Research Statement

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Background

As a Human-Computer Interaction (HCI) researcher, I design, build, and evaluate technologies to make the physical and digital environment more accessible for people with disabilities. In my research, I conduct formative studies to understand challenges that impact individuals with disabilities. Combining and extending computational techniques like crowdsourcing and machine learning, I prototype, build, and deploy new technologies that address accessibility challenges. To communicate my work with my community, I evaluate them through qualitative and quantitative methods.

Research Areas

My recent projects focus on using augmented reality (AR) to support blind and low-vision (BLV) individuals during nighttime running and developing presentation methods for refreshable tactile displays (RTDs) to enhance learning for blind students. RunSight is a guidance system that addresses an essential challenge for BLV individuals: enabling low-vision individuals to run safely at night. The system uses AR through see-through head-mounted displays to enhance runners' visual awareness by highlighting their guide's position and identifying potential hazards. In a study with eight low-vision runners, all participants successfully completed at least one kilometer using RunSight, while none could engage in guided running without it in dark conditions. This work demonstrates how augmented reality can make previously inaccessible activities possible for people with visual impairments.

My research also explores ways to support visually impaired students' learning through novel interaction methods for RTDs. For example, I developed Tactile Data Comics, which transform complex visual information into accessible educational content by combining step-by-step tactile graphics with synchronized verbal narration. Unlike static diagrams, this approach guides users through information progressively. A study with 16 visually impaired students demonstrated significant improvements in both comprehension and engagement compared to verbal-only descriptions or traditional static tactile graphics.

Selected Publications and Outputs

- Jiao, Y., Sun, R., Luo, R., Yao, X., She, X., Hara, K., Zhang, Y., and Fu, X. (2025). Tactile Data Comics: Combining Step-by-step Presentation of Tactile Graphics with Verbal Narration for the Blind and Visually Impaired. In Proceedings of ASSETS 2025. Honorable Mention Award
- Abe, Y., Matsushima, K., Hara, K., Sakamoto, D., and Ono, T. (2025). "I can run at night!": Using Augmented Reality to Support Nighttime Guided Running for Low-vision Runners. In Proceedings of CHI 2025. (Yokohama, Japan). Honorable Mention Award.