

Ángel Alexander Cabrera

I am a PhD student in the [Human-Computer Interaction Institute \(HCII\)](#) at Carnegie Mellon University, advised by [Adam Perer](#) and [Jason Hong](#). I work on human-centered AI, specifically in applying techniques from HCI and visualization to help people better understand and improve their machine learning models. I am supported by an [NSF Graduate Research Fellowship](#) and have spent time at Apple AI/ML, Microsoft Research, and Google.


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 [Google Scholar](#)

 [GitHub](#)


Education

- 2019 - Present **Ph.D. in Human-Computer Interaction (HCI)** Carnegie Mellon University
Advised by [Adam Perer](#) and [Jason Hong](#).
 [Data Interaction Group](#)
- 2022 **M.S. in Human-Computer Interaction** Carnegie Mellon University
- 2019 **B.S. in Computer Science** Georgia Institute of Technology
Concentration in intelligence and modeling/simulation.
Minor in economics.
- Fall 2017 Sciences Po - Paris, France
Exchange program with a focus on economics and political science.

Work Experience

- Summer 2021 **Apple AI/ML** Research Intern
Modular machine learning interfaces, see [Symphony](#).
 [Apple AI/ML](#)
- Summer 2020 **Microsoft Research** Research Intern
Behavioral model analysis, see [AIFinity](#).
 [VIDA Group](#)
- Summer 2018 **Google** Software Engineering Intern
Automated driver assistance and hyperlocal weather prediction for Android Auto.
 [WSJ Article](#)
- Summer 2017 **Google** Software Engineering Intern
Anomaly detection and regression analysis system for Google's data processing pipelines.
- Summer 2016 **Google** Engineering Practicum Intern
Analytics platform for monitoring and detecting erroneous edits to Google Maps.




Awards








- 2019 - 2022 **National Science Foundation Graduate Research Fellowship (NSF GRFP)**
Three-year graduate fellowship for independent research. Full tuition with an annual stipend of \$34,000.
 [Website](#)

- 2019 **Love Family Foundation Scholarship**
Co-awarded the \$10,000 scholarship for the undergraduate with the most outstanding scholastic record.
[🌐 Announcement](#)
- 2015 - 2019 **Stamps President's Scholar** Georgia Tech and the Stamps Family Charitable Foundation
Full ride scholarship with \$15,000 in extracurricular funding awarded to 10 incoming students.
[🌐 Website](#)
- 2018 **The Data Open Datathon** Correlation One and Citadel Securities
Placed third and won \$2,500 for creating a ML system to predict dangerous road areas.














Refereed Publications

- [9] **Zeno: An Interactive Framework for Behavioral Evaluation of Machine Learning**
[Ángel Alexander Cabrera](#), Erica Fu, Donald Bertucci, Kenneth Holstein, Ameet Talwalkar, Jason I. Hong, Adam Perer
ACM Conference on Conference on Human Factors in Computing Systems (CHI). Hamburg, Germany, 2023.
[🌐 Demo](#) [🔗 Code](#) [🌐 Website](#)
- [8] **Improving Human-AI Collaboration with Descriptions of AI Behavior**
[Ángel Alexander Cabrera](#), Adam Perer, Jason I. Hong
ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW). Minneapolis, 2023.
[📄 PDF](#) [📖 BibTex](#) [🌐 Website](#)
- [7] **What Did My AI Learn? How Data Scientists Make Sense of Model Behavior**
[Ángel Alexander Cabrera](#), Marco Tulio Ribeiro, Bongshin Lee, Rob DeLine, Adam Perer, Steven M. Drucker
ACM Transactions on Computer-Human Interaction (TOCHI). 2022.
[📄 PDF](#) [📖 BibTex](#) [🌐 Website](#)
- [6] **Symphony: Composing Interactive Interfaces for Machine Learning**
[Ángel Alexander Cabrera*](#), Alex Bäuerle*, Fred Hohman, Megan Maher, David Koski, Xavier Suau, Titus Barik, Dominik Moritz
ACM Conference on Conference on Human Factors in Computing Systems (CHI). New Orleans, 2022.
[📄 PDF](#) [📖 BibTex](#) [📺 Video](#) [🌐 Website](#)
- [5] **An open repository of real-time COVID-19 indicators**
Alex Reinhart, Logan Brooks, Maria Jahja, Aaron Rumack, Jingjing Tang, [\[et al, including Ángel Alexander Cabrera\]](#)
Proceedings of the National Academy of Sciences (PNAS). 2021.
[📄 PDF](#) [📖 BibTex](#) [🌐 Demo](#) [🔗 Code](#) [🌐 Website](#)
- [4] **Discovering and Validating AI Errors With Crowdsourced Failure Reports**
[Ángel Alexander Cabrera](#), Abraham Druck, Jason I. Hong, Adam Perer
ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW). Virtual, 2021.
[📄 PDF](#) [📖 BibTex](#) [🌐 Website](#)
- [3] **Regularizing Black-box Models for Improved Interpretability**
Gregory Plumb, Maruan Al-Shedivat, [Ángel Alexander Cabrera](#), Adam Perer, Eric Xing, Ameet Talwalkar
Conference on Neural Information Processing Systems (NeurIPS). Vancouver, 2020.
[📄 PDF](#) [📖 BibTex](#) [🔗 Code](#) [🌐 Website](#)

