Deliverable E Group C2.4

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Abstract

This document presents the modifications applied to our concept by implementing two new non-functional constraints. Included in this document is a detailed description of our updated concept, a prototype of both the tutorial subsystem and the user interface subsystem. This document will also provide an assessment of our prototypes according to the established target specifications from deliverable B.

Table of Contents

1. Introduction

The design of the first prototype has been completed. Throughout the process, two constraints were taken into account, time and accessibility that can impede the success of the product. The aforementioned constraints are being assessed and taken into account. The design of the second prototype will address the aforementioned constraints as well as the critical assumptions and the previously mentioned target specifications. The third and final client meeting will also be considered when doing the second prototype.

2. Non-Functional Design Constraints

As for non-functional design constraints, the team has decided to implement 2 constraints. These non-functional design constraints are the following: Design constraints on Time and design constraints on continuous usability (sustainability).

The team decided to implement the non-functional design constraint of the time required for completion of the software. The purpose of this constraint is to improve the quality of the software and to solidify the needs of our client. Indeed, having this non-functional constraint in mind while prototyping will benefit the team from adding unnecessary aspects to the software. Also, this links into the need of having a simple and easy-to-use software because, decreasing the time required to use the product will decrease the users from being distracted and lose focus. As a matter of fact, in the second client meeting, the team asked the client on whether the user will practise with the application on a daily basis. The client answered by explicitly describing that the user will use the software on a daily basis for 10 to 20 minutes. As a result, to provide a better experience for the user, we have decided to implement this non-functional design constraint into our design. This constraint also links up with the user experience requirements that allows a better interaction between both the user and the product. Therefore, this constraint will both improve our prototyping and our final design concept.

As for the second non-functional design constraint that the team is willing to implement during our prototyping is the design constraint for accessibility. This constraint was inspired from previous course material in GNG 2101. As a matter of fact, we believe having a constraint for accessibility will greatly improve the quality of the final product. The constraint is to allow a variety of individuals to use the application instead of focusing on the specific user. While we discussed it with the client, they agreed on having the application that can be used by everyone computer-wise instead of just the one user that is using a joystick as a computer mouse.This will help us during the prototyping since we can generalize our design concept. In other words, we will be able to focus on a sustainability idea for our software then just create a software that will help only one specific individual. Hence, while prototyping, we can adjust the application to be more general. This will enable us to receive better feedback from our testers because they will be open-minded on who is going to use this software.

3. Changes Needed to be Implemented into the Design

4.

For Constraint 1:

- Make the tutorial videos short and straight to the point.
    - Eliminating any complex words while also maintaining a language that is not belittling to the people using the web app. Anything above 30 seconds would be considered too long.
- Make sure that the response time of the software is not slow.
    - The software should be responsive and should not allow the user to doubt themselves in knowing whether they did the mouse operation or not. The app will not be running any effects that would tax the PC and make it download unnecessary software further lengthening the time to load.
- Test the essential basic mouse skills and not the understanding of other aspects related to the exercise (don't have them think where to pull a folder or something, just make them do the action with the mouse)
    - The purpose of this product is to give an introduction to mouse operations, not to introduce computer OSes or other elements. Exercises will be concise and will not need more than two mouse operations to achieve the exercise.

For Constraint 2:

- Generalize the videos.
    - The videos will not contain complex vocabulary or slang words to describe an action. The videos will be written in simple English in order to maximize the number of people that can understand what is being asked of them.
- Have hint icons in the exercises.
    - In order to not frustrate the user, hints will be displayed in every exercise in order to allow for users to further progress in the exercises while also maintaining the teaching element.
- Have accessibility to subtitles.
    - Some people are visual learners as opposed to auditory and will have the option of both in order to increase accessibility.
- Usage of keyboard as alternative to mouse
    - Some of the users are used to navigating menus without a mouse. Keyboard shortcuts will be implemented to further allow users to slowly incorporate mouse movements.
- UI will have colour blind friendly options.
    - In order to make the website user-friendly, the UI will use a colour palette that can be seen by the biggest number of people.
- Subtitles with big fonts or zoom option.
    - In order to increase user comfort, a zoom feature will be implemented so users with visual impairments can enlarge the font and screen to their comfort.

