

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
 - ECE 179: Robot Dynamics and Control

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 and built genetic toggle switches with time-varying parameters for the purpose of optimizing plastic degradation done by bacteria.
- Mathematically modelled parameter varying-genetic toggle switches.
- Provided stability analysis of toggle switch models 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**June 2014 - Aug 2014****University of California, Los Angeles** (Volunteer)**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**Sep 2016 - June 2019****University of California, San Diego**

- 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 Genetic Toggle SwitchesUsing Koopman Operators. Mathematics 2021, 9, 3133. <https://doi.org/10.3390/math9233133>**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 given to a select subset of incoming Ph.D. students.****Chancellor's Associates Scholarship (UCSD)****2015 - 2019**

- 4-year full-ride scholarship

University of California's Leadership Excellence through Advanced Degrees Fellowship (UC LEADs)**2017 - 2019**

- Funding for 2 Summers of research
- Funding to travel for research conferences.

Fulfillment Fund Scholarship Recipient**2015 - 2019**

- 4-year scholarship

2018 SACNAS National Diversity in STEM Conference Presentation Award**2018**

**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:

- Bacterial Cell Cultures
- Mammalian Cell Cultures
- DNA Design
- Golden Gate Assembly
- Genetic Editing
- DNA Sequence Analysis
- Genetic Circuit Design

Design and Simulation:

- Geneious Prime
- Solid Works
- Meshmixer
- OpenFOAM
- 3D printing
- Simulink

Mathematics:

- Modelling and control biological and physical processes
- Verification and falsification of claims through logic and reasoning
- Probabilistic and Statistical methods
- Numerical Analysis

Circuits and Electronics:

- μ C: Arduino

Graphic Design:

- Adobe Photoshop
- Adobe Illustrator