

| 18h15 - 19h00 | 16h30 - 18h00 | 14h30 - 16h00 | 12H30 - 14h30 | 11h00 - 12h30 | 9h00 - 10h30 | 8h30 - 9h00 | | |
|-----------------------|---|--------------------------------------|------------------|---|---|-------------|--|--------------|
| | Installation at Hotel | | | | | | | Tue, Sept 6 |
| Visit of Montpellier | Medical Imaging II <i>C. Burtlot</i> | Design and Safety <i>F. Péroz</i> | Official Lunch | Medical Imaging I <i>H. Delingenne</i> | Introduction to Surgical Robotics <i>E. Dombre</i> | Opening | | Wed, Sept 7 |
| Student Presentations | Registration <i>J. Truccaz</i> | Control II <i>M. de Kadtelin</i> | Lunch | Control I <i>P. Pignier</i> | Modelling <i>H. Delingenne</i> | | | Thu, Sept 8 |
| Student Presentations | Future Trends I <i>M. Misunishi</i> | Technical III <i>T. Ornator</i> | Lunch | Technical II <i>J. Rosen</i> | Technical I <i>G. Morel</i> | | | Fri, Sept 9 |
| | | | | 10h-12h Visit of LIRMM | | | | Sat, Sept 10 |
| | | | Sightseeing Tour | | | | | Sun, Sept 11 |
| Student Presentations | Medical IV <i>E. Stindel</i> | Medical III <i>L. Soler</i> | Lunch | Medical II <i>O. Chironnon</i> | Medical I <i>N. Bonnet</i> | | | Mon, Sept 12 |
| Student Presentations | Technical IV <i>W. T. Ang</i> | To be confirmed | Lunch | Industrial II <i>Y. Patou</i> | Industrial I CAD Implant <i>G. Champelboux</i> | | | Tue, Sept 13 |
| | Evaluation and Closing Cocktail | Future Trends IV <i>P. Darro</i> | Lunch | Future Trends III <i>P. Clapain</i> | Future Trends II <i>G. Heger</i> | | | Wed, Sept 14 |

PRELIMINARY PROGRAM

Admission

The number of participants is restricted to 40. Priority will be given to Ph.D. students and Post-docs from the European Community but a limited number of researchers and professionals, as well as students from extra-EC countries will be accepted.

Applicants must fill the application form (available at <http://www.lirmm.fr/UEE05>) by June 15th, 2005. 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 funding, the complement being provided by themselves. The travel will be at the participant own expenses. The organizers will offer the lunches, as well as the welcome and closing receptions, and the sightseeing tour.

For further administrative information, please contact Céline Berger, LIRMM, berger@lirmm.fr

For further scientific information, please contact Etienne Dombre / Philippe Poinet, LIRMM dombre@lirmm.fr / poignet@lirmm.fr



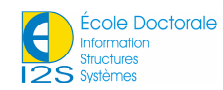
Laboratoire d'Informatique de Robotique et de Microélectronique de Montpellier



Pôle Universitaire Européen de Montpellier et du Languedoc-Roussillon

Surgical Robotics
2nd Summer European University
Coordinated by
Etienne Dombre and Philippe Poinet
LIRMM, CNRS-Université Montpellier II
Montpellier, France,
September 7-14, 2005

<http://www.lirmm.fr/UEE05>



Ministère de l'Éducation Nationale, de l'Enseignement Supérieur et de la Recherche
European Robotics Research Network (EURON)
Conseil Général de l'Hérault
Pôle Universitaire Européen de Montpellier
Faculté de Médecine, Université Montpellier I
Ecole Doctorale I2S, Université Montpellier II
Centre National de la Recherche Scientifique (CNRS)

Surgical robotics

Robotics enables surgery to be less invasive and/or to enhance the performance of the surgeon. In minimally invasive surgery (MIS), 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 images to improve precision and reproducibility when cutting, drilling, milling bones, to locate accurately and remove tumours... In both cases, 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 as well as providing innovative new ones, in MIS, micro-surgery and image-guided therapy.

The highly interdisciplinary nature of surgical robotics requires close cooperation between medical staff and researchers in mechanics, computer technology, control and electrical engineering. This cooperation has resulted in many prototypes for a wide variety of surgical procedures. A few robotics systems are now available on a commercial basis and have entered the operating room namely in neurosurgery, orthopaedic surgery 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 interventions; design and control of guiding systems for assistance of the surgeon gesture. These fields will be addressed by surgeons and researchers working in leading

hospitals and labs. Insight into practical integration problems will be widely covered.

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 a first edition held in 2003, also in Montpellier, which had been considered at the time as a success by both the participants and the lecturers (<http://www.lirmm.fr/manifs/UEE/accueil.htm>).

Content

The lectures will be organized in three parts:

- *Fundamental aspects of Surgical Robotics (2 days)*: medical imaging, modelling, force and vision-based control, design and safety, planning and registration;
- *Applications (3 days)*: technical point of view (from design to experiment); surgical point of view (orthopaedics and MIS); industrial point of view;
- *Future trends (1 day)*: perspectives in small size robots and mechatronics devices for surgery and therapy.

Time will be reserved for the participants to present their own research work. A visit of the LIRMM will also be organized.

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:

W.T. Ang, Nanyang Technological University, Singapore
C. Barillot, IRISA, Rennes
N. Bonnet, Hôpital Pitié-Salpêtrière, Paris
G. Champeboux, CAD Implant, Voiron
O. Chavanon, CHU, Grenoble
P. Cinquin, TIMC, Grenoble
H. Delingette, INRIA/EPIDAURE, Sophia Antipolis
P. Dario, Scuola Superiore Sant'Anna, Pise, Italy
M. de Mathelin, LSIIIT, Strasbourg

E. Dombre, LIRMM, Montpellier
G. Hager, John Hopkins Univ., Baltimore, USA
M. Mitsuishi, Univ. Tokyo, Japon
G. Morel, LRP, Paris
T. Ortmaier, DLR, Munich, Allemagne
Y. Patou, ISIS, Saint Martin d'Hères
F. Pierrot, LIRMM, Montpellier
P. Poignet, LIRMM, Montpellier
J. Rosen, Univ. Washington, Seattle, USA
M. Shoham, Mazor Surgical Tech., Haifa, Israël
L. Soler, IRCAD, Strasbourg
E. Stindel, CHU-LATIM, Brest
J. Troccaz, TIMC, Grenoble

Lectures and school materials

All lectures will be given in English. Copies of the Lecturers' slides will be available at the time of the class. All the School material (including slides of students' presentations) will be available at the end of September on the website of the LIRMM together with copies of significant papers of the lecturers as well as videos.

ECTS

The 36-hour course of the Summer University will be recognized by the *Doctoral School on Information, Systems and Structure (I2S)* of the University of Montpellier II (a *Doctoral School* in the French Universities manages the Ph.D. degree). 4 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 (see map on website). The lodging will be provided in a residence where apartments will be shared by two or three participants. The residence is at 10' walking from downtown and from the lecture room, and can also be easily accessed by tramway.