Abstract:
The Drexel Wireless Systems Laboratory (DWSL, wireless.ece.drexel.edu) seeks to demonstrate the feasibility of next generation wireless systems through the design, construction, and testing of prototype wireless hardware. Cognitive radio builds upon the flexibility in physical layer algorithm implementation delivered by Software Defined Radio (SDR) to include assessment of, and adaptation to, the surrounding radio environment. In this presentation, we summarize our research in electrically reconfigurable antennas and demonstrate how these antennas can provide a valuable degree of freedom to cognitive radios (i.e., "cognitive antennas"). Cognitive antennas have the ability to dynamically change their radiation characteristics in response to the needs (broadly defined) of the overlying link and network. We investigate a variety of architectures for cognitive antennas and quantify how they can improve communication links through pattern diversity. We will present several case studies of how these antennas can be used in current and emerging communication networks with algorithms geared towards throughput maximization, interference suppression, interference alignment, encryption key generation, and user authentication. Measurement results are also included to support these concepts and motivate the release of a new Software Defined Communication (SDC) testbed developed by DWSL.

Bio:
Kapil R. Dandekar received the B.S. degree in Electrical Engineering (1997) from the University of Virginia, Charlottesville, VA; the M.S. and Ph.D. degrees in Electrical and Computer Engineering from the University of Texas at Austin (1998, 2001), Austin, TX. Beginning in 2001, he joined the faculty at Drexel University in Philadelphia, PA. He is currently an Associate Professor in Electrical and Computer Engineering at Drexel University; the Director of the Drexel Wireless Systems Laboratory (DWSL); Associate Dean for Research in the Drexel University College of Engineering.

Dandekar’s research has been supported by the U.S. National Science Foundation, Army CERDEC, National Security Agency, Office of Naval Research, and private industry. Dandekar’s current research interests and publications involve wireless, ultrasonic, and optical communications, reconfigurable antennas, and smart textiles. Antenna technology from DWSL has been licensed by external companies for technology commercialization. The Software Defined Communication (SDC) testbed developed by DWSL is currently being released for adoption in the academic and industrial research community.