4. Effectiveness of Changes to Satisfy the Constraints

For the first constraint (time constraint), the team believes that having shorter videos allows the user to be more focused and engaged towards learning rather than getting distracted and bored from the duration of the tutorial. Indeed, according to Boclips.com, the length of a tutorial video is a massive factor that can affect the learning quality of a user. Additionally, experimental research was performed during a classroom where a professor showed a variety of videos with different lengths. According to the data collected by the researchers, 60% of students were lost focused when the video's length extended over 6 minutes to 9 minutes (Boclips, 2022). As a result, this research proves that this non-functional requirement constraint will affect the overall design in a positive manner. As mentioned through the research, while a tutorial video is longer, the rate of focus from a user decreases. Hence, by creating smaller tutorial videos, we will be able to decrease the time of completion of the software by also keeping the user engaged and focused. Overall, the team has also decided to simulate this research and we have determined that most of us had difficulty following tutorial videos that were long in length. For example, in the pre-Lab for soldering, it contained long tutorial videos that caused every member of the team to lose focus and become bored. Therefore, we opted to implement this constraint since it will benefit the user in order to stay engaged to learn about the basic mouse skills.

As for the second non-functional design constraint which is designed for accessibility, the team decided to implement it into our software because it will not only benefit the team to have more freedom while programming the software, but it will also allow other potential individuals to use the software for the purpose of learning basic mouse skills. This being said, in order to generalize and implement the constraint of accessibility, the team decided to use a standard mouse during the tutorial videos because it is the most common mouse. Compared to a gaming mouse, it would not benefit the user to learn about the added features that are not found on standard mouses. Additionally, to satisfy this constraint, the team decided that it would be beneficial to include subtitles and captions to the tutorial videos. As a matter of fact, throughout some of the research done by the team, we were able to determine that these features implemented into the software will improve and satisfy the constraint of accessibility. For example, according to the Bureau of Internet Accessibility, captions enrich accessibility because it expands the software to be used by others, "Your website should provide people with options for accessing content in a way that aligns with their preferences. As such, both transcripts and captions are important for accessibility. Providing both types of text alternatives can enrich your content and expand your audience" (Bureau of Internet Accessibility, 2022). An additional change that we are planning to implement in our design to accommodate for the constraint of accessibility are pop-up hint icons. As a matter of fact, according to CUNY, to satisfy accessibility, there are four different aspects that should be respected: "Perceivable, Operable, Understandable and Robust." Overall, the pop-up hint icons lean into the understandability category which allows the user to have a better learning experience and understanding of what is being taught. Hence, hints will help the users by guiding them towards completing the tasks to learn how to use the basic mouse skills. With this being elaborated, the method used to describe the usefulness of the changes to satisfy our non-functional design criteria was done through research.

