Ottawa-Carleton Institute for Biomedical Engineering

Department of Systems and Computer Engineering
Carleton University

Seminar Announcement

Speaker: Dr. Andy Adler
Canada Research Chair in Biomedical Engineering (Tier II)
Systems and Computer Engineering, Carleton University

Topic: "Advances in image reconstruction in Electrical Impedance Tomography"

Date: Wednesday 25 October

Time: 1-2pm

Place: Minto Boardroom (2014MC), Carleton University

Abstract: Electrical Impedance Tomography (EIT) uses a set of electrodes placed around the patient's body to apply current simulation and measure the resulting potentials, from which an image of the internal conductivity distribution is calculated. EIT is sensitive to physiological phenomena which affect the conductivity - it has been used to image the brain (to view perfusion changes due to epilepsy and stroke), the breast (to screen for cancerous regions), the abdomen (for gastric emptying) and thorax (to image the movement of blood and gas in the heart and lungs).

EIT image reconstruction is difficult because of the way current propagates through all paths in the body; EIT image reconstruction is non-linear, spatially variant, and mathematically ill-conditioned. To solve these problems, regularized image reconstruction techniques are used, which use prior models to penalise low probability solutions.
Recently, the increase in computer power has facilitated much more powerful algorithms. This talk will review recent work in EIT image reconstruction. We will look at: 1) imaging of electrode movement and conductivity, 2) temporal filtering, and 3) non-blurring image reconstruction (using Total Variation). Finally, we discuss the EIDORS project (www.eidors.org) an open source collaborative software project for EIT algorithms.

Bio: Andy Adler is an associate professor and Canada Research Chair (Tier II) in biomedical engineering in Systems and Computer Engineering at Carleton University in Ottawa, Canada. His research interests are in: 1) development of non-invasive biomedical measurement technologies and sensors, including the medical image and signal processing algorithms, and, 2) biometrics imaging and security systems, and the associated algorithms, measurement devices, and privacy and security aspects. In 2002-2006, he taught and researched in Electrical Engineering at the University of Ottawa. Prior to working as an academic, he worked in senior technology positions in Ottawa: BioDentity (now cryptometrics) as senior biometrics scientist; AiT (now 3M) developing cryptographic and security technology for government applications; and DEW (now ActivCard) as hardware engineering team leader. Previously, he worked in research at CIL explosives (now Orica). Andy Adler received the B.A.Sc. (honours) in Engineering Physics from the University of British Columbia in 1990, and a Ph.D. in Biomedical Engineering from the École Polytechnique de Montréal in 1995. He also worked at postdoctoral positions at McGill University and the University of Colorado Health Sciences Center.