University of Pittsburgh | School of Computing and Information

Proposal Defense

Doctor of Philosophy in Computer Science

"**Smarter Spaces: Designing Automated Systems for Improving Agency in Spaces**" by **Andrew Xu**

Date: November 14, 2025
Time: 2:00PM - 4:00PM
Place: Eli Lilly Conference Room, Sennott Square, 3810 Forbes Ave, Pittsburgh, PA 15213

Committee:

- Jacob Biehl, Associate Professor, Computer Science, University of Pittsburgh
- Adam Lee, Professor, Computer Science, University of Pittsburgh
- Aakash Gautam, Assistant Professor, Computer Science, University of Pittsburgh
- Rosta Farzan, Professor, DINS, University of Pittsburgh

Abstract:
The rise of powerful AI models and ubiquitous computing has enabled the widespread deployment of smart space technologies across both public and private environments. These systems promise to make the built environment more adaptive and efficient by providing rich spatial insights. However, the benefits of such technologies are rarely distributed equally among stakeholders. Building managers and administrators often gain actionable information about space utilization, while end-users seldom experience tangible benefits from their data being collected. For many, the perceived advantages of sensing are overshadowed by concerns about privacy, surveillance, and lack of control. As a result, the very systems designed to enhance human–building interaction risk alienating the people they aim to serve. This inequity threatens to erode public trust and reduce engagement within shared environments, undermining the long-term success of smart spaces.

To address this, I have developed an end-to-end sensing platform that captures insights into space use while adapting to user-defined privacy preferences. System testing and focus group discussions revealed a critical need to provide users with greater transparency and control in order to mitigate resignation and enhance engagement. Building on this foundation, my proposed work consists of two parts: first, co-designing interface features with users to reflect their privacy and control needs, and second, evaluating these designs in-situ to examine how interacting with the interface influences user agency and behaviors.This work establishes a framework for equitable human–building interaction, positioning smart spaces not as passive surveillance systems but as participatory environments that empower their occupants.