Olivia Weng

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Research Interests

My research lies at the intersection of artificial intelligence and embedded systems. I use hardware-software codesign to build efficient, fault-tolerant computer architectures for neural networks at the edge.

Education

University of California San Diego
PhD, Computer Science & Engineering 2020 - 2026 (expected)
Proposed thesis: *Codesigning Efficient and Resilient Neural Networks for Edge Inference*
Advisor: Ryan Kastner
Committee: Javier Mauricio Duarte, Sicun Gao, Ryan Kastner (Chair), Nhan Tran (Northwestern University, Fermilab), Jishen Zhao

University of California San Diego
MS, Computer Science & Engineering 2020 - 2023

The University of Chicago
BS, Computer Science *spec.* Computer Systems 2016 - 2020

Teaching

Univeristy of California San Diego

CSE 29: Systems Programming and Software Tools – *Instructor of Record* Summer 2025
- 4-credit introductory-level required course covering binary representation, C programming, memory management, systems programming, process execution.
- Developed and adapted lecture, homework and exam materials; homework and exams deployed with PrairieLearn for automated grading on a browser-accessible computing environment.
- Co-managed a staff of seven undergraduate tutors and graduate teaching assistants.
- Provided office hours and 1-on-1 student meetings.
- 17 students enrolled. Weng average evaluation: 4.67/5. Summer session average: 4.48/5.

CSE 142L: Computer Architecture: A Software Perspective – *Head TA* Summer 2021, Fall 2021
- Developed control flow graph visualizer for students to see computer architecture concepts in action.
- Guest lectured on memory allocators and how `malloc()` and `free()` work. Two hour-long lectures. 287 students enrolled.

The University of Chicago

CMSC 15400: Introduction to Computer Systems – *Grader* Spring 2020
CMSC 15200: Introduction to Computer Science II – *Grader* Summer 2018, Winter 2019
CMSC 22200: Computer Architecture – *Grader* Spring 2018
CMSC 16100: Honors Introduction to Computer Science I – *Grader* Autumn 2017

Professional Development

Peer Review of Teaching Program Summer 2025
UCSD Teaching and Learning Commons

· Participated in peer review of summer session teaching with another graduate student instructor, completing a training course on how to productively review teaching and provide constructive feedback.

Advanced College Teaching: Equitable Course Design and Instruction Spring 2025
UCSD Teaching and Learning Commons
· Completed a ten-week course on developing equitable courses and creating an inclusive classroom, including participating in teaching demos and learning how to develop a syllabus.

Foundations of Teaching Badge Winter 2025
UCSD Teaching and Learning Commons
· Participated in a five-week workshop series on inclusive teaching practices.

Publications

Peer-reviewed Conference and Journal Articles

1. **Greater than the Sum of its LUTs:** FPGA 2025
Scaling Up LUT-based Neural Networks with AmigoLUT
Olivia Weng, Marta Andronic, Danial Zuberi, Jiaqing Chen, Caleb Geniesse, George A. Constantinides, Nhan Tran, Nicholas J. Fraser, Javier Mauricio Duarte, Ryan Kastner.
In *Proceedings of the 2025 ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA)*.
Monterey, CA. February 2025.
https://doi.org/10.1145/3706628.3708874

2. **Turn on, Tune in, Listen up:** TRETS 2024
Maximizing Side-Channel Recovery in Cross-Platform Time-to-Digital Converters
Colin Drewes, Tyler Sheaves, Olivia Weng, Keegan Ryan, William Hunter, Christopher McCarty, Ryan Kastner, Dustin Richmond
In *ACM Transactions on Reconfigurable Technology and Systems (TRETS) 17, 3, Article 49*.
September 2024.
https://doi.org/10.1145/3666092

3. **FKeras: A Sensitivity Analysis Tool for Edge Neural Networks** JATS 2024
Olivia Weng, Andres Meza, Quinlan Bock, Benjamin Hawks, Javier Campos, Nhan Tran, Javier Duarte, Ryan Kastner.
In *ACM Journal on Autonomous Transportation Systems 1, 3, Article 15*.
September 2024.
https://doi.org/10.1145/3665334

4. **Pentimento: Data Residue in Cloud FPGAs** ASPLOS 2024
Colin Drewes, Olivia Weng, Andres Meza, Alric Althoff, Bill Hunter, David Kohlbrenner, Ryan Kastner, Dustin Richmond.
In *Proceedings of the 29th ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*.
San Diego, CA. April 2024.
https://doi.org/10.1145/3620665.3640355

