A4.2 Usability Evaluation Report

Introduction

On Nov 21, 2023, we conducted usability research designed to study the users' experience with our intelligent foot hygiene machine prototype. We invited 5 participants and asked them to interact with our prototype. Each one-on-one session lasted 20-30 minutes. We had the 10-minute debrief sessions after each usability session. The study focused on evaluating the user's experience with the defined tasks and seeking to understand users' perceptions of intelligent shower control to identify the user experience issues and provide recommendations.

Prototype

Design Concept of the Products

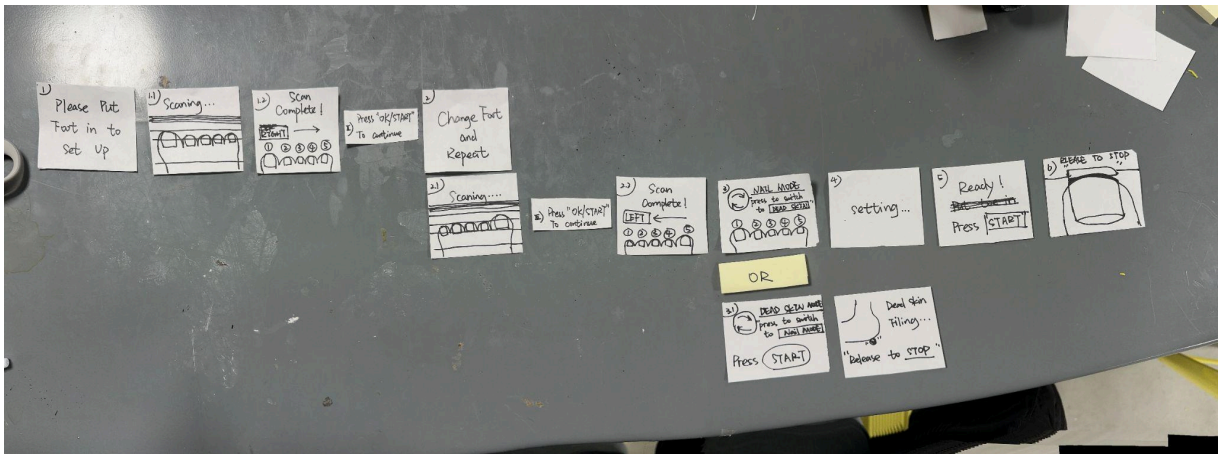
We designed a set of products including an automatic foot filing machine and a remote control device. The auto foot-filing machine takes care of foot hygiene by tackling two most common and important daily tasks for users: nail cutting and dead skin removal. The remote control enables users to avoid the possible risk and difficulties of having to bend over their body to reach their feet.

Design Concept of User Flow

The user begins by pressing the power button, and enters the initial setup procedure. The user scans their first foot, waits for scanning completion, and then confirms the information scanned. Then the user switches his/her/their foot to complete the later half of the setup.

After set up, the user chooses from two modes through the interface showing on the screen which indicates the switch button to choose the function. For nail filing mode, the user can choose from 1 to 5 to choose the toe to complete foot hygiene. For dead skin filing, the user can press the switch button and use the "start" button to proceed. Out od

safety concerns, to start the filing procedure, the user has to press and hold the “start” button. Once released, the filing mechanism will immediately stop to prevent potential harm to the user’s foot. While filing, a real-time camera view of the toe will be shown on the screen for the user to monitor.



Link to Prototype in Use

https://drive.google.com/file/d/1JvRXUUnVfK3SFCZbnHAqaIJwj7SnSHDc/view?usp=sharing

Evaluation

Core User Tasks :

1. **Speak out your first impression of the product**

   To see if our product is intuitive enough for users to understand the function of different parts of the product and the way to use them

2. **Put your foot into the tool.**

   To see whether this product is adjustable for different foot sizes.

To see if the user can quickly understand how the product works based on its appearance.

3. **Set up your tools for foot hygiene tasks (cutting nails and dead skin removal)**

   To see if the visualization of the user interface contains clear and sufficient information for users to check if the nail drills are in the right position.

4. **Operate the foot filer to do foot hygiene.**

   To see if the operation method is easy to understand and practice.

