上海交通大学自动化系
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Advanced Robotics for Manufacturing: Intelligent Grinding, Assembly, Collaboration and beyond

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摘要：

Although robots have been widely used in production lines for decades, there are still many tasks that require manual operation, such as grinding, weld wash, and delicate assembly. To let robots to help human workers or replace human workers on these tasks, we need to enable higher level of intelligence of these robots, in particular, better self-awareness and real-time decision making. In the first part of the talk, I will introduce some of our recent projects towards that goal, including a weld wash system using Yaskawa GP50, an electronic assembly system using UR5, and a Lego assembly system using FANUC LR Mate. The enabling technologies include energy-function based real-time safe control, convex-feasible-set-based real-time motion planning, tolerance-guided reinforcement learning, and intelligent hardware-software co-design. In the second part of the talk, I will introduce some of our recent work on enabling diverse modes of human-robot collaboration, including better learning from human demonstration and better interpretation of human's needs. I will conclude the talk with future perspectives on how robotics and AI could revolutionize manufacturing practice.

简介：

Dr. Changliu Liu is an assistant professor in the Robotics Institute, School of Computer Science, Carnegie Mellon University (CMU), where she leads the Intelligent Control Lab. Prior to joining CMU, Dr. Liu was a postdoc at Stanford Intelligent Systems Laboratory. She received her Ph.D. in Engineering together with Master degrees in Engineering and Mathematics from University of California at Berkeley and her bachelor degrees in Engineering and Economics from Tsinghua University. Her research interests lie in the design and verification of intelligent systems with applications to manufacturing and transportation. She published the book "Designing robot behavior in human-robot interactions" with CRC Press in 2019; and the book "Algorithms for verifying deep neural networks" in Foundations and Trends in Optimization in 2021. She is the founder of the International Neural Network Verification Competition launched in 2020. Her work has been covered by IEEE Spectrum, ATI news, Robotiq Blog, etc; and has been recognized by NSF Career Award, Amazon Research Award, Ford URP Award, Advanced Robotics for Manufacturing Champion Award, and many best/outstanding paper awards.