Exercise 2: Tools of the Trade

UX Studio II

Section 1 - 1:30 - 4:20pm

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Introduction

Our team consists of three students majoring in UX Design: Aashika Parekh, Mikaela Thompson, and Harini Sethu.

Purpose & Goals

While many UX professionals may gravitate towards familiar and established software, there are many reasons to step outside our comfort zone and explore new and unfamiliar tools, as it broadens our skill sets and ultimately leads to the creation of more user-centric and cutting-edge digital experiences. Our aim for this exercise is to learn a new design software by ideating, sketching, and prototyping a digital smart thermostat interface using the following design tools: Framer, Adobe XD, and Cacoo.

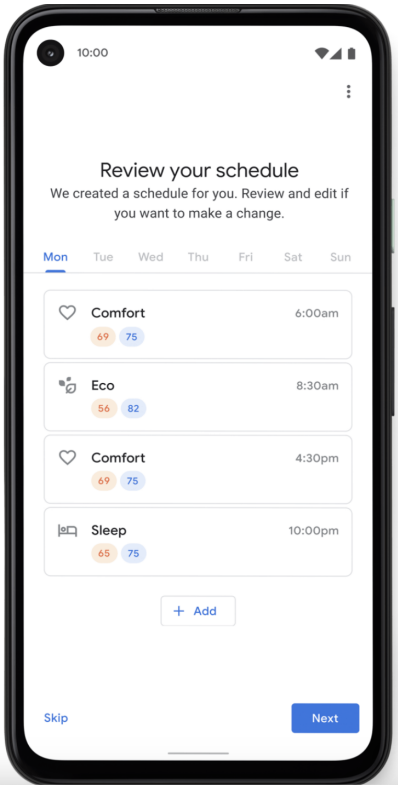
Secondary Research

We first started with conducting secondary research on the current smart thermostats available on the market to identify opportunities and gain inspiration for our solution.

Comparative Analysis

Google Nest Thermostat (interface pictured right):
https://store.google.com/product/nest_thermostat?hl=en-US&pli=1

- Controlled with Nest thermostat app on mobile phone
- Manually or automatically create a schedule for temperature settings varied by time and date
- Turn HVAC fan on/off and see indoor/outdoor humidity and temperature
- Limitation: cannot control geolocation parameters



Amazon Smart Thermostat:
https://www.amazon.com/dp/B08J4C8871?tag=googhydr-20&hvadid=548780112127&hvpos=&hvne[...]cphy=9016722&hvtargid=kwd-529916061312&ref=pd_sl_1lonzjprak_e

- Automatically adjusts temperature with voice commands
- View heating/cooling settings
- View indoor temperature and adjust current temperature to a schedule
- Emergency heat mode, vacation mode
- Automatic humidity sensing
- Limitation: very minimal home screen

Ecobee Wi-Fi Enabled Smart Thermostat (pictured right):
https://www.ecobee.com/en-us/smart-thermostats/

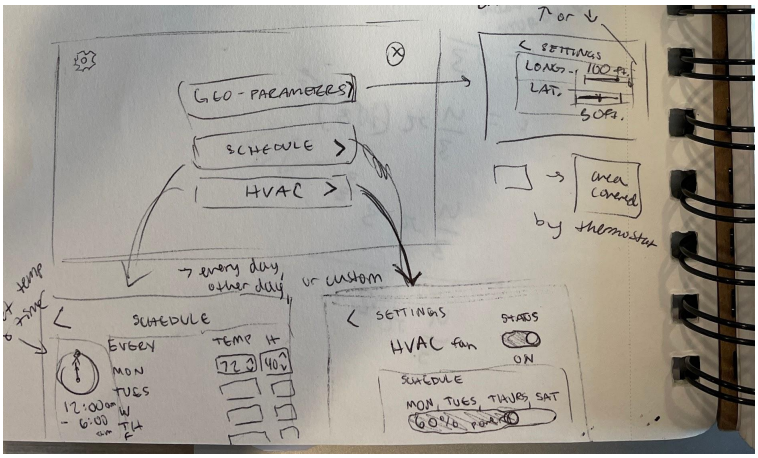
- Control from smartphone, Apple Watch, or tablet
- Works with several smart home ecosystems (Amazon, Apple Home, Google, SmartThings)
- Security built in with detections for smoke alarms and sudden temperature drops
- Detects motion and occupancy for geolocation-based temperature adjustment
- View both indoor and outdoor temperature + humidity

