Frontier of Artificial Network

Department of Data Science
香港城市大學
City University of Hong Kong

Embodied Mobile Manipulation: Trajectory Optimization vs. Diffusion

Invited Speaker
Hangxin Liu
Beijing Institute for General Artificial Intelligence

Date: July 29, 2025 (Tuesday)
Time: 14:00 - 15:00 (Hong Kong Time)
Zoom Meeting: 933 9140 1618

Biography

Hangxin Liu received his Ph.D. degree in Computer Science from the University of California, Los Angeles (UCLA) in 2021. He is currently a research scientist at State Key Laboratory of General Artificial Intelligence, Beijing Institute for General Artificial Intelligence (BIGAI), China. He received an M.S. degree in Mechanical Engineering from UCLA in 2018 and two B.S. degrees in Mechanical Engineering and Computer Science, both from Virginia Tech in 2016. His research interests focus on robot perception, learning, human-robot interaction, and cognitive robotics. He has published over 50 papers in leading journals and conferences in AI and robotics, such as Science Robotics, Nature Machine Intelligence, TPAMI, IJCV, RA-L, ICRA, IROS, and AAAI. He also received the Best Paper Award at ACM TURC in 2019 and was a finalist of the IROS Best Paper Award on Mobile Manipulation in 2023.

Abstract

Research in Embodied AI increasingly emphasizes interaction with the physical world. However, mobile manipulation, a core capability that enables agents to perform diverse tasks across large and unstructured environments, remains a significant challenge. This talk first introduces planning-based approaches to motion generation in mobile manipulation. By leveraging a robot modeling framework based on the Virtual Kinematic Chain (VKC), we demonstrate strong mobile manipulation performance in multi-step, complex tasks via trajectory optimization. Moreover, this framework enables the generation of large-scale, high-quality datasets, supporting the training of diffusion models tailored for mobile manipulation. Finally, the talk examines the respective strengths of planning and control methods versus generative diffusion-based approaches, offering new insights for the development of future embodied AI systems.