Krystal Maughan

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Github: https://github.com/kammitama5

Tel: 607.342. 6970

Blog: https://kammitama5.github.io/

Research Interests: Differential Privacy, Provable Fairness, Machine Lea	rning
University of Vermont, PhD candidate	2019-present
Differential Privacy, Provable Fairness, Machine Learning	
Skills: Python, R, Haskell, Matlab, Sage, LaTeX, Jupyter, SQL, AWS, PySpark, Sparkly	r, Tensorflow, Git
Research Assistant, PLAID Lab (Vermont)	2019-present
Supervisor: Joe Near: Research on Provable Fairness and Privacy	
Using Machine Learning. Funded via Amazon Research Award (2020-2022 PI: J. Near,	, D. Darais)
Microsoft, Applied Scientist PhD Intern, Summer 2021 (Redmond: remote) Azure E+P Enterprise and Security DI	2021
Microsoft Research, Independent Contractor, Summer 2021 (New York: remote) Reinforcement Learning Open Source Fest participant Vowpalwabbit's Contextual Bandits Estimators in Python	2021
Research Intern, Autodesk Summer 2020 (Pier 9, San Francisco: remote) Research Intern for Forge Team, Differential Privacy project	2020
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 Banking (Haskell fintech): 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

Peer-l	Reviewed Workshop 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	
*	"Archipelago Penseé" (Maughan, K .)	2020
	- presented as a poster: RAIS at NeurIPS	
NVIT	ED 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) Al 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 Al Workshop Proceedings,) "Archipelago Penseé" (first author)	
NAT	ED RESEARCH TALKS	
		2021
*	3,	2021
*	Career Mentoring Workshop: Grad Cohort for Women "Towards a Measure of Individual Fairness for Deep Learning":	2021
*	"Towards a Measure of Individual Fairness for Deep Learning" ; Jane Street PhD Symposium	2021
*	"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)	
ESE	ARCH AWARDS	
*	Outstanding Poster Award for Brilliant Idea Category, "Towards a Measure of Audi	itability in
	Fairness for Deep Learning", Mediterranean Machine Learning Summer School (-
THE	R PRESENTATIONS	,
*	Brown University <u>SUMS</u> , Maths and Illusion: exhibited a fractal-inspired pop-up b	ook (2021)
ERI"	T-BASED MENTORSHIPS / RESEARCH MENTORSHIPS	
	ee, Google's CS Research Mentorship Program (CSRMP) with Dr. A. Lees	2021
	e, Global Outreach Mentorship with Dr. S. Gupta (EC 2020)	2020
	e, Global Outreach Mentorship With Dr. S. Gupta (EC 2020)	2020

Mentee, LatinX in AI Research Workshop Mentorship with Dr. J. Barajas (ICML 2020)