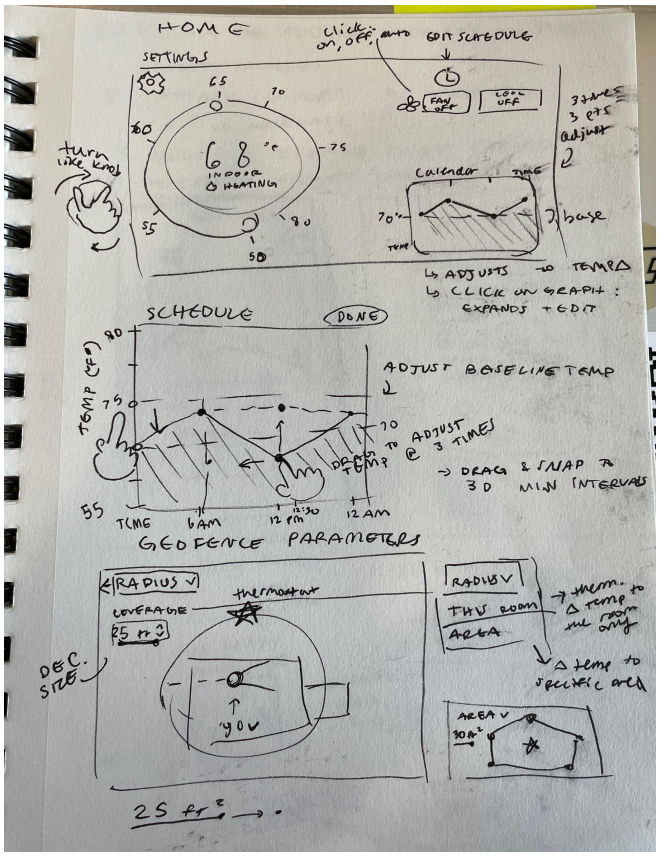
Design Process

Sketching & Ideation

We then conducted a sketching and ideation phase. We used our secondary research and comparative analysis results to identify the following features that we wanted to include in our solution:

- Manually adjust thermostat schedule and view schedule as an interactive graph showing the time slots and temperatures set to each selected time in the day.
- View of both indoor and outdoor temperature and humidity levels
- Adjust temperatures based on given time slots
- Radial temperature dial that displays current temperature and heating/cooling settings





Sketch of settings panel with schedule and HVAC options pictured above. Sketch of detailed schedule graph, thermostat home screen, and geolocation parameter settings pictured to the right.

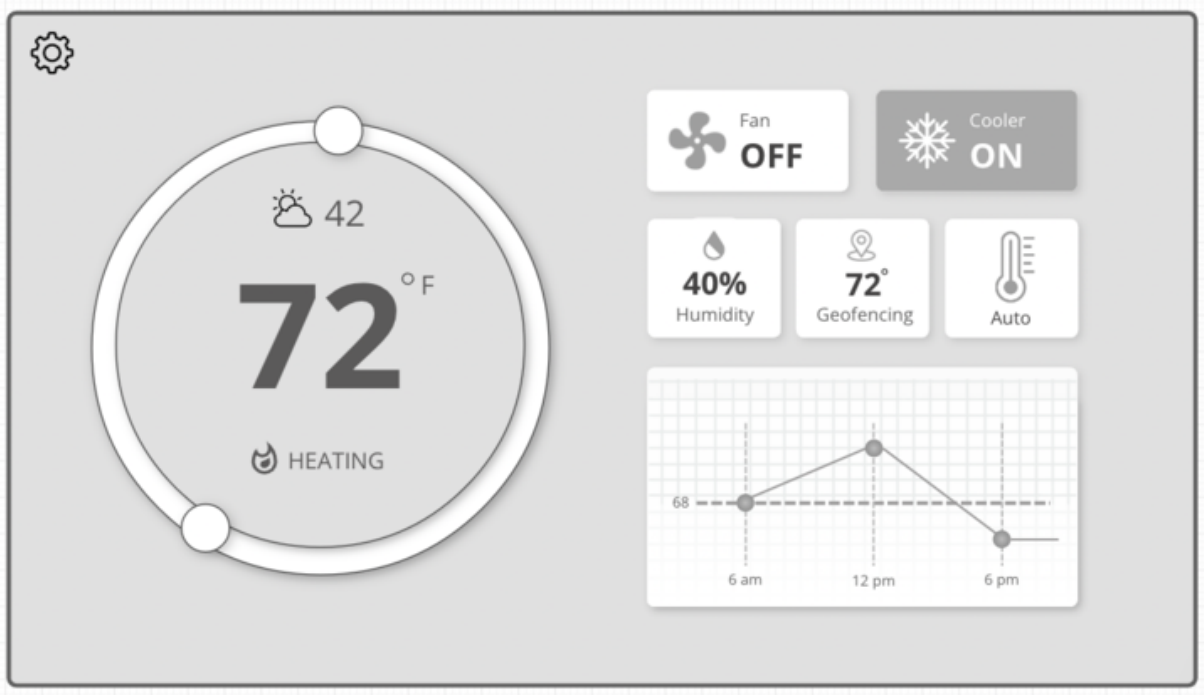
Constructing Wireframes

Process

We designed the low-fidelity version of our app on Cacoo with an emphasis on simplicity and the overall functionality of the app. Our goal in creating the lo-fi mockups was to identify and test what features and placements we wanted for our solution before moving on to designing the mid-fis.

