

# ELECTRICAL & COMPUTER ENGINEERING SEMINAR

## “Design of Cooperative Systems”

by

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Tuesday, April 3, 2007 4:00 p.m.

LSC 210

### Abstract & Biography

We will overview some of the recent developments in the design of *cooperative (multi-agent) systems*, defined as systems of interconnected autonomous agents optimizing their own local objectives yet accomplishing a global objective. Cooperative systems design is a recent research theme that received significant attention primarily due to interest in designing “smart” vehicles with intelligent and coordinated action capabilities to achieve a system-wide objective. Other applications include multi-vehicle search and target assignment for military mission planning, multi-sensor deployment for anti-submarine warfare, cooperative multi-user MIMO signaling in wireless communication systems, distributed optimization in VLSI routing, congestion management in transportation systems.

There are two key issues in designing such systems: 1) designing local objectives, i.e., telling the autonomous agents what to optimize, and 2) designing negotiation algorithms, i.e., telling the autonomous agents how to optimize. Recent research shows that game theory is the most natural framework to analyze and synthesize cooperative systems. We will review some of the core concepts and tools provided by game theory to address those key issues involved in designing cooperative systems.

Gürdal Arslan received Ph.D. degree in electrical engineering from the University of Illinois at Urbana-Champaign, in 2001. From 2001 to 2004, he was an Assistant Researcher in the Department of Mechanical and Aerospace Engineering, University of California, Los Angeles. In August 2004, he joined the Electrical Engineering Department at the University of Hawaii, Manoa. His current research interests lie in the design of cooperative (multi-agent) systems using game theoretic methods. Recent applications of his research include autonomous resource allocation for mission planning, multi-sensor deployment, traffic management, and cooperative multi-user MIMO signaling in wireless communication systems. He is a member of the IEEE Control Systems Society and he received the National Science Foundation CAREER Award on [“Cooperative Systems Design - Stochastic Games Approach”](#) in May 2006.

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