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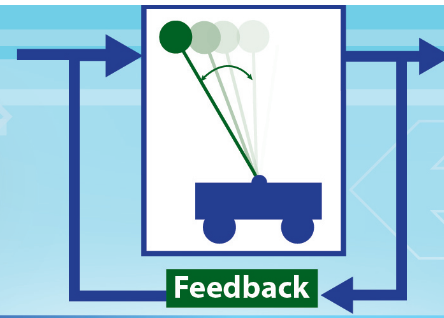
Control Seminar



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Intermittent Communication Control in Mobile Robot Networks

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3:30 – 4:30 pm • 1500 EECS

ABSTRACT: Wireless communication is known to play a pivotal role in enabling teams of robots to successfully accomplish global coordinated tasks. For this reason, in recent years, there has been a large amount of work focused on designing controllers that ensure point-to-point or end-to-end network connectivity for all time. Available approaches rely on either graphs to model inter-robot communication or on more realistic wireless communication models that consider path loss, shadowing, and multipath fading as well as optimal routing decisions for desired information rates. Nevertheless, due to the uncertainty in the wireless channel, it is often impossible to ensure all-time connectivity in practice. Moreover, all these methods severely restrict the robots from accomplishing their tasks, as motion planning is always restricted by connectivity constraints on the network. Instead, a much preferred solution is to enable robots to communicate in an intermittent fashion, and operate in disconnect mode the rest of the time. In this talk we show that intermittent connectivity can be captured by a global Linear Temporal Logic (LTL) formula that forces robots to meet infinitely often at designated rendezvous points, and propose a novel technique to approximately decompose the global LTL formula into local ones, significantly increasing scalability of our method.

BIO: Michael M. Zavlanos received the Diploma in mechanical engineering from the National Technical University of Athens (NTUA), Athens, Greece, in 2002, and the M.S.E. and Ph.D. degrees in electrical and systems engineering from the University of Pennsylvania, Philadelphia, PA, in 2005 and 2008, respectively. From 2008 to 2009 he was a Post-Doctoral Researcher in the Department of Electrical and Systems Engineering at the University of Pennsylvania, Philadelphia. He then joined the Stevens Institute of Technology, Hoboken, NJ, as an Assistant Professor of Mechanical Engineering, where he remained until 2012. Currently, he is an assistant professor of mechanical engineering and materials science at Duke University, Durham, NC. He also holds a secondary appointment in the department of electrical and computer engineering. His research interests include a wide range of topics in the emerging discipline of networked systems, with applications in robotic, sensor, and communication networks. He is particularly interested in hybrid solution techniques, on the interface of control theory, distributed optimization, estimation, and networking.

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