- [2] **Designing Alternative Representations of Confusion Matrices to Support Non-Expert Public Understanding of Algorithm Performance**
Hong Shen, Haojian Jin, [Ángel Alexander Cabrera](#), Adam Perer, Haiyi Zhu, Jason I. Hong
ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW). Virtual, 2020.
-  [PDF](#)  [BibTex](#)  [Website](#)

- [1] **FairVis: Visual Analytics for Discovering Intersectional Bias in Machine Learning**
[Ángel Alexander Cabrera](#), Will Epperson, Fred Hohman, Minsuk Kahng, Jamie Morgenstern, Duen Horng (Polo) Chau
IEEE Conference on Visual Analytics Science and Technology (VAST). Vancouver, Canada, 2019.
-  [PDF](#)  [BibTex](#)  [Blog](#)  [Video](#)  [Demo](#)  [Code](#)  [Website](#)

Workshops, Demos, Posters, and Preprints

- [4] **Evaluating Systemic Error Detection Methods using Synthetic Images**
Gregory Plumb, Nari Johnson, [Ángel Alexander Cabrera](#), Marco Tulio Ribeiro, Ameet Talwalkar
ICML - Workshop on Spurious Correlations, Invariance and Stability. Baltimore, MD, 2022.
-  [PDF](#)  [Website](#)
- [3] **"Public(s)-in-the-Loop": Facilitating Deliberation of Algorithmic Decisions in Contentious Public Policy Domains**
Hong Shen, [Ángel Alexander Cabrera](#), Adam Perer, Jason I. Hong
CHI - Fair & Responsible AI Workshop. Hawaii, USA, 2020.
-  [PDF](#)  [Workshop](#)  [Website](#)
- [2] **Discovery of Intersectional Bias in Machine Learning Using Automatic Subgroup Generation**
[Ángel Alexander Cabrera](#), Minsuk Kahng, Fred Hohman, Jamie Morgenstern, Duen Horng (Polo) Chau
ICLR - Debugging Machine Learning Models Workshop (Debug ML). New Orleans, Louisiana, USA, 2019.
-  [PDF](#)  [Workshop](#)  [Website](#)
- [1] **Interactive Classification for Deep Learning Interpretation**
[Ángel Alexander Cabrera](#), Fred Hohman, Jason Lin, Duen Horng (Polo) Chau
CVPR - Demo. Salt Lake City, Utah, USA, 2018.
-  [PDF](#)  [Video](#)  [Demo](#)  [Code](#)  [Website](#)

Talks

- November 2022 "Designing Large Web Applications" - *CMU 05-431/631 Software Structures for User Interfaces (SSUI)*
- November 2022 "Modern Web Frameworks" - *CMU 05-431/631 Software Structures for User Interfaces (SSUI)*
- October 2022 "Evaluating Machine Learning" - *CMU 05-618/318: Human-AI Interaction*
- October 2022 "Evaluating Machine Learning" - *CMU 10-605/805: ML with Large Datasets*
- September 2022 "Visualization and Machine Learning" - *CMU 17-428/728: ML and Sensing*
- September 2021 "Ethics in Data Visualization" - *CMU 05-899: Data Visualization*
- September 2021 "D3 Deep Dive" - *CMU 05-899: Data Visualization*
- April 2021 "Data Science Widgets with Svelte and Jupyter" - *Svelte Summit 2021*

Teaching

- Fall 2022 **05-431/631 Software Structures for User Interfaces (SSUI)** Graduate Teaching Assistant @ Carnegie Mellon
Teach weekly lab sections, grade tests and homeworks.
- Fall 2021 **05-499:C - Data Visualization** Graduate Teaching Assistant @ Carnegie Mellon
Taught a D3 course and led an ethics workshop in addition to grading and course management.
- 2016 - 2018 **CS1332 - Data Structures and Algorithms** Undergraduate Teaching Assistant @ Georgia Tech
Taught a weekly recitation, graded tests and homework, and helped create assignments.
- Fall 2016 **GT 1000 - First-Year Seminar** Team Leader @ Georgia Tech
Designed a class curriculum for incoming first years and helped lead a weekly seminar class.

