

A novel intervention method to promote workers' safety awareness and mental health during human-robot collaboration

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Human-robot collaboration is a flourishing work configuration in which workers and collaborative robots (co-robots) share the workplace and work together. This work configuration takes advantage of the endurance of co-robots and the dexterity and ability of humans to react to unpredicted and less structured environments .

As a co-robot is designed to work alongside workers, it is no longer an option to isolate workers from co-robots. Yet, there is a lack of understanding on worker's safety awareness in response to co-robot behaviors. Furthermore, appearances and actions of co-robots may increase workers' mental stress.



We seek to understand the profile of workers' safety awareness and mental stress in response to co-robot appearance and actions, and to develop and evaluate an intervention method to promote workers' mental health through co-robot actions. The outcome will catalyze the investigation of the risks of emerging technologies and their solutions.

This project will be conducted by three key steps. First, we will utilize virtual reality technologies to learn workers' mental and physical behaviors during a variety of human-robot collaboration. Second, we will enhance robot's capacity of

understanding worker's mental states by applying computer vision algorithm. Third, we will develop a reinforcement learning-based robot action planning method to allow robot to alter worker's negative mental state through robot actions.

The enhanced safety awareness, together with engineering methods, will form a safer work environment. This research addresses a topic of the National Occupation Research Agenda: examine emerging risks from new technologies

This project will yield a new course that bridge emerging technologies and occupational safety. This project will also yield an enrichment module that will be disseminated to high school students, our future STEM workforce, at different regions in North Carolina.

