Special Symposia

S 1. Medical Device and Healthcare Industry: Trends and Opportunities

Grand Ballroom – Salon A

The medical device and healthcare industry plays a critical role in modern society. Many biomedical engineering research and development efforts are translated into various medical device and healthcare solutions and improve the diagnosis and treatment of various diseases as well as management of the public health. In this symposium, leaders from major medical device and healthcare industries will speak about their visions and discuss trends, opportunities and issues within medical device and healthcare industry. Representative from FDA will also address the regulatory aspects of medical device and healthcare technology.

Session I: 13:30 – 15:00, Thursday, 3 September

- Richard Kuntz, Senior VP of Medtronic, Inc. and President, Medtronic Neuromodulation
  - Navigating through the opportunities in Neuromodulation to assure a scientific and cost-effectiveness base for best patient care
- Chris Chavez, President, St. Jude Medical Neuromodulation
  - Neuromodulation: Approaching the 'Tipping Point'
- Joseph Smith, VP of Emerging Technologies, Johnson & Johnson Science and Technology
  - Medical Devices and the Aaudacity of Hope in Healthcare

Session II: 16:40 – 18:10, Thursday, 3 September

- John LaLonde, VP Research and Development, Boston Scientific Cardiac Rhythm Management
  - Strategic Choices in Remote Patient Monitoring Platforms
- Rebecca M. Bergman, VP, New Therapies and Diagnostics, Medtronic CRDM
  - Creating Healthier Hearts: The Future of Cardiovascular Device Therapies
- Jonathan Sackner-Bernstein, Associate Director, Center for Devices and Radiologic Health, FDA
  - The FDA: Regulators Leading Safety and Innovation

S 2. Federal Funding in Biomedical Engineering

Grand Ballroom – Salon A; 16:40 – 18:10, Friday, 4 September

This symposium will review the federal funding opportunities in biomedical engineering and sciences and discuss important issues in the grant application processes. It will provide important information and guidances for biomedical engineering scientists, especially young faculty, postdoctoral fellows and graduate students. The minisymposium will consist of invited talks by the invited speakers and a panel discussion facilitating two-way interactions between the invited speakers and the audience.

- Dr. Zohara Cohen, Program Director, Division of Discovery Science and Technology, National Institute of Biomedical Imaging and Bioengineering, NIH
- Dr. Semahat Demir, Program Director, Biomedical Engineering, Directorate for Engineering, NSF
- Dr. John B. Charles, Program Scientist, Human Research Program, Space Life Sciences Directorate, NASA Johnson Space Center
- Dr. Guo Feng Xu, Scientific Review Officer, SBIB, National Institutes of Health

S 3. Benefits and Pitfalls of University - Industry Collaborations

Marquette III; 9:40 – 11:10, Friday, 4 September

Organizers: Dieter Haemmerich (Medical University of South Carolina, USA)
Wayne McDaniel (University of Missouri, USA)

The rapid growth in development and deployment of medical devices in the past decades has been fueled by efforts in both industry and academia. Nevertheless, often research in academia does not find its way towards commercialization due to a number of different hurdles. In this symposium the relationship between academia and industry related to development and commercialization of medical devices will be discussed from both viewpoints. Differences in culture, issues related to intellectual

property and licensing, and suggestions for furthering collaboration between the two entities will be presented. Prominent members from major universities and medical device companies will present their viewpoint on these issues.

- Nitish Thakor, Ph.D., Professor of Biomedical Engineering, Johns Hopkins University
  - Academic Entrepreneurs - Taking Research from Bench to Bedside
- Mark Kroll, Ph.D., Chairman Board of Directors, Newcardio, Inc.
  - Bridging the Philosophical and Patent gaps
- John Pearce, Ph.D., Professor of Electrical and Computer Engineering, University of Texas at Austin
  - Academic / Industrial Partnerships: Issues and Strategies
- John Keimel, Senior Director, Research & Business Development, Medtronic Neuromodulation
  - A comparison of large and small company collaborations with academia - the long and the short of it
- Yongmin Kim, Ph.D., Professor of Bioengineering, University of Washington at Seattle
  - Joys and Tribulations of Translational Research in Academia

S 4. Clinical Data: From Medical Institutions to Industrial Research – IP Protection Approaches

Marquette IV; 9:40 – 11:10, Saturday, 5 September

Organizer: IEEE EMBS Industry Relation Committee

Medical system and device industries use clinical data for developing and validating their products. Typically this data is generated at medical institutions and then transferred to industry, often involving academia, for product development and testing. Transferring and working with this data give rise to both technical and legal challenges. In this symposium, experienced personnel in this field from industrial, legal, academic, and medical institutions will offer their views on the legal and practical approaches needed to deal with clinical data and intellectual property (IP) which may result from its use.

