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Ankit Shah

Research Interests

Cognitive robotics; End-user programming for robots; Algorithmic human-machine interaction

Education

Sept 2021 **Massachusetts Institute of Technology**, *Ph.D*, Advisor: Prof. Julie Shah.
Autonomous Systems

June 2016 **Massachusetts Institute of Technology**, *S.M.*
Aeronautics and Astronautics

August 2013 **Indian Institute of Technology Bombay**, *B. Tech.*
Aerospace Engineering

Work Experience

Oct 2021 – Present **Postdoctoral Research Associate**, Computer Science, Brown University.
- Advisors: Prof. Stefanie Tellex, Prof. George Konidaris
- Robot adaptation to unseen tasks
- Natural Language guided robotics

Jan 2014 – Sept 2021 **Graduate Research Assistant**, CSAIL, MIT.
- Specification inference from demonstration
- Robot planning with uncertain specifications
- Human interactive robot learning

Technical Expertise

Languages Python (primary), Julia, C++, JavaScript

Frameworks PyTorch, TensorFlow, Spot (library for model checking), Gen (probabilistic programming), ROS

Publications

Journal Articles

[J1] A. Shah, S. Li, and J. Shah, "Planning with uncertain specifications (PUnS)," *IEEE Robotics and Automation Letters*, 2020

[J2] A. Shah, P. Kamath, S. Li, P. Craven, K. Landers, K. Oden, and J. Shah, "Supervised Bayesian specification inference from demonstrations," *The International Journal of Robotics Research (Under Review)*, 2021

[J3] A. Shah, L. Blumberg, and J. Shah, "Planning for manipulation of interlinked deformable linear objects with applications to aircraft assembly," *IEEE Transactions on Automation Science and Engineering*, 2018

Conference Proceedings

[C1] J. X. Liu, Z. Yang, I. Idrees, S. Liang, B. Schornstein, S. Tellex, and A. Shah, "Lang2LTL: Translating natural language commands to temporal robot task specification," *arXiv preprint arXiv:2302.11649 (under review)*, 2023

[C2] B. Quartey, A. Shah, and G. Konidaris, "Exploiting contextual structure to generate useful auxiliary tasks," *arXiv preprint arXiv:2303.05038 (under review)*, 2023

[C3] A. Shah*, J. X. Liu*, E. Rosen, G. Konidaris, and S. Tellex, "Skill transfer for temporally-extended task specifications," *arXiv preprint arXiv:2206.05096 (under review)*, 2022

[C4] Y. Wang, N. Figueroa, S. Li, A. Shah, and J. Shah, "Temporal logic imitation: Learning plan-satisficing motion policies from demonstrations," in *Proceedings of the 6th Annual Conference on Robot Learning (oral presentation)*, 2022

[C5] S. Booth, Y. Zhou, A. Shah, and J. Shah, "Bayes-TrEx: a bayesian sampling approach to model transparency by example," in *Proceedings of the AAAI Conference on Artificial Intelligence*, 2021

[C6] S. Li, N. Figueroa, A. Shah, and J. Shah, "Provably safe and efficient motion planning under uncertainty for human-robot collaboration," in *Robotics: Science and Systems XVII*, 2021

[C7] A. Shah, S. Wadhwania, and J. Shah, "Interactive robot training for non-Markov tasks," *arXiv preprint arXiv:2003.02232 (under review)*, 2020

[C8] J. Kim, C. Muise, A. Shah, S. Agarwal, and J. Shah, "Bayesian inference of linear temporal logic specifications for contrastive explanations," in *Proceedings of the Twenty-Eighth International Joint Conference on Artificial Intelligence*, 2019

[C9] P. Craven, K. Oden, K. Landers, A. Shah, and J. Shah, "Man-machine interoperation in training for large force exercise air missions," in *Proceedings of the Interservice/Industry Training, Simulation and Education Conference*, 2019

[C10] A. Shah, P. Kamath, J. A. Shah, and S. Li, "Bayesian inference of temporal task specifications from demonstrations," in *Advances in Neural Information Processing Systems*, 2018

[C11] P. Craven, K. Oden, K. Landers, A. Shah, and J. Shah, "Man-machine interoperation in training for offensive counter air missions," in *Proceedings of the Interservice/Industry Training, Simulation and Education Conference*, 2018

[C12] A. J. Shah and J. A. Shah, "Towards manipulation planning for multiple interlinked deformable linear objects," in *Proceedings of the IEEE International Conference on Robotics and Automation*, 2016

Workshops and Symposia

[W1] J. X. Liu, Z. Yang, B. Schornstein, S. Liang, I. Idrees, S. Tellex, and A. Shah, "Lang2LTL: Translating natural language commands to temporal specification with large language models," in *CoRL Workshop on Language and Robot Learning*, 2022

[W2] Y. Wang, N. Figueroa, A. Shah, S. Li, and J. Shah, "Temporal logic imitation: Learning plan-satisficing motion policies from demonstrations," in *RSS Workshop on Overlooked Aspects of Imitation Learning: Systems, Data, Tasks and Beyond*, 2022

[W3] J. X. Liu, E. Rosen, A. Shah, S. Zheng, T. Edwards, G. Konidaris, and S. Tellex, "Leveraging temporal structure in task specifications for pomdp planning," in *Proceedings of the 5th Multi-disciplinary Conference on Reinforcement Learning and Decision Making*, 2022

[W4] A. Shah*, J. X. Liu*, E. Rosen, G. Konidaris, and S. Tellex, "Skill transfer for temporally-extended task specifications," in *IJCAI Workshop on Generalization in Planning*, 2022

