Payton J Thomas

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Education

UC San Diego — La Jolla, CA
PhD Bioengineering, GPA: 4.00 — 2023–Present

Massachusetts Institute of Technology — Cambridge, MA
Visiting Scholar Biological Engineering — 2021-2022

University of Utah — Salt Lake City, UT
Honors BS Biomedical Engineering with Chemistry Minor, GPA: 3.98 — 2019–2023

University of Utah — Salt Lake City, UT
Honors BS Applied Mathematics, GPA: 3.98 — 2019–2023

Research Experience

Graduate Research Assistant, UC San Diego — La Jolla, CA
Biodynamics Lab, PI: Jeff Hasty — August 2023-Present

- Constructed synthetic genetic circuits *in vivo* using genetic engineering and biotechnology techniques
- Applied nonlinear dynamics techniques to rigorously study complex biological systems
- Constructed microfluidic chips for the visualization of genetic circuit behaviors on the single-cell level

Undergraduate Researcher, CU Boulder — Boulder, CO
Genetic Logic Lab, PI: Chris Myers — May 2020-September 2023

- Developed simulation tools for the computer-aided design of genetic circuits
- Adapted variance-reduction techniques for stochastic simulation of genetic circuit dynamics
- Developed novel stochastic simulation algorithms for the analysis of rare genetic events

Project Lead, Utah BioDesign Lab — Salt Lake City, UT
Magnetic Optic Nerve Stimulator Team — January 2022-December 2022

- Developed a device which can magnetically stimulate the optic nerve for use during brain surgery
- Led a team of engineers and guided project directions
- Presented design reviews and updates to a panel of supervisors

Undergraduate Researcher, MIT — Cambridge, MA
Synthetic Biology Center, PI: Ron Weiss — December 2021-December 2022

- Constructed biophysical models of neuromorphic genetic circuits
- Cleaned and generated statistical models of scRNA-Seq Data
- Constructed neuromorphic genetic circuits *in vivo*

Undergraduate Researcher, University of Utah — Salt Lake City, UT
Scientific Computing and Imaging Institute, PI: Tamara Bidone — August 2021-June 2022

- Simulated E-Cadherin dynamics

- Statistically analyzed simulation results
- Quantified effects of actin coralling in cell-cell adhesion formation

Undergraduate Researcher, University of Utah Salt Lake City, UT

Division of Clinical Pharmacology, PI: Venkata Yellepeddi April 2020-December 2020

- Developed a Python library for rapid physiologically-based pharmacokinetics modelling of nanoparticle biodistribution
- Validated pharmacokinetics models with results from animal models

Project Lead, InnovaBio West Jordan, UT

SKIP Project, PI: Mary Nelson August 2017-August 2019

- Utilized genetic engineering techniques to produce bioactive, recombinant human skeletal muscle and kidney-enriched inositol phosphatase in *E. coli*
- Trained interns in the essential techniques of biotechnology and genetic engineering
- Presented results to supervisors

TEACHING EXPERIENCE

Tutor, High Performance Tutoring Salt Lake City, UT

Private Tutor August 2018-Present

- Tutored mathematics, physics, chemistry, biology, and English from the high school to advanced undergraduate level
- Helped students apply for and get accepted to college and graduate school
- Developed ACT and SAT curricula

BUMMP Mentor, UC San Diego La Jolla, CA

Biology Undergraduate and Master's Student Mentor October 2023-Present

- Helped undergraduate biology students get involved in research
- Organized social and recreational events
- Helped URM and first-generation students succeed in biology

JUMP Mentor, UC San Diego La Jolla, CA

Engineering Undergraduate Student Mentor October 2023-Present

- Helped undergraduate engineering students navigate their program and career
- Facilitated program workshops on career and technical skills
- Fostered a sense of community by leading small-group social activities

College of Engineering Ambassador, University of Utah Salt Lake City, UT

Ambassador August 2019-May 2023

- Conducted STEM outreach and education events at local high schools
- Mentored undergraduate engineering students in the Engineering Scholars program
- Organized Engineering Day at the University of Utah for over 1000 students annually

Tutoring Assistant, Kumon West Jordan, UT

Private Tutor August 2017-May 2018

- Tutored children ages 3 to 14 in mathematics and reading
- Graded student homework assignments

Awards

- **Hertz Fellowship Semifinalist, 2024** The Hertz Fellowship is a highly selective and prestigious graduate research fellowship. I was considered as a semifinalist among around 10% of top PhD candidates from top 55 engineering schools around the country.

