

# SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

## **DIRECTION-OF-ARRIVAL ESTIMATION OF HYDROACOUSTIC SIGNALS FROM MARINE VESSELS**

DISSERTATION DEFENSE

by

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**Abstract:** Direction-of-arrival (DOA) estimation of underwater signals has important applications in the detection, localization, and tracking of marine vessels such as ships, submarines, and torpedoes. Hydroacoustic signals from marine vessels consist of two components: a noise-like component with a continuous frequency spectrum and a sinusoidal component whose frequency spectrum takes discrete values. Previous studies have not explored the application of the knowledge of this signal structure to improve the direction-of-arrival estimation accuracy of marine vessels.

We consider the estimation of the DOA of hydroacoustic signals from marine vessel sources. We model these signals as a mixture of deterministic sinusoidal signals and stochastic Gaussian processes. We derive maximum likelihood (ML) DOA estimators based on this signal model. In addition, we compute the asymptotic error covariance matrices of the proposed ML estimators, as well as those of typical ML estimators that assume the signals are Gaussian and have zero means, for DOA estimation of such signals. Our analytical comparisons and numerical examples show that, compared with typical ML estimators, our proposed ML estimators enhance the DOA estimation accuracy for hydroacoustic signals from marine vessels.

DATE: Thursday, March 8, 2012  
TIME: 3:00 p.m.  
PLACE: Green Hall, Room 0120

Dissertation advisor:  
Dr. Arye Nehorai

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