

# Cecilia Ferrando

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Research interests: Differential Privacy, Privacy-Preserving Machine Learning, Statistical Machine Learning.

## Education

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### University of Massachusetts Amherst

Amherst, MA

PHD IN COMPUTER SCIENCE, MANNING COLLEGE OF INFORMATION AND COMPUTER SCIENCES

Aug. 2019 - Spring 2026 (exp.)

- Manning CICS Thesis Writing Fellowship recipient (2024)
- Dean's Outstanding Leadership Award recipient (2021)
- PhD Applicant Support Program, Co-Chair (2020-2022)
- CS Fellow (merit scholarship for Computer Science students, 2019-2020)
- Cadence Women in Technology Scholar (2019-2020)
- GPA: 3.95/4

### Carnegie Mellon University

Pittsburgh, PA

MS IN COMPUTATIONAL DESIGN, FOCUS ON MACHINE LEARNING

Aug. 2016 - May 2018

- Fulbright Scholar

### Polytechnic University of Turin and Collegio Carlo Alberto

Turin, Italy

HONORS BS+MS DOUBLE DEGREE, MAJORS: ECONOMICS AND STATISTICS, ARCHITECTURE

Sep. 2010 - Jul. 2016

- Collegio Carlo Alberto "Allievi" Scholar
- Alta Scuola Politecnica Scholar
- Won EU-funded scholarship to study abroad in Paris, France (2014-2015)

## Research Experience

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### Meta

New York, NY (remote)

RESEARCH ENGINEER INTERN, STATS & PRIVACY R&D TEAM. HOST: JAMES HONAKER, PHD

May 2022 - Aug. 2022

- Researched and applied novel statistically valid differentially-private inference methods for two company-specific problems
- Provided the engineering team with a ready-to-use implementation of my algorithms that the company can now adopt on multiple private inference pipelines

### Google Research

New York, NY (remote)

RESEARCH INTERN. HOST: ALEX KULESZA, PHD

May 2021 - Aug. 2021

- Conducted research on novel differentially-private inference methods and supporting theory
- Independently designed and ran extensive experiments to validate new methods
- Presented our work at an internal research seminar
- Formalized results into a conference workshop paper (accepted at PriML at NeurIPS 2021)

### University of Massachusetts Amherst

Amherst, MA

RESEARCH ASSISTANT TO PROF. DANIEL SHELDON, PROBABILISTIC MACHINE LEARNING

Aug. 2019 -

- Developing new methods and algorithms for noise-aware differentially private inference and uncertainty estimation
- Published research papers on differentially private inference
- Implemented and published code to execute experiments validating my methods, including output visualization
- Current research includes query-based synthetic data for ML, non-parametric bootstrap for differentially private inference

### Carnegie Mellon University

Pittsburgh, PA

RESEARCH ASSISTANT TO PROF. DANIEL CARDOSO LLACH, SPATIAL MACHINE LEARNING

May 2017 - Apr. 2018

- Published research on applications of machine learning for spatial analysis of architectural plans
- Presented Master's thesis work at Spatial Cognition 2018, winning Best Poster Presentation award
- Developed novel graph learning techniques to mathematically encode the spatial hierarchies of architectural plans
- Trained statistical models to classify architectural plans based on their graph embedding
- Contributed to curating an exhibition on the origins of computer-aided design (CAD)

## Other Experience

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### Cadence Design Systems

Pittsburgh, PA

MACHINE LEARNING SOFTWARE ENGINEER

Jun. 2018 - May 2019

- Independently led applied research on generative adversarial networks using capsule networks, implementing algorithms from scratch
- Improved the performance of a classification algorithm by 11% by integrating capsule networks in the computer vision pipeline
- Communicated results with audiences of different expertise and background
- Invited to present my methods and results at Cadence Machine Learning Summit 2019, attendees included company's top scientific and executive leadership

### Procore Technologies

Carpinteria, CA

QUANTITATIVE RESEARCH INTERN

May 2017 - Jul. 2017

- Developed data analytic app for uncertainty estimation of statistics derived from user data. The company has adopted my app for routine use in their survey data analysis pipeline
- Communicated quantitative results with technical and non-technical audiences
- Collaborated with UX, Engineering and Finance teams

## Research Papers

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Upcoming:

**C. Ferrando**, D. Sheldon, *Private Regression via Data-Dependent Sufficient Statistic Perturbation*, under review

Published:

**C. Ferrando**, S. Wang, D. Sheldon, *Parametric Bootstrap for Differentially Private Confidence Intervals*, AISTATS 2022

**C. Ferrando**, J. Gillenwater, A. Kulesza, *Combining Public and Private Data*, PriML Workshop at NeurIPS 2021

**C. Ferrando**, N. Dalmaso, J. Mai, D. Cardoso Llach, *Architectural Distant Reading – Using Machine Learning to Identify Typological Traits Across Multiple Buildings*, CUMINCAD 2019

## Workshop Posters

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**C. Ferrando**, D. Sheldon, *Private Regression via Data-Dependent Sufficient Statistic Perturbation*, TPDP 2024

**C. Ferrando**, D. Sheldon, *Parametric bootstrap for correcting clamping and truncation bias in differential privacy*, Women in Machine Learning Workshop, NeurIPS 2020

**C. Ferrando**, *A Machine Learning Framework for Spatial Analysis*, Best Poster Presentation award, Spatial Cognition 2018

