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Decentralized Model Predictive Control techniques for multiagent coordination problems

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Abstract:

This seminar deals with the application of Model Predictive Control to coordination problems in multiagent systems. The core part of the talk will be devoted to decentralized strategies able to guarantee consensus in groups of agents with single- or double-integrator dynamics. At each time step, the agents transmit their states to the others by means of a time-varying communication network and individually compute their own controls, based on the available information. In particular, each agent solves a constrained finite-time optimal control problem involving the state of neighboring agents. Moreover, following the so-called Receding-Horizon principle, at each step the controller only applies the first input of the computed control sequence. Our methods are formally proven to guarantee consensus under mild assumptions. Furthermore, the optimal paths of the agents enjoy some interesting geometric properties. During the talk, it will also be shown how the proposed control techniques can be exploited to solve a multiagent containment problem. This is done by building up a leader-follower architecture governed by a hybrid logic based on automata.

Biography:

Luca Galbusera Luca Galbusera was born in Milano, Italy. He received the M.Sc. degree in systems and control engineering (with honors) from the Politecnico di Milano in 2006. Then, he completed the Ph.D. degree in information engineering at the same institution, where he pursues his scientific activity. His research interests include multi-agent systems, model predictive control, switched systems, systems with delays, optimal and robust control.