

Stephanie Milani

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📄 <https://stephmlani.github.io/>
in [stephanie-milani](#)
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Education

- 2019–Present **Carnegie Mellon University.**
Ph.D. in Machine Learning.
Advisor: Fei Fang.
- 2019–2021 **Carnegie Mellon University.**
M.S. in Machine Learning Research.
- 2019 **University of Maryland, Baltimore County.**
B.S. in Computer Science, B.A. in Psychology. *Cum Laude.* Honors College Certificate.
Advisors: Marie desJardins and Cynthia Matuszek.

Research Experience

- 2019–Present **Carnegie Mellon University, Research Assistant.**
Advisor: Fei Fang.
- 2022 **Microsoft Research, Montreal, Research Intern.**
Advisors: Geoff Gordon and Ian Little.
- 2021 **Microsoft Research, Cambridge, Research Intern.**
Advisors: Katja Hofmann and Harm van Seijen.
- 2019 **Carnegie Mellon University, Research Assistant.**
Advisor: David Held.
- 2018–2019 **Carnegie Mellon University, Research Intern.**
Advisor: Katia Sycara.
- University of Maryland, Baltimore County, Research Assistant.**
Advisor: Cynthia Matuszek.
- 2016–2019 **University of Maryland, Baltimore County, Research Assistant.**
Advisor: Marie desJardins.
- 2018 **Carnegie Mellon University, Robotics Institute Summer Scholar.**
Advisor: Katia Sycara. *4% acceptance.*
- 2017 **Carnegie Mellon University, Robotics Institute Summer Scholar.**
Advisor: Christoph Mertz. *4% acceptance.*
- 2014–2016 **University of Maryland, School of Medicine, Research Assistant.**
Advisor: Jennifer Wenzel.

Teaching Experience

- 2021 **Historical Advances in Machine Learning (10-777), CMU, Teaching Assistant.**

Honors and Awards

Honors

- 2021 **IBM PhD Fellowship Nomination**
Microsoft Research PhD Fellowship Nomination

- 2020 **Microsoft Research Ada Lovelace Fellowship Nomination**
Open Phil AI Fellowship Finalist
- 2018–2019 **Newman Civic Fellow**
 1/268 awarded nationally, for leadership and dedication to increasing access to CS.
Rewriting the Code Fellow
 Awarded for technically-skilled experience and projects.
- 2017–2019 **National Academy of Engineering Grand Challenge Scholar**
 2018 **NSF Research Experience for Undergraduates**
 Awarded to research norm-aware planning and learning at Carnegie Mellon University.
- 2017–2018 **France-Merrick Scholar**
 1/7 awarded, for commitment to leadership and service in CS and AI.
- 2017, 2018 **UMBC Researcher of the Week**
 Awarded for work on planning and reinforcement learning.
- 2017 **Traffic21 Women in Transportation Fellow**
 Only student awarded fellowship, for research at Carnegie Mellon University.
- Awards**
- 2022 **ECML PhD Registration Grant**
 17% acceptance.
AAAI Student Scholarship
- 2021 **Funding Proposal for MineRL BASALT**
 Artificial Intelligence Journal (AIJ), €15,000. Awarded to R. Shah, C. Wild, S. H. Wang, N. Alex, B. Houghton, W. H. Guss, **S. Milani**, N. Topin, P. Abbeel, S. Russell, and A. Dragan.
- 2020 **Inclusivity Compute and Conference Grants for MineRL Competition at NeurIPS**
 Artificial Intelligence Journal (AIJ), €7,500. Awarded to **S. Milani** and N. Topin.
Top Reviewer Award, ICML (top 33% of all reviewers)
- 2019 **Travel Awards: NeurIPS, RLDM, ICML, ICML Diversity and Inclusion** (Declined)
Inclusivity Travel Grants for MineRL Competition and Workshop at NeurIPS
 Artificial Intelligence Journal (AIJ), €3,000. Awarded to **S. Milani** and N. Topin.
UMBC Honors College Community Service Award
 1/4 awarded, for strong academic performance and outstanding community service.
- 2018–2019 **UMBC Undergraduate Research Award**
 1/55 awarded, for work on hierarchical, norm-aware reinforcement learning.
- 2018 **Best Undergrad Poster Presentation, UMBC CSEE Research Symposium**
 Awarded for work on abstract Markov decision processes.
OurCS Workshop Oracle Scholar
 1/102 students chosen to attend workshop for exploring research problems.
Grace Hopper Student Scholar
 1/657 awarded, funded by Palo Alto Networks to attend Grace Hopper.
CWIT Grace Hopper Award (Declined)
 26% acceptance, funded to attend Grace Hopper.
Inclusion@RSS Scholar
 Awarded to attend Robotics: Science and Systems Conference.
- 2017 **UMBC Battlebots Tournament, Third-Place Winner**

