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Research goals: My research goals are to develop human-robot interaction (HRI) and distributed artificial intelligence methods that result in effective, reliable, and resilient robotic systems for real-time, mission deployments in dynamic environments. My **HRI** research develops capabilities for humans to supervise and task large, heterogeneous robot teams. The remote deployment of robots significantly complicates the presentation of meaningful, timely, and relevant information to the human operators or supervisors. Humans' ability to understand robot provided information and to react appropriately decreases disproportionately as the number and types of robots increase. My HRI research focuses on developing a system of interfaces that provide advanced interaction and visualization capabilities to address these complexities, while supporting human decision making and situation awareness.

My research in **artificial intelligence** develops distributed coalition formation algorithms that allocate task assignments autonomously to distributed robots. Coalition formation assigns robots to task teams based on specified criteria; however, it is an NP-hard problem. Heuristic algorithms provide good solutions, but cannot be generalized to all real-time, dynamic environments. My research group has begun developing a collection of algorithms that support coalition formation for a large range of real-time, dynamic situations. Task allocation is very difficult and cognitively demanding for humans, thus the coalition formation research is being integrated into the HRI research in order to support human decision making.

Projects: The Human-Machine Teaming laboratory pursues research related to Human-robotic interaction and multiple robot coordination and cooperation for heterogeneous ground and aerial robots. Our human-robotic interaction research focuses on developing a system of interfaces to permit a hierarchy of human commanders to direct mission objectives based upon supervising and directing robotic tasks. This

research requires development of interaction and visualization techniques to permit the humans to understand information provided by multiple robots at the humans' required level of abstraction in order to support their decision making activities. Our multiple robot coordination and cooperation research focuses on developing a system of coalition formation algorithms that is robust to real-time deployments in highly dynamic and uncertain environments. All of our approaches and algorithms are validated on physical robots and with high-fidelity simulators. We conduct human user evaluations that incorporate sound experimental design and evaluation.

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