

# Mohamed Soufi

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Paris-Saclay M2 Synthetic Biology Student applying to opportunities that align with my research interests. Dedicated to rebuilding biology for forward and reverse-engineering. More specifically, interested in cell-free ribosome biogenesis, synthetic cells, cell-free systems, and ribosome engineering. As a technician at the Mayalu Lab at Stanford, I set up the new wet lab and the first project. Former Bioengineering Ph.D. student at Rice University, but voluntarily withdrew after science funding cuts. Graduated from Caltech in 2022 with a B.S. in Bioengineering and Computer Science minor, conducted research on the directed evolution of acoustic reporter genes in the Shapiro Lab, published in *ACS Synthetic Biology*.

## EDUCATION

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### B.S. in Bioengineering and Computer Science minor

California Institute of Technology • Pasadena, CA • August 2018 - December 2022 • 3.6 GPA

### Ph.D. in Bioengineering (voluntary withdrawal)

Rice University • Houston, TX • August 2024 - February 2025 • 4.0 GPA

## EXPERIENCE

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### Freelance Writer

Remote

April 2025 - Present

- Part-time 3-month contract to help build Asimov Press long-form and technical coverage
- Freelance writing for Addgene and Synbiobeta
- Submitted to NTI Next Generation for Biosecurity Essay Competition

### Research Technician

Mayalu Lab, Stanford

June 2023 - June 2024

- Spearheaded the development of a quorum-sensing circuit with paradoxical feedback to robustly control bacterial populations (publication in preparation)
- Established a BSL-2 laboratory from scratch, including setup of equipment, procurement of samples, supplies, reagents, protocols, and safety
- Trained lab members on established and new protocols and techniques, enabling a postdoc and graduate student to independently manage the lab and advance the quorum-sensing project
- Designed molecular biology protocols, carried out experiments, and managed daily lab operations
- Served as Lab Safety Coordinator, maintaining compliance with institution and county guidelines for a safe working environment
- Presented my work during lab meetings

### Undergraduate Researcher

Shapiro Lab, Caltech

February 2021 - April 2023

- Developed and automated data acquisition and processing pipeline of ultrasound images for screening bacteria expressing gas vesicles, resulting in up to 12 hour per scan time savings
- Created Graphical User Interfaces (GUIs) using MATLAB App Designer to make the pipeline accessible to lab members with no coding background
- Co-authored *ACS Synthetic Biology* publication on the Directed evolution of acoustic reporter genes.
- Performed molecular biology wet lab work, including the assembly, transformation, and expression of DNA constructs in *E. coli* in high-throughput
- Presented work to the lab and larger Caltech community.
- Demonstrated reliability and troubleshooting ability with over 1000 hours of lab experience.
- Provided training to lab members on established protocols and techniques.

### Research Technician

Shapiro Lab, Caltech

December 2023 - April 2023

- Continued post-graduation to complete my undergraduate research project, now published in *ACS Synthetic Biology*

### Summer Undergraduate Research Fellow

Stathopoulos Lab, Caltech

June 2019 - October 2019

- Worked with Prof. Stathopoulos and Dr. Susie Newcomb on a project whose goal was to determine how transcription factors regulate the *brinker* promoter proximal element in *Drosophila Melanogaster*
- Used RNAi to knockdown the transcription of *brk*, which we observed with in situ hybridization

### CHORI Summer Student Research Program, Lucas Memorial Intern

Fung Lab, CHORI

June 2018 - August 2018

- Worked with Dr. Ellen Fung on a project whose goal was to find the best predictors of vertebral fracture in Thalassemia patients

## PAPERS

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- Soufi, M. Fracassi, A. Hoxie, N., Abdo, Noireaux, V. & Jewett, M.J. (2025) Cell-Free Ribosome Biogenesis for Synthetic Cells. [Manuscript in preparation]
- Roy, R. Soufi, M., Perez-Medina V., & Mayalu, M. (2025) Paradoxical Signaling-Based Synthetic Population Control Circuit in *E. coli* [Manuscript in preparation]
- Hurt, R. C., Jin, Z., Soufi, M., Wong, K. K., Sawyer, D. P., Shen, H. K., Dutka, P., Deshpande, R., Zhang, R., Mittelstein, D. R., & Shapiro, M. G. (2024). Directed evolution of

acoustic reporter genes using high-throughput acoustic screening. ACS Synthetic Biology. <https://doi.org/10.1021/acssynbio.4c00283>

