



Geometry as a Prior in Signal Processing

Rhodes Hall 310: April 3, 2012 @ 10:15AM



ISN Seminar Speaker:
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Abstract

The recent advances of signal processing are much inspired by the exploitation of freedom in data representation that is neglected before, from sparse representations of a signal to low-dimensional embeddings of large datasets; and also by the exploitation of freedom in system capabilities that is not available before, from waveform coordination in radar to real-time data acquisition using wearable sensors. This changes how we design probing sequences to acquire information, and how to design new algorithms to process information to minimize complexity and maximize performance. It is important to identify emerging applications for new techniques, while at the same time understand the fundamental limits. In this talk, I will first show some novel applications of Compressive Sensing (CS) that I have worked on, namely wireless Electrocardiogram (ECG) monitoring in body area network and Asynchronous Multiuser Detection in wireless communications; followed by discussing the fundamental limits of CS when the underlying sparsity basis does not align perfectly to the actual physical world. Then I describe the PETRELS (Parallel Estimation and Tracking by REcursive Least-Squares) algorithm for online subspace estimation and tracking from incomplete data, and show it successfully overcomes the limits of CS for Direction-of-Arrival estimation in array processing.

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Biography

Yuejie Chi is a Ph.D. candidate in Electrical Engineering at Princeton University, advised by Professor Robert Calderbank. She received her B.Eng. and M.A. in Electrical Engineering from Tsinghua University 2007 and Princeton University 2009 respectively. She interned at Mitsubishi Electric Research Lab at Cambridge, MA in 2011 and at Qualcomm Inc. at San Diego, CA in 2010, where she won a Roberto Padovani Scholarship for her work. She also won a Best Student Paper Award at ICASSP 2012. Her main research focus is statistical signal processing, high-dimensional data analysis, machine learning and their applications in communications, networks, wireless healthcare, sensing and image processing.