5. Updated of Detail Design

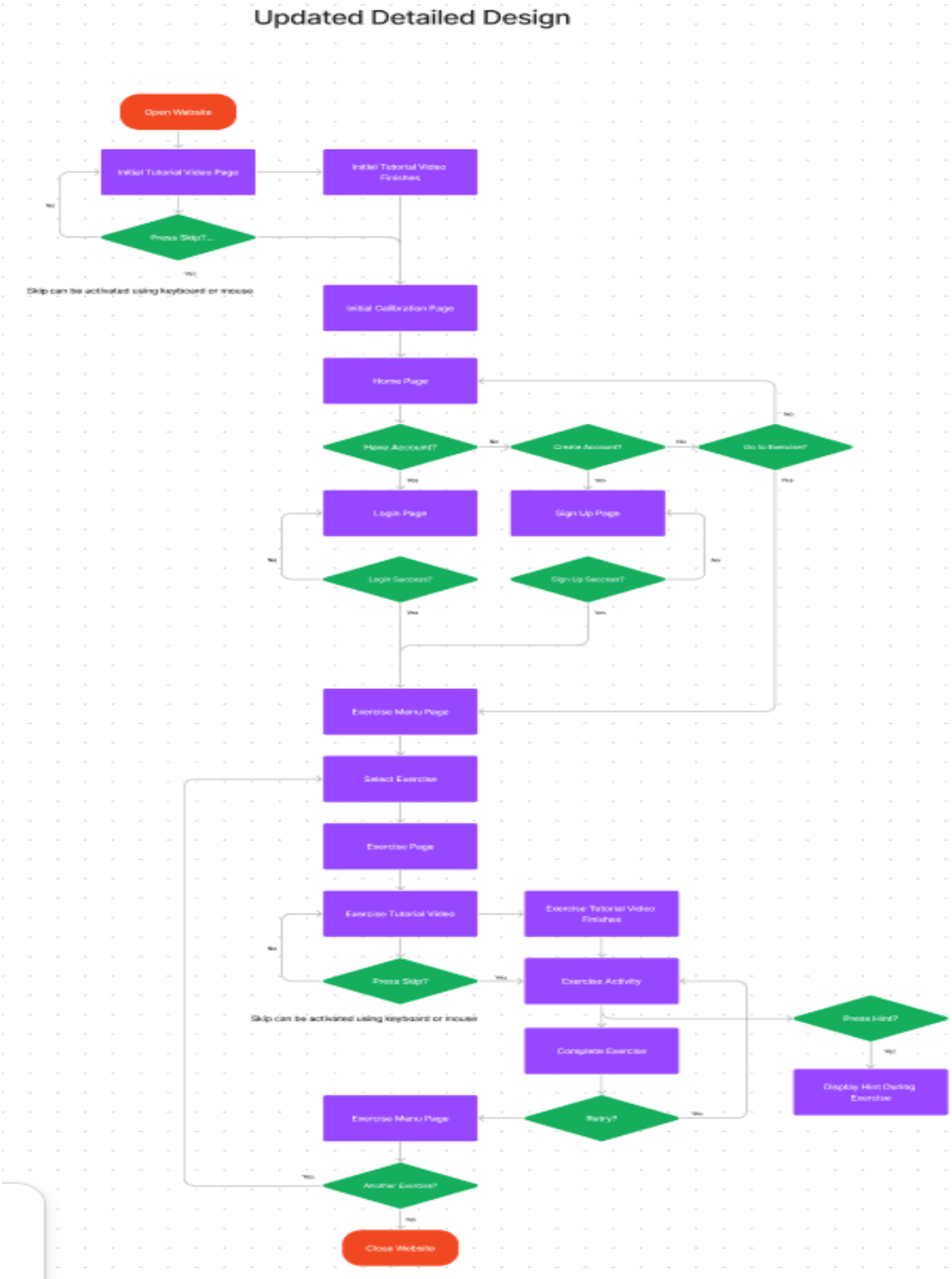

Figure 1: Updated Detailed Design of our Final Concept

Here is a link to properly visualise the updated detail design: Link

6. Description of Second Prototype and Testing Critical Assumptions

As of this moment, prototype 1 is completed. It comprised the user interface and the tutorial subsystems. For prototype 2, we will concentrate on the development of three different exercises that practises the basic mouse skills. Indeed, we will develop a clicker exercise, a dragging exercise and a real-life implementation exercise. Hence, we will be prototyping the exercise subsystem which will help the user practise some basic mouse skills. This prototype will have objectives such as milestones and measuring performance. Indeed, the milestone objective is put in place in order to advance to the upcoming tasks and steps in our prototype phases before design day. As for the measuring performance objective, the goal is to determine any issues with the software, how can we improve it and what are possible risks that can occur.

Leading from that idea, some critical assumptions that we have not yet tested, but that we are willing to test in the upcoming prototype 2 in order to reduce risks of failure are bugging testing and cross-browser compatibility. Also, we will determine if the exercises properly function and be adequate for a new learner of a computer mouse since our goal is to have a simple and easy to use educational applications.