Our lo-fi wireframe (pictured below) includes:

- A main dial that displays the current inside temperature, outside temperature, and whether the thermostat was either heating or cooling the environment. Surrounding the dial are controls to increase and decrease the temperature to your desire.
- A button to turn on/off the HVAC fan setting
- A button to turn on/off cooling versus heating mode
- A view of the current humidity level indoors
- A view of the temperature being set indoors when the geofencing software detects that a user is approaching a designated area
- A view of whether the thermostat is being set on automatic or manual heating/cooling
- A graph that changes the indoor temperature at different times throughout the day
    - Vertical dotted lines that allow you to select three separate times in the day to adjust the indoor temperature according to a timed schedule
    - Individual time points that can be selected and dragged to a desired temperature to set at each time



Affordances

We discovered the following affordances for Cacoo as a low-fidelity and interaction design tool:

- **Non-copyright icon library**
    - While minimal in variety, the icon library in Cacoo offered free and customizable icon sorted by category and design style
- **Templates**
    - Cacoo offers templates for various diagram types, including user flows, sitemaps, and wireframes. These templates provide structure and guidance for users when starting a new design project.
- **Collaboration features**
    - In-app video features allow users to chat together over video.
    - Offers real-time editing and commenting, allowing users the ability to work together on a design, review it, and provide feedback effectively.
- **Integrations**
    - Cacoo can import assets from Google Drive, Adobe Cloud, and Confluence.
- **Alignment and distribution tools**
    - Cacoo includes alignment and distribution tools that help users ensure that elements are properly aligned, which is essential for creating organized and visually appealing wireframes and diagrams.

Limitations

Despite having many benefits that make Cacoo a valuable software to learn, we discovered some main limitations:

- **Limited Prototyping Features**
    - Cacoo is primarily a diagramming tool, so it doesn't offer prototyping capabilities found in dedicated UX design tools like Figma or Sketch
    - Creating interactive prototypes with complex interactions may be challenging
- **Color customization**
    - Cacao doesn't allow the user to create custom colors, they can only select colors from an existing spectrum.
- **Integration options**
    - Cacoo's integration options with other UX design tools and platforms are limited, making it challenging to incorporate Cacoo into an existing UX design workflow.

Transition to Hi-fidelity

Once our low-fidelity wireframe was completed, we started creating the high-fidelity mockup using AdobeXD. This platform was very similar to Figma and other Adobe products, so it didn't take us much time to learn how to use it. Our main process during this journey was replicating the elements from low to high fidelity. However, once we started designing we noticed certain elements would make more sense if grouped together. For example, the fan function of turning off, on, and auto, is spread out between 3 buttons, but the user would understand it better if they were all on the same panel. Similarly, we continuously went back to our project brief to confirm that we were hitting all the requirements asked of us.

AdobeXD Affordances

We discovered the following affordances for AdobeXD as a high-fidelity and interaction design tool:

- **Cross-functional with other Adobe Creative Cloud apps**
    - Past Adobe projects are easily accessible on this interface. You can integrate past work seamlessly into your canvas. The key and mouse controls are similar to other ACC products.
- **Simplified Toolbar**
    - This platform works very similar to Photoshop or Illustrate. They have a super clear toolbar on the left side with basic functions, and more advanced features on the right panel.
- **Interactive Prototype Feature**
    - For projects like this one that require interactivity, AdobeXD works very similar to Figma. You're easily able to navigate to other screens with animation elements.
- **User-friendly interface**
    - This platform works similarly to Figma. You can access templates, elements, text, and prior work with a simple navigation bar on the left side.

AdobeXD Limitations

There were a few main limitations to AdobeXD that we had to deal with when making our high-fidelity mockups:

