Project Background and Objective

In the early stages of a startup, many individuals and small teams try to rent an office due to a lack of financial support, so it is crucial to choose a comfortable environment from the beginning. The theme of this data visualization project is to provide the most comfortable recommendations for workers who rent offices. Since the sensor readings of indoor environmental quality are relatively abstract, it is difficult for users to directly evaluate the comfort of different areas, so my goal is to design an interactive visualization system that converts raw data into charts and provides meaningful insights to help users make more informed decisions.

Dataset and Variable Selection

The dataset for this project comes from the SAMBA system developed by the IEQ Lab at the University of Sydney. For this web design, I focused on variables that affect the comfort of the office work environment:

- air temperature (ta)
- light level (lux)
- noise level (spl)

Visualisation Design

The projects I tested were comfort and stability, so I tested the average and standard deviation of the three variables in different areas on the 25th, 28th, and 30th floors in October 2019. I used scatter plots for each variable and highlighted each room with color and shape:

- The x-axis of each scatter plot represents the average of the variable.
- The y-axis represents its standard deviation.

The recommended comfort zone range is marked with a green shaded band and a red line:

- The green shaded area represents the recommended comfort range for the average.
- Two red horizontal lines highlight the ideal stability range (SD between 0.4 and 1.2).

This allows users to easily understand not only the average comfort of the room, but also the stability over time.

Data Preprocessing

Next, in order to realize this idea, I streamlined the necessary data for analysis. First, I screened the original SAMBA data set, extracted the data from October 2019 separately to narrow the scope, selected the three floors 25, 28 and 30 that were detected in October, and then deleted all variables except air temperature (ta), light level (lux) and noise level (spl). Finally, I grouped the data by zone and calculated the average and standard deviation. This method clearly shows the differences across time in different zones on different floors.

Design Iteration Based on A1

This concept originated from the feedback of Assessment 1. Feedback showed that the space left for the entire web design for analysis charts is not enough. So I redesigned it, created a landing page, and placed the setting box on the homepage. The analysis interface only places analysis charts to show data analysis. Secondly, I also redesigned the scatter analysis chart, integrated the average values of the three variables into the chart and unified the standard deviation, set a recommendation area, and added interactive functions to allow users to explore more intuitively.

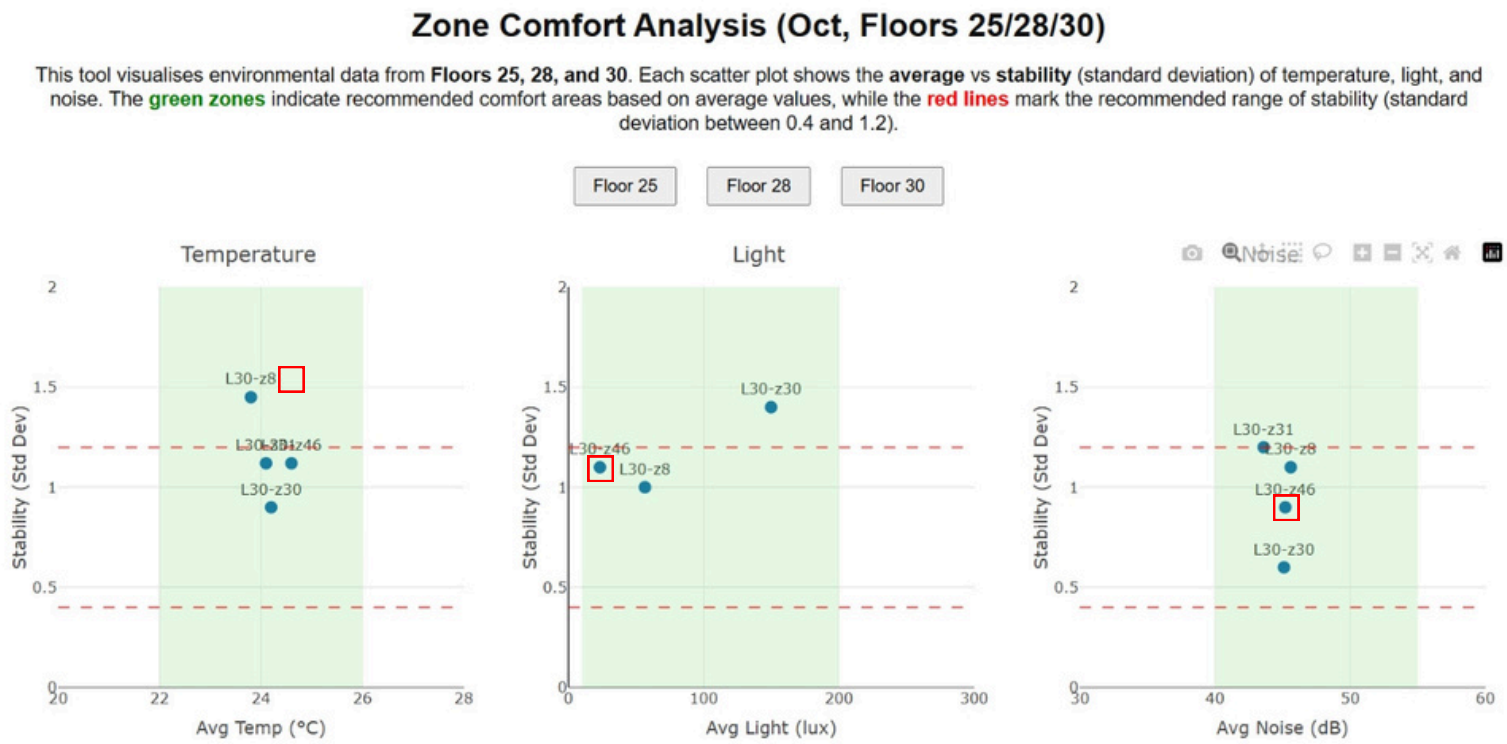
Throughout the design process, we used ChatGPT to support our coding, data interpretation, and writing.

