



Seminar of the



AFRL/VA and AFOSR

**Collaborative Center of Control Science (CCCS)**

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## **Centralized and Distributed Algorithms for Dynamic Task Assignment Problems**

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11:30am, March 10, 2003  
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**Abstract:** In this talk, we discuss two problems associated with resource allocation in distributed teams of unmanned air vehicles. The first problem focuses on task partitioning among team members in the presence of dynamically arriving tasks, when information about task arrivals is obtained locally by individual team members and takes time to communicate among the team. Communication delays lead to differing information sets among team members, which evolve dynamically in response to communications from team members. The task partitioning problem is formulated as an optimal assignment problem; the talk will describe a dynamical systems model of this information evolution, and discuss a distributed decision algorithm that converges to an optimal assignment of tasks robustly in the presence of arbitrary but finite communication delays. The second problem is task assignment in the presence of unreliable resources and new task arrivals. Under the assumption that resource failures can be observed, the resulting problem becomes a stochastic control problem with a combinatorial state and decision space that is difficult to solve exactly. We describe an approximate problem that can be solved exactly in polynomial time. We also discuss extensions of the previous distributed algorithms to solve the approximate stochastic control problem in the presence of differing information sets and unknown but bounded communication delays.

**Biography:** David A. Castañón is Professor in Electrical and Computer Engineering at Boston University. He received his B.S. degree in Electrical Engineering from Tulane University in 1971, and his Ph.D. degree in Applied Mathematics from the Massachusetts Institute of Technology in 1976. He was a research scientist at MIT in the Laboratory for Information and Decision Systems, then chief scientist at Alphatech, Inc. in Burlington, MA, before joining Boston University in 1990. His research interests include stochastic control, estimation and optimization, with applications to automated target recognition and distributed control. Dr. Castañón is a senior member of IEEE, and is Vice President of Finance for IEEE's Control Systems Society.