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Jayesh K. Gupta

Interests

Data-driven simulations, sequential decision making, multi-agent systems, scaling.

Work

2020-present Senior Researcher at Microsoft Corporation

Education

2015–2020 **Doctor of Philosophy in Computer Science**, *Stanford University*, Stanford
GPA - 3.9/4.0

2011–2015 **B. Tech. in Electrical Engineering**, *Indian Institute of Technology*, Kanpur
Minor in Computer Science, GPA - 8.9/10.0

Research Experience

2015–2020 Ph.D. candidate at Stanford University. Advisor: Mykel Kochenderfer

Summer 2019 Research Intern at Microsoft Research, Cambridge, UK. Collaborators: Sam Devlin, Katja Hofmann

Summer 2014 Undergraduate researcher at Cornell University. Mentor: Ashutosh Saxena

2014 Undergraduate researcher at IIT Kanpur. Mentor: A. K. Chaturvedi

2012–2013 Undergraduate researcher at IIT Kanpur. Mentor: Nishchal Verma

Publications

Tung Nguyen, Johannes Brandstetter, Ashish Kapoor, **Jayesh K Gupta**[*], Aditya Grover[*] **"ClimaX: A foundation model for weather and climate"**. *International Conference on Machine Learning (ICML)*, 2023. **[pdf|code|blog]**

Johannes Brandstetter, Rianne van den Berg, Max Welling, **Jayesh K. Gupta**, **"Clifford Neural Layers for PDE Modeling"**. *International Conference on Learning Representations (ICLR)*, 2023. **[pdf|code|blog]**.

Jayesh K. Gupta[*], Sai Vemprala[*], Ashish Kapoor, **"Learning Modular Simulations for Homogeneous Systems"**. *Advances in Neural Information Processing Systems (NeurIPS)*, 2022. **[pdf|code|blog]**.

Benoît Guillard, Sai Vemprala, Jayesh K. Gupta, Ondrej Miksik, Vibhav Vineet, Pascal Fua, Ashish Kapoor, **"Learning to Simulate Realistic LiDARs"**. *International Conference on Intelligent Robots and Systems (IROS)*, 2022. **[pdf]**

Xiaobai Ma, David Isele, **Jayesh K. Gupta**, Kikuo Fujimura, Mykel J. Kochenderfer, **"Recursive Reasoning Graph for Multi-Agent Reinforcement Learning"**. *AAAI Conference on Artificial Intelligence (AAAI)*, 2022. **[pdf]**

Shushman Choudhary*, **Jayesh K. Gupta***, Peter Morales and Mykel J. Kochenderfer, **"Scalable Anytime Planning for Multi-Agent MDPs"**. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2021. **Best Paper Award.** **[pdf|website]**.

Sheng Li, **Jayesh K. Gupta**, Ross Allen, Peter Morales and Mykel J. Kochenderfer, **"Deep Implicit Coordination Graphs for Multi-Agent Reinforcement Learning"**. *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2021. **[pdf]**.

Kunal Menda*, Jean de Becdelievre*, **Jayesh K. Gupta***, Ilaan Kroo, Mykel J. Kochenderfer and Zachary Manchester, **Scalable Identification of Partially Observed Systems with Certainty-Equivalent EM**, *International Conference on Machine Learning (ICML)*, 2020. **[pdf|website]**.

Shushman Choudhary, **Jayesh K. Gupta**, Mykel J. Kochenderfer, Dorsa Sadigh and Jeannette Bohg, **"Dynamic Multi-Robot Task Allocation under Uncertainty and Temporal Constraints"**, *Robotics: Science and Systems (RSS)*, 2020. **[pdf]**.

Jayesh K. Gupta*, Kunal Menda*, Zachary Manchester and Mykel J. Kochenderfer, **"Structured Mechanical Models for Robot Learning and Control"**, *Conference on Learning for Dynamics and Control (L4DC)*, 2020. **[pdf|website]**.

Xiaobai Ma, **Jayesh K. Gupta** and Mykel Kochenderfer, **"Normalizing Flow Model for Policy Representation in Continuous Action Multi-agent Systems"**, *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2020. **[pdf]**

Bohan Wu, **Jayesh K. Gupta** and Mykel J. Kochenderfer, **"Model Primitives for Hierarchical Lifelong Reinforcement Learning"**, *Journal of Autonomous Agents and Multiagent Systems (JAAMAS)*, 2020. **[pdf]**.

Raunak P. Bhattacharyya, Derek J. Phillips, Changliu Liu, **Jayesh K. Gupta**, Katherine Driggs-Campbell and Mykel J. Kochenderfer **"Simulating Emergent Properties of Human Driving Behavior Using Multi-Agent Reward Augmented Imitation Learning"** *International Conference on Robotics and Automation (ICRA)*, 2019. **[pdf]**.

Bohan Wu, **Jayesh K. Gupta** and Mykel J. Kochenderfer, **"Model Primitive Hierarchical Lifelong Reinforcement Learning"**, *International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2019. **Long oral presentation.** **[pdf]**.

