

**RESEARCH
INTERESTS**

Fine-Grained Complexity Theory, Pseudorandomness, Cryptography, Machine Learning, Circuit Lower Bounds, and how these all influence each other

Interrogating the social impact of CS research, such as Algorithmic Fairness and Machine Learning's use in the practice of Law, and embedded values of information systems

**RESEARCH
AND
ENGINEERING
EXPERIENCE**

Melengo, Research Engineer

Oct 2024 - Present

Fashion design and manufacturing platform

- Built fullstack GenAI image-to-image pipeline for generating arrays of clothing options from fashion inspiration images using ChatGPT and Flux APIs in a Next.js framework
- Built backend Python pipeline to extract sized and arrangeable sewing pattern SVGs from PDFs, and used Modal to attach a clean drag-and-drop UI frontend

Lycalopex Fellowship, Software Engineering Fellow

Jul 2024 - Aug 2024

Competitive paid fellowship to contribute to the official Go cryptography library

- Created the new [cryptotest package](#) introducing reusable testing suites for Go's crypto library
- Merged a testing suite for each interface of Go's 5 core secret-key primitives in 5 weeks, spanning 60+ tests
- Caught a security bug in the CTR mode stream cipher that my tests uncovered and filed an [issue](#)

Recurse Center, Software Engineer in Residence

Fall 2023

Self-directed residency for software engineers to collaborate and hone their craft

- Built interactive [DSP web apps](#) with React and WebMIDI/WebSockets and [music software](#) with Python
- Initiated & led weekly workshops on dev tooling, web accessibility and WCAG 2.1 compliance (47% increase in Lighthouse scores across projects), and ran sprints for bite-sized web projects for a team of 7

ERC-funded [COHUBICOL](#) Project, Postdoctoral Researcher

2020 - 2021

Hosted by Mireille Hildebrandt at Radboud University and VUB University

- Collaborated with Lawyers and Legal Philosophers to account for ML's effect on legal outcomes, legal decision-making, and the foundations of the Rule of Law
- Surveyed existing Legal Tech and documented a vocabulary of technical concepts at the intersection of ML and Law, improving legibility and testability
- Trained a team of lawyers on fundamental ML and mentored a CS PhD student

EDUCATION

PhD UC Berkeley, *Computer Science*

2014 - 2020

Advised by Shafi Goldwasser and Christos Papadimitriou

Thesis Title: *On the Utility of Fine-Grained Complexity Theory*

BA CSU Sacramento, *Math/Computer Science*

2009 - 2014

Minor: Statistics

Graduated with Highest Honors and Commencement Speaker

- PUBLICATIONS** Learning with Distributional Inverters
with Eric Binnendyk, Marco L. Carmosino, Antonina Kolokolova, and Ramyaa Ramyaa, in ALT 2022.
- XOR Codes and Sparse Learning Parity with Noise
with Andrej Bogadnov and Prashant Nalini Vasudevan, in SODA 2019.
- Proofs of Work from Worst-Case Assumptions
with Marshall Ball, Alon Rosen, and Prashant Nalini Vasudevan, in CRYPTO 2018.
- Fine-Grained Derandomization: From Problem-Centric to Resource-Centric Complexity
with Marco L. Carmosino and Russell Impagliazzo, ICALP 2018.
- Average-Case Fine-Grained Hardness
with Marshall Ball, Alon Rosen, and Prashant Nalini Vasudevan, STOC 2017.
- INTERNSHIPS** Visiting Researcher, *MIT*, Advised by Ryan Williams Fall 2019
 Visiting Researcher, *UC San Diego*, Advised by Russell Impagliazzo Summer 2018
 Visiting Researcher, *CUHK*, Advised by Andrej Bogdanov Summer 2017
 FACT Center, *IDC Herzliya*, Advised by Alon Rosen Summer 2016
 TRUST REU, *Stanford University*, Advised by Dan Boneh Summer 2013
- ORGANIZED WORKSHOPS** Resistance AI Workshop, co-organized for NeurIPS 2020
 – Co-organized with members of the Radical AI network with the lens of asking “How does AI shift power in the world?”
 – Co-designed and led interactive session on Technological Imaginaries and sustainable models of technology
 – Centered Black and Indigenous activists, researchers, and organizers to present and discuss how to shift power back to marginalized communities
- Manifesting the Sociotechnical: Experimenting with Methods for Social Context and Social Justice, *with Ezra Goss, Lily Hu, and Stephanie Teeple*, in ACM FAccT* 2020.
 – Collaborated with interdisciplinary team to create and run a workshop addressing the Science and Technology Studies (STS) perspectives of Algorithmic Fairness
 – Guided Fairness researchers through Community Organizing-inspired power analysis techniques to understand power dynamics inherent to the domain
- PROGRAM COMMITTEES** Beyond Fairness: Towards a Just, Equitable, and Accountable Computer Vision
Workshop organized by Emily Denton and Timnit Gebru, at CVPR 2021.
- Resistance AI
Jointly organized workshop at NeurIPS 2020.
- ORGANIZING AND ENGAGEMENT** Organizer in the Radical AI Network 2020 - 2021
 – Active member of the Radical AI network, helping form its principles, public statements, and activities
 – Co-organized the Resistance AI workshop for NeurIPS 2020
 Prominently Featured in Simons Institute Educational Short Film Summer 2021

