# User Evaluation

## Pilot test

In the pilot test, we invited one of the members from another group in class to participate. Only one of our team members installed Adobe XD on his laptop. Therefore, the participant would use that laptop to interact with our interface. Firstly, we briefly introduced our interface to the participant and provided a list of tasks that needed to be completed while using our interface. When our participant was ready, we performed screen recording as well as voice recording. The first task was to set a feeding plan for her pet. The feeding zone was the most complicated in our interface, and the participant did not know where to select the type of food. After a while, we told her to click the 'Breakfast,' 'Lunch,' and 'Dinner' buttons, which would direct her to another page where she could select food. The remaining tasks were not complex, and each of those tests only took her about one minute to finish. After she finished all of the tasks, we asked her about her opinions on the detailed design of our interface. She gave us many helpful suggestions, such as simplifying the functionalities on the feeding page, providing an instruction manual for the feeding page. In addition, we asked her to rate the difficulty on a number scale. Not surprisingly, she thought that feeding was the most sophisticated and time-consuming part, while other functions were easy to follow and implement.

In the pilot test, we also discovered some problems. In the first place, we only have one device with the software downloaded for the participants. Therefore, this will greatly reduce the speed and efficiency of our evaluation, and when one of the participants completed the test, the other participants were likely to learn the details of the evaluation in advance,

leading to inaccuracy of the experimental results. Consequently, we plan to conduct the user evaluations in the lab room. Many computers here have Adobe XD installed, allowing multiple participants to use the interface at the same time. Secondly, as mentioned above, the design of the feeding page is too complicated, which makes it difficult for participants to complete the tasks. We should change the task description in the task sheet and give participants more clues and hints. Also, a questionnaire will make it easier for us to collect data from users. Therefore, we should make a questionnaire for users to fill out whenever they complete each task.

## Final user evaluation

Five users from the researcher's personal relationships were asked to evaluate the medium-fidelity mockup of our Smart Pet Caring System application prototype. Three of them are women, while two of them are men. All of them are university students and pet owners. We chose them to participate in our evaluation because the potential users of our interface are mainly university students who are busy with their studies and do not have enough time to look after their pets. After the evaluation, they will tell us, from the perspective of pet owners, whether our interface meets their expectations.

The evaluation method we chose is In-person Usability Testing for the following reasons. First, this approach is compatible with us launching offline testing, which means we can visually observe how users are completing tasks. Second, whenever a user completes a task, we can immediately communicate with them and get their feedback on every detail of our interface's design. In addition, we can observe users' facial expressions and body language to get their user experience and mood when using the interface.

Users are invited to the lab using Adobe XD files on their computers to complete tasks on the task sheets and fill out a questionnaire to share their feelings and feedback. Participants completed the tasks independently. Each of them was accompanied by a facilitator. We would record when participants completed the tasks, so as to facilitate the final data analysis and summary. While they were doing the tasks, we asked them their feelings about our interface design and offered help when they encountered difficulties using our interface. Whenever they completed a task, we asked them to fill out the corresponding area of the questionnaire.

