Dear Faculty, IGERT Fellows, IGERT Associates and Students,

You are cordially invited to attend a Seminar presented by Yalin Wang.
Please plan to attend.

Yalin Wang

Assistant Professor
Computer Science and Engineering
School of Computing, Informatics, and Decision Systems Engineering
Arizona State University

Date: Monday, May 13, 2013
Location: Bourns A265
Time: 11:00am

Computational Conformal Geometry with its Applications in Shape Analysis

Abstract:
In the era of computers, attempts to imitate the ability of the human visual system to understand shapes gave birth to the fields of computer vision and pattern recognition. There are two major problems in shape analysis research: similarity and correspondence. In the past several years, my colleagues and I have developed a series of conformal geometry methods to tackle these two fundamental questions. Conformal structure is an intrinsic and universal structure for general manifolds. With harmonic energy minimization, holomorphic 1-form and discrete curvature flow (Ricci/Yamabe flow) methods, we can parameterize general surfaces onto various canonical domains such as sphere, Euclidean plane, and the Poincaré disk. The obtained canonical representations are intrinsic and stable. They provide a rigorous framework for representing, matching and measuring general surfaces. The obtained conformal grids are beneficial for PDE-based signal processing and the induced conformal invariants - the Teichmüller space coordinates and Beltrami coefficients - are stable shape indices for statistical analysis. They also help compute tensor-based morphometry (TBM) accurately. For example, we proposed multivariate TBM framework to consider full tensor information which significantly increased statistical power to pinpoint morphometry changes. The approach enjoys rigorous theoretic foundation and simple implementation. Some recent results on human brain mapping will be reported.

Bio:
Dr. Yalin Wang received his PhD degree in Electrical Engineering in Univ. of Washington in 2002 (adviser: Robert Haralick). He took his postdoc training with the Fields medalist, Dr. Shing-Tung Yau at Harvard University and Drs. Tony Chan and Arthur Toga at UCLA. He was a founding member and key investigator at UCLA Center for Computational Biology (2005 – 2010). He was also a co-founder and CTO of Geometric Informatics, Inc., a recipient of the NIST Advanced Technology Program Award.

Currently, he is an assistant professor in School of Computing, Informatics, and Decision Systems Engineering at Arizona State University. His research focuses on the computer vision, mathematics, neuroscience, and clinical aspects of neuroimaging and brain mapping. He develops new imaging methods to track how diseases spread in the living brain over time and how medications resist them. He

has published over 120 peer-reviewed technical papers and was invited to give plenary talks at different international technical conferences, including HBM (twice), MICCAI (twice), CVPR (twice), etc.