SEMINAR NOTICE

Preston M. Green Department of Electrical and Systems Engineering

DISTRIBUTED TARGET TRACKING AND SYNCHRONIZATION IN WIRELESS SENSOR NETWORKS

DISSERTATION DEFENSE
By

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Abstract: Wireless sensor networks provide useful information for various applications but pose challenges in scalable information processing and network maintenance. This talk focuses on statistical methods for distributed information fusion and sensor synchronization for target tracking in wireless sensor networks.

In the first part of this talk, I will introduce a distributed particle filtering algorithm based on distributed fusion of local posteriors provided by individual sensors in a network. We derive a nonlinear distributed fusion rule from Bayes' theorem and implement it via average consensus. Also, we approximate local posteriors as Gaussian mixtures and fuse them nonlinearly through importance sampling. Moreover, we develop an adaptive method for Gaussian mixture fitting through a combination of hierarchical clustering and the expectation-maximization algorithm. In the second part of this talk, I will introduce a statistical approach to clock synchronization for target tracking. We model relative clock offsets between sensors as unknown parameters in a state-space model that connects sensor observations to hidden target states. We use the expectation-maximization algorithm to obtain a maximum likelihood estimate of the relative clock offsets, given no knowledge of the target states, and study the performance of the expectation-maximization algorithm under Monte Carlo approximations. Numerical examples are presented to demonstrate the effectiveness of all the proposed statistical methods.

DATE: **Monday, April 18, 2016**
TIME: **1:00 pm**
PLACE: **Green Hall, Room 0120**

Dissertation 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