

Krystal Maughan

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Research Interests: *Differential Privacy, Provable Fairness, Machine Learning*

University of Vermont, PhD candidate **2019-present**

Differential Privacy, Provable Fairness, Machine Learning

Skills: Python, Haskell, LaTeX, Jupyter, SQL, AWS, PySpark, Tensorflow, Pytorch, Git

Research Assistant, PLAID Lab (Vermont) **2019-present**

Supervisors: Joe Near and Emma Tosch: Research on Provable Fairness and Privacy

Using Machine Learning. Funded via Amazon Research Award (2020-2022 PI: J. Near, D. Darais)

Research Assistant, PLAID Lab (Vermont) **2020-present**

Supervisors: Joe Near and Swati Gupta: Research on Participatory Fairness

Microsoft, Applied Scientist PhD Intern, Summer 2021 (Redmond: remote) **2021**

Research Intern, Autodesk Summer 2020 (Pier 9, San Francisco: remote) **2020**

Research Intern for Forge Team, Differential Privacy project

Graduate Writing Consultant, Fall 2020 (Vermont) **2020-2021**

Writing Mentor and Consultant for graduate students

Technical Writing Consultant for fields as broad as Materials Science to History

Teacher's Assistant, Fall/Spring 2019-2020 (Vermont) **2019-2020**

Compiler Construction with Haskell (taught by Joe Near) **2020**

Advanced Web Design (taught by Bob Erickson)

Programming with Matlab (taught by Radhakrishna Dasari) **2019**

Data Privacy with Jupyter, Python (taught by Joe Near)

RELEVANT WORK EXPERIENCE

Mercury: Software Engineering Intern (San Francisco) **2019**

Apple, Inc.: Software Engineering Intern (Sunnyvale) **2019**

Google Summer of Code: Developer for Haskell.org (remote) **2018**

Mozilla: Increasing Rust's Reach Developer (remote) **2018**

PUBLICATIONS:

❖ "Towards a Measure of Individual Fairness for Deep Learning" **2020**
(Maughan, K. and Near, J.) - presented as poster for **MD4SG 2020**

❖ "Towards Audibility for Fairness in Deep Learning" **2020**
(Ngong, I., Maughan, K. and Near, J.)- presented as poster for **AFCI at NeurIPS**

INVITED RESEARCH POSTER PRESENTATIONS

- ❖ “Towards a Measure of Individual Fairness for Deep Learning” (**first author**) 2021
Mediterranean Machine Learning Summer School (M2L) (Winter cohort)
- ❖ Poster Presentation, 4th **MD4SGD 2020** Annual Proceedings 2020
“Towards a Measure of Individual Fairness for Deep Learning” (**first author**)
- ❖ Poster Presentation, Carnegie Mellon’s (CMU) **AI for Social Good Symposium** 2020
“Examining Implicit Bias in Police Data: Lessons Learned about Reproducibility
And Transparency in AI”
- ❖ “Towards Audibility for Fairness in Deep Learning” 2020
(Ngong, I., **Maughan, K.** and Near, J.)- presented as poster for **AFCI at NeurIPS**
(Algorithmic Fairness through the lens of Causality and Interpretability)
- ❖ Poster Presentation for **RAIS at NeurIPS** 2020
(1st Resistance AI Workshop Proceedings,) “Archipelago Penseé” (**first author**)

INVITED RESEARCH TALKS

- ❖ “Towards a Measure of Individual Fairness for Deep Learning” ; 2021
Amazon Science internal presentation (with advisor Dr. J. Near)
- ❖ “Creating an end to end participatory data survey pipeline with 2020
variable constraints” (Data Economies and Governance MD4SG working group)
- ❖ “Towards a Measure of Individual Fairness for Deep Learning” ; 2020
Short Presentation given for UVM/CS++ Research Day (20 min talk)
- ❖ “Personalized Robotic Control using MISL” 2019
for UVM/CS++ Research Day (20 min talk)

