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Title:

Magnetically-Actuated Flexible and Minaturized Systems

Abstract:

The talk provides an overview of two ongoing research topics within the Surgical Robotics Laboratory (SRL) in the area of targeted drug delivery systems. In the first part of the talk, I describe some recent work from our lab on the topic of magnetically-actuated continuum robotic instruments. I will begin by presenting optical shape sensing techniques to localise the position of flexible instruments. This is followed by describing ultrasound-guided control of several types of novel magnetically-actuated instruments. Recent technological advances in micro-sized magnetic agents opens new possibilities for biomedical research. The second-half of the talk provides an overview of an ongoing research topic within SRL in the area of medical microrobotics (magnetically-actuated minaturized systems). I will discuss how wirelessly-controlled agents might offer advantages in terms of reduced invasiveness and untethered access to deep-seated regions within the human body. On that account, this talk covers the closed-loop control of microparticles, hydrogel grippers, microjets, and magnetosperms.

Biosketch:

Sarthak Misra joined the University of Twente in 2009. He is currently a Full Professor in the Department of Biomechanical Engineering at the University of Twente, Netherlands. He is also affiliated with the Department of Biomedical Engineering, University of Groningen and University Medical Center Groningen, Netherlands. Sarthak obtained his doctoral degree in the Department of Mechanical Engineering at the Johns Hopkins University, Baltimore, USA. Prior to commencing his studies at Johns Hopkins, he worked for three years as a dynamics and controls analyst at MacDonald Dettwiler and Associates on the International Space Station Program. Sarthak received his Master of Engineering degree in Mechanical Engineering from McGill University, Montreal, Canada. He is the recipient of the European Research Council (ERC) Starting, Consolidator, and Proof-of-Concept grants, Netherlands Organization for Scientific Research (NWO) VENI and VIDI awards, Link Foundation fellowship, McGill Major fellowship, and NASA Space Flight Awareness award. He is the co-chair of the IEEE Robotics and Automation Society Technical Committee on Surgical Robotics, and area co-chair of the IFAC Technical Committee on Biological and Medical Systems. Sarthak's broad research interests are primarily in the area of applied mechanics at both macro and micro scales. He is interested in the modeling and control of electro-mechanical systems with applications to medical robotics.