

# Funding Opportunities at the NSF and Cooperative Path Planning in Real Time

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3:30-4:30 pm

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4-178 EECS Bldg.

**ABSTRACT:** The presentation includes two separate topics: 1. a brief overview of NSF programs and funding opportunities in the Control Systems Program within CMMI division in the ENG directorate, and 2. some recent results and new directions in cooperative control research. Considered is a class of problems in coordinating multi-agent systems that include the so called radar deception problem, rigid formation keeping and formation reconfiguration. Cooperative deployment of agents to accomplish the associated tasks is dominated by task coupling, partial information, and uncertainty. Being able to move a team of networked agents from a reference configuration (location and shape) A to a goal configuration B is fundamental, and provides the basis for, their effective deployment. A geometric formulation of the associated constraints provides a unifying framework for these three problems. A real time motion planning algorithm that generates feasible reference trajectories for these problems is proposed. A unique feature of the approach is that it explicitly considers actuator and other operating constraints and derives the constrained dynamics of the multi-agent system in a way that these constraints become transparent. This approach to deriving constrained dynamics eliminates the need for nonlinear programming methods to account for system constraints thus making it very attractive for real time control. In addition the explicit consideration of actuator and operating limits and nonholonomic constraints in the synthesis of reference trajectories addresses the important issue of dynamic feasibility of such trajectories.

**BIOGRAPHY:** An ASME Fellow, Dr. Suhada Jayasuriya is currently the NSF Control Systems Program Director and Kotzebue Endowed Professor of Mechanical Engineering at Texas A&M University. He received his B. Sc. Degree from University of Sri Lanka, and M.S., Ph.D. degrees from Wayne State University all in Mechanical Engineering. He is the Editor of the ASME Journal of Dynamic Systems, Measurement and Control and ASME Director on the AACC Board. He served as the chair of the Dynamic Systems and Control Division of ASME. Professor Jayasuriya's research focuses on cooperative and distributed control and uncertain nonlinear systems  
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