SEMINAR NOTICE

Department of Electrical and Systems Engineering

OPTIMAL POLARIZED WAVEFORMS FOR DETECTING AND TRACKING TARGETS IN CLUTTER

by

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We develop optimal design methods of radar polarized waveforms for detecting and tracking point targets in the presence of clutter. First, we demonstrate the importance of exploiting polarization information in estimating the position of a target located close to a sea surface. We analyze the performance of different polarimetric array configurations in comparison with the conventional scalar-sensor array by computing the Cramér-Rao bound on the unknown target parameters. Then, we develop a new polarimetric detector for targets in heavy inhomogeneous clutter and analyze its performance in comparison with existing polarimetric detectors. To optimally design the transmit waveform, we propose a method that maximizes the target probability of detection. Finally, we develop a tracking algorithm applying a sequential Monte Carlo method (particle filter) that incorporates the complete polarimetric information of both the target and its environment in the tracking process. We propose a new criterion for selecting the optimal waveform one-step ahead based on a recursive form of the posterior Cramér-Rao bound. We demonstrate the performance of our proposed methods using numerical and real data examples.

DATE: Thursday, August 23, 2007
TIME: 3:00 p.m.
PLACE: Bryan Hall, Room 305

Research advisor:
Arye Nehorai

This seminar is in partial fulfillment
of the Doctor of Philosophy Degree

Washington University in St. Louis
SCHOOL OF ENGINEERING & APPLIED SCIENCE