



Centre for Biosystems Science and Engineering

Seminar

Targeted Drug Delivery Systems: Needle Steering and Medical Micro robotics

on

1st February 2017,

4:00 PM, MRDG Seminar Hall, 1st Floor, Biological Sciences Building.

by

Prof. Sarthak Misra

Surgical Robotics Laboratory, University of Twente, Netherlands

The speaker will provide an overview of two ongoing research topics within the Surgical Robotics Lab in the area of targeted drug delivery systems, i.e., needle steering and medical micro robotics.

The first part of the talk, speaker will describe combining needle deflection models with image-guided techniques to steer flexible needles to a moving target. Two different models for predicting needle deflection undergoing multiple bends will be presented. The first is a kinematics-based model, and the second model predicts needle deflection based on the mechanics of needle-tissue interaction. The models are validated using double bend experiments in soft-tissue simulants, and also using a needle embedded with Fibre Bragg Grating sensors. The kinematics-based model is used for steering the needles under image-guidance. The proposed steering algorithm is demonstrated using camera and ultrasound images as feedback while compensating for target motion. The algorithm is also used to track a needle undergoing multiple bends in 3D using a 2D ultrasound probe.

The second half of the talk, will entail a discussion on how wirelessly controlled agents might offer advantages in terms of reduced invasiveness and untethered access to deep-seated regions within the human body. The closed-loop control of micro particles, miniaturised hydrogel grippers, micro jets, and magneto sperms will also be discussed.

About the speaker

Sarthak Misra is currently an Associate Professor in the Department of Biomechanical Engineering at University of Twente. He directs the Surgical Robotics Laboratory, and is affiliated with MIRA - Institute for Biomedical Technology and Technical Medicine. Sarthak obtained his doctoral degree in the Department of Mechanical Engineering at the Johns Hopkins University. 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's broad research interests are primarily in the area of applied mechanics at both macro and micro scales. He is interested in the modelling and control of electro-mechanical systems with applications to medical robotics.