REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHW-24-03

Neurocognitive Estimation of Real-time Decision-making for Human-autonomy Teaming

PROJECT DESCRIPTION: Adaptive displays and autonomous systems can utilize predictions of neural activity and performance-based mathematical models but are not yet equipped with the awareness for how an operator is making decisions, and how that process may change over time. In this work, we leverage mathematical techniques to capture the dynamics of decision-making processes over time with computational ease. These estimates can serve as input to an autonomous system and inform rapid adaptations to enhance performance of the human-machine team. Quantifying the latent variables unpinning cognitive decision-making can enhance interpretation of neural and behavioral data and inform and provide early detection of cognitive state prior to a task period of interest. For instance, high temporal resolution of an operator's rate and accuracy of decision-making is critical to provide useful adjustments to displays, task scheduling, automation, or division of task-load between operators in adaptive work systems. The student intern will learn how to collect/analyze neurophysiological and behavioral data using approaches in cognitive modeling to investigate the strengths and limitations of human perception and cognition. The student will help to define principles that allow for the proper integration and distribution of multisensory data in operational environments. The student will assist with model development to inform system design that ensures information is processed in the most efficient way, and overall decision-making and performance is optimized. Additionally, the student will report research updates in weekly meetings, participate in team-based research efforts, take on an active role in designing/conducting experiments, perform data analysis, adhere to ethical and health safety protocols in the laboratory, and share research findings through publications and presentations.

ACADEMIC LEVEL: Doctoral; Masters

DISCIPLINE NEEDED:

- Cognitive Science
- Experimental Psychology
- Biomedical Engineering

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

RESEARCH MENTOR: Elizabeth Fox, Ph.D.
Human-Factors & Industrial-Organizational Psychology, Wright State University, 2019

Elizabeth Fox is a Research Psychologist in the Cognition and Modeling Branch within the 711th Human Performance Wing at Wright-Patterson Air Force Base, Ohio. She earned her PhD in Human Factors and Industrial/Organizational Psychology at Wright State University in 2019, where she studied the neurobehavioral effects of multitasking. Her current research involves the development of neural and mathematical models that may be used to investigate individual and team factors that influence performance in complex, multimodal environments. *Photo courtesy of the U.S. Air Force Research Laboratory.*