

Meeting: 1001, Evanston, Illinois, SS 15A, Special Session on Mathematical Problems in Robotics

1001-68-172 **Eric Klavins*** (klavins@ee.washington.edu), Electrical Engineering, Campus Box 352500,
Seattle, WA 98195. *A Grammatical Approach to Self-Organizing Robotic Systems.*

The fundamental problem of designing self-organizing systems is to understand how local interactions between components give rise to global properties. This problem must be solved if we are to engineer predicatable and reliable large-scale systems consisting of vast numbers of parts (e.g. micro-robots, cells or molecules). In this talk I will describe a formal approach to modeling and designing self-organizing systems based on graph rewriting. The approach allows us to describe massively parallel algorithms for self-assembly, self-replication, distributed locomotion and other decentralized processes and to rigorously prove that they work. I will illustrate the approach by showing how it can be used in robotics and in MEMs self-assembly. (Received August 24, 2004)