REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHW-25-07

Closed-Loop Human-Automation Interaction Adaptation

PROJECT DESCRIPTION: Technological advances have enabled task sharing between human operators and automation. However, the efficiency of human-automation interaction (HAI) during long scenarios often suffers because of low human-automation trust, transparency, and situation awareness. The problem is further compounded by excessive fatigue, stress, and cognitive workload. Automation advancements may help combat these problems. Highlighting relevant information to improve attention and build human situation awareness, changing the level of automated aiding to moderate cognitive workload, and selectively assigning tasks to human or automated control are promising adaptive strategies. The best result might occur if the automation were sensitive to the cognitive state of the human prior to major lapses in the human's performance. The purpose of this research is to investigate strategies for interface design that could maximize operator awareness of control automation mode shifts. During data collection, investigators will combine traditional physiological measures to trigger changes in task control. This will help characterize extended shift effects on performance and identify physiological signals that can guide real-time task environment adaptations. Ultimately, the appropriateness of HAI interventions that involve task aiding or shedding to build situation awareness may be identified. The research team will also investigate display and control refinements to optimize human operator awareness and reactivity.

LEARNING OBJECTIVE: The student intern will learn about the advantages and disadvantages of using physiological measures to signal operator performance readiness. Through this research experience, the student will also come to understand data collection and analysis processes and have the opportunity to participate in scientific literature reviews, research design and analysis, and data collection.

ACADEMIC LEVEL: Masters; Doctoral; Undergraduate

DISCIPLINE NEEDED:

- Human Factors
- Psychology
- Information Sciences

RESEARCH LOCATION: Wright-Patterson Air Force Base, Dayton, Ohio

RESEARCH MENTOR: James P. Bliss, Ph.D.
Human Factors Psychology, University of Central Florida, 1993

Dr. Bliss is a Senior Research Psychologist in the Warfighter Interactions and Readiness Division with expertise in human factors, complex task performance, automation trust, and the collection and use of physiological measures. As a former tenured faculty member, he has a wealth of experience teaching students of all levels about the research process. He has conducted funded and unfunded military research for the past 35 years, focusing on warfighter training, evaluation of trust, and use of simulation technologies by warfighters at all levels. His current research interests include the optimal use of automation on the battlefield and the employment of cognitive warfare methods during conflict. *Photo courtesy of the U.S. Air Force Research Laboratory.*

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