Furthermore, we were still able to test some critical assumptions along the way. Indeed, we were able to connect different web-based browsers together by routing their addresses in the code. We were also able to work a little bit on the accessibility constraint by integrating subtitles to the video we have. As for issues we dealt with through our critical product assumptions is that depending on the users' pixels on their computer, the arrangement and alignment of some icons are shifted. Hence it is something that we are planning to fix and find a solution for. However, as mentioned earlier, we are still planning to test other critical assumptions of our product since we are starting the exercise prototypes.

7. Documentation of Prototype 1

For prototype 1, we built the basics for our design, which is a physical focused prototype. In other words, we developed our user interface subsystem and our tutorial subsystem. The goal of this prototype was to build a simple user interface by keeping an interaction between the user and the program easy to use. As for the purpose of this prototype, we planned to create a prototype that had the objective of milestones and learning. In other words, for milestones, we aimed to have completed this prototype by the final client meeting in order to demonstrate the user interface, but mainly to receive feedback on the quality of the tutorials because it is one of the most essential subsystems apart from our exercise subsystems. Indeed, we the client like the idea of our exercises from client meeting 2. However, we needed his feedback on the way we are willing to approach the tutorial subsystem because we want to properly design our software to satisfy our users' needs, which is to create a simple and easy-to-use software that is not childish. As a result, we were able to achieve this milestone by completing the prototypes before the 3rd client meeting. As for the other purpose for this prototype is the learning objective. Indeed, while we were developing this prototype, we were able to evaluate it by determining issues that might cause issues or discomfort to our user. As a result, we have determined that the initial colours that we have set denied the ease of reading the text on the icons. Hence, we were able to determine this possible risk by refining our design and decision of colours that is to be implemented into our design. Overall, this prototype is of medium fidelity for the reason of being included into the final design. It is medium fidelity because as a team, we might improve the user interface and the quality of the tutorial when implementing them with the other subsystems such as the progress tracking subsystems, the exercise subsystem and the adaptive difficulty subsystem.

