

Raul Garcia

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Education

- 2020–2025 **Rice University.**
PhD Computational and Applied Mathematics
Advisor: Dr. Illya V. Hicks
- 2014–2018 **University of California, Davis.**
BS Applied Mathematics
Cum laude

Interests

Mathematical optimization algorithms and software, stochastic optimization, strong MIP formulations, operations research, deep learning

Experience

- Summer 2022 **Research Intern**, *MIT Lincoln Laboratory*, Lexington MA.
- 2019–2020 **Quality Product Auditor**, *Pacific Southwest Container*, Modesto CA.
Performed daily testing and data collection of products. Conducted internal process audits and generated weekly Process Capability Analysis reports with Minitab.
- 2017–2018 **Reader**, *Dept. of Mathematics*, UC Davis, Davis CA.
Undergraduate grader for courses in Real Analysis and Ordinary Differential Equations
- 2017–2017 **Orientation Leader**, *Student Housing*, UC Davis, Davis CA.
Advised and mentored incoming students with course scheduling, degree requirements, campus resource navigation, and student life.

Software

- 2022–Present **Audubon_F21**, Python package for identifying and censusing various colonial waterbird species from aerial images of Texas coastal islands taken via UAV.
 - Sponsored by Houston Audubon for their waterbird population monitoring studies
 - Employs Faster R-CNN object detection model (Detectron2) with data augmentation and Bayesian optimization for hyperparameter tuning
 - Experimented with custom implementation utilizing DenseNet as backbone
 - Co-developer with various students from the Rice Data to Knowledge Lab
- 2021–Present **ClutteredEnvPathOpt.jl**, Julia package employing various MIP approaches to optimal path planning of robots and drones in cluttered environments.
 - Formulation techniques for disjunctive constraints: 1) Combinatorial disjunctive constraints constructed via an independent branching scheme; 2) Big-M
 - Co-developer with Joey Huchette and Miles Olson

Teaching

Rice University

Department of Computational and Applied Mathematics

Spring 2022 **Grader**, CAAM 378: Introduction to Operations Research and Optimization.

Fall 2021, **Grader**, CAAM 335: Matrix Analysis.

Fall 2020

Spring 2021 **Grader**, CAAM 334: Matrix Analysis for Data Science.

University of California, Davis

Department of Mathematics

Spring 2017 **Teaching Assistant**, MAT 17C: Calculus III for Bioscience Students.

Fall 2016 **Teaching Assistant**, MAT 17A: Calculus I for Bioscience Students.

Spring 2016 **Teaching Assistant**, MAT 17B: Calculus II for Bioscience Students.

Presentations

"A Combinatorial Disjunctive Constraint Approach to Optimal Path Planning".

- o MIP Workshop (poster), May 2022
- o Kavradi Lab, Apr 2022
- o Rice CAAM Dept. Graduate Seminar, Sep 2021

"Deep Learning for Precision Waterbird Monitoring".

- o Rice D2K Showcase (poster), Apr 2021

"On the Value of Binary Expansions for General Mixed-Integer Programs",
Paper Presentation.

- o Rice SIAM Journal Club, Feb 2021

Awards and Fellowships

2022–2025 **GEM Fellowship**, MIT Lincoln Laboratory.

2020–2024 **Computational Science and Engineering Recruiting Fellowship**, *Ken Kennedy Institute*, Rice University.

Service and Outreach

2020–Present **Society for Industrial and Applied Mathematics (SIAM) Student Chapter**, Rice University.

- o Graduate Seminar Chair, 2021–2022
- o Grill Master, 2020–2021

2021–Present **Julia Users of Rice Group**, Co-founder, Rice University.

Summer 2021 **Instructor**, *Tapia STEM Camp*, Rice University.

Guided high school students from underrepresented backgrounds on projects focusing on computational thinking and equity

2020–Present **Rice Graduate Education for Minorities**, *Tapia Center for Excellence and Equity in Education*, Rice University.

2020–2021 **Mentor**, *Association of Women in Mathematics (AWM)*, Rice University.

Served as mentor to a group of first-year Rice students interested in mathematics

2015–2018 **Chicano and Latino Engineers and Scientists Society**, UC Davis.

Memberships.

- Institute for Operations Research and the Management Sciences (INFORMS)
- Society for Industrial and Applied Mathematics (SIAM)

Conferences

MIP Workshop.

- 2022 - Poster presenter
- 2021 - Attendee (online)

Blackwell-Tapia Conference.

- 2021 - Attendee with support

INFORMS Annual Meeting.

- 2021 - Attendee

Relevant Coursework

Linear and Integer Programming; Applied Machine Learning Projects; Stochastic Optimization; Intro to Machine Learning; Iterative Methods for Systems of Equations and Unconstrained Optimization; Advanced Numerical Analysis; Computational Science; Object-Oriented Programming

Programming Languages and Software

Programming & Software Julia, Python, C++, C, Gurobi, MATLAB, Bash, Rust

Libraries JuMP, Detectron2, PyTorch, scikit-learn

Languages

English, Spanish