5. **Clean the tool.**

   To see whether the cleaning method is matching the users' usual practice or not.

Issue Severity Rating Scale:

0 = Not an issue.

1 = Minor issues. Issues may degrade usability but users can still use it.

2 = Show stopper. Must be corrected before product release.

Key Usability Findings:

1) Participants don't like adjusting the size of the equipment every time they use it, even if they are the only users of the product.

   Severity: 2

   Label: Preparation

   Description: At task 3, Participant #4 was setting up the tool. When he was adjusting the size of the tool to fit his feet, he said, "Should I adjust the size every time I use it?" After knowing that he should, he expressed his disappointment.

   Recommendation & changes: Add a size-fixing feature to remember the previous user's feet size.

2) Users feel tired of pressing the button in order to get the equipment running.

   Severity: 3

   Label: Product Usability

   Description: At task 4, Participant #2 was operating the drills to do foot hygiene. When we told him he must keep pressing the button in order to get the tool running in order to stop the tool quickly when he gets hurt, he said, “ For me it is tiring to hold the button for minutes. And for aging people, this problem may get worse since their muscle is weak.”

   Recommendation & changes: Replace buttons that require applied pressure with a touchscreen so that users can trigger actions without the need for exerting force.

3) In order to reach the equipment before and after using it, users have to bend their waist, which is not friendly for aging people who probably have physical issues.

   Severity: 2

   Label: Product Usability

   Description: At task 5, Participant #3 was trying to reach the tool in order to clean it. According to Participant #3, he thought it hard for older adults with physical problems to reach and clean the tool.

   Recommendation & changes: Add the residue storage feature in order to reduce the number of times that users clean the tool.

4) The user could not get that the 5 buttons on the remote were designed for different toe mode settings

   Severity: 2

   Label: Visual indicators

   Description: At task 4 Participant 1 was switching back and forth the “switch” button, and didn’t get the indication of the five buttons which pair to five toes of

the foot on the tool. According to Participant 1, “I thought this interface was telling me if I want to continue, I need to press this button.”

Recommendation & changes: Use the live image on the screen directly to indicate how to set toe mode, and change the normal screen into an interactive touch screen.

5) The user found the order for 5 toes of each foot confusing

   Severity: 2

   Label: Product Usability

   Description: Participants 4 and 5 both raised the question of why the 5 buttons are designed in the order 1 to 5. They said that when they switched foot on the product, the order becoming 5 to 1 felt weird. They suggested if can use other indicators for the buttons like shapes or letters.

   Recommendation & changes: Use non-ordered indicators, in this case, shapes like triangles, rounds, squares, etc. to suggest toes.

6) Users found the user interface and switching button confusing, users are confused or misguided to think pressing the switch button is the next move.

   Severity: 1

   Label: Product Usability

   Description: All participants paused or showed long-time participation at task 4 when the two filing modes and the switching button showed up. When asked what they were thinking, participants told us that they were not sure which button they should press in order to continue.

   Recommendation & changes: Make the user interface clear and info-prioritized, instead of filling in all the information at the same time.

7) The users could not get that the scanning was a one-time initial setup, and were surprised that they needed to scan one foot after another.

   Severity:1

   Label: Product Usability

Description: During the user research study, we found out that due to the using habit, most of the participants prefer to finish the scanning and nail filling procedure foot by foot. When we posted the task of “Changing another foot to scan” on the UI design of our product, most of the participants looked confused. And 3 of the participants mentioned that they wanted to scan and file foot by foot.

Recommendation & changes: Revise the scanning and setup procedures for our product by implementing a foot-by-foot scanning and filling approach.

8) The icon of the buttons can not reflect their meaning.

   Severity: 2

   Label: User Interface

   Description: The incorrect visual guidance on the user or physical interface might mislead the users’ behavior and confuse them when practicing. Participant 1# found it hard to find the “Start button” or “OK button”, while Participant 3# thought the start button was rollable and could control direction and movement.

   Recommendation & changes: Improve the UI design, providing a clear introduction on the user screen to point out the location of the button and usage of the button. Change the design of the button, and make its shape clearer to be used.

