USC Viterbi

School of Engineering
*Ming Hsieh Department
of Electrical Engineering*

Ming Hsieh Institute Seminar Series

Ming Hsieh Department of Electrical Engineering

Center for Systems and Control
CommNetS

Automata-Switched Systems, Decentralized Control, and Team Games

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Monday, November 26, 2018
2:00 – 3:00 PM
EEB 132

Abstract: This seminar is inspired from a practical perspective by recent advances in computing, sensing and networking hardware that make reconfigurable multiagent systems both technologically and economically feasible on a widespread scale. Switching is a common feature in systems that are comprised of interacting software and physical processes, and in this talk we will focus on a special type of hybrid model called an automaton-switched linear system. These models are closely related to Markovian jump linear systems, and contain both discrete and continuous states, where discrete states evolve according to automata, or more general transition systems, and continuous states evolve according to linear dynamics influenced by the discrete states. We will discuss how such systems can be automatically analyzed using ideas from control theory and semidefinite programming, and will provide solutions to several synthesis problems in this framework, including for instance the long-studied moving horizon problem, and the decentralized control problem for systems with nested structure. We will also present results on a particular class of team games in which players have incomplete model knowledge individually, but jointly know the global system dynamics. The HoTDeC multi-vehicle testbed will also be presented, along with implementations of the above results on indoor UAVs.

Bio: Geir E. Dullerud is the W. Grafton and Lillian B. Wilkins Professor in Mechanical Engineering at the University of Illinois at Urbana-Champaign. There he is also a member of the Coordinated Science Laboratory, where he is Director of the Decision and Control Laboratory (21 faculty); he is an Affiliate Professor of both Computer Science, and Electrical and Computer Engineering. He has held visiting positions in Electrical Engineering KTH, Stockholm (2013), and Aeronautics and Astronautics, Stanford University (2005-2006). Earlier he was on faculty in Applied Mathematics at the University of Waterloo (1996-1998), after being a Research Fellow at the California Institute of Technology (1994- 1995), in the Control and Dynamical Systems Department. He holds a PhD in Engineering from Cambridge University. He has published two books: "A Course in Robust Control Theory", Texts in Applied Mathematics, Springer, 2000, and "Control of Uncertain Sampled-data Systems", Birkhauser 1996. His areas of current research interest include convex optimization in control, cyber-physical system security, cooperative robotics, stochastic simulation, and hybrid dynamical systems. In 1999 he received the CAREER Award from the National Science Foundation, and in 2005 the Xerox Faculty Research Award at UIUC. He is a Fellow of both IEEE (2008) and ASME (2011). He is the General Chair of the upcoming IFAC workshop Distributed Estimation and Control in Networked Systems (NECSYS) to be held in Chicago in 2019.