




Faranak Rajabi

Ph.D. Candidate, Mechanical Engineering Department, UC Santa Barbara

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Interdisciplinary researcher at UC Santa Barbara's Computational Applied Science Laboratory, combining mechanical engineering and computer science to develop scalable computational models for complex systems. Strong background in nonlinear dynamics, optimization, and numerical methods for PDEs, with research spanning brain-inspired control, geometric modeling, and biophysical systems. Passionate about solving large-scale system design challenges and deploying mathematical solutions at scale.

Skills

Mathematical Modeling and Optimization: Nonlinear dynamics, system-level modeling, non-convex optimization, numerical methods for PDEs.

Computational Mathematics: Numerical linear algebra, gradient-based optimization, reinforcement learning foundations.

Machine Learning: Data-driven control systems, ML for dynamical models, PyTorch, TensorFlow.

Programming Languages: Python, MATLAB, C++.

Tools and Frameworks: Git, Linux, NumPy, SciPy, Pandas, LaTeX.

Applied Interests: Hardware-aware modeling, system simulation, parallel computing.

Education

University of California, Santa Barbara

Ph.D. in Department of Mechanical Engineering

Jan. 2022 – Present

Santa Barbara, CA

- GPA: 3.94/4
- Co-advised by Dr. Fredric Gibou and Dr. Jeff Moehlis. Ph.D. Candidate at [Computational Applied Science Laboratory](#)
- **Relevant Courses:**
 - Numerical Simulation with ODEs · Finite Difference Methods for PDEs · Applied Dynamical Systems · Advanced Matrix Computations · Linear Systems · Kalman and Adaptive Filtering · PDE's

University of California, Santa Barbara

Master of Science in Computer Science, Department of Computer Science

Aug. 2023 – Present

Santa Barbara, CA

- GPA: 4/4
- **Relevant Courses:**
 - Level Set Methods · Machine Learning: a Signal Processing Approach · Data Structures Algorithms

Experience

Graduate Research Assistant - [CASL](#) at UC Santa Barbara

Under the supervision of Dr. Fredric Gibou and Dr. Jeff Moehlis

Jan. 2022 – Present

Santa Barbara, CA

- * Developed advanced computational methods for protein-aggregation modeling in continuum media, with applications in biotherapeutics.
- * Developed an extensible C++/MATLAB toolkit for high-dimensional PDE modeling using level set methods, enabling efficient geometric computations and surface evolution simulations. up to 4-dimensions.
- * Pioneered a data-driven, machine learning-based approach to Adaptive Deep Brain Stimulation.
- * Implemented minimum energy control optimization for a four-dimensional system of coupled neural oscillators.
- * Designed an optimal stochastic control strategy for a noisy network of neural oscillators.

Graduate Teaching Assistant - UC Santa Barbara

Teaching Assistant for undergraduate courses

Apr. 2022 – Present
Santa Barbara, CA

- * TA for Introduction to Programming course - Elaborated an intensive Matlab crash course to UC Santa Barbara's undergraduate STEM majors.
- * TA for Mathematics of Engineering course - Instructed numerical simulation for engineering problems and ODEs using Matlab for Mechanical Engineering major undergraduate students at UC Santa Barbara.
- * TA and Lab instructor for Basic Electronics and Circuits course - Taught engaging lectures in electronics circuits.
- * TA for Dynamics - Instructed fundamental principles of motion and forces in physics and engineering.

Academic Leadership Roles

Multiple Mentoring Positions

Sept. 2023 – Present
Santa Barbara, CA & Remote

- * **Career Mentor Fellow** (American Physics Society) - Guide physics doctoral students through academic and industry career paths
- * **Graduate Division Mentor** (UCSB) - Support first and second-year doctoral students from diverse backgrounds
- * **Women in STEM Mentor** (UCSB) - Provide academic guidance to undergraduate women in STEM fields

Publications

- * **F. Rajabi**, F. Gibou, and J. Moehlis, *Optimal Control for Stochastic Neural Oscillators*, **Biological Cybernetics**, vol. 119, article no. 9, 2025.
- * **Conference:** Z. Rostami, **F. Rajabi**, and A. Shamloo, "Cell Separation by Using Active and Passive Methods Together," 4th International Conference on Innovative Technologies in Science, Engineering and Technology, Istanbul, Turkey, November 12, 2020.
- * **Conference:** **F. Rajabi**, A. Bakhshi, and G. Kazemi, "Drug Delivery Applications of Mechanical Micropumps," International Conference on Applied Researches in Science & Engineering, Amsterdam, Netherlands, January 10, 2021.
- * **Under Review:** **F. Rajabi**, J. Fingerman, A. Wang, J. Moehlis, and F. Gibou, "CASL-ForgeX: A Comprehensive Guide to Solving Deterministic and Stochastic Hamilton-Jacobi Equations," Under review at Computer Physics Communications.

Presentations & Posters

- * **F. Rajabi**, "A Level-Set Method Approach to Optimally Control Stochastic Neural Oscillators," Poster presented at the 2023 ResearchGate Conference. [[Poster](#)]
- * **F. Rajabi**, "Continuum Dynamics Protein Aggregation Model," Student E-Poster accepted for presentation at the 2025 AAAS Annual Meeting, Technology, Engineering & Math Category.

Honors and Awards

- * **UCSB Graduate Summer Fellowship**, 2024, 2023, 2022 - Awarded highly competitive fellowship to fund summer research.
- * **UCSB Block Grant**, 2022 - Recipient of grant awarded to top 10% of incoming PhD students.
- * **Sharif University Scholarship**, 2016-2021 - Awarded full tuition waiver based on national exam performance.