Publications

Preprints

- [1] **S. Milani***, N. Topin*, M. Veloso, and F. Fang. A Survey of Explainable Reinforcement Learning. *arXiv preprint arXiv:2202.08434*, 2022.

Book Chapters

- [1] **S. Milani**, Z. Zhang, N. Topin, Z. R. Shi, C. Kamhoua, E. Papalexakis, and F. Fang. Interpretable Multi-Agent Reinforcement Learning with Decision-Tree Policies. *Explainable Agency in Artificial Intelligence*, CRC Press / Taylor & Francis, 2022. Invited contribution. **Submitted**.

Peer-Reviewed Conference Papers and Proceedings

- [1] **S. Milani**, A. Juliani, I. Momennejad, R. Georgescu, J. Rzepecki, R. Georgescu, A. Shaw, G. Costello, F. Fang, S. Devlin, and K. Hofmann. Navigates Like Me: Understanding How People Evaluate Human-Like AI in Video Games. *The ACM Conference on Human Factors in Computing Systems (CHI)*, 2023. **Submitted**.
- [2] M. Carroll, J. Lin, O. Paradise, R. Georgescu, M. Sun, T. Rashid, D. Bignell, **S. Milani**, K. Hofmann, M. Hausknecht, A. Dragan, S. Devlin. UniBIT: Unified Inference in Sequential Decision Problems. *The 36th Conference on Neural Information Processing Systems (NeurIPS)*, 2022. 25.6% acceptance.
- [3] **S. Milani***, Z. Zhang*, N. Topin, Z. R. Shi, C. Kamhoua, E. Papalexakis, and F. Fang. MAVIPER: Learning Decision Tree Policies for Interpretable Multi-Agent Reinforcement Learning. *The European Conference on Machine Learning (ECML)*, 2022. 26% acceptance.
- [4] A. Kanervisto, **S. Milani**, K. Ramanauskas, B. V. Galbraith, S. H. Wang, B. Houghton, S. Mohanty, R. Shah. The MineRL BASALT Competition on Learning from Human Feedback. *The 36th Conference on Neural Information Processing Systems (NeurIPS) Competition Track*, 2022.
- [5] R. Shah, S. H. Wang, C. Wild, **S. Milani**, A. Kanervisto, V. G. Goecks, N. Waytowich, D. Watkins-Valls, B. Prakash, E. Mills, D. Garg, A. Fries, A. Souly, C. J. Shern, D. del Castillo, T. Lieberum. Retrospective on the 2021 BASALT Competition on Learning from Human Feedback. *Proceedings of the NeurIPS 2021 Competition and Demonstration Track*, 2022.
- [6] A. Kanervisto*, **S. Milani***, K. Ramanauskas, N. Topin, Z. Lin, J. Li, J. Shi, D. Ye, Q. Fu, W. Yang, W. Hong, Z. Huang, H. Chen, G. Zeng, Y. Lin, V. Micheli, E. Alonso, F. Fleuret, A. Nikulin, Y. Belousov, O. Svidchenko, A. Shpilman. MineRL Diamond 2021 Competition: Overview, Results, and Lessons Learned. *Proceedings of the NeurIPS 2021 Competition and Demonstration Track*, 2022.
- [7] W. H. Guss, A. Dirik*, B. V. Galbraith*, B. Houghton*, A. Kanervisto*, N. S. Kuno*, **S. Milani***, S. Mohanty*, K. Ramanauskas*, R. Salakhutdinov*, R. Shah*, N. Topin*, S. H. Wang*, and C. Wild*. The MineRL Diamond Competition on Sample Efficient Reinforcement Learning. *The 35th Conference on Neural Information Processing Systems (NeurIPS) Competition Track*, 2021.
- [8] R. Shah, C. Wild, S. H. Wang, N. Alex, B. Houghton, W. H. Guss, **S. Milani**, N. Topin, P. Abbeel, S. Russell, and A. Dragan. The MineRL BASALT Competition on Learning from Human Feedback. *The 35th Conference on Neural Information Processing Systems (NeurIPS) Competition Track*, 2021.
- [9] W. H. Guss, **S. Milani**, N. Topin, B. Houghton, S. Mohanty, A. Melnik, A. Harter, B. Buschmaas, B. Jaster, C. Berganski, D. Heitkamp, M. Henning, H. Ritter, C. Wu, X. Hao, Y. Lu, H. Mao, Y. Mao, C. Wang, M. Opanowicz, A. Kanervisto, Y. Schraner, C. Scheller, X. Zhou, L. Liu, D. Nishio, T. Tsuneda, K. Ramanauskas, and G. Juceviciute. Towards robust and domain agnostic reinforcement learning competitions: MineRL 2020. *Proceedings of the NeurIPS 2020 Competition and Demonstration Track*, 2021.
- [10] N. Topin, **S. Milani**, F. Fang, and M. Veloso. Iterative Bounding MDPs: Learning Interpretable Policies via Non-Interpretable Methods. *The 35th AAAI Conference on Artificial Intelligence*, 2021. 21% acceptance.

