ANIMESH GARG

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RESEARCH INTERESTS

I develop Algorithmic Foundations for **Generalizable Autonomy** for robot-learning. I focus on understanding **structured inductive biases and causality** towards general-purpose embodied intelligence that learns from imprecise information and achieves flexibility & efficiency of human reasoning. My research blends Robotics, Reinforcement Learning, Computer Vision and Causality. My current focus is on applications of intelligent manipulation in manufacturing and service robotics.

EDUCATION

University of California, Berkeley *2016*
· Ph.D., Operations Research, Minor in Artificial Intelligence & Machine Learning
Committee: Ken Goldberg, Alper Atamtürk, Pieter Abbeel, Laurent El Ghaoui
· M.S., Computer Science
Committee: Ken Goldberg, Pieter Abbeel, Alper Atamtürk

Georgia Institute of Technology, Atlanta *2011*
· M.S., Industrial Engineering
Committee: Henrik Christensen, Jim Rehg

Netaji Subhas Institute of Technology, University of Delhi, India *2010*
· B.E., Manufacturing Processes & Automation Engineering

HONORS AND AWARDS

Paper Awards:

2021 Best Student Paper Award at Robotics Systems and Science (RSS) 2021
2020 Outstanding Paper Award, Object Oriented Learning Workshop, ICML 2020
2019 Best Conference Paper Award at IEEE ICRA 2019
Best Workshop Paper Award, Robot Learning Workshop, NeurIPS 2019
Best Cognitive Robotics Paper Finalist at IEEE ICRA 2019
Best Cognitive Robotics Paper Finalist at IEEE IROS 2019
2015 Best Video Award at Hamlyn Surgical Robotics Challenge 2015
Best Medical Robotics Paper Finalist at IEEE ICRA 2015
Best Workshop Paper Award at IEEE ICRA 2015
2012 Best Application Paper Award at IEEE CASE 2012

Individual Awards:

2021 AAAI New Faculty Highlights Invited Speaker
2020 Canada CIFAR AI Chair
2018 Stanford-Coulter Translational Research Award (with PI: Silvio Savarese) ($100K)
2015 Invited Speaker at the IEEE ICRA 2015 Ph.D. Forum
UC Berkeley Ira Abraham Fellowship
2014 Elected Student/Non-Oncology Resident, American Society of Clinical Oncology
UC Regents Fellowship (Summer)
2013 NSF Travel Support for IEEE CASE 2013

	S. Tashiera Fellowship, UC Berkeley (Summer)
2012	UC Berkeley International Office Tuition Award
2012–13	Earl C. Anthony Tuition Fellowship, UC Berkeley
2010	Erasmus Mundus Fellowship (full tuition and stipend at TU Munich)
2007–10	University of Delhi Academic Merit Scholarship Award (full tuition waiver)
2004–10	State Bank of India Meritorious Student Scholarship (stipend)

EXPERIENCE

University of Toronto — August, 2019 - Present
Assistant Professor — *Toronto, ON*

Vector Institute — August, 2019 - Present
Faculty Member — *Toronto, ON*

Nvidia AI Research — August, 2018 - Present
Senior Research Scientist (Consulting) — *Santa Clara, CA*

Advisor (Startups) — August, 2020 - Present
Technical Advisor — *Remote*

Stanford AI Lab — August, 2016 - August, 2018
Postdoctoral Researcher (Fei-Fei Li and Silvio Savarese) — *Stanford, CA*

Osaro Inc — Oct, 2016 - May, 2017
Robotics Consultant — *San Francisco, CA*

Automation Lab, UC Berkeley — August, 2011 - August, 2016
Graduate Student Researcher — *Berkeley, CA*

Georgia Institute of Technology — August, 2010 - July, 2011
Graduate Student Researcher — *Atlanta, GA*

National Thermal Power Corporation — Summer, 2009
Engineering Intern — *New Delhi, India*

