

Lily Xu

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lily-x.github.io

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| EDUCATION | Harvard University , Cambridge, MA PhD Candidate, School of Engineering and Applied Sciences Advised by Prof. Milind Tambe | 2019 – present |
| | Dartmouth College , Hanover, NH A.B. with Honors in Computer Science, minor in Spanish <i>Magna cum laude</i> | 2014 – 2018 |
| HONORS AND AWARDS | Google PhD Fellowship INFORMS Doing Good with Good OR Competition Winner AAAI Best Paper Award Runner Up Harvard University Certificate of Distinction in Teaching Certificate of Appreciation from the SMART Consortium Five Citations for Academic Excellence at Dartmouth College <i>Special distinction rarely awarded by faculty members “for meritorious characteristics not indicated adequately by academic grades.”</i> Computational Photography (Wojciech Jarosz, CS 89.15) Latin American Film (Silvia Spitta, Spanish 63.01) Computer Graphics (Emily Whiting, CS 77) Object-Oriented Programming (Travis Peters, CS 10) Introduction to Programming and Computation (Hany Farid, CS 1) Adobe Women-In-Technology Scholarship – Honorable Mention Rick Angulo World Experience Award <i>For “intellectual openness, enthusiasm, and impressive academic performance” following a study abroad program in Cusco, Peru. Award in \$1,500.</i> James O. Freedman Presidential Scholar Willis S. Fitch ’17 Metropolitan Washington Scholarship Bank of America’s Joe Martin Scholarship | 2022 2021 2021 2021 2018 2014 – 2018 2017 2016 2016 2015 2014 |
| PUBLICATIONS | Ranger Patrols Deter Poachers: Causal Inference with Bayesian Modeling and Field Tests as an Instrument <i>Under review</i> Rachel Guo, Lily Xu , Andrew Perrault Robustness at Scale: Restless Bandit Interventions for Real-World Maternal Healthcare by Grouping over Large Populations <i>Under review</i> Jackson Killian*, Arpita Biswas*, Lily Xu* , Shresth Verma, Vineet Nair, Aparna Taneja, Aparna Hegde, Neha Madhiwalla, Paula Rodriguez Diaz, Sonja Johnson-Yu, Milind Tambe Restless and Uncertain: Robust Policies for Restless Bandits via Deep Multi-Agent Reinforcement Learning <i>Under review</i> Jackson A. Killian, Lily Xu , Arpita Biswas, Milind Tambe Ranked Prioritization of Groups in Combinatorial Bandit Allocation <i>IJCAI-22: Proc. 31st International Joint Conference on Artificial Intelligence</i> | |

Lily Xu, Arpita Biswas, Fei Fang, Milind Tambe

Coordinating Followers to Reach Better Equilibria: End-to-End Gradient Descent for Stackelberg Games

AAAI-22: Proc. 36th AAAI Conference on Artificial Intelligence

Kai Wang, Lily Xu, Andrew Perrault, Michael K. Reiter, Milind Tambe

Robust Reinforcement Learning Under Minimax Regret for Green Security

UAI-21: Proc. 37th Conference on Uncertainty in Artificial Intelligence

Lily Xu, Andrew Perrault, Fei Fang, Haipeng Chen, Milind Tambe

Oral Presentation (6.17% of submissions)

Envisioning Communities: A Participatory Approach Towards AI for Social Good

AIES-21: Proc. 4th AAAI/ACM Conference on AI, Ethics, and Society

Elizabeth Bondi*, Lily Xu*, Diana Acosta-Navas, Jackson A. Killian

**Equal contribution*

Dual-Mandate Patrols: Multi-Armed Bandits for Green Security

AAAI-21: Proc. 35th AAAI Conference on Artificial Intelligence

Lily Xu, Elizabeth Bondi, Fei Fang, Andrew Perrault, Kai Wang, and Milind Tambe

Best Paper Award Runner Up Top 6 of 1692 accepted papers (top 0.08% of submissions)