- Simons Institute’s Theory Shorts: *Until the Sun Engulfs the Earth: Lower Bounds in Computational Complexity*
 - Explained Complexity Theory for a general audience in plain English
- Presented at Queer in AI Workshop at ICML Fall 2020
- Gave a talk “*Queer*” in AI: *Moral Injury and Going Beyond Resilience*
 - Gave language and commiseration to the experience of being marginalized in academia and tech
- AI Policy and Queer Privacy Panel at Queer in AI Workshop at ICML Fall 2020
- Panelist with Kade Crockford and Alex Hanna, moderated by Jevan Hutson
- Founded the QTPRES Conference Spring 2020
- Created, secured funding for, and co-organized *QT Presenters: QTPOC Reclaiming Education and Science (QTPRES)* Conference for sharing STEM concepts with the Queer, Trans, and POC (QTPOC) community in the SF Bay Area
 - Coordinated diverse array of presenters and facilitators to present with a gathering of 40 (mostly non-academic) attendees
 - Secured venue, food catering, zine tables, and a DJ for a community celebration
- Skype A Scientist 2017 - 2020
- Skyped with various on-site and online high school and elementary school classrooms across the US including rural areas and with diverse demographics
 - Gave pop intuitions of theoretical CS and explained academic pathways, funding, traveling, and opportunities
- EECS Peer at UC Berkeley 2017 - 2020
- Held office hours for graduate students in EE and CS as a peer counselor
- Volunteered for Empowering Womxn Of Color Conference (EWOCC) Spring 2018
- Was a general volunteer for EWOCC at UC Berkeley, helping this important conference go smoothly
 - Learned conference organization skills to later create my QTPRES conference for the Bay Area QTPOC community
- Dinner With a Scientist Spring 2018
- Had dinner with groups of 4th and 5th grade Oakland elementary students from underrepresented backgrounds and gave them insight into a career in STEM
 - Showed math “magic tricks” to poise math as a creative field that can get weird and interesting in higher education
- Mentor in Directed Reading Program at UC Berkeley Fall 2017
- Mentored Berkeley undergraduate Sichao (Jeff) Xu through complexity theory and derandomization literature
- Created and Maintained Blog *On The Shoulders Of Windmills* 2015 - 2016
- Posted on our responsibilities as academics and scientists and on technology through a sociotechnical lens
 - Posted on my experiences in graduate school and openly on mental health in academia
- Graduate Panelist for the CSU Sacramento SHPE Chapter Conference Fall 2014
- Talked to Latinx undergraduates about the process and opportunities of academia
 - Gave information and resources on REUs, fellowships, and application processes
- Featured in *Si Magazine* that features role models for Latinx youths Fall 2014

