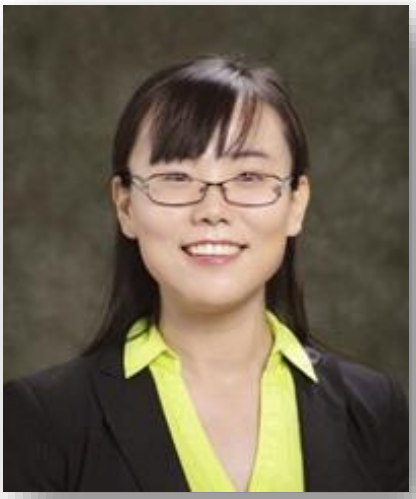
CoCo Seminar Series
Fall 2026

Planning and Control of Coupled Multi-Robot Systems



Dr. Kaiyan Yu
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Binghamton University

Wednesday November 11, 2026 12:15-1:15pm EST
Hybrid (EB-T1 & Zoom; meeting link available on http://coco.binghamton.edu/)

When many agents share a workspace, the interesting problems come from how they are coupled. Most multi-robot planning treats the agents as independent and the coupling between them as a constraint to be designed around. This talk looks at two settings where the coupling is instead the structure that makes the problem solvable. In the first, the coupling runs through the task. A team of robots must simultaneously survey an area and service linear features running through it, such as cracks in a road surface. These look like separate problems but form one continuous domain, and separating them creates discontinuities that force detours and overlaps. By mapping both domains onto a shared manifold, we show that plan quality is governed by a topological condition on the order in which regions are visited, which yields planning with provable optimality guarantees, including when the features must be discovered during execution. In the second, the coupling runs through the environment. At the nanoscale, agents such as nanowires have no onboard actuation and are driven by a single global electric field, so one input reaches every agent at once. Independent control under one shared input would be impossible if the agents were identical. It works precisely because they are not: small differences between them are what let a common input move them to different targets. I will show results from both hardware robot platforms and nanoscale manipulation.

Kaiyan Yu is an Associate Professor in the Department of Mechanical Engineering at Binghamton University, State University of New York, where she directs the Automated Control Systems and Robotics Lab. She received her B.S. in Intelligent Science and Technology from Nankai University, China, and her Ph.D. in Mechanical and Aerospace Engineering from Rutgers University. Her research focuses on autonomous robotic systems, motion planning and control, and micro and nano scale robotic manipulation under external fields. She received the NSF CAREER Award in 2022 and serves as an Associate Editor for IEEE Transactions on Automation Science and Engineering, IEEE Robotics and Automation Letters, IFAC Mechatronics, and Frontiers in Robotics and AI, as well as on the IEEE Robotics and Automation Society and ASME Dynamic Systems and Control Division Conference Editorial Boards.

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