Design an Access Technology

SP25: Experience Design & Evaluation of Access Technologies

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In Collaboration with **Abby**

Our Collaborator

Abby is an undergraduate 4+ (graduate) student at Indiana University in Indianapolis. She has neurodivergent disabilities like ADHD and dyslexia, as well as Hashimoto's disease and Postural Orthostatic Tachycardia syndrome (POTS). Abby's disabilities present challenges with complex layouts, multi-step tasks, and distracting pop-ups/overlays.

Due to the POTS, Abby experiences positive and negative spikes outside the threshold of a healthy heart rate. These spikes can lead to fatigue and even cause her to faint. These episodes can occur while performing abrupt actions like getting up too fast, walking, or really any strenuous activity may provoke a spike.

Abby struggles with the current heart rate tracking software because they do not provide her sufficient context for her episodes. Her preferences in interface include minimalistic designs, high contrast, and large fonts to accommodate her neurodivergent disabilities.

Problem Statement

With Abby's POTS, she can be in danger of fatigue or fainting with a spike in her heart rate when not conserving the proper energy. Already existing heart rate tracking applications do not provide Abby with sufficient context for her POTS episodes. Abby wants a personalized experience that helps her seamlessly understand what actions and patterns may have caused a spike in her heart rate.

Our Solution

- Link to Prototype (Mobile): https://www.figma.com/proto/MSWiZmOzX8iLCANkPp40Vo/ACCESS-TECH?page-id=0%3A1&node-id=108-367&viewport=-193%2C-145%2C0.26&t=DIL8TQHYYFWpH2Pj-1&scaling=scale-down&content-scaling=fixed&starting-point-node-id=83%3A1526&show-proto-sidebar=1
- Link to Prototype (Watch): https://www.figma.com/proto/MSWiZmOzX8iLCANkPp40Vo/ACCESS-TECH?page-id=396%3A580&node-id=396-632&p=f&viewport=-51%2C20%2C0.36&t=wGBpvT4qc9B2MkuU-1&scaling=scale-down&content-scaling=fixed

We created an app that warns Abby about the onset of a POTS episode and helps her log and revisit episodes she has previously had. To do this, we also propose a smart, collapsible cane that can fit in her bag or anywhere. We use this cane, along with her smart watch, to gather data and show actionable insights.

1. Smart Cane

The cane would be collapsible so that it can be packed away easily when it is not needed. The handle of the cane includes a sensor similar to treadmills that can help track heart rate. The

cane also has fall detection if Abby faints while holding the cane. The cane also has compartments for storing medicines for quick access. The cane also comes with a haptic motor that can vibrate to let Abby know when an episode might be about to start.

2. Phone App

The phone app vibrates and lets Abby know that she might be about to have a POTS episode, which can help her prepare and take precautionary measures. We used an iOS system design language to make the app feel natural to the operating system, as the POTS episode notification would be a system notification.
Once the app displays the alert, Abby has the option to call emergency services, dismiss the alert as a false positive, or log the episode. The initial UI is made to feel calming and gentle with subtle animations. She is then greeted with an episode support screen. We added this screen in the event that a third party may be present who might need to assist her and wants instructions on how to help.
The logging screen first presents Abby with data captured from the watch and cane, including specifics that she mentioned other apps don't provide. Since the app also allows Abby to log her medications, we also included those in the log to cover for any potential drug interactions that might influence the episode. She can then log her emotions before the episode, along with her activity status and any symptoms she experienced. We also added a Notes section to account for any other relevant data that we may have missed.
On the home page, Abby can view her current medical data, log a past episode, view the logs of her past episodes, and log data such as medication, nutrition, and hydration. As Abby continues to log episode data, the app will use machine learning to understand what factors contribute to worsening her condition and provide insights on what she could do differently.