5. **Tailor: Altering Skip Connections for Resource-Efficient Inference** TRETS 2024
Olivia Weng, Gabriel Marcano, Vladimir Loncar, Alireza Khodamoradi, Abarajithan G, Nojan Sheybani, Andres Meza, Farinaz Koushanfar, Kristof Denolf, Javier Mauricio Duarte, Ryan Kastner.
In *ACM Transactions on Reconfigurable Technology and Systems (TRETS) 17, 1, Article 11*.
January 2024.
https://doi.org/10.1145/3624990

6. **Turn on, Tune in, Listen up:** FPGA 2023
Maximizing Channel Capacity in Time-to-Digital Converters
Colin Drewes, Olivia Weng, Keegan Ryan, William Hunter, Christopher McCarty, Ryan Kastner, Dustin

Richmond
In *Proceedings of the 2023 ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA)*.
Monterey, CA. February 2023.
Nominated for Best Paper.
https://doi.org/10.1145/3543622.3573193

Juried Extended Abstracts

1. **Adapting Skip Connections for Resource-Efficient FPGA Inference** FPGA 2023
Olivia Weng, Gabriel Marcano, Alireza Khodamoradi, Nojan Sheybani, Farinaz Koushanfar, Kristof Denolf, Javier Duarte, Ryan Kastner.
In *Proceedings of the 2023 ACM/SIGDA International Symposium on Field Programmable Gate Arrays (FPGA)*.
Monterey, CA. February 2023.
https://doi.org/10.1145/3543622.3573172

2. **A Tunable Dual-Edged Time-to-Digital Converter** FCCM 2021
Colin Drewes, Steven Harris, Winnie Wang, Richard Appen, Olivia Weng, Ryan Kastner, William Hunter, Christopher McCarty, Dustin Richmond
In *IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM)*
Virtual, May 2021.
https://doi.org/10.1109/FCCM51124.2021.00040

Workshop Proceedings

1. **Open-source FPGA-ML codesign for the MLPerf Tiny Benchmark** MLBench 2022
Hendrik Borras, Giuseppe Di Guglielmo, Javier Duarte, Nicolò Ghielmetti, Ben Hawks, Scott Hauck, Shih-Chieh Hsu, Ryan Kastner, Jason Liang, Andres Meza, Jules Muhizi, Tai Nguyen, Rushil Roy, Nhan Tran, Yaman Umuroglu, Olivia Weng, Aidan Yokuda, Michaela Blott
In *Workshop on Benchmarking Machine Learning Workloads on Emerging Hardware (MLBench)*
at *Fifth Conference on Machine Learning and Systems (MLSys)*.
Santa Clara, CA. September 2022.
https://arxiv.org/abs/2206.11791

2. **Design Space Exploration for Machine Learning Architectures** ReCoDe 2021
Michael Barrow, Olivia Weng, Ryan Kastner
In *Workshop on Reimagining Codesign*
hosted by *US DOE, Office of Advanced Scientific Computing Research*.
Virtual, March 2021.
https://www.oliviaweng.com/recode2021.pdf

3. **Hardware-efficient Residual Networks for FPGAs** SLOHA 2021
Olivia Weng, Alireza Khodamoradi, and Ryan Kastner.
In *Workshop on System-level Design Methods for Deep Learning on Heterogeneous Architectures (SLOHA)*
at *Conference on Design, Automation and Test in Europe (DATE)*.
Grenoble, France, February 2021.
https://arxiv.org/abs/2102.01351

4. **Evaluating Achievable Latency and Cost: SSD Latency Predictors** AccML 2020
Olivia Weng and Andrew A. Chien.
In *Workshop on Accelerated Machine Learning (AccML)*
at *High Performance Embedded Architectures and Compilers (HiPEAC)*.
Bologna, Italy, January 2020.
https://accml.dcs.gla.ac.uk/papers/2020/AccML_2020_paper_15.pdf

Invited Papers

1. **Reliable Edge Machine Learning Hardware for Scientific Applications** VTS 2024
Tommaso Baldi, Javi Campos, Ben Hawks, Jennifer Ngadiuba, Nhan Tran, Daniel Diaz, Javier Duarte,

Ryan Kastner, Andres Meza, Melissa Quinnan, Olivia Weng, Caleb Geniesse, Amir Gholami, Michael W. Mahoney, Vladimir Loncar, Philip Harris, Joshua Agar, Shuyu Qin.
In *IEEE 42nd VLSI Test Symposium (VTS).*
Tempe, AZ. April 2024.
`https://doi.org/10.1109/VTS60656.2024.10538639`

Submissions

1. **PrioriFI: More Informed Fault Injection for Edge Neural Networks** ASPLOS 2026
   Olivia Weng, Andres Meza, Nhan Tran, Ryan Kastner.

