

Seminar

CENTER FOR
ADAPTIVE NEURAL SYSTEMS

IRA A. FULTON SCHOOL OF ENGINEERING

Haptics in Medical Robotics: Surgery, Simulation, and Rehabilitation

Allison Okamura, PhD

Abstract: Haptics is the science and technology of experiencing and creating touch sensations. This talk will examine the role of haptics in three types of medical systems: surgical robotics, surgical simulators, and rehabilitation robotics. Robot-assisted surgery can improve the outcomes of medical procedures by enhancing accuracy and minimally invasive access, thereby reducing patient trauma and recovery time. However, the current lack of force and tactile information is hypothesized to compromise system performance. With approaches ranging from psychophysical studies to control systems engineering, we are designing teleoperated robots capable of providing haptic feedback in challenging surgical environments. Haptic information is also needed for accurate surgical simulation. Surgical simulators present a safe and potentially effective method for surgical training, and can also be used in robot-assisted surgery for pre- and intra-operative planning. I will describe experiments to determine the mechanics of interaction between surgical instruments and tissues, as well as techniques for accurate patient-specific modeling. Finally, rehabilitation through robotically enabled orthotics and prosthetics inherently requires understanding and appropriate generation of haptic interactions. Our recent work in this area includes motor control augmentation with an exoskeleton robot, and studies of the role of haptic proprioception in prosthetic limb use.

Biography: Allison M. Okamura received the BS degree from the University of California at Berkeley in 1994, and the MS and PhD degrees from Stanford University in 1996 and 2000, respectively, all in mechanical engineering. She is currently an associate professor of mechanical engineering and the Decker Faculty Scholar at Johns Hopkins University. She is associate director of the Laboratory for Computational Sensing and Robotics and a thrust leader of the NSF Engineering Research Center for Computer-Integrated Surgical Systems and Technology. Her awards include the 2005 IEEE Robotics Automation Society Early Academic Career Award, the 2004 US NSF CAREER Award, the 2004 JHU George E. Owen Teaching Award, and the 2003 JHU Diversity Recognition Award. Her research interests are haptics, teleoperation, medical robotics, virtual environments and simulators, prosthetics, rehabilitation engineering, and engineering education.

Location and Time:

Location: ERC 490

Date: Oct. 21, 2008

Time: 4:00pm—5:00 pm

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