- Charles Dennis, J.D., CRDM VP Business Development & IP, Medtronic
- Vitaly Herasevich, M.D., Ph.D., Senior Scientist, Pulmonary & Critical Care, Mayo Clinic
- Denise Kettelberger, Ph.D., J.D., Special Counsel, IP Group, Faegre & Benson, LLP
- Robert Leonard, J.D., Partner, Chair, IP Transactions Group, Faegre & Benson, LLP
- Roger Mark, M.D., Ph.D., Distinguished Professor of Health Sciences & Technology, Massachusetts Institute of Technology
- John Zaleski, Ph.D., CPHIMS, Sr. Director and Research Department Head, Biomedical Informatics, Philips Research North America

Minisymposia

MS 1. Medical Imaging – New Biomarkers and Clinical Perspective

Grand Ballroom – Salon B

Organizer: Yi Wang (Cornell University, USA)

MRI and CT are rated as the most important medical innovations in past 40 years by physicians. Medical imaging based diagnosis and therapy have become a fundamental component of modern medicine, largely due to the technological contributions of biomedical engineers. Medical imaging today is still a young and dynamical field. The frontier of cellular and molecular imaging is progressing rapidly. New imaging biomarkers are continuously discovered and developed for detecting diseases at their early stage. As a technology development platform for translating science into clinics, medical imaging will continue to play a dominant role in future medicine. To help biomedical engineers to capture the exciting opportunities presented in medical imaging, this symposium on medical imaging is organized to convey the latest advancements on molecular imaging and new image biomarkers, and to impregnate clinical perspectives for technology development. This Medical Imaging minisymposium will consist of lectures by the following distinguished engineer and clinician investigators in medical imaging.

Session I: 9:40 – 11:10, Thursday, 3 September

- Zaver Bhujwalla, Ph.D., Professor of Radiology and Oncology and Director of In Vivo Cellular Molecular Imaging Center, Johns Hopkins University
  - Molecular and Functional Imaging of Cancer

- Wei Chen, Ph.D., Professor of Radiology and Biomedical Engineering, University of Minnesota

  - New Medical Imaging Developments based on In Vivo MRS
- Yi Wang, Ph.D., Faculty Distinguished Professor of Radiology and Biomedical Engineering, Cornell University

  - Magnetic Source MRI: A New Quantitative Imaging of Magnetic Biomarkers

Session II: 16:40 – 18:10, Thursday, 3 September

- Michael Vannier, M.D., Professor of Radiology, Chicago University

  - CT Clinical Perspective: Challenges and the Impact of Future Technology Developments
- David Sahn, M.D., Professor of Medicine and BME, Oregon Health & Science University

  - Advanced Technology for Intracardiac Ultrasound Guidance for Electrophysiologic Procedures
- Ioannis Kakadiaris, Ph.D., Eckhard Pfeiffer Professor of Computer Science, Electrical & Computer Engineering, and Biomedical Engineering, University of Houston

  - Cardiovascular Informatics

MS 2. Bionanotechnology

Supported by partnership funds provided by the Institute for Engineering in Medicine, University of Minnesota

Marquette VI; 9:40 – 11:10, Saturday, 5 September

Organizers: John Bischof (University of Minnesota, USA)
Carston R. Wagner (University of Minnesota, USA)

Bionanotechnology is a rapidly advancing field where tools and products of nanoengineering converge with biomedical applications. This mini-symposium will focus on cutting edge work from several leading labs to engineer surfaces and particles at the nanoscale to yield specific biological functions. The engineering will include the manufacturing, coating and functionalization of particles and surfaces for improved biomedical applications. Recent breakthroughs in the detection, diagnosis and therapy of diseases available through these new technologies will be discussed.

