

SCALABLE COOPERATIVE CONTROL AND PLANNING FOR FUTURE MOBILITY SYSTEMS

Speaker

Dr. Pengbo Zhu

Cornell University

Abstract

Emerging transportation systems are rapidly evolving toward highly connected and automated mobility networks, where connected vehicles, shared mobility fleets, and unmanned aerial vehicles (UAVs) interact continuously with transportation infrastructure and human users. Enabling efficient cooperation among multi-agents remains a fundamental challenge due to the complex interactions, communication constraints, and computational demands of large-scale transportation systems. This talk presents scalable cooperative control and planning approaches for future mobility systems. Coordination strategies are developed for on-demand mobility services, including detour planning for ride-pooling vehicles that improves vehicle utilization, sustainability, and passenger service quality. Decentralized planning algorithms are further introduced for dual-task urban air mobility (UAM) systems, enabling autonomous drone fleets to simultaneously perform parcel delivery and urban traffic monitoring. The talk also discusses the co-design of connected and automated vehicle (CAV) routing and adaptive traffic signal control, demonstrating how coordinated optimization of vehicles and smart infrastructure can enhance network-wide traffic efficiency in mixed traffic environments. Across these applications, scalable learning and control methodologies are developed with rigorous theoretical guarantees to enable decentralized decision-making while maintaining low communication and computational overhead. Together, these research efforts contribute to the development of efficient and sustainable mobility systems for future smart cities.

Biography

Dr. Pengbo Zhu is a Postdoctoral Research Associate in the School of Civil and Environmental Engineering at Cornell University, where she works with Prof. Andreas A. Malikopoulos. She received her Ph.D. from the Swiss Federal Institute of Technology Lausanne (EPFL). Her research lies at the intersection of control theory, optimization, and intelligent transportation systems. Her current research spans mobility-on-demand systems, connected and automated vehicles, and urban air mobility systems, with an emphasis on developing scalable, theoretically grounded methods for large-scale multi-agent systems. She is the recipient of the Swiss National Science Foundation (SNSF) Postdoc. Mobility Fellowship. Her work has been published in leading journals and conferences, including Transportation Research Part C: Emerging Technologies, Transportation Research Part E: Logistics and Transportation Review, IEEE Transactions on Control Systems Technology, and the IEEE Conference on Decision and Control (CDC). She received the Best Paper Award at the 13th Symposium of the European Association for Research in Transportation (hEART 2025) and got selected into the 2026 cohort of CEE Rising Stars.



31 August 2026
Monday



11:00am -12:00nn



**Room 3574 (Lift 27/28),
Civil Engineering
Conference Room, HKUST**

Enquiry:

Ms. Crystal Lau
cecrystal@ust.hk