

SEMINAR NOTICE

Department of Electrical and Systems Engineering

Cooperation Strategies for Cyber Physical Systems

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Abstract: Cyber physical systems are characterized by a tight interplay between their physical and computational components. This characteristic is typical of numerous systems that consist of the natural environment, humans, robots and computers. Common examples of such systems are cities with people carrying mobile computing devices, networks of unmanned aerial vehicles, and swarms of mobile robots. The complex interaction between heterogenous components and the increasingly distributed architecture of such systems poses great challenges for control design purposes. Different scientific communities have developed approaches to deal with each of the components individually, while making simplifying assumptions on the others. I am interested in control design approaches that cross the boundaries between these disciplines in a systematic way. In this talk, I demonstrate such approaches by considering two specific scenarios: routing of multiple autonomous robots and task scheduling for human operators. These scenarios arise naturally in applications like environmental monitoring, surveillance and emergency management. The proposed control algorithms for these scenarios systematically rely upon the interplay between the combinatorial nature of the task, the differential constraints on the motion of the robots and the cognitive characteristics of human operators. Moreover, the results provide insight into how the performance of the overall system changes as its complexity increases, in terms of the number of robots, human operators and the number of tasks.

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Bryan Hall, Room 305

Host: R. Martin Arthur

Short Bio: Ketan Savla is a postdoctoral associate at the Laboratory for Information and Decision Systems at MIT. He obtained his Ph.D. in Electrical Engineering and M.A. in Applied Mathematics, both in 2007, from the University of California, Santa Barbara. Prior to that, he received his M.S. in Mechanical Engineering from UIUC in 2004 and his B. Tech. in Mechanical Engineering from IIT Bombay in 2003. His current research interests are in systems and controls, algorithmic and experimental robotics, humans-in-the-loop systems and game theoretic aspects of multi-agent systems. His CDC-ECC'05 paper was a finalist for the best student paper award.