14TH INTERNATIONAL CONFERENCE ON ADVANCED ROBOTICS

Munich, Germany
June 22nd to 26th, 2009

http://www.icar2009.org

Sponsored by the German Robotics Society (DGR)
Technically Co-sponsored by IEEE Robotics and Automation Society (RAS)

ICAR 2009 Workshop
June 22, 2009 – Munich, Germany

Title

Surgical Robotics and Computer-assisted Navigation for Minimally Invasive Interventions

Organizers

Sonia Pujol, Ph.D., Harvard University, USA

Paolo Fiorini, Ph.D., University of Verona, Italy

Synopsis

Minimally invasive surgical interventions offer therapeutic alternatives to traditional open surgery in order to improve patient safety and outcomes: the main benefits include smaller incisions, reduced post-operative pain, a shorter hospital stay and a faster recovery. However, when conducting an intervention on an anatomical target from a remote access, surgeons face new technical challenges related to the absence of direct visual assessment of the site of the lesion, and direct tactile feedback on the organ of interest.

The development of sophisticated technologies that combine miniaturized sensors, artificial intelligence, micromechanics and virtual reality environments have fostered the emergence of service robots capable of operating in hazardous environments where human operators cannot be deployed such as space and underwater. Over the past few decades, such technologies have being applied towards the problematic of navigating the safest path through the human body.

Surgical robots and computer-assisted navigation systems are capable of providing technical solutions to overcome many of the challenges of minimally invasive interventions. By integrating anatomical and functional mapping of the areas of interest with real-time tracking of surgical tools, surgical robotic systems have the potential to extend the surgeon's ability to navigate the safest path to anatomical targets. However, there is a need for accurate, simple, and affordable computer-assisted surgical systems. Beyond technological achievements, research efforts in surgical robotics and computer-aided navigation need to be driven by three main requirements of minimally invasive interventions: clear clinical benefits for the patient, minimal training for the surgeon, and cost-effectiveness for the healthcare system.

The objectives of this workshop are 1) to present the recent developments in technologies associated with enhancing surgeons' perception during minimally invasive procedures, 2) to serve as a comprehensive forum to discuss all aspects and existing resources for the development of surgical navigation systems, and 3) to assess the current challenges for integrating medical robotics and computer-assisted navigation technologies to the next generation of operating rooms.

Type of Session:

This one-day workshop is composed of a series of didactic lectures by invited speakers, a panel presentation of open-source software resources for surgical navigation, and a panel discussion aiming at establishing a list of directions and open research questions in surgical robotics.

Preliminary Program

8:30-9:00   Registration and Coffee

9:00-9:30   Welcome and presentation of workshop objectives
               Sonia Pujol, Ph.D. and Paolo Fiorini, Ph.D.

9:30-10:30   Session 1

9:30-10:00   Computer-Assisted Neurointerventions: the clinician perspective
               Kai Frerichs, MD, Brigham and Women's Hospital, USA

10:00-10:30   Remote Navigation in the Brain: trends and challenges
               Sonia Pujol, Ph.D., Harvard University, USA

10:30-11:00   Coffee Break

11:00-12:00   Session 2

11:00-11:30   Augmented Reality: intelligent displays for surgical procedures
               Nassir Navab, Ph.D., Technische Universität München, Germany

11:30-12:00   Augmented Perception: the role of haptics in minimally invasive surgery
               Paolo Fiorini, Ph.D., University of Verona, Italy

12:00-13:45   Lunch Break

13:45-15:30   Session 3

13:45-14:15   Robotically Assisted Spine Needle Placement
               Kevin Cleary, Ph.D., Georgetown University Medical Center, USA

14:15-14:45   Applications of programmable and task-customized surgical robots
               Eigil Samset, Ph.D., University of Oslo- Kongsberg SIM, Norway

14:45-15:30   Panel Presentation: Open-source tools for Computer-Assisted Surgery
               Kevin Cleary, Ph.D., Georgetown University Medical Center, USA
               Sonia Pujol, Ph.D., Harvard University, USA

15:30-16:00   Coffee Break

16:00-18:00   Session 4

16:00-16:30   Laserosteotomy using light-weight robot
Jörg Raczkowsky, Ph.D., University of Karlsruhe, Germany

16:30-17:00   Accurate Robotic Assistant for Surgical Procedures (AccuRobAs)
Paolo Fiorini, Ph.D., University of Verona, Italy
Jörg Raczkowsky, Ph.D., University of Karlsruhe, Germany
Rainer Konietschke, Ph.D., DLR, Germany
Philippe Poignet, Ph.D., University of Montpellier, France

17:00-17:45   Panel Discussion: Challenges and Future directions in Computer-Assisted Surgery

17:45-18:00   Conclusion
Sonia Pujol, Ph.D. and Paolo Fiorini, Ph.D.