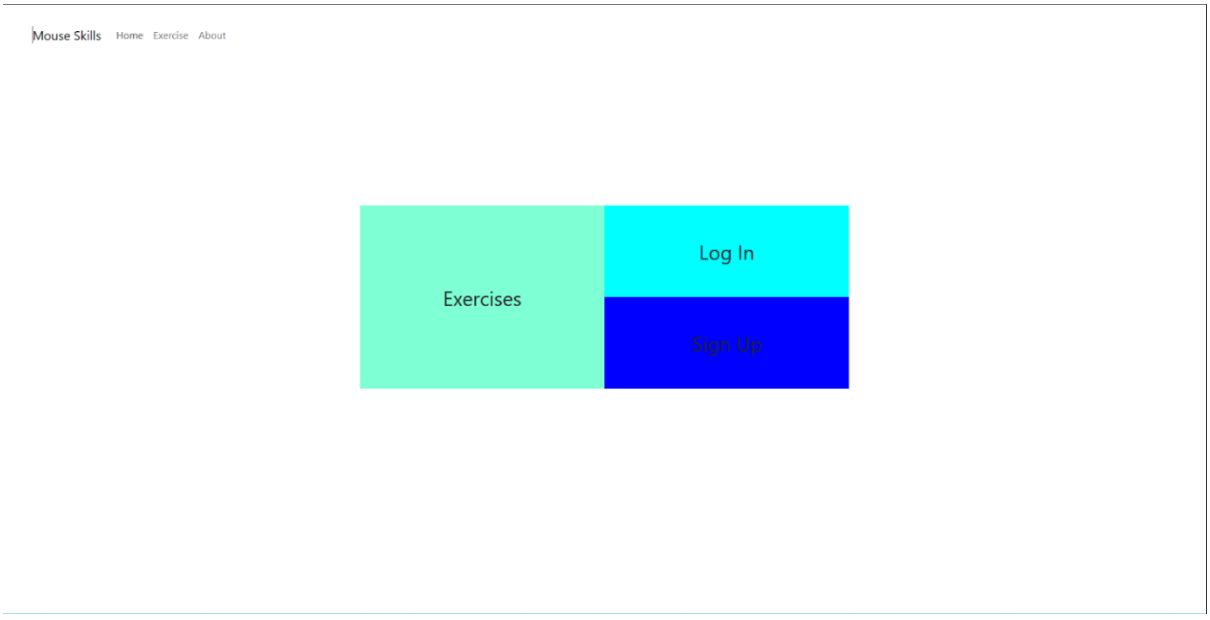

Figure 2: User Interface subsystem Prototype

Figure 3: Tutorial subsystem Prototype

8. Analysis of Prototype

The testing and analysis of our current product followed the same procedure as conducted last time (find previous results in Deliverable D). To recap, the testing method is as follows: The age range of testers is from 10 to 77 years old. As our client stated, the users of our product are adults. However, we decided that it would be best to have testers of all age ranges to get the opinion of a broader dynamic. However, the opinions of our adult testers were taken into more consideration. Based on our testers experience, we asked the testers to rate target specifications, from 1 to 5, as our team did. We compared the results to our stated target specification stated in the previous deliverable. We also invited our testers to provide any comments about the prototype.

We also ensured to use the same participants as last time to ensure the diversity dynamic is better controlled and would provide more consistent results. The results of the tests are as follows:

User Interface Complexity:

Test Result: 2.1

Ideal Target Specification: 2

Marginal Target Specification: 1-3

Difficulty of Tasks:

Test Result: 2.5

Ideal Target Specification: 2

Marginal Target Specification: <3

Number of Unique Modules:

Test Result: 5

Ideal Target Specification: 5

Marginal Target Specification: <7

Recommended Age:

Test Result: 18+

Ideal Target Specification: >18

Marginal Target Specification: >15

Some notes, quotes and comments from our testers:

- Colours should be changed.
- Needs less reading and more audio/videos.
- Very big improvement compared to last testing.
- Instructions should be read to the user.
- Increase text size.

After analyzing our data, it is easy to see that our tester's input matches our target specifications closer than the results of our initial test in Deliverable D. All of our data fall within our marginal technical specifications, which deems the metrics as acceptable. Once again, the feedback from the testers revolves around features that we plan to incorporate into our final product. The main differences between the prototype from the first test include an increased number of options for testers to use (more buttons to press, more windows, etc.). Overall, we are once again satisfied with our findings.

9. Summary of Client Feedback

The third client meeting, which occurred on the morning of Monday, February 27, gave us an opportunity to present our prototype and all coding work done to this point. We also presented a sample exercise, depicting the use of real-life applications such as Facebook, Outlook, and Disney Plus. This client feedback, similar to the previous meetings, came with all positive feedback. Some key takeaways include:

- Liking the heavy focus on teaching users mouse skills in frequently used websites.
- Liked the prototype that was presented.
- Confirming that the website will be low traffic.
- Subtitles would be useful in addition to video audio.
- Mouse used in videos did not match ones used by the website's users. Photo below is a mouse from the user's setup:

