Hierarchical Optimization Strategies for Deployment of Mobile Robots

Article

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Publication Information

International Journal of Intelligent Control and Systems (IJICS), Special Issue on Swarm Robotics Volume 11, Issue 3, 2006, Pages 141-153

Abstract

In this paper, we integrate model predictive control (MPC) and mixed integer linear programming (MILP) into a hierarchical framework suitable for solving optimization problems involving robotic networks. A critical issue in MPC/MILP applications is that the underlying optimization problem must be solved on-line. This creates a time constraint which is hard to meet when the number of robots and the number of obstacles increase. To alleviate this difficulty, we develop strategies that significantly improve the efficiency of a hierarchical, decentralized optimization scheme. As an application is considered a case of target assignment problem in urban-like environments. Numerical simulations verify the scalability of the algorithm to the number of robots and complexity of the environment.

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