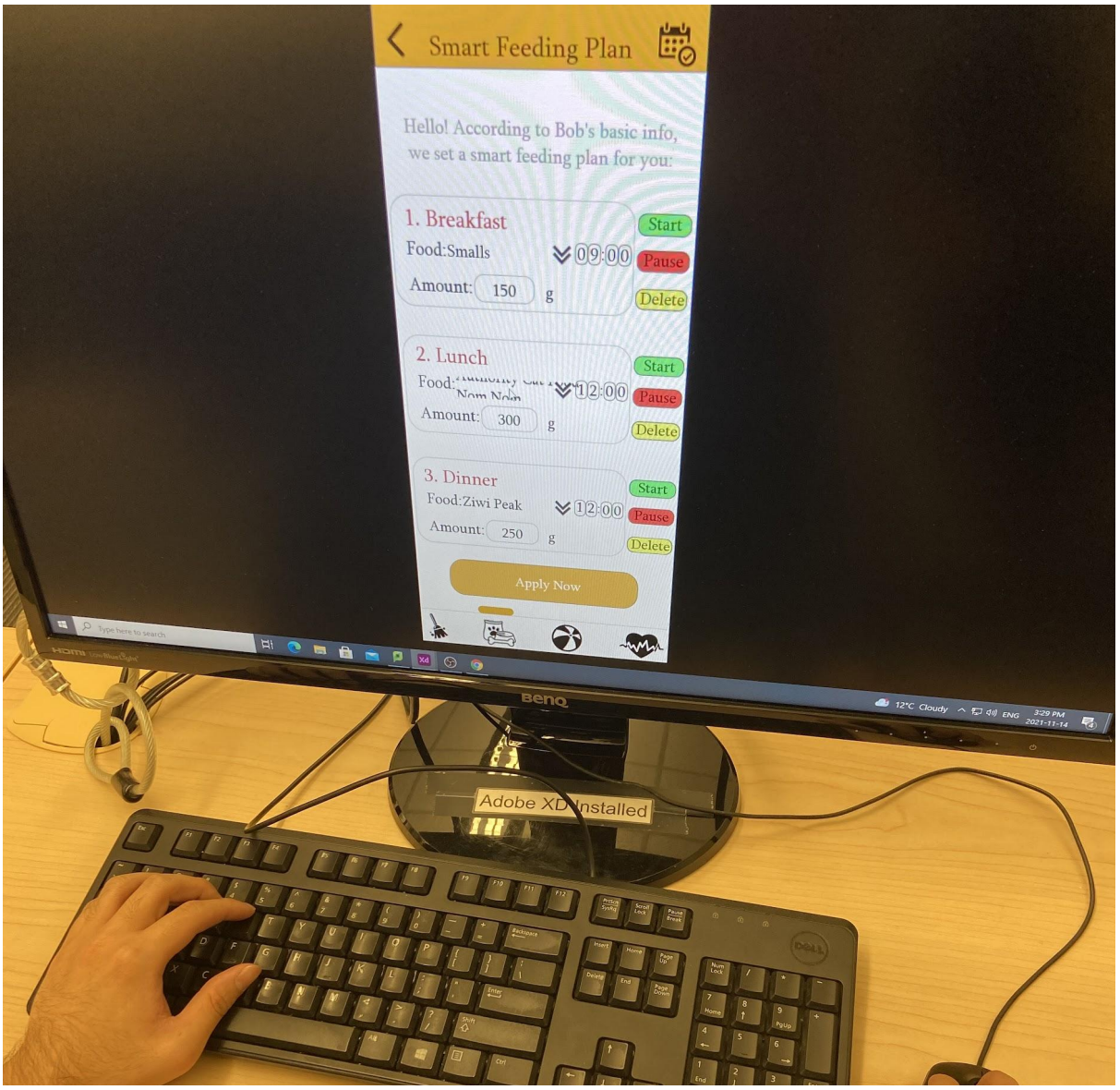


*Figure 1. Participant Using the Prototype*

After the participants completed all the tasks, we also asked them a series of questions about the application of the interface, aiming to understand the user experience further when using our interfaces, such as thoughts on interface design, difficulties, and problems encountered, suggestions for changes, and overall evaluation of the application.

## Results

The data sources we collected included:

1. Screen recording: to capture the whole process of the users completing the four tests using our interface.
2. Questionnaire results: to get users' feedback and suggestions about our interface.
3. Hand-written notes: to write down the difficulties that the users meet while using our interface as well as their feelings.

We used both qualitative and quantitative data analysis methods to analyze the data because some of the data is measurable such as the time spent in each task. At the same time, some of the information is not measurable such as the users' feelings.

According to the screen recording, we found that the task of setting a feeding plan was the most time-consuming. For the rest of the tasks, most of the participants can finish them quickly (Figure 2).

