USC Viterbi
School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Seminar

Adapting feedback control and pattern recognition paradigms for biotechnological applications

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Friday, March 24, 2023
1:00pm – 2:00pm
EEB 248

https://usc.zoom.us/j/93768871353?pwd=c0haOXhxREVBY05VbUs0cDh4YTMzdz09
Meeting ID: 937 6887 1353 **Passcode:** 003253

Abstract: Engineering synthetic genetic networks with desired behavior for robust adaptation or complex decision-making is challenging. Current approaches rely on different negative regulation techniques or logic-based operators, which suffer from suboptimal performance. To address this limitation, we introduce two design principles: (1) ultrasensitive input-output behavior and (2) tunable thresholds. Here, we engineer ultrasensitive-based networks to both achieve adaptive behavior through feedback control and build synthetic genetic programs for molecular pattern recognition by implementing neural computing networks in living cells.

Biosketch: Christian Cuba Samaniego received his BS degree in Mechatronic Engineering from "Universidad Nacional de Ingenieria" in Lima-Peru in 2009. He obtained his PhD in Mechanical Engineering from University of California Riverside in 2017 under the supervision of Prof. Elisa Franco. He joined the Biological Engineering Department at Massachusetts Institute of Technology as a postdoc under the supervision of Prof. Ron Weiss (2019), and Mechanical and Aerospace Engineering Department in the lab of Prof. Elisa Franco (2022). Currently, Christian is a research fellow in the Department of Immunology at Harvard Medical School in the lab of Prof. Ming-Ru Wu. His current research is at the interface of Control Theory, Systems and Synthetic Biology, and Machine Learning. I am specially interested in the design, analysis and applications of biomolecular feedback control systems and molecular neural networks for decision-making (molecular pattern recognition) in living cells.

Host: Dr. Urbashi Mitra (ubli@usc.edu)