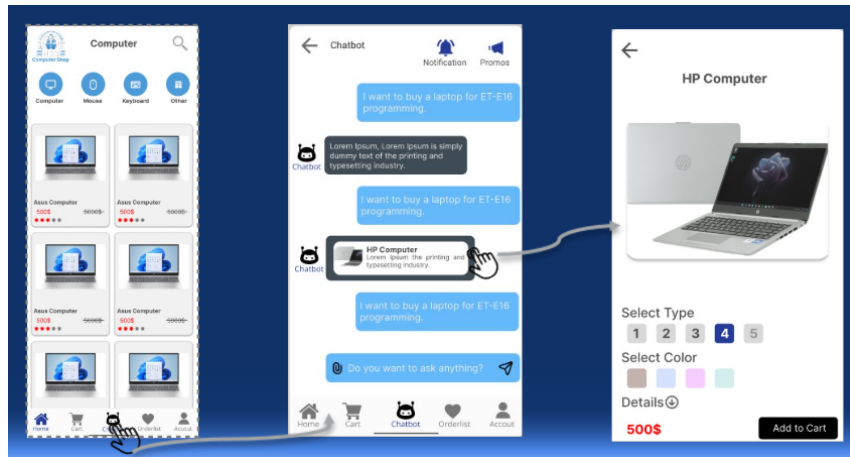## 4.2 Tasks

Task 1: Chatbot Interaction

Figure 4.1: Simple task flow: Chatbot

Complexity: Simple

Importance: Addresses personalized user needs efficiently.

Evaluation Technique: Heuristic evaluation revealed that the chatbot position and feedback mechanisms were not intuitive.

What was learned: The chatbot button was difficult to locate, and users lacked guidance for interacting with it.

Changes: Moved the chatbot button to a sticky navigation bar and added prompts for recommendations.

Values Identified:

- **Accessibility:** Improved visibility of chatbot functionality.

- **Transparency:** Clear instructions fostered better user interaction.

Task 2: Viewing Products

Complexity: Moderate

Importance: Ensures smooth user experience as they are exposed to fully detail properties.

Evaluation Technique: Conducted heuristic evaluation and user testing. Evaluators rated the transition and their experience using the Home, Product Detail and 3D View pages.

What was learned: Users found the original navigation list cumbersome and inconsistent in terminology.
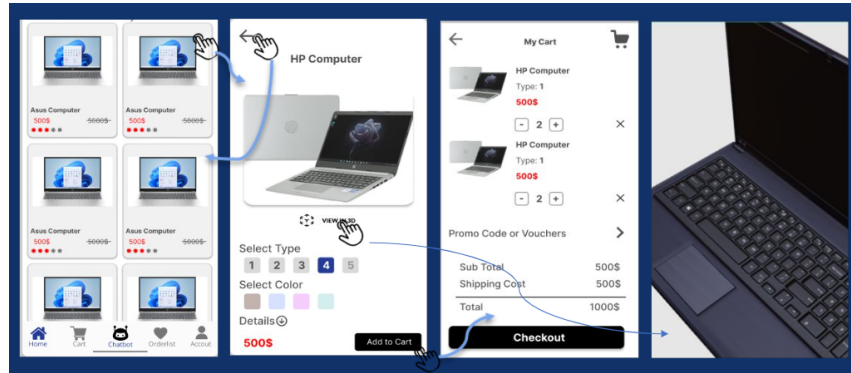
Figure 4.2: Updated navigation bar with icons.

Changes: Replaced the list with icons for a cleaner layout. Standardized the terminology across sections.

Values Identified:

- **Usability:** Simplified access to key app sections.