Stay Ahead of Poachers: Illegal Wildlife Poaching Prediction and Patrol Planning Under Uncertainty with Field Test Evaluations

ICDE-20: Proc. 36th IEEE International Conference on Data Engineering 2020

Lily Xu*, Shahrzad Gholami*, Sara Mc Carthy, Bistra Dilkina, Andrew Plumptre, Milind Tambe, Rohit Singh, Mustapha Nsubuga, Joshua Mabonga, Margaret Driciru, Fred Wanyama, Aggrey Rwetsiba, Tom Okello, Eric Enyel

**Equal contribution*

WORKSHOP PAPERS **Enhancing Poaching Predictions for Under-Resourced Wildlife Conservation Parks Using Remote Sensing Imagery**

NeurIPS Workshop on Machine Learning for Development 2020

Rachel Guo, Lily Xu, Andrew Plumptre, Drew Cronin, Francis Okeke, and Milind Tambe

Best Lightning Paper

Game Theory on the Ground: The Effect of Increased Patrols on Deterring Poachers

Working paper

Appeared at Harvard CRCS Workshop on AI for Social Good 2020

Lily Xu, Andrew Perrault, Andrew Plumptre, Margaret Driciru, Fred Wanyama, Aggrey Rwetsiba, and Milind Tambe

A High-Performance Graph Model for Near-Optimal Payments for Ecosystem Services

Working paper

Appeared at Mechanism Design for Social Good (MD4SG) Workshop 2020

Florian Berlinger*, Lily Xu*, Yiling Chen

**Equal contribution*

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| RESEARCH EXPERIENCE | Harvard University , Cambridge, MA <i>Doctoral Research Assistant</i> Advised by Prof. Milind Tambe | 2019 – present |
| | University of Southern California , Los Angeles, CA <i>Doctoral Research Assistant</i> Advised by Prof. Bistra Dilkina and Prof. Milind Tambe | 2018 – 2019 |
| | Dartmouth College , Hanover, NH <i>Undergraduate Senior Thesis Researcher</i> Advised by Prof. Amro Farid | 2017 – 2018 |
| | <i>Presidential Scholar Research Assistant</i> Advised by Prof. Emily Whiting and Prof. David Kotz | 2016 – 2017 |
| WORK EXPERIENCE | Google Research , Remote <i>Student Researcher</i> | Spring 2022 |
| | Google , Seattle, WA <i>Software Engineering Intern</i> | Summer 2017 |
| | Dyn, Inc. , Hanover, NH <i>Data Analytics Research Intern</i> | Spring 2016 |
| TEACHING EXPERIENCE | <i>Guest Lecturer</i> | |
| | University of Southern California, ISE 599. Analytics for Social Impact | Spring 2022 |
| | University of Pennsylvania, OIDD 941. Recent Advances in Data-Driven Decision-Making | Spring 2022 |
| | Harvard University, CS 96. Machine Learning for Social Impact | Spring 2022 |
| | Harvard Business School, HBSMBA 2231. From Data to Decisions | Fall 2021 |
| | Cornell Tech, ORIE 5355/INFO 5370. People, Data, Systems | Fall 2021 |
| | Wellesley University, CS 115. Computing for the Socio-Techno Web | Fall 2021 |
| | Australian National University, CECS8001. Building Cyber-Physical Systems | Fall 2021 |
| | University of Pittsburgh, CS 1699. AI for Good: Ethics and Implications | Spring 2021 |
| | University of Michigan, SI 431. Algorithms and Society | Spring 2021 |
| | Harvard University, CS 182. Artificial Intelligence | Fall 2020 |
| | Dartmouth College, CS 11. Foundations of Applied Computer Science | Spring 2018 |
| | Harvard University <i>Head Teaching Fellow</i> CS 182: Artificial Intelligence | Fall 2020 |
| | Dartmouth College <i>Teaching Assistant, Department of Computer Science</i> | |
| | CS 31: Algorithms | Winter 2017 |
| | CS 11: Foundations of Applied Computer Science | Spring 2018 |
| | CS 10: Object-Oriented Programming | Spring 2016 |
| | CS 10: Object-Oriented Programming | Spring 2015 |
| | CS 1: Intro to Programming and Computation | Spring 2018 |
| | CS 1: Intro to Programming and Computation | Fall 2017 |
| | CS 1: Intro to Programming and Computation | Spring 2017 |
| | CS 1: Intro to Programming and Computation | Winter 2016 |

