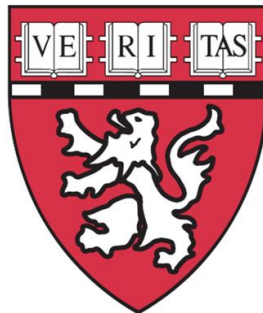


# ICRA 2016 Tutorial on Medical Robotics

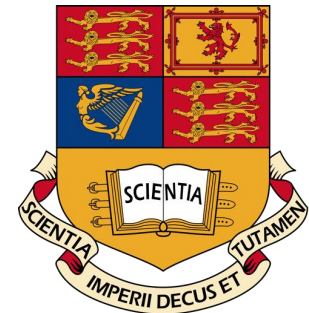
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# Tutorial on Medical Robotics

Please fill out  
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If you have questions during the tutorial but  
are too shy to ask, enter them here:  
<http://tinyurl.com/medrobtut>

# Frontiers of Medical Robotics

- **Robot-Assisted Surgery** needs to be more dextrous, integrated with superhuman sensing and autonomous capabilities. There is huge potential for procedure-specific and patient-specific rapid design and fabrication.
- **Image Guided Therapy** can play a key role in Precision Medicine where the accurate biopsy enabled by biopsy robot can analyze disease tissue at the molecular level and then to apply targeted treatments to address that individual patient's disease process. Addressing tumor heterogeneity is key.

# Frontiers of Medical Robotics

**Movement assistance and therapy** require:

- human-human sensorimotor interaction in order to shape intuitive and efficient human-robot interaction
- commercialization and testing of second generation of simple rehabilitation devices
- novel robot-aided neuroscientific investigations leading to new treatments
- affordable, commercial smart devices (wearable, wheelchairs)

# Learning Objectives

## Lectures 1 & 2 (Allison)

- Define surgery and minimally invasive surgery
- Explain the function and advantages/disadvantages of current commercial robot-assisted surgical systems
- Highlight design features of current and future generations of robotic devices
- Understand the kinematic structures of medical robots
- Identify common types of sensors and actuation technologies used in medical robots
- Identify control strategies used for human-in-the loop medical robots

## Lecture 3 (Noby)

- Understand the fundamentals of medical imaging
- Understand the role of medical imaging to guide therapy and diagnosis – Image Guided Therapy
- Learn role of robotics in Image Guided Therapy research and key enabling technologies

## Lecture 4 (Etienne)

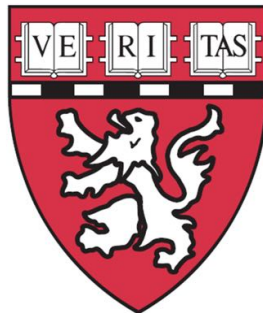
- Learn the main factors for collaborative robots physically interacting with human movements
- Know how robots can be used to investigate human sensorimotor control
- Understand some aspects of human-robot interaction

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