MERIT-BASED MENTORSHIPS / RESEARCH MENTORSHIPS

- Mentee, Global Outreach Mentorship with Dr. Swati Gupta (EC 2020) 2020
- Mentee, LatinX in AI Research Workshop Mentorship with J. Barajas (ICML 2020) 2020
- Mentee, Mentored by Amal Ahmed, (ICFP 2020) 2020
- Mentee, Lighthouse3 AI Ethics Mentoring Externship with F. McEvoy (1 of 20 chosen) 2020
- Mentee, Code2040 Fellowship with Ben Waber 2020

MERIT-BASED GRANTS / SCHOLARSHIPS

- Nominee, Microsoft Ada Lovelace Fellowship (1 of 2) 2020
- TechX Social Impact / Harvard Franklin Fellowship (1 of 12) 2020
- Participant, Algorithmic Game Theory Mentoring Workshop (AMW) 2020
(co-located with EC 2020)
- WiML ICML Travel Funding Grant (sponsor QuantumBlack) 2020
- ALife Student Scholarship Recipient (to attend ALife Conference) 2020
- BRAID Funding to attend Grace Hopper Conference (courtesy of UVM) 2020
- Udacity’s Machine Learning Scholarship for Microsoft Azure 2020
- NCWIT Change Leader Scholar (1 of 30) 2020
- NCWIT Collegiate Award Finalist (1 of 85) 2019
- Code2040 2020 Fellow (1 of 80) 2019
- WiCyS Student Scholarship (Women in Cybersecurity) 2019
- Udacity Technology Scholarship (AI track): Intro to Deep Learning with Pytorch 2019

MERIT-BASED GRANTS / SCHOLARSHIPS

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|---|------|
| <i>Helium Grant (chosen as 1 of 11 out of 700)</i> | 2018 |
| <i>EaRI Career Scholarship, (R Data Science Scholarship) - declined offer</i> | 2018 |
| <i>Udacity Bertelsmann Data Science Scholarship - declined offer</i> | 2017 |
| <i>AT and T Aspire to Tech grant Winner</i> | 2017 |
| <i>NCAS Workshop participant (NASA Community College Aerospace Scholars)</i> | 2016 |
| <i>Who's Who/ Peggy Williams Memorial Scholarship/ Best BFA Award (Best of Major)</i> | 2008 |

OTHER GRANTS/ FELLOWSHIPS

| | |
|--|-----------|
| <i>Grace Hopper Conference</i> | 2020 |
| <i>NCWIT/Bloomberg GHC Conference Grant</i> | 2020 |
| <i>Women of Color in Technology Complimentary Registration</i> | |
| <i>Financial Aid Grant, SciPy (Scientific Computing with Python)</i> | 2020 |
| <i>MSRI SACNAS Grant</i> | 2020 |
| <i>LXAI+BAI@GTC Nvidia Digital DLI Workshop Scholarship Award for DLI workshop</i> | 2020 |
| <i>"Applications of AI for Anomaly Detection [LDLIW2249] (Deep Learning Institute at GTC)</i> | |
| <i>ICERM (Brown University) Variable Precision in Mathematical & Scientific Thinking</i> | 2020 |
| <i>RWC2020 (Real World Crypto: registration, flight, lodging) Grant via IACR</i> | 2020 |
| <i>CRA-WP Grad Cohort for Women (covers flight, registration, lodging)</i> | 2019 |
| <i>CRA-WP Grad Cohort for Underrepresented Minorities (flight, registration, lodging)</i> | 2019 |
| <i>Neurips Conference Travel Grant (includes free registration)</i> | 2019 |
| <i>Sage-Days-104 : To work on SageMath Software: Arithmetic Dynamics</i> | 2019 |
| <i>Simons Institute (Berkeley) Error-Correcting Codes and High-Dimensional</i> | 2019 |
| <i>Expansion Boot Camp (attendee)</i> | |
| <i>ICERM (Brown University) Encrypted Search Workshop Grant (Lodging provided)</i> | 2019 |
| <i>Cornell Number Theory Conference Grant (Lodging provided)</i> | 2019 |
| <i>MSRI (Mathematical Sciences Research Institute) Grants to attend:</i> | |
| <i>Optimal Transport and applications to machine learning and statistics</i> | 2020 |
| <i>Connections for Women:</i> | 2019 |
| <i>- Derived Algebraic Geometry, Birational Geometry and Moduli Spaces workshop</i> | |
| <i>- Introductory Workshop: Derived Algebraic Geometry and Birational Geometry And Moduli Spaces</i> | |
| <i>NASA L'Space NPWEE Concept Proposal writing programme participant</i> | 2019 |
| <i>NASA L'Space Proposal/Review Academy (patentable research proposal for funding)</i> | 2019 |
| <i>NASA L'Space Academy (virtual team & mentorship with NASA scientists Level 1)</i> | 2019 |
| <i>Racket Summer School (National Science Foundation Grant)</i> | 2018-2019 |
| <i>PLMW (Programming Languages Mentorship Workshop)</i> | 2018 |
| <i>ICFP (International Conference Functional Programming)</i> | |
| <i>PLMW(Programming Languages Mentorship Workshop)</i> | 2018 |
| <i>PLDI (Programming Languages Design and Implementation)</i> | |
| <i>OPLSS (Oregon Programming Languages Summer School Grant) - declined offer</i> | 2018 |

