

Program

	8:30-9:00	Tuesday, Sept 1	Installation at the Belambra Clubs	
	9:00-10:30	Wed., Sept 2	Opening	Introduction to surgical robotics F. Pognet
	11:00-12:30	Thursday, Sept 3	Control I F. Nageotte	Technical II S. Mirra Technical III J. Troccaz
	12:30-14:30	Friday, Sept 4	Official Lunch	Medical imaging I N. Navab
	14:30-16:00	Saturday, Sept 5	Situation Awareness J-P Henry	Lunch LIRMM demonstrations (LIRMM)
	16:30-18:00	Sunday, Sept 6	Modelling & Simulation C. Duriez	Control II G. Morel Free afternoon
	18:00-19:00	Monday, Sept 7	Students' presentations	Medical imaging II D. Stoyanov
		Tuesday, Sept 8	Industrial Forum	Technical IV R. Taylor
		Wednesday, Sept 9	Olympic Games	Medical II P. Livernaux Surgery Modelling P. Jannin Future trends in surgical robotics II A. Menzassi
		Thursday, Sept 10	Students' presentations	Medical III E. Sindel Lunch Medical IV L. Soler Future trends in surgical robotics I P. Fiorini
		Friday, Sept 11	Medical Imaging I D. Stoyanov	Future trends in Surgery A. Meizer
		Saturday, Sept 12	Students' presentations	Evaluation and closing session

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 25th, 2015 (www.lirmm.fr/sss-2015/registred.html). A scientific committee will select the candidates. A letter of confirmation will be sent to accepted participants.

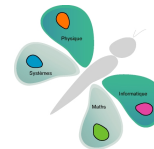
The lodging expenses and the meals will be supported by the organizers thanks to sponsor funding and completed by the registration fees of the participants. The travel will be at the participants' own expenses.



Contact

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7th Summer School Surgical Robotics

September 2-9, 2015
Montpellier (France)

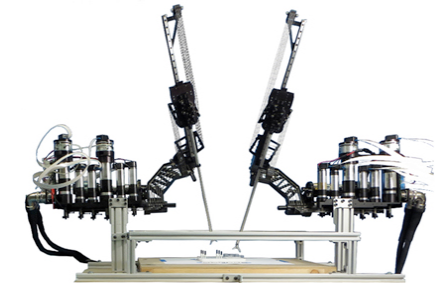


Image : Courtesy of Applied Dexterity
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www.lirmm.fr/sss-2015

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Université de Montpellier
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/her fatigue and to restrict his/her 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.

These courses are 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 six previous editions held in Montpellier on a biennial basis since 2003:

www.lirmm.fr/sss-2015/lasted.html

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, abdominal surgery, ENT);
- *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:

Arianna Menciassi, Scuola Superiore Sant'Anna, Pisa, Italy

Jaydev Desai, University of Maryland, USA

Christian Duriez, INRIA, Villeneuve d'Ascq, France

Paolo Fiorini, University of Verona, Italy

Jean-Pierre Henry, STAN Institut, Nancy, France

Pierre Jannin, LTSI, Rennes, France

Philippe Liverneux, CHU, Strasbourg, France

Sylvain Martel, Polytechnique Montréal, Canada

Andreas Melzer, IMSaT, Dundee, UK

Sarthak Misra, University of Twente, The Netherlands

Guillaume Morel, ISIR, Paris, France

Pierre Mozer, ISIR, Paris, France

Florent Nageotte, ICube, Strasbourg, France

Nassir Navab, TUM, Munich, Germany

Philippe Poinet, LIRMM, Montpellier, France

Cameron Riviere, Carnegie Mellon University, USA

Luc Soler, IRCAD, Strasbourg, France

Eric Stindel, CHU-LATIM, Brest, France

Danail Stoyanov, University College of London, England

Russ Taylor, John Hopkins University, Baltimore, USA

Jocelyne Troccaz, TIMC, Grenoble, France

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 (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 at the "Belambra Club Presqu'île du Ponant", which is located at La Grande-Motte (seaside resort near Montpellier) (www.lirmm.fr/sss-2015/get.html). The attendees will be sharing apartments for two to three persons.