Washington University in St. Louis

Engineering

Preston M. Green Department of Electrical & Systems Engineering

Seminar Announcement

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Coordinated Science Laboratory

University of Illinois, Urbana-Champaign

Monday, March 7, 2016

Green Hall, Room 0120

10:10 AM

Interplay between Information and Objectives in Formation Control

Abstract: This talk is on control of large network systems within the framework of decentralized control. A main challenge in decentralized control is to understand the interplay between information acquisition and flow among different controllers (agents) and their objectives. We are particularly interested in the question of whether a certain objective is feasible when agents in the network are only allowed to communicate over a predefined information flow graph. Specifically, we address in this talk a fundamental problem for decentralized systems in the context of formation control, namely controllability and path-controllability of the formation system.

For the problem of controllability, we investigate the relationships between the geometry of formations, the structure of the underlying information flow graph, and controllability of a class of nonlinear formation control systems. In particular, we relate the condensation of the information flow graph to the reachable set of the control system. We show that the formation control model is controllable (and approximately path-controllable) almost everywhere provided that the graph is weakly (directed) connected and satisfies a mild assumption on the numbers of vertices of the strongly connected components. Some future directions of research on this class of problems will be discussed before concluding the talk.

Bio: Xudong Chen obtained the B.S. degree from Tsinghua University, Beijing, China, in 2009, and the Ph.D. degree in Electrical Engineering from Harvard University, Cambridge, Massachusetts, in 2014. He is currently a postdoctoral fellow in the Coordinated Science Laboratory at the University of Illinois, Urbana-Champaign. His research interests are in the area of control theory, stochastic processes, optimization, game theory and their applications in large network systems.

Host: Dr. Arye Nehorai