Fangzhou Xiao

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Education

California Institute of Technology — Pasadena, CA
Ph.D. in Bioengineering, Advisor: John C. Doyle
Thesis committee: Richard M. Murray, Erik Winfree, Rob Phillips, Lior Pachter — 2016–2022 (expected)

Washington University in St. Louis — St. Louis, MO
B.S. in Biomolecular Systems and Mathematics, with Highest Distinction — 2012–2016

Publications

[1] **F. Xiao**, D. Cappelletti, J. Marken, and M. Khammash, "Polyhedra and log derivative parameterization of binding reaction network steady states", Manuscript in preparation.

[2] **F. Xiao**, J. P. Marken, R. Murray, and J. C. Doyle, "Reaction order polyhedra reveal the full regulatory profile of biomolecular reaction rates", Manuscript in preparation.

[3] **F. Xiao**, M. Khammash, and J. C. Doyle, "Stability and control of biomolecular circuits through structure", in *2021 Annual American Control Conference (ACC)*, 2021.

[4] V. Galstyan, K. Husain, **F. Xiao**, A. Murugan, and R. Phillips, "Proofreading through spatial gradients", *eLife*, vol. 9, A. Yildiz and A. M. Walczak, Eds., e60415, Dec. 2020.

[5] J. P. Marken*, F. Xiao*, and R. M. Murray, "A geometric and structural approach to the analysis and design of biological circuit dynamics: A theory tailored for synthetic biology", *bioRxiv*, 2020.

[6] N. Olsman, A.-A. Baetica, **F. Xiao**, Y. P. Leong, R. M. Murray, and J. C. Doyle, "Hard limits and performance tradeoffs in a class of antithetic integral feedback networks", *Cell Systems*, vol. 9, no. 1, 49–63.e16, 2019.

[7] N. Olsman, **F. Xiao**, and J. C. Doyle, "Architectural principles for characterizing the performance of antithetic integral feedback networks", *iScience*, vol. 14, pp. 277–291, 2019.

[8] **F. Xiao**, M. Fang, J. Yan, and J. C. Doyle, "Coupled reaction networks for noise suppression", in *2019 American Control Conference (ACC)*, 2019, pp. 1547–1554.

[9] C. Liu, **F. Xiao**, J. Hoisington-Lopez, K. Lang, P. Quenzel, B. Duffy, and R. D. Mitra, "Accurate typing of human leukocyte antigen class i genes by oxford nanopore sequencing", *The Journal of Molecular Diagnostics*, vol. 20, no. 4, pp. 428–435, 2018.

[10] Y. Nakahira, **F. Xiao**, V. Kostina, and J. C. Doyle, "Fundamental limits and achievable performance in biomolecular control", in *2018 Annual American Control Conference (ACC)*, 2018, pp. 2707–2714.

[11] N. Olsman, **F. Xiao**, and J. Doyle, "Evaluation of hansen et.al.: Nuance is crucial in comparisons of noise", *Cell Systems*, vol. 7, no. 4, pp. 352–355, 2018.

[12] **F. Xiao** and J. Doyle, "Robust perfect adaptation in biomolecular reaction networks", in *2018 IEEE Conference on Decision and Control (CDC)*, 2018, pp. 4345–4352.

Scholarships and Awards

- Best student paper finalist award at Annual American Control Conference (ACC), for the paper "Stability and control of biomolecular circuits through structure." — 2021

- U-STAR undergraduate research fellowship at WashU. 2014 – 2015

Grant Proposals

- Rule-based Systems Theory for Regulation in Networks of Biomolecules, Microbial Cells and Popoulations – main writer, in response to 2021 NSF solicitation Understanding the Rules of Life: Emergent Networks.
- Dynamic Design Principles of Adeno-associated Virus Capsid Assembly – main writer, in response to Caltech internal pilot grants in 2019 and 2020.

Visits and appointments

- **Visitor** at Khammash group at ETH Zurich Summer 2019

Teaching and Mentoring

- **Instructor** at Caltech Winter 2021
  BioTutorials: Analysis and Design of Biological Circuits (Bi 23 Section 5)
  Video recordings and lecture notes viewable at:
  https://drive.google.com/drive/folders/1vWiFMJn4BwHijoefonwDXYIkdbjhaf9r?usp=sharing
- **Teaching Assistant** at Caltech Winter 2021
  Machine Learning and Data Mining (CMS/CS 155) instructed by Lior Pachter
- **Mentor** for summer research undergraduate student at Caltech Summer 2018
  Meichen Fang from Peking University. Later went on PhD studies at Caltech Bioengineering.
- **Teaching Assistant** at Caltech Winter 2018
  Introduction to Computational Biology and Bioinformatics (Bi/BE/CS 183) instructed by Lior Pachter and Matt Thompson
- **Teaching Assistant** at WashU Fall 2015
  Theory of Statistics (Math 5061) instructed by Jimin Ding

Presentations

- 2021 American Control Conference, virtual, **best student paper finalist**, 15-min talk, on "Stability and control of biomolecular circuits through structure". Video recording viewable at:
  https://drive.google.com/file/d/1u5FYkSI9ZzEP7itai_mH1ZQds_52gfVt/view?usp=sharing
- 2020 Winter Q-Bio in Big Island, Hawaii, 15-min talk and a poster, on "Structural analysis and robust design of biomolecular circuits – fast binding and slow catalysis". Poster viewabe at:
  https://drive.google.com/file/d/1bAivEs2IoqKUG_ctObcB7oAjDc2Upx_y/view?usp=sharing
- 2019 American Control Conference in Philadelphia, PA, 15-min talk, on "Coupled reaction networks for noise suppression".
- 2019 Winter Q-Bio at Oahu, Hawaii, a poster, on "Structural analysis and robust design of biomolecular circuits – fast binding and slow catalysis". Poster viewabe at:
- 2018 Conference on Decision and Control in Miami, FL, 15-min talk, on "Robust perfect adaptation in biomolecular reaction networks".

Skills

- **Programming:** Python, Matlab, Mathematica.
- **Experiment:** Cloning.
- **Language:** English and Mandarin.