

Design of Soft Robots: Smart Actuation and Controlled Motion

Presented by

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Abstract

Smart devices, intelligent materials and soft robots are paving the way for rapid technological advancements, and are currently among the hottest topics of research in engineering and robotics. Soft robots with embedded actuation and sensing capabilities have the potential to perform a variety of tasks, including navigating restricted spaces and providing distributed contact not possible using traditional robots. However, significant challenges exist in transforming these concepts into functional devices due to issues in modeling large deformations, controlling dynamics of motion and actuating continuum devices. This talk will cover design, modeling and actuation techniques for soft robots, continuum manipulators and compliant mechanisms, with an eye on surgical, biomedical and scientific application. Recent developments in bio-inspired untethered magnetic soft robots will be discussed, demonstrating interesting motion capabilities. A novel design for a metallic continuum manipulator for high precision motion will be described. Reduced order computationally-efficient models for analysis of flexible members will be detailed, for implementation in closed-loop actuation. These developments in various aspects of soft robots and continuum devices are expected to improve the functionality and utility of these devices for applications ranging from minimally invasive surgical procedures to scientific exploration.

Biography

Venkatasubramanian Kalpathy Venkiteswaran received his combined Master's and PhD degrees in Mechanical Engineering from The Ohio State University, USA in 2017. He is currently a postdoctoral research fellow at Surgical Robotics Lab, University of Twente, The Netherlands. During his doctoral research, he studied methods for design and analysis for flexure-based compliant mechanisms under the tutelage of Prof. Haijun Su. He is currently involved in various projects for medical applications including magnetic soft robots and continuum manipulators for minimally invasive surgery. Venkat was recently awarded the Pioneers in HealthCare research grant by the TechMed Centre for collaborative research and is also the recipient of the Best Paper Award at ASME IDETC in 2014. His research interests are primarily in the fields of soft robotics and compliant mechanisms, utilizing innovative design and fabrication techniques inspired by nature towards achieving human-centric applications.

Friday, May 3rd, 2019

11:00am to Noon

ETRL room 101

Meet the speaker before the seminar in ETRL room 119, 10:30am to 10:50am. Light refreshments will be served.