JK Tyre Pvt India Ltd. — Winter, 2007
Engineering Intern — *Banmore, India*

SELECTED INVITED TALKS & DEMOS

- **Paving the road to Robot Autonomy with Simulation**
  Invited Speaker at NVIDIA Robotics & AI Technical Workshop — *Sep 2021*
- **Causal Inference in Decision Making & Prediction**
  Invited Speaker at Canadian Operations Research Society Annual Conference — *Jun 2021*
- **Building Blocks of Generalizable Autonomy**
  UCSD; MIT; SFU; UWaterloo; VinAI; Technion — *Feb 2021 - Jun 2021*
- **Generalizable Autonomy in Robotic Manipulation**
  Keynote Speaker, Student Conference on AI, UoFT — *Jan 2021*
- **Generalizable Autonomy in Robotic Manipulation**
  Keynote Speaker, Engineering Science Conference, UofT — *Jan 2021*
- **Structured Inductive Bias for Imitation from Videos**
  CVPR Workshop on Learning from Instructional Videos — *Jun 2020*
- **Unsupervised Representations towards Counterfactual Predictions**
  CVPR Workshop on Compositionality in Computer Vision — *Jun 2020*
- **Generalizable Autonomy in Robotic Manipulation**
  Keynote Speaker, Conference on Computer and Robot Vision — *May 2020*

- **Structured Priors in Robot Learning**
  Fields Institute, Toronto; MIT Deep Learning, MIT; Huawei Noah's Ark Research;
  SoE, University of Toronto; EASE Summer school, University of Bremen *Sept 2019 - Jan 2020*
- **Generalizable Autonomy in Robotics**
  Google X; Re:Work Deep Reinforcement Learning; Vector Institute; ETH Zurich *Apr-July 2019*
- **Deep Reinforcement Learning for Medical Applications**
  MICCAI 2018 Tutorial in Deep RL *Sept 2018*
- **Generalizable Robot Learning: Manipulation and Mobility**
  CVPR18 Fine-Grained Instructional Video understanding Workshop; Re:Work Deep Learning for Robotics;
  NVIDIA GTC 2018; TRI Symposium (Stanford-MIT-Michigan) *Dec 2017-June 2018*
- **Towards Generalizable Imitation in Robotics**
  University of Toronto (CS), University of Michigan (CS), NYU (CS-Courant),
  USC (EE), Univ. of British Columbia (EE), University of Sydney (ACFR) *Mar-Apr 2018*
  Google AI, MSR, FAIR, Nvidia Research *May-June 2018*
  Stanford Robotics Seminar Series, MIT (AA), CalTech (MCE), UNC (CS) *Nov 2017 - Jan 2018*
- **Closing the Visuo-Motor Loop with Deep Reinforcement Learning**
  Stanford CS 331B, AA 274, CS 327A Guest Lecturer *Oct'16-Mar'17*
  SAIL-Toyota AI Center Annual Review *Sept 2016*
- **Algorithmic Automation in Medical Robotics**,
  MIT (ME), UC San Diego (ECE), Stanford (CS) *Mar-Apr 2016*
  Uber Marketplace Optimization, Amazon Research, Baidu Research, Drive.ai (now Apple) *Jan-Apr 2016*
- **Unsupervised Task Segmentation For Learning from Demonstrations**,
  BEARS Research Symposium (short talk), Berkeley, CA *Feb 2016*
  Algorithms for Human Robot Interaction Workshop, Berkeley, CA *Nov 2015*
- **Algorithms for 3D Printed Implants for Brachytherapy in Intracavitary Tumors**,
  INFORMS 2015 Conference, Philadelphia, PA *Nov 2015*
- **UC Berkeley IEOR 24** Intro to IEOR (Seminar) Guest Lecture: OR in Healthcare *Sept 2015*
- **Learning by Observation for Surgical Subtasks**,
  BEARS Research Symposium (short talk), Berkeley, CA *Feb 2015*
- **Custom 3D printed Implants for High Dose Rate Brachytherapy**,
  Poster & Demo at Stanford Berkeley Robotics Symposium, *Oct 2014*
  BEARS Research Symposium (short talk), Berkeley, CA *Feb 2014*
- **UC Berkeley IEOR 24** Intro to IEOR (Seminar) Guest Lecture: Linear Programming *Sept 2011*
- **A Robotic System for Needle Steering**, IEEE IROS 2011 Demonstrations *Sept 2011*

RESEARCH FUNDING

LG AI Research Grant 2021-2025
Sole PI *$120,000 CAD*
Causal Models for Generalizable Robot Learning.

