Announcing the Final Examination of Kevin Muhs for the degree of Doctor of Philosophy

Time & Location: February 9, 2018 at 10:00 AM in Engineering II 312 L

Title: AN AGENT BASED MODEL TO ASSESS CREW TEMPORAL VARIABILITY DURING U.S. NAVY SHIPBOARD OPERATIONS

Understanding the factors that affect human performance variability as well as their temporal impacts is an essential element to fully integrating and designing complex, adaptive environments. This understanding is particularly necessary for high stake, time-critical routines such as those performed during Nuclear Reactor, air traffic control, and military operations. Over the last three decades significant efforts have emerged to demonstrate and apply a host of techniques to include Discrete Event Simulation, Bayesian Belief Networks, Neural Networks, and a multitude of existing software to provide relevant assessments of human task performance and temporal variability. The objective of this research was to design and develop a novel Agent Based Modeling and Simulation (ABMS) methodology to generate a timeline of work and assess impacts of crew temporal variability during U.S. Navy Small Boat Defense operations in littoral waters.

The developed ABMS methodology included human performance models for six crew members (agents) as well as a threat craft, and incorporated varying levels of crew capability and task support. AnyLogic ABMS software was used to simultaneously provide detailed measures of individual sailor performance and of system-level emergent behavior. This methodology and these models were adapted and built to assure extensibility across a broad range of US Navy shipboard operations.

Application of the developed ABMS methodology effectively demonstrated a way to visualize, and quantify impacts/uncertainties of human temporal variability on both workload and crew effectiveness during US Navy shipboard operations.

Major: Industrial Engineering

Educational Career:
Bachelor's of Nuclear Engineering, BS, 1987, University of Washington
Master's of Mechanical Engineering, MS, 1995, Naval Postgraduate School
Master's of Astronautical Engineering, MS, 1995, Naval Postgraduate School

Committee in Charge:
Waldemar Karwowski, Chair, Industrial Engineering and Management Systems
Peter Hancock, Industrial Engineering and Management Systems, Department of Psychology
Ahmad Elshennawy, Industrial Engineering and Management Systems
Glenn Sjoden, United States Air Force Technical Applications Center

Approved for distribution by Waldemar Karwowski, Committee Chair, on January 24, 2018.

The public is welcome to attend.