- [11] **S. Milani**, W. Shen, K. S. Chan, S. Venkatesan, N. O. Leslie, C. Kamhoua, and F. Fang. Harnessing the Power of Deception in Attack Graph Games. *The 11th Conference on Decision and Game Theory for Security*, 2020.
- [12] W. H. Guss, M. Y. Castro*, S. Devlin*, B. Houghton*, N. S. Kuno*, C. Loomis*, **S. Milani***, S. Mohanty*, K. Nakata*, R. Salakhutdinov*, J. Schulman*, S. Shiroshita*, N. Topin*, A. Ummadisingu*, and O. Vinyals*. NeurIPS 2020 Competition: The MineRL Competition on Sample Efficient Reinforcement Learning using Human Priors. *The 34th Conference on Neural Information Processing Systems (NeurIPS) Competition Track*, 2020.
- [13] **S. Milani**, N. Topin, B. Houghton, W. H. Guss, S. P. Mohanty, K. Nakata, O. Vinyals, and N. S. Kuno. A Retrospective Analysis of the 2019 MineRL Competition on Sample-Efficient Reinforcement Learning Using Human Priors. *Proceedings of the NeurIPS 2019 Competition and Demonstration Track*, 2020.
- [14] J. Winder, **S. Milani**, M. Landen, E. Oh, S. Parr, S. Squire, M. desJardins, and C. Matuszek. Planning with Abstract Learned Models While Learning Transferable Subtasks. *The 34th AAAI Conference on Artificial Intelligence*, 2020. 20.6% acceptance.
- [15] W. H. Guss, C. Codel*, K. Hofmann*, B. Houghton*, N. S. Kuno*, **S. Milani***, S. Mohanty*, D. Perez-Liebana*, R. Salakhutdinov*, N. Topin*, M. Veloso*, and P. Wang*. The MineRL Competition on Sample Efficient Reinforcement Learning using Human Priors. *The 33rd Conference on Neural Information Processing Systems (NeurIPS) Competition Track*, 2019.
- [16] H. Li, **S. Milani**, V. Krishnamoorthy, M. Lewis, and K. Sycara. Perceptions of Domestic Robots' Normative Behavior Across Cultures. *The 3rd AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society (AIES)*, 2019.

