Colorado State University's
Information Science and Technology Center (ISTeC)
presents <u>two</u> lectures by

Dr. Georgios Giannakis

ADC Endowed Chair Professor,
Director, Digital Technology Center,
Department of Electrical and Computer Engineering,
University of Minnesota

ISTeC Distinguished Lecture
in conjunction with the
Electrical and Computer Engineering Department and
Computer Science Department Seminar Series

"Wireless Cognitive Communications"
Monday, January 31, 2011
Reception: 10:30 a.m.
Lecture: 11:00 – 12:00 noon
Location: Lory Student Center Room 205

Joint Electrical and Computer Engineering Department
and Computer Science Department Special Seminar
sponsored by ISTeC

"Exploiting Sparsity for Wireless Communications"
Thursday, January 27, 2011
Lecture: 2:00 – 3:15 p.m.
Location: Engineering Room B105

ABSTRACTS

"Wireless Cognitive Communications"

Exciting research and development efforts provide ample testament to the fact that wireless cognitive radio (CR) technology holds great promise to address fruitfully the perceived dilemma of bandwidth under-utilization versus spectrum scarcity, which has rendered the current fixed-access communication networks inefficient. Accordingly, the need arises for intelligent radios equipped with critical cognition infrastructure to sense, learn, and adapt to their operational radio frequency (RF) ambiance. This talk outlines such an infrastructure for comprehensive situation awareness using the novel notion of RF cartography, which amounts to constructing maps capturing the distribution of power across space, time, and frequency; as well as the propagation medium per frequency from each node to any point in space and time. Mimicking the way we rely on AAA or GPS-generated maps to navigate our cars, the vision is to utilize these maps for: 1) identification of opportunistically available bands; 2) localization, and tracking of other radios; and 3) interference control, resource allocation, and information routing.

"Exploiting Sparsity for Wireless Communications"

Sparsity is an attribute characterizing many natural and man-made signals, not only because nature is inherently parsimonious, but also because practical constraints encourage engineering designs with as few degrees of freedom as possible. For this reason, sparsity has been exploited over the last dozen years in a broad range of statistical inference and signal representation applications, leading to the recent, exciting results on compressive sampling at sub-Nyquist rates. This talk will explore areas where exploitation of sparsity can be beneficial for wireless communications. Those include estimation of multi-access system parameters (channel taps, timing offsets, and activity factors) as well as multi-user detection. If time allows, we will also discuss how sparsity can enable efficient spectrum sensing for cognitive radio networks.

SPEAKER BIOGRAPHY

Georgio. B. Giannakis (http://spincom.umn.edu/) received his Diploma in Electrical Engineering from the National Technical University of Athens, Greece, 1981. From 1982 to 1986 he was with the University of Southern California (USC), where he received his MSc. in Electrical Engineering, 1983, MSc. in Mathematics, 1986, and Ph.D. in Electrical Engr., 1986. Since 1999 he has been a professor with the University of Minnesota, where he now holds an ADC Chair in Wireless Telecommunications in the ECE Department, and serves as director of the Digital Technology Center. His general interests span the areas of communications, networking and statistical signal processing - subjects on which he has published more than 300 journal papers, 500 conference papers, two edited books and two research monographs. Current research focuses on compressive sampling, cognitive radios, network coding, cross-layer designs, mobile ad hoc networks, wireless sensor and social networks. He is the (co-) inventor of 20 patents issued, and the (co-) recipient of seven paper awards from the IEEE Signal Processing (SP) and Communications Societies including the G. Marconi Prize Paper Award in Wireless Communications. He also received Technical Achievement Awards from the SP Society (2000), from EURASIP (2005), a Young Faculty Teaching Award, and the G. W. Taylor Award for Distinguished Research from the University of Minnesota. He is a Fellow of IEEE, EURASIP, has served the IEEE in a number of posts, including that of a Distinguished Lecturer for the IEEE-SP Society.

To arrange a meeting with the speaker, please contact Dr. Liuqing Yang at (970) 491-6215 or lqyang@engr.colostate.edu.

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