

Modeling Challenges and Applications of Soft Robotics: Sensing and Control

Abstract:

The talk will discuss modeling and control of soft robots with emphasis on applications as steerable implantable devices. Simplified approaches for modeling and control of steerable slender continuum devices made of elastomers and their possible applications for cochlear implant surgery will be used to motivate this talk. The talk will also discuss how some of these approaches can inform indirect sensing and steering of electrode arrays for cochlear implant surgery and other applications. Recent extensions of these approaches to contact detection using pneumatic braided muscle actuators will also be discussed along with challenges and suggestions for future research directions.

Short bio

Nabil Simaan (FIEEE, Ph.D. (2002 Technion, Israel)) is a Professor of Mechanical Engineering, Computer Science and Otolaryngology at Vanderbilt University, Nashville TN. In addition to serving as an Associate Editor for ASME JMR, he has served as an Editor for IEEE ICRA, associate editor for IEEE TRO, Associate Editor for ASME JMR, and editorial board member for Robotica and a co-chair of the IEEE Technical Committee on Surgical Robotics. His research interests include parallel robotics, continuum & soft robotics, and design of new robotic systems for dexterous and image-guided surgical robotics. His recent works focuses on use of intraoperative sensing for enabling complementary situational awareness in robot-assisted surgery. His prior research has led to the formation of Auris Surgical Robotics and his prior works have supported the development of new surgical systems such as the Titan Sport system by Titan Medical. He was elected IEEE Fellow for contributions to dexterous continuum robotics for surgery.