

Title: Design and Control of Concentric Tube Robots
Topic: Christos Bergeles Visiting Scholar Symposium
Time: Feb 18, 2021 09:30 AM Eastern Time (US and Canada)

Abstract

Concentric tube continuum robots can navigate anatomical pathways to reach deep seated pathology locations. Their flexible structure makes them ideal intraluminal navigation and operation in confined spaces. Critically, however, their flexibility comes at the expense of manipulability, force capability, workspace, intuitiveness and operational safety. This talk will discuss modelling of those robots, also visiting the fields of machine learning for kinematics and inverse kinematics derivation. Patient- and surgery- specific design processes for optimal operational capability of the robots will be presented. The talk will conclude with new control algorithms that consider the inherent non-holonomic constraints of these elongated slender continuum robots, showing how mechanical instabilities and control «local minima» can be avoided.

Bio

Christos Bergeles is Assistant Professor (Tenured) at *King's College London, United Kingdom*, and Deputy Director of the Centre for Doctoral Studies on Surgical & Interventional Engineering. His research focuses on the development of image-guided micro-surgical systems, crossing the boundaries between smart instrumentation and artificial intelligence. The mission of his team, the Robotics and Vision in Medicine Lab, is to develop flexible robotic systems that deliver regenerative therapies with micrometer precision. Key experience includes the development of robust mechatronic systems that adhere to clinical requirements to facilitate their translation. Close collaboration with expert clinicians ensures that the developed systems are fit for purpose, and speeds up the process of delivering patient benefits. Christos is the recipient of the ERC Starting Grant (2017 - 2022) and the Fight for Sight award (2014) from the Royal College of Ophthalmologists.

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