## Selected Projects

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Spring 2021

**2020 National Institute of Standards and Technology Differential Privacy Temporal Map Challenge, team won \$43,000 prize**, with Ryan McKenna, Joie Wu, Arisa Tajima, Brett Mullins, and Siddhant Pradhan

Fall 2019

**Adaptive robust regression for heteroskedastic data**, UMass Amherst CS689 Machine Learning, final project with Kenta Takatsu

Spring 2017

**HP-Intel NASA Design Challenge “Life in Space”**, 1st prize winning team project

Fall 2016

**The Harmonograph**, Carnegie Mellon 15-112 Fundamentals of CS and Programming, final project, 2nd prize over 400+ projects

## Honors & Awards

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SCHOLARSHIPS AND FELLOWSHIPS

2024

**Manning CICS Thesis Writing Fellowship**, CICS, University of Massachusetts Amherst

2022

**GHC Scholarship**, Anita Borg, Grace Hopper Celebration

2020

**Cadence Women in Technology Scholarship**, Cadence Design Systems

2019

**CS Fellowship**, CICS, University of Massachusetts Amherst

2016-2018

**Fulbright Scholarship (\$40,000)**, US Department of State

2010-2016

**Collegio Carlo Alberto “Allievi” Scholarship (\$17,000)**, Collegio Carlo Alberto, Turin, Italy

2013-2015

**Alta Scuola Politecnica**, top 1% students, Polytechnic University of Turin, Italy

2014-2015

**Erasmus+ Scholarship**, European Union

## AWARDS

- 2021 **Dean's Outstanding Leadership Award**, for piloting the PhD Applicant Support Program, CICS, University of Massachusetts Amherst
- 2021 **2020 NIST Differential Privacy Temporal Map Challenge (\$43,000)**, with the Minutemen team
- 2020 **NeurIPS 2020 registration award**, Women in Machine Learning
- 2020 **GHC 2020 registration award**, CICS, University of Massachusetts Amherst
- 2020 **ICML and ICLR 2020 registration award**, Women in Machine Learning
- 2019 **NeurIPS 2019 travel and registration award**, NeurIPS Conference
- 2017 **First Prize**, HP-Intel "Life in Space" Design Challenge, CMU team
- 2017 **Second Prize**, Carnegie Mellon 15-112 best CS projects over more than 400
- 2009 **Albo delle Eccellenze**, top high-school students in Italy, Italian Ministry of Education

## CONFERENCE PRESENTATIONS

- 2018 **Spatial Cognition 2018 Best Poster Award**, Spatial Cognition 2018, Tuebingen, Germany

## Teaching & Mentorship

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### University of Massachusetts Amherst

Amherst, MA

#### TEACHING ASSISTANT, CS119 INTRODUCTION TO PROGRAMMING

Fall 2023 - Spring 2024, Spring 2025

- Contributed to course organization, office hours, assignments and grading
- Organized hands-on programming labs for the students
- Rated 'Outstanding' in TA evaluations

### University of Massachusetts Amherst

Amherst, MA

#### GRADUATE THESIS MENTOR TO UNDERGRADUATE STUDENT ADI GEVA

Feb. 2021 - May 2022

- Mentored Adi as she worked on her thesis project on bootstrap methods for differentially private confidence intervals. Adi won the UMass Manning CICS 2022 Outstanding Undergraduate Achievement Award

### University of Massachusetts Amherst

Amherst, MA

#### GRADUATE MENTOR, CICS EMBER PROGRAM

Jun. 2020 - May 2021

- Mentoring undergraduate students from underrepresented groups conducting applied research on uncertainty quantification in differential privacy

### University of Massachusetts Amherst

Amherst, MA

#### GRADUATE MENTOR, CICS UNDERGRADUATE RESEARCH PROGRAM

Jun. 2020 - Jan. 2021

- Mentoring five undergraduate students conducting applied research on uncertainty quantification in differential privacy
- Provided weekly 1-1 guidance and feedback tailored on each student

## Service & Leadership

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- 2022- **NeurIPS, ICML, ICLR, AISTATS, JMLR**, Reviewer
- 2020-2022 **PhD Applicant Support Program (PASP)**, UMass Amherst CICS, Co-Chair. A mentorship program supporting underrepresented prospective PhD students. Received Dean's Outstanding Anti-Racism Leadership Award.
- 2020-2021 **Voices of Data Science**, Co-Chair. Leading the committee organizing the inaugural Voices of Data Science at UMass Amherst conference. The 2021 edition highlighted work by women (cis and trans) and non-binary data scientists.
- 2020 **UMass Graduate CS Women group**, Social Co-Chair. Organized networking events for CS women graduate students and faculty.
- 2020 **New Student Committee**, UMass Amherst CICS. Contributed to PhD candidate visit day.

## Skills

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### Programming

Python (NumPy, SciPy, Pandas, PyTorch, Opacus, TensorFlow, TensorFlow Privacy, JAX, Jupyter, Matplotlib, Seaborn), Cloud (AWS), C++, Matlab, Git, LaTeX

### Design

Adobe Photoshop, InDesign, Illustrator, Lightroom, PremierePro. Autodesk AutoCAD, 3DSMax. Rhino, Grasshopper

### Languages

Italian (native), English (advanced), French (advanced)