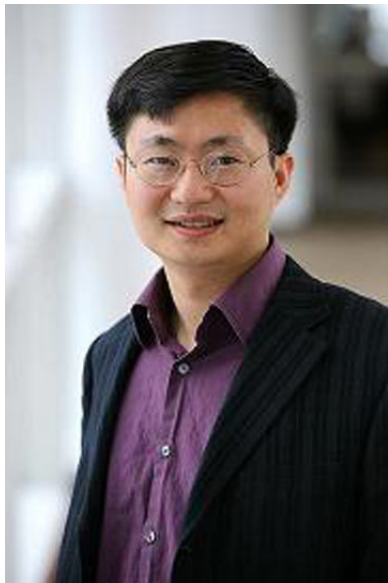


NORTHWESTERN INSTITUTE ON COMPLEX SYSTEMS PRESENTS

Wednesdays

@NICO



Compressed Sensing and Its Application in Large Wireless Networks*

Dongning Guo

**Electrical Engineering & Computer Science
McCormick School of Engineering**

Wednesday, May 27, 2009

12:00 - 1:00 PM

(Refreshments served at 11:45 AM)

**Chambers Hall, 600 Foster Street
Lower Level Classroom**

The Nyquist/Shannon sampling theorem states that any band-limited analog signal can be represented without any loss by its discrete samples taken at a frequency twice of its bandwidth, whereas lower sampling rate induces irrecoverable loss. Intuitively, an analog signal of bandwidth B has at most $2B$ degrees of freedom per second, which implies that at least $2B$ measurements per second is necessary. What is ignored is the fact that most useful signals have sparse representation in certain domain, and apparently much fewer degrees of freedom. In this talk, we discuss the new compressed sensing paradigm where a few random linear measurements of a sparse signal is shown to be sufficient for recovering the signal. As an application, we show that neighbor discovery in large wireless networks is a compressed sensing problem by nature. Besides the fundamental limits on the number of transmissions for accurate discovery, we show a simple and effective non-coherent compressed sensing scheme, which requires much fewer transmissions than conventional random-access schemes.

*This work is done with EECS Ph.D. student Jun Luo.

NICO Coffee Hour will follow for questions, networking, and collaboration.

<http://www.northwestern.edu/nico/>



**NORTHWESTERN
UNIVERSITY**