Invited speakers include:

- Professor Shuming Nie, Ph.D., Director for Emory-Georgia Tech Cancer Nanotechnology Center, Wallace H. Coulter Department of Biomedical Engineering, Emory University School of Medicine & Georgia Institute of Technology

  - Biomedical Nanotechnology: New Opportunities in Molecular Imaging, Diagnostics, and Therapy
- Professor Kathy Ferrara, Ph.D., Department of Biomedical Engineering, University of California, Davis

  - Imaging nanoparticle stability and activation in vivo
- Professor Luke Lee, Ph.D., Biomolecular Nanotechnology Center, Department of Bioengineering, University of California, Berkeley

  - Nanobiophotonics and BioASICs for Molecular Medicine

MS 3. Neuromodulation

Grand Ballroom – Salon C; 9:40 – 11:10, Friday, 4 September

Organizer: Dominique M. Durand (Case Western Reserve University, USA)

This symposium will focus on the use of electrical stimulation for controlling the electrical activity of the nervous system. Dr. Grill will concentrate on the bladder control with electrical stimulation and Dr. Durand will review the various electrical stimulation paradigms for controlling seizure activity. Dr. Zelma Kiss will focus on the clinical and experimental aspects of deep brain stimulation for patients with motor disorders.

Invited speakers include:

- Warren M. Grill, Ph.D., Professor, Biomedical Engineering, Duke University

  - Neuromodulation for bladder control
- Zelma HT Kiss, M.D., Associate Professor, Department of Clinical Neurosciences, University of Calgary, Canada

  - Clinical and experimental aspects of deep brain stimulation
- Dominique M. Durand, Ph.D., Professor, Biomedical Engineering, Case Western Reserve University

  - Control of Epilepsy with applied electrical stimulation

MS 4. Frontier of Nano Magnetic Materials, Devices and Systems in Biomedical Applications

Marquette VII; 9:40 – 11:10, Saturday, 5 September

Organizers: Jianping Wang (University of Minnesota, USA)
Michael R. Neuman (Michigan Technological University, USA)

Modern magnetic technologies such as nanomagnetic technology and spintronic devices are having a huge impact in life science. Some recent exciting applications of magnetic technologies in biomedical engineering are magnetic imaging, magnetic drug delivery and therapy using magnetic nanoparticles, lab-on-chips using magnetic sensing schemes, etc. This minisymposium will provide an overview of the frontier of the development and research of nano magnetic materials and devices in biomedical applications. It will cover the emerging applications of magnetic nanoparticles, spintronic sensors and sensing systems, and magnetic imaging systems. Several state-of-art nano magnetic materials, sensors, and systems will be introduced by the invited lecturers. Traditional and untraditional fabrication of nano magnetic materials, spintronic sensors and MRI contrast agencies will be reviewed.

Invited speakers include:

- Professor Sara Majtech, Ph.D., Department of Physics, Carnegie Mellon University
- Dr. Gary Zabow, Ph.D., Electromagnetics Division, National Institute of Standards and Technology
- Professor Jian-Ping Wang, Ph.D., Department of Electrical and Computer Engineering, University of Minnesota

MS 5. Frontiers of Microrobotics in Endo-and Transluminal Therapy

Conrad D; 8:30 – 10:00, Sunday, 6 September

Organizer: Paolo Dario (University of Pisa, Italy)

The need for an advanced way to perform surgery is motivated by the progress of diagnostic techniques, which allow to discover pathologies at a very early stage. Surgical robotics strives to make surgical interventions less invasive, less risky for both patients and clinicians, more efficient, less costly, and capable of achieving better patient outcomes. This can be accomplished by creating modular, integrated systems comprised of imaging (e.g., CT scan, MRI, ultrasound or X-ray), computing, and sensing, coupled with miniaturized robotic devices, and human-machine interfaces. These systems will be able to perform a wide variety of surgical interventions in many organ systems, also with a "from inside" approach. In fact, it seems likely that the current generation of operating robots will be replaced by a second generation that meets more closely the requirements of minimally invasive and endo-transluminal access surgery. This Mini Symposium aims to provide useful overview of the state of the art for those already engaged in the field of surgical robotics, as well as in related field. Internationally recognized experts in the field will discuss open scientific, technological and medical problems and new frontiers in the emerging and increasingly important field of microrobotics for endo- and transluminal therapy.