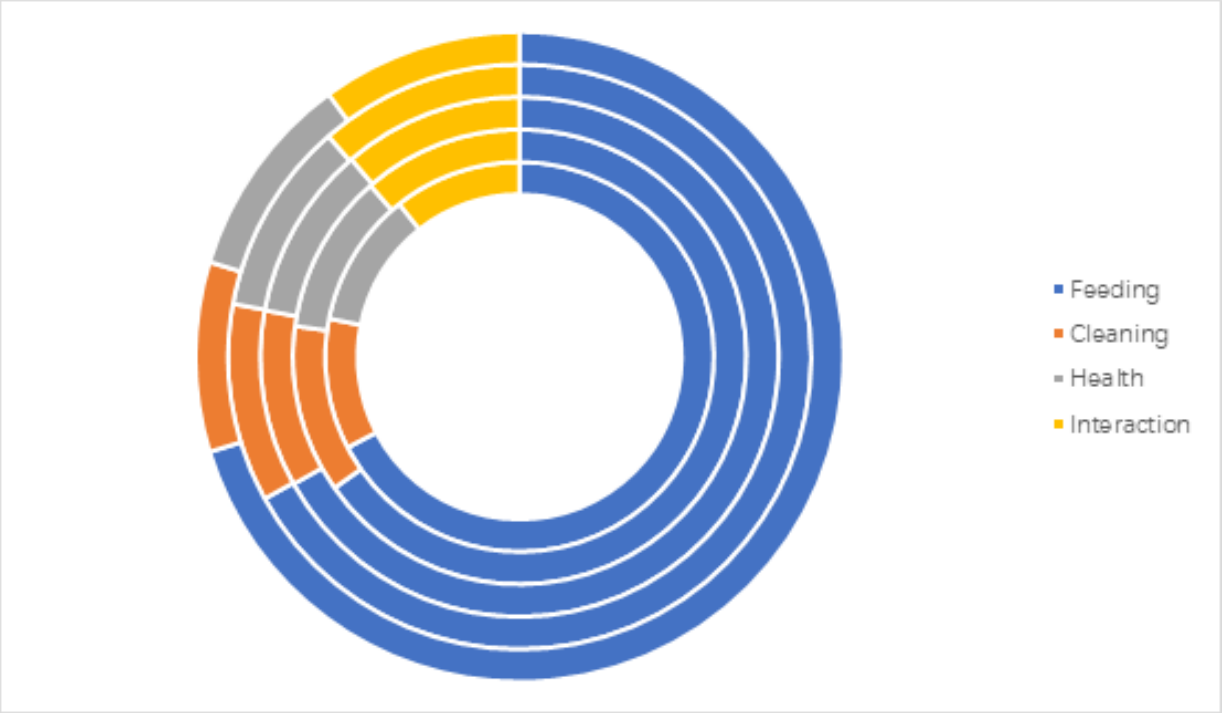


*Figure 2: Time spent on each task*

As for the difficulty rate, most of the participants thought it was hard to set up a feeding plan. The health, cleaning, and interaction part of the interface were all simple and easy to interact with (Figure 3).

