香港大學 機械工程系
Department of Mechanical Engineering
THE UNIVERSITY OF HONG KONG

# SEMINAR

## Building Assured Autonomy at Scale: Logic Specification, Provable Control, and Verified Learning

**Date:** March 27, 2026 (Friday)
**Time:** 9:30 a.m. (Hong Kong Time)
**Venue:** Online Seminar

**Speaker:** Dr. Xusheng Luo
Postoctoral Fellow
Robotics Institute, School of Computer Science
Carnegie Mellon University
USA

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## Abstract:

Autonomous systems are rapidly transitioning from controlled research environments into real-world applications, including drones, self-driving vehicles, and service robots. However, their broad deployment depends not only on achieving high performance, but also on assurance—the ability to guarantee safe, reliable, and predictable behavior in the face of uncertainty. In this talk, I outline my vision for enabling assured autonomy at scale.

I will present three tightly connected research thrusts. First, I introduce novel task specification frameworks based on hierarchical temporal logic, allowing robots to reason about and execute rich, temporally extended, and user-friendly instructions. Second, I demonstrate how correct-by- construction control synthesis enables provably correct planners and controllers that seamlessly integrate high-level task planning with low-level motion execution, across both single- and multi- robot systems in navigation and manipulation settings. Third, I present verification techniques for learning-enabled components, including perception systems and learning-based controllers, that provide quantitative guarantees on safety and reliability in complex environments.

Together, these efforts form a principled foundation for autonomous systems that are expressive, scalable, and rigorously assured—supporting trustworthy deployment in critical domains such as manufacturing and mobility.

## Biography:

Dr. Xusheng Luo is a Research Scientist at the Robotics Institute at Carnegie Mellon University, where he works with Prof. Changliu Liu. He received his Ph.D. in Mechanical Engineering (Robotics) from Duke University under the supervision of Prof. Michael Zavlanos, and earned his B.S. and M.S. degrees in Aerospace Engineering from the Harbin Institute of Technology. His research centers on AI-enabled robotic autonomy, integrating symbolic reasoning, control theory, and machine learning to develop autonomous systems with formal guarantees of safety, robustness, and performance. His work has been recognized with the ASME DSCD Rising Star Award and the NSF CPS Rising Star Award.

**ALL INTERESTED ARE WELCOME**

**For further information, please contact Prof. Mingxin Huang at 3917 7906.**