Program (23/07/13)

	8:30-9:00	9:00-10:30	11:00-12:30	12:30-14:30	14:30-16:00	16:30-18:00	18:00-19:00
Tuesday, Sept 3					Installation at Residence Hotel "Les Citadines"		
Wedn., Sept 4	Opening	Introduction to surgical robotics P. Poignet	Robot registration J. Troccaz	Official Lunch	Control I F. Nageotte	??? J. Troccaz	Visit of Montpellier
Thursday, Sept 5		Design & Safety J. Rosen	Modeling & Simulation C. Duriez	Lunch	Control II N. Zemiti	Students' presentations	Students' presentations
Friday, Sept 6		Technical I R. Howe	Control III G. Morel	Lunch	Industrial forum *(CRDP)*		Medical imaging G.Z. Yang	Cocktail Medical School
Saturday, Sept 7		Technical II R. Taylor	LIRMM demonstrations *(LIRMM)*	Free afternoon			
Sunday, Sept 8		Sightseeing tour					
Monday, Sept 9		Technical III C. Riviere	Technical IV R. Webster	Lunch	Medical I L. Soler	Technical V G. Kronreif	Students' presentations
Tuesday, Sept 10		Medical II P. Mozer	Medical III E. Stindel	Lunch	Medical IV S. Perretta	Students' presentations	Students' presentations
Wedn., Sept 11		Future trends in Surgery A. Melzer	Future trends in surgical robotics I P. Fiorini	Lunch	Future trends in surgical robotics II P. Dario	Evaluation and closing session	

Basics

Applications: technical viewpoint

Applications: surgical viewpoint

Future trends

Admission

The number of participants is restricted to 50. Priority will be given to Ph.D. students and Post-docs from the European Community but a significant number of researchers and professionals, as well as students from extra-EC countries will be accepted.

Applicants must be registered by July 1st, 2013 (http://2013.sssr.fr/registred.php). A scientific committee will select the candidates. A letter of confirmation will be sent to accepted participants.

The lodging expenses will be partially supported by the organizers depending on fundings, the complement being provided by the participants. The travel will be at the participants' own expenses. The organizers will offer the lunches and the sightseeing tour.

Contact

For further administrative information, please contact Justine Landais, LIRMM, Justine.Landais@lirmm.fr

For further scientific information, please contact Philippe Poignet / Nabil Zemiti, LIRMM, poignet@lirmm.fr / zemiti@lirmm.fr

Laboratoire d'Informatique de Robotique et de Microélectronique de Montpellier

LIRMM

6th Summer School
Surgical Robotics

September 4-11, 2013
Montpellier (France)

Coordinated by
Philippe Poignet and Nabil Zemiti
LIRMM, CNRS – Université Montpellier 2
Renaud Garrel
Université Montpellier 1, ENT Dpt

http://2013.sssr.fr

Labex CAMI
Labex NUMEV
Centre National de la Recherche Scientifique (CNRS)
Université Montpellier 1
Université Montpellier 2
Ecole Doctorale I2S

Surgical robotics

Robotics enables surgery to be less invasive and/or to enhance the performance of the surgeon. In minimally invasive surgery (MIS) for instance, robotics can improve the dexterity of conventional instruments, which is restricted by the insertion ports, by adding intra-cavity degrees of freedom. It can also provide the surgeon with augmented visual and haptic inputs. In open surgery, robotics makes it possible to use in real time pre-operative and per-operative image data to improve precision and reproducibility when cutting, drilling, milling bones, to locate accurately and remove tumours. In both cases, as in other surgical specialities, robotics allows the surgeon to perform more precise, reproducible and dextrous motion. It is also a promising solution to minimize his fatigue and to restrict his exposition to radiation. For the patient, robotics surgery may result in less risk, pain and discomfort, as well as a shorter recovery time. These benefits explain the increasing research efforts made all over the world since the early 90's.