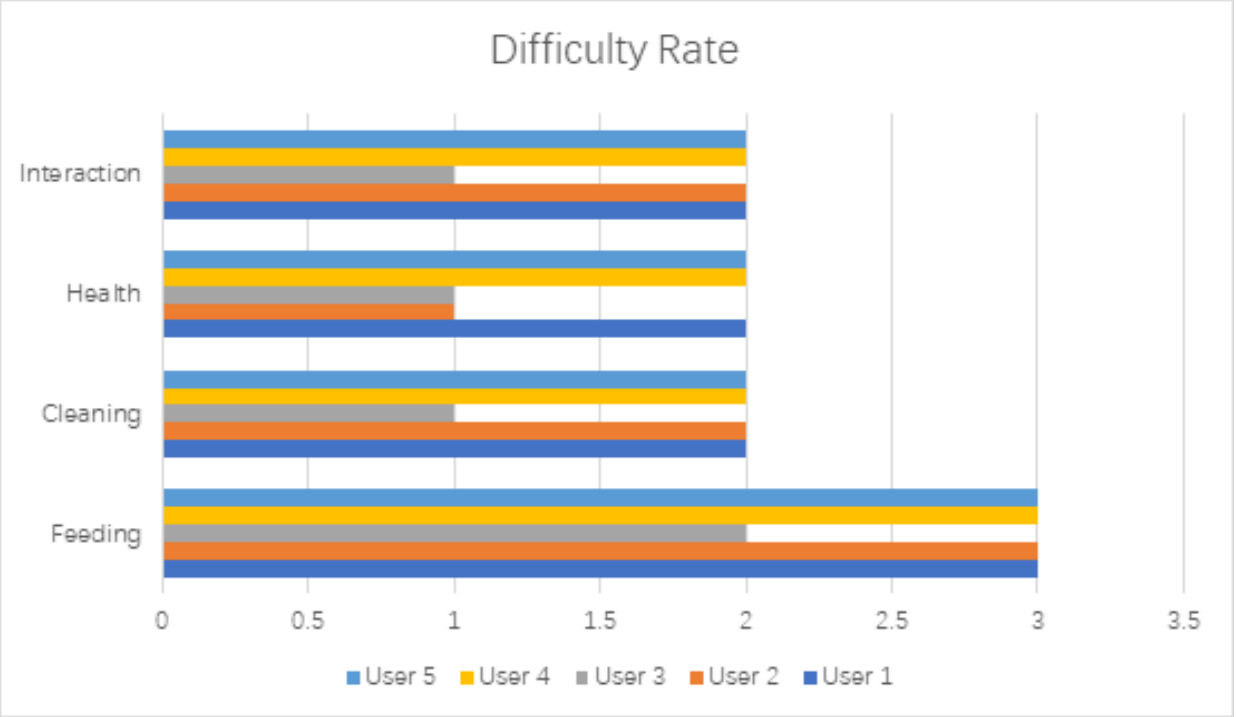


*Figure 3: Difficulty rate*

Besides, the table below shows the users' responses to the rest of the questions of each part of the interface.

| Task | Question | Result |
|---|---|---|
| **Feeding** | Are the buttons on the interface easy to understand? That is, do you know exactly the functionality of each button? | All participants responded that there are too many buttons and settings on the feeding page, and the functions of some of the buttons are not clear enough.<br><br>3/5 of the participants reported that the 'Amount of food' button is confusing and not sure what it represents. |
| | Do you find it difficult to navigate to the right area to complete the tasks? | 4/5 of them reported that there are too many buttons, making it complicated to navigate to the right place quickly. |

| | | |
|---|---|---|
| | What do you like and dislike about the design of the interface? | 4/5 of the users think the feeding part contains many useful and necessary detailed functions, but it's too complicated for the users to control and find the area they want to go to. |
| | Do you think this subpart of the interface meets your expectations? | All of them thought this subpart met their expectations, but this subpart needs to be simplified. |
| **Health** | Are the buttons on the interface easy to understand? That is, do you know exactly the functionality of each button? | All of the participants reported that each button conveyed precise information about the corresponding function. |
| | Do you find it difficult to navigate to the right area to complete the tasks? | All of them thought the interface was minimalistic enough and was easy for them to navigate. |

| | | |
|---|---|---|
| | What do you like and dislike about the design of the interface? | All of them liked the design of the interface because it was simple and convenient. |
| | Do you think this subpart of the interface meets your expectations? | 1/5 of them reported that there was no report history with the exact dates if users would like to review the previous reports.<br><br>2/5 of them reported that the interface should enable them to cancel the reservation of vaccination.<br><br>3/5 of them reported that the interface should tell the users if the weight and temperature of the pet are normal. |
| **Cleaning** | Are the buttons in the interface easy to understand? That is, do you | 4/5 of them thought the buttons were clear enough to follow. The users can know exactly what the |

