

# Engineering Neuroscience & Health

Department of Biomedical Engineering

Division of Biokinesiology and Physical Therapy



**Presents:**

**Dr. Richard Leahy**

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**Monday**

**April 13, 2009**

**4:00 p.m.**

**Refreshments will be served 3–4 pm**

## “Automated Analysis and Coregistration of Cortical Anatomy”

Richard M Leahy, Ph.D.

Professor Electrical Engineering, Biomedical Engineering and Radiology

MRI can now provide a wealth of information about structural and functional networks in the human brain. A prerequisite to the analysis of this kind of data at the group level is the ability to bring brain images into register, i.e. to define point to point correspondences across subjects in such a way that the main structures in the brain are aligned. Since the cerebral cortex is a highly convoluted structure, inter-subject alignment presents a challenging problem. I will describe our approach to this problem in which we use a sequence of analysis tools to extract a representation of the cortical surface from a structural MRI scan. We then use sulcal landmarks to align these surfaces across subjects. Using these results we are able to perform inter-subject surface based analysis of cortical morphometry or functional activation. Finally, using these aligned surfaces a constraint we can also coregister volumetric images across subjects in such a way that their cortices remain precisely aligned.

## Research Interests

Dr. Leahy's research interests lie in the application of signal and image processing theory to the formation and analysis of biomedical images. His research group is currently involved in the development and analysis of computational methods for formation of positron emission tomography (PET) images with applications in clinical oncology and gene expression imaging in small animals. For the past 15 years, Dr. Leahy has been involved in the development of inverse method for spatio-temporal imaging of neural activity from measurements of magnetoencephalographic (MEG) and electroencephalographic (EEG) data. The results of this research are distributed to the research community in the form of a freely available software package, BrainStorm. Dr. Leahy has also had a long research interest in the analysis of anatomical imagery, and specifically in the automated segmentation and labelling of neuroanatomical images and in extracting surface representations of the cerebral cortex from volumetric data. His work is supported by the National Cancer Institute, the National Institute of Mental Health and the National Center for Research Resources.

## Locations:

*Seminar is simultaneously presented*

**UPC: HNB 100 – LIVE**

**Hedco Neurosciences Building**

UPC Campus Map/Directions:  
<http://www.usc.edu/about/visit/upc/>

**HSC: CHP 147— Video Conference**

**Center for the Health Professional**

HSC Campus Map/Directions:  
<http://www.usc.edu/about/visit/hsc/>

**Organized by Professor Francisco Valero-Cuevas** <http://bme.usc.edu/valero/>

## Web Cast

<http://capture.usc.edu/college/Catalog/?cid=af180d48-ceff-42b9-a35c-eb199daed320>

Information about all seminars can be found at

<http://www.clmc.usc.edu/~heiko/ENH>

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