- **Undergraduate Research Scholar, 2023** The Undergraduate Research Scholar Designation (URSD) recognizes a student's commitment to their development as a researcher during their undergraduate career. The URSD appears in the awards section of the transcripts of graduating students. URSD awardees receive a white research cord from the Office of Undergraduate Research to wear at convocation and commencement.

- **Kennecott Engineering Scholar, 2022** Kennecott Scholars are excellent engineering students at the University of Utah who have the opportunity to live in an engineering themed living-learning community.

- **MIT Visiting Scholar, 2021** Visiting Scholars conduct academic research at MIT for a period of one week to one year. I was a visiting scholar in the Weiss Lab at the MIT Synthetic Biology Center.

- **UROP Awardee, 2021** UROP provides funding for students who assist with a faculty member's research. I was granted a UROP award for my work simulating E-Cadherin dynamics with Tamara Bidone.

- **Goldwater Scholar Finalist, 2021** The Goldwater Scholarship is the most prestigious undergraduate scholarship in the natural sciences, mathematics, and engineering in America. Four students are nominated for the award by participating institutions each year.

- **University of Utah Presidential Scholar, 2019** The Presidential Scholarship is the most valuable merit scholarship offered by the University of Utah. Presidential Scholars receive a full tuition waiver and housing stipend for eight semesters of undergraduate study.

- **Sterling Scholar: Science, 2019** A Sterling Scholar is a high school senior who is publicly recognized and awarded for the pursuit of excellence in scholarship, leadership, and citizenship in the State of Utah. The title of finalist is given to 14 students in each subject annually.

- **National Merit Scholar, 2019** The highest level of distinction given by NMSC, given to students who have been judged to have the strongest combination of academic skills and achievements, extracurricular accomplishments, and potential for success in rigorous university studies.

- **National AP Scholar, 2018 and 2019** The highest level of distinction given by AP, granted to students in the United States who receive an average score of at least 4 on all AP Exams taken, and scores of 4 or higher on eight or more of these exams. Won twice.

Conference Awards

- **NonaWorks Software x Biology Hackathon Winner, 2023** Each year, Nona hosts a hackathon event where students have the opportunity to work as a team to develop software to solve open problems in the biotechnology space. I led a diverse team of five students to solve an advanced biosecurity problem and win first place in the competition.

- **SB^{3}C Student Paper Contest Winner, 2022** Each year, the Summer Bioengineering, Biomechanics, Biotransport Conference (SB^{3}C) selects 2 undergraduate papers from its international applicant pool as winners for an undergraduate paper competition.

- **Utah's Next Top Model Winner, 2021**   The University of Utah holds this mathematical modeling contest annually. I led a team of three students to win first place in the competition.

- **SLCC SME Symposium First Place, 2018** First place prize at the annual Salt Lake Community College Science, Math, and Engineering Symposium in the Team Technical Poster Category. Awarded for my team's research on the expression and solubility of SKIP in E. Coli.

