Title:
Distributed optimization in cyber-physical networks: novel computation and communication challenges

Presenter:
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Abstract:
Large-scale cyber-physical network systems have become ubiquitous in everyday life. Cooperative robots, sensor networks, smart grids and social-networks are just few examples. The presence of computation capability, storage and communication in any portable device on one side and the massive data and sensing availability on the other side offers a unique opportunity for the control and optimization community. An important prerequisite for numerous estimation, learning, decision and control tasks arising in such complex systems is the cooperative solution of optimization problems without the presence of a coordinating unit. In this novel distributed peer-to-peer computational framework the communication and the interaction topology represent a fundamental challenge. Differently from the parallel computation setting, the communication is not a design parameter anymore, but rather a specific to deal with. In this talk I will present a set of methodologies to solve large-scale, constrained optimization problems arising in cyber-physical networks. The proposed distributed optimization algorithms are scalable with respect to the network size, work in asynchronous networks (possibly directed and unreliable), do not need any parameter tuning, and can handle non-smooth optimization problems.