

Dominic Carrano

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Education

University of California, Berkeley

B.S. Electrical Engineering and Computer Science

08/2016 - 05/2020

GPA: 3.85 (Major) • 3.80 (Cum.)

Selected Coursework: Machine Learning, Convex Optimization, Probability and Random Processes, Digital Signal Processing, Signals and Systems, Operating Systems, Algorithms, Computer Architecture, Data Structures, Discrete Math, Multivariable Calculus, Linear Algebra

In Progress: Digital Image Processing, Statistical Signal Processing

Experience

Undergraduate Researcher • Berkeley Laboratory for Information Systems and Sciences

01/2019 - Present

- Studying the use of error-correcting codes to mitigate straggling workers in distributed systems under Professor Kannan Ramchandran.
- Demonstrated a 25% faster runtime than state-of-the-art matrix multiplication straggler tolerance schemes on AWS Lambda by implementing a locally recoverable product code in Python with NumPyWren, leading to asymptotically optimal decoding costs.
- Published experimental results and theoretical guarantees of coding-based approach at IEEE ICDCS 2020.

Signal Processing and Laser Systems Intern • Lawrence Livermore National Laboratory

05/2019 - 08/2019

- Reduced mean squared error of laser signal acquisition algorithm by 5x and saved \$2 million over previously proposed method by using fiducial signal to approximate impulse response measurements, eliminating the need to take multiple impulse shots.
- Developed and shipped new software tool to calibrate raw data from all 48 of the National Ignition Facility's 3 ω laser diagnostics by implementing provably optimal parametric fits in Matlab, providing a way to track the health of diagnostic tools for future experiments.

Signal Processing and Laser Systems Intern • Lawrence Livermore National Laboratory

05/2018 - 08/2018

- Quantified previously unknown error bars for laser diagnostic measurements by implementing Monte Carlo-based error propagation in Matlab, leading to a 2-3% reduction in error after adding masking and normalization techniques to the deconvolution algorithm.
- Presented work at SPIE Photonics West 2019 in San Francisco with a first author publication in the conference proceedings.

Teaching

EECS 120 (Signals and Systems) Teaching Assistant • UC Berkeley EECS Department

08/2018 - Present

20-hour-per-week head TA in Spring 2019, Fall 2019, and Spring 2020 semesters. 8-hour-per-week TA in Fall 2018 semester.

- Marshaled an 8-person staff and took charge of a 130 student class as head TA, coordinating logistics with the professor.
- Initiated and spearheaded a project to create six new hands-on Jupyter Notebook virtual labs for students in the Spring 2019 semester.
- Continually upgraded the original six labs based on student feedback, and led Spring 2020 staff in effort to create four new labs, completing a full set of 10. Lab topics include heart rate monitoring, image deblurring, audio recognition (Shazam), and more.
- Published work on designing and implementing the Python labs in the 2020 International Conference on Higher Education Advances.
- Taught weekly sections to 30 students on signal processing, linear time-invariant system theory, and their engineering applications.
- Demonstrated consistent improvement in teaching ability as evidenced by end of semester feedback, receiving an average rating of 4.3/5 in fall 2018, 4.6/5 in spring 2019 and 4.8/5 in fall 2019 all from anonymous student surveys with 80+% response rates.

Publications

V. Gupta*, D. Carrano*, Y. Yang, V. Shankar, T. Courtade, K. Ramchandran. *Serverless Straggler Mitigation using Local Error-Correcting Codes*. IEEE International Conference on Distributed Computing Systems, Singapore, 2020. [[pdf](#)] [[code](#)]

D. Carrano, I. Chugunov, J. Lee, B. Ayazifar. *Self-Contained Jupyter Notebook Labs Promote Scalable Signal Processing Education*. International Conference on Higher Education Advances, Valencia, Spain, 2020. [[pdf](#)]

D. Carrano, R. Muir. *Deconvolution uncertainty for power sensors at the National Ignition Facility*. SPIE High Power Lasers for Fusion Research, San Francisco, 2019. [[pdf](#)]

Skills and Tools

Proficient: Python (+NumPy, SciPy, Matplotlib, Jupyter Notebook), Soccer Fullback

Familiar: Java, MATLAB, C, Unix/Linux, LaTeX, HTML, Git, GitHub, Markdown

Achievements

Eagle Scout, Boy Scouts of America

10/2012