A Hierarchical Optimization Algorithm for Cooperative Vehicle Networks

Article

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Publication Information

Conference: American Control Conference, 2006 June 14, 2006, 6 pages

Abstract

In this paper, we combine model predictive control (MPC) and mixed integer linear programming (MILP) into a hierarchical optimization framework capable of solving a class of coordination problems in multi-vehicle networks. A critical issue in MPC/MILP applications is that the underlying optimization problem must be solved on-line. This introduces a time constraint that is hard to meet when the number of vehicles and the number of obstacles increase. To alleviate this problem, we implement some heuristics that significantly improve the efficiency of the proposed hierarchical, decentralized optimization scheme. Numerical simulations verify the scalability of the algorithm to the number of vehicles and complexity of the environment.

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