ACADEMIC REVIEWER

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|--|----------------|
| <i>Reviewer, Springer AI and Ethics Journal</i> | 2020 - present |
| <i>Reviewer for AFCI workshop at NeurIPS (Fairness and Accountability)</i> | 2020 |
| <i>Reviewer for Black in AI at NeurIPS workshop</i> | 2020 |

ACADEMIC REVIEWER

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|---|------|
| Reviewer and Programme Committee Member, LXAI@ICML Workshop | 2020 |
| Committee Reviewer, HCI Track, GHC (Grace Hopper Conference) | 2020 |
| Chair Reviewer, PML4DC (Practical ML for Developing Countries) workshop, ICLR | 2020 |
| Reviewer, Tapia Conference (Panels and Workshops) | 2020 |
| Reviewer, Travel Grant Applications, Black in AI for AAAI | 2020 |
| Reviewer, Travel Grant Applications, Clojure Conj (2 rounds) | 2017 |

ACADEMIC SERVICE (AI/Machine Learning)

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|---|------|
| Black in AI Logistics Co-Chair (NeurIPS) | 2020 |
| WiML Senior Program and Mentorship Co-Chair, WiML (NeurIPS) | 2020 |
| Committee Member, Zoom Infrastructure, EMNLP | 2020 |
| Session Facilitator, ICML 2020 for "Recommender System Research in Industry" (1 of 2) | 2020 |
| Volunteer ACL (Association of Computational Linguistics) | 2020 |
| Co-organizer, ACL (Association of Computational Linguistics) Black in AI Socials | 2020 |
| Volunteer, ICML 2020 (International Conference on Machine Learning) | 2020 |
| Volunteer, EC'20 (Economics and Computation) | 2020 |
| Volunteer, ICLR (International Conference on Learning Representations) | 2020 |
| Member, MD4SG (Mechanism Design for Social Good); Education working group | 2020 |
| Member, MD4SG Data and Governance working group | 2020 |
| Chair, AAAI Black in AI Annual Lunch | 2020 |
| Panelist, AAAI Try AI Workshop | 2020 |
| Invited Panelist, CRAFT workshop, FAT* conference (declined offer) | 2020 |

ACADEMIC JOURNALS (AI/Machine Learning)

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|---------------------------------------|------|
| Board Member, AI and Ethics, Springer | 2020 |
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ACADEMIC SERVICE (Other)

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|---|------|
| Panelist, PhD recruiting event (included multiple schools, sponsored by CodePath) | 2020 |
| Student Volunteer, ICFP (International Conference Functional Programming) | 2020 |
| Student volunteer, ICFP (International Conference Functional Programming) | 2018 |
| Student volunteer, PLDI (Programming Languages Design and Implementation) | 2018 |
| Student volunteer, POPL (Principles of Programming Languages) | 2018 |
| Student volunteer, SPLASH | 2018 |
| (Systems, Programming, Languages, and Applications) (declined offer) | |