Usability Testing

After drawing the data analysis chart, I conducted a Usability Test to evaluate whether users can understand the visualization and make choices about comfortable studios based on the visualization.

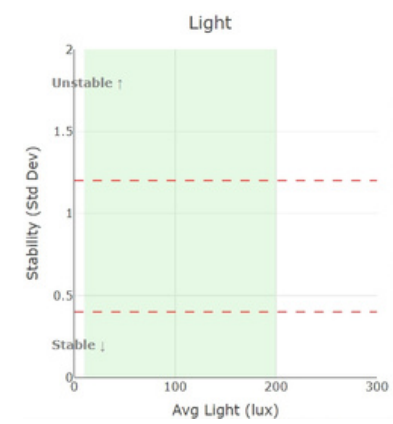
Test setup:

Participants: 8
Test steps:
1. Complete the Usability Testing task
2. Complete the System Usability Scale table
3. Complete the Heuristic Evaluation table



Test tasks:

1. Find a room with a comfortable temperature on the 25th floor
Goal: Test the user's understanding of the Floor button, the subtitles: temperature, light, noise, the x-axis (average) and y-axis (stability/standard deviation), and whether they can correctly identify the comfort zone represented by the green box in the figure and the recommended stability range represented by the red threshold line.



2. Please find the floor with the worst lighting
Goal: Test whether users can effectively cross-compare between different floors and find floors that do not meet the standards.

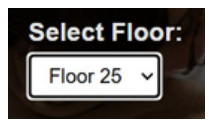
3. Please find the zone where all three elements are comfortable
Goal: Test whether the user can effectively cross-check the three scatter plots, find the room that meets the three comfort zone standards at the same time, and identify the serial number of each room

Main findings

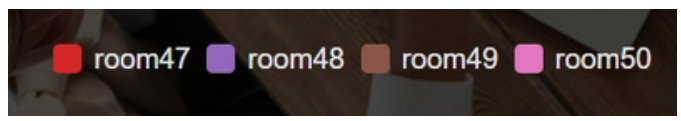
Most users can find problems, but many problems are also obvious:
1. The green range can be smaller to make the data more accurate
2. The way of expressing rooms is not clear, and it is not possible to directly understand that each scattered point is a room
3. The button on each floor does not change color when clicking on it, and I cannot know which floor I am currently on
4. I don’t want to find the most comfortable room by myself. I am not doing math problems. I hope that the room with the best tips can be marked on the table.
5. I don’t understand the meaning of standard deviation and why it is so important. Can you explain it in detail?