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| | CS 1: Intro to Programming and Computation | Fall 2015 |
| | <i>Teaching Assistant, Tuck School of Business</i> | |
| | Tuck FWP: Fundamentals of Web Programming | Spring 2017 |
| | Tuck DSA: Data Structures and Analytics | Spring 2017 |
| STUDENTS ADVISED | Christopher Ong '23, Harvard College | Spring 2022 – |
| | Rachel Guo '22, Harvard College | Summer 2020 – |
| | <i>NCWIT Collegiate Award Winner</i> | |
| | <i>CRA Outstanding Undergraduate Researcher Award — Honorable Mention</i> | |
| | <i>Harvard Hoopes Prize</i> | |
| | <i>Thesis: On the Effect of Ranger Patrols on Deterring Poaching: A Bayesian Approach for Causal Inference Using Field Tests as an Instrument</i> | |
| | Emilia Cabrera '21, Harvard College | Fall 2020 – Fall 2021 |
| | <i>Thesis: Protecting the Lion's Share: Mitigating Illegal Wildlife Poaching with Multi-Agent Reinforcement Learning</i> | |
| | April Chen '22, Harvard College | Summer 2021 |
| | <i>Adobe Research Women-In-Technology Scholarship Winner</i> | |
| | Ezenia Diaz-Lembert '23, Harvard College | Spring 2021 |
| PROFESSIONAL SERVICE | Initiative Organization | |
| | Co-organizer, Mechanism Design for Social Good (MD4SG) | March 2021 – |
| | Co-lead, MD4SG Community Engagement | Oct 2020 – Apr 2021 |
| | Co-organizer, MD4SG Working Group on Environment | Jan 2020 – Apr 2021 |
| | Program Organization | |
| | Co-organizer, Harvard CRCS panel on the Future of AI for Social Impact | April 2022 |
| | Co-organizer, Harvard CRCS Social Impact Seminar Series | Spring 2022 |
| | Social events co-chair, ACM EAAMO | October 2021 |
| | Co-organizer, Harvard CRCS Rising Stars Speaker Series | April 2021 |
| | Co-organizer, CompSust Open Graduate Seminar (COGS) | Spring 2020 |
| | Social co-chair, Fourth Workshop on MD4SG | August 2020 |
| | Lead organizer, Harvard CRCS Rising Stars Workshop | March 2020 |
| | Co-organizer, Computational Sustainability Doctoral Consortium | October 2019 |
| | Conference Chair | |
| | Session chair, INFORMS O.R. to Fight Climate Change / Sustainable O.R. | October 2022 |
| | Program Committee | |
| | <i>Conferences</i> | |
| | Artificial Intelligence, Ethics, and Society (AIES) | 2022 |
| | ACM Conference on Fairness, Accountability, and Transparency (FAccT) | 2022 |
| | Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO) | 2021, 2022 |
| | ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS) | 2021 |
| | AAAI Conference on Artificial Intelligence (AIS track) | 2020, 2021 |
| | <i>Workshops</i> | |
| | Black in AI Workshop @ NeurIPS | 2020, 2021 |
| | Machine Learning for the Developing World (ML4D) @ NeurIPS | 2020, 2021 |
| | Machine Learning for Public Health (ML4PH) @ NeurIPS | 2021 |
| | Data-Driven Humanitarian Mapping @ KDD | 2021 |

