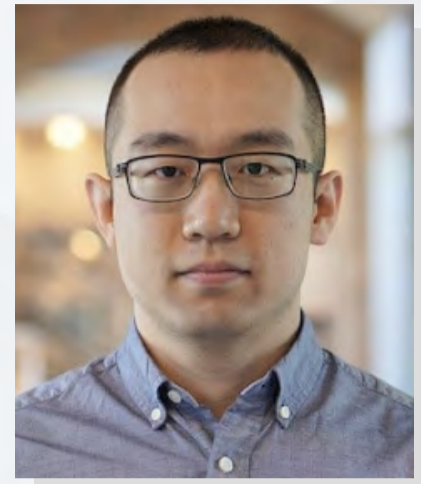# Department of Systems Engineering

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Multi-Agent Human-Robot Collaboration: Trust and Online Teaming

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Abstract

Trust has been identified as a critical factor for effective human-robot teaming. However, existing literature on trust modeling predominantly focuses on dyadic human-robot teams, and there is little, if not no, research on trust modeling in multi-human-multi-robot (MHMR) teams. To fill this research gap, we propose the Trust Inference and Propagation (TIP) model, a mathematical framework for computational trust modeling in MHMR teams. The TIP model accounts for both the direct and indirect experiences that a human agent has with a robot, successfully capturing the underlying trust dynamics and significantly outperforming a baseline model. In addition, to foster trust in MHMR teams, we develop an online learning algorithm for real-time, optimal team formation in dynamic, collaborative environments. Specifically, we model the teaming problem as a matching linear bandit and show the proposed algorithm achieves sublinear regret, which offers a promising avenue for real-time, optimal team formation that goes beyond static or pre-planned strategies.

About the Speaker

Yaohui Guo is a Ph.D. candidate in the Department of Industrial and Operations Engineering at the University of Michigan. His research focuses on human-robot/AI collaboration, specifically in developing algorithms that enhance robots' interaction abilities by accurately interpreting human internal states. He has received Master's degrees in Robotics and Mathematics from the University of Michigan, and a Bachelor's degree in Mechanical Engineering and Automation from Xi'an Jiaotong University. His research is supported by the Rackham Predoctoral Fellowship.

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