2020

MERIT-BASED MENTORSHIPS / RESEARCH MENTORSHIPS Mentee, Mentored by Dr. Amal Ahmed, (ICFP 2020) Mentee, Lighthouse3 AI Ethics Mentoring Externship with F. McEvoy (1 of 20 chosen) Mentee, Code2040 Fellowship with Dr. Ben Waber	2020 2020 2020
MERIT-BASED GRANTS / SCHOLARSHIPS TechX Social Impact / Harvard Franklin Fellowship (1 of 12) USENIX Enigma Grant Nominee, Microsoft Ada Lovelace Fellowship (1 of 2) Participant, Algorithmic Game Theory Mentoring Workshop (AMW) (co-located with EC 2020)	2020 2021 2020 2020
WiML ICML Travel Funding Grant (sponsor QuantumBlack) ALife Student Scholarship Recipient (to attend ALife Conference) BRAID Funding to attend Grace Hopper Conference (courtesy of UVM) Udacity's Machine Learning Scholarship for Microsoft Azure NCWIT Change Leader Scholar (1 of 30) NCWIT Collegiate Award Finalist (1 of 85) Code2040 2020 Fellow (1 of 80) WiCyS Student Scholarship (Women in Cybersecurity) Udacity Technology Scholarship (Al track): Intro to Deep Learning with Pytorch Helium Grant (chosen as 1 of 11 out of 700) EaRI Career Scholarship, (R Data Science Scholarship) - declined offer Udacity Bertelsmann Data Science Scholarship - declined offer AT and T Aspire to Tech grant Winner	2020 2020 2020 2020 2019 2019 2019 2018 2018 2017 2017
NCAS Workshop participant (NASA Community College Aerospace Scholars) Who's Who/ Peggy Williams Memorial Scholarship/ Best BFA Award (Best of Major)	2016 2008
OTHER GRANTS/ FELLOWSHIPS Grace Hopper Conference NCWIT/Bloomberg GHC Conference Grant Women of Color in Technology Complimentary Registration Financial Aid Grant, SciPy (Scientific Computing with Python)	2020 2020 2020
MSRI SACNAS Grant LXAI+BAI@GTC Nvidia Digital DLI Workshop Scholarship Award for DLI workshop "Applications of AI for Anomaly Detection [LDLIW2249] (Deep Learning Institute at GTC) ICERM (Brown University) Variable Precision in Mathematical & Scientific Thinking RWC2020 (Real World Crypto: registration, flight, lodging) Grant via IACR CRA-WP Grad Cohort for Women (covers registration: remote) CRA-WP Grad Cohort for Women (covers flight, registration, lodging) CRA-WP Grad Cohort for Underrepresented Minorities (flight, registration,lodging) Neurips Conference Travel Grant (includes free registration) Sage-Days-104: To work on SageMath Software: Arithmetic Dynamics Simons Institute (Berkeley) Error-Correcting Codes and High-Dimensional Expansion Boot Camp (attendee) ICERM (Brown University) Encrypted Search Workshop Grant (Lodging provided) Cornell Number Theory Conference Grant (Lodging provided)	2020 2020 2020 2021 2019 2019 2019 2019

OTHER GRANTS/ FELLOWSHIPS

OTHER GRANTS/ FELLOWSHIPS	
NASA L'Space NPWEE Concept Proposal writing programme participant	2019
NASA L'Space Proposal/Review Academy (patentable research proposal for funding)	2019
NASA L'Space Academy (virtual team & mentorship with NASA scientists Level 1)	2019
MSRI (Mathematical Sciences Research Institute) Grants to attend:	
Optimal Transport and applications to machine learning and statistics	2020
Connections for Women:	2019
 Derived Algebraic Geometry, Birational Geometry and Moduli Spaces workshop Introductory Workshop: Derived Algebraic Geometry and Birational Geometry And Moduli Spaces 	
Racket Summer School (National Science Foundation Grant)	2018-2019
PLMW (Programming Languages Mentorship Workshop)	2018
ICFP (International Conference Functional Programming)	
PLMW(Programming Languages Mentorship Workshop)	2018
PLDI (Programming Languages Design and Implementation)	
OPLSS (Oregon Programming Languages Summer School Grant) - declined offer	2018
ACADEMIC REVIEWER	
Reviewer, Springer AI and Ethics Journal	2020 - present
Reviewer, ICLR Distributed and Private Machine Learning workshop	2021
Reviewer, PML4DC (Practical ML for Developing Countries) workshop, ICLR	2021
Reviewer, Tapia Conference (Panels and Workshops)	2021
Reviewer for AFCI workshop at NeurIPS (Fairness and Accountability)	2020
Reviewer for Black in AI at NeurIPS workshop	2020
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 Al for AAAI	2020
Reviewer, Travel Grant Applications, Clojure Conj (2 rounds)	2017
ACADEMIC SERVICE (Al/Machine Learning)	
Privacy Enhancing Technologies Symposium, Student Co-Organizer	2021
Black in Al 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 Al 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

