Jackson A. Killian

Website: killian-34.github.io
Email: jkillian@g.harvard.edu

Education

Harvard University — Cambridge, MA
Ph.D., Computer Science, Advisor: Milind Tambe — 2019–Current
Expected Defense: January 2022

University of Southern California — Los Angeles, CA
Ph.D., Computer Science, Advisors: Milind Tambe, Bistra Dilkina — 2018–2019

The Ohio State University — Columbus, OH
B.S., Physics, Computer & Information Science — 2013–2018

- GPA: 3.99/4.00, Summa Cum Laude, Honors College, Honors Research Distinction

Honors and Awards

- **Best Lightning Paper Award**, Workshop on Machine Learning in Public Health @ NeurIPS — 2020
- **National Science Foundation Graduate Research Fellowship** — 2019–2022
- **1st Place in Math, Computation, and Analytics**, Denman Undergraduate Research Forum — 2018
- **Physics Senior Alumni Award**, The Ohio State University — 2017
- **Pelotonia Undergraduate Research Fellowship**, Columbus, OH — 2016–2017
- **Invited Member, Phi Beta Kappa**, National Honor Society — 2016
- **Invited Member, Phi Kappa Phi**, National Honor Society — 2015
- **Invited Member, Sigma Pi Sigma**, Physics Honor Society — 2015

Experience

Harvard University — Cambridge, MA
Graduate Research Assistant, Advisor: Dr. Milind Tambe — 2018–Current

- Conduct research in sequential decision-making and machine learning, especially as it applies to challenges in public health. Work with research teams and NGOs to design and deploy systems with impact.

Google, AI4SG Group — Cambridge, MA
Ph.D. Student Researcher, Advisors: Philip Nelson, Dr. Manish Jain — Summer 2022

- Develop algorithms to plan targeted health interventions for a virtual chronic disease management platform.

Broad Institute, ML for Health Group — Cambridge, MA
Research Intern, Advisors: Dr. Puneet Batra, Dr. Steve Lubtiz — Summer 2021

- Design contrastive models to learn clinically useful representations from large unlabeled medical image data.

Microsoft Research India — Bangalore, India
Research Intern, Advisor: Dr. Amit Sharma — Summer 2019

- Create counterfactual explanation methods for healthcare worker-facing machine learning models.

The Ohio State University — Columbus, OH
Independent Undergraduate Researcher, Advisors: Dr. Kevin Passino, Dr. Arnab Nandi — 2017–2018

- **Thesis:** Design study, collect data, and train AI to estimate sobriety from smartphone sensors.
  Dataset: [link]

The Ohio State University Columbus, OH

Undergraduate Research Assistant, Advisors: Dr. Ralf Bundschuh and Dr. Pearlly Yan 2015–2018

– Develop computational workflows for high-throughput sequencing data to support research in cancer genetics.

Publications

* indicates equal contribution

Rigorously Reviewed Conference Publications

C7. **Killian JA**, Xu L, Biswas A, Tambe M. "Restless and Uncertain: Robust Policies for Restless Bandits via Deep Multi-Agent Reinforcement Learning." *Conference on Uncertainty in Artificial Intelligence (UAI)*. 2022

C6. Ou HC, Siebenbrunner C, **Killian JA**, Brooks MB, Kempe D, Vorobeychik Y, Tambe M. "Networked Restless Multi-Armed Bandits for Mobile Interventions." *21th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2022

C5. **Killian JA**, Biswas A, Shah S, Tambe M. "Q-Learning Lagrange Policies for Multi-Action Restless Bandits." *Proceedings of the 27th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD)*. 2021.

C4. Bondi E*, Xu L*, Acosta-Navas D, **Killian JA** "Envisioning Communities: A Participatory Approach Towards AI for Social Good." *Proceedings of the 2021 AAAI/ACM Conference on AI, Ethics, and Society (AIES)*. 2021.

C3. **Killian JA**, Perrault A, Tambe M. "Beyond 'To Act or Not to Act': Fast Lagrangian Approaches to General Multi-Action Restless Bandits." *20th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2021.

C2. **Mate A*, Killian JA***, Xu H, Perrault A, Tambe M. "Collapsing Bandits and Their Application to Public Health Interventions" *Neural Information Processing Systems (NeurIPS)*. 2020.

C1. **Killian JA**, Wilder B, Sharma A, Choudhary V, Dilkina B, Tambe M. "Learning to Prescribe Interventions for Tuberculosis Patients using Digital Adherence Data" *Proceedings of the 25th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining (KDD)*. ACM, 2019.

