#2026620 FW-HTF-P: Supporting an Aging Workforce in Future Transportation and Delivery Work

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Objective: This planning project aims to provide knowledge needed to understand and improve workforce performance of older adults in transportation and delivery systems, which are heavily impacted by recent advances in automated cars, trucks, and drones.

Motivation: While automation may replace many human drivers, new jobs may also arise involving novel functions afforded by the new technology. An outstanding challenge is to help existing workers transition into these new jobs. Aging workers—who may be experiencing age-related cognitive and physical declines and who may find it more difficult to learn and adopt new technologies—will require extra provisions for such transitions.

Preliminary data collection: we conducted an online study (using M-Turk) to assess user engagement in an online Tetris game as a function of difficulty and duration[1]. We collect a large sample (n=220) of self-reported and performance data from 220 participants to validate several well-known scales for measuring momentary states of users that may contribute to task engagement, a key construct to understand in designing future automation that are adaptive to worker states. In addition to validating existing scales, we also found interesting patterns about changes in self-reported engagement versus distress across different difficulty conditions.

[1]Shen, S., Chen, H.-Y.W., Covey, T., Mercado, E., & Bisantz, A. (Accepted) Examination of user engagement and subjective states in an online Tetris Game. To be published in *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 2022.

Work-in-progress: a **laboratory** study will collect physiological and cognitive responses during the playing of Tetris vs. the monitoring of a Tetris game to characterize individual differences in attention and engagement for manual interactions vs. system monitoring tasks. Data to be collected include real-time physiological data (electrodermal activity, heart rates, eye gazes, fNIRs), ongoing task performance, and self-reported subjective states during gameplay of different difficulty levels and monitoring of gameplay (i.e., watching a video of gameplay). Older vs. younger participants' cognitive functions will also be assessed using a series of validated cognitive tests to investigate the neural and physiological correlates between cognitive functions and task engagement behaviors. This study will yield insights for the design of human-machine interfaces that optimize real-time collaboration between a human operator and an automated system based on workers' cognitive and physiological profiles.

Work-in-progress: an **online survey** (n=250) will collect and analyze data about current commercial truck drivers' experiences and attitudes towards automation at work and the associated training requirements. As part of the planning grant, we are interested in learning about the unique challenges and barriers truck drivers may face in transitioning or adjusting to their evolving job functions. We will analyze respondents' attitudes and perceptions about increasing automation in their work vehicles, and their preparedness and willingness to learn new technology.