NON-ACADEMIC SERVICE

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|--|------|
| Participant, Git Contributors Inclusion Summit | 2020 |
| Reviewer, Code2040 Application Essays | 2020 |
| Reviewer, OpenMined Differential Privacy articles | 2020 |
| Judge, DataKind, Data.org, Inclusive Growth and Recovery Challenge | 2020 |
| Google Developer Student Club Lead (for University of Vermont) | 2019 |

GRANT WRITING / PROPOSALS

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| CDS&E Computational and Data-Enabled Science and Engineering | 2020 |
| Database Grant Proposal for SageMaths (as Key Personnel) (PI Ben Hutz) | |

WRITING / PUBLICATIONS / POSTS

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|---|------|
| Contributor, Wikipedia: WikiProject Women in Red/AI Ethics | 2020 |
| Tech X Social Impact " Impossible Markets and Big Dreams : My interaction with the COO of Impossible Foods" | 2020 |
| Tech X Social Impact " Ready! Start: Exploring the Virtual Healthcare Multiverse " | 2020 |
| Google Summer of Code " Breaking the Time-Space Barrier with Haskell " | 2018 |

RESEARCH PhD INVITATIONS

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|--|------|
| Mediterranean Machine Learning Summer School (M2L) (Winter cohort) | 2021 |
| Winter Institute in Computational Social Science (WICSS) (University of Arizona) | 2021 |
| SOCML (Self Organizing Conference on Machine Learning, Machine Learning and Privacy session, Moderated by U. Erlingsson, organized by I. Goodfellow) (1 of 9 chosen) | 2020 |

INDUSTRY PhD INVITATIONS

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|--|------|
| Jane Street Symposium | 2021 |
| Participant, Adobe, "The Future of Creativity" (Virtual) | 2020 |
| Participant, Microsoft Research, Frontiers in Machine Learning (Redmond, remote) | 2020 |
| Participant, Discover Bloomberg: Women in Engineering event (New York, remote) | 2020 |
| Participant, Twitter PhD ML Flock Event (New York, Boston office) | 2019 |

PRESS

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| VentureBeat "AI needs systemic solutions to systemic bias, injustice and inequality" | 2020 |
| Featured by Women of Silicon Valley, June Edition, 16 "Caribbean Techies" | 2020 |
| Featured by Women of Silicon Valley, May Edition | 2020 |
| Interviewed for CareerGirls.org Boston (videographed at MIT) | 2019 |
| Featured by Coursera (Learner Story) | 2017 |

INDUSTRY TALKS

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|---|------|
| Speaker, EGG on Air Conference (human-centred AI) | 2020 |
| Speaker, EGG at Morgan State (talk on Human-centred AI and research) | 2020 |
| Presenter, VentureBeat's Transform 2020 Wrap-up for panel on Ethics and AI | 2020 |
| Moderator, VentureBeat's Transform 2020 panel on Ethics and AI | 2020 |
| Interviewed for Podcast, The Data Standard | 2020 |
| Interviewed for Podcast, Women of Silicon Valley | 2020 |
| Invited Panelist, Career Girls AI Virtual Camp | 2020 |
| Invited Speaker, Autodesk Design (Boston Office) on Differential Privacy | 2020 |
| Interviewed for Podcast on Black in AI (1 of 2 persons), iPhone Life Interview | 2020 |
| Invited Speaker, Sister to Sister International, Inc (STSI) on AI, Privacy, Ethics | 2020 |
| Invited Panelist, Morehouse@Momentum Coding School, "The Data Don't Lie" | 2020 |
| Invited Guest, Corecursive Podcast (Technical Podcast) | 2020 |
| Women in Data Science talk "Why conferences matter" (40 min NeurIPS inspired talk) | 2020 |
| "Magic Gnomes: A GHC Compiler talk (5-minute talk at Github for Sentry's Show & Tell) | 2019 |
| "Denotational Semantics" (2 minute Lightning Talk for Meetup group) | 2018 |
| "Recap of Google I/O 2018" (20 minute presentation at Google Developer Group LA) | 2018 |