9) Users find the foot shape shown on the product is confused.

   Severity: 2

   Label: User Interface

   Description: We put a feet pattern on the surface of the product to guide the users to the correct location to put their feet. But we only provide the pattern with the right foot. So many participants are hesitating whether they should put their left foot on it.

   Recommendation & changes: Switch this guidance into a non-specific pattern that shows a place instead of showing the pattern of feet. Or, do something adjustable that can show left feet and right feet.

10) Cleaning Function for the product: Users found it tiring to clean the equipment every time they used it.

    Severity: 2

    Label: Product Usability

    Description: After filing their nail and dead skin, there will be a lot of remains and dirt. Users found it confusing whether the electronic is washable or not. When asking the users about their cleaning method, each of them has a separate method, but maintaining basic cleanliness and disinfection are most of the requirements. Also, users found cleaning the equipment every time they use it tiring.

    Recommendation & changes: Add a vacuum and collecting dust bin at the bottom of the machine to collect the remains and peel-off. Add self-cleaning features to the product, such as UV disinfection.

Evaluation Reflection

1. What was easy about setting up and running the evaluation?

The easy part is using a low-fidelity prototype when running the evaluation. It saves time since you don't have to spend time coding interfaces or producing precise physical models. In this way, it allows you to do fast iterations in a short period of time.

2. What was hard about setting up and running the evaluation?

Because of the low fidelity of the product, it's hard to show all features clearly, which may cause some confusion for our participants. We are forced to give explanations in order to keep the evaluation running. But the more we talk, the more likely we bias our users.

3. What parts of the evaluation procedure surprised you?

Participants who share the same opinion about a feature will have completely different advice, which may result from their unique social backgrounds and experiences.

4. What would you do differently next time you set up an evaluation exercise?

Set up the table and evaluation materials more organized, and prepare better for users who participate in the test to be more relaxed and comfortable. For example, prepare clearer reading materials, and make the interface drawings more organized for each task.

5. If this were a real product being developed, when else would you want to run an evaluation exercise?

Before the design process, we would use several real market products to get first-hand information from our target users. And we would run an evaluation exercise every time we finish an iteration. Finally, we would run an evaluation exercise after we finish the final product.

Appendix #1 Evaluation Test Plan Draft

Introduction

1. Team Introduction

   Hi, I am Joel and I will be the moderator running the study today. This is Apple and she will help run the prototype throughout today's session. This is Freya and she will record the evaluation process. We would like you to think out loud throughout this testing session so we hear what you're thinking about as you use the product. I will hand you a printout of each task that I want you to accomplish. Tell me when you finish each task. In order to help you practice thinking out loud, please read the following paragraph out loud:

2. Participant Introduction

Please Read Aloud:

Today you will be using this new machine for foot hygiene. We have a set of tasks for you to complete using this new service. These tasks will contain the interaction with the machine and the user app interface. Please keep in mind that we are testing the function and user experience of the product; we are not testing you. If you encounter any issues during the test, please understand that we are in the prototyping phase and we aren't testing your abilities. This test is to help us improve our design. During the entire test, please share your thoughts, comments, and decisions out loud as you proceed and speak out loud.

3. Task Setup Introduction

   You accidentally hurt your lower back and are unable to bend your body very well. You are trying hard to cut your toenails as part of your daily foot hygiene routine. You find our product which can assist you in completing your nail cutting and dead skin grinding tasks. You've never used products or systems like this before, but you decide to try it out.

Task Lists

1. Task: Speak out your first impression of the product

   It's a Tuesday night and you are planning to do your foot hygiene machine. This includes getting your toenails cut and your dead skin removed. You decide to use the new product you got from online. Open the package and get the tools out. Tell us what you think of the product.

   Reasoning:
   To see if our product is intuitive enough for users to understand the function of different parts of the product and the way to use them.

2. Task: Put your foot into the tool.

This is your first time using this foot hygiene tool. Now set the tools as you feel like and put your foot on them to get ready.

Reasoning:
To see whether this product is adjustable for different foot sizes.
To see if the user can quickly understand how the product works based on its appearance.