	2020
ACADEMIC JOURNALS (Al/Machine Learning)	
Board Member, AI and Ethics, Springer	2020
ACADEMIC SERVICE (Other)	
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)	
ACADEMIC ASSOCIATION FOR COMPUTING MACHINERY (ACM) MEMBERSHIP	S
SIGecom Special Interest Group on Economics and Computation	2020-present
Student Member, International Association of Cryptologic Research (IACR)	2020-present
NON-ACADEMIC SERVICE	
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	
CDS&E Computational and Data-Enabled Science and Engineering	2020
Database Grant Proposal for SageMaths (as Key Personnel) (PI Ben Hutz)	
WRITING / PUBLICATIONS / POSTS	
	2020
Contributor, Wikipedia: WikiProject Women in Red/Al Ethics	2020
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the	2020
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods"	
Contributor, <u>Wikipedia: WikiProject Women in Red/Al Ethics</u> Tech X Social Impact " <u>Impossible Markets and Big Dreams</u> : My interaction with the COO of Impossible Foods" Tech X Social Impact " <u>Ready! Start: Exploring the Virtual Healthcare Multiverse</u> " Google Summer of Code " <u>Breaking the Time-Space Barrier with Haskell</u> "	2020 2018
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell"	2020
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell" RESEARCH PhD INVITATIONS	2020 2018
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell" RESEARCH PhD INVITATIONS Participant, Doctoral Consortium, ACM FAccT:	2020
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell" RESEARCH PhD INVITATIONS Participant, Doctoral Consortium, ACM FAccT: (ACM Conference on Fairness, Accountability and Transparency)	2020 2018 2021
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell" RESEARCH PhD INVITATIONS Participant, Doctoral Consortium, ACM FAccT: (ACM Conference on Fairness, Accountability and Transparency) Participant, CRAFT workshop at ACM FAccT	2020 2018
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell" RESEARCH PhD INVITATIONS Participant, Doctoral Consortium, ACM FAccT: (ACM Conference on Fairness, Accountability and Transparency) Participant, CRAFT workshop at ACM FAccT - Inspecting algorithms ins social media platforms	2020 2018 2021
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell" RESEARCH PhD INVITATIONS Participant, Doctoral Consortium, ACM FAccT: (ACM Conference on Fairness, Accountability and Transparency) Participant, CRAFT workshop at ACM FAccT - Inspecting algorithms ins social media platforms - Rethinking Demographic Data Infrastructures for Algorithmic Fairness	2020 2018 2021 2021
Tech X Social Impact "Impossible Markets and Big Dreams: My interaction with the COO of Impossible Foods" Tech X Social Impact "Ready! Start: Exploring the Virtual Healthcare Multiverse" Google Summer of Code "Breaking the Time-Space Barrier with Haskell" RESEARCH PhD INVITATIONS Participant, Doctoral Consortium, ACM FAccT: (ACM Conference on Fairness, Accountability and Transparency) Participant, CRAFT workshop at ACM FAccT - Inspecting algorithms ins social media platforms	2020 2018 2021

RESEARCH PhD INVITATIONS

Invited Participant, "Society-centric approaches to AI challenges in Cybersecurity", The Alan Turing Institute	2021
	2021
	2021
- organized by I. Goodfellow (1 of 9 chosen)	2021
	2021
Simons Institute, Innovations in Theoretical Computer Science (ITCS)	2021
INDUSTRY PhD INVITATIONS	0001
	2021
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	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	
Featured in the "Black Girls CODE the Future" Coloring Book	2021
VentureBeat "Al 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
	2019
INDUSTRY TALKS	
	2021
	2017
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	2020
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Interviewed for Podcast, The Data Standard	2020
Interviewed for OpenMined course (Privacy-Preserving Machine Learning and Fairness)	
	2020
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Invited Panelist, Morehouse@Momentum Coding School, "The Data Don't Lie"	2020
Invited Guest, Corecursive Podcast (Technical Podcast)	2020
Featured Session Clip, End of Year 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
Wendy's Subway, Invited Guest, Audiobook, "Turn Illness into a Weapon"	2021