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| Autonomous Agents for Social Good (AASG) Workshop @ AAMAS | 2021 |
| AI for Social Good Workshop @ IJCAI | 2020 |
| Resistance AI @ NeurIPS | 2020 |
| Fourth Workshop on Mechanism Design for Social Good (MD4SG) | 2020 |
| AI for Social Good Workshop @ Harvard CRCS | 2020 |
| Workshop on Humanitarian Mapping @ KDD | 2020 |

Reviewer

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| Deep Learning Indaba | 2022 |
| Caltech Computer Vision for Ecology (CV4Ecology) Summer School | 2022 |
| ICML, <i>subreviewer</i> | 2021 |
| NeurIPS, <i>subreviewer</i> | 2020 |
| IJCAI Special Track on CompSust and Human Well-being, <i>subreviewer</i> | 2020 |
| COMPASS, <i>subreviewer</i> | 2019 |
| Bloomberg Data for Good Exchange (D4GX), <i>subreviewer</i> | 2019 |

INVITED TALKS

Ranked Prioritization of Groups in Combinatorial Bandit Allocation

INFORMS Annual Meeting, “Fairness in Sequential Decision Making” October 2022

Learning, Planning, and Optimization Under Uncertainty for Wildlife

Conservation

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| UC Berkeley, Ethics and Practices of Algorithmic Conservation | April 2022 |
| MD4SG Environment Working Group | April 2022 |
| UCL Climate Hack AI Competition, <i>keynote</i> | March 2022 |
| Harvard University, AI-Assisted Decision-Making Colloquium | February 2022 |
| Pasteur’s Quadrant Seminar Series | February 2022 |
| INFORMS 2021, Doing Good with Good OR Finalists | October 2021 |

Robust Reinforcement Learning Under Minimax Regret for Green

Security

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| Computational Sustainability (CompSust) Doctoral Consortium | March 2022 |
| Google Research India, AI for Social Good | January 2022 |
| Uncertainty in Artificial Intelligence (UAI) Conference | July 2021 |
| AAMAS Autonomous Agents for Social Good (AASG) Workshop | May 2021 |

PAWS: AI to Predict and Plan Against Poaching

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| International Congress for Conservation Biology, Kigali, Rwanda | December 2021 |
| IUCN World Conservation Congress, Marseille, France | September 2021 |
| WILDLABS Tech Tutors: Season Three | September 2021 |
| AI for Climate, Mexico Lightning Talks Series powered by Huawei | July 2021 |
| SMART Partnership, Webinar for International Women’s Day | March 2021 |
| WWF Webinar on SMART | April 2020 |

Dual-Mandate Patrols: Multi-Armed Bandits for Green Security

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| Beijing Academy of Artificial Intelligence | March 2021 |
| University College London, AI Society | February 2021 |
| Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21) | February 2021 |
| CompSust Doctoral Consortium | October 2020 |
| CRCS AI for Social Good Workshop | July 2020 |
| Carnegie Mellon University, AI and Social Good Symposium | April 2020 |
| Harvard University, EconCS Seminar | March 2020 |

Poaching Prediction and Patrol Planning Under Uncertainty

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| Harvard CRCS Rising Stars Workshop | March 2020 |
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| IEEE International Conference on Data Engineering (ICDE-20) | April 2020 |
| Harvard University, PhD on Tap | February 2020 |
| Carnegie Mellon University, CompSust Doctoral Consortium | October 2019 |
| KDD Data Mining and AI for Conservation Workshop | August 2019 |
| AAMAS Strategic Reasoning for Societal Challenges Workshop | May 2019 |

OUTREACH

Speaking: Public Events

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| AI LA Earth Summit | April 2021 |
| South by Southwest (SXSW), Wildlife AI Panel | March 2021 |
| World Science Festival, Science and Storytime | June 2019 |