Huawei AI Research Grant 2021-2025
Sole PI *$180,000 CAD*
Causal Models for Generalizable Robot Learning.

NSERC Discovery Grant 2021-2025
Sole PI *$120,000 CAD*
Causal Models for Generalizable Robot Learning.

Canada Foundation for Innovation's John R. Evans Leaders Fund (CFI-JELF) 2020
Co-PI with Florian Shkurti. *$354,000 CAD*
Autonomous mobile manipulation in human environments – learning algorithms and robot systems.

University of Toronto XSeed Innovation Award 2020-2022
Co-PI with Jonathan Kelly. *$120,000 CAD*
Neural Representation Learning on Continuous Manifolds for Robotics.

New Frontiers in Research Fund (NFRF) Exploration 2020-2022
Co-PI with Florian Shkurti, Sanja Fidler, Angela Schoellig, Alan Aspuru-Guzik. *$250,000 CAD*
Reproducible Chemical Synthesis & Materials Discovery via Human Demonstrations & Autonomous Robotics.

TEACHING

University of Toronto
· CSC 2547: *Topics in Deep Learning: 3D & Geometric Structure* (Instructor) *W21*
· CSC 475: *Introduction to Reinforcement Learning* (Instructor) *W21, F21*
· CSC 375: *Algorithmic Intelligence in Robotics* (Instructor) *F20, W22*
· CSC 2621: *Topics in Reinforcement Learning for Robotics* (Instructor) *W20*
Stanford University
· CS 332: *Advanced Survey of Reinforcement Learning* (Co-Instructor) *F17*
University of California, Berkeley
· IEOR 131: *Simulation of Industrial Engineering Systems* (TA) *Sp16*
· IEOR 170: *Industrial Design and Human Factors* (TA) *Sp15*
· IEOR 115: *Industrial and Commercial Data Systems* (TA) *F14, F13, Sp13, F11*
· IEOR 191: *Technology Entrepreneurship* (TA) *F12*
Georgia Institute of Technology
· CS 3451: *Computer Graphics* (Grader) *Sp11*

MENTORING

Status	Student	Affiliation	Year	After Graduation
Postdoc	Nikita Dvornik	Toronto CS	2021-	
PhD	Dylan Turpin	Toronto PhD (CS)	2021-	
	Leili Goli	Toronto PhD (CS)	2021-	
	Ziyi Wu	Toronto PhD (CS)	2021-	
	Maria Attarian	Toronto PhD (CS)	2021-	
	Zihan Zhou	Toronto PhD (CS)	2021-	
	Yun-Chun Chen	Toronto PhD (CS)	2020-	
	Claas Voelcker	Toronto PhD (CS)	2020-	
	Wei Yu	Toronto PhD (CS)	2020-	
	Mayank Mittal	ETH PhD (Robotics)	2021-	
Masters (Thesis)	Liquan Wang	Toronto MSc (CS)	2021-	
	Shunshi (Matthew) Zhang	Toronto MSc (CS)	2020-	
	Qizhen (Irene) Zhang	Toronto MSc (CS)	2020-	
	Homanga Bharadhwaj	Toronto MSc (CS)	2019-21	PhD, CMU
	Dylan Turpin	Toronto MSc (CS)	2019-21	PhD, UofT