**TEACHING
AND
OUTREACH
EXPERIENCE**

- Recurse Center, Software Engineer in Residence Fall 2023
Self-directed residency for software engineers to collaborate and hone their craft
- Created & presented lecture series on math in music software: Geometric Intuitions of the Fourier Transform
 - Designed & built educational, interactive tools for [music theory](#) and [signal processing](#)
- EduExplora, Instructor and Course Creator July 2023
UC Berkeley STEM outreach program for exceptional Latinx high school students
- Created & taught *Science In A Box*: an Introductory Python course on Object-Oriented design via physics simulations
 - Coached 30 student developers on utilizing documentation, debugging, finding repos, understanding APIs, and pair programming
- Preschool Facilitator in Oakland Forest Schools (Volunteer) Summer 2023
Outdoor schools for marginalized and neurodiverse preschool students
- Facilitated preschoolers from diverse communities in outdoor setting with a lot of movement, play, and communicated boundaries
 - Helped move them slowly towards independence with their actions, awareness of their emotions, and communication of their needs
- E125: Ethics, Engineering, and Society Spring 2020
UC Berkeley GSI with Prof. Raluca Scarlat
- Co-taught ethics in engineering through a sociotechnical lens and helped design discussion format for accommodating large class sizes
 - Helped direct reading list, co-facilitated class discussions, and graded
- Created and Taught Lessons in the Berkeley Math Circle Fall 2018
Program for local high and middle schoolers exceptional in mathematics
- Created lessons on the philosophy of complexity theory using Interactive and Zero-Knowledge Proofs as concrete concepts
 - Gave encouraging overview of academia and research for aspiring students
- CS276: Graduate Cryptography Fall 2015
UC Berkeley GSI with Prof. Alessandro Chiesa
- Helped to adaptively decide flow of curriculum, held office hours, and graded
 - Created and taught lessons on Zero-Knowledge Proofs
- CS172: Computability and Complexity Spring 2015
UC Berkeley GSI with Prof. Luca Trevisan
- Ran discussion sections, held office hours, and graded
 - Created and taught lessons on diagonalization proofs, their history, and limitations
- Jointly Taught NSF LSAMP Summer Math Program Summer 2014 - 2015
CSU Sacramento Instructor with Prof. Scott Farrand
- Taught incoming CSU Sacramento underrepresented STEM students
 - Guided students through problem solving on recreational math problems and calculus problems to reintroduce them to math as a creative and social activity
 - Trained in how to “spread thinking around a room”
- Project Creator/Leader for UC Berkeley SMASH Academy Summer 2014
Summer program for underrepresented students from Oakland high schools
- Designed five-week math project for low-income high school STEM students

- Used problem solving of recreational math problems, building to exploring pure math through Symmetry Groups to show math as a creative enterprise

COSMOS Program Instructor Summer 2014

UC Davis Instructor with Prof. Monica Vazirani

- Helped teach Summer program for exceptional high school students in math
- Guided students through Abstract Algebra and Symmetry problems in lecture format and working groups

STAT50: Introduction to Probability and Statistics, Teaching Assistant Fall 2012

CSU Sacramento TA with Prof. Coşkun Çetin

- Tutored students in Probability, held office hours, and graded
- Led some lectures on Birthday Bounds

Tutor Math Lab 2011 - 2013

CSU Sacramento tutor in walk-in Math Lab for all math students

- Tutored diverse undergraduate population in all core math courses
- Helped organize community events for an active undergraduate math population

INVITED TALKS

Aalborg University [SECURE](#) Workshop May 2021

Participatory Privacy: Towards Returning Power and Autonomy to Communities

Boston University Algorithms and Theory Seminar October 2020

Discriminatory and Liberatory Algorithms'

Mechanism Design for Social Good Workshop August 2020

Discussant for Keynote Speaker Stephanie Dinkins

ICML Queer in AI Workshop July 2020

"Queer" in AI: Moral Injury and Going Beyond Resilience

Resistance AI Network June 2020

Discriminatory and Liberatory Algorithms'

UC San Diego Theory Seminar May 2020

Discriminatory and Liberatory Algorithms:

How Do We Define "Fair" Responsibly?

