

Plenary Speech II

14:15 – 15:00, Tuesday, July 11

CYT LT1

Robots that Assist Surgeons in Minimally Invasive Surgery



Professor Yunhui Liu

CUHK T Stone Robotics Institute, The Chinese University of Hong Kong, China

Abstract

Robots are being widely employed to perform surgical procedures for their high accuracy in manipulating surgical instruments. In addition to remotely-controlled surgical robots such as the da Vinci surgical system, one of the major directions of research and development in surgical robotics is to develop small, low-cost, user-friendly, and easy-to-learn robot assistants that can collaborate with surgeons

side-by-side in supportive tasks like assistants. This talk will introduce our on-going efforts on development of assistive surgical robots and present the latest solutions to the key technological problems, including customized design of safe surgical robots using compliant and safe joints, endoscopic image-based control for assistive surgical robots to stably interact with soft tissues without knowing deformation models, and the friendly and easy-to-learn multi-modal interface for facilitating interactions between hands-occupied surgeons and the robots. Two robotic assistants and their experiments on cadavers will be demonstrated for handling endoscope in nose and throat surgery and manipulating uterus in total laparoscopic hysterectomy, respectively.

Biography

Prof. Yunhui Liu received his B. Eng. degree in Applied Dynamics from Beijing Institute of Technology, China, in 1985, his M. Eng. degree in Mechanical Engineering from Osaka University in 1989, and his Ph.D. degree in Mathematical Engineering and Information Physics from the University of Tokyo, Japan, in 1992. He worked at the Electrotechnical Laboratory, MITI, Japan from 1992 to 1995 as a Research Scientist. He has been with Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong since 1995, and is currently a Professor, the Director of the CUHK T Stone Robotics Institute. Professor Liu is interested in medical robotics, vision-based robot control, aerial robotics, multi-fingered grasping, networked robotics, and robot applications. His research has been widely funded by RGC, ITF and QEF in Hong Kong, and by the national programs in Mainland China. He has published over 200 papers in refereed professional journals and international conference proceedings. He has received a number of best paper awards from international journals and major international conferences in robotics and automation. He is the Editor-in-Chief of Robotics and Biomimetics and an Editor of Advanced Robotics, and was an Associate Editor of IEEE Transactions on Robotics and Automation. He was listed in Highly Cited Authors (Engineering) by Thomson Reuters in 2013. Professor Liu was the General Chair of 2006 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). He is a Fellow of IEEE.