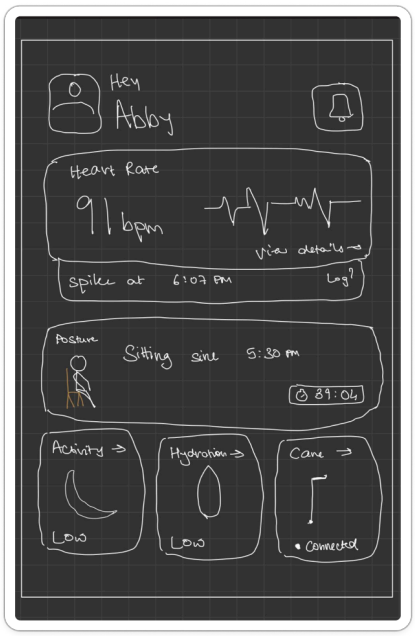
Scenario

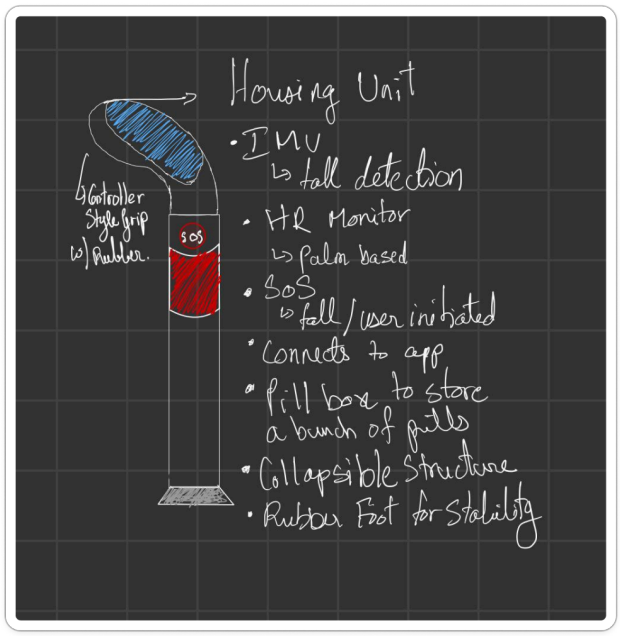
You are sitting in your first class as it approaches the end of class. You prepare to get back up and walk to your next class, but start feeling mildly fatigued/dizzy when you start making the motions to get up. You would like to know why this occurred and what may have caused this episode. At this moment, your smartwatch vibrates, giving you an alert of a spike in your heart rate, letting you know that at that moment an episode may have occurred, and gives you the ability to log the episode.

Task

You stood up a bit too quickly, and it created a spike in your heart rate. Log your spike, and once you have recovered, log your experience to align with what actions you were taking during the spike and how you felt.

Low-Fidelity Sketches





In-class Critique

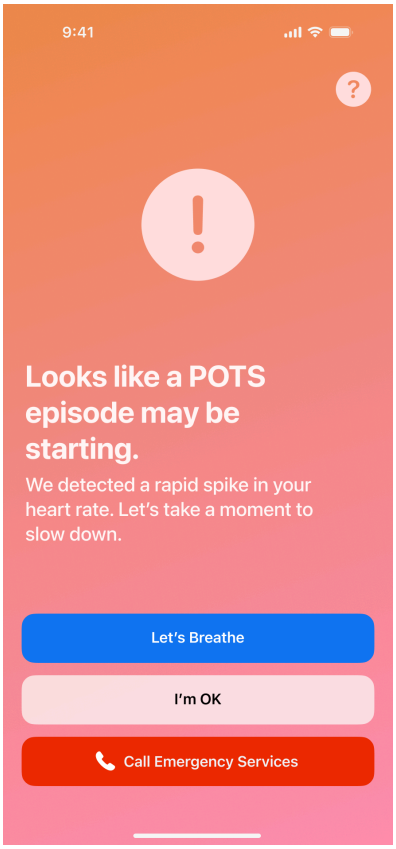
- Live activity tracking her current state (sitting, walking, running, sleeping, etc.)
- Questioned about having to check her phone all the time to view data. Focus on a shift to relying on mobile interface modality.
- Audience wanted to know more use cases and the experience of Abby with our prototyped cane.
- Needed a problem statement that focused on a challenge the prototype could directly address in a robust user flow.
- Questioned if Abby liked her cane. Confirmed it was not disliked, but was something extra to remember.
- More robust watch interfaces with task-based flows.