3. Task: Set up your tools for foot hygiene tasks (cutting nails and dead skin removal)

   The position of drills seems a little bit unsuitable. Set up your tools for foot hygiene tasks (cutting nails and dead skin removal).You need to adjust the foot drill's set up to a fit position for your toe.

   Reasoning:
   To see if the visualization of the user interface contains clear and sufficient information for users to check if the nail drills are in the right position.

4. Task: Operate the foot drill to do foot hygiene.

   It's all set. Please operate the foot drill in a way that feels right to you to complete your foot hygiene tasks (cutting nails and dead skin removal)

   Reasoning:
   To see if the operation method is easy to understand and practice.

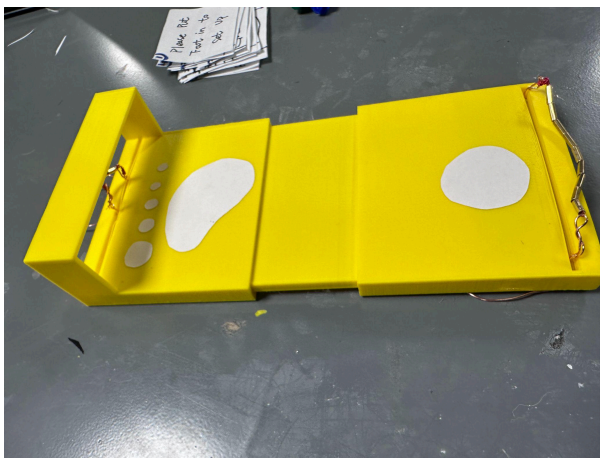
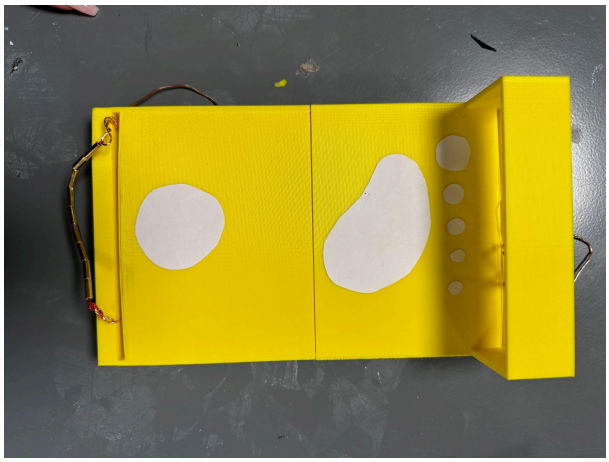
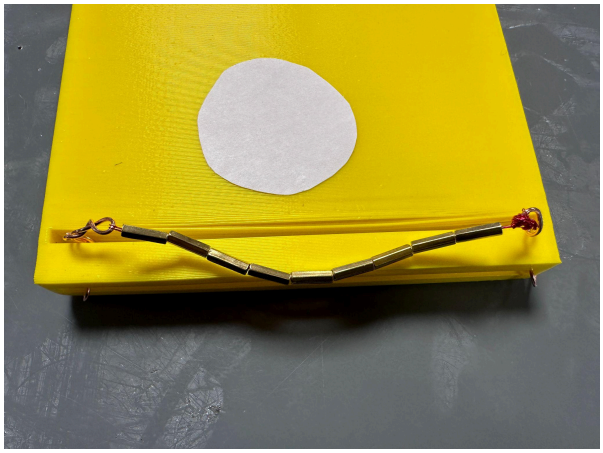
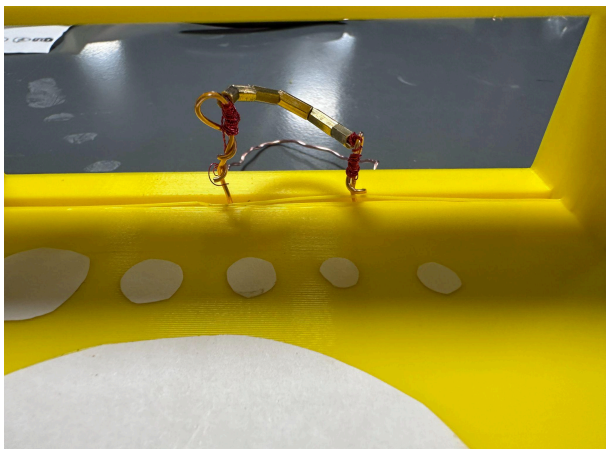
5. Task: Please clean the tool.

