

CITIZENSHIP: U.S. Citizen

EDUCATION: **University of California, Santa Barbara** **2019 - Present**

- Ph.D. Mechanical Engineering
- Mechanical Engineering Excellence Fellowship
 - GPA: 4.0
 - Coursework:
 - ME 203: Operator Theory
 - ME 210 A/B: Numerical Analysis: Matrix Analysis, ODEs, PDEs
 - ME 215 A: Applied Dynamical Systems
 - ME 225EY: Biological Computing
 - ME 225 MM: Mathematical Methods
 - ME 236: Nonlinear Control Systems
 - ME 243 A/B: Signals, CT/DT Control Systems
 - ME 269: Network Systems
 - ECE 283: Machine Learning (Supervised, Unsupervised)
 - Teaching Assistantship and Tutoring:
 - ME 14: Statics
 - ME 155a: Control System Design
 - ME 163: Vibrations

University of California, San Diego **2015 - 2019**

- B.S. Math – Applied Science
- Chancellor's Associates Scholarship
 - Selected Coursework:
 - MAE 101 A: Intro to Fluid Mechanics
 - MAE 108: Probability and Statistics for Engineers
 - Math 103 A: Intro to Abstract Algebra
 - Math 120 A: Complex Analysis
 - Math 142 A/B: Real Analysis
 - Math 154: Intro to Graph Theory
 - Math 171 A: Linear Optimization

GRADUATE RESEARCH: **Biological Control, Computing, and Learning Laboratory** **Jan 2020 – Present**

- University of California, Santa Barbara**
- Designed genetic toggle switch with quorum sensing (GTSQS) for the purpose of optimizing plastic degradation done by bacteria.
 - Mathematically modelled the GTSQS switch with a 3-state nonlinear ODE.
 - Provided stability analysis of GTSQS through the framework of Koopman Operator Theory.

UNDERGRAD RESEARCH: **Delplanque Research Group** **June 2018 – Aug 2018**

- University of California, Davis** (Funded by UC LEADs)
- Carried out numerical simulations of respiratory drug intake in the human trachea using OpenFOAM.
 - Found correlations between parameters of the simulated particle injections and the evenness of the particle distributions.

Coimbra Research Group **June 2017 – Aug 2017**

- University of California, San Diego** (Funded by UC LEADs)
- Conducted research on numerical methods to solve variable order differential equations (VODEs) using MATLAB.

- Devised an efficient numerical method that could solve VODEs 50% faster than conventional methods, so VODE model predictions could be made more quickly, improving the energy efficiency of the system.

Center for Advanced Surgical and Interventional Technology
University of California, Los Angeles (Volunteer)

June 2014 - Aug 2014
June 2016 - Aug 2016

- Assisted in the testing of an innovative way to treat prostate cancer known as focal laser therapy.
- Used CAD for the modeling of a human head to test remote trans-oral surgery.
- Developed molds using Solid Works to test the effects of a catheter-fed laser on phantom tissue.
- Compiled lists of potential treatment candidates within the UCLA health database using SQL.

EMPLOYMENT: Supplemental Instructor
University of California, San Diego

Sep 2016 - June 2019

- Facilitated math workshops for college students consisting of tutoring and support to ensure their academic success.
- Worked with professors to develop lesson plans for the facilitation of math workshops that supplemented material from courses.
- Classes Supported: Linear Algebra, Calculus (1,2,3), Pre-Calculus.

PUBLICATIONS: Harrison, J., Yeung, E.: Stability Analysis of Parameter Varying Nonlinear Genetic Toggle Switches Using Koopman Operators. (Accepted to *Mathematics* 2021. In preparation for publication.)

CONFERENCES: Harrison, J., Ruvalcaba, C., Delplanque, J.-P.: Computational Simulations for the Improvement of Respiratory Drug Intake in the Human Trachea

- SACNAS (2018) | UC LEADs Symposium (2019)
- SACNAS Presentation Award
- UC LEADs Symposium Honorable Mention.

Harrison, J., Orosco, J., Coimbra, C.F.M.: Efficient Numerical Methods for Solving Variable Order Differential Equations

- SACNAS (2017) | SCCUR (2017)

AWARDS & Mechanical Engineering Excellence Fellowship

2019

DISTINCTIONS: -Funding in the form of a stipend

Chancellor's Associates Scholarship (UCSD)

2015 - 2019

- 4-year scholarship

University of California's Leadership Excellence through Advanced Degrees Fellowship (UC LEADs)

2017 - 2019

- Funding in the form of a stipend for 2 Summers of research

- Funding to travel for research conferences.

Fulfillment Fund Scholarship Recipient

2015 - 2019

- 4-year scholarship in the form of stipend

2018 SACNAS National Diversity in STEM Conference

2018

Presentation Award

**TECHNICAL
SKILLSETS:**

Programming

-Syntax:

- Python
- MATLAB
- Java
- SQL
- HTML
- CSS
- Julia

-Environment:

- Linux
- Windows
- macOS

Machine Learning:

-PyTorch

-SKLearn

-PCA

-Neural Networks

-Clustering: logistic regression, k-means

Bio Lab:

-Cell Cultures

-DNA amplification

-Golden Gate Assembly

-Genetic Circuit Design

Design and Simulation:

-Solid Works

-Meshmixer

-OpenFOAM

-3D printing

-Simulink

Circuits and Electronics:

- μ C: Arduino

Graphic Design:

-Adobe Photoshop

-Adobe Illustrator