Georgia Tech
Institute for Robotics and Intelligent Machines

IRIM Seminar Series

Interactive Autonomy: Game-Theoretic Learning & Control for Multi-Agent Interactions

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Abstract: To transform our lives, autonomous systems need to interact with other agents in complex shared environments. For example, autonomous cars need to interact with pedestrians, human-driven cars, and other autonomous cars. Autonomous delivery drones need to navigate in the aerial space shared by other drones, or mobile robots in a warehouse must navigate in the factory space shared by robots. The multi-agent nature of such application domains requires us to develop a systematic methodology for enabling efficient interactions of autonomous systems across various applications. In this talk, I will first focus on game-theoretic planning and control for robots. To reach intelligent robotic interactions, robots must account for the dependence of agents' decisions upon one another. I will discuss how game-theoretic planning and control enables robots to be cognizant of their influence on other agents. I will present our recent results on leveraging the structure that is inherent in interactions to develop efficient motion planning algorithms which are suitable for real-time operation on robot hardware. In the second part of the talk, I will focus on how robots can learn and infer the intentions of their surrounding agents to account for agents' preferences and objectives. Currently, robots can infer the objectives of isolated agents within the formalism of inverse reinforcement learning; however, in multi-agent domains, agents are not isolated, and the decisions of all agents are mutually coupled. I will discuss a mathematical theory and numerical algorithms for inferring these interrelated preferences from observations of agents' interactions.

Bio: Negar Mehr is an assistant professor in the Department of Mechanical Engineering at the University of California, Berkeley. Before that, she was an assistant professor of Aerospace Engineering at the University of Illinois Urbana-Champaign. She was a postdoctoral scholar at Stanford Aeronautics and Astronautics department from 2019 to 2020. She received her Ph.D. in Mechanical Engineering from UC Berkeley in 2019 and her B.Sc. in Mechanical Engineering from Sharif University of Technology, Tehran, Iran, in 2013. She is a recipient of the NSF CAREER Award. She was awarded the IEEE Intelligent Transportation Systems best Ph.D. dissertation award in 2020.

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