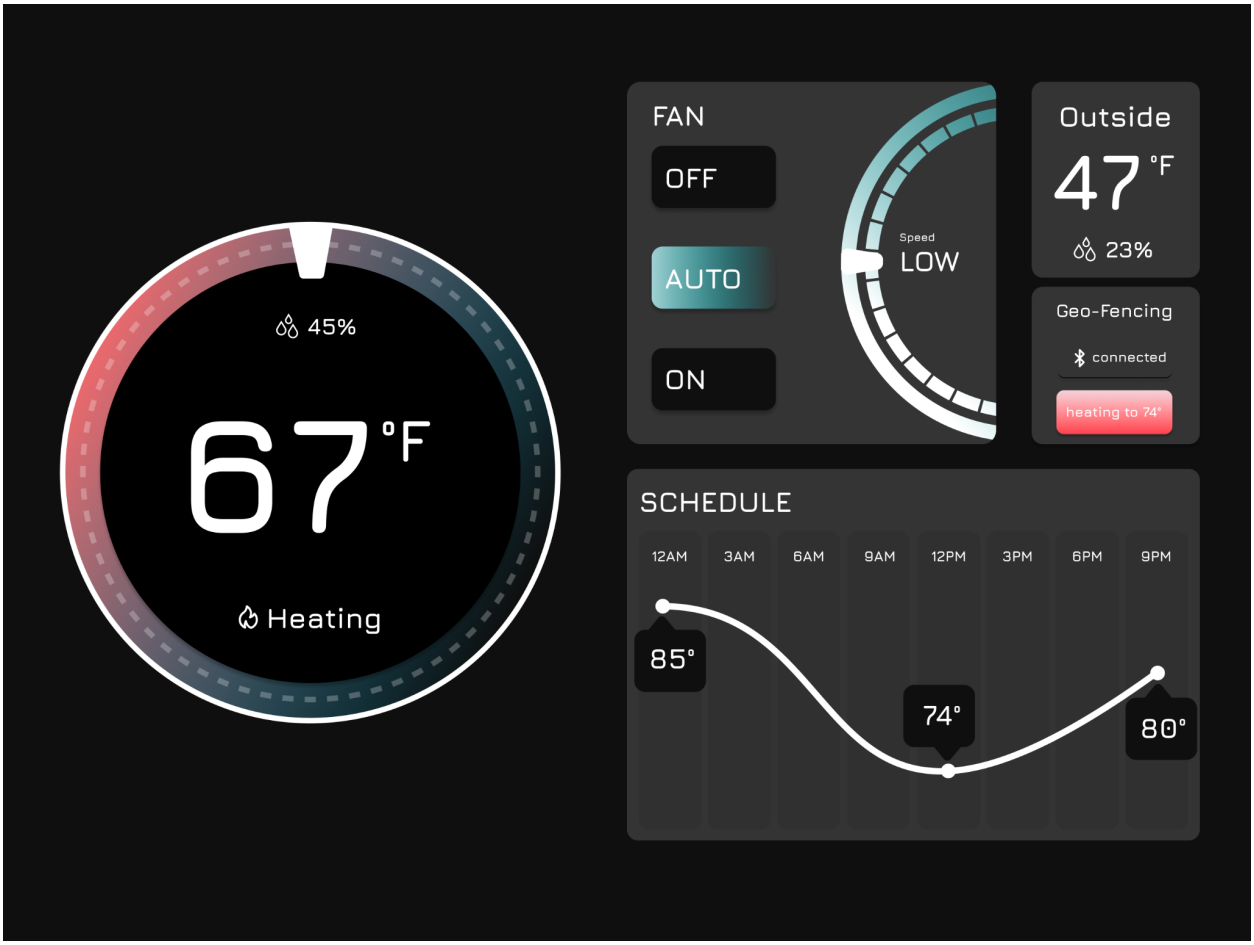
- **Expensive**
    - Just like other Adobe products, this platform is not free for users. It's a bit costly, and very similar to Figma. I suggest using that or a free replacement.
- **Difficult to Share and Collaborate**
    - It's a bit harder to collaborate with teammates on this product. If they don't have AdobeXD it's only able to be exported and sent to them, they can't work on it.
- **Hard to add plugins**

- This product makes it tough to integrate a third party plugin into the workspace, for example, adding logos, media, and icons.

Features

