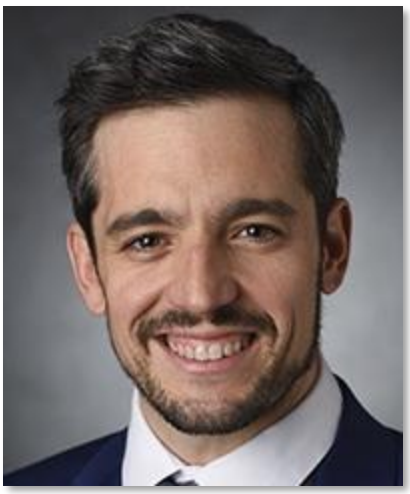
CoCo Seminar Series Spring 2026

Learning to Swarm: How AI and Mechanics Enable Nature-Inspired Collective Robotics



Dr. Christian Peco
Associate Professor, Engineering Science and Mechanics, Pennsylvania State University

Thursday March 26, 2026 12:15-1:15pm EDT
Hybrid (EB-T1 & Zoom; meeting link available on http://coco.binghamton.edu/)

Biological collectives such as slime molds, fungal networks, and bird flocks show remarkable self-organization and adaptability, all arising from simple, local interactions among individual members. In this talk, I will explore how these natural strategies can inspire algorithms for swarm robotic systems, allowing groups of robots to coordinate, adapt, and work together on complex tasks. We use computational mechanics simulations to model the behavior of fungal networks and slime molds, producing rich datasets that neural networks can learn from. The resulting decentralized strategies are tested in a multiagent simulation platform and then implemented on physical robot prototypes in our lab. These methods enable distributed sensing, adaptive exploration, and collaborative task completion in challenging environments. This research shows how nature-inspired design, AI, and mechanics can produce robust and flexible swarm robotic systems for real-world applications.

Christian Peco is a researcher at the intersection of computational mechanics, artificial intelligence, and swarm robotics. He received his Ph.D. from the Universitat Politècnica de Catalunya – BarcelonaTech in Spain and completed postdoctoral research at Duke University. He is currently an Associate Professor in Engineering Science and Mechanics at Pennsylvania State University, where he directs the CBioSail Lab. Within the framework of his NSF CAREER Award, he focuses on studying emergent behavior in biological networks and how these principles can inform data-driven, distributed swarm engineering systems.

For more information, contact Robert Wagner (rwagner4@binghamton.edu).
http://coco.binghamton.edu/