Design iteration based on feedback

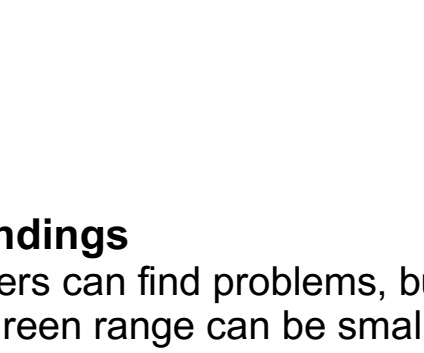
Change 1: Added a filter for floors, and clicking on each floor will display it more clearly
Reason: Some users said they were not clear about the current floor



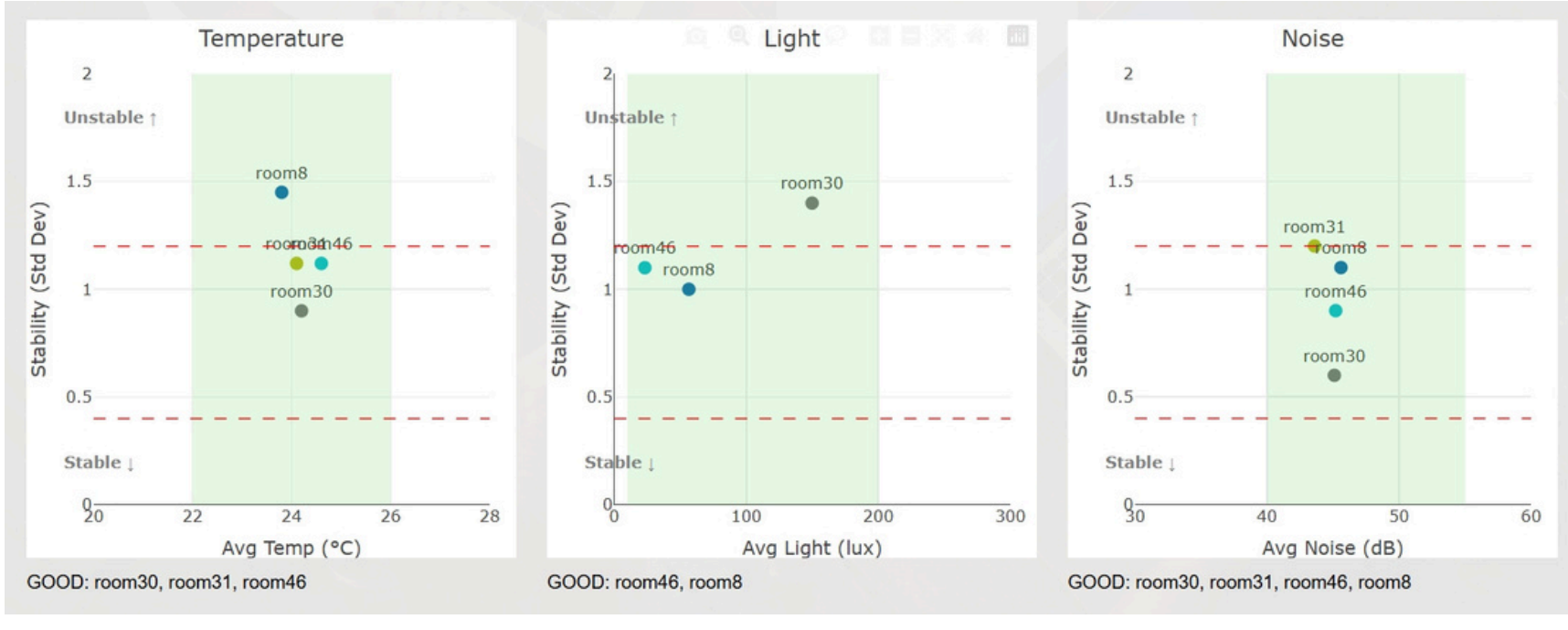
Change 2: Change the name of the scattered point to "roomXX" and add a legend
Reason: Some users do not understand that each scattered point represents a room.



Change 3: Add an explanation of the standard deviation above and on the matching page.
Reason: Users do not understand the meaning of standard deviation.



Change 4: Add the most comfortable room recommendation under each analysis chart.
Reason: Users think that analyzing charts is a waste of time.



GOOD: room30, room31, room46
GOOD: room46, room8
GOOD: room30, room31, room46, room8