| | | |
|---|---|---|
| | know exactly the functionality of each button? | functionality of each button was.<br><br>1/5 of them reported that the frequency button was not clear enough. |
| | Do you find it difficult to navigate to the right area to complete the tasks? | All the users thought that it was not difficult to navigate to the right area to complete the tasks. The navigation is clear and simple enough. |
| | What do you like and dislike about the design of the interface? | All the users found it simple and easy to finish all the functions without any instructions.<br><br>1/5 of them thought that the 'clean manually' button was confusing and should be 'clean now'. |
| | Do you think this subpart of the interface meets your | 4/5 of them thought this subpart met all their |

| | | |
|---|---|---|
| | expectations? | expectations.<br><br>1/5 of them suggested adding a ‘Check cleaning schedule’ function. |
| **Interaction** | Are the buttons in the interface easy to understand? That is, do you know exactly the functionality of each button? | All the users did not find any difficulty understanding all the symbols and functionalities. |
| | Do you find it difficult to navigate to the right area to complete the tasks? | All the steps and functionalities were simple and clear enough, so users could easily finish their tasks. |
| | What do you like and dislike about the design of the interface? | All the users found out it was easy to use with conveniences.<br><br>2/5 of the users hoped there could be more functionalities about |

| | | |
|---|---|---|
| | | controlling the camera's shooting angle and direction.<br><br>1/5 of them suggested that the interface should tell them if the videos and photos are stored into the album successfully. |
| | Do you think this subpart of the interface meets your expectations? | Overall, the subpart can meet users' basic needs. All users are glad that they can have a video chat with their pets. |

## Discussion

According to the data we collected, we learned that the feeding part of our interface was too complicated since the participants spent too much time finishing the feeding task, and all of them thought the first task was hard. As for the other three parts, all participants agreed that the designs were simple and efficient. We also got some valuable suggestions, such as adding a 'Cancel vaccination appointment' function on the vaccination page. However, some feedback was hard to achieve. For example, it is hard to tell the users if the weight and temperature of their pets are normal because it depends on the breed, age of their pets, as well

as external factors such as temperature, mood, and diet. Lastly, we summarize some modifications that should be made to each part on our interface.

Health part：

1. Add the ‘History Report’ function.
2. Add a ‘Cancel vaccination appointment’ function to the vaccine page.

Interaction part:

1. The users should be able to control the camera on the robot to change the shooting angle and directions.
2. Users should be informed if the photos and videos are stored in the album successfully.

Feeding Part:

1. Functions should be simplified and more detailed instructions should be included to guide the users.
2. The ‘Amount of food’ should be moved to the main feeding page.

Cleaning Part:

1. Change the “Clean Manually” to “Clean Now” to avoid confusion.
2. Add a ‘Check Cleaning Schedule’ for users

## Limitation and Reflection

There are mainly two limitations of our study. Firstly, there are only five participants in our study, so the result may not be universal and representative. Secondly, the authenticity of the data we collected cannot be verified. For example, we cannot prove whether participants

really like our interface design. Also, even if they like the design of our interface, we cannot conclude that other people also like it.

After finishing the evaluation, we reflected on the whole process. As for the good aspects, we recruited the participants successfully, and everyone was willing to cooperate with the study. We collected a lot of data, which is very helpful for us to improve our interface. However, there are certainly some drawbacks. The most significant one is that the number of participants is not as many as possible to give us more constructive ideas and feedback. Besides, the range of participants only included university students who keep a cat, limiting potential users.

From this process, we learned how to design a proper human-computer interaction interface. We believe the most important thing is user research since the design is all for users. Once only we listen carefully about the users' needs and feedback, we can improve our product more. Besides, the whole process is development. From learning from people with empathy to finding a good entry point at the beginning. And then define and specify the requests in order to establish a central goal and adapt toward it. After that, we learned how to propose and discuss multiple ideas and make changes to make them perfect. Then we learned how to use Adobe XD as our prototype design tool to visualize our product. Finally, collect from the tests and make a final edition. In the future, since we have a basic idea of each step, we can do it more efficiently. Especially the user research area where we are short of. Besides, we can split the tasks more equally and properly to everyone in the team because we used to argue the different amount of work each person does. Moreover, we can start the tasks as early as possible since we do not have enough rest time and give the TA a preview and obtain feedback to improve our writing works. In general, it is an educational process.