OTHER (NON-INDUSTRY) TALKS

MIT Hacking Racism in Healthcare Challenge (keynote speaker)	2020
PLAID Lab speaker, "What Scientists can learn from Artists"	2020
PLAID Lab Speaker, "Information Theory: from Spacecraft to Blockchain"	2021
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):

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)	
Doctoral Research with advisor Joe Near	2021-present
Information Theory, taught by Jeff Frolik (Fall)	2021
Abstract Algebra I taught by Puck Rombach (Fall)	2021
Privacy, Law and Policy, taught by Ryan Kriger (Spring)	2021
(Post-quantum) Cryptography, taught by Christelle Vincent (Spring)	2021
Secure Distributed Computation; taught by Joe Near using Python (Fall)	2020
Machine Learning; taught by Safwan Wshah using Python (Spring)	2020
Doctoral Research with advisors Joe Near and David Darais (Spring, Fall)	2019-2020
Software Verification; taught by David Darais using Agda (Fall)	2019
Data Privacy; taught by Joe Near using Python (Fall)	2019
Computer Human Interaction; taught by Josh Bongard (Fall)	2019

CLASSES (AUDIT)

Stanford EE 374: Internet-Scale Consensus in the Blockchain Era 2021

- Taught by Dr. David Tse through Stanford University
- Audited class, scribed for Lecture 11, Spring 2021

CLASSES (RELATED)

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

ONLINE LEARNING (SELECTED)

Stanford ICME Summer NLP in Deep Learning Workshop	2020
Participant, IBM Qiskit Global Quantum Computing Summer School	2020
Participant, PL+HCl Swimmer Summer School	2020
(Programming Languages + Human Computer Interaction)	

ONLINE	LEARNING	(SELECTED)
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Participant, MSRI, Decidability, Definability and Computability in Number Theory 2020

DeepLearning.ai 2020-2021

- Neural Networks and Deep Learning
- Improving Deep Neural Networks: Hyperparameter Regularization and Optimization
- Structuring Machine Learning Projects
- Natural Language Processing Specialization
- Cryptography I
- Cryptography: Boolean Functions, S-boxes and Related Problems

Hyperlink Academy 2020-2021

- Design Neighborhood Scale Software (Ostromian economics and computing)
- Digital Alchemy (digital file formats, data manipulation)
- Artificial World Building (genetic algorithms, reinforcement learning, cellular automata)
- Esoteric Programming Language Theory (Graphical to Impossible programming languages)
- Language Construction Workshop (Conlang: Linguistics / 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)

R Orange County Book Club (6 weeks Mastering Spark with R)

2021

R Orange County Book Club (6 weeks Text Mining with R)

- Presented Chapters 10 and 11 (Distributed R, Extensions in Spark using R)
- Presented Chapter 7 (Twitter data Case Study in Text Mining with R)
- Presented R code exercises relevant to assigned chapters

R Orange County Workshops

2021

- Modeling Normally Distributed Data with Repeated Measures (February)
- Transforming Data into Dashboards with Tableau (March)
- R Virtual Science Hackathon (April) (project-based)

R Nimble virtual short course (C. Paciorek)

2021

- Basic concepts on converting BUGS and JAGS models
- MCMC sampling, model components for Bayesian non-parametric distributions

University of Vanderbilt Regression Modeling Strategies Short Course

2021

- Four day course on regression modeling and causal models
- Linear models, logistic and ordinal regression (F. Harrell, Jr., PhD, D. Levy, PhD)

Brown University Applied Mathematics

2021

- Contributed Artwork to SUMS on Mathematics and Illusion
- (SUMS: Symposium for Undergraduates in Mathematical Sciences)

ONLINE LEARNING (SELECTED) Gray Area Festival Workshops - Conceptual Cartography with Mapbox - Data Visualization: Theory to Practice	2020
Pioneer Works - Data Visualization as Activism (S. Lavigne)	2020
- Feminist Data Set (with C. Sinders)	
- 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 (led by C. Gossett, with lecture guest F. Moten) 	2020
- Unsettling Historical Common Sense	
The Improv Group	2020
- Storytelling for Technologists	