

# SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

## ADAPTIVE OFDM RADAR FOR TARGET DETECTION AND TRACKING

DISSERTATION DEFENSE

by

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**Abstract:** We develop algorithms to detect and track targets by employing radar with a wideband orthogonal frequency division multiplexing (OFDM) signal. The frequency diversity of the OFDM signal improves the sensing performance as the scattering centers of a target resonate differently at different frequencies. In addition, being a wideband signal, OFDM improves the range resolution and provides spectral efficiency. First, we detect a moving target in the presence of multipath reflections, which exist, for example, in urban environments. We exploit the multipath propagation by utilizing multiple Doppler shifts that correspond to the projections of the target velocity on each of the multipath components. Then, we develop tracking methods for both a single and multiple targets. For the single-target case, we consider low-grazing angle tracking, in which we incorporate the meteorological conditions in the troposphere, earth's curved surface, and roughness of the sea surface. To track multiple targets, we exploit the inherent sparsity on the delay-Doppler plane to develop a computationally efficient procedure. We present adaptive waveform design techniques to select the spectral parameters of the OFDM signal. In contrast to conventional systems, the adaptive waveform design (in a closed-loop) enables us to achieve better sensing performance by fitting the operational scenario.

DATE: Thursday, October 28, 2010  
TIME: 10:00 a.m.  
PLACE: Bryan Hall, Room 305

Dissertation advisor:  
Dr. Arye Nehorai

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