MELINDA LIU PERKINS

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PROFILE

Ph.D. in electrical engineering with 10 years of experience building mathematical models for life sciences. Emphasis on bridging theory and practice.

- Mathematical expertise in control systems, dynamical systems, and stochastic processes.
- Extensive experience coding simulations and analyzing data in Matlab and Python.
- Motivated, independent worker, evidenced by receipt of multiple academic awards, success applying for individual research funding, and sole authorship of one peer-reviewed journal publication.
- Strong track record of collaboration with international, multidisciplinary teams, resulting in 5 peer-reviewed journal publications.

EDUCATION

Ph.D. in Electrical Engineering, University of California, Berkeley   2020

B.S. in Electrical Engineering with Honors, Stanford University   2015
Emphasis in Signal Processing, Minor in Biology

RESEARCH AND PROFESSIONAL EXPERIENCE

Developmental Biology Unit, European Molecular Biology Laboratory   2020–2024
Postdoctoral fellow with Justin Crocker

- **Project: Chromatin and crosstalk**
  - Building mathematical theory to explore how chromatin increases gene expression accuracy
- **Project: Dynamics of transcriptional repression**
  - Genetically engineering fruit flies to interrogate how quickly genes turn on and off

Department of Electrical Engineering, University of California, Berkeley   2015–2020
Doctoral student advised by Murat Arcak

- **Dissertation: Biological patterning in networks of interacting cells**
  - Introduced framework applying image processing principles to gene expression patterning
  - Validated mathematical theory in synthetic biological setups
  - Spearheaded international collaboration in which designed and validated testbed for cells to signal to each other through computer-controlled light inputs
- **Project: Binary cell fate determination in living embryos**
  - Developed quantitative dynamical systems model to experimentally confirm bistability

Department of Electrical Engineering, Stanford University   2013–2015
Undergraduate researcher advised by Elizabeth Hadly and John Pauly

- **Honors Thesis: Acoustic interference in bat echolocation**
  - Developed a metric based on sonar signal processing to analyze how calls from one echolocating bat interfere with another

TECHNICAL SKILLS

- **Mathematical modeling**: dynamical systems (linear/nonlinear), control systems, signal processing, stochastic processes
- **Data analysis**: exploratory, image processing, basic statistics (e.g., linear regression, ANOVA)
- **Programming languages**: C, C++, Java, Matlab, Python (numpy, pandas, scipy, SQLite), R
- **Other**: Linux/Unix, cluster computing
- **Molecular and systems biology**: gene regulatory networks, enhancer biology (incl. biophysical modeling with statistical mechanics), synthetic circuit and construct design

SELECTED GRANTS AND AWARDS

EMBL Interdisciplinary Postdoc (EIPOD4) Fellowship (3-year stipend)	2020
Leon O. Chua Award, EECS Department, UC Berkeley, presented annually to one recipient for outstanding achievement in nonlinear science	2020
Berkeley Fellowship for Graduate Study (2 years full fees and tuition), UC Berkeley	2015
Excellence Award ($5000), EECS Department, UC Berkeley	2015
Frederick E. Terman Award for Scholastic Achievement in Engineering, Stanford University, granted to top 5% of seniors by GPA in School of Engineering	2015
Undergraduate Advising and Research Major Grant, Stanford University	2014

SELECTED PUBLICATIONS (complete list of 9 at Google Scholar)

- J. Zhao*, **M. L. Perkins***, M. Norstad, and H. G. Garcia (2023) "A bistable autoregulatory module in the developing embryo commits cells to binary fates." *Curr. Biol.* 33(14): 2851–2864.e11. doi:10.1016/j.cub.2023.06.060
  *contributed equally
- **M. L. Perkins** (2021) "Implications of diffusion and time-varying morphogen gradients for the dynamic positioning and precision of bistable gene expression boundaries." *PLOS Comp. Biol.* 17(6): e1008589. doi:10.1371/journal.pcbi.1008589
- **M. L. Perkins**, D. Benzinger, M. Arcak, and M. Khammash (2020) "Cell-in-the-loop pattern formation with optogenetically emulated cell-to-cell signaling." *Nat. Commun.* 11(1): 1355. doi:10.1038/s41467-020-15166-3
- **M. L. Perkins** and M. Arcak (2019) "A spatial filtering approach to biological patterning." *SIAM J. Appl. Dyn. Syst.* 18(3): 1694-1721. doi:10.1137/18M1216092

SELECTED INVITED TALKS

"A bistable autoregulatory module in the developing embryo commits cells to binary fates," *Development presents...*, The Company of Biologists (virtual). Host: Paul François	2023
"A networked systems approach to engineering synthetic biological patterning in theory and practice," *Caltech Young Investigators Lecture Series*, California Institute of Technology (virtual). Host: Yisong Yue	2021
"Biological networking: how EE meets regenerative medicine", *UC Berkeley EECS Annual Research Symposium* (Berkeley, CA, USA), one of five invited 5-min student talks	2019

COMMUNICATION AND LEADERSHIP

Co-organizer for Theory@EMBL seminars, which were so successful at showcasing early-career researchers that EMBL developed the NextGen Seminar Series to extend the programme to topics beyond theory	2021–2024

Graduate Student Instructor, EE 120: Signals and Systems (1 semester, 100 students) — 2019
- Wrote problem sets, taught students during discussion section and office hours
- Delivered guest lecture on signal processing of bat echolocation

Graduate Student Instructor, CS 195: Social Implications of Computer Technology — 2019
(2 semesters, 300–400 students)
- Developed and delivered new lecture content (20% of total lecture time)
- Designed new assignments to emphasize critical thinking and intellectual humility
- Prepared and ran weekly discussion sections

Science outreach volunteer (e.g., Bay Area Scientists in Schools, Golden Gate Science Olympiad, Expanding Your Horizons, Bay Area Teen Science, EMBL ELLS virtual school visits)	2017–present
Social co-chair for UC Berkeley Women in Computer Science and Engineering, organizing mentoring and social events	2016–2017