SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

NESTED ARRAY PROCESSING FOR DIRECTION OF ARRIVAL AND SOURCE NUMBER ESTIMATION

Ph.D. Preliminary Research Examination

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Abstract: We develop algorithms for direction of arrival (DOA) estimation and source number detection using nested vector-sensor arrays. The array structure is obtained by nesting two or more uniform linear arrays (ULAs) of vector sensors. By using one component's information of the interspectral tensor, we demonstrate that the proposed nested vector-sensor array can provide O(*N2*) degrees of freedom (DOFs) with only *N* physical sensors. This is in contrast to the ULA, which has only O(*N*) DOFs. To utilize the increased DOFs, we propose a novel spatial smoothing approach by exploiting multilinear algebra in order to preserve the data structure and avoid reorganization. Thus, the data is stored in a higher-order tensor. Both the signal model of the nested vector-sensor array and the signal processing strategies, which include spatial smoothing, source number detection, and DOA estimation, are developed in the multidimensional sense. We apply our analytical results to both electromagnetic (EM) and acoustic vector sensors. The effectiveness of the proposed methods is verified through numerical examples. In addition to the nested array processing with vector sensors, we will also briefly present methods that use a nested scalar-sensor array.

DATE: Tuesday, March 25, 2014
TIME: 1:30 p.m.
PLACE: Green Hall, Room 0120

Thesis advisor:
Dr. Arye Nehorai

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

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