Peer-Reviewed Workshop Papers and Extended Abstracts

- [1] Y. Du, Z. Song, **S. Milani**, C. Gonzalez, F. Fang. Learning to Play Adaptive Cyber Deception Game. *The 13th Workshop on Optimization and Learning in Multiagent Systems at the International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2022.
- [2] M. Carroll, J. Lin, O. Paradise, R. Georgescu, M. Sun, D. Bignell, **S. Milani**, K. Hofmann, M. Hausknecht, A. Dragan, S. Devlin. FlexiBiT: Flexible Inference in Sequential Decision Problems via Bidirectional Transformers. *The 10th International Conference on Learning Representations (ICLR) Workshop on Generalizable Policy Learning in the Physical World*, 2022.
- [3] E. Zuniga*, **S. Milani***, G. Leroy*, J. Rzepecki, R. Georgescu, I. Momennejad, D. Bignell, M. Sun, A. Shaw, G. Costello, M. Jacob, S. Devlin, and K. Hofmann. How Humans Perceive Human-like Behavior in Video Game Navigation. *The ACM Conference on Human Factors in Computing Systems (CHI), Late Breaking Work*, 2022. 36.1% acceptance.
- [4] **S. Milani**, N. Topin, Z. R. Shi, C. Kamhoua, E. Papalexakis, and F. Fang. Extracting Decision Tree Policies for Interpretable Multi-Agent Reinforcement Learning. *The 36th AAAI Conference on Artificial Intelligence (AAAI) Workshop on Explainable Agency in Artificial Intelligence*, 2022. 47% acceptance.
- [5] E. Zuniga*, **S. Milani***, M. Jacob, and K. Hofmann. Understanding Human-like Behavior in Video Game Navigation. *The 35th Conference on Neural Information Processing Systems (NeurIPS) Human-Centered AI Workshop*, 2021.
- [6] **S. Milani***, Z. Fan*, S. Gulati, T. Nguyen, F. Fang, and A. Yadav. Intelligent Tutoring Strategies for Students with Autism Spectrum Disorder: A Reinforcement Learning Approach. *The 34th AAAI Conference on Artificial Intelligence (AAAI) Workshop on AI for Education*, 2020. Also accepted for lightning talk at the *CMU Symposium on AI and Social Good*, 2020.
- [7] B. Houghton, **S. Milani**, N. Topin, W. H. Guss, K. Hofmann, D. Perez-Liebana, M. Veloso, and R. Salakhutdinov. Guaranteeing Reproducibility in Deep Learning Competitions. *The 33rd Conference on Neural Information Processing Systems (NeurIPS) Challenges in Machine Learning (CiML) Workshop*, 2019.

- [8] **S. Milani**, N. Topin, and K. Sycara. Penalty-Modified Markov Decision Processes: Efficient Incorporation of Norms into Sequential Decision Making Problems. *The 4th Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM)*, 2019.
- [9] J. Winder, **S. Milani**, M. Landen, E. Oh, S. Parr, S. Squire, M. desJardins, and C. Matuszek. Planning with Abstract, Learned Models. *Do Good Robotics Symposium*, 2019.
- [10] J. Winder, S. Squire, M. Landen, **S. Milani**, and M. desJardins. Towards Planning with Hierarchies of Learned Markov Decision Processes. *The 27th International Conference on Automated Planning and Scheduling (ICAPS) Integrated Execution of Planning and Acting (IntEx) Workshop*, 2017.
- [11] S. Squire, J. Winder, M. Landen, **S. Milani**, and M. desJardins. R-AMDP: Model-based Learning for Abstract Markov Decision Process Hierarchies. *The 3rd Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM)*, 2017.

Technical Reports

- [1] **S. Milani**. Penalty-Modified Abstract Markov Decision Processes. *Technical Report for Undergraduate Research Award, UMBC*, 2019.
- [2] **S. Milani**. Creating a Scalable Framework for Model-Free Reinforcement Learning in Norm-Rich Environments. *Robotics Institute Summer Scholars Working Papers Journal*, 2018.
- [3] **S. Milani** and C. Mertz. Generating Hard Positive Examples via Adversary for Occluded Traffic Sign Detection. *Robotics Institute Summer Scholars Working Papers Journal*, 2017.

* denotes equal contribution.

Professional Service

Organizing

- 2021–Present **MineRL BASALT Competition on Learning from Human Feedback**, Organizer.
- 2019–2021 **MineRL Competition on Sample-Efficient Reinforcement Learning**, Organizer.
- 2021 **Minecraft as a Research Platform for RL Workshop at MSR Research Summit**, Organizer.