Aditya Grover, Maruan Al-Shedivat, **Jayesh K. Gupta**, Yuri Burda and Harrison Edwards, **"Learning Policy Representations in Multiagent Systems"**, *International Conference on Machine Learning (ICML)*, 2018. **Long oral presentation.** **[pdf]**

Aditya Grover, Maruan Al-Shedivat, **Jayesh K. Gupta**, Yuri Burda and Harrison Edwards, **"Evaluating Generalization in Multiagent Systems using Agent-Interaction Graphs"**, *Autonomous Agents and Multiagent Systems (AAMAS)*, 2018. **[pdf]**

John Mern, **Jayesh K. Gupta** and Mykel Kochenderfer **"Layer-wise Synapse Optimization for Implementing Neural Networks on General Neuromorphic Architectures"**, *IEEE Symposium Series on Computational Intelligence (SSCI)*, 2017. **[pdf]**

Jayesh K. Gupta, Maxim Egorov and Mykel Kochenderfer, **"Cooperative Multi-agent Control using Deep Reinforcement Learning"**, *Autonomous Agents and Multiagent Systems (AAMAS)*, 2017. **Best Paper** at ALA Worskshop. **[pdf]**

Maxim Egorov, Zachary N. Sunberg, Edward Balaban, Tim A Wheeler, **Jayesh K. Gupta**, Mykel J. Kochenderfer **"POMDPs.jl: A Framework for Sequential Decision Making under Uncertainty"**, *Journal of Machine Learning Research (JMLR)*, 2017. **[website]**

Jonathan Ho, **Jayesh K. Gupta** and Stefano Ermon, **"Model-Free Imitation Learning with Policy Optimization"**, *International Conference on Machine Learning (ICML)*, 2016. **[pdf]**

Ashesh Jain, Debarghya Das, **Jayesh K. Gupta** and Ashutosh Saxena, **"PlanIt: A Crowdsourcing Approach for Learning to Plan Paths from Large Scale Preference Feedback"**, *International Conference on Robotics and Automation (ICRA)*, 2015. **[website]**

Nishchal Verma, **Jayesh K. Gupta**, Sumanik Singh, Rahul Sevakula, Sonal Dixit, **"Feature Level Analysis"**, *IEEE Workshop On Computational Intelligence: Theories, Applications and Future Directions, IIT Kanpur*, pp. 148-152, July 2013. **[poster|pdf]**

Jayesh K. Gupta, Sumanik Singh, Nishchal K. Verma, **"MTBA: Matlab Toolbox for Biclustering Analysis"**, *IEEE Workshop On Computational Intelligence: Theories, Applications and Future Directions, IIT Kanpur*, pp. 94-97, July 2013. **[poster|pdf|website]**

Nishchal Verma, Sumanik Singh, **Jayesh K. Gupta**, Rahul K. Sevakula, Sonal Dixit, Al Salour, **"Smart Phone Application for Fault Recognition"**, *2012 Sixth International Conference on Sensing Technology (ICST2012)*, 18-21 Dec. 2012. **[pdf]**

Other Work (Workshop/Under Review)

Ross E. Allen, **Jayesh K. Gupta**, Jaime Pena, Yutai Zhou, Javona White Bear, and Mykel J. Kochenderfer, **"Health-Informed Policy Gradients for Multi-Agent Reinforcement Learning"**. *Workshop on Optimization and Learning in Multiagent Systems (OptLearnMAS)*, 2021. **[pdf]**.

Kunal Menda*, **Jayesh K. Gupta***, Zachary Manchester and Mykel J. Kochenderfer, **"Structured Mechanical Models for Efficient Reinforcement Learning"**, *Workshop on "Structure & Priors in Reinforcement Learning" (SPiRL)*, 2019. **[pdf]**.

Kunal Menda, **Jayesh K. Gupta**, Zachary Manchester and Mykel J. Kochenderfer, **"Training Structured Mechanical Models by Minimizing Discrete Euler-Lagrange Residual"**. **Under submission**.

Jayesh K. Gupta*, Kunal Menda*, Zachary Manchester and Mykel J. Kochenderfer, **"A General Framework for Structured Learning of Mechanical Systems"**. **Under submission**.

Kunal Menda*, **Jayesh K. Gupta*** and Mykel J. Kochenderfer, **"Efficiently Grounding Symbolic Operators for Lifelong Learning"**. **Under submission**.

Jayesh K. Gupta* and Johannes Brandstetter*, **"Towards Multi-spatiotemporal-scale Generalized PDE Modeling"**. **Under submission**.

Awards and Achievements

- Best paper award, AAMAS 2021.

- Best paper award, ALA Workshop, AAMAS 2017.
- Received **Academic Excellence Award** for distinctive performance in the terms 2011-12 and 2012-13.
- **All India Rank 477** in **IIT Joint Entrance Examination 2011**, out of around 500,000.

Teaching

Winter 2019	AA222/CS361: Engineering Design Optimization. TA
Fall 2018	AA228/CS238: Decision Making under Uncertainty. TA
Spring 2017	CS234: Reinforcement Learning. Guest Lecture
Winter 2017	AA222/CS361: Engineering Design Optimization. TA
Fall 2017	AA228/CS238: Decision Making under Uncertainty. TA

Service

Reviewer

- **Journals**: JAIR (2018, 2021), AURO (2020)
- **Conferences**: NeurIPS (2017, 2018, 2019, 2020, 2021, 2022), ICML (2018, 2019, 2020, 2021, 2022), ICLR (2019, 2020, 2021, 2022), AAAI (2019), IROS (2019, 2020, 2021), AAMAS (2021), ICRA (2021), JAIR

Technical Skills

Languages Python, Julia, C, C++, Ruby, JavaScript

Open Source Contributions

JuliaPOMDP: Contributor and co-maintainer of the POMDPs.jl suite of packages.

PDEArena: Creator and maintainer of the PDEArena, a modern PDE surrogates benchmarking framework in PyTorch.

CliffordLayers: Co-creator and maintainer of the cliffordlayers, a PyTorch library for neural network layers inspired by Clifford/Geometric algebras.

PyCallChainRules.jl: Creator and maintainer of the PyCallChainRules.jl, a Julia package for automatic differentiation of Python functions.