Preprints

1. **Neural Network Quantization for Efficient Inference: A Survey** arXiv 2021
   Olivia Weng
   In *arXiv:2112.06126*.
   December 2021.
   `https://arxiv.org/abs/2112.06126`

Research Mentorship

Cecilia Chen, Undergraduate 2024 - present
· Mentor on evaluating the effects of training quantized neural networks on noisy inputs with and without regularizers to improve robustness.

Siddharth Mundra, Undergraduate 2024
· Mentored on ensembling lookup-table-based neural networks for improved resource scalability on FPGAs.

Abijith Yayavaram, Masters 2022 - 2023
· Mentored on reducing resource usage of ReLU activation computation in hls4ml, producing a more efficient dataflow-style architecture for custom neural network inference on FPGAs.

Kyle Yang, Masters 2022
· Mentored on evaluating the effects of noise injection on quantized neural network accuracy.

Laurent Lo, Undergraduate 2022
· Mentored on automating calculating activation bitwidths that prevent overflow in hls4ml as part of UCSD's International Summer Research Program.

Steven Harris, Winnie Wang, Undergraduate 2021-22
· Mentored on compressing a neural network that classifies victim computation on multi-tenant cloud FPGAs using a power side-channel profile. Part of UCSD's Early Research Scholars Program.

Presentations

PrioriFI: Efficient Fault Injection for Edge Neural Networks
Fast Machine Learning for Science Conference 2025, Zurich, Switzerland September 2, 2025

Codesigning Efficient and Resilient Edge Neural Networks
WiscProf 2025, University of Wisconsin-Madison, Madison, WI May 20, 2025

Greater than the Sum of its LUTs: Scaling Up LUT-based Neural Networks with AmigoLUT
FPGA 2025, Monterey, CA February 27, 2025

AmigoLUT: Scaling Up LUT-based Neural Networks with Ensemble Learning
Fast Machine Learning for Science Conference 2024, West Lafayette, IN October 16, 2024

Efficient and Resilient Neural Networks for On-chip Inference
The University of Chicago, Chicago, IL — October 10, 2024
Fermi National Accelerator Laboratory, Batavia, IL — October 11, 2024

Reliable Edge Machine Learning Hardware for Scientific Applications
VTS 2024, Tempe, AZ — April 23, 2024

FKeras: A Sensitivity Analysis Tool for Edge Neural Networks
Fast Machine Learning for Science Workshop 2023, London, UK — September 27, 2023

Open-source FPGA-ML codesign for the MLPerf Tiny Benchmark
MLBench 2022, Santa Clara, CA — September 1, 2022

Hardware-efficient Residual Networks for FPGAs
SLOHA 2021, Virtual — February 5, 2021

Evaluating Achievable Latency and Cost: SSD Latency Predictors
AccML 2020, Bologna, Italy — January 20, 2020

Employment

AMD — Jul 2023 - Dec 2023
Research Intern

The University of Chicago — Jan 2017 - Jun 2020
Computer Lab Tutor

Braintree — Jun 2019 - Aug 2019
Software Engineer Intern

The University of Chicago — Jun 2018 - Sep 2018
Research Assistant
Advisor: Yanjing Li

Gridless Power Corporation — Jun 2017 - Aug 2017
Software Intern

Awards

CSE Doctoral Award for Excellence in Service and Leadership — 2025
University of California, San Diego

WiscProf: Future Faculty in Engineering Workshop — 2025
Hosted by University of Wisconsin-Madison

MICS-Qualcomm Hypatia Dissertation Fellowship — 2024 - 2026

Achievement Rewards for College Scientists (ARCS) Fellowship — 2023 - 2026
San Diego Chapter

National Science Foundation Graduate Research Fellowship — 2022 - 2025

Jacobs School of Engineering Fellowship — 2020 - 2022
University of California, San Diego

