REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHW-26-04

Human Perception and Decision-making in Augmented Visual Environments

PROJECT DESCRIPTION: The ability to accurately perceive a visual environment and make effective decisions is paramount in operational scenarios. This ability is especially important in low-light conditions (e.g., nighttime), where key cognitive processes experience fundamental changes, even with the use of night vision goggles (NVGs). Despite their long-standing use in the armed forces community, the specific impacts of NVGs on overall human cognitive performance are still relatively unknown. This project leverages a wide research portfolio dedicated to human vision and NVGs to understand how, why, and when performance changes in low light conditions. Specifically, this project uses advanced statistical techniques and computational modeling approaches from the cognitive and neural sciences to measure changes in perception, action, and decision making in operationally relevant laboratory tasks utilizing different configurations of NVGs. The products developed during this effort will inform decisions related to tactics, health, and equipment in operational scenarios and support the Air Force's strategic goals of decision superiority in the battlefield.

LEARNING OBJECTIVES: This project will provide students with the opportunity to engage with a diverse set of statistical and computational frameworks, such as multilevel models, structural equations, cognitive process models, and biologically inspired neural networks. Students will learn fundamental computational modeling techniques and use outcomes garnered from these models to make important inferences regarding visual performance, fatigue, and vigilance in low-light operational conditions. By the end of the internship, students will have gained a greater understanding of a) visual perception, b) advanced statistics, and c) cognitive modeling and will use this knowledge to provide structured, empirical analyses to important questions posed by operational customers that use night vision goggles.

ACADEMIC LEVEL: Doctoral

DISCIPLINES NEEDED: Experimental Psychology, Cognitive Science

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

RESEARCH MENTOR: Adam Fenton, Ph.D.
Psychology, University of Virginia, 2023

Dr. Adam Fenton is a Research Psychologist in the Cognition and Modeling Branch in the Human Effectiveness Directorate of the 711th Human Performance Wing, Air Force Research Laboratory at Wright-Patterson AFB, OH. His work aims to optimize human and artificial decision-making by developing computational models of cognition. Dr. Fenton leverages Bayesian statistics, machine learning, and physiological measures to investigate decision-making. Prior to government work, he was an ORISE post-doctoral fellow in the Air and Space Biosciences Division (RHB) at the AFRL. Dr. Fenton earned his Ph.D. in Psychology from the University of Virginia in 2023.

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RESEARCH MENTOR: Taylor Curley, PhD
Psychology, Georgia Institute of Technology, 2021

Dr. Taylor Curley is a Research Psychologist in the Cognition and Modeling Branch within the Human Effectiveness Directorate of the 711th Human Performance Wing, Air Force Research Laboratory, Wright-Patterson AFB, Ohio. He serves as an expert on computational modeling of human behavior and cognition, particularly as it relates to performance. Dr. Curley has used symbolic cognitive architectures and neurocognitive models to simulate memory, sustained attention, fatigue, and vision. He also serves as an expert in agent-based modeling, complex systems analysis, and advanced statistical methodologies. Dr. Curley's previous experience includes work in cognitive aging, memory decline, and longitudinal analysis of cognition. He served as a contractor with Cubic Defense prior to joining the AFRL as a civilian.

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