Invited speakers include:

- Philippe Poignet, Professor, LIRMM-CNRS, Montpellier, France
- Jacob Rosen, Professor, University of California, Santa Cruz, USA
- Jaydev Desai, Professor, University of Maryland, USA
- Louis Phee, Professor, Nanyang Technology University, Singapore
- Arianna Menciassi, Professor, University of Pisa, Italy

MS 6. People, Places and Companies Involved in the Early History of Biomedical Devices and Instrumentation

Grand Ballroom – Salon A; 16:40 – 18:10, Saturday, 5 September

Organizers: Robert Patterson (University of Minnesota, USA)
Ron Leder (National Autonomous University of Mexico, Mexico)

This minisymposium will focus on the early work and people involved in the development of the modern medical device field, a good part of which took place in Minnesota. Three eye-witness presenters will discuss related perspectives on the history of the medical device industry. The audience will receive a first-hand perspective on the industry that is not available elsewhere.

Invited speakers include:

- David J. Rhees, Ph.D., Executive Director, The Bakken Museum, Minneapolis, MN
  - The history of the medical device industry in Minnesota
- Willis J. Tompkins, Ph.D., Professor, University of Wisconsin at Madison
  - Evolution of microcomputer-based medical instrumentation
- Robert Patterson, Ph.D., Professor Emeritus, University of Minnesota
  - Otto Schmitt's contributions to basic and applied medical engineering and to the profession

Special Sessions

SS 1. Meet the Editors

Directors Row 4; 13:30 – 15:00, Friday, 4 September

Organizers: Andrew Laine, Columbia University, EMBS VP Publications
Bruce Wheeler, University of Florida, EIC, IEEE T-BME

- Dr. Bruce Wheeler, Editor-in-Chief, IEEE Transactions on Biomedical Engineering
- Dr. Nitish Thakor, Editor-in-Chief, IEEE Transactions on Neural Systems and Rehabilitation Engineering
- Dr. Y.T. Zhang, Editor-in-Chief, IEEE Transactions on Information Technology in Biomedicine
- Dr. Michael R. Neuman, Editor-in-Chief, IEEE Engineering in Medicine and Biology Magazine
- Dr. Milan Sonka, Editor-in-Chief, IEEE Transactions on Medical Imaging
- Dr. Michael Hughes, Editor-in-Chief, IEEE Transactions on NanoBioscience
- Dr. Rob Butera, Deputy Editor-in-Chief, IEEE Transactions on Biomedical Circuits and Systems

SS 2. How to Effectively Deliver an Oral Presentation

Directors Row 4; 9:40 – 11:10, Friday, 4 September

Organizers: Christopher James, University of Southampton, UK
Cristian Linte, Robarts Research Institute, Canada

For many of us oral presentations can be the prime means for communicating our ideas and our research, not only to our peers, but also to our employers and to potential customers. As students, you are no exception – the prospect of an oral presentation can be daunting, the pressure is on to make a good impression with your research. That we are scientists presenting sometimes very complicated scientific ideas and results need not necessarily be a recipe for a sleep inducing "death by PowerPoint" presentation, rather there are simple ways in which we can all try and make our presentations effective and captivating. This session aims to give you some all-round pointers on the "do"s and "don't"s of preparing and delivering an effective presentation that best conveys your ideas smoothly, understandably and, most important, succinctly.

Invited speakers include:

- Dr. Christopher J. James, University of Southampton, UK
  - Simple ideas on Presentation Design
- Cristian A. Linte, IEEE EMBS Student Representative, Robarts Research Institute, Canada
  - More on the Delivery…
- Jennifer Campbell, Assistant Director, Heart and Stroke Foundation of Canada
  - Talking Science to Non-scientists

SS 3. Writing Scientific Articles

Directors Row 4; 16:40 – 18:10, Friday, 4 September

Organizers: Matthias Reumann, IBM
Cristian Linte, Robarts Research Institute, Canada

This session's audience targets student and GOLD members primarily. The whole writing process from starting to write to publication will be covered in this session. The talks will give brief overviews of the structure and important points that make an excellent scientific article, writing methods to improve writing skills will be addressed and the final talk will cover the review and editorial process. At the end of the talk there will be enough time for a longer discussion and direct questions.

