Jamiree Harrison

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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
  - 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 toggle switches.
· Provided stability analysis of time varying toggle switch models through the framework of Koopman Operator theory.
· Developed algorithms which fit time varying parameters to the pertinent toggle switch 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: **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

PROJECTS: -**Quantitative assessment of wildfire risk** (SIAM Grad Student Math Modeling Camp)
PDF

-**Prediction of chronic kidney disease degeneration with machine learning** (SIAM Mathematical Problems in Industry | Vironix)
PDF

CONFERENCES: **Harrison, J.,** Yeung, E.: Analysis and validation of parameter varying genetic toggle switches using Koopman Operators
· SIAM CSE23 (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 & DISTINCTIONS:

Mechanical Engineering Excellence Fellowship **2019**
-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 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
Annie Nguyen, Biological Control Lab
-Undergraduate research assistant at UCSB, 2023

TECHNICAL SKILLSETS:

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

-Environment:
- Linux
- Windows
- macOS

Machine Learning:
-PyTorch
-TensorFlow
-Sci-Kit Learn
-SciPy Optimize
-Principal Component Analysis
-Neural networks for classification and prediction
-Logistic Regression
-k means 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
-Adobe Illustrator