

UNIVERSITY OF RHODE ISLAND

Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Location: Lippitt Hall 204

Time: Monday, October 30, 2017, 1:00pm
(refreshments at 12:50 p.m.)

Subspace Estimation for Sensor-Array Signal Processing

by **Prof. Richard Vaccaro**

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Abstract: Subspace estimation is an implicit or explicit part of signal processing tasks such as adaptive beamforming or direction-of-arrival estimation using an array of sensors. This talk will begin with background information on sensor-array signal processing and the importance of estimating the signal subspace. This subspace is usually estimated by calculating the eigenvector decomposition (EVD) of the sample covariance matrix. The justification for using the eigenvectors is that, as the number of snapshots grows large, the span of the principal eigenvectors converges to the true signal subspace. That is, the eigenvectors are a consistent estimator of the signal subspace. However, a more useful property than consistency is finite-sample accuracy, as measured by statistical efficiency. That is, for a finite number of snapshots, how accurately can the signal subspace be estimated? A bound on subspace accuracy has recently been derived and the sample eigenvector subspace does not achieve it. In this talk, a new, closed-form, optimal subspace estimation (OSE) algorithm that achieves the accuracy bound will be presented and demonstrated with several examples.

Bio-Sketch: Richard J. Vaccaro received a Ph.D. in electrical engineering from Princeton University in 1983 and since then has been a faculty member at the University of Rhode Island in the Department of Electrical, Computer, & Biomedical Engineering. He was Department Chair from 1999-2005. He is a past chair of the Underwater Acoustic Signal Processing Technical Committee of the IEEE Signal Processing Society. His research interests include sensor-array signal processing, modeling and estimation for rate gyros, and control system design.