NeuroEngineering Day

The **NeuroEngineering Day** will take place on Monday January 20, 2020, **from 9am to 12h**, at the Sala de Audiovisuales de la Facultad de Psicología y Logopedia. https://goo.gl/maps/YV8NQfXmXCWDQ2Nq5

Brief description

The activities will include plenary lectures by internationally recognized experts in the fields of Medical Image Computing and Computer-Assisted Interventions.

Prof. Ron Kikinis is the founding Director of the Surgical Planning Laboratory (SPL), Department of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, and a Professor of Radiology at Harvard Medical School. This laboratory was founded in 1990. Before joining Brigham & Women's Hospital in 1988, he trained as a resident in radiology at the University Hospital in Zurich, and as a researcher in computer vision at the ETH in Zurich, Switzerland. He received his M.D. degree from the University of Zurich, Switzerland, in 1982. In 2004 he was appointed Professor of Radiology at Harvard Medical School. In 2009 he was the inaugural recipient of the MICCAI Society "Enduring Impact Award". On February 24, 2010 he was appointed the Robert Greenes Distinguished Director of Biomedical Informatics in the Department of Radiology at Brigham and Women's Hospital. On January 1, 2014, he was appointed "Institutsleiter" of Fraunhofer MEVIS and Professor of Medical Image Computing at the University of Bremen. Since then he is commuting every two months between Bremen and Boston. He is the Principal Investigator of 3D Slicer, a free open source software platform for image analysis and visualization. Over the years Dr. Kikinis has served as the Principal Investigator(PI) and site PI of a number of large and small NIH and NSF funded grants (see here for his NIH funding). This includes the National Alliance for Medical Image Computing (NA-MIC). He is currently serving as the PI of the Neuroimaging Analysis Center (NAC) and the Quantitative Image Informatics for Cancer Research (QIICR). He is also the Director of Collaborations for the National Center for Image Guided Therapy (NCIGT).

Biosketch: https://en.wikipedia.org/wiki/Ron_Kikinis

Presentation title: 3D Slicer: An Open Source Platform for Medical Image Computing

Abstract: Research in Medical Image Computing requires substantial informatics capabilities. In terms of visualization you need a flexible framework that allows integrated display of a variety of imaging and non-imaging data. You need versatile tools for segmentation, alignment (registration), and model-based analysis. Interfaces and APIs are required which enable two-way communication with devices such as imaging sources, trackers, instruments and robots. You also need a user interface that enables use of these technologies under a variety of constrained conditions (not a lot of room, limited computer resources, not a lot of time).

Prof. Alexandra J. Golby is Professor of Neurosurgery and Radiology at Harvard Medical School. Dr. Golby is a Neurosurgeon and Director of Image-guided Neurosurgery at Brigham and Women's Hospital in Boston, where she is also Co-Director of the Advanced Multimodality Image Guided Operating Room (AMIGO), Co-Director of Clinical fMRI and Director of the Golby Lab. She holds the Haley distinguished Chair in the Neurosciences at BWH. She is also Principal Investigator of Golby Lab, a surgical brain mapping laboratory. Dr. Golby's research focuses on the translation of a broad range of neuroimaging techniques to neurosurgical planning and intraoperative guidance. The overarching goal of this work is to help surgeons perform optimal brain surgery by defining and visualizing critical brain structures and pathologic tissue to be removed.

Biosketch: http://golbylab.bwh.harvard.edu/alexandra-j-golby/

Presentation title: Helping neurosurgeons perform optimal surgery through the use of imaging and image guidance.

Abstract: Since its inception just over 100 years ago, the practice of neurosurgery has been profoundly impacted by the evolution of medical imaging. Now, in addition to increasingly sophisticated structural and functional imaging, advances in computational power allows us to extract clinically important features from these images in clinically relevant time frames. Improvements in imaging and visualization including functional brain mapping with fMRI and advanced structural imaging such as white matter mapping with dMRI), allow the surgeon to have a much better understanding of the anatomy and pathology of an individual patient. Intraoperative guidance with multi-modal neuronavigation allows the surgery to be carried out precisely and helps to optimize resection while minimizing risk to critical brain structures. Intra-operative treatment monitoring including intraoperative imaging can help the clinician to be aware of changes which occur during surgery. Together these technologies provide a tool kit for intracranial neurosurgery which allows personalized precision surgical care.

Prof. Gabor Fichtinger is Professor of Computer Science and Canada Research Chair, with cross appointments in Electrical and Computer Engineering, Mechanical and Materials Engineering, Surgery and Pathology at Queen's University, Canada, with adjunct appointments at the Johns Hopkins University, USA, Western University, Canada and the medical University of Vienna, Austria. Dr. Fichtinger holds a Cancer Ontario Research Chair in Cancer Imaging. He is the Director of the Laboratory for Percutaneous Surgery (Perk Lab). Dr. Fichtinger's specialty is image-guided needle-placement procedures, primarily for cancer diagnosis and therapy and musculoskeletal conditions and he will tell us about a large and growing family of medical interventions that involves the placement of some linear surgical instruments. Typical examples include needle based aspirations, injections, local ablation therapies, brachytherapy, but "virtual needles" like high energy X-ray and laser beams are also commonly applied. The majority of these interventions today are performed percutaneously (i.e., across the skin).

