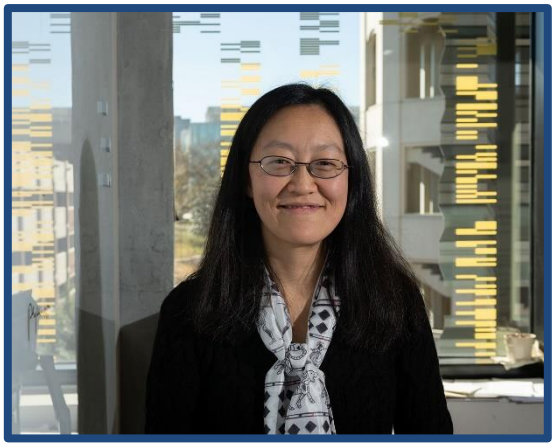
"Engineering Microsystems and Computational Pipelines to Understand the Brain"

Virtual Seminar
Wednesday
April 7, 2021
3:00 p.m.



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Abstract

My lab is interested in engineering micro systems and computational tools to address questions in systems neuroscience, developmental biology, and cell biology that are difficult to answer with conventional techniques. We are particularly interested in the questions of how the brain is assembled during development (and changes during aging) and information processed by brain circuits. We work with a powerful genetic system - the free-living soil nematode *C. elegans*. In this talk, I will introduce two sets of powerful mathematical and physics-based tools accessible by engineers to accelerate the biological understanding. I will talk about two recent developments in discrete microfluidic systems exploiting multiphase and dynamical behavior of the fluids and microswimmers (i.e. *C. elegans*). By designing the microfluidic system cleverly using appropriately chosen dimensionless numbers, we can have exquisite control of the samples and experimental conditions. I will also talk about a powerful graph-theory-based framework to build probabilistic models of brain atlases. This machine-learning approach greatly reduces bias, enables automated and robust cell identification, and will enable a variety of applications including gene-expression analysis, whole-brain imaging, and connectomics.

Bio

Hang Lu is the Love Family Professor of Chemical and Biomolecular Engineering, the Director of the Interdisciplinary Bioengineering Program at Georgia Tech, and the Associate Director of the Southeast Center for Mathematics and Biology (SCMB) supported by NSF and Simons Foundation. Her current research interests are microfluidics, machine learning, quantitative analyses, and their applications in neurobiology, cell biology, and biotechnology. Her award and honors include the ACS Analytical Chemistry Young Innovator Award, an NSF CAREER award, an Alfred P. Sloan Foundation Research Fellowship, a DuPont Young Professor Award, a DARPA Young Faculty Award, and Council of Systems Biology in Boston (CSB2) Prize in Systems Biology. She was also named an MIT Technology Review TR35 top innovator, and invited to give the RPI Van Ness Award Lectures in 2011, and the Saville Lecture at Princeton in 2013. She is an elected fellow of AAAS and AIMBE. Her lab's work has been and is supported by >$37M ($17M to her lab) from US NSF, NIH, private foundations and others.

Spring 2021 CBE Seminar Series

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