Reviewing

- 2022 GameSec-22, AAMAS-22 Workshop on Autonomous Agents for Social Good, ICML-22
- 2021 NeurIPS-21 Competition Track, ICML-21
- 2020 ICLR-21, AAAI-21, Game Theory and Machine Learning for Cyber Security (book chapter reviewer), ICML-20 (Top Reviewer Award), AAAI-20 Workshop on Diversity in Artificial Intelligence
- 2019 ICML-19 Workshop on AI for Social Good, ICLR-19 Workshop on AI for Social Good
- 2017, 2018 RISS Working Papers Journal

Conference Volunteering

- 2020 ICML, ICLR
- 2019 RLDM
- 2017 ICAPS
- 2016 Maryland Computing Education Summit

Academic / Departmental Service

- 2021–2022 **Carnegie Mellon University Machine Learning PhD Admissions Committee**.
- 2020–2021 **Carnegie Mellon University Machine Learning Master’s Admissions Committee**.
- 2020 **Carnegie Mellon University RISS Admissions Committee**.
- 2017, 2018 **RISS Working Papers Journal**, Assistant Managing Editor.

2017 **UMBC Department of IT**, Machine Learning Consultant.

Invitation-only Meetings

2018 **CCC AI Roadmap Workshop: Integrated Intelligence**.

Resulted in *A 20-Year Community Roadmap for AI Research in the US*.

Outreach

2021 **RISS Graduate School Application Support**, Panelist.

2019–2021 **CMU AI Mentorship Program**, Mentor.

2020 **CMU Graduate Application Support Program (GASP)**, Mentor.

The Campus Laboratory School at Carlow University Career Day, Presenter.

2019 **Steel City Showdown FIRST Robotics Competition**, Referee and Volunteer.

Robotics Institute Summer Scholars Program, Presenter at Orientation.

Rewriting the Code Alumni Office Hours.

Dedicated 30 min/week to provide career and academic advice to female undergrads.

2016–2019 **UMBC Computer Science Education**, Vice President, President, Treasurer.

2017–2018 **Creative Coders**, Curriculum Development Coordinator.

Developed curriculum for middle-school students to learn CS concepts.

2017 **Creative Coders**, Co-founder.

Co-founded program to introduce middle-school students to CS.

QuHacks Hackathon at UMBC, Organizer.

Organized day-long hackathon for appx. 100 high-school and middle-school students.

North County High School Computer Science Classes, Co-presenter.

2016–2017 **Computer Science Matters in Maryland**, Curriculum Developer.

2016, 2017 **Hour of Code at UMBC**, Organizer and Volunteer.

Organized and volunteered during two-day-long Hour of Code events on CS and AI.

Relevant Coursework

Graduate

Convex Optimization; Data Analysis; Advanced Machine Learning Theory and Methods; Graduate Artificial Intelligence; Advanced Introduction to Machine Learning; Intermediate Statistics.

Undergraduate

Design and Analysis of Algorithms; Data Management Systems; Introduction to Machine Learning; Artificial Intelligence; Data Structures; Software Engineering; The Science of Making Good Decisions; Neuropsychology; Computation, Complexity, and Emergence.

Affiliations

Rewriting the Code Alumni, AAAI, ACM.

Selected Media Coverage

- “Security games reveal how networks can fool cyber attackers.” U.S. Army DEVCOM Army Research Laboratory Public Affairs. November 2020.
- “MineRL sample-efficient reinforcement learning challenge—back for a second year—benefits organizers, as well as larger research community,” by Noboru Sean Kuno. Microsoft Research Blog. August 2020.
- “Project Malmo competition returns with student organizers and a new mission: To democratize reinforce-

ment learning," by Noboru Sean Kuno. Microsoft Research Blog. August 2019.

- "Traffic21's Women in Transportation Awardee Joining CMU's Machine Learning Ph.D. Program." Mobility21. April 2019.
- "Stephanie Milani named Newman Civic Fellow for expanding access to CS education," by Catalina Sofia Dansberger Duque. UMBC News. April 2018.
- "The Hour of Code Arrives at UMBC," by Declan Keefe. The Retriever. December 2017.