

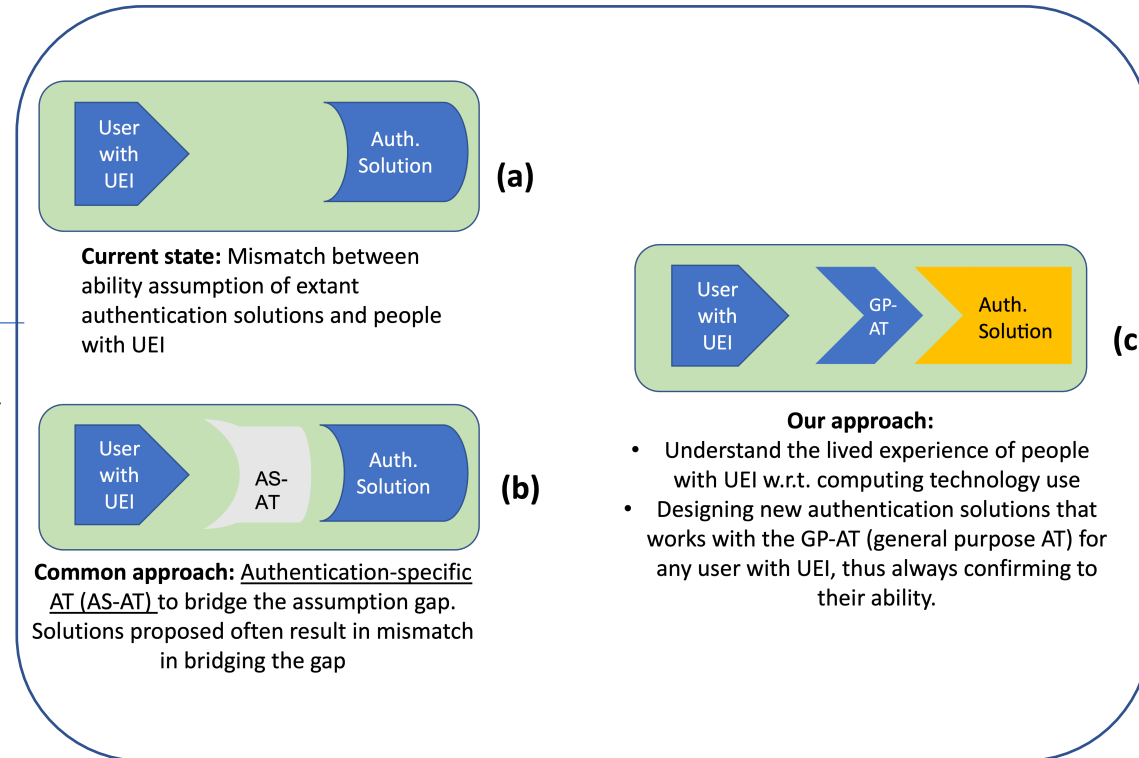
SaTC: CORE: Small: Authentication Solutions for Individuals with Upper Extremity Impairment

Challenges:

- Authentication has become increasingly ubiquitous for controlling access to personal computing devices.
- Current ways of authenticating on personal computing devices (e.g., passwords/pins/biometrics) typically require users to perform complex actions with their arms, hands, and fingers.
- This creates barriers for people with upper extremity impairment (UEI) who cannot use extant authentication systems well.

Solutions:

- Our approach takes a *user-focused view to security artifacts design*. In this regard, we spent time understanding the lived experience of people with UEI w.r.t. the difficulties they face in authenticating to their devices. We found: (1) People with UEI face problems at all stages of authentication from credential registration to credential recovery. (2) All forms of extant authentication from passwords to biometrics present significant problems.
- In addition, we have also looked at the *effect of COVID-19 on people with UEI* in terms of their use of computing devices including authentication.
- Our solutions to address the idea of *ability-based design*. This includes:
 - Developing a solution that **authenticate a person using ballistocardiogram** measured using IMUs in a head-mounted display. All the person has to do is sit still for a few seconds.
 - Exploring the use of a **proximity-based authentication solution** that allows a caregiver to access a person's device when in proximity to them. But lose access when they move away.
 - Exploring the use of a **recognition-based authentication solution** that (1) that authenticates based on clicking/tapping images of people they know; (2) clicking/tapping is the most basic feature that all assistive technologies for people with UEI provide.



Scientific Impact:

- This project allows for the development of new authentication solutions that work for people who cannot use their arms, hands, and fingers dexterously.
- This work focused on making essential security artifacts (in this case, authenticating to one's computing devices) accessible and therefore available to marginalized groups in our society.
- With the advent of COVID-19 we have also looked into how the pandemic has affected the lives of people with UEI in terms of authentication use as well as the broader computing use.

Broader Impact and Broader Participation:

- We plan to open source the recognition-based authentication solution we are working on for everyone to use.
- Ideas on accessibility and design from this project have been used to bolster courses taught by the PI at both undergraduate (HCI, social issues on computing) and graduate levels (HCI).
- The COVID-19 pandemic got in the way of our outreach plans. With the pandemic restrictions being lifted we plan to work on outreach efforts and planning for this currently underway.
- This work has been featured in both the print and online version of **The Boston Globe** in Jan 2021.