COLLEGE OF ENGINEERING

Control Seminar

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Optimal Control and Estimation With Noisy Time and Communicative Actions

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3:30 – 4:30 pm 1500 EECS

ABSTRACT: This talk will cover two topics: 1) Control and estimation with noisy time, and 2) communication via control actions. In most control analysis, time is assumed to be perfectly known. However, in many important scenarios ranging from robotics, biological motor control, and transportation systems, timing information is not known perfectly. In the first part of the talk, we will examine problems of optimal control and estimation when time is imperfectly measured. For optimal control, we will show that under some clock noise models, dynamic programming principles can be obtained. In the linear quadratic case, explicit solutions can be computed. For estimation, we will present the problem of estimating time from sensor data. In particular, we will examine how control can influence the accuracy of time estimates, and we will discuss the estimation of time from multiple sensors with inaccurate time-stamps.

The second part of the talk will focus on communication with control actions. This communication strategy is known as signaling. While most signaling problems are mathematically challenging, humans routinely signal during cooperative movements. The second part of the talk will present a tractable problem that models salient features of human signaling strategies. The problem consists of a signaler that reaches towards an unspecified target, and an observer that decides on the target location based on movement measurements. The optimal control scheme reproduces qualitative phenomena observed in human reaching experiments.

BIO: Andrew Lamperski received the BS degree in biomedical engineering and mathematics in 2004 from the Johns Hopkins University, Baltimore, MD, and the PhD degree in control and dynamical systems in 2011 from the California Institute of Technology, Pasadena. He held postdoctoral positions in control and dynamical systems at the California Institute of Technology from 2011–2012 and in mechanical engineering at the Johns Hopkins University in 2012. From 2012–2014, did postdoctoral work in the Department of Engineering, University of Cambridge, on a scholarship from the Whitaker International Program. In 2014, he joined the Department of Electrical and Computer Engineering, University of Minnesota as an Assistant Professor. His research interests include optimal control and estimation, with applications to neuroscience and robotics.

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