SPEAKERS

Luca Antiga, Orobix
Guido Baroni, Politecnico di Milano
Emanuele Luigi Carniel, Università di Padova
Matteo Cianchetti, Scuola Superiore Sant'Anna, Pisa
Gianni Ciofani, IIT and Politecnico di Torino
Lucio De Paolis, Università del Salento
Vincenzo Ferrari, Università di Pisa
Paolo Fiorini, Università di Verona
Francesco Maisano, University Hospital Zürich, CH
Francesco Migliavacca, Politecnico di Milano
Roberto Orecchia, Istituto Oncologico Europeo
Leandro Pecchia, Warwick University, UK
Gianni Pedrizzetti, Università di Trieste
Riccardo Pietrabissa, Politecnico di Milano
Emiliano Schena, Università Campus Bio-Medico, Roma
Chiarella Sforza, Università degli Studi di Milano
Cesare Stefanini, Scuola Superiore Sant'Anna, Pisa e Khalifa University of Science and Technology, Abu Dhabi (UAE)
Marilena Vendittelli, Sapienza Università di Roma
Marco Viceconti, Università di Bologna
Guang-Zhong Yang, Imperial College of London, UK
Loredana Zollo, Università Campus Bio-Medico, Roma

SCIENTIFIC ORGANIZERS

Elena De Momi, Politecnico di Milano
Arianna Menciassi, Scuola Superiore Sant'Anna
Alberto Cesare Luigi Redaelli, Politecnico di Milano

LOCAL ORGANIZERS

Claudio Cobelli, Dipartimento di Ingegneria dell'Informazione, Università degli Studi di Padova
Gianna Toffolo, Dipartimento di Ingegneria dell'Informazione, Università degli Studi di Padova

GENERAL INFORMATION

1. Early bird registration fee is € 300 VAT exempt, before July 31st 2019. Standard registration fee is € 350 VAT exempt after July 31st 2019.
   Daily registration fee is €100 VAT exempt.
   Student (PhD students/Perfezionamento e Scuole di Specializzazione, assegnisti, post-doc) early bird registration fee is € 140 VAT exempt, before July 31st 2019, or € 170 VAT exempt, after July 31st 2019.
   For MSc students (with status certification), early bird registration fee is € 80 VAT exempt, before July 31st 2019, or € 100 VAT exempt, after July 31st 2019.
   € 1500 VAT exempt registration fee for companies are valid for 3 people.
   Registration fee includes the School Proceeding book, edited by Patron.

2. Registration form can be filled in at:
   http://www.bioing.it/archiviodati/scuola_bressanone/BRESS19/index.html
   In any case, a pdf copy of registration form together with your payment receipt and status certification for MSc students shall be sent **via email** to gnb-reg@fondazione.polimi.it
   The registration fee shall be paid on the following bank account headed to FONDAZIONE POLITECNICO DI MILANO at BANCA INTESA SANPAOLO – 20121 Milano (MI) – **IBAN: IT21 P030 6909 6061 0000 0119 189 (BIC: BCITITMM) specifying in payment description the following information: SURNAME NAME GNB Annual School**.
   On-site registration will be possible only with credit/debit card payment.
   School program is available here:
   http://www.bioing.it/archiviodati/scuola_bressanone/BRESS19/programma.html
   Logistic information can be got at Associazione Turistica di Bressanone, via Stazione 9, 39042 Bressanone (BZ), Tel. 0472-836401.

GRUPPO NAZIONALE DI BIOINGEGNERIA

UNIVERSITÀ DEGLI STUDI DI PADOVA
Cicli di conferenze in Bressanone
Dipartimento di Ingegneria dell'Informazione

DOTTORATI DI RICERCA IN BIOINGEGNERIA

Università di Ancona, Bologna, Firenze, Genova, Napoli, Padova, Pavia, Pisa, Roma "La Sapienza", Roma Tre, Roma Campus Bio-Medico, Trieste, Politecnici di Milano e Torino
Istituto Italiano di Tecnologia - Genova
Scuola Superiore Sant'Anna - Pisa
Istituto Universitario di Scienze Motorie - Roma

XXXVIII Annual School

"Advanced bioengineering methods, technologies and tools in surgery and therapy"

Brixen, September 9 – 12, 2019

@
Casa della Gioventù dell'Università di Padova
via Rio Bianco, 6
Bressanone (Bolzano)

AIMS AND OBJECTIVES

The XXXVIII Bioengineering School is aimed at presenting the emerging bioengineering technologies and practices in surgery and therapy. Advance image-based patient modeling, machine learning-based diagnostics, augmented reality, navigation solutions and surgical robotics are examples of technologies which are reshaping the future of care. In such a process, technology professionals, and particularly biomedical engineers, are pivoting the innovation. Terms like evidence-based medicine and personalized medicine have progressively entered into medical language and mostly rely on our capability to extract and elaborate information from diagnostic tools and translate them into specific clinical strategies and approaches. There is indeed a strong need for an interdisciplinary approach and biomedical engineer is asked to manage this process in order to rapidly translate new technological developments into clinical practice. The objective is to deliver new knowledge, invent new technologies, and develop new devices to advance medical care.