OTHER (NON-INDUSTRY) TALKS

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| MIT Hacking Racism in Healthcare Challenge (keynote speaker) | 2020 |
| PLAID Lab speaker, "What Scientists can learn from Artists" | 2020 |
| CS Crew Project talk : contributing to Maths software (CodeWorld, SageMaths) | 2019 |
| CS Crew GSoC talk (40-minute talk about Google Summer of Code and Internships) | 2019 |
| CS293 Technical Interviewing Workshop Talk | 2019 |

D&I (Diversity and Inclusion) Invitations (Academic Conferences):

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| KDD 2020 D&I Grant (free registration) | 2020 |
| ECCV 2020 (free registration courtesy Google Research) | 2020 |

Developer Conference Grant/ Scholarship Invitations (Non-Academic Conferences):

AppSec (LA) 2019, TechTogetherBoston 2020, Twilio's Signal Conf 2019, Curry On! 2019, RustConf 2018, LambdaConf 2017/2018, Strange Loop 2017, Software Craftsmanship North America (SCNA), Clojure Conj 2016/2017, Clojure West 2017, Chrome Dev Summit 16-18, Google IO 2016-2019

CLASSES (PhD)

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| Privacy, Law and Policy, taught by Ryan Kriger (Spring) | 2021 |
| Secure Computation; taught by Joe Near using Python (Fall) | 2020 |
| Machine Learning; taught by Safwan Wshah using Python (Spring) | |
| Doctoral Research with advisors Joe Near and David Darais (Spring, Fall) | 2019-present |
| Software Verification; taught by David Darais using Agda (Fall) | 2019 |
| Data Privacy; taught by Joe Near using Python (Fall) | |
| Computer Human Interaction; taught by Josh Bongard (Fall) | |

CLASSES (RELATED)

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| Participant (1 of 18), "Dark Matters", School for Poetic Computation (taught by American Artist : workshop on Surveillance, data, ethics, history of Silicon Valley; guests included Dr. Simone Browne, Stephanie Dinkins and Rashida Richardson) | 2020 |
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ONLINE LEARNING (SELECTED)

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|---|------|
| Stanford ICME Summer NLP in Deep Learning Workshop | 2020 |
| Participant, IBM Qiskit Global Quantum Computing Summer School | 2020 |
| Participant, PL+HCI Swimmer Summer School (Programming Languages + Human Computer Interaction) | 2020 |
| Participant, MSRI, Decidability, Definability and Computability in Number Theory | 2020 |

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| DeepLearning.ai | 2020 |
| - Neural Networks and Deep Learning | |
| - Improving Deep Neural Networks: Hyperparameter Regularization and Optimization | |
| - Structuring Machine Learning Projects | |
| - Natural Language Processing Specialization | |

ONLINE LEARNING (SELECTED)

Hyperlink Academy 2020-2021

- *Design Neighborhood Scale Software (Ostromian economics and computing)*
- *Esoteric Programming Language Theory (Graphical to Impossible programming languages)*
- *Language Construction Workshop (Conlang: I made a language) (C. Gorrie)*
- *The Book is a Program 0 (Publishing a book in Racket) (J. Dueck)*
- *GUIs through Art History 0 (Recreating Periods of Art in History using GUIs) (E. Lin)*

InterAccess

- *Parametric Thinking with Images (Grasshopper3D)* 2020
- *Generating Images with Shaders (GLSL)*

Gray Area Festival Workshops

2020

- *Conceptual Cartography with Mapbox*
- *Data Visualization: Theory to Practice*

Pioneer Works

2020

- *Data Visualization as Activism (S. Lavigne)*
- *Feminist Data Set (with C. Sinderson)*
- *AI + Creativity (A. Miller, D. Geers and A. Dorsen)*

FutureLearn

- *"Empire: The Controversies of British Imperialism"* 2020
- *The Laws of Digital Data, Content and Artificial Intelligence* 2020
- *"Functional Programming in Haskell"* 2017

Wendy's Subway

- *Reading workshop with Che Gossett on Abolitionist Insurgencies* 2020
(led by C. Gossett, with lecture guest F. Moten)
- *Unsettling Historical Common Sense*

The Improv Group

2020

- *Storytelling for Technologists*