Journal Publications

J4. Singh K, Rustagi Y, Abouhashem AS, Tabasum S, Verma P, Hernandez E, Pal D, Khona DK, Mohanty SK, Kumar M, Srivastava R, Guda PR, Verma SS, Mahajan S, **Killian JA**, et al. "Genome-wide DNA hypermethylation opposes healing in chronic wound patients by impairing epithelial-to-mesenchymal transition." The Journal of Clinical Investigation (JCI). 2022 Jul 12.

J3. Wilder B, Charpignon M, **Killian JA**, Ou HC, Mate A, Jabbari S, Perrault A, Desai AN, Tambe M, Majumder MS. "Modeling between-population variation in COVID-19 dynamics in Hubei, Lombardy, and New York City" *Proceedings of the National Academy of Sciences (PNAS)*. 2020.

J2. **Killian JA**, Topiwala T, Pelletier A, Frankhouser D, Yan P, Bundschuh R. "FuSpot: A Web-based Tool for Visual Evaluation of Fusion Candidates" *BMC Genomics*. 2018. 19:139. https://doi.org/10.1186/s12864-018-4486-3

J1. He H, Li W, Yan P, Bundschuh R, **Killian JA**, Labanowska J, Brock P, Shen R, "Identification of a recurrent LMO7-BRAF fusion in papillary thyroid carcinoma" *Thyroid*. 2018. https://doi.org/10.1089/thy.2017.0258

Workshop Papers and Doctoral Consortia

W9. **Killian JA**, Xu L, Biswas A, Tambe M. "Your Bandit Model is Not Perfect: Introducing Robustness to Restless Bandits Enabled by Deep Reinforcement Learning." *NeurIPS-21 Robust Bayes Workshop.* 2021.

W8. **Killian JA**, Perrault A, Tambe M. "Fast Intervention Scheduling via Lagrangian Solutions to Multi-Action Restless Bandits." *AAAI-21 Workshop on AI for Behavior Change, AAAI-21 Workshop on Designing AI for Telehealth, IJCAI-20 Workshop on AI for Social Good. 2020–2021*

W7. Prins A, Mate M, **Killian JA**, Abebe R, Tambe M. "Incorporating Healthcare Motivated Constraints in Restless Multi-Armed Bandit Based Resource Allocation" *NeurIPS-20 Workshop on Machine Learning for Health. NeurIPS-20 Workshop on Machine Learning in Public Health.* 2020.

- **Awarded:** Best on Theme, Best Lightning Paper

W6. Sharma A, **Killian JA**, Perrault A. "Optimization of the Low-Carbon Energy Transition Under Static and Adaptive Carbon Taxes via Markov Decision Processes" *Harvard CRCS Workshop on AI for Social Good.* 2020.

W5. **Killian JA**, Charpignon M, Wilder B, Perrault A, Tambe M, Majumder MS. "Evaluating COVID-19 Lockdown and Reopening Scenarios for Georgia, Florida, and Mississippi." *KDD-20 Workshop on Humanitarian Mapping.* 2020.

W4. Mate A, **Killian JA**, Wilder B, Charpignon M, Awasthi A, Tambe M, Majumder MS. "Evaluating COVID-19 Lockdown Policies For India: A Preliminary Modeling Assessment for Individual States." *KDD-20 Workshop on Humanitarian Mapping.* 2020.

W3. Mate A*, **Killian JA***, Xu H, Perrault A, Tambe M. "Collapsing Bandits and Their Application to Public Health Interventions." *Doctoral Consortium on Computational Sustainability.* 2020

W2. **Killian JA**, Passino K, Nandi A, Madden D, Clapp J. "Learning to Detect Heavy Drinking Episodes Using Smartphone Accelerometer Data" *Proceedings of the 4th International Workshop on Knowledge Discovery in Healthcare Data (KDH).* 2019.

W1. **Killian JA**, Wilder B, Sharma A, Choudhary V, Dilkina B, Tambe M. "Learning to Prescribe Interventions for Tuberculosis Patients using Digital Adherence Data." *AAMAS-19 Joint Workshop on Autonomous Agents for Social Good.* 2019.

Selected Coverage in Press

- **Business Insider France**, Author: Aria Bendix — May 25, 2020
  Four Days of Work, Followed by 10 Days of Lockdown Could Help Prevent Another Wave of Infections.
- **Medical Xpress**, Author: Leah Burrows — May 4, 2020
  What is the Right Strategy to Limit the Spread of COVID-19?
- **Live interview on ABC-7 WJLA** — April 30, 2020
  Myself and Dr. Milind Tambe discussing models for the Spread of COVID-19.
- **The Atlantic**, Author: Amanda Mull — April 29, 2020
  Georgia's Experiment in Human Sacrifice.
- **The Daily Beast**, Author: William Bredderman — April 28, 2020
  New Model Shows How Deadly Lifting Georgia's Lockdown May Be.
- **Nature India**, Author: Subhra Priyadarshini — April 27, 2020
  Model Finds 'Middle Ground' for India's Lockdown Exit.
- **The James Ohio State University Comprehensive Cancer Center** — May 2017
  Pelotonia Investment Report: Contains spotlight interview detailing my undergraduate fellowship research.

