Jamiree Harrison

jamiree@ucsb.edu Website: https://jamiree.github.io/

CITIZENSHIP: U.S. Citizen

EDUCATION: University of California, Santa Barbara 2019 - Present

Ph.D. Candidate, Mechanical Engineering Advisor: Enoch Yeung

- Mechanical Engineering Excellence Fellowship

- GPA: 4.0

- Coursework:

ME 203 : Operator Theory

: Numerical Analysis: Matrix Analysis, ODEs, PDEs ME 210 A/B

: Applied Dynamical Systems ME 215 A ME 225EY : Biological Computing ME 225 MM : Mathematical Methods : Nonlinear Control Systems ME 236 ME 243 A/B : Linear Control Systems ME 269 : Network Systems

ECE 283 : Machine Learning (Supervised, Unsupervised)

- Teaching Assistantship and Tutoring:

ME 14 : Statics

: Control System Design ME 155a

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

: Probability and Statistics for Engineers MAE 108

Math 103 A : Intro to Abstract Algebra : Complex Analysis Math 120 A Math 142 A/B : Real Analysis Math 154 : Intro to Graph Theory

: Linear Optimization Math 171 A

Biological Control Laboratory GRADUATE

University of California, Santa Barbara

Jan 2020 - Present

- · 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 **Delplanque Research Group**

June 2018 - Aug 2018

RESEARCH:

RESEARCH:

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 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 NASA Jet Propulsion Lab Intern /EXPERIENCE: Attitude Control Systems Engineer

May 2024 - Aug 2024

- · 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 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 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) | 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 and travel for conferences

Fulfillment Fund Scholarship

2015 - 2019

- 4-year scholarship

2018 SACNAS National Diversity in STEM Conference

2018

Presentation Award

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 Programming:

SKILLSETS:

- -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