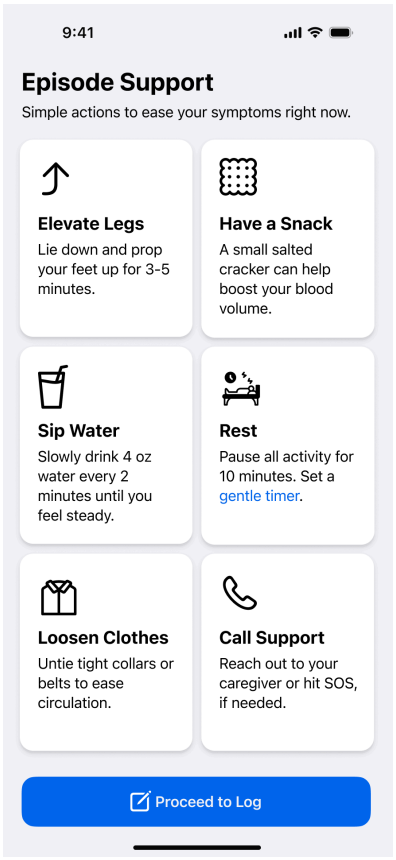
Change made from Low Fidelity

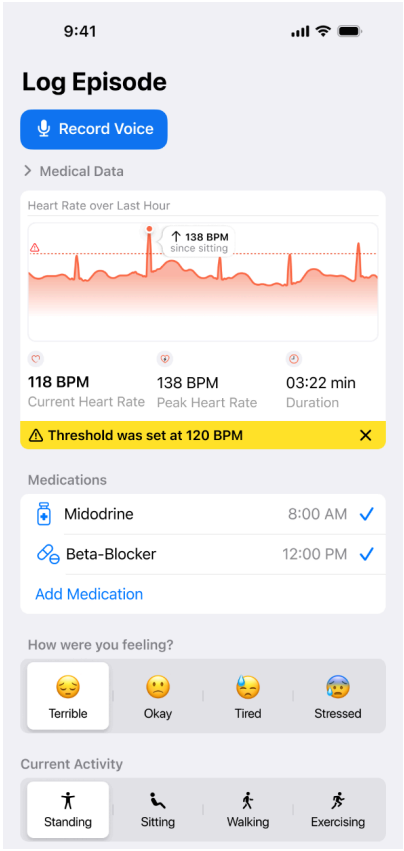
- The changes we made involved making more robust mobile interfaces, so the user could actually test the functionality of the task. We added more context and meaning to our home screen, presented in our initial presentation, based on secondary research conducted in the early phases
- We also added a watch modality since it was something we had planned, but never prototyped for our first iteration. Our watch interface covers our most important task of detecting and logging a spike in Abby's heart rate.

- To validate our featured prototype of the collapsible cane, we were able to discuss with Abby her perceptions and feelings regarding her past experiences with a cane and confirmed that this collapsible design is something she would appreciate because of the discreet nature and sensor tracking.
- Our team later revised our original problem statement and narrowed down our scope even further regarding creating an access technology to better manage Abby's POTS. We ensured to address the current preferences and challenges Abby faces with her current tracking methods were accounted for, and overall experience was improved.

High-Fidelity Screenshots







Smart Cane High Fidelity

High Fidelity for the cane was created with Sora based on our previous iteration

Abby's Thoughts

- Abby enjoyed having the modality of the cane, in case she ever forgot her watch (sensor).
- She liked the collapsible feature of the design, easy to store.
- Believed the design was straightforward and did not have doubts or questions.
- Compared to the collapsible sensor cane we prototyped to traditional canes she used, she enjoyed not having to fold the cane.
- Abby also liked that we gave her options when a spike is detected, to account for a false positive scenario.
- Having various sensor points was mentioned as a positive in case one technology was left behind, the other could still gather data.

Future Works

A final round of testing with Abby could help us understand whether we missed out on any critical data logging. With more data about how an episode occurs and how Abby reacts and deals with it, we could further refine and sharpen our design to appropriately fit the use case. Having medical domain expertise can also help us ensure our model is feasible. We would also love to extend our design to accommodate other autoimmune disorders for a more universal solution.