Invited talks

- "AI for Behavior Change: Sequential Planning for Medication Adherence"
  - **Verily Health Platform's Analytics Team**, Boston — September 2022
- "Can Restless Bandits Be a Useful Model For Public Health Intervention Problems?"
  - **Pasteur's Quadrant Seminar Series on AI4SG**, Virtual — April 2022
- "Beyond 'To Act or Not to Act': Techniques for Restless Bandits with Multiple Types of Interventions"
  - **Google Research India; Google GPay Team**, Virtual — February 2022
- "Predictive Models of Medication Adherence for TB patients in India"
  - **AI vs. TB Workshop**; researchers, TB experts, state health officials; Mumbai, India — July 2019, Jan 2020
  - **CompuSustNet**, Virtual — May 2019
  - **Goldman Sachs India**, Mumbai, India — March 2019
  - **Wadhwani AI**, Mumbai, India — March 2019
- "FuSpot: A Web-based Tool for Visual Evaluation of Fusion Candidates"
  - **Pelotonia Research Symposium**, Columbus, OH — October 2017
- "OHI/O: Ohio State's Hackathon Program"
  - **CIO Tomorrow**, Columbus, OH — April 2017

Professional Service

- **Organizing Committee**: Harvard AI in Healthcare Group Panel Series and Journal Club 2020–Current, Harvard CRCS Rising Stars Speaker Series 2021, Harvard CRCS Rising Stars in AI for Social Impact Workshop 2020.
- **Program Committee**: AAAI 2023, IAAI 2023, NeurIPS 2022, AAAI 2022, NeurIPS 2021, AAAI Social Impact Track 2021, AAMAS Autonomous Agents for Social Good Workshop 2021, KDD Humanitarian Mapping Workshop 2020, Harvard CRCS AI for Social Good Workshop 2020, IJCAI AI for Social Good Workshop 2020, AAMAS Optimization and Learning Workshop 2020.
- **Reviewer**: PLOS ONE 2021–current, AAMAS 2020, AAAI 2020, KDD 2019.

Students Mentored

- Kavya Kopparapu, Eric Lin (A.B. students, Harvard). Fall 2020-Spring 2022. Project: Keeping Trust When Data Shifts: A User Study Allowing Updates to AI Models in High Stakes Domains.
- Alaisha Sharma (A.B. student, Harvard). Spring 2020. Project: Optimization of the Low-Carbon Energy Transition Under Static and Adaptive Carbon Taxes via Markov Decision Processes.
- Amy Danoff (A.B. student, Harvard). Fall 2020. Project: Shortest Path Algorithm for Local Explanations to Machine Learning Black Boxes.

Teaching

- **Graduate Teaching Assistant**, University of Southern California — Fall 2018
  CS 102: Fundamentals of Computation
  - Lead labs, design and grade homework, proctor and grade exams, manage undergraduate teaching assistants

Service

- **Volunteer**, BOTS robotics education program for elementary students, Los Angeles 2019
  - 20+ students per session, 5-6 teachers per professional development session
- **Co-Creator, Organizer of ShowOHI/O**, a science-fair-style tech showcase 2017, 2018
  - 40+ student projects, 100+ professional attendees, 200+ student attendees
- **Organizer of DataFest at Ohio State**, a nation-wide data analytics competition 2017
  - 150+ students, dozens of industry partners
- **Web-team lead, Organizer of HackOHI/O**, Ohio State's hackathon program 2016, 2017
  - 750+ students, 200+ professional judges & mentors, 100+ industry partners

Professional Experience

Spatial.AI Cincinnati, OH
Data Science Intern, Managers: Lyden Foust, Will Kiessling Summer 2018
- Design NLP pipelines to compute social media data-derived behavioral insights for businesses.

PNC Philadelphia, PA
Application Developer Intern, Manager: James Snyder Summer 2017
- Develop ASP.NET and Python/Django web applications to support business operations.

Delaware City Bus Company Sewell, NJ
Independent Database Developer 2015–Current
- Design and maintain Microsoft Access Database for private bus company with 100s of routes.

Skills

- **Programming Languages (proficient)**: Python, Java, C#, R, MATLAB
- **ML/Optimization Tools**: PyTorch, Tensorflow, Gurobi, CPLEX, Sklearn, Numpy, Pandas
- **Web/Database Experience**: ASP.NET, Python/Django, PHP, JavaScript, HTML, CSS, SQL, SQLite, Visual Basic, Microsoft Access