Kunzel Powell Fellowship — 2020 - 2021
University of California, San Diego

Dean's Fund for Undergraduate Research — 2020
The University of Chicago

Dean's List 2017, 2018, 2019
The University of Chicago

Grace Hopper Conference Scholarship 2018
The University of Chicago

Service

External Reviewer

- ACM/IEEE DAC (2025)
- ACM FPGA (2023, 2024, 2025)
- IEEE FCCM (2021, 2022, 2023)
- IEEE FPL (2021)

Departmental Service

UCSD CSE NSF GRFP Workshop, Organizer Oct 2022 - Present
- Develop curriculum on how to write a strong application for the NSF GRFP, leading students through weekly lessons and peer review
- Mentees: Anya Bouzida (Awardee), Katherine Izhikevich, Lisa Takai

UCSD CSE DEI Book Club, Organizer + Member Oct 2020 - Present
- Select books and lead discussion on pressing and timely diversity issues, focusing on the U.S.
- Books read: *The Color of Law, Minor Feelings, How to be an Anti-Racist, Whistleblower: My Unlikely Journey to Silicon Valley and Speaking Out Against Injustice, Between the World and Me, The Loneliest Americans, The End of Bias: A Beginning, Automating Inequality, Fulfillment: Winning and Losing in One-Click America, The Ungrateful Refugee: What Immigrants Never Tell You, The Autobiography of a Transgender Scientist, Teaching to Transgress: Education as the Practice of Freedom, What Can a Body Do?: How We Meet the Built World, Elite Capture: How the Powerful Took Over Identity Politics (And Everything Else), Body and Soul: The Black Panther Party and the Fight against Medical Discrimination*

UCSD CSE Graduate Committee, PhD Student Representative Oct 2022 - Jun 2025
- Represent PhD student interests during committee discussions to guide the formation of a new Research Exam and guidelines for PhD student advising

UCSD GradWIC Mentorship Program, Mentor Oct 2021 - Jun 2023, Oct 2024 - Present
- Mentor a PhD student Sung Eun Kim in navigating the first year of her PhD in regards to starting up research and balancing classes
- Mentored a Masters student Qian Qian in finding a software engineering internship and guiding her through the interview process
- Mentored a Masters student Feiyu in starting research in machine learning hardware acceleration

MyCSPhD.org, Content Creator + Panelist Dec 2020 - Apr 2021
- Created an informational video on the CS Ph.D. experience based on an interview with a Ph.D. student at the University of Washington, currently available on the My CS Ph.D Youtube channel
- Participated in two My CS Ph.D. information session panels, answering questions about why pursue a Ph.D in CS and what Ph.D student life is like

Jacobs Undergraduate Mentoring Program, Mentor Oct 2020 - Jun 2021
- Mentored three undergraduate students, fostering connections between software engineers in industry and maintaining morale amidst a global pandemic

UCSD GradWIC Graduate School Application Workshop, Volunteer Oct 2020 - Mar 2021
- Reviewed and gave feedback on several undergraduate students' graduate school application materials over multiple workshop sessions

ACM-W@UChicago Mentorship Program, Undergraduate Mentor May 2018 - Jun 2020

· Guided Neha through how to start research and secure a research advisor, pointing her to various professors in the department with whom she could potentially work—she worked with Professor Shan Lu
· Supported and checked in with Melanie as she went through the internship recruiting process and the CS major at UChicago, reviewing her resume and helping her select classes

CS Student Activities Council, Student Representative Sep 2017 - Jun 2020
· Secured funding to support four computer science student organizations on campus to host events that foster collaboration and grow the undergraduate tech community at UChicago

Asynchronous Anonymous, Director Jan 2017 - Jun 2020
· Coordinated weekly tech talks given by a diverse set of undergraduates, elevating minority speakers, to build an inclusive tech community at UChicago, engaging students with new technologies

Society of Women Engineers' Girls' Day in STEM, Volunteer May 2019
· Created a workshop that taught basic cryptography topics, in which 50 middle and high school girls participated
· Facilitated a discussion on diversity and what it means to be a woman in STEM among a group of 7 local Chicago middle school girls

compileHer Tech Capstone 2019, Volunteer Apr 2019
· Led a group of 12 local Chicago middle school girls through interactive workshops that introduced select computer science topics, guiding them through completing each activity

ACM-W@UChicago, Board Member Jan 2017 - Jun 2018
· Organized study breaks and student panels in committee of five women computer science majors weekly to bring women and minority computer science community together and discuss diversity issues in the tech industry

References

Available upon request.