PUBLICATIONS

1. M Ahmadi, L Buecherl, **PJ Thomas**, CJ Myers, Z Zhang, C Winstead, H Zheng, "A Bounded Model Checking Approach to Analyzing Infinite-State Stochastic Models", *ACS Synthetic Biology, [SUBMITTED]*

2. **PJ Thomas**, "Stability of Genetic Oscillators with Distributed Delayed Feedback", *Range: Undergraduate Research Journal, July 2023*

3. **PJ Thomas**, "Importance Sampling for the Analysis of Genetic Circuits", *Range: Undergraduate Research Journal, July 2023*

4. Z Sents, TE Stoughton, L Buecherl, **PJ Thomas**, P Fontanarrosa, and CJ Myers, "SynBioSuite: A Tool for Improving the Workflow for Genetic Design and Modeling", *ACS Synthetic Biology, March 2023*

5. **PJ Thomas**, M Ahmadi, L Buecherl, C Winstead, CJ Myers, and H Zheng, "A Comparison of Weighted Stochastic Simulation Methods for the Analysis of Genetic Circuits", *ACS Synthetic Biology, December 2022*

6. B Shaikh, LP Smith, D Vasilescu, G Marupilla, M Wilson, E Agmon, H Agnew, SS Andrews, A Anwar, ME Beber, FT Bergmann, D Brooks, L Brusch, L Calzone, K Choi, J Cooper, J Detloff, B Drawert, M Dumontier, GB Ermentrout, JR Faeder, AP Freiburger, F Fröhlich, A Funahashi, A Garny, JH Gennari, P Gleeson, A Goelzer, Z Haiman, J Hasenauer, JL Hellerstein, H Hermjakob, S Hoops, JC Ison, D Jahn, HV Jakubowski, R Jordan, M Kalaš, M König, W Liebermeister, RSM Sheriff, S Mandal, R McDougal, JK Medley, P Mendes, R Müller, CJ Myers, A Naldi, TVN Nguyen, DP Nickerson, BG Olivier, D Patoliya, L Paulevé, LR Petzold, A Priya, AK Rampadarath, JM Rohwer, AS Saglam, D Singh, A Sinha, J Snoep, H Sorby, R Spangler, J Starruß, **PJ Thomas**, D Van Niekerk, Daniel Weindl, Fengkai Zhang, Anna Zhukova, AP Goldberg, JC Schaff, ML Blinov, HM Sauro, II Moraru, and JR Karr, "BioSimulators: A Central Registry of Simulation Engines and Services for Recommending Specific Tools", *Nucleic Acids Research, May 2022*

7. L Buecherl, R Roberts, P Fontanarrosa, **PJ Thomas**, J Mante, Z Zhang, and CJ Myers, "Stochastic Hazard Analysis of Genetic Circuits in iBioSim and STAMINA", *ACS Synthetic Biology, October 2021*

CONFERENCE TALKS

1. **PJ Thomas**, T Transue, Quan Huu Ho, Yehuda Binik, Phuong Khanh Tran, "BioGenius–Biosecurity for DNA Synthesis Cores", *NonaWorks Software x Biology, September 2023*

2. **PJ Thomas**, T Transue, "A Learning-Based Approach to Inferring RNA Velocity Landscapes", *IWBDA, September 2023*

3. L Buecherl, **PJ Thomas**, M Ahmadi, J Jeppson, A Gerber, E Reiss, C Winstead, H Zheng, Z Zhang, CJ Myers, "A Collection of Biological Models for the Development of Infinite-State Stochastic Model Checking Tools", *IWBDA, September 2023*

4. **PJ Thomas**, "Importance Sampling for the Analysis of Genetic Circuits", *University of Utah Undergraduate Research Symposium, April 2023*

5. **PJ Thomas** and TC Bidone, "The Role of Actin Coralling in the Formation of Cell-Cell Adhesions", *SB3C, June 2022*

6. **PJ Thomas**, M Ahmadi, H Zheng, and CJ Myers, "A Comparison of Weighted Stochastic Simulation Methods", *IWBDA, September 2021*

7. T Stoughton, L Buecherl, **PJ Thomas**, P Fontanarrosa, and CJ Myers, "iBioSim Server: A Tool for Improving the Workflow for Genetic Design and Modeling", *IWBDA, September 2021*

8. **PJ Thomas**, "Production of Biologically Active Recombinant Human SKIP", *SLCC SME, March 2019*

9. E Green, V Scott, and **PJ Thomas**, "Purification and Expression of SKIP", *SLCC SME, March 2018*