- **Transparency:** Consistent naming reduced user confusion.
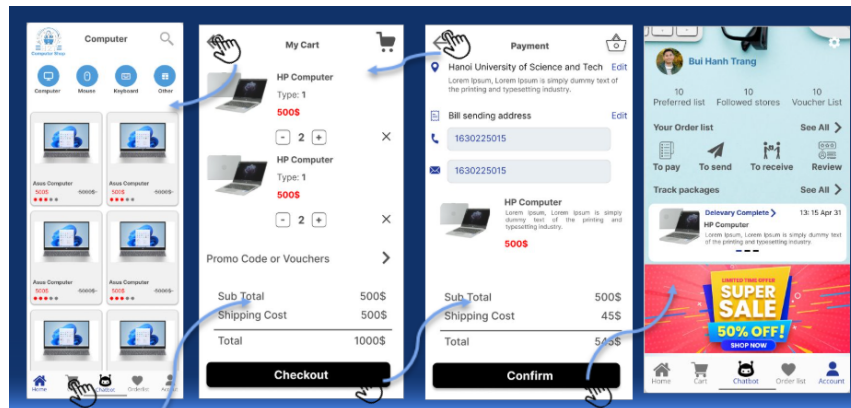
Task 3: Purchasing Products

Figure 4.3: Added instructions for 3D product viewing.

Complexity: Complex

Importance: Meets the primary objective of the app, facilitating purchasing decisions.

Evaluation Technique: User testing and heuristic evaluation identified issues in the 3D product checkout process.

What was learned:

- Users lacked feedback for actions like "Add to Cart" and checkout.

- Inconsistent options in the checkout process caused confusion.

Changes:

- Added clear error messages for actions.

- Streamlined the checkout process to include appropriate feedback and navigation options.

Values Identified:

- **Usability:** Instructions improved the interaction with complex features.

- **Transparency:** Feedback for errors and unavailable items reduced frustration.

4.3   Heuristic Violations and Fixes

Four major heuristic violations were identified during the evaluation phase:

Automatic scrolling on the main page frustrated users
H3: User Control & Freedom - Fixed
During the user interaction with the app, it was observed that the main page automatically scrolled down when users tried to select an icon from the top. This behavior caused confusion, as users lost control over the page and were unable to interact with the interface as expected. The scrolling function was repaired to allow manual control, ensuring that users could select icons and navigate freely without being unexpectedly interrupted by automatic scrolling.

Inactive options in the account page reduced usability
H7: Flexibility & Efficiency of Use - Fixed
On the account page, many options were visible but inactive, which led to frustration among users as they attempted to interact with features that were not functioning. This cluttered the interface, detracting from the user experience. Pages were added for each option, ensuring all listed features were accessible and functional. This change improved the overall usability and made the account page more efficient to navigate.

Lack of loading indicators for product images
H1: Visibility of System Status - Not fix
When browsing products, users encountered a delay when loading images, but there was no indication that the images were still loading. This led to confusion, as users were unsure if the app was responsive. Despite this, we decided not to fix this issue at this stage because the delay was minimal and did not significantly impact the overall user

experience. Furthermore, adding a loading indicator might have introduced unnecessary complexity, which could affect the performance of the app.

Excessive information displayed on product pages
H8: Aesthetic and Minimalist Design - Not fix

Some product pages showed too much information at once, including long descriptions and multiple badges, making the page feel cluttered. While this could have been simplified by reducing the amount of information shown, we chose not to address this in the current iteration. The decision was based on user feedback indicating that advanced users preferred having all product details in one place, and a more minimalistic design could detract from the in-depth experience they were seeking.

Chapter 5

Final Prototype and Reflection

The main tool used for the development of the final prototype was **Figma**, which has been fundamental during the interface design process. Figma allowed the development of interactive prototypes and also design iterations, making the collaboration of team members easier to handle, as well as user testing with feedback in real time. In this project, we also learnt how important understanding diverse user needs is through iterative refinement of designs for user-friendly platforms. Since we engaged quite early with the users and more frequently, it helped us in garnering feedback to inform our design decisions. That iterative process really helped identify several pain points and prioritize those kinds of features that would make this final product much more intuitive and functional. In addition, we learned how design has to be flexible due to changing user expectations and needs throughout the process.

With more time, several other things could be done to develop this better. First is the addition of **multilingual support**, so that people all over the world can take the advantage of this wonderful platform. Next, the improvement in **intelligence in chatbots** by making them response more accurately and context-aware, leading to an improved end-user experience. Lastly, allowing **more diverse product categories** makes the platform multifaceted and interesting to more diverse users, hence solving different kinds of needs for diverse groups of customers.

—— **The End** ——