Research Statement

My research interest focuses on **human-technology interaction in construction**. Specifically, I am interested in studying how emerging technologies can be safely and efficiently applied to promote current construction education and training. I am eager to investigate how construction professionals can safely interact and collaborate with emerging technologies on construction sites.

Dissertation Research: The title of my dissertation research project is *"**Active Learning in Online Construction Site Visits: Focusing on Students' Knowledge Construction and Collaborative Problem-Solving**."* My research intends to integrate a systematic learning strategy into online construction site visits to facilitate students in constructing their own knowledge while leveraging collaborative communication affordances to scaffold their collaborative problem-solving skills. The proposed online site visits are designed to provide a fully online device-agnostic experience where multiple synchronous students can learn and practice collaborative communication and problem-solving skills within spatiotemporal construction contexts. Ultimately, my dissertation will contribute to improving the existing online site visits in construction and other STEM education by establishing a clear workflow for designing and implementing online delivery methods of spatiotemporal contexts of sites, offering an effective remote alternative when existing learning opportunities are unavailable. This project has received support from the *National Science Foundation (NSF)*. The initial findings of my Ph.D. dissertation have been published in the *Elsevier Journal of Advanced Engineering Informatics* and were honored with the Best Conference Paper Runner-Up award at the *2022 Associated School of Construction (ASC) International Conference*.

Research on Human-Robot Interaction: I am also deeply engaged in research initiatives focused on exploring human-robot interactions within construction job sites. As an example, we have used inferential and VR visualization techniques to construct conceptual visualizations of proximal and distant human-robot interaction and identify potential safety challenges of integrating four-legged robots on construction jobsites. The study would provide a detailed understanding of how robots might adversely affect workers' safety and health, including physical risk, attentional costs, and psychological impacts. Ultimately, the study could be used in creating regulatory and administrative guidelines for the safe operations of small legged robots in construction. The results of this research have been published in the *Elsevier Journal of Safety Research*.

I also worked on developing and testing a VR-based site visit simulating future construction workplaces dominated by small legged robots, aiming to provide insights into such robots, their diverse applications in construction, associated safety challenges, and necessary safety countermeasures for working safely with such robots. The research provided opportunities for construction students and workers to obtain an in depth understanding of small legged robots in construction and to cultivate trust and positive perceptions regarding diverse and unfamiliar scenarios without exposing them to undue risks or incurring substantial costs. The findings from my research on this project are currently under review at the *Elsevier Journal of Safety Science*.

Research Mentorship: My journey in mentorship began when my advisors requested my assistance in guiding graduate students working on projects centered around human-technology interactions in construction. I had the privilege of mentoring both Master and junior Ph.D. students, providing them with guidance throughout their scientific research endeavors. This encompassed tasks such as defining research problems, formulating questions and objectives, and honing their manuscript writing skills. The outcomes of this mentorship have not only contributed to my growth as a researcher but have also deepened my

appreciation for the crucial role that researchers and faculty members play in nurturing students' academic development and career progression.

Future Research: Following the completion of my Ph.D. studies, I am committed to continuing my multidisciplinary approach, focusing on human-technology interaction research in construction. My future research paths will be aligned with contemporary industry needs and the research priorities of funding organizations that align with my expertise and passions. Below are a few examples of potential research programs that I am interested in developing:

- ***Emerging Technologies for Future of Construction Education and Training:*** Using various emerging technologies, such as VR, AR, and AI-driven tools, combined with cutting-edge educational theories, my aim is to reshape teaching and learning methods. My goal is to create innovative learning and training solutions that prepare the next generation of students and educators to thrive in the technologically advanced and collaborative environments of tomorrow.
- ***Safe Human-Robot Interaction in Construction:*** Identifying potential safety challenges and formulating required countermeasures to address the safety problems of humans and robots sharing workplaces on construction jobsites by It aims to establish a reasonable framework or guideline for designing, integrating, and operating robots on construction sites. I am also interested in investigating the safe interaction between humans and robots while equipping construction workers and professionals with the necessary skills and knowledge to excel in robot-populated work environments. My focus is on facilitating safe collaboration with robots, thereby ensuring their safe integration on construction sites.

Future Funding: I am committed to advancing research in human-technology interaction in construction, ensuring that I remain responsive to evolving academic and industrial challenges. Given the practical significance of these subjects and the attention they have gained from various external funding agencies, I am confident that my research will receive both governmental and industrial support. Below is a select example of sources I intend to explore for potential funding opportunities:

- ***National Science Foundation (NSF)*** (e.g., Research on Emerging Technologies for Teaching and Learning (RETTL), Improving Undergraduate STEM Education: Directorate for STEM Education (IUSE: EDU), Human-Centered Computing (HCC))
- ***National Institute for Occupational Safety and Health (NIOSH)*** (e.g., R21 – Exploratory/Developmental Grants, Center for Construction Research and Training (CPWR))
- ***U.S. Department of Labor*** (e.g., Susan Hardwood Training Grant)
- ***Department of Transportation*** (e.g., National Cooperative Highway Research Program (NCHRP), Innovations Deserving Exploratory Analysis Programs (IDEA), Federal Discretionary Grants of Florida Department of Transportation)

My extensive collaborative experience with experts from various disciplines, coupled with my diverse international educational background, equips me to thrive in multidisciplinary research settings involving teams spanning diverse fields, from computer science to engineering education and psychology. In addition to academic collaborations, I am eager to explore partnerships with industry groups and foundations. This approach will allow me to gain deeper insights into current industry requirements and explore the practical

applications of my research through real-world case studies. In doing so, I aim to bridge the gap between theoretical research and practical solutions, contributing to meaningful advancements in the field.