Mechanism Design for Social Good Working Group on Bias March 2020

Discriminatory and Liberatory Algorithms:

How Do We Define "Fair" Responsibly?

Swarthmore College Computer Science Department February 2020

Discriminatory and Liberatory Algorithms

Oberlin College Computer Science Department January 2020

Discriminatory and Liberatory Algorithms

MIT Algorithms and Complexity Seminar November 2019

Discriminatory and Liberatory Algorithms

Simons Institute Pseudorandomness Reunion June 2018

Fine-Grained Derandomization

UC San Diego Theory Seminar June 2018

Fine-Grained Derandomization

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| | MIT Algorithms and Complexity Seminar <i>Fine-Grained Derandomization</i> | April 2018 |
| | UC Berkeley Theory Lunch <i>Fine-Grained Derandomization</i> | February 2018 |
| | Simons Institute Industry Day <i>Proofs of Work from Worst-Case Assumptions</i> | March 2017 |
| | Stanford Theory Lunch <i>Average-Case Fine-Grained Hardness</i> | February 2017 |
| | UC Berkeley Theory Lunch <i>Average-Case Fine-Grained Hardness</i> | January 2017 |
| | Simons Institute Fine-Grained Complexity Reunion <i>Average-Case Fine-Grained Hardness</i> | December 2016 |
| PARTICIPATED WORKSHOPS | Beyond Fairness: Towards a Just, Equitable, and Accountable Computer Vision <i>CVPR 2021</i> | Summer 2021 |
| | CRYPTIC COMMONS: Transdisciplinary Probes of the Ideal and Real World in Actual Cyber-Physical Systems <i><u>SECURE</u> at Aalborg University</i> | Spring 2021 |
| | Philosopher's Seminar: Interpretability Issues in Machine Learning <i>COHUBICOL</i> | Fall 2020 |
| | Fairness <i>Simons Institute Summer Cluster</i> | Summer 2019 |
| | Lower Bounds in Computational Complexity <i>Simons Institute Semester</i> | Fall 2018 |
| | Meta-Complexity <i>Oxford Mathematical Institute</i> | July 2018 |
| | Pseudorandomness <i>Simons Institute Semester</i> | Spring 2017 |
| | Winter School on the Sum of Squares Algorithm <i>UC San Diego</i> | January 2017 |
| | Proof Complexity <i>Chebyshev Laboratory at St.Petersburg State University</i> | May 2016 |
| | Fine-Grained Complexity & Algorithm Design <i>Simons Institute Semester</i> | Fall 2015 |
| | Cryptography <i>Simons Institute Semester</i> | Summer 2015 |
| | SAT & Satisfiability Modulo Theories Summer School <i>Stanford University</i> | July 2015 |
| | Randomization in Numerical Linear Algebra | June 2015 |

Gene Golub SIAM Summer School in Delphi, Greece

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| HONORS AND AWARDS | NSF Graduate Research Fellowship | Spring 2015 |
| | Chancellor's Fellowship (campus-wide), <i>UC Berkeley</i> | Spring 2014 |
| | Excellence Award, <i>Department of Computer Science, UC Berkeley</i> | Spring 2014 |
| | Faculty Endowment Scholarship (campus-wide), <i>CSU Sacramento</i> | Spring 2014 |
| | Commencement Speaker, <i>CSU Sacramento</i> | Spring 2014 |
| | Roger Leezer Scholarship, <i>Department of Math, CSU Sacramento</i> | Fall 2013 |
| | Stewart Moredock Scholarship, <i>Department of Math, CSU Sacramento</i> | Fall 2013 |
| | President of CSUS Chapter of SIAM, <i>CSU Sacramento</i> | 2012-2013 |
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| EXTERNAL REVIEWER | Journal of Cryptology (JoC) 2019, CRYPTO 2018, Foundations of Computer Science (FOCS) 2018, Theory of Cryptography Conference (TCC) 2018, Foundations of Computer Science (FOCS) 2017 | |