

The Electrical and Computer Engineering Program presents

# From Biological Pathways to Regulatory Networks

Dr. Aniruddha Datta

**Monday, 14 March 2011, 1–2 p.m.**

**Lecture Hall 144**

*light lunch will be served*

In this talk, we present a general theoretical framework for generating Boolean networks whose state transitions realize a set of given biological pathways or minor variations thereof. This ill-posed inverse problem, which is of crucial importance across practically all areas of biology, is solved by using Karnaugh maps which are classical tools for digital system design. It is shown that the incorporation of prior knowledge, presented in the form of biological pathways, can bring about a dramatic reduction in the cardinality of the network search space. Constraining the connectivity of the network, the number and relative importance of the attractors, and concordance with observed time-course data are additional factors that can be used to further reduce the cardinality of the search space. The networks produced by the approaches presented here should facilitate the understanding of multivariate biological phenomena and the subsequent design of intervention approaches that are more likely to be successful in practice. As an example, the results presented here are applied to the widely studied p53 pathway and it is shown that the resulting network exhibits dynamic behavior consistent with experimental observations from the published literature.



Aniruddha Datta received the B. Tech degree in Electrical Engineering from the Indian Institute of Technology, Kharagpur in 1985, the M.S.E.E. degree from Southern Illinois University, Carbondale in 1987 and the M.S. (Applied Mathematics) and Ph.D. degrees from the University of Southern California in 1991. In August 1991, he joined the Department of Electrical and Computer Engineering at Texas A&M University where he is currently a Professor and holder of the J. W. Runyon, Jr. '35 Professorship II.

His areas of interest include adaptive control, robust control, PID control and Genomic Signal Processing. He has authored or coauthored 5 books and over 100 journal and conference papers on these topics. He is a Fellow of IEEE, has served as an Associate Editor of the IEEE Transactions on Automatic Control from 2001 to 2003, the IEEE Transactions on Systems, Man and Cybernetics-Part B from 2005-2006 and is currently serving as an Associate Editor of the EURASIP Journal on Bioinformatics and Systems Biology.

## FOR MORE INFORMATION:

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