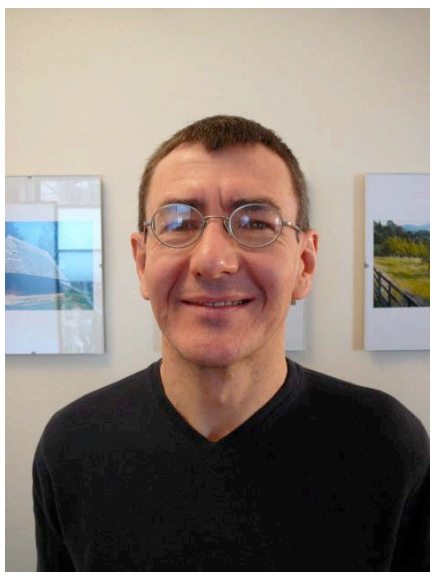
Electrical & Computer ENGINEERING **SEMINAR**

Thursday, January 29

Scaife Hall Auditorium
Room 125 4:30 p.m.
Refreshments at 4:00 p.m.



Arnaud Jacquin, Ph.D. Senior R&D Scientist

Algorithm Development Brainscope Company Inc.

Dr. Jacquin joined Brainscope at the time of its creation in June 2006. Prior to this date, he was a Senior DSP Engineer with Everest Biomedical Instruments for 3 years. He has worked in Signal Processing Research and Development for more than 20 years. He has expertise in the design of image and video processing algorithms (compression, segmentation), and in the design and implementation of algorithms for the processing of bio-signals involving tools such as wavelets, fractals, and ICA. Currently, he is working within a team of Scientists at the NYU Brain Research Laboratory and a team of Hardware and Software Engineers at Brainscope in Bosnia and Herzegovina on the Design and Integration of algorithms into systems aimed for various biomedical devices being developed by Brainscope. These devices are based on extracting brain function information from scalp-recorded EEG.

Dr. Jacquin previously worked for Lucent Bell Laboratories in Murray Hill, NJ, USA for 12 years. He holds a Diplôme d'Ingénieur de l'Ecole Supérieure d'Electricité (SUPELEC), France, a Master of Science degree in Electrical Engineering and a Ph.D. in Applied Mathematics, both from the Georgia Institute of Technology, USA. He is a Senior Member of the IEEE and a Member of the New York Academy of Sciences. He is the co-inventor of close to 20 U.S. patents and has published more than 30 refereed journal and conference articles. He was awarded the IEEE Signal Processing Society Senior Award (Image and Multidimensional Signal Processing Area) in 1993.

Brain Function Classification and the Construction of the Brain Abnormality Index (BAI)

Research conducted over several decades at the NYU Brain Research Laboratory has shown that scalp-recorded EEG can be used to identify abnormalities in brain function. This is done by first building large databases of digitized EEG signals obtained for classes of subjects which are representative of the conditions that we are interested in detecting (e.g. psychiatric disorders, stroke, traumatic brain injury, dementia, etc.), second, by computing a database of quantitative EEG signal features (qEEG features) using various signal processing techniques and third, by building classifiers using some of these features. Unlike imaging techniques (e.g. CT scans) which are typically good at identifying structural abnormalities in the brain, quantitative EEG techniques can identify functional abnormalities. These two types of techniques can therefore lead to complementary assessments of brain function in a hospital environment.

In this talk, I will first review the basic concepts involved in solving generic classification problems, including standard measures of classification performance. These problems are found in a wide variety of fields such as Engineering, Biology, Medicine, and Social Science. Humans seem to be inherently able and eager to quickly perform various mental classification tasks (which sometimes fail). They also have a good track record of building devices which include automated classification systems. I will describe the types of classification problems based on scalp-recorded EEG that we are currently tackling. I will present our Research process which covers: EEG data collection at clinical sites, the organization of data into databases which include a "gold standard" clinical diagnostic, and the construction of classifiers. Finally I will talk about ways to display the result of a classifier of brain function as an easily interpretable probabilistic index.

ECE Seminar Hosts

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