

# Justin Burzachiello

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## Education

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**University of California, San Diego (UC San Diego)** **01/2025–Present**  
Ph.D. in Mechanical and Aerospace Engineering (3.80 GPA)

**Stony Brook University (SBU)** **08/2023–12/2024**  
M.S. in Computational Applied Mathematics (3.63 GPA)

**University of California, Riverside (UC Riverside)** **09/2019–06/2023**  
B.S. in Physics (3.80 GPA, Magna Cum Laude): Applied Physics concentrated into Computer Science

## Coursework

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**Math** : Numerical analysis, ODEs/PDEs (numerical, theoretical), Complex analysis, Measure theory, Functional analysis, Discrete math, Mathematical physics

**CS** : Parallel computing, Machine learning, Reinforcement learning, Computer Vision, Neuroimaging, DSA, Software engineering

**Engineering** : CFD, Design optimization, Model reduction, Robotics

## Skills

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**Programming** : Python (PyTorch, skimage), C++, MATLAB, LabVIEW

**Engineering** : VGSTUDIO MAX, ImageJ, EGSnrc, SOLIDWORKS

**Other** : MPI, LaTeX, UNIX, Bash, Slurm, Git / GitHub

## Publications

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Structural and Dynamical Analyses of Apo and Cap-binding eIF4E: An in silico Study (BioArxiv, **2024**)

Impact of Rhizobium Tropicum Produced EPS on Arabidopsis Thaliana Growth (ICBBG2025, **2025**)

## Experience

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**UC San Diego: Kramer Research Group** **01/2025–Present**  
*Graduate research assistant* (advised by Dr. Boris Kramer) *La Jolla, CA*

- Implemented spectral submanifolds for nonlinear dimensionality reduction in Lagrangian structure-preserving Operator Inference-based model reduction.
- Used computational graph transformations to significantly reduce computational complexity of multidimensional numerical integration for polynomial chaos expansion uncertainty quantification.

**VJ Technologies** **05/2024–08/2024**  
*CT System Engineer Intern* *Bohemia, NY*

- Modeled chemical filtration through FEM simulation of water flow through a CT scan of coffee.
- Quantified manufacturing defects in 3D prints with CT & VGSTUDIO MAX.
- Computed ionizing photonic & electronic radiation dose from particle accelerators with EGSnrc.
- Used ImageJ to compute root growth increase after adding EPM to *Arabidopsis thaliana*.

**SBU: Deng Research Group** **02/2024–Present**  
*Graduate research assistant* (advised by Dr. Yuefan Deng) *Stony Brook, NY*

- Lead my team in processing CT scans of plant roots; segmented voxels-of-interest.

- Analyzed molecular dynamics distance matrix time series of eIF4E protein for AI drug discovery.
- TA for AMS 210–Applied Linear Algebra, AMS 361–Applied Calculus IV: Differential Equations.

#### **UC Riverside: Coh Research Group**

**03/2022–12/2023**

*Research Assistant I in Mech. Eng.* (under Dr. Sinisa Coh)

*Riverside, CA*

- Created Python library for WYSIWYG tensor arithmetic from strings for quantum physics.
- Created private Sphinx-based database website for hosting Wannier90/Wannier-Berri DFT data.
- Used supercomputer Quantum ESPRESSO DFT software to calculate properties of materials.

#### **U.S. DOE, ORNL: Application Engineering Group**

**06/2022–08/2022**

*Software engineer intern* (under Drs. Greg Watson and Ben O'Neill)

*Oak Ridge, TN*

- Documented source code of VnV verification and validation software.
- VS Code extension: <https://marketplace.visualstudio.com/items?itemName=jburz2001.vnv-snippets>
- Visualized data for finite element method mesh refinement studies.

#### **UC San Diego: Kramer Research Group**

**06/2021–09/2021**

*Undergraduate research assistant* (under Dr. Boris Kramer)

*Remote*

- Configured genetic programming AI for symbolic regression-based physics derivation (1 of 13 honorees, out of 400+, to present at UC San Diego 2021 Summer Research Conference).
- Documented 5 Lagrangian mechanical systems' equations, figures, and physics with LaTeX.
- Used MATLAB to program ODE simulations for a mass-spring-damper and discretized linear beam.

#### **UC Riverside: Microwave Nano-Electronics Laboratory**

**02/2020–11/2021**

*Undergraduate research assistant* (under Dr. Yongtao Cui)

*Riverside, CA*

- Created an FPGA-based PLL with a lock-in amplifier, PI controller, and I/O with LabVIEW (1 of 5 honorees, out of 20+; presented at UC LEADS 2021 Research Conference).
- Built custom atomic force microscope (AFM) components with SOLIDWORKS.
- Analyzed microscale topography with a Bruker AFM; post-processed the data with NanoScope.

### **Presentations**

#### **SBU Garcia Scholars**

**06/2024**

- Presented work on using micro-CT with image processing in order to quantify plant root growth.

#### **Oak Ridge National Laboratory (ORNL) Summer Intern Symposium**

**08/2022**

- Presented VnV software-based web app for ASGarD software-based numerical fluid simulation

#### **UC San Diego STARS Closing Ceremony**

**08/2021**

- Nominated to present physics-based artificial intelligence research at STARS closing ceremony  
1 of 2 nominees out of 60+ students

#### **UC San Diego 2021 Summer Research Conference**

**08/2021**

- Conveyed how to use artificial intelligence to derive physical laws from experimental data  
1 of 13 “Student Spotlight” honorees out of 400+ students

#### **MSRIP/UC LEADS/Cal Pre-Doc Symposium**

**08/2021**

- Conveyed how to use artificial intelligence to derive physical laws from experimental data

#### **UC LEADS 2021 Koret Leadership and Research Symposium**

**03/2021**

- Presented FPGA-based quartz tuning fork sensor for atomic force microscopy  
1 of 3 “Honorable Mentions” in engineering out of 20+ students

#### **UC LEADS 2020 Summer Symposium**

**07/2020**

- Presented methodologies for developing an LIA and optimizing FPGA memory consumption

## Geospatial data science: various venues

08/2017–08/2019

- Advocated for combatting homelessness with a custom ArcGIS-based resource guide:
  - \* **Redlands City Hall**: conveyed the need for more haircut/shower resources for the homeless
  - \* **San Diego Convention Center**: demoed resource guide at 2018 ESRI User Conference
  - \* **University of Redlands**: answered questions from San Bernardino County foster youth
  - \* **Redlands Country Club**: demoed resource guide to the Women's Council of Realtors
  - \* **Redlands Mitten Building**: demoed resource guide to the YouthHope Foundation

## Outreach & Service

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### UC Riverside Undergraduate Research Journal

09/2021–06/2023

*Editorial board member*

*UC Riverside*

- Reviewed 6 article submissions for 3 rounds of reviews

### Mentor Collective

08/2021–06/2023

*Mentor*

*UC Riverside*

- Mentored 8 undergraduate freshmen in their first year of college

## Honors

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### UC Riverside

Outstanding 1st-, 2nd-, and 4th-Year Undergraduate Student

06/2020, 2021, 2023

Graduate Deans' Leadership Award

03/2022

Schuler Endowed Scholarship for Guardian Scholars (i.e., for foster youth)

2022–2023 academic year

UC Riverside Honors (offered)

2020