Masters (Project)	Panteha Naderian	Toronto MScAC	2020	Layer6
	Keyu Long	Toronto MScAC	2020	Layer6
	Priya Thakur	Toronto MScAC	2020	Google
	Mohan Zhang	Toronto MScAC	2020	RSVP.ai
	Yu-Siang Wang	Toronto MScAC	2020	Microsoft
Visitors	Chaitanya Devaguptatu	IIT Hyd. MS	2021-	
	Haoyu Xiong	TJU BS	2020-	
	Chenjia Bai	HIT PhD	2021	
	Jiankai (Jack) Sun	CUHK BS	2020-21	MSc CUHK
	Mayank Mittal	ETH MSc	2020-2021	PhD, ETH
	Alexandra Volokhova	MIPT MSc	2020-2021	PhD, MILA
	Sizhe (Benny) Sui	SJTU BS	2020	SJTU, MS(Robotics)
Interns	Krishna Javatabhulla	Nvidia	2021	
	Melissa Mofizian	Nvidia	2021	
	Zhaoming Xie	Nvidia	2020	Postdoc, Stanford
	Valts Blukis	Nvidia	2020	Research Scientist, Nvidia
	Michael Lutter	Nvidia	2020	TU Darmstadt (PhD)
	Tan Minh Nguyen	Nvidia	2019-20	Postdoc, UCLA
	Beidi Chen	Nvidia	2019	Postdoc, Stanford
	Weili Nie	Nvidia	2019	Research Scientist, Nvidia
	De-An Huang	Nvidia	2019	Research Scientist, Nvidia
	Yunzhu Li	Nvidia	2019	MIT (PhD)
	Hongyu Ren	Nvidia	2019	Stanford (PhD)
	Ajay Mandlekar	Nvidia	2019	Stanford (PhD)

My group also has 22 current UG students (pair.toronto.edu/people).
Moreover, in my role as a Postdoc (Stanford), I advised 7 PhD students, 4 MS and 8 UG students. Further as a PhD student (UC Berkeley), I advised 1 MS and 7 UG students.

SERVICE & OUTREACH

- **Conference Organization**: Publicity chair CoRL 2020
- **Workshop Organization**.
  - NeurIPS 2021: *Safe Real-World Robot Autonomy*
  - NeurIPS 2021: *Deployable Decision Making*
  - IROS 2021: *Safe Real-World Robot Autonomy*
  - RSS 2021: *Visual Learning and Reasoning for Robotics*
  - COSPAR 2021: *Autonomy for Future Space Science Missions*
  - ICLR 2020: *Deep Learning and Differential Equations*
  - RSS 2020: *Action Representation Learning*
  - RSS 2020: *Visual Learning and Reasoning for Robotics*
  - RSS 2018: *Causal Learning in Robotics*
  - ICML 2018: *Machine Learning in Robotics*
  - MICCAI 2018: *Deep Reinforcement Learning for Medical Applications*
  - ICRA 2017: *C4 Surgical Robots: Compliant, Continuum, Cognitive, and Collaborative*
  - 3DV 2016: *Understanding 3D and Visuo-Motor Learning*

· **Area Chair/Associate Editor**: Managing reviews and recommending decisions in Sub-Topics.
  · Robotics: RSS (2021), CoRL (2020, 2021), ICRA (2018, 2020, 2021, 2022), IROS (2020)
  · Machine Learning: NeurIPS (2020, 2021), ICLR (2021)
  · Computer Vision: CVPR (2021), ICCV (2021)

· **Reviewing**
  Funding: NASA Proposal Review in Medical Robotics 2017.
  Journals: *International Journal of Robotics Research (IJRR)* – 2016-18; *Robotics & Automation Letters (RA-L)* – 2018; *Computer Vision & Image Understanding (CVIU)* – 2017; *IEEE Transactions on Automation Science and Engineering (T-ASE)* – 2015-16; *Springer Journal on Australasian Physical & Engineering Sciences in Medicine* – 2014.
  Conferences
  · **Computer Vision**: *IEEE Conf on Computer Vision and Pattern Recognition (CVPR)* – 2018-19; *European Conf on Computer Vision (ECCV)* – 2018-2020.
  · **Machine Learning**: *Int'l Conf. on Learning Representations (ICLR)* – 2019-2020; *Neural Information Processing Systems (NeurIPS)* – 2018-19; *Conf. on Artificial Intelligence (AAAI)* – 2017-18.
  · **Robotics**: *IEEE Int'l Conf on Robotics and Automation (ICRA)* – 2014-20; *IEEE Int'l Conf. on Intelligent Robots and Systems (IROS)* – 2015-19; *Conference on Robot Learning (CoRL)* – 2017-19; *IEEE Int'l Conf on Automation Science and Engineering (CASE)* – 2013-16.

