Washington University in St. Louis

Engineering

Preston M. Green Department of Electrical & Systems Engineering

Seminar Announcement

Justin Hsia

Postdoc/Lecturer

University of California, Berkeley

Friday, January 29, 2016

Green Hall, Room 0120

10:10 AM

Design and Engineering of Pattern Formation in Gene Expression in Escherichia Coli

Abstract: The production of patterns in gene expression in an ensemble of cells is a phenomenon central to the development of multicellular organisms. Different methods of cell-to-cell communication exist and exhibit different properties in range, speed, and fidelity, lending themselves to the production of different types of patterns. The design and engineering of pattern formation systems in a model organism (E. coli) are of significant impact to both emerging efforts at engineering multicellularity in the synthetic biology community as well as new guidance for those groups looking for similar phenomena in natural systems.

In this talk, I will present my work in designing and engineering spontaneous pattern formation systems in E. coli based on Turing pattern formation (i.e. diffusion-driven instability) and contact-dependent inhibition (CDI). For both types of patterning, I will cover the theoretical framework developed to search for viable new designs and the analysis that allowed us to examine the parameter spaces and experimental plausibility. Finally I will present simulation and ongoing laboratory results.

Bio: Justin Hsia is a postdoc and part-time lecturer at the University of California, Berkeley. He received dual B.S. degrees in Electrical Engineering and Computer Sciences (EECS) and Mechanical Engineering from UC Berkeley in 2007. After working at Lockheed Martin, he returned to UC Berkeley to work on his Ph.D. in EECS, where he studied design and analysis of synthetic biological networks with Murat Arcak, focusing on patterning systems. Before finishing his Ph.D. in 2015, Justin gained extensive teaching experience in both the EE and CS departments, including as an instructor.

Host: Dr. Hiro Mukai