Mentoring

- Fall 2022 - Present **Tianqi Wu** M.S. in Computer Science, Carnegie Mellon
Interactive error discovery for ML.
- Summer 2022 - Present **Erica Fu** B.S. in Information Systems, Carnegie Mellon
UX design for an ML evaluation platform. See [Zeno](#).
- Summer 2022 - Present **Donny Bertucci** B.S. in Computer Science, Oregon State University. REU at Carnegie Mellon
Interactive model debugging. See [Zeno](#).
- Summer 2022 - Present **Kan Sun** B.S. in Math, Carnegie Mellon.
Algorithmic discovery of ML errors.
- Spring 2021 - Present **Kazi Jawad** B.S. in Statistics and Machine Learning, Carnegie Mellon
Interactive exploration and debugging of image classification models.
- Fall 2021 - Spring 2022 **Emily Guo** B.S. in Statistics and Machine Learning, Carnegie Mellon
Improving human-AI interaction with descriptions of model behavior.
- Spring 2020 - Spring 2021 **Abraham Druck** B.S. in Mathematical Sciences, Carnegie Mellon. Now: Technology Analyst at Morgan Stanley
Crowdsourced discovery of ML failures for image captioning. See [Deblinder](#).
- Fall 2020 - Spring 2020 **CMU AI Mentoring Program**

Service

Program Committee

- 2022 - 2023 AC, ACM Conference on Human Factors in Computing Systems (CHI) Late Breaking Work
- 2022 AC, ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW) Posters
- 2022 PC, Workshop on Visualization for AI Explainability (VISxAI) at IEEE VIS
- 2022 PC, ACM Fairness, Accountability, and Transparency (FAccT)

Reviewer

- 2021 - 2023 ACM Conference on Human Factors in Computing Systems (CHI)
- 2021 - 2023 ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)
- 2020 - 2022 IEEE VIS

- 2022 ACM Fairness, Accountability, and Transparency (FAccT)
- 2022 ACM Symposium on User Interface Software and Technology (UIST)
- 2022 IEEE Computer Graphics and Applications (CGASI)
- 2019 - 2021 IEEE Transactions on Visualization and Computer Graphics (TVCG)
- 2019 ACM Transactions on Interactive Intelligent Systems (TiIS)

Student Volunteer

- 2019 IEEE VIS
- 2019 ACM Fairness, Accountability, and Transparency (FAccT)

Department

- 2022 REU application reviewer
- 2020 - 2021 Ph.D. student faculty representative

Press

- 2020 "New forecasting data could help public health officials prepare for what's next in the coronavirus pandemic" - *CNN*
- 2020 "Facebook and Google Survey Data May Help Map Covid-19's Spread" - *Wired*
- 2020 "Carnegie Mellon Unveils Five Interactive COVID-19 Maps" - *Carnegie Mellon*
- 2020 "Visualizing Fairness in Machine Learning" - *Data Stories Podcast*
- 2019 "Alex Cabrera Wins Love Family Foundation Scholarship" - *GT SCS*
- 2019 "Georgia Tech Satellite Successfully Launched Into Space" - *Georgia Tech*
- 2018 "Datathon Challenges Students to Create Solutions to Real-World Problems" - *GT SCS*

Projects and Open Source

- 2021 **Svelte + Vega**
A Svelte component for reactively rendering Vega and Vega-Lite visualizations.
[GitHub](#) [Demo](#)
- 2021 **Svelte + Jupyter Widgets**
A framework for creating reactive data science widgets using Svelte JS.
[Blog](#) [GitHub](#) [Video](#)
- 2020 **COVIDCast Visualization of COVID-19 Indicators**
Interactive visualization system of COVID-19 indicators gathered through >20,000,000 surveys on Facebook and Google by [CMU Delphi](#).
[Website](#) [GitHub](#)
- 2015 - 2017 **PROX-1 Satellite** Flight Software Lead and Researcher
Led a team of engineers in developing the software for a fully undergraduate-led satellite mission.
[In space!](#) [Press release](#)
- 2014 **CTF Resources**
Guide and resources for capture the flag (CTF) competitions with over 1.4k stars on GitHub.
[Website](#) [GitHub](#)

Selected Courses

- Ph.D. MultiModal Machine Learning
- Causality and Machine Learning

Human Judgement and Decision Making
Applied Research Methods

B.S. Deep Learning
Data and Visual Analytics
Machine Learning
Computer Simulation
Honors Algorithms