Remarkably, most of the above-mentioned technologies are based on the acquisition and use of 4D imaging. Accordingly, there is a *fil rouge* connecting the previous XXXVII Bioengineering School, dedicated to recent advancements of medical imaging, and the XXXVIII Bioengineering School, focusing on "Advanced bioengineering methods, technologies and tools in surgery and therapy". Images are indeed a relevant part of the information collected in the preoperative phase to tailor the therapy. Surgical planning nowadays use 3D patient-specific models to optimize the therapy, design the surgical intervention and predict the outcomes. 3D printed anatomies and holograms can augment the medical operator perception during surgery. Imaging and augmented reality are used to guide teleoperated surgery.
In this perspective, the current School projects towards the 2020 School on Biorobotics and Artificial Intelligence.
One of the main results attainable with such new technologies is the reduction of the invasiveness of medical treatment. This positively rebounds on patient recovery, societal costs and clinical efficacy and efficiency. Technology allows for limiting the use of invasive diagnostic technology, pursuing a precise identification of the surgical target, favoring the use of minimal accesses and guiding dexterous robotic devices, which can precisely and safely manipulate soft tissues.
Technology innovation obviously poses the need for new rules in terms of device certification, device and clinical assessment and ethics requirements, which will be also addressed during the School.

Finally, the School dedicates a special emphasis to innovation. Under the mentoring of selected start-uppers, during the School week, students will be guided in an idea game aimed at exploring the basic steps bringing an idea to a product/service.

PROGRAM

Monday, Sept 9th, 2019

INTRODUCTION

14:00 School opening (E. De Momi, A. Menciassi, A. Redaelli)

14:15 Surgical planning based on computational models (A. Redaelli, L. Antiga)

15:15 Images/ patient/ robot registration and surgical navigation (E. De Momi, S. Moccia)

16:00 *COFFEE BREAK*

16:15 Micro-actuation and micro-sensing for surgical and therapeutic interventions (A. Menciassi, V. Iacovacci)

17:00 Student project activities presentation and start-up pitches

Tuesday, Sept 10th, 2019

PATIENT MODELLING AND SURGICAL SIMULATION ON VIRTUAL PATIENTS

9:00 Structural modelling tools for the design and the optimization of surgical procedures and devices (E. L. Carniel)

9:45 How and why to build a patient-specific cardiovascular model (F. Migliavacca, J.F.R. Matas, G. Dubini)

10:45 *COFFEE BREAK*

11:00 Credibility of virtual patients (M. Viceconti, F. Pappalardo)

11:45 Image-based mechanical assessment of cardiac function (G. Pedrizzetti, F. Sturla)

12:30 *LUNCH BREAK*

INTRA-OPERATIVE INFORMATION AUGMENTATION AND TARGETED THERAPIES

14:00 Augmented reality (L.T. De Paolis, M.C. Barba, V. De Luca)

14:45 Surgical simulators and training (V. Ferrari, S. Condino, M. Carbone)

15:30 *COFFEE BREAK*

15:45 Technologies for monitoring the effects of minimally invasive thermal therapies (E. Schena, P. Saccomandi)

16:35 Multifunctional hybrid nanovectors (G. Ciofani, A. Marino, C. Tapeinos, M. Battaglini)

Wednesday, Sept 11th, 2019

COMPUTER ASSISTED AND ROBOTIC SURGERY

9:00 Tele-operated and safe surgical systems (P. Fiorini)

9:50 Robotic radiotherapy and radiosurgery (G. Baroni, C. Paganelli and R. Orecchia)

11:00 *COFFEE BREAK*

11:20 Interventional radiology and cardiology (M. Vendittelli and F. Maisano)

12:30 *LUNCH BREAK*

14:15 Medical micro-robots (C. Stefanini)

15:15 Soft robots in surgery (M. Cianchetti)

16:15 *COFFEE BREAK*

16:30 AMICI DELL'UNIVERSITÀ DI PADOVA, BRESSANONE FREUNDE DER UNIVERSITÄT PADUA, BRIXEN Award ceremony

17:30 LECTIO MAGISTRALIS (G.Z. Yang) The future of surgical and therapeutic technologies

Thursday, Sept 12th, 2019

9:00 Start-up presentation (R. Pietrabissa)

10:00 Wrap-up of project work

10:45 *COFFEE BREAK*

11:00 Project idea presentation (all)

12:30 *LUNCH BREAK*

DEVICE CERTIFICATION AND CLINICAL ASSESSMENT

14:00 Medical devices assessment and clinical certification (L. Pecchia, D. Piaggio, R. Castaldo, L. Radice, N. Pallikarakis)

14:45 Assessment in maxillofacial surgery (C. Sforza, M. Zago, D.M. Gibelli, F. Biglioli, A.B.Gianni)

15:30 Robot-assisted post-surgery rehabilitation (L. Zollo, F. Cordella, A. Ciancio)

16:15 Closing and idea contest award ceremony (E. De Momi, A. Menciassi, A. Redaelli)

16:30 School ends.

GNB General assembly is on Thursday 12th 2019 5pm - 8pm.