Northern Virginia Chapter

Presents

A Technical Seminar by
Dr. John R. Buck
Professor, ECE Department
University of Massachusetts Dartmouth

A Biologically Inspired Active Sonar Receiver Trading Detection for Resolution

Join us for pizza, soda, seminar, and stimulating discussion.

Date & Time:
Thursday, November 18, 2010
6:30 PM - 8:30 PM

Location:
George Mason University, Fairfax Campus
Research I Building, Room 163

For Directions See: http://www.gmu.edu/resources/welcome/Directions-to-GMU.html

RSVP by November 15 to jknelson@ieee.org appreciated, but walk-ins are welcome.

Sponsored by the IEEE Signal Processing Society of Northern Virginia
Website: http://ewh.ieee.org/r2/no_virginia/sps
Bat echolocation systems must balance the conflicting demands of detecting weak targets in noise and resolving closely spaced reflectors for complex acoustic environments. Bats demonstrate an impressive ability to discriminate targets with multiple reflectors, or glints, where the interglint intervals are much smaller than the integration time of the bat auditory system, and at times even closer together than the mainlobe width for the autocorrelation function of the bat's transmitted chirp signal. This suggests that the bats' auditory processing functions as a sonar receiver which goes beyond a simple matched filter. This talk will present the Variable Resolution and Detection Receiver (VRDR), a new active sonar receiver design which smoothly trades detection performance for resolution performance. The VRDR converges to a matched filter at the detection asymptote and an inverse filter at the resolution asymptote. Monte Carlo experiments indicate that for a broad set of dipole (two echo) targets the VRDR achieves better performance than the classic matched filter or the tunable deconvolution algorithm previously proposed by Senmoto and Childers (IEEE AES, 1972). [Work performed in collaboration with Prof. James A. Simmons of Brown University, and supported by US Office of Naval Research.]

Speaker Bio:
John R. Buck received his Ph.D. from the MIT./WHOI Joint Program in Electrical and Oceanographic engineering in 1996. He joined the faculty of the ECE Department at the University of Massachusetts Dartmouth later that year. His research focuses on applications of signal processing and information theory to underwater acoustics and animal bioacoustics. In 2005, the IEEE Education Society awarded Prof. Buck the Mac Van Valkenburg Early Career Teaching Award in recognition to his contributions to signal processing pedagogy. His other past awards include a Fulbright fellowship, an NSF CAREER award, an ONR Young Investigator Award, and the MIT Goodwin Medal.