Invited speakers include:

- Dr. Michael R. Neuman, Editor in Chief, IEEE Engineering in Medicine and Biology Magazine
  Professor and Chair, Department of Biomedical Engineering,
  Michigan Technological University, USA
  - The backbones of an article
- Dr. Matthias Reumann, Functional Genomics and Systems Biology, IBM T.J. Watson Research Center
  - Where to start? – Overcoming writers block and other methods to improve your writing skills
- Dr. Bruce Wheeler, Editor in Chief IEEE Transactions on Biomedical Engineering,
  Professor and Interim Chair, Department of Biomedical Engineering, University of Florida
  - Preparing your manuscript – what are the editors and reviewers looking for

SS 4. Pathways to Success in Biomedical Engineering: Early Career Development

Directors Row 4; 16:40 – 18:10, Saturday, 5 September

Organizer: Kaustubh "KP" Patil, Ph.D., Medtronic, Inc., USA

This is a career development panel discussion specially organized for students, postdocs, and recent graduates. How to successfully transition from undergraduate to graduate studies? And from graduate to doctoral and postdoctoral? What career options exist after completing education? What skills are required to advance in these career tracks? Gain tips from panelists on how to successfully navigate through these issues and to accomplish your best. A valuable session for anyone aspiring to venture into graduate biomedical engineering research, or industrial, academic or institutional service.

Invited speakers include:

- Hubert Lim, Ph.D., Assistant Professor, Department of Biomedical Engineering, University of Minnesota
- Arun Kumar, Ph.D., Senior Scientist, Cardiac Rhythm & Disease Management, Medtronic Inc., and Chair, Twin Cities IEEE Section
- Matthias Reumann, Ph.D. -Post-doctoral Fellow, IBM T.J. Watson Research Center, and EMBS GOLD Representative.

SS 5. Negotiating your First Bioengineering Job: Academia, Private Sector or Government

Directors Row 4; 9:40 – 11:10, Saturday, 5 September

Organizer: Cristian Linte, Robarts Research Institute, Canada

This session is intended to prepare current bioengineering students and post-doctoral fellows, getting them in the right shape to apply, negotiate and succeed in getting their first job in industry or academia. Tips on putting together the appropriate CV, preparing your portfolio and getting ready for the interview will be covered by the invited speakers. The panel will consist of representatives from academia and the private sector, as well as government and regulators. This session aims to give you some all-round pointers on the "do"s and "don't"s towards choosing, applying, attending an interview and negotiating your future position as a young biomedical engineer.

Invited speakers include:

- Dr. Aaron Fenster, Director, Imaging Research Laboratories, Robarts Research Institute, Canada
  - An Academic Perspective
- Dr. Nicolas Chbat, Philips Research North America
  - Opinions from Industry
- Dr. Eric Zhao, Medtronic Inc.
  - Learn from a Recent Ph.D. Graduate

- Dr. Semahat Demir, BME Program Director, National Science Foundation
  - The NSF's Viewpoint
- Dr. Carole Carey, US Dept. of Health and Human Services
  - What are the Regulators looking for?

SS 6. Women in Biomedical Engineering and Health Informatics: Careers, Diversity and Trends

Directors Row 4; 13:30 – 15:00, Saturday, 5 September

Organizers: Carolyn McGregor, University of Ontario Institute of Technology, Canada
Monique Frize, Carelton University, Canada

A valuable session for anyone whether student or not, interested in learning more about Biomedical Engineering and Health Informatics as a career choice for women. Prominent women within the domains Biomedical Engineering and Health Informatics will present their research and their thoughts on diversity and trends. Utilize the fantastic networking opportunity that will conclude this session to build and establish new professional networks with other women interested in our fields of expertise. Bring your contact details and be ready to make new contacts that are relevant for you.

Invited speakers include:

- Dr. Jennifer Percival, University of Ontario Institute of Technology, Canada
  - Staying connect during Family Breaks
- Dr. Semahat Demir, National Science Foundation
  - Women in Engineering: Peer-mentoring
- Dr. Martha Zequera Diaz, EMBS Adcom Committee Latin America Representative
  - Women in Engineering Trends in Latin America
- Dr. Heidi Stratti, University of Western Sydney, Australia
  - Women in Engineering: Experiences from Down Under

SS 7. Stimulus Funding – and the Impact on the Medical and Biological Engineering Enterprise

Marquette IV & V; 9:40 – 11:10, Friday, 4 September

Organizer: Benjamin Corb, American Institute for Medical and Biological Engineering (AIMBE)

In February 2009, the President and Congress took unprecedented action in an effort to slow down the growing financial crisis in the United States. Within the nearly $800 billion funding package, the federally funded research and development enterprise in this country received a significant boost in funding, totaling over $20 billion. Now, eight months after President Obama signed the American Reinvestment and Recovery Act, the American Institute for Medical and Biological Engineering (AIMBE) will highlight how these funding increases will impact your research and development opportunities. Also to be discussed is the important role grass roots advocacy played in working with Congress to secure the R&D dollars found in the bill, and how you can get involved in the process.

