Spring 2011 Course Announcement

EEE 598: Radar Signal Processing

Instructor: Douglas Cochran  
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Meeting time: TBA  
Location: TBA

Overview:

This course provides a comprehensive introduction to the essential concepts and methods used in digital processing of radar signals. It also surveys several more advanced topics in radar signal processing that are of current interest in connection with the design of advanced radar systems and operational capabilities. The perspective of the course is centered in signal design and processing of received signals. Standard models for propagation and scattering of electromagnetic signals will be employed without emphasis on the underpinning electromagnetic theory.

Target Audience:

This course is designed for graduate students who already have knowledge of signal analysis and the fundamentals of digital and statistical signal processing.

Format:

The course material will be presented by the instructor and guest lecturers. Since this is an advanced graduate course, grading will be on the basis of homework and projects rather than exams.

Textbook:


Main Topics:

- Basic principles and applications of radar systems
- Signal transmission in active radar
  - Pulse-Doppler systems
  - Signal coherence and incoherence
  - Energy direction: antenna arrays, beamforming at the transmitter
- Receiver processing
  - Noise and clutter
  - Optimal detection and matched filtering
  - Ambiguity
  - Pulse integration, Doppler processing, and moving target indicator
  - Beamforming and adaptive beamforming at the receiver
  - Passive emitter detection and localization
  - Waveform and waveform library design
  - Space-time adaptive processing
  - Distributed, multistatic, and multiple-input multiple-output (MIMO) systems
  - Synthetic aperture (SAR/ISAR) principles
  - Waveform scheduling for clutter mitigation and tracking