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CECS Seminar



"Learning for Autonomy: Trust Modeling in Human–Robot Collaboration and Distributional Multi-Agent Reinforcement Learning"

Professor Yue Wang, Ph.D.

Professor, Warren H. Owen – Duke Energy Professor of Engineering, Associate Dean of Research
School of Mechanical and Automotive Engineering

Thursday, December 11th
10:00-11:00 a.m.
Location: EH 2430

Abstract: Effective collaboration among autonomous robots and human operators is essential for deploying robotic systems in complex environments. However, enabling robots to learn collaborative behaviors while adapting to environmental changes, communication constraints, and evolving human expectations remains a fundamental challenge. This seminar begins with an overview of research at the Interdisciplinary & Intelligent Research (I2R) Lab focused on human– robot interaction and autonomy. We discuss computational models for human trust in robots, how trust can be quantified and learned, and how it can be incorporated into robot decision-making, motion planning, and control to achieve safer autonomy with higher user acceptance. Building on these models, the talk highlights learning-based approaches that enable robots to reason under uncertainty and adapt to human preferences. We consider reinforcement learning in which key quantities, such as value functions, are represented probabilistically rather than as point estimates. These methods enable more stable and data-efficient learning. We then introduce a fully distributed multi-agent reinforcement learning framework that leverages graph attention networks and consensus-based learning to enable robots to learn collaborative strategies through local interactions, without relying on centralized training or global information. This approach addresses key challenges in multi-agent learning, including non-stationarity, limited communication, and changing team configurations. The talk will conclude with a discussion of remaining challenges and future research directions toward trustworthy, scalable, and resilient human-robot interaction and physical AI.

Biography: Dr. Yue Wang is the Warren H. Owen-Duke Energy Professor of Engineering and the Director of the Interdisciplinary and Intelligent Research (I2R) laboratory at the School of Mechanical and Automotive Engineering at Clemson University. She is also the Associate Dean of Research at the College of Engineering and Applied Science (CECAS) at Clemson. Dr. Wang received a Ph.D. degree in Mechanical Engineering from Worcester Polytechnic Institute in 2011 and held a postdoctoral position in Electrical Engineering at the University of Notre Dame from 2011 to 2012. She became an Assistant Professor at Clemson University in 2012, was promoted to Associate Professor in 2018, and then early promoted to Full Professor in 2022. In 2023-2025, she served as a Program Director at the National Science Foundation (NSF). In this role, her primary responsibilities included managing the Dynamics, Controls, and Systems Diagnostics (DCSD) program and the Foundational Research in Robotics (FRR) program within the Directorate for Engineering's Division of Civil, Mechanical, and Manufacturing Innovation (CMMI). Dr. Wang's research interests are human-robot interaction systems, multi-robot systems, and cyber-physical systems. Her research contributions include trust-based control for humanrobot collaboration systems, collaborative robotics for manufacturing, multi-robot symbolic motion planning, and human-aware control, learning, and verification for autonomous systems.

Hosted By: Mohammad Al Faruque