Invited speakers include:

- Kristina M. Ropella, Ph.D., Professor and Chair, Biomedical Engineering Department, Marquette University
- William J. Heetderks, M.D., Ph.D., Director, Extramural Science Programs, National Institute of Biomedical Imaging and Bioengineering
- Frederick A. Robertson, M.D., M.B.A., President and CEO, TomoTherapy

Pre-Conference Workshops
Wednesday, 2 September

Workshop 1. Building Neural Interfaces for Neural Prostheses – Beyond Brain Machine Interface: Motor, Cognitive and Virtual

Organizers: Nitish Thakor (Johns Hopkins Medical School, USA)
Brenda K. Wiederhold (Interactive Media Institute, USA)
James Cullen (Interactive Media Institute, USA)

Time: 8:00 – 18:00

Recent development in brain computer and brain machine interfaces have captured the attention and imagination of students, engineers and the scientific community. In this arena, building the neural interfaces and their ability to control prosthetic devices has posed one of the biggest challenges and opportunities to do pioneering work in the fields of interface technology, signal and information analysis methods and algorithms, and interfacing to prosthetic machinery. This workshop will review the current state of the art in neural interfacing technologies and present a cutting edge application to controlling upper limb dexterous prostheses. The lectures will review technologies spanning microelectrodes, large scale integrated circuits, packaging these systems for implantable and wearable applications, neural signals recording, analysis and decoding. Finally, through simulations and demonstrations, application of the neural interface technology to control dexterous prosthetic manipulators will be illustrated. The proposed "open source" approach will facilitate participation of new investigators and collaborators in advancing the field. The workshop attendees will get to meet the leaders in the field developing these technologies as well as participate in the discussion to identify the best solutions and approaches and the emerging and futuristic applications.

1) Introduction to the Workshop
   Elmar Schmeisser, PhD, Army Research Laboratory
2) Overview of Neural Interface Technologies – noninvasive and invasive
   Nitish V. Thakor, PhD, Professor of Biomedical Engineering, Johns Hopkins University
3) Neurophysiological Foundations
   Jiping He, Professor of Harrington Department of Bioengineering, Arizona State University
4) Consolidation of Prosthetic Motor Skill in Primates
   Jose Carmena, PhD, Assistant Professor of Electrical Engineering, Cognitive Science and Neuroscience, UC Berkeley
5) BCI-based Robotic Rehabilitation for Stroke
   Cuntai Guan, PhD, Senior Scientist and Program Manager at Institute for Infocomm Research, A*STAR, Singapore
6) BCI's based on the detection of high gamma oscillation in ECoG and EEG
   Reinhold Scherer, PhD, post-doc research associate of Computer Schience & Engineering, University of Washington
7) Non-Invasive Brain Controlled Robots
   Jose del R. Millan, PhD, Defitech Professor of the Swiss Federal Institute of Technology in Lausanne
8) Cognitive Integration of Prosthetic Devices: Is it feasible?
   Jose C. Principe, PhD, Distinguished Professor of Electrical and Biomedical Engineering, University of Florida
9) Cognitive Science and Human Factors Issues in NMCD
   Celestine Ntuen, PhD, Director of the Institute for Human-Machine Studies, North Carolina Agricultural and Technical State University
10) Non-Manual Visual Digest Networks
    Yang Cai, PhD, Director of Ambient Intelligence Lab, Carnegie Mellon University
11) Implicit Communication can improve intention based systems
    Ted Selker, PhD, Associate Professor, MIT Media Lab
12) Virtual Reality Feedback to Target Cortical Remapping
    Eugene Tunik, PhD, Assistant Professor of physical therapy, New York University
13) Integrating Hands-free Interface into 3D Virtual Reality Environments
    Danillo De Rossi, PhD, Professor of Bioengineering, University of Pisa
14) Human Machine Interaction via non-contact Body Field Signals
    Pascal Hamisu, PhD, Fraunhofer Institute for Computer Graphics IGD, Germany
15) JHU/APL Virtual Integration Environment, Data Sharing, Open Prosthetics
    Jonathan Kunniholm, PhD, Research Assistant at Duke University

Workshop 2. Deep Brain Stimulation

Organizers: Aviva Abosch (University of Minnesota Medical School, USA)
Gregory F. Molnar (Medtronic, Inc., USA)
Gregory A. Worrell (Mayo Clinic, USA)

