
Computer Science Colloquium

Automated Scheduling Decision Support for Supervisory Control of Multiple UAVs

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Olsen 311

Refreshments at 2:30, Talk from 3:00-4:00

In the future vision of allowing a single operator to control multiple unmanned vehicles (on land, in the air, or under water), it is not well understood how operators will manage multiple vehicles, what kind of decision support can compliment operators, and how human cognitive limitations will impact overall system effectiveness. To this end, this talk presents the results of an experiment in which operators simultaneously managed four highly autonomous homogenous UAVs executing an air tasking order in a simulation, with the overall goal of destroying a predetermined set of targets within a limited time period. The primary factors under investigation were different levels of automation from manual to management-by-exception visually represented in a timeline for time-pressured scenarios. Increasing levels of automation can reduce workload but they can also result in situation awareness degradation as well as automation bias. This human-in-the-loop experiment revealed that when provided with a high workload preview visualization as well as automated recommendations for workload mitigation, operators became fixated on the need to globally optimize their schedules, and did not adequately weigh uncertainty in their decisions. This fixation significantly degraded operator performance to the point that operators without any decision support performed better than those with probabilistic prediction information and the ability to negotiate potential outcomes.

Bio: Mary (Missy) Cummings received her B.S. in Mathematics from the United States Naval Academy in 1988, her M.S. in Space Systems Engineering from the Naval Postgraduate School in 1994, and her Ph.D. in Systems Engineering from the University of Virginia in 2003. A naval officer and military pilot from 1988-1999, she was one of the Navy's first female fighter pilots. She is currently the Boeing Assistant Professor in the Aeronautics & Astronautics Department at the Massachusetts Institute of Technology. Her previous teaching experience includes instructing for the U.S. Navy at Pennsylvania State University and as an assistant professor for the Virginia Tech Engineering Fundamentals Division. Her research interests include human supervisory control, collaborative human-computer decision making, decision support, information complexity in displays, and the ethical and social impact of technology.