SDSU | College of Engineering Mechanical Engineering

Mechanical Engineering Seminar Series

November 10, 2026, 11:00AM

Dean's Conference Room, E 203E

Title: Miniature Continuum Robots for Medical Interventions

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Abstract: Continuum robots have found wide applications in medicine because they can be designed with high length-to-diameter ratios, making them particularly well suited for minimally invasive and endoluminal medical interventions. Their slender, curvilinear structures allow them to navigate through body lumens, natural orifices, and small surgical incisions to perform minimally invasive procedures. However, the design, modeling, and control of continuum robots are substantially more complex and challenging than those of traditional robots composed of rigid links connected by discrete joints, especially as their dimensions scale down to the submillimeter level. In this talk, I will introduce our work on the design, modeling, and control of meso-scale and micro-scale continuum robots for minimally invasive surgery, including: (1) meso-scale robotic transcatheter delivery systems for mitral valve repair and aortic valve replacement, incorporating image-based and electromagnetic guidance; (2) meso-scale, single-port steerable robotic neuroendoscopic tools for neurosurgical applications; and (3) micro-scale continuum robotic guidewires for endovascular interventions.

Bio: Dr. Ronghuai Qi is currently an Assistant Professor in Dynamics, Control, and Robotics at the University of Nevada, Las Vegas (UNLV). Prior to joining UNLV, he was a Postdoctoral Fellow in the Medical Robotics and Automation Laboratory at the Georgia Institute of Technology, Atlanta, GA. He received his Ph.D. in Mechanical and Mechatronics Engineering, with a focus on robotics and control, from the University of Waterloo, ON, Canada, in 2019.

Dr. Qi's research interests include medical robotics for minimally invasive surgery, miniature continuum and soft robotics, robot-assisted rehabilitation, robot modeling and control, shape and force sensing, and image-guided interventions. His interdisciplinary research has been published in highly prestigious journals and conferences, such as Nature-npj Robotics, T-RO, T-MRB, RA-L, T-SMC, ICRA, and IROS. Dr. Qi serves as an Associate Editor of IEEE Robotics and Automation Letters (RA-L), served as an Associate Editor of IROS 2026, and received the Best Application Paper Award at CableCon 2023 and the Best Poster Award at the ICRA 2025 Workshop. He also served as a member of the NIH IGIS Review Panel in 2025. Dr. Qi has received grant awards from DoD, NASA, UNLV TTDGRA, UNLV FOA, and Restore Robotics LLC.