Graduate Student opportunities in HANSONLAB/RUMBA/RUBIC

The Hanson Lab is looking for Graduate students for some experimental and computational projects. Research will focus both on experimental design, data collection and computational modeling of brain imaging data. Data are collected locally at the RUBIC (Rutgers University Brain Imaging Center—houses a 3 Tesla SIEMENS TRIO, http://rubic.rutgers.edu). Our lab is focused on learning and memory, knowledge/brain representation and network/graph modeling. Computational work is supported by a number linux clusters including the NM^3 (Newark Massive Memory Machine**).

There are 4 different graduate programs that we participate in (one in Bold coming up soon):

Deadlines in December 15th (look at specific website for details)
Psychology (NK)
https://grad.admissions.rutgers.edu/GraduateProgram/Detail.aspx?code=26830&degree=PHD
Neuroscience (NK)
https://grad.admissions.rutgers.edu/GraduateProgram/Detail.aspx?code=26112&degree=PHD
Computer Science (NB)
https://grad.admissions.rutgers.edu/GraduateProgram/Detail.aspx?code=16198&degree=PHD
Electrical Engineering (NB)
https://grad.admissions.rutgers.edu/GraduateProgram/Detail.aspx?code=16332&degree=PHD

When you apply, in your personal statement please indicate you would like to **join the Hanson Lab** and the kind of training you would be interested in pursuing. Example projects and training opportunities listed next.

Example projects in the lab:

(PROJECT 1) brain reading and category representation: this project is focused on decoding fMRI signals while subjects are viewing common objects and classes (e.g. furniture, animals, vehicles etc..). Brain patterns are classified using Machine Learning methods (e.g. SVM, pda) and effective representations are extracted.
What are the underlying dimensions (e.g. animacy, object class, shape) and data structures that promote encoding and retrieval of category information.

(PROJECT 2) large scale brain network modeling: this project is focused on extracting large scale networks from subjects doing a common task, or in "resting state" condition (where subject is asked to do "nothing" in the scanner). Free running large scale networks are observed during resting state that span brain areas from anterior to posterior regions including 100s to 1000s of distinct locations (ROIs). Large scale network properties, including hubs, modules and network connection patterns will be characterized and modeled. Of particular interest is the "scale-free" aspects of these networks.

Other related projects are possible and can be created in collaboration with Lab advisors.
Basic Project training opportunities, include tutorial training in neuroimaging and data acquisition from the TRIO scanner. Training also includes experimental cognitive neuroscience, experimental psychology methods and data collection and analysis of both behavioral and neuroimaging data. Finally, computational methods including machine learning, feature selection/preprocessing and methods for high-dimensional visualization. Our lab also collaborated in the development of pyMVPA methods and more recently IMaGES (effective connectivity methods).

Please contact jose@rubic.rutgers.edu for further information.

Example Recent publications:

Hanson, S. J. and Schmidt, A. High-resolution imaging of the fusiform face area (FFA) using multivariate non-linear classifiers shows diagnosticity for non-face categories. NeuroImage, Vol 54(2), Jan 15, 2011, 1715-1734.
Poldrack, R.A., Halchenko, Y., & Hanson, S.J., (2010). Decoding the large-scale structure of brain function by classifying mental states across individuals. Psychological Science, 20, 1364-1372
Ramsey JD, Hanson SJ, Hanson C, Halchenko YO, Poldrack RA, Glymour C (2010). Six problems for causal inference from fMRI. Neuroimage, 49, 1545-1558.

**1600 Ivy Bridge Intel processors, and over 12 Terabytes of RAM memory, in addition, the FDR infiniband interconnection between computing nodes allows for the execution of massively parallel algorithms. Fast I/Os are also in the toolbox provided by NM3 through fast, local scratch disks mounted on each computing node.)