Our hi-fi wireframe (pictured below) includes:

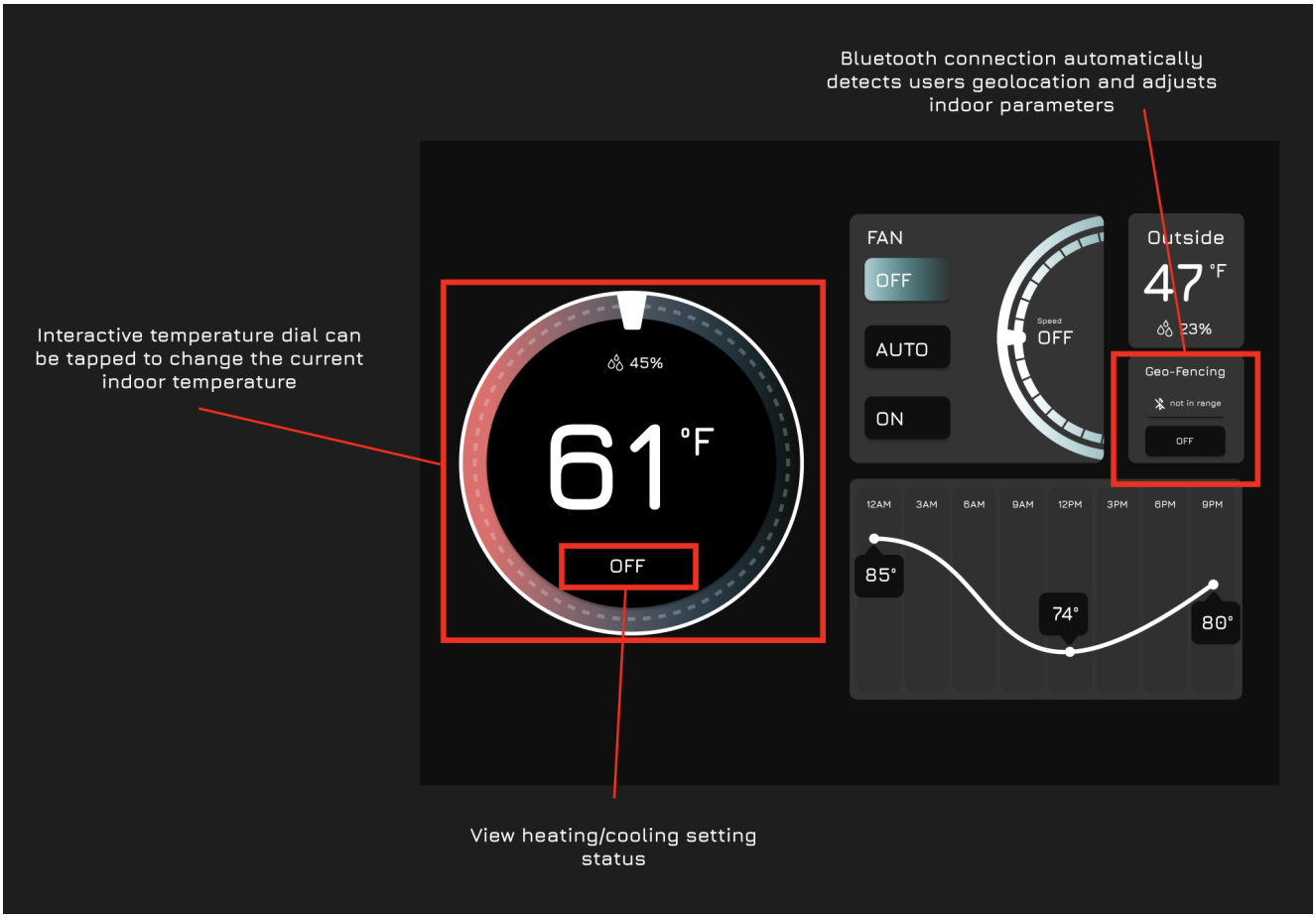
- A main dial that displays the current inside temperature, humidity, and whether the thermostat is heating or cooling the area. Surrounding the dial is a notch to select the desired temperature.
- A panel allowing the user to select the HVAC Fan mode and speed setting.
- A non-clickable widget informing the user of the outside temperature and humidity.
- A panel displaying the Geo-Fencing status and button to set a new temperature.
- A graph that allows users to schedule automatic temperature changes 3 times throughout the day



