# Cecilia Ferrando

(+1) 412-636-1876 | cferrando@umass.edu | www.ceciliaferrando.com | ceciliaferrando | cecilia-ferrando

## Education

**University of Massachusetts Amherst** — *Amherst, MA*

PhD in Computer Science — *Aug. 2019 - May 2024 (exp.)*

- CICS Fellow (merit scholarship for Computer Science students, 2019-2020)
- Cadence Women in Technology Scholar (2019-2020)
- PhD Appplicant Support Program, Co-Chair (2020-)

**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

**Meta** — *New York, NY (remote)*

Research Engineer Intern, Stats & Privacy R&D team. Host: James Honaker, PhD — *May 2022 - Aug. 2022*

- Researched novel statistically valid differentially-private inference methods for two company-specific problems
- Closely collaborated with the engineering team to provide a ready-to-use implementation of my algorithms that the company can now use on multiple private inference pipelines
- Set up a working research paper, looking to submit it to a conference with my internship manager in the coming months

**Google LLC** — *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

**University of Massachusetts Amherst** — *Amherst, MA*

Research Assistant to prof. Daniel Sheldon, Probabilistic Machine Learning — *Aug. 2019 -*

- Published research on uncertainty quantification in differential privacy
- Performed extensive literature reviews
- Implemented code for differentially-private inference and uncertainty estimation, as well as output visualization
- Developing new methods and algorithms for reasoning about differential privacy noise in various inference problems
- Adapting bootstrap methods bias reduction in differentially-private inference problems
- Analyzing disparate impact of the bias induced by privacy mechanisms, for example on deep neural networks
- Exploring advantages and limitations of differentially-private synthetic dataset generation methods
- Responsible for organizing weekly meetings for eight PhD and Master's students in prof. Sheldon's lab

**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
- Implemented graph learning techniques and visibility graphs to study spatial hierarchies
- Developed novel method to mathematically encode the spatial "footprint" of architectural plans
- Trained statistical models to correctly classify architectural plans based on their graph embedding
- Contributed to curating an exhibition on the origins of computer-aided design (CAD)

## Other Experience

**Cadence Design Systems** *Pittsburgh, PA*

Machine Learning Software Engineer *Jun. 2018 - May 2019*

- Conducted applied research on generative adversarial networks, capsule networks, graph matching, implementing algorithms from scratch
- Improved the performance of a company-specific classification algorithm by 11% by integrating capsule networks in existing algorithm
- 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

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

## Posters and Presentations

**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 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

Scholarships and Fellowships

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|---|---|
| 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 |
| 2010-2016 | **Alta Scuola Politecnica**, top 1% students, Polytechnic University of Turin, Italy |
| 2014-2015 | **Erasmus+ Scholarship**, European Union |

Awards

2021 **Dean's Outstanding Anti-Racism Leadership Award**, 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
2019 **NeurIPS 2019 travel award**, CS Women, CICS, University of Massachusetts Amherst
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

**University of Massachusetts Amherst** *Amherst, MA*

Graduate thesis mentor to undergraduate student Adi Geva *Feb. 2022 - 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 *Feb. 2021 - 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 Winter Research program *Jan. 2021*

- Mentoring three undergraduate students conducting applied research on uncertainty quantification in differential privacy

**University of Massachusetts Amherst** *Amherst, MA*

Graduate mentor, CICS Undergraduate Summer Research program *Jun. 2020 - Aug. 2020*

- Mentored two undergraduate students conducting applied research connected to differential privacy
- Provided weekly 1-1 guidance and feedback tailored on each student

## Service & Leadership

2020- **PhD Applicant Support Program (PASP)**, CICS, University of Massachusetts Amherst, Co-Chair. A new mentorship program for prospective PhD students, with a focus on supporting underrepresented candidates. Received Dean's Outstanding Anti-Racism Leadership Award.

2020- **Voices of Data Science**, Co-Chair. Leading the committee organizing the inaugural Voices of Data Science 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**, CICS, University of Massachusetts Amherst. Contributed to PhD candidate visit day.

2018 **Greater Pittsburgh Community Food Bank**, volunteered with the Cadence Global Giving program.

## Skills

**Programming** Python (NumPy, SciPy, PyTorch, TensorFlow, jupyter, matplotlib), C++, Matlab, git, LaTeX
**Design** Adobe Photoshop, InDesign, Illustrator, PremierePro. Autodesk AutoCAD, 3DSMax. Rhino, Grasshopper
**Languages** Italian (native), English (advanced), French (advanced)