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# 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.

 [cabreraalex.com](http://cabreraalex.com)


 [cabrera@cmu.edu](mailto:cabrera@cmu.edu)

 [GitHub](#)

 [Google Scholar](#)




## Education

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- 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

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- 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 [AIFinnity](#).  
 [VIDA Group](#)
- Summer 2018    **Google**  
Software Engineering Intern  
Researched and prototyped improvements for automated driver assistance systems and hyperlocal weather prediction for the next generation of Android Auto.  
 [WSJ Article](#)
- Summer 2017    **Google**  
Software Engineering Intern

Created an anomaly detection and trend analysis system for Google's data processing pipelines.

Summer 2016 **Google**

Engineering Practicum Intern

Built an analytics platform for monitoring and catching erroneous edits to Google Maps.

## Awards

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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.

 [Press Release](#)

## Refereed Publications

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[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](#)<sup>\*</sup>, Alex Bäuerle<sup>\*</sup>, 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 Hong, Adam Perer

*ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW)*. Virtual, 2021.

- [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 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

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- [4] **Evaluating Systemic Error Detection Methods using Synthetic Images**  
Gregory Plumb, Nari Johnson, [Ángel Alexander Cabrera](#), Marco Tulio Ribeiro, Ameet Talwalkar  
*Workshop on Spurious Correlations, Invariance and Stability at ICML. 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 Hong  
*Fair & Responsible AI Workshop at CHI. 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  
*Debugging Machine Learning Models Workshop (Debug ML) at ICLR. 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  
*Demo at IEEE Computer Vision and Pattern Recognition (CVPR). Salt Lake City, Utah, USA, 2018.*  
 PDF  Video  Demo  Code  Website

## Teaching

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Fall 2022	<b>05-431/631 Software Structures for User Interfaces (SSUI)</b> Graduate Teaching Assistant @ Carnegie Mellon
Fall 2021	<b>05-499:C - Data Visualization</b> Graduate Teaching Assistant @ Carnegie Mellon Taught a D3 course and led an ethics workshop in addition to grading and course management.
Fall 2016	<b>CS1332 - Data Structures and Algorithms</b>
Spring 2017	Undergraduate Teaching Assistant @ Georgia Tech
Spring 2018	Taught a 1 1/2 hour weekly recitation, graded tests and homework, and helped create assignments.
Fall 2016	<b>GT 1000 - First-Year Seminar</b> Team Leader @ Georgia Tech Designed a class curriculum for incoming first years and helped lead a weekly seminar class.

## Mentoring

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

## Service

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### Program Committee

2022	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 - 2022 ACM Conference on Human Factors in Computing Systems (CHI)
- 2021 - 2022 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 & Talks

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- 2021 "Data Science Widgets with Svelte and Jupyter" - *Svelte Summit 2021*
- 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

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- 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.

## 2014 CTF Resources

Guide and resources for capture the flag (CTF) competitions with over 1.4k stars on GitHub.

 Website  GitHub

## Selected Courses

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- 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
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