ICRA 2006 Workshop  
Robotics Based Medicine  
Orlando, USA  
Friday, May 19th, 2006

1. Co-organizers

Mamoru Mitsuishi, The University of Tokyo, Japan  
Koji Ikuta, Nagoya University, Japan  
Paolo Dario, Scuola Superiore Sant’Anna, Italy  
Kazuo Kiguchi, Saga University, Japan

2. Objectives and Topics

The workshop named “robotics based medicine” focuses on the new contribution of the robotics into the biomedical area including nano and micro biotechnology. The workshop includes, for example, the following topics: (1) surgical system considering the biomedical characteristics of a tissue, bone and organ, (2) miniature medical robotics, and (3) muscle MEMS.

Medical applications are some of the most promising areas for robotic technology. Many researches on “robotics based medicine” have been carried out in these days. Robotics in surgery and rehabilitation is especially expected as a new medical technology. Therefore, the workshop mainly deals with robotic surgery and robotic rehabilitation.

To support the surgical operations, processes performed before, during and after surgery can be assisted and the following items should be considered: medical CAD/CAM systems including medical image processing, needle insertion assist, reconstruction of three dimensional models from radiographic studies, registration and navigation during the operation, mechanisms for producing dexterous motion, safety, and issues related to disinfection and irrigation in the clinical environment. These systems must be considered the biomedical characteristics. Future trends, such as miniature medical robotics and muscle MEMS, are also discussed as a main part of the workshop.

To support the rehabilitation operation, patients’ motion in rehabilitation or daily activities can be assisted can be assisted. This is important for injured, disabled, and elderly persons. Presentations in the proposed workshop will cover the latest topics of these wide areas in the U.S., Europe, and Asia.
3. Schedule

8:00-8:10: Opening
   Mamoru Mitsuishi (The University of Tokyo, Japan)

8:10-8:40: Towards the development of a cybernetic hand: scientific, technical and clinical issues
   Maria Chiara Carrozza (Scuola Superiore Sant'Anna, Italy)

8:40-9:10: A Robotic Rehabilitation Environment with Visual Feedback Distortion
   Yoky Matsuoka (Carnegie Mellon University, USA)

9:10-9:40: Human Centered Approach in Surgical and Rehabilitation Robotics
   Jacob Rosen (University of Washington, USA)

9:40-10:10: Haptic and Robotic Technology for Medical Rehabilitation and Assessment
   Darwin G. Caldwell (University of Salford, England)

10:10-10:40: Coffee Break

10:40-11:10: Broadcast Feedback of Cellular Muscle Actuators and Bio-Nano Systems
   H. Harry Asada, Jun Ueda, and Lael Odhner (Massachusetts Institute of Technology, USA)

11:10-11:40: Robot-Aided Neurorehabilitation
   Robert Riener and Tobias Nef (ETH Zurich and University Hospital Balgrist, Switzerland)

11:40-12:10: Advanced Technologies for Rehabilitation: State of the art and future perspectives
   Paolo Dario, Silvestro Micera, and M. Chiara Carrozza (Scuola Superiore Sant'Anna, Italy)

12:10-13:30: Lunch

13:30-14:00: Power Assist Robots for Physically Weak Persons
   Kazuo Kiguchi (Saga University, Japan)
14:00-14:30: Non-Contact Impedance Sensing for Medical Application
   Makoto Kaneko (Hiroshima University, Japan)

14:30-15:00: What is the intelligence for useful medical robot?
   Masakatsu G. Fujie (Waseda University, Japan)

15:00-15:30: Coffee Break

15:30-16:00: Micro/Nano Robotics for cellular biology and future biomedicine
   Koji Ikuta (Nagoya University, Japan)

16:00-16:30: Image Guided Robotics Surgery – Towards Less Invasive Therapy
   Tobias Ortmaier and Rainer Konietschke (German Aerospace Center (DLR), Germany)

16:30-17:00: How to Give Intelligence to Medical Robots?
   Dong-Soo Kwon (KAIST, Korea)

17:00-17:30: Minimally Invasive Orthopedic Surgical System for TKA/UKA Considering the Biomedical Characteristics of the Bone
   Mamoru Mitsuishi and Naohiko Sugita (The University of Tokyo, Japan)

17:30-18:00: Discussions

18:00: Adjourn