NJIT

Department of Computer Science

Exoskeletons, Surgical Robots, and Humanoids: Building Physical Intelligence for Human Augmentation

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Host: Zhihao Yao and Shantanu Sharma

Date: Monday, November 17, 2025
Coffee: 2:15 PM – 2:30 PM
Time: 2:30 PM – 3:30 PM
Location: GITC 4402 (4th floor Seminar Lecture Hall)
Zoom Link: https://njit-edu.zoom.us/j/95903616720?pwd=UrsFtzLWaZFP0ePgVmqLxAOES8ECNn.1

Abstract:
From wearable exoskeletons and surgical robots to humanoid systems, the next generation of embodied machines requires intelligence that can sense, learn, and act in the physical world. Our work combines innovations in hardware and algorithms to bridge this gap, where high torque density actuators enable compact and lightweight designs, and a physics-informed simulation-based learning framework integrated with deep reinforcement learning allows robots to adapt autonomously to human motion without extensive real-world data collection. This approach, published in Nature, advances the creation of robots that understand human intent and collaborate safely and effectively. Together, these developments move us toward versatile intelligence that unites control theory, machine learning, and human-robot interaction to extend human capability in healthcare and beyond.

Bio:
Dr. Hao Su is an Associate Professor at New York University, Director of the Biomechatronics and Intelligent Robotics Lab, and Center Director of the Center of Assistive and Personal Robotics for Independent Living (APRIL). He is also a founding faculty member of NYU Center for Robotics and Embodied Intelligence (CREO) and a keynote speaker at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Dr. Su has received numerous honors including the National Science Foundation CAREER Award, the Switzer Distinguished Fellowship from the U.S. Department of Health and Human Services, the Toyota Mobility Challenge Discover Award, the Best Medical Robotics Paper Award at the IEEE International Conference on Robotics and Automation, and the Best Paper Award from the ASME Dynamic Systems and Control Division. His research has been published in Nature, Science Robotics, Nature Machine Intelligence, Science Advances, IEEE Transactions on Robotics, and IEEE/ASME Transactions on Mechatronics. He serves as Technical Editor of the IEEE/ASME Transactions on Mechatronics, Associate Editor of the IEEE Robotics and Automation Magazine and the ASME Journal of Mechanisms and Robotics, and is on the Editorial Advisory Board of the International Journal of Medical Robotics and Computer-Assisted Surgery. He also holds multiple patents in surgical robotics, wearable robots, and socially assistive robotics.