



Surgical Navigation and Planning in Computer-Integrated Interventional Medicine: An Information Fusion Perspective

by

Professor Hongliang Ren
Department of Bioengineering
National University of Singapore
Singapore



Date: 21 June 2012 (Thursday)

Time: 10:30 am – 12 noon

Venue: Room 222, 2/F, Ho Sin Hang Engineering Building, CUHK

Abstract

Surgical planning and navigation systems enable surgeons to carry out surgical interventions more accurately and less invasively, by tracking the surgical instruments with respect to the target anatomy. This talk will discuss several relevant aspects of this topic, such as a wireless hybrid navigation system primarily for laparoscopic surgeries, ultrasound based tracking of surgical robots for beating-heart surgeries, and other related studies.

The main topic will focus on a wireless integrated navigation system in laparoscopic surgeries. In order to get the real-time position and orientation measurements of surgical instruments inside the human body, we developed a miniature tracking device, free of the constraints of line-of-sight or entangling sensor wires. The proposed sensor fusion algorithm integrates the information from miniature inertial measurement unit (IMU) and electromagnetic tracking (EMT) devices, based on a quaternion formulation of the system dynamics and sensor models. The experimental results show that the proposed system can meet the tracking requirements, in terms of tracking accuracy, latency and robustness.

Biography of the Speaker

Hongliang Ren has been an assistant professor in Bioengineering at the National University of Singapore since June 2012. He was a research fellow, working on image-guided robotic surgery systems, at the Sheikh Zayed Institute for Pediatric Surgical Innovation at Children's National Medical Center, Washington D.C., from January to May 2012. He was with the Pediatric Cardiac Bioengineering Lab, Department of Cardiovascular Surgery, Harvard Medical School and Children's Hospital Boston from December 2010 to December 2011. Prior to joining Harvard, he was a postdoctoral researcher in the Laboratory for Computational Sensing and Robotics (LCSR) and the Engineering Center for Computer-Integrated Surgical Systems and Technology (ERC-CISST), Department of Biomedical Engineering and Department of Computer Science, The Johns Hopkins University, Baltimore, USA, from 2008 to 2010. He received his Ph.D. degree in Electronic Engineering from The Chinese University of Hong Kong (CUHK), Hong Kong, in 2008. His research interests include image-guided Computer-Integrated Surgical (CIS) systems, medical robotics and biomedical sensor networks.

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ALL ARE WELCOME

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** Light refreshment will be served at 10am before the lecture **