CAREER: Closed-loop Health Behavior Interventions in Multi-device Environments

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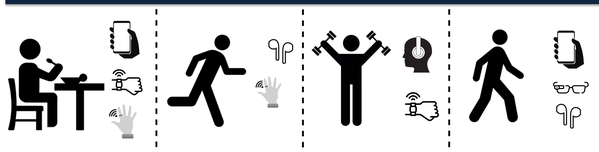
Our overarching vision is to develop assistive CPS technologies to help people improve their health outcomes.

We aim to design generalizable techniques that can be extended to multiple populations with different behavioral traits and intervention needs, and handle a changing physical layer, closing the loop in real-world multi-device environments.

Goals

Focus on behaviors that can be derived from human body motion in populations that typically rely on a human caregiver for assistive services.



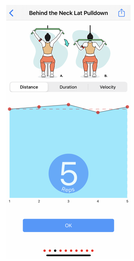
- ❑ Modeling human motion in sparse multi-device environments.

Challenges

- ❑ Multi-device environments
- ❑ Human behavior is complex
- ❑ Limitations of computational models
- ❑ Limitations of digital interventions
- ❑ Learning user-centric health behaviors.
- ❑ Focus on leveraging motion as an indicator of human health.
- ❑ Combining physical and verbal behaviors to infer psychological behavioral states.

Intellectual Merit

- ❑ Modeling human motion in sparse multi-device environments.
- ❑ Learning motion-derived behaviors.
- ❑ Human-in-the-loop model to deliver interventions .



- ❑ Assist the user by providing the right intervention at the right time.
- ❑ Exploring gamified intervention mechanisms.

Technical Approach

Milestones

***Completed**:*

- ❑Learning speech behaviors from jaw motion using earables.
- ❑Contactless gesture recognition for the blind population.

***Ongoing**:*

- ❑ Data collection in controlled and semi-controlled environments.
- ❑ Modeling coarse and fine-grained human motion.
- ❑ Knowledge distillation to sparse multi-device environments.

Broader Impact

- ❑ Facilitate rapid development of mHealth applications.
- ❑ Providing the foundations for using adaptive and personalized interventions for diverse health populations to enable assistive care for all.
- ❑ Research outcomes from this work will be integrated into our comprehensive education plan

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