



**THE CHINESE UNIVERSITY OF HONG KONG**  
**Department of Electronic Engineering**  
**Seminar**



**Teaching a robot to perform surgery:  
from 3D image understanding to  
deformable manipulation**

**Michael Yip**  
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**Department of Electrical and Computer Engineering,**  
**University of California San Diego**

**Date: 28 Feb 2024 (Wednesday)**

**Time: 2:30 – 3:30 p.m.**

**Place: Rm 222, Ho Sin Hang Engineering Building, CUHK**

**Abstract**

Robot manipulation of rigid household objects and environments has made massive strides in the past few years due to the achievements in computer vision and reinforcement learning communities. One area that has taken off at a slower pace is in manipulating deformable objects. For example, surgical robotics are used today via teleoperation from a human-in-the-loop, but replacing the human's visual understanding and task performance with an AI remains a lofty and puzzling challenge. How do you build intuition and control of how to deform, stretch, or cut anatomical tissue, find hemorrhages and suction blood and bodily fluids from view, or simply localize your robot within a dynamically changing and deformable world in real-time?

In this talk, I will discuss our work to automate robotic surgery and how we build new modeling and learning schemes for deformable robot manipulation and visual servoing. I will discuss how we analyze a multimodal spectrum of sensory information to solve real-to-sim and sim-to-real problems, while towing a fine line between physics-based models and the less-explainable yet highly successful latent space embeddings. I will show how this translates beyond the operating room and into general robot manipulation.

**Biography**

Michael Yip, Ph.D., is an Associate Professor at the University of California San Diego and the Director of the Advanced Robotics and Controls Laboratory. His research expertise is at the intersection of robotics, machine learning, and computer vision, enabling robots to work with deformable objects and environments with image guidance and tactile perception. The work has been applied to automating robotic surgery, enabling snake robot locomotion, coordinating multiple robot arms, autonomous driving, and search and rescue. Dr. Yip and his research group have won numerous best paper awards at major robotics conferences and journals. He was elected as a member of the National Academy of Inventors in 2024. Dr. Yip was previously a Research Associate with Disney Research, a Visiting Professor at Stanford University, and a Visiting Professor with Amazon Robotics. He received a B.Sc. from the University of Waterloo, an M.S. from University of British Columbia, and his Ph.D. from Stanford University.

**\*\*\* ALL ARE WELCOME \*\*\***

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