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Date and Time: 02/20/2015 - 10:30am - 11:30am,
Location: MDEA, #311 on the UCI Campus Map

Title: Controllability Metrics, Limitations and Algorithms for Complex Networks

Abstract
Complex networks emerge in diverse natural and technological systems. The ability to manipulate and reconfigure complex networks through local interventions is fundamental to guarantee reliable and efficient network functionalities. Typically, it is not feasible nor desirable to control each network component, thus the importance to identify optimal control components and strategies, and to characterize to what extent few control components can reprogram complex networks.

In this talk I will present different metrics for network controllability and highlight fundamental limitations. In particular, based on the network topology and weights, I will show that most complex network are difficult to control by few control nodes, as the control energy grows exponentially with the network cardinality. Conversely, I will characterize certain "anisotropic" networks whose controllability degree is independent of the network cardinality. Finally, I will describe a scalable control algorithm with performance guarantees, and I will discuss possible research directions.

Speaker's Bio
Fabio Pasqualetti is an Assistant Professor in the Department of Mechanical Engineering, University of California, Riverside. He completed a Doctor of Philosophy degree in Mechanical Engineering at the University of California, Santa Barbara, in 2012, a Laurea Magistrale degree (M.Sc. equivalent) in Automation Engineering at the University of Pisa, Italy, in 2007, and a Laurea degree (B.Sc. equivalent) in Computer Engineering at the University of Pisa, Italy, in 2004. His main research interest is in secure control systems, with application to multi-agent networks, distributed computing, and power networks. Other interests include vehicle routing and combinatorial optimization, with application to distributed area patrolling and persistent surveillance, and computational neuroscience.