



**The Center for Control, Dynamical Systems, and Computation
University of California at Santa Barbara
Fall 2006 Seminars
Presents**

Programmable Stochastic Self-Assembly

by Eric Klavins

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Abstract:

We consider the control of programmable self-assembling systems whose dynamics are governed by stochastic reaction-diffusion dynamics. In our system, particles may decide the outcomes of local reactions initiated by the environment, thereby steering the global system to produce a desired assembly type. I will describe the construction of local rule sets using graph grammars and methods by which the global properties of the resulting systems can be guaranteed. Then, based on measured natural reaction rates, we describe a method that automatically generates the best rule set for the particles so as to maximize the yield in the system - essentially an example of metabolic pathway engineering in a unique setting. We demonstrate the design method using a variety of examples, including with our self-assembling robot test-bed.

About the Speaker:

Eric Klavins is an assistant professor of Electrical Engineering at the University of Washington in Seattle. He received a B.S. in Computer Science in 1996 from San Francisco State University and M.S. and Ph.D. degrees in Computer Science and Engineering in 1999 and 2001 from the University of Michigan in Ann Arbor, MI. From 2001 to 2003 he was a Postdoctoral Scholar in the Control and Dynamical Systems Department at the California Institute of Technology. In 2001, he received an NSF CAREER award entitled "Programmable Robotic Self-Assembly". His research interests include robotics, control systems, concurrency, self-organization and biochemistry.