- Soufi, M., Wang, M., & Lin, E. Modeling Microtubule Time to Catastrophe, 2020, <https://meganwang08.github.io/microtubule-catastrophe/>

## PRESENTATIONS

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- Soufi, Mohamed (2022, August 18). *Development of an acoustic 96-well plate reader*. Caltech SURF Seminar 2022, Pasadena, CA, United States.
- Soufi, Mohamed (2021, October 16). *Development of an acoustic 96-well plate reader*. Caltech SURF Seminar 2021, Pasadena, CA, United States.
- Soufi, Mohamed (2019, October 20). *Determining how transcription factors regulate the brinker Promoter Proximal Element in Drosophila Melanogaster*. Caltech SURF Seminar 2019, Pasadena, CA, United States.

## AWARDS

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**Caltech Summer Undergraduate Research Fellowship 2022**

**Caltech Summer Undergraduate Research Fellowship 2021**

**Caltech Summer Undergraduate Research Fellowship 2019**

## EXTRACURRICULARS

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**Tutoring** • 2019 - Present (Pasadena Police Activities League, Young Legends Program, Ocean Tutor Program, Private Tutoring)

**Stanford Synthetic Biology Planning Committee** • 2023-24

**NCAA Division III Men's Soccer** • 2018-22

- Committed between 10 - 30 hours per week throughout the year for training, meetings, film study, travel, and games while maintaining full course and research load
- Led tours of facilities to prospective student-athletes and their families
- Organized group practices and individual workouts during the Covid pandemic

## SKILLS

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**Languages:** Arabic (native), French (working proficiency)

**Tutoring**

**Wet Lab Molecular Biology**

- Directed evolution High throughput molecular cloning, CIDAR MoClo and 3G Assembly, PCR, Gel Electrophoresis, Bacteria Culture, DNA purification/sequencing/analysis

**Software Development**

- Python (Data Analysis and Visualization, numpy, scipy, polars, pandas, bokeh, holoviews, panel), MATLAB, C++, C, JAVA, GIT

## PROJECTS

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**Independent Research: Cell-Free Ribosome Biogenesis for Synthetic Cells**

**March 2024 - Present**

- Leading a joint review and perspective paper on cell-free ribosome biogenesis with collaborators from the Build-a-Cell community, including Professors Jewett and Noireaux
- Leading the reading and writing, organize meetings, delegate tasks, and reach out to experts for interviews and feedback
- Leading this project allows me to critically evaluate the field, connect with labs and experts globally, lay the groundwork for future collaborations, and prepare for my Ph.D.

**IV Caller 2.0**

**December 2024 - January 2025**

- Developed software at Bao Lab at Rice to analyze and visualize microhomology alignments around large CRISPR/Cas9-induced deletions.
- Created interactive plots for k-mer and homology distribution analysis, deployable in both Jupyter Notebook and on a standalone server.

**Brawlhouse**

**March 2022 - June 2022**

- Designed a 2D Top-down shooter game following standard software engineering processes to document, review, test, inspect, and release code as part of CS 3 course at Caltech
- Implemented full game including physics engine (handles objects, forces, and collisions) and SDL for graphics in C
- Developed core backend and frontend components for visual and character design

**Pulse Oximeter**

**May 2021 - June 2021**

- Engineered functional pulse oximeter that displays your pulse trace, heart rate, and blood oxygen saturation from an LED sensor probe as part of BE189a course at Caltech
- Used hardware pieces (LEDs, resistors, transistors, amplifiers), an Arduino motherboard, and software using Python packages (bokeh, numpy)

**Modeling Microtubule Time to Catastrophe**

**October 2020 - December 2020**

- Wrote an online paper for Programming and Data Analysis in Biology class at Caltech with 2 other students
- Designed interactive graphics, wrote python package, mathematically derived unique Poisson model, and analyzed public dataset from Howard Lab
- Compared consecutive Poisson interactions model to Gamma distribution model