



2015 Mechanical Engineering Alumni Award Winner



Dr. Niklas Karlsson

Modeling and Control of Online Advertising

Guest Speaker at the ME Graduate Student Convocation Ceremony

October 7th, 2015 @ 3:00pm in ESB 1001

Internet advertising is a huge and growing industry with many interesting and challenging engineering problems. This talk first reviews the evolution of optimization paradigms adopted for online advertising from 1998 to 2015. Thereafter we discuss methods for how to describe online advertising as a high-dimensional dynamic system, and how on top of this to apply conventional engineering principles for control and optimization. We show how this on-the-surface non-standard engineering problem on a proper abstraction level can be represented in terms that mechanical engineers are familiar with. In the process of developing a model that describes the dynamics, we highlight unique aspects of the system, making it challenging as well as inviting for further research. The challenges involve non-linearities, time-variability, randomness, uncertainties, latency, and coupling effects. We finally sketch on a solution for advertising campaign optimization, where the objective is to deliver an advertising budget smoothly throughout a campaign flight at the smallest possible cost to the advertiser.

Dr. Karlsson is Vice President of Research and Development at AOL/Verizon, and directs Algorithm Research within AOL Platforms, R&D. He was recruited by Advertising.com (AOL) in 2005 to build and direct the research group responsible to develop the next generation advertising campaign control system. During his tenure at AOL Niklas has conceived and developed for example the feedback-control based advertising campaign delivery system AdLearn™ 5, and the bid randomization-based content optimization system ContentLearn™. From 2002 to 2005 Niklas was the principal investigator of navigation and feedback control at Evolution Robotics, where he among other things invented the vSLAM™ technology which triggered iRobot's acquisition of Evolution Robotics. With a passion for control, optimization, machine learning, statistics, signal processing, and bidding strategies his work has resulted in many successful products and 25 issued U.S. patents with many more patents and products in the pipeline. Karlsson received his Ph.D. at University of California at Santa Barbara (UCSB) in Mechanical Engineering with a specialization in Dynamic Systems, Control, and Robotics. He received an M.A. in Statistics and Applied Probability from UCSB and a M.S. in Engineering Physics from Lund University. At UCSB Niklas received the Outstanding Teaching Assistant award (2000-01).