

# Compressive Covariance Sensing for Enhancing Access to Wireless Spectrum

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Public Lecture  
IEEE NSW VTS & ComSoc Chapters

## Date:

**Thursday, 16 April  
2015**

## Time:

**11:00am - 12:30pm**

## Location:

Room G3  
Electrical Engineering  
Building  
The University of New  
South Wales,  
Kensington

## Cost:

IEEE, EA, IET, ACS-TSA,  
IRSE members – Free,  
Students – Free,  
Non-members – \$10

## RSVP:

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## Abstract:

Compressive sensing is one of the recent eminent advances in signal processing and statistical learning, with impact to various applications including data sciences, communications, sensor networks, bioinformatics, and medical imaging. It requires information-bearing signals to be sparse over known domains, either naturally or by design. In this talk, I will introduce the fresh notion of *compressive covariance sensing*, and advocate its exciting implications for (cyclo) stationary processes characterized by second-order statistical descriptors. Such descriptors include (periodic) covariances or frequency, cyclic, angular and Doppler spectra, which already effect signal compression even in the absence of sparsity. Using this key observation, we will demonstrate how the attribute of sparsity can be leveraged more effectively, or, even bypassed when recovering the second-order statistical information of interest. As a leitmotif, we will use the task of wideband spectrum sensing for wireless cognitive radio, which is instrumental for realizing the goal of enhancing access to the radio spectrum. We will present a cyclic feature based compressive spectrum sensing approach for wideband cognitive radios. Using the new framework of compressive covariance sensing, wideband weak signals can be sensed reliably from sub-Nyquist-rate samples in the presence of noise uncertainty, even for (non-sparse) crowded spectrum.

## Speaker Biography

Dr. Zhi (Gerry) Tian is a Professor in the Electrical and Computer Engineering Department of George Mason University, Fairfax, VA, as of January 2015. Prior to that, she was on the faculty of Michigan Technological University from 2000 to 2014. She served as a Program Director in the Division of Electrical, Communications and Cyber Systems at the US National Science Foundation from 2012 to 2014. Her research interests lie in wireless communications, wireless sensor networks and statistical signal processing. She is an IEEE Fellow. She is an elected member of the IEEE Signal Processing for Communications and Networking Technical Committee (SPCOM-TC) and a member of the Big Data Special Interest Group IEEE Signal Processing Society. She served as Associate Editor for *IEEE Transactions on Wireless Communications* and *IEEE Transactions on Signal Processing*.