Time: 8:00 – 17:00

Deep Brain Stimulation (DBS) is approved by the U.S. Food and Drug Administration for the treatment of Parkinson's disease, essential tremor, and dystonia. To date, over 30,000 DBS devices have been successfully implanted worldwide. Although its safety and efficacy for the treatment of movement disorders has been well established, the mechanism of DBS remains unknown. Research is currently underway to elucidate the mechanism of action of DBS and to assess the effects of electrical stimulation in various brain targets to possibly treat other neurological and psychiatric conditions. This workshop will provide an historical overview of DBS development, review currently approved indications and clinical outcomes, highlight theories about DBS mechanisms, and finally highlight active areas of research and technology development.

1) Overview of DBS
   Ali Rezai, MD, Director of Neurological Restoration, Center of Neurological Restoration, Cleveland Clinic Foundation
2) Regulatory History of DBS & Development of the Field
   Mark T. Rise, PhD, Distinguished Scientist, Neuromodulation, Medtronic, Inc.
3) In-Depth Clinical Outcome of DBS for Movement Disorders
   Michael Okun, MD, Co-Director of Movement Disorders Center, Department of Neurology, Neurosurgery, Psychiatry and History, University of Florida, Gainesville
4) In-Depth Clinical Outcome of DBS for Obsessive-Compulsive Disorder
   Benjamin Greenberg, MD, PhD, Associate Professor, Department of Psychiatry and Human Behavior, Brown University Medical School
5) Safety considerations—Procedural and Radiofrequency Heating
   Aviva Abosch, MD, PhD, Director of Epilepsy, Stereotactic, and Functional Neurosurgery, Department of Neurosurgery, University of Minnesota Medical Center
   Thomas Vaughn, PhD, Professor of Radiology, Electrical Engineering and Biomedical Engineering, University of Minnesota Medical Center
6) Basal Ganglia Physiology and DBS
   Jonathan Dostrovsky, PhD, Affiliate Scientist, Division of Brain Imaging and Behavior Systems, Neuroscience Toronto Western Research Institute, University of Toronto
   Peter Brown, MD, FRCP, Head of the Sobell Department of Motor Neuroscience and Movement Disorders, University College London
   Robert Chen, MA, MBBChir, MSc, FRCPC, Professor, Division of Brain Imaging and Behavior Systems, Neuroscience, Toronto Western Research Institute, University of Toronto
7) Theories of Mechanism of Action of DBS
   Warren M. Grill, PhD, Professor of Biomedical Engineering, Pratt School of Engineering, Duke University
   Cameron McIntyre, PhD, Associate Staff, Department of Biomedical Engineering, Cleveland Clinic Foundation
8) Electrical stimulation for the treatment of psychiatric disorders
   Helen Mayberg, MD, Professor of Psychiatry Neurology, Emory University School of Medicine
9) Brain Stimulation Devices for Epilepsy
   Gregory A. Worrell, MD, PhD, Associate Professor, Department of Neurology, Division of Epilepsy, Mayo Clinic
10) Device Technology Innovation
    Timothy Denison, PhD, IC Manager, Neuromodulation Division, Medtronic, Inc.
    Gregory F. Molnar, PhD, Director of Neuromodulation Research, Medtronic, Inc.

Workshop 3. Biological Micro Electro Mechanical Systems (BioMEMS): Fundamentals and Applications

Organizers: Mehmet R. Dokmeci (Northeastern University, USA)
Franz Baudenbacher (Vanderbilt University, USA)

Time: 8:00 – 17:00

This workshop will provide an overview on how to apply Biological MicroElectroMechanical Systems (BioMEMS) technologies to obtain new insights into biological processes that encompass processes at the molecular, cellular and tissue scales including chemotaxis and cellular forces; cell metabolism, electrophysiology and signaling; angiogenesis and metastasis; and differentiation and development. This workshop will begin with a series of lectures and invited talks outlining key aspects of the micro and nanofabrication technologies and applications of BioMEMS technologies to life sciences, and will also allow participants to have a hands on experience fabricating and operating BioMEMS devices and learn specific details regarding the practical aspects of BioMEMS and sensor design, fabrication, and use for specific applications. The workshop will include leading scientists in the field, and is geared towards graduate students, research scientists, faculty and industrial participants who are interested in gaining experience in the exciting field of BioMEMS.