Surgical robotics requires great skills in many engineering fields as the integration of robots in the operating room is technically difficult. It induces new problems such as safety, man-machine cooperation, real time sensing and processing, mechanical design, force and vision-based control… However, it is very promising as a mean to improve conventional surgical procedures, for example in neurosurgery and orthopedics, as well as providing innovative new ones in micro-surgery, image-guided therapy, MIS and Natural Orifice Transluminal Endoscopic Surgery (NOTES).

The highly interdisciplinary nature of surgical robotics requires close cooperation between medical staff and researchers in mechanics, computer sciences, control and electrical engineering. This cooperation has resulted in many prototypes for a wide variety of surgical procedures. A few robotics systems are yet available on a commercial basis and have entered the operating room namely in neurosurgery, orthopedics and MIS.

Depending on the application, surgical robotics gets more or less deeply into the following fields: multi-modal information processing; modelling of rigid and deformable anatomical parts; pre-surgical planning and simulation of robotic surgery; design and control of guiding systems for assistance of the surgeon gesture. During the Summer school, these fields will be addressed by surgeons and researchers working in leading hospitals and labs. They will be completed by engineers who will give insight into practical integration problems.

This course is addressed to PhD students, post-docs and researchers already involved in the area or interested by the new challenges of such an emerging area interconnecting technology and surgery. Basic background in mechanical, computer science, control and electrical engineering is recommended.

This Summer School follows five previous editions held in Montpellier on a biennial basis since 2003:
http://2013.sssr.fr/lasted.php

Content

The lectures will be organized in four parts:

- *Fundamental aspects of surgical robotics (2 days):* medical imaging, modelling, control, design and safety, planning and registration, haptics;
- *Applications (2 days):* technical point of view (from design to experiment), and surgical point of view (orthopedics, urology and abdominal surgery);
- *Industrial forum (1 day)* with exhibition of equipments, presentations of applications, and demonstrations; visit of the LIRMM facilities;
- *Future trends (1 day):* perspectives in small size robots and mechatronic devices for surgery and therapy; perspectives in NOTES.

Time will be reserved for the participants to present their own research work.

Invited lecturers

Chosen among the most well-known experts worldwide, the lecturers have a significant theoretical and practical background in Surgical Robotics. They represent the clinical, scientific and engineering communities:

Paolo Dario, Scuola Superiore Sant'Anna, Pisa, Italy
Christian Duriez, INRIA, Villeneuve d'Ascq, France
Paolo Fiorini, University of Verona, Italy
Robert D. Howe, Harvard University, Cambridge, USA
Gernot Kronreif, ACMIT, Wiener Neustadt, Austria
Andreas Melzer, IMSaT, Dundee, UK
Guillaume Morel, ISIR, Paris, France
Pierre Mozer, ISIR, Paris, France
Florent Nageotte, ICube, Strasbourg, France
Silvana Perretta, IRCAD, Strasbourg, France
Philippe Poignet, LIRMM, Montpellier, France
Cameron Riviere, Carnegie Mellon University, USA
Jacob Rosen, University of California, Santa Cruz, USA
Luc Soler, IRCAD, Strasbourg, France
Eric Stindel, CHU-LATIM, Brest, France
Russ Taylor, John Hopkins University, Baltimore, USA
Jocelyne Troccaz, TIMC, Grenoble, France
Robert J. Webster III, Vanderbilt University, USA
Guang-Zhong Yang, Imperial College, London, UK
Nabil Zemiti, LIRMM, Montpellier, France

Lectures and school materials

All lectures will be given in English. The lecturers' slides will be available on line at the time of the class. All the School material (including slides of students' presentations) will be available by the end of September on the website of the Summer school together with significant papers of the lecturers as well as videos.

ECTS

The 36-hour courses of the Summer School will be accredited by the *Doctoral School on Information, Systems and Structure* (I2S) of the University of Montpellier 2 (a *Doctoral School* in the French Universities manages the Ph.D. degree). 5 ECTS credit points will be awarded to student attendees.

Accommodation

The lectures will be given in the "Centre Régional de Documentation Pédagogique", which is located downtown Montpellier (http://2013.sssr.fr/get.php).

The students will be housed in apartments for two people, in the residence "Les Citadines – Antigone", at walking distance from CRDP.