Biosketch: http://perk.cs.queensu.ca/users/gabor

Presentation title: Perk Tutor: free open source platform for ultrasound-guided needle insertion training

Abstract: Ultrasound is a safe, inexpensive and widely used medical imaging modality, making impact on minimally invasive medical interventions, including many procedures that involve needle insertion. Performing needle insertion under live ultrasound guidance demands exquisite sonographic experience, manual skills and hand-eye coordination. To ensure that the next generations of physicians are competent using this technology, efficient and effective educational programs need to be developed. This talk presents the Perk Tutor (www.PerkTutor.org), a configurable and free open-source training environment for ultrasound-guided needle insertions, based on the 3D Slicer medical image analysis and visualization platform. The Perk Tutor provides the trainee with quantitative feedback on progress toward the specific learning objectives. The Perk Tutor has been successfully used in a variety of needle placement procedures and training scenarios, demonstrating its adaptability to different clinical workflows and learning objectives.

Dr. Zora Kikinis is Assistant Professor of Psychiatry at Harvard Medical School and Brigham and Women's Hospital and investigator at the Psychiatry Neuroimaging Lab (PNL). Dr. Zora Kikinis's research interests include combining genetics and neuroimaging to investigate the etiology of schizophrenia. In 2008 Dr. Kikinis received a National Alliance for Research in Schizophrenia and Depression (NARSAD) Young Investigator Award. Dr. Kikinis trained in Switzerland and received her Ph.D. in Biochemistry from the Biocentrum, University of Basel, Basel, Switzerland. Before joining the PNL, she worked at MIT and Tufts University, on regulation of gene expression and its implication in the fields of cellular iron homeostasis, obesity and diabetes at the cellular level and in mouse models. After taking time off to care for her family, she has reentered her career to coordinate a multidisciplinary project combining genetics and neuroimaging in order to investigate the etiology of schizophrenia.

Biosketch: http://pnl.bwh.harvard.edu/zora-kikinis-ph-d/

Presentation title: Diffusion Tensor Imaging: a Non-invasive Probe to Investigate White and Gray Matter of the Brain

Abstract: 22q11Deletion Syndrome (22q11DS) is a neurodevelopmental disorder and is believed to be caused by a deletion of 30 to 40 genes on one of the chromosomes 22. Individuals with 22q11DS are at high risk to develop psychosis (40% incidence in adulthood). Psychosis is a spectrum disease that is not fully understood. Diffusion Magnetic Resonance Imaging (dMRI) provides novel and non-invasive tools for mapping the white and gray matter of the brain. Using this methodology in adolescents with 22q11DS, we have demonstrated that changes in the white and gray matter

precede the clinical symptoms associated with psychosis. Findings of changes in white and gray brain matter in individuals with 22q11DS could potentially be used as a start point for developing screening strategies for subjects at increased risk for psychosis beyond 22q11DS.

Program

9 – 9:30 Opening and introduction

9:30 – 10:00 Prof. Ron Kikinis - 3D Slicer: An Open Source Platform for Medical Image Computing.

10:00 – 10:30 Prof. Alexandra Golby - Helping neurosurgeons perform optimal surgery through the use of imaging and image guidance.

10:30 – 11:00 Coffee-Break

11:00 – 11:30 Prof. Gabor Fichtinger - Perk Tutor: free open source platform for ultrasound-guided needle insertion training

11:30 – 12:00 Prof. Zora Kikinis - Diffusion Tensor Imaging: a Non-invasive Probe to Investigate White and Gray Matter of the Brain

12:00 Closing

Local Organizing Committee

Conference Chairs
Prof. Juan Ruiz Alzola
Professor of Imaging Technologies in the area of Signal Processing and Communications
Director, Grupo de Tecnología Médica y Audiovisual (GTMA)
Instituto Universitario de Investigación Biomédica y Sanitaria (IUIBS)
Universidad de Las Palmas de Gran Canaria
http://mt4sd.ulpgc.es

Research Affiliate at Instituto de Astrofísica de Canaria (IAC). PI of IAC's Medical Technology Program
Affilate Member at Instituto Universitario de Neurociencia (IUNE), Universidad de La Laguna

Prof. José Luis González-Mora
Professor of Physiology,
Facultad de Ciencias de La Salud
Dpto. de Ciencias Médicas Básicas,Sección Fisiología
Director, grupo de Neuroquímica y Neuroimagen, LNN
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