Jamiree Harrison

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CITIZENSHIP: U.S. Citizen

EDUCATION:

University of California, Santa Barbara   **2019 - 2025**
Ph.D. Mechanical Engineering
Advisor: Enoch Yeung
- 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   : Linear 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 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 modeled parameter varying genetic circuits.
· Provided stability analysis of time varying toggle switch models through the framework of Koopman Operator theory.
· Developed modular framework for the estimation varying parameters in nonlinear dynamical system models.
· Built a library of promoters which give distinct gene expression profiles during different bacterial growth phases.

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 Meshmixer to design a model 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.
· Tested haptic feedback on the da vinci remote surgical robot.

EMPLOYMENT / EXPERIENCE: **NASA Jet Propulsion Lab Intern**   May 2024 – Aug 2024
Attitude Control Systems Engineer
· Developed a hypothesis-driven orbital space mission to gather atmospheric and geological data pertaining to Saturn's moon, Titan.
· Designed fully redundant attitude control system with contingency plans in the case of partial system failure.
· Aggregated sensing and control components driven by pointing requirements, propellant margins, life cycle considerations, costs, scheduling, and trade-offs.

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 which would supplement 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 switches using Koopman Operators. Mathematics 2021, 9, 3133. https://doi.org/10.3390/math9233133
- **Harrison, J.**; Yeung, E. Estimating Varying Parameters in Dynamical Systems: A Modular Framework Using Switch Detection, Optimization, and Sparse Regression https://doi.org/10.48550/arXiv.2412.16198
- **Harrison, J.**; et al. Data-driven engineering, optimization, and phenotypic clustering of a novel hybrid promoter library for mixed-phase expression in prokaryotes (*Manuscript in review*)
- **Harrison** et al. Prediction of Chronic Kidney Disease Degeneration with Machine Learning. Mathematics in Industry Reports 2024 https://doi.org/10.33774/miir-2024-lj5gd
- Hess, B.; Stromberg, Z.; Phillips, S.; Reichart, N.; **Harrison, J**.; et al. Permafrost is a source of potential bacterial pathogens identified by a phenotyping platform (*Manuscript in review*)

PROJECT:	**Data driven assessment of wildfire risk** (SIAM Grad Student Math Modeling Camp) - Used clustering, statistical analysis, dynamic mode decomposition, ODE and PDE modeling to predict and interpret wildfire risk across the United States. (PDF)
CONFERENCES / TALKS:	**Harrison, J.,** et al.: Uncertainty Quantification for a Bacterial Hybrid Promoter Library - Society of Industrial and Applied Math [SIAM] Uncertainty Quantification 2024
	Harrison, J., et al.: Design of a Phase Dependent Hybrid Promoter Library in *E. Coli* - Quantitative Biology [Q-BIO] 2024
	Harrison, J., Yeung, E.: Analysis and validation of parameter varying genetic toggle switches using Koopman Operators - Society of Industrial and Applied Math [SIAM] Computational Science and Engineering 2023
	Harrison, J., Ruvalcaba, C., Delplanque, J.-P.: Computational simulations for the improvement of respiratory drug intake in the human trachea - SACNAS (2018) Presentation Award - UC LEADs Symposium (2019) Honorable Mention
	Harrison, J., Orosco, J., Coimbra, C.F.M.: Efficient Numerical Methods for Solving Variable Order Differential Equations - SACNAS (2017)	SCCUR (2017)

AWARDS & DISTINCTIONS:	**Mechanical Engineering Excellence Fellowship** -Funding given to a select subset of incoming Ph.D. students	**2019**
	Chancellor's Associates Scholarship (UCSD) - 4-year full-ride scholarship	**2015 - 2019**
	University of California's Leadership Excellence through Advanced Degrees Fellowship (UC LEADs) - Funding for 2 Summers of research and travel for conferences	**2017 - 2019**
	Fulfillment Fund Scholarship - 4-year scholarship	**2015 - 2019**
	2018 SACNAS National Diversity in STEM Conference Presentation Award	**2018**

MENTORSHIP:	**Bardia Khosravi	Biological Control Lab** - Undergraduate research assistant at UCSB, 2023 - Continuing bachelor's degree at UCSD in fall 2023 **Kevin Chang	Biological Control Lab** - Undergraduate research assistant at UCSB, 2023-Present **Annie Nguyen	Biological Control Lab** - Undergraduate research assistant at UCSB, 2023-2024 - Graduate researcher at UCSB, 2024-Present **Jai Mehra	Biological Control Lab** - Undergraduate research assistant at UCSB, 2023-Present **Isabella Escamilla	Biological Control Lab** - Undergraduate research assistant at UCSB, 2023

TECHNICAL SKILLSETS:

Programming:
-Syntax:
- · Python
- · MATLAB
- · Java
- · SQL
- · HTML & CSS
- · Julia

Data Science and Machine Learning:
-PyTorch
-TensorFlow
-Sci-Kit Learn
-SciPy Optimize
-Principal Component Analysis
-Neural networks for classification and prediction
-Logistic Regression
-k means Clustering
-c means Probabilistic Soft Clustering

Biological Lab Skills:
-Bacterial Cell Cultures
-Mammalian Cell Cultures
-DNA Design
-Golden Gate Assembly
-Genetic Editing
-DNA Sequence Analysis
-Genetic Circuit Design
-Gen5 Plate Reader Experiments

Design and Simulation:
-Geneious Prime
-Solid Works
-Meshmixer
-OpenFOAM
-3D printing
-Simulink

Mathematics:
-Modelling and control of biological and physical processes
-Verification and falsification of claims through logic and reasoning
-Probabilistic and statistical methods
-Numerical analysis
-Model parameter fitting

Circuits and Electronics:
-µC: Arduino

Graphic Design:
-Adobe Photoshop and Illustrator