[W5] A. Shah and J. Shah, "Interactive robot training for temporal tasks," in *HRI Pioneers, Companion of the 2020 ACM/IEEE International Conference on Human-Robot Interaction*, 2020

[W6] S. Booth*, A. Shah*, Y. Zhou*, and J. Shah, "Sampling prediction-matching examples in neural networks: a probabilistic programming approach," in *AAAI Workshop on Statistical Relational AI*, 2019

[W7] A. Shah and J. Shah, "Planning with uncertain specifications (PUnS)," in *RSS Workshop on Combining Learning and Reasoning – Towards Human-Level Robot Intelligence*, 2019

[W8] J. Kim, C. Muise, A. Shah, S. Agarwal, and J. Shah, "Bayesian inference of temporal specifications to explain how plans differ," in *ICAPS 2019 Workshop on explainable AI in planning*, 2019

[W9] A. Shah and J. Shah, "Towards specification learning from demonstrations," in *RSS Workshop on Learning From Demonstrations for High-Level Robotics Tasks*, 2018

[W10] M. Gombolay and A. Shah, "Appraisal of statistical practices in HRI vis-a-vis the t-test for Likert items/scales," in *2016 AAAI Fall Symposium Series*, 2016

Thesis

[T1] A. Shah, *Interactive Robot Training for Complex Tasks*. PhD thesis, Massachusetts Institute of Technology, 2021

[T2] A. Shah, "Planning for manipulation of interlinked deformable linear objects with applications to aircraft assembly," Master's thesis, Massachusetts Institute of Technology, 2016

Invited Talks

Oct 2018	Brown University Robotics
Mar 2019	University of Colorado Boulder
May 2019	University of Washington
Jan 2021	MIT Aeronautics and Astronautics: Symposium on Humans Interacting with Autonomy
Feb 2021	Brown University Robotics
Feb 2021	Georgia Institute of Technology
Apr 2021	Sony AI
Apr 2022	University of New Hampshire
Oct 2022	Northeast Robotics Colloquium
Nov 2022	University of Pennsylvania GRASP Lab
Dec 2022	University of Massachusetts Amherst
Jan 2023	Northeastern University

Academic Service

Reviewer	IEEE Robotics and Automation Letters
	IEEE Transactions on Automation Science and Engineering
	Autonomous Agents and Multi-Agent Systems
	Conference on Neural Information Processing Systems
	International Conference on Learning Representations
	AAAI Conference on Artificial Intelligence
	IEEE International Conference on Robotics and Automation
	Robotics: Science and Systems
	Conference on Robot Learning
	International Conference on Machine Learning
	ACM/IEEE International Conference on Human Robot Interaction
	IEEE/RSJ International Conference on Intelligent Robots and Systems
	IEEE Conference of Decision and Control
	IEEE Conference on Robot and Human Interactive Communication
Program Committee	2021 International Joint Conference on Artificial Intelligence (Senior Program Committee)
	2021 HRI Pioneers
Organizing Committee	2021 RSS: Workshop on Accessibility of Robot Programming, and Work of the Future

Teaching Experience

Fall 2013 **Teaching Assistant**, *16.06 Principles of Automatic Control*.
Undergraduate control theory class

Fall 2020 **Kaufman Teaching Certification Program**.
Series of workshops on evidence-based teaching

Award and Honors

2020 HRI Pioneers

NeurIPS 2020 Reviewer Award

2013 IIT-B Institute Silver Medal for the best academic performance in Aerospace Engineering

IIT-B Boeing Academic Award (2009)

IIT-B Institute Academic Award (2009, 2010, 2011)

Gold Medal at the Indian National Physics Olympiads 2009 (Top-35 students across the country)

Mentorship

Undergraduate Researchers

Jan 2016 – Jan 2017 **Pravina Samaratunga**, *MIT, S.B. 2019*, now at Square Robot
- Estimation of deformable object shape from depth images.

May 2016 – Sep 2016 **Niyati Desai**, *MIT, S.B. 2019*, Caltech, Ph.D. (in progress)
- Robot software framework for manipulation planning for cables.

May 2017 – Jan 2018 **Lotta Blumberg**, *MIT, S.B. 2018*, M.Eng. 2019, now at Draper Laboratory
- Simulation and evaluations of task planning algorithms for deformable object manipulation.
- Supervised learning for mission trajectory segmentation.

Feb 2018 – Jun 2018 **David Amirault**, *MIT, S.B., M.Eng. 2020*, now at Hudson River Trading
- Recovering interpretable data structures from temporal logic formulas.
- Design of priors over temporal logic formulas as probabilistic programs.

Feb 2018 – Jun 2018 **Ali Zartash**, *MIT, S.B. 2019*, now at Cerebras
- Deep sequence classification for trajectory segmentation.

Sep 2018 – March 2019 **Josh Rosenkranz**, *MIT, S.B. 2019*, now at Xwing
- Comparison of Seq-2-Seq learning with Bayesian specification inference for simulated air-combat excercise assessment.

Jan 2022 – Feb 2023 **Benjamin Schornstein**, *Brown University, Sc.B. 2024*
- Translating natural language commands to formal specifications.

May 2022 – Feb 2023 **Sam Liang**, *Princeton University, B.S.E 2023*
- Translating natural language commands to formal specifications.

Graduate Researchers

Oct 2021 – present **Jason Xinyu Liu**, *Brown University, Ph.D. Student*
- Skill transfer for temporal tasks
- Translating natural language commands to formal specifications.

Jan 2022 – present **Benedict Quartey**, *Brown University, Ph.D. Student*
- Transfer learning with temporal specification.

Aug 2022 – present **Ziyi Yang**, *Brown University, Ph.D. Student*
- Translating natural language commands to formal specifications.