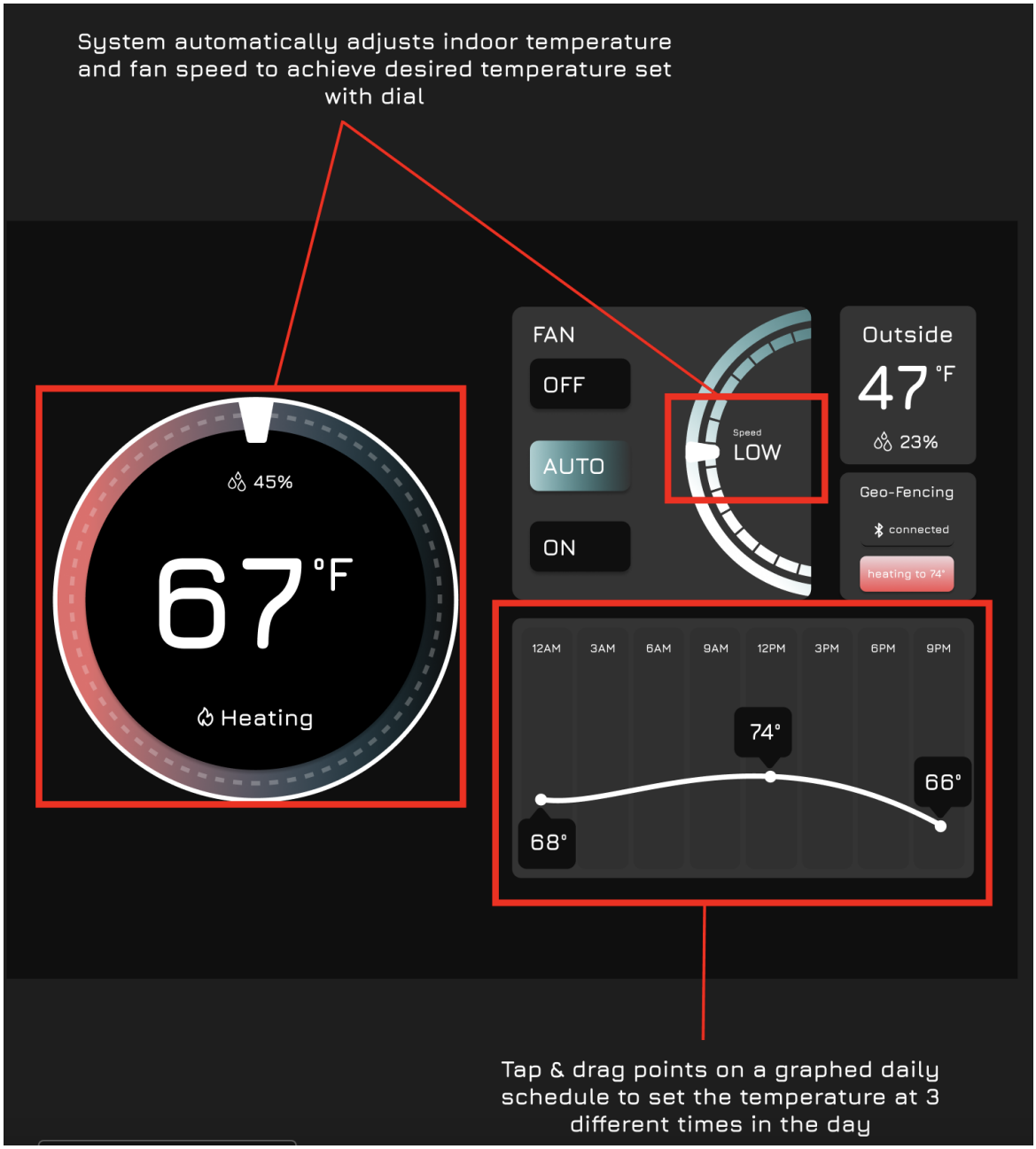
Designing for Interactivity

We designed our prototypes to be interactive using **Framer**. As shown below, we designed the temperature dial to be interactive by enabling users to ‘spin’ the dial to the temperature they want by utilizing a ‘tap start’ or dragging interaction. Once users drag the dial to their desired temperature, the HVAC fan and heating and cooling setting will be automatically set to achieve the certain temperature.

We also designed a **geolocation indicator** feature that uses bluetooth to detect when an individual’s device connected to the smart thermostat is within a desired range. The heat and A/C will automatically turn on to adjust the indoor parameters set by the user on their phone when their device is within the bluetooth range of the smart thermostat. When the user is not in range (as detected by using geolocation data), the bluetooth will disconnect and the indoor parameters will automatically adjust back to the scheduled settings. For maximum customizability, users can manually turn the HVAC fan to on, off, or automatic by using the fan dial to the right of the temperature dial. The indoor and outdoor humidity can also be viewed below the temperature displays.



Additionally, we designed the **interactive schedule** feature to allow users to set the temperature at different times in the day by tapping and dragging points on the graph to a desired time and temperature. This was done by transitioning the first original graph on a ‘tap start’ interaction to a different graph representing the changed temperature. Each point snaps to an hourly time and single temperature point (no half-temperatures) to avoid any overly precise data.



Affordances

We discovered the following affordances for Framer as a hi-fidelity and interaction design tool:

- **Import pre-existing designs from Adobe XD to Figma to Framer**
    - Framer allows for users to copy and paste their lo-fi and hi-fi designs from Adobe XD into their platform by moving files into Figma first.
- **Create designs instantly with AI**
    - Framer has an AI tool that can automatically create any website or mobile app hi-fidelity mockup based on a user generated prompt.
- **Create custom component elements to be reused across a project**
    - Components can be created for any file in Framer, which are single or grouped elements that remain consistent across all layers and pages of a design project.
- **Add interactions to components**
    - Using the Interactions panel on the right navigation panel, interactions (including animations) can be added to different components in a design.
- **View and export CSS styling code of your prototype to any external file**
- **Drag and drop pre-made elements into any design**
    - Such as YouTube videos, pages, sections, navigation bars, icons, forms, search bars, and more.
    - Minimizes time spent on a single design.