1) Introduction to BioMEMS
   Prof. Franz Baudenbacher, Vanderbilt University
   Prof. Kevin T. Seale, Vanderbilt University
2) Polymeric devices and Microfluidics
   Prof. Ali Khademhosseini, Harvard Medical School
3) Tissue Models and Tissue Engineering
   Prof. Shuichi Takayama, University of Michigan
4) Integrated BioMEMS and Nanodevices
   Prof. Rashid Bashir, University of Illinois at Urbana-Champaign
5) BioMEMS and Neural Systems
   Prof. Mehmet Fatih Yanik, Massachusetts Institute of Technology
6) Lab on a Chip Systems
   Prof. Abraham "Abe" Lee, University of California at Irvine
7) BioMEMS and Global Health
   Prof. Utkan Demirci, Harvard Medical School
8) Hands-on Microfabrication on a bench
   Prof. Franz Baudenbacher, Vanderbilt University

Workshop 4. Cardiovascular Health Informatics: From Wearable Medical Devices to Body Sensor Networks

Organizer: Yuan-Ting Zhang (Chinese University of Hong Kong and Chinese Academy of Sciences, China)

Time: 8:00 – 12:00

This workshop will address a spectrum of health informatics from physiological and biomedical information acquisition, processing, transmission to data fusion for the non-invasive monitoring of cardiovascular diseases. This half-day workshop will closely examine important issues on the body sensor networks with applications, and will define the concepts of the Cardiovascular Health Informatics (CHI). Topics will include core technologies highlighting wearable medical device design as well as the importance of standards for achieving optimized system performance. This workshop offers an opportunity to share ideas, obstacles and solutions with your peers in the area of cardiovascular health informatics.

1) Cardiovascular Hemodynamic Regulation and its Application for Patients' Care
   Prof. Kenji Sunagawa, Kyushu University
2) Distributed Diagnosis and Home Healthcare (D2H2) in Cardiology
   Prof. Yongmin Kim, University of Washington
3) Some Perspectives on Medical Device Standards
   Dr. Carole C. Carey, US Food and Drug Administration (FDA)
4) A Wearable BSN for the Estimation of Blood Pressure and An Update on the IEEE Standard for Cuffless BP Measuring Devices
   Prof. Y.T. Zhang, Chinese University of Hong Kong and Chinese Academy of Sciences

Workshop 5. EMBS/LifeScience Alley Workshop on Medical Device Commercialization: Getting Great Ideas to Market

Organizer: Larry Kuusisto (LifeScience Alley, USA)
Time: 8:00 – 17:00

This comprehensive full-day program is a blueprint, showing what it takes to be successful in medical device commercialization. It is designed as an overview for engineers with ideas who don't know where to begin – its intent is to overcome constraints with clear practical knowledge. The program was successfully piloted to an audience of 100 engineers in 2008. The team of speakers that constructed this program holds an impressive history of broad-based expertise and successful implementation in medical device commercialization. Topics to be covered: Trends in Innovation and the Changing Environment; Idea to standard of care: pitfalls and challenges; Idea Creation: packaging and protecting your idea; Concept Development & Planning; Organizing for Success; Feasibility to Market Launch; Market Launch --› Market Adoption --› Standard of Care. Workshop speakers include:

1) Carla Monacelli, Managing Partner, Argenta Reimbursement and Argenta TEC
2) Dan Titcomb, Founder and Managing Principal, Pulse Innovation, Inc.
3) Steve C deBaca, Vice President of Quality, Boston Scientific Corporation
4) Joe Galatowitsch, President and Managing Partner, Dymedex Consulting
5) Bob Dummer, Manager of Technology Transfer, Synovis Surgical Innovations
6) Lynn Ihlenfeldt, VP Product Development, Minnetronix, Inc.
7) Mark DuVal, President, DuVal & Associates
8) Kevin McCardle, President and Principal Consultant, McArdle Business Advisors
9) Paul Hansen, Trade Commissioner, Consulate General of Canada
10) Gerry Timm, Professor of Urologic Surgery, University of Minnesota
11) Brian Rembish, Founder and President, MedTech Leadership™
12) Paula Skjefte, President/CEO, Waterford Consulting
13) Randy Nelson, President, Evergreen Medical Technologies, LLC
14) Tom Waddell, Principal, Project Leadership Services
15) Bill Combs, Distinguished Engineer, Medtronic, Inc.
16) Larry Kuusisto, Vice President of Education, LifeScience Alley