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Collaborative Center of Control Science (CCCS)

Decentralized Cooperative Search and Task Allocation in Teams of UAVs

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Abstract: There has been considerable work recently on algorithms for cooperative control of uninhabited autonomous vehicles (UAVs) engaged in search-and-destroy (or, possibly, search-and-rescue) missions. Most of these approaches have focused on specific aspects of the overall problem, such as search, path planning, target assignment, rendezvous, coordination of time-over-target, etc., and solutions have been proposed based on search theory, linear and dynamic programming, satisficing, evolutionary algorithms, and market-based methods. In this talk, we present some of our recent work on cooperative search using opportunistic learning, dynamic programming and potential-based approaches, and discuss ideas for path planning and target allocation in dynamic combat environments. Most work in these areas has focused on centralized optimization. However, in dynamic environments, or in those with little a priori information, centralized and global approaches can scale poorly and impose unacceptable costs. We focus on decentralized and incremental methods. Also we attempt to incorporate the temporal aspects of task allocation into our framework.

Biography: Ali Minai received his Ph.D. in Electrical Engineering and post-doctoral training in computational neuroscience, both at the University of Virginia. His research interests are in complex adaptive systems and distributed intelligence. He has been with the Department of Electrical Engineering at University of Cincinnati since 1993. Details about Dr. Minai's research are available at http://www.ececs.uc.edu/~aminai/