

Human-Robot Interactions with Vulnerable Populations

I am interested in researching how embodied technology such as social robots can assist vulnerable populations. Specifically, I am interested in how the well-being of vulnerable populations, such as older adults and those with cognitive impairments, can be improved through human-robot interactions (HRI). While persuasion and motivation in human-human interaction has been extensively studied, only a handful of these persuasive strategies has been applied in HRI (strategies such as reciprocity, praise, using emotion). Moreover, the effectiveness of these strategies has not been studied with older adults and those with cognitive impairments. Does this segment of the population respond similarly when a robot is trying to engage them in an activity as when a human does? Which strategies, or combination of strategies work best? In what ways do vulnerable populations benefit from social human-robot interactions? What is the optimal design of a socially assistive robot in enhancing social well-being with this population? My research focuses on these questions in the context of informing the future design of socially assistive robots, taking into account personal, social, and ethical considerations, so as to provide long-term benefits to both those who provide care and those in need of care.

The objective of my research is to develop a novel learning framework for a socially assistive robot to adapt its interaction behaviour strategies to motivate and engage vulnerable populations in maintaining their cognitive skills in a real-world scenario. Specifically, I will: i) investigate and identify robot behaviour strategies for effective user motivation and maintenance of cognitive abilities in vulnerable populations, such as older adults; and ii) develop a robot control architecture using select robot behaviour strategies in an adaptable and personalized manner to support robot-assisted cognitive activities with this population.

This research aims to inform how we can effectively design embodied, personalized, socially adaptable interactive technologies, addressing the well-being of socially isolated segments of the population by promoting engagement, motivation, and enhanced social interactions. My research takes a human-centered focus and involves the end-user in the design process. It aims to enrich our understanding of the technological challenges users face in the real world, as well as inform us about how technology can be designed in such a way as to overcome barriers to implementation, assisting caregivers while promoting end-user well-being.

In my research, I will be actively involved in community engagement: working with long-term care homes and non-profits that care for vulnerable adults with cognitive impairments, engaging caregivers and residents in validating the efficacy of adaptive robot behaviours that positively impact these vulnerable populations. This will be an interdisciplinary and collaborative endeavor – using a mixed methods research design,

working alongside formal and informal caregivers and those who interact directly with groups of vulnerable users. To assess the social impact of this research while providing assistance to vulnerable users, this area of research benefits from cross-disciplinary cooperation that incorporates computer scientists, mechanical engineers, policy advisors, as well as cognitive psychologists, occupational therapists, and social workers.

Research Areas

Human-robot interaction (HRI)

Social Robotics

Psychology of human-AI interaction

Engineering design

Human-centered design

Design for vulnerable populations

AI ethics

Persuasive technology