

Friday 12 December 2014**11h00****UT3 Paul Sabatier, IRIT, Salle des Thèses****Mohamad SAWAN****Polystim Neurotech Lab., Ecole Polytechnique de Montréal
(Canada)****Toward Brain-Machine-Brain Interfaces for the
Recovery of Vital Functions**

Abstract: Emerging Brain-Machine Interfaces for diagnostic and recovery of neural vital functions are promising alternative to study neural activities underlying cognitive functions and pathologies. This talk covers circuit techniques and Microsystems intended for intracortical neurorecording and neurostimulation. Special attention will be paid to multidimensional design and implementation challenges such as power management, low-power circuit design, high-data rate communication modules, and reliable wireless energy and data transmission will be described. Case studies of continuous EcoG recording intended for learning about the intracortical vision mechanism, and adaptive spike detection intended for onset epileptic seizure focus localization and treatment will be described. In addition, microstimulation strategies in the primary visual cortex, which is intended to recover vision for the blind through multisite large arrays of microelectrodes will be reported. Finally, Lab-on-chip (LoC) based neuro-transmitters detection, manipulation and characterization intended for diagnostic purposes to locate dysfunctions at the level of neural cells interconnections will be summarized.

Bio: Mohamad Sawan received the Ph.D. degree in electrical engineering, from Sherbrooke University, Sherbrooke, Canada in 1990. He joined Polytechnique Montreal in 1991, where he is currently a Professor of microelectronics and biomedical engineering. His interests are the design and test of analog, digital, RF, MEMS and optic circuits and Microsystems, and clinical imaging. Dr. Sawan is a holder of a Canada Research Chair in Smart Medical Devices, he is leading the Microsystems Strategic Alliance of Quebec (ReSMiQ), and is founder of the Polystim Neurotechnologies Laboratory. Dr. Sawan is founder and cofounder of several international conferences such as the IEEE International NEW circuits and systems (NEWCAS) conference, the IEEE Int'l conference on electronics, circuits and systems (ICECS), and the IEEE Int'l conference on biomedical circuits and systems (BIOCAS). He is also cofounder and Associate Editor (AE) of the IEEE Transactions on BIOCAS, he is Editor and AE, and member of the board of several international Journals. He published more than 600 peer reviewed papers, two books, 10 book chapters, and 12 patents. Dr. Sawan received several awards, among them the Bombardier Award for technology transfer, the Jacques-Rousseau for Multidisciplinary research, the medal of merit from Queen Elizabeth II, the medal of merit from the President of Lebanon for his outstanding contributions, and the Barbara Turnbull Award for spinal cord research in Canada. He is Fellow of the IEEE, Fellow of the Canadian Academy of Engineering, Fellow of the Engineering Institute of Canada, and Officer of the Quebec's National Order.

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