MAE

Seminar

Series

High-Performance Soft Wearable Robots for Human Augmentation: New Paradigm of Design and Control for Scientific Discovery

THURSDAY,

OCTOBER 15

4:00 PM

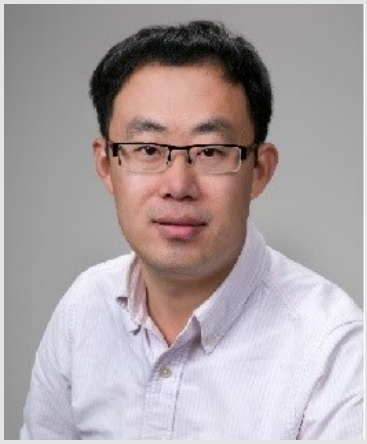
Zoom Information

Meeting ID: 983 6137 4638

PASSWORD: MAE

ABSTRACT

Wearable robots for physical augmentation of humans are the new frontier of robotics, but they are typically rigid, bulky, and limited in lab settings for steady-state walking assistance. To overcome those challenges, the first part of the talk will present a new design paradigm that leverages high torque density motors to enable the electrification of robotic actuation. Thus, our soft robots are able to achieve unprecedented performances, including most lightweight powered exoskeleton, high compliance and high bandwidth human-robot interaction, and fastest soft robot. The second part of the talk will focus on AI-powered controllers that estimate human dynamics and assist multimodal locomotion with superhuman performance to walk longer, squat more, jump higher, and swim faster. We use robots as a tool for scientific discovery to explore new research fields, including wearable robots for pediatric rehabilitation and pain relief of musculoskeletal disorders. Our breakthrough advances in bionic limbs will provide greater mobility and new hope to those with physical disabilities. We envision that our work will enable a paradigm shift of wearable robots from lab-bounded rehabilitation machines to ubiquitous personal robots for workplace injury prevention, pediatric and elderly rehabilitation, home care, and space exploration.



Dr. Hao Su

Irwin Zahn Endowed

Assistant Professor

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City University of New York

https://haosu-robotics.github.io

BIO SKETCH

Hao Su is Irwin Zahn Endowed Assistant Professor in the Department of Mechanical Engineering at the City University of New York, City College. He is the Director of the Biomechatronics and Intelligent Robotics (BIRO) Lab and Director of the Center of Assistive and Personal Robotics for Independent Living (APRIL). He was a postdoctoral research fellow at Harvard University and the Wyss Institute for Biologically Inspired Engineering. Before this role, he was a Research Scientist at Philips Research North America, where he designed robots for lung and cardiac surgery. He received his Ph.D. degree at Worcester Polytechnic Institute. Dr. Su received the NSF CAREER Award, Best Medical Robotics Paper Runner-up Award at the IEEE International Conference on Robotics and Automation (ICRA), and Philips Innovation Transfer Award. He is principal investigators of grants sponsored by NSF (National Robotics Initiative, Cyber-Physical Systems, Future of Work), NIH R01, and Toyota Mobility Foundation. He is currently directing a $4 million Center of Assistive and Personal Robotics for Independent Living (APRIL) funded by the National Science Foundation and Department of Health and Human Services. His lab won the Toyota Mobility Unlimited Discovery Award, Cisco Global Problem Solver Challenge (finalist), and Best Student Paper Award Finalist in IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM). Dr. Su is Junior Chair of the Technical Committee on Mechanisms and Design of the IEEE Robotics and Automation Society (RAS). He is the Associate Editor of the IEEE Robotics and Automation Letters, Frontiers in Robotics and AI, IEEE International Conference on Robotics and Automation (ICRA), IEEE International Conference on Intelligent Robots and Systems (IROS), the BioRobotics theme editor of the IEEE Engineering in Medicine and Biology Society (EMBC). He holds multiple patents on surgical robots and assistive robots.

University at Buffalo

Department of Mechanical and Aerospace Engineering

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