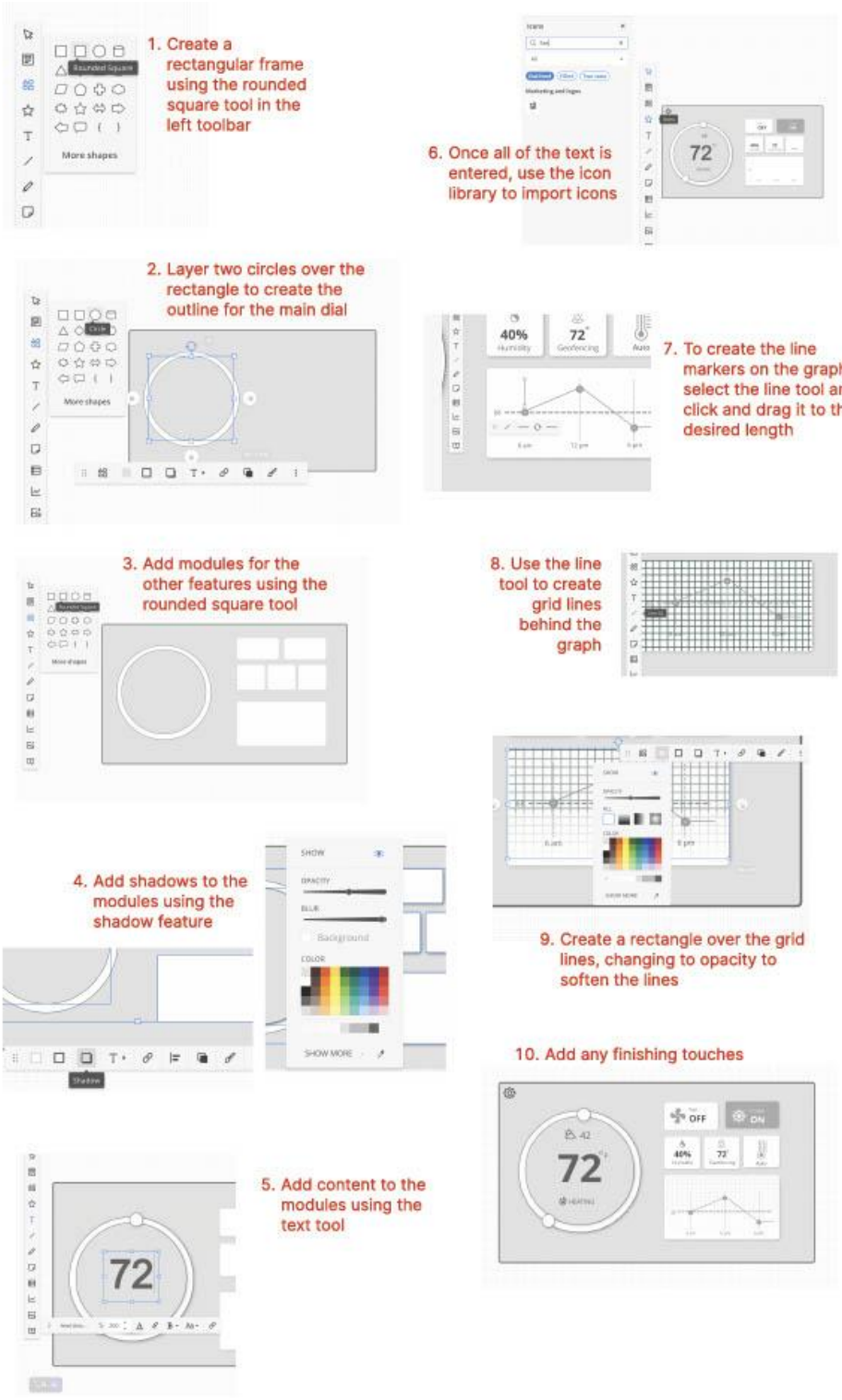
Limitations

There were a few main limitations to Framer that we had to deal with when making our prototypes interactive:

- **Little to no creative freedom with interaction types**
    - The available interaction options (for example: on tap, tap start, mouse enter) are limited and don't provide as many options compared to competitors like Adobe XD.
- **Heavy reliance on templates and premade designs**
    - The encouragement of premade assets and designs limits the amount of customizability for projects and makes the tool only useful for constructing websites and mobile apps.
    - In Framer, it is more difficult to find specific tools like the Frame tool as most tools are hidden behind drop down menus.
- **Interactions can only be added to components and pre-made elements like a Carousel slider.**
    - Frames themselves can not have interactions added to them unless they are made into a component.
        - Compared to Adobe XD or Figma, where interactions can be added to any frame.

Step by Step Guides

Lo-fi Wireframes: Cacoo



Mid-Hi-fi Mockups: Adobe XD

1. Open a new file
2. Select the Artboard Tool
    a. Click and drag for the desired size: Width [1366 px] x Height [1024 px]
3. Formatting the structure
    a. Circle Tool
        i. Circle 1 - 2 circles for the speed dial
        ii. Enlarged the 2 circles to fit on the left half of the canvas
            1. Circle 2 - dashed: border thickness [5]
            2. Circle 3 - inner circle
    b. Rectangle Tool
        i. Stacked 4 rectangles on the right half of the canvas
4. Main Dial
    a. Text Tool
        i. Upload: “Jura” Font from Google
        ii. Add main temperature text [67°]
        iii. Add HVAC text [Heating]
        iv. Add humidity text [45%]
    b. Icons (external)
        i. Add icon [Humidity] and [Heat]
5. Fan Panel (Top Left Rectangle)
    a. Text Tool
        i. Add text [FAN], [OFF], [AUTO], [ON], [Speed], [Low]
    b. Rectangle Tool
        i. 3 rounded rectangles for the buttons (Off, On, Auto)
    c. Pen Tool
        i. 1 rounded triangle for the notch
    d. Circle Tool
            1. 2 circles for the speed dial
6. Outside Panel (Top Right Rectangle)
    a. Text Tool
        i. Add text [Outside], [47°F], [23%]
    b. Icons (external)
        i. Add Icon [Humidity]
7. Geo-Fencing Panel (Right Middle Rectangle)
    a. Text Tool
        i. Add text [Geo-Fencing], [connected], [heating to 74°]
    b. Icons (external)
        i. Add Icon [Wifi]
8. Schedule (Bottom Rectangle)
    a. Text Tool

        i. Add text [Schedule], [12AM], [3AM], [6AM], [9AM], [12PM], [3PM], [6PM], [9PM], [85°], [74°], [80°]
    b. Circle Tool
        i. 3 small circles for the scheduling maneuver points
    c. Rectangle Tool
        i. 8 rounded rectangles vertically across the bigger rectangle
    d. Rectangel and Pen Tool
        i. 3 small speech bubbles to show the temperature
    e. Pen Tool and Circle Tool
        i. Draw a curved line
        ii. 3 small circles on top of each point