   Now you have finished your food hygiene process! You can pack your tools up and put them in the place you want!

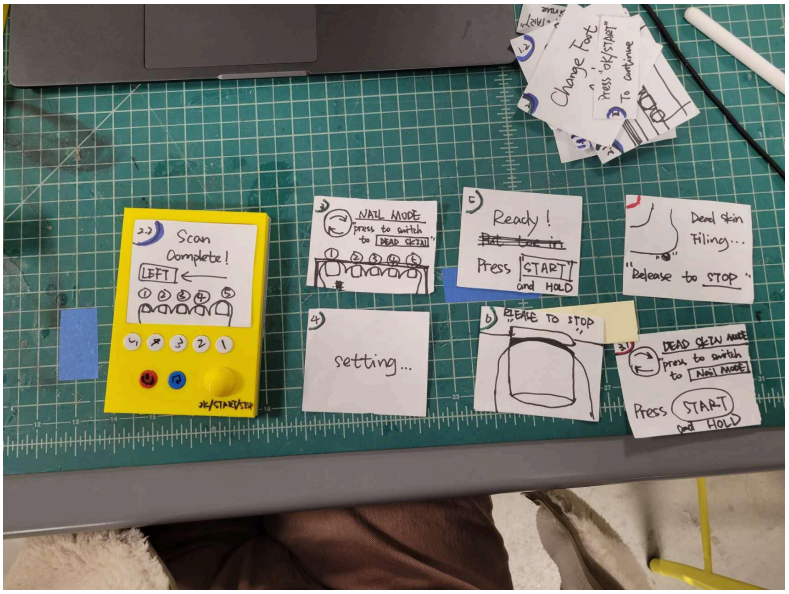
   Reasoning:
   To see whether the cleaning method is matching the users' usual practice or not.

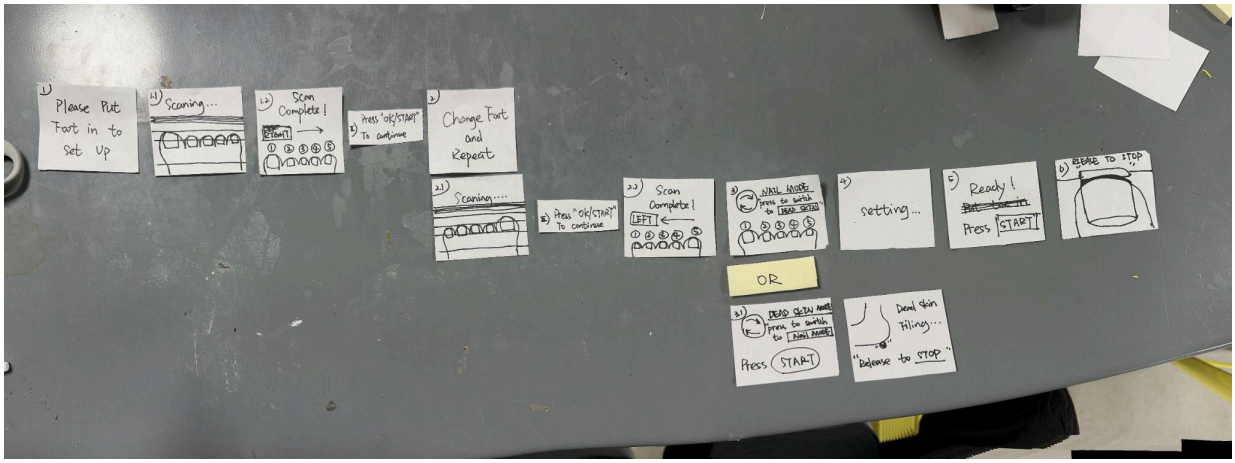
Appendix #2 Physical Prototype

Foot Filer Machine Prototype

Remote Control & Screen Prototype





Appendix #3 Evaluation Test Photo