Speaking

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| Harvard Tech for Social Good, <i>panelist</i> | April 2021 |
| Harvard SEAS PhD Admitted Students Open House, <i>panelist</i> | March 2021 |
| Harvard SEAS Research Labs Open House | November 2020 |
| GirlsComputingLeague, AIInnovation Business Summit | September 2020 |
| IEEE Computer Society, Women in Computing, Kerala Chapter | September 2020 |
| Data Science Africa, Tutorial on MD4SG and the Environment | July 2020 |
| Ledyard Canoe Club, Inclusivity in the Outdoors | July 2020 |
| Dartmouth Women in Computer Science, <i>panelist</i> | May 2020 |
| Harvard SEAS Diversity, Inclusivity, and Belonging, <i>panelist</i> | May 2020 |
| Center for Initiatives in Jewish Education, high school student visit | March 2020 |
| L.A. Unified School District (LAUSD), African American Family Day | May 2019 |
| Zoo Magnet High School, College and Career Day | November 2018 |

Mentoring

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| InTouch Peer Mentor, Harvard University | 2020 – |
| Women in STEM Mentor, Harvard University | 2019 – 2020 |
| Women in Computer Science, Dartmouth College | 2017 – 2018 |

Volunteering

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| A Guide to Your PhD, Harvard SEAS | October 2020 |
| Project Teach, Harvard University | April 2020 |
| Cambridge Public Schools STEAM It Up! | October 2019 |
| Hustle N' Code Hackathon, <i>technical lead</i> | December 2018 |
| <i>Hustle N' Code is a Los Angeles hackathon for youth in public housing.</i> | |
| <i>My team won first place, and the four students each received a laptop.</i> | |

PRESS

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| INFORMS Resoundingly Human Podcast | May 2022 |
| The Hill , These new technologies could transform wildlife conservation. | February 2022 |
| Voice of America (VOA) News , Wildlife Rangers Use AI to Predict Poachers' Next Moves. | January 2022 |
| Harvard SEAS , Computer Conservation. | November 2021 |
| AIhub , Interview with Lily Xu. | October 2021 |
| Rethinking Economics NL , Disruptive Technologies podcast series. | May 2021 |
| Engadget , PAWS anti-poaching AI predicts where illegal hunters will show up next. | March 2021 |
| Mongabay , Where to patrol next: 'Netflix' of ranger AI serves up poaching predictions. | November 2020 |
| Harvard SEAS , Preventing poaching. | June 2020 |
| BBC Sounds , How tech is tackling wildlife trafficking. | June 2020 |
| BBC World Service , Using technology to take on poachers. | August 2019 |

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| | USC Viterbi Magazine, AI is for Animals. | April 2019 |
| NON-ACADEMIC LEADERSHIP | <p>Ledyard Canoe Club at Dartmouth, Secretary, Canoeing Leader 2014 – 2018</p> <ul style="list-style-type: none"> • Co-governed club functions for over 100 undergraduates. Managed club assets that include \$1M in endowments, a student-run rental business with annual revenues of \$50K, and boats and equipment valued at \$150K. • Co-organized an Explorers Symposium featuring ten notable speakers, including Olympic racers and members of National Geographic-sponsored expeditions. • Led a group of twenty-eight students on a nine-day, 220-mile canoe expedition. • Voted by my peers to receive the Jay Evans '49 Award for service and commitment to the club. <p>Fusion Dance Ensemble, Director 2014 – 2018</p> <ul style="list-style-type: none"> • Led a group of fourteen dancers. Choreographed, taught, and performed contemporary and hip-hop dances, with over 20 performances each year. <p>Dartmouth Sophomore Trips, Co-director 2015 – 2016</p> <ul style="list-style-type: none"> • Planned the Sophomore Trips program for 130 undergraduates across 14 three-day outdoor trips throughout New Hampshire and Vermont. <p>Dartmouth First-Year Trips, Grant Crew Volunteer Summer 2015</p> <ul style="list-style-type: none"> • Served on a nine-person crew for a 21-day, round-the-clock commitment to assist with five-day outdoor orientation trips for 1,000 incoming students. | |
| PERSONAL | Residential member, Los Angeles Eco Village | 2018 – 2019 |