Interactivity: Framer

1. Imported Adobe XD file into Figma and then again into Framer
    a. Downloaded Figma to Framer extension on Figma
    b. Copy and pasted imported layers from Figma into Framer
2. Main Temperature Dial
    a. Dial Turn Interaction
        i. Select color circle, left click, create into component
        ii. Duplicate component
        iii. Rotate ~90 degrees
        iv. Group and create component
            1. Right click -> Create Component
        v. Add on Tap Start transition
    b. Transition to new temperature setting
        i. Duplicate previous screen
        ii. Change temperature text to 74 degrees
        iii. Group and create component
            1. Right click -> Create Component
        iv. Add Transition after delay: 0.02s
        v. Change Geo-fencing ‘off’ button to ‘connected’
            1. Double click -> Edit text
    c. Create blinking animation
        i. Duplicate previous screen
        ii. Remove all text and symbols on temperature dial
        iii. Group and create component
            1. Right click -> Create Component
        iv. Add Transition after delay: 0.2s
            1. Repeat i-ii for the next 3 screens, alternating between empty temperature dials and ones with text

v. Show bluetooth geo-fencing connection
    1. Change button background:
        a. Properties panel -> Color -> linear gradient
        b. Edit colors to faded red and pink gradient
    2. Edit text on button
        a. Double click -> edit to ‘heating’

d. Create transition to final temperature after manual temperature adjustment
    i. Duplicate previous screen (ctrl+c + ctrl +v)
    ii. Edit temperature text to 62 F
        1. Double click -> edit -> enter
    iii. Group and create component
        1. Right click -> Create Component
    iv. Add interaction -> Transition -> On tap start
        1. Set to after delay: 1 sec

Conclusion & Reflection

Mikaela

Designing the interactivity for this project was a huge challenge. I have never used Framer before, so I had to watch many youtube tutorials and research online to figure out how to do simple things- things that I would already know how to do in Figma, which is the tool I usually use. Framer itself is more limited in the amount and types of interactions that can be added to designs when compared to Figma, which has much more freedom and flexibility. I noticed as I was prototyping our hi-fidelity screens that Framer is built for very specific prototypes: websites and mobile apps. Because of this, a lot of the interactions that can be added are very simple, such as on-tap or on-hover interactions. For example, when I was designing the main temperature dial to be interactive on our interface, it took me another hour just to figure out how to create a rotation animation with a pressing interaction. If I were to create this same animation in Figma, it would have probably taken about a third of the time, since I’m so familiar with the tool. As a whole, this exercise was very useful. I learned a lot about the different features in Framer and was able to master the basics of a new design software.

Aashika

I enjoyed exploring a new platform to design a thermostat. I loved working with AdobeXD. It felt like I was working on Figma and Photoshop hybrid. I was very comfortable working on the platform and it was super clear to use. The interface has a clean and effective layout. I really liked being able to access past ACC projects. Not that it was needed for this project, but for the future it's cool to have the possibility to integrate a design on Photoshop into XD. I also like the ability to make the prototypes interactive. We didn't use XD for the interaction segment of this project, but I did mess around and learn how to use it. The platform also has responsive designs, so users are easily able to create desktop, tablet, and phone layouts. Unfortunately, it is difficult to share and collaborate on this product. Since XD requires a subscription, sharing projects and canvases are tough. It's also pretty expensive to buy this product, and there are many free replacements on the web that can do the same thing as XD. Switching sides to my overall experience, I thoroughly enjoyed working with my friends on this project. It felt great to bounce ideas, brainstorm, and sketch together before starting mockup designs. We were able to use our strengths to divide up the work in a manageable way. I do wish we were able to showcase our actual thermostats during the class presentations. Our team worked super hard on reaching a robust UI design, and being able to view other groups' designs would have been lots of fun.

Harini

Learning Cacoo was daunting at first because not only had I never used the software, I had never even heard of it prior to this exercise. Because the software was initially released in 2009, I was initially setback with how few features were available to work with. The icon library, for example, had a very minimal range of icons which forced me to import them from external sites. Additionally, there was very little variety in the shapes I could use which limited the amount of ideas I could actually execute. However, after getting a little more comfortable with the software, I found that it did offer a few benefits. One feature I really enjoyed was the shadow feature. While not necessary for a low fidelity wireframe, I found that being able to easily add and modify shadows behind every shape made the prototype look a lot more professional. I also enjoyed the feature of being able to add post it notes to the wireframe because sometimes there were features that I knew I wanted to implement towards the end, and the post it notes were great ways to keep track of all of my ideas. As UX design continues to evolve, having the right tools at our disposal is essential. Cacoo proved to be a valuable addition to my toolkit, and I look forward to using it in future projects.

Sources Cited

Amazon Smart Thermostat. (n.d.). www.amazon.com. Retrieved September 30, 2023, from https://www.amazon.com/dp/B08J4C8871?tag=googhydr-20&hvadid=548780112127&hvpos=&hvne

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