2010-2011

Graduate Seminar Series

The Departments of

Mechanical Engineering – Engineering Mechanics & Electrical and Computer Engineering

Proudly Presents

Dr. Steven Y. Goldsmith

Sandia National Laboratories

Dr. Steven Y. Goldsmith is Distinguished Member of the Technical Staff at Sandia National Laboratories in Albuquerque, New Mexico where he has been employed since 1979. He attended the University of New Mexico where received the B.E. degree in Biomedical Engineering in 1977, the M.S. degree in Electrical Engineering in 1979 with an emphasis in systems theory, and the Ph.D in Engineering in 1989 with an emphasis in intelligent systems. Since joining Sandia he has developed information and control systems for many different applications including particle beam fusion accelerators, intelligent signal processing, seismic monitoring, arms control and treaty verification, cryptography, environmental life-cycle analysis, e-commerce and international trade, electric grid coordination, collective robotics, information operations, and cyber security.

He is currently the Principal Investigator of the Advanced Information Systems Laboratory in Sandia's Energy, Resources, and Nonproliferation Program. Dr. Goldsmith's research efforts are focused on intelligent agent systems and technology, particularly the development of adaptive and self-organizing systems for the coordination of large-scale infrastructures. His current projects involve the application of intelligent agents to advanced cyber systems, complex systems simulation, "smart" electric grid controls, and microgrid coordination systems.

Thursday, Mar. 3, 2011 4:00 – 5:00 p.m. Room 112, ME-EM Bldg.

Agent-based Informatics for Autonomous Microgrids

It is a foregone conclusion among power systems experts that localized microgrids based on fine-grained distribution of small capacity generators and fine-grained control of loads using advanced power grid informatics will limit the scope of cascading failures, reduce transmission losses and CO_2 emissions, enable renewable source penetration, and generally improve the reliability of electrical service throughout the entire grid. However, the current centralized grid coordination and control architecture is inadequate for managing distributed power grids. Centralized SCADA functions requiring substantial human-in-the-loop decision and intervention cannot scale, i.e. cannot decide proper actions, nor decide in time, for the number of independent generation and load resources implied by highly distributed autonomous microgrids. This talk will present an overview Sandia's technical approach to the power grid informatics challenges posed by distributed autonomous microgrids. The basis of our approach is to leverage advanced multi-agent system (MAS) technology to develop the collective decision functions and interaction protocols necessary to harmonize the competing and common interests among, and coordinate the actions of, a heterogeneous society of autonomous power agents. The presentation will exhibit the general MAS architecture and highlight some fundamental research issues being investigated through development testing on a small computational cluster.

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