

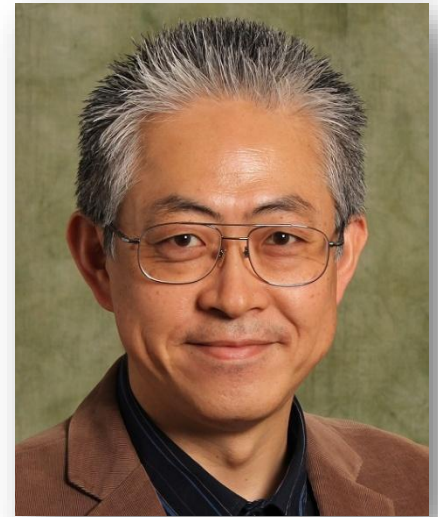


CoCo Seminar Series Fall 2026

Evolution and Complexity Growth of Artificial Life in Cellular Automata and Other Discrete Dynamical Systems

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Mary Shepard B. Upson Visiting Professor in Engineering, Cornell University

Wednesday September 2, 2026 12:15-1:15pm EDT

Hybrid (EB-T1 & Zoom; meeting link available on

<http://coco.binghamton.edu/>)

Since John von Neumann's early work on self-reproducing automata, discrete dynamical systems such as cellular automata (CA) have been extensively used in the field of Artificial Life as a mathematical/computational medium to represent various biological phenomena. While the traditional focus has been on implementing mechanisms for self-replication/self-reproduction, the core vision in von Neumann's work and much of its subsequent work has always been the evolution and complexity growth of biological systems. The "evolution" part of this vision was fully realized in deterministic CA in the late 1990s and early 2000s, whereas the "complexity growth" part remains quite difficult and elusive. In recent years, however, this topic has gained renewed attention in the Artificial Life community under the new term "open-ended evolution", utilizing various types of discrete dynamical systems that go beyond traditional CA. In this talk, I plan to provide a historical overview of this line of research and review several new developments that use variations of discrete dynamical systems, including Generative Network Automata and their applications for representation of open-ended artificial chemistry models and automated modeling acquisition of real biological developmental processes.

Hiroki Sayama is the Director of CoCo at Binghamton University and currently on his sabbatical as a Mary Shepard B. Upson Visiting Professor in Engineering at Cornell University. He obtained his B.Sc., M.Sc., and D.Sc. in Information Science from the University of Tokyo. His research interests include complex systems, network science, computational social science, artificial life/chemistry, and complex systems education.

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