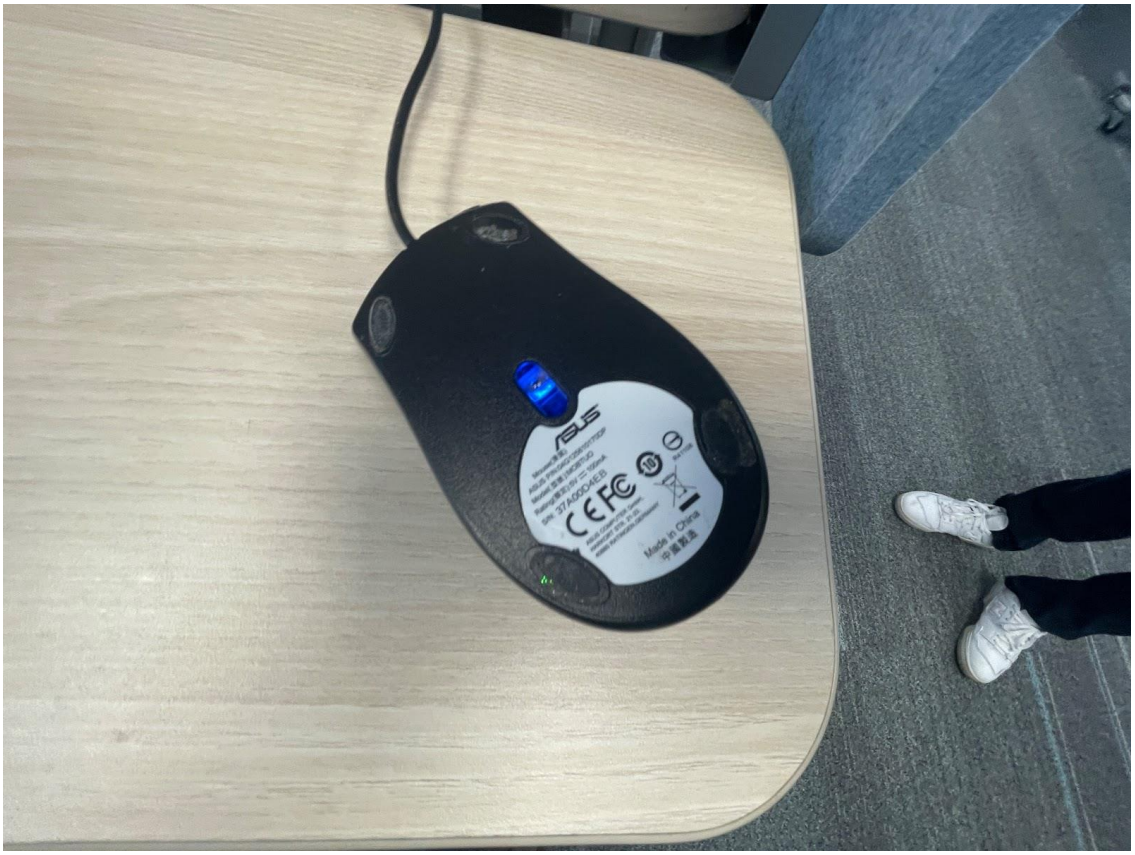

Figure 4: Mouse from Computer-Wise

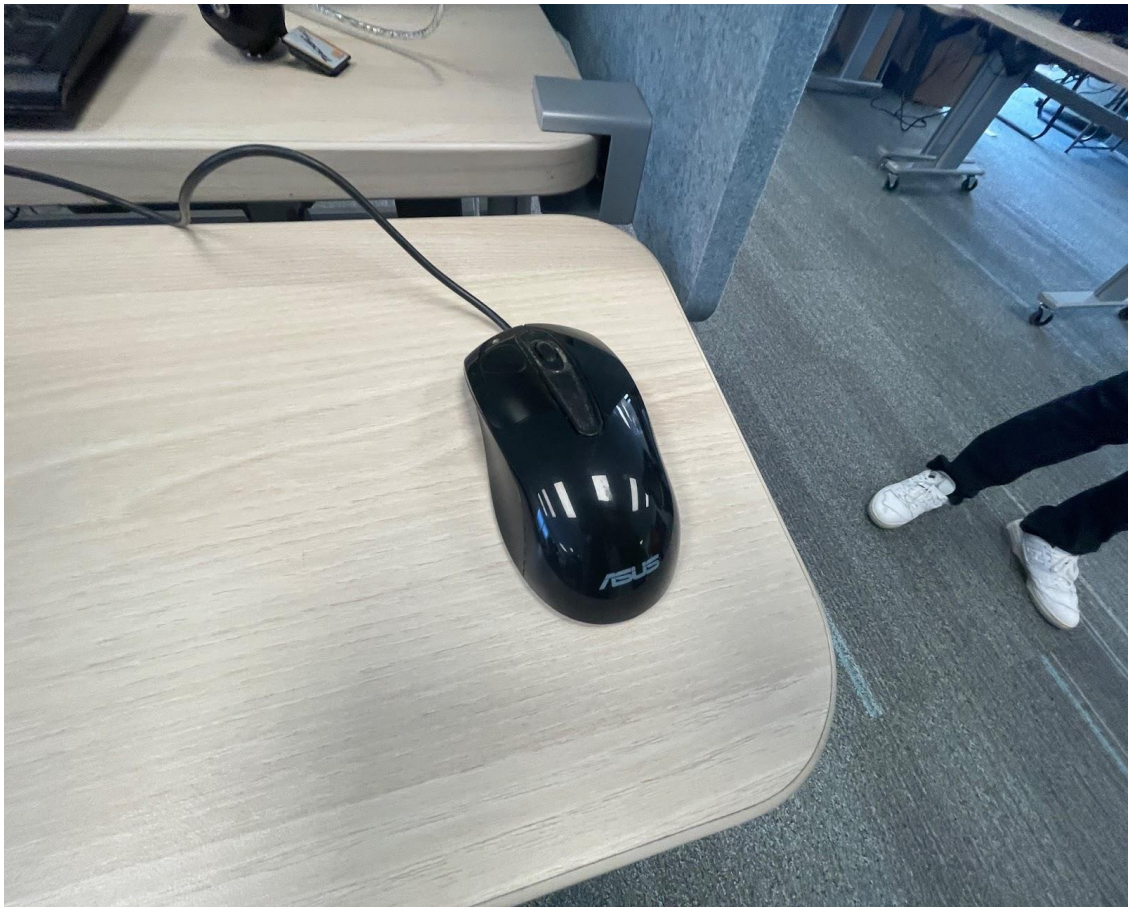

Figure 5: Mouse from Computer-Wise

- The camera angle was not preferable - needs to be less awkward, suggested an aerial view.
- The video tutorial needs to be inverted.

Additionally, the TA present during our meeting expressed concern about the lack of prototyping. However, this will be fixed by focusing more on implementing more aspects of our product into our model, and having multiple screenshots and diagrams which would be more representative to our final product.

10. Critical Assumptions not Yet Tested

Despite already having conducted testing, we still have product assumptions that have not been tested yet. These cannot be tested with our current prototype because it is still in the early design stages which would not provide us with a useful analytic, as many changes and features still need to be implemented. These tests are important and will be conducted within the next week.

- Cross browser compatibility: Ensuring that our website runs on all web browsers such as google chrome, Microsoft edge, safari, etc. If our website is not able to run on a specific browser (for example, some programs are unable to run on safari), we will need to communicate with our client and ensure this is not an issue.
- Medium/high traffic crash testing: As we confirmed with our client that the website will be low traffic (>20 users at one time), we still need to ensure that our final product will be able to accommodate a higher number of users in the event that it gains in popularity.
- Bug testing - application completeness: Bug testing usually takes place during the final phases of product design and is used to ensure that there are no errors within the website, and everything is working as it should. This will be completed by traditional methods such as using the application repeatedly and reporting if anything is working improperly.

11. Wrike Gantt Snapshot

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=ql9OI3UUbJ7wgyTIZrfAr5Nl2lLXnVVZ%7CIE2DSNZVHA2DELSTGIYA

12. Conclusion

Even though our team is slightly behind schedule, we feel as though we have a new realistic end goal for design day. Having a proof of concept models will be more realistic for the team's skill set, and will be able to complete high quality work to present on the design day. This deliverable highlighted many of the advancements on our second prototype, identified its critical assumptions and testing. This information will still be used while going forward as we are going to add the exercises into the current prototype. Our team is going to continue to work together by using all coding knowledge to make the exercises, and plans to use the next three weeks effectively to finish our project before March 30th.

Additional Notes

Based on the conversation with our team and both TA’s after the lab on Monday, March 6, the team gathered and discussed our end goal for design day. Based on our discussion, we have decided to streamline our product as a proof of concept models, and create a fewer number of specific exercises, and explain how the other exercises would be in a similar fashion to the one displayed. This will allow us to allocate more time to a fewer number of tasks, resulting in a higher quality end product to present on the design day, and to our client.

The tasks which are going to be created include an email simulation and a simple clicking task game.

13. References

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Link for detailed design on Figma: Link