Collaborative Research: NRI: Reducing Falling Risk in Robot-Assisted Retail Environments

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Long-Term Goal: design mobile cobots that can reduce Wholesale and Retail (WRT) workplace falling injuries

Objectives:

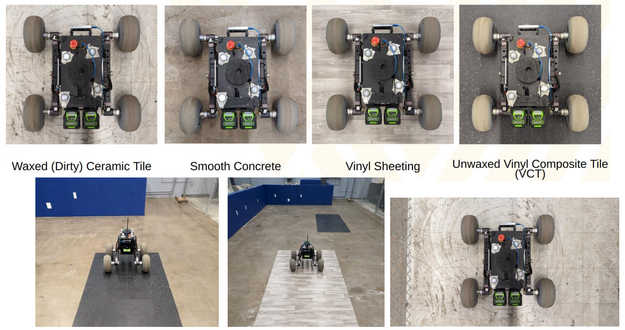
(1) identify and evaluate the holistic risks associated with the operation of mobile co-bots in WRT

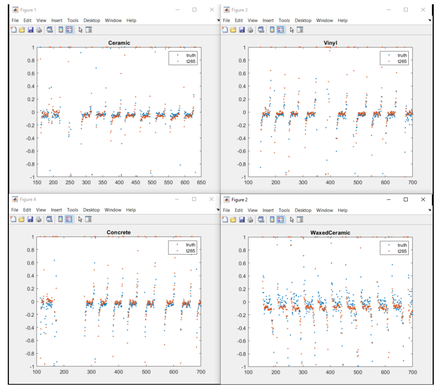
(2) develop a new function (an indoor space walkability map) that could augment a wide range of WRT cobots to survey the indoor WRT ground surface

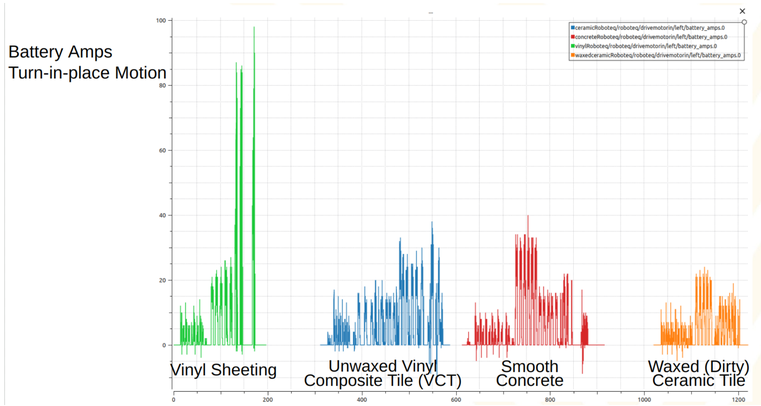
(3) investigate the effects of mobile cobots and the walkability map on workers' physical falling risk exposure, cognitive workload and psychological impacts in real-world WRT sites

Project Status:

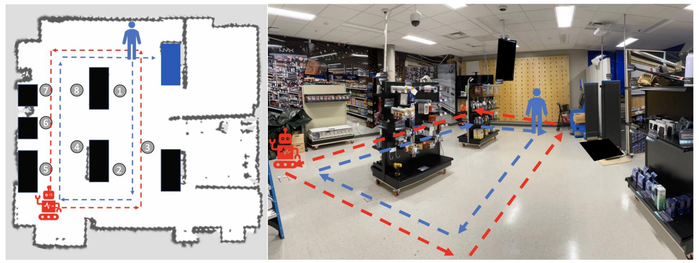
(1) Slip estimation method (Drs. Gu and Gross led):

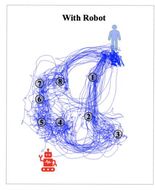


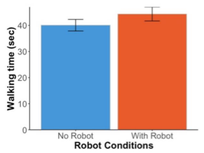


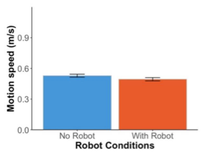


(2) Effect of mobile cobots on individuals' physical responses (Dr. Hu led):



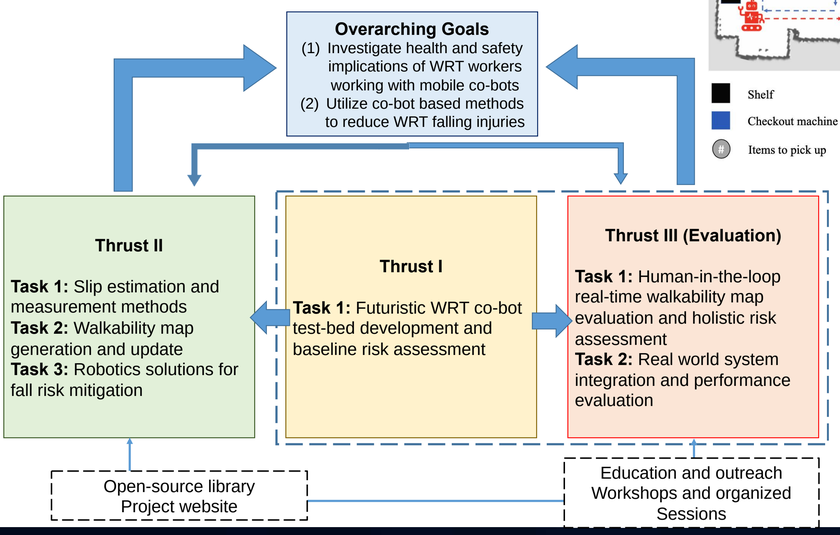






(3) Outreach and engagement with industry (Dr. Hayes led):

Technical Approach:



Intellectual Merit:

- Advance the mobile robot slip detection and mapping capabilities through an integrated use of multiple sensing modalities and robot planning strategies
- Elicit new findings of human movement science in future-oriented co-bot populated environment
- Advances falling risk surveillance and falling prevention methods considering a human-robot collaborative setting

Broader Impact:

- A better understanding of the risks involved in human-robot interaction will likely boost the acceptance of robots.
- The proposed research will form a basis for training a new generation in future MRT, with specific skill sets in robotics and human-center system safety engineering
- Broaden dissemination to enhance scientific and technological development

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