



**The Center for Control, Dynamical Systems, and Computation
University of California at Santa Barbara
Winter 2009 Seminar Series
Presents**

**Information-theoretic Paradigms for Modeling and Control
of Dynamical Systems**

**Prashant Mehta
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Abstract:

This talk is concerned with information theoretic approaches for control-oriented performance and robustness analysis of nonlinear dynamical systems. The mathematical foundation shares common roots including Markov models of nonlinear systems and use of information theoretic metrics such as entropy of stochastic processes. We discuss extensions of fundamental performance limitations (Bode formula) to control of nonlinear systems. For robustness analysis, we outline a prediction-based approach for comparing dynamical systems. An information theoretic metric is described to compare systems in terms of additional uncertainty that results for the prediction problem with an incorrect choice of the model. The latter is related to and inspired by T. Georgiou's recent work on information geometry of spectral densities. Applications to jet engines and biology are also discussed.

About the Speaker:

Prashant G. Mehta is an Assistant Professor at the Department of Mechanical Science & Engineering, University of Illinois at Urbana-Champaign. He received his Ph.D. in Applied Mathematics from Cornell University in 2004. Prior to joining UIUC, he was a research engineer at the United Technologies Research Center (UTRC). At UTRC, he was recognized with an outstanding achievement award for his contributions in developing dynamical systems methods to obtain practical solutions to problems in aero-engines. His research interests are in development of stochastic methods for modeling and control of nonlinear systems, with applications to biology, integrated building systems and communication networks.