· **Outreach**
  · Tutorial and Demo on Intro to Learning in Robotics at AI4ALL at Stanford. *Summer 2018*
  · Organized Lab Tour for Society of Women Engineers to encourage STEM in High-School Girls. *Nov 2015*
  · Organized *Berkeley Automation Sciences Lab Open House*, Cal Day *2013–15.*
  Research showcase for the community and prospective college students to be exposed to the college environment and STEM as a potential career.
  · Student Committee Member for UC Berkeley EECS and IEOR faculty Searches *2015*
  · *NSIT Alumni Association* Co-Founded an online alumni network & started bi-annual publication. *2009*

REFERENCES

Please contact me for timely delivery of reference letters.

PEER-REVIEWED PUBLICATIONS

Updated list of publications also available on Google Scholar and animesh.garg.tech
Journal: 10+1 (under review), Conference: 67+7 (under review), Workshops: 22, Patents: 1+16 (filed)

Theses

[T2] Optimization and Design for Automation of Brachytherapy Delivery and Learning Robot-Assisted Surgical Subtasks. Ph.D. Thesis, University of California, Berkeley, 2016.

[T1] Autonomous Palpation for Tumor Localization: Design of a Palpation Probe and Gaussian Process Adaptive Sampling. Masters' Thesis, University of California, Berkeley, 2016.

Preprints (Under Review)

[U8] M. Lutter, B. Belousov, S. Mannor, D. Fox, **A. Garg**, J. Peters. Continuous-Time Fitted Value Iteration for Robust Policies. *Preprint under review T-PAMI 2021.*

[U7] M. Mittal, D. Hoeller, F. Farshidian, M. Hutter, **A. Garg**. Articulated Object Interaction in Unknown Scenes with Whole-Body Mobile Manipulation. *Preprint under review.*

[U6] C. Liu, K. Long, G. Yu, M. Volkovs, **A. Garg**. LECO: Label-Efficient Contrastive Video Representation Learning *Preprint under review at CVPR 2022.*

[U5] S. Sinha, K. Roth, A. Goyal, M. Ghassemi, H. Larochelle, **A. Garg**. Uniform Priors for Data-Efficient Transfer. *Preprint under review at CVPR 2022.*

[U4] J. Sun, D.-A. Huang, B. Zhou, **A. Garg**. PlaTe: Visually-Grounded Planning with Transformers in Procedural Tasks. *Preprint under review at ICRA 2022.*

[U3] W. Yu, W. Chen, S. Yin, S. Easterbrook, **A. Garg**. Concept Grounding with Modular Action-Capsules in Semantic Video Prediction. *Preprint under review at ICLR 2022.*

[U2] Z. Xie, X. Da, B. Babich, **A. Garg**, M. van de Panne. GLiDE: Generalizable Quadrupedal Locomotion in Diverse Environments with a Centroidal Model. *Preprint under review ICRA 2022.*

[U1] S. Zhang, M. Erdogdu, **A. Garg**. Convergence and Optimality for Policy Gradient Methods in Weakly Smooth Settings. *Preprint under review at AAAI 2022.*

Journal Publications

[J10] D. P. Losey, H. J. Jeon, M. Li, K. Srinivasan, A. Mandlekar, **A. Garg**, J. Bohg, D. Sadigh. Learning Latent Actions to Control Assistive Robots. *Automous Robots 2021 (AURO)* .

[J9] A. Dundar, K. J. Shih, **A. Garg**, R. Pottorf, A. Tao, B. Catanzaro. Unsupervised Disentanglement of Pose, Appearance and Background from Images and Videos. *IEEE Transactions of Pattern Analysis and Machine Intelligence 2021 (PAMI-TC).*

[J8] V. Joseph, G. Gopalakrishnan, S. Muralidharan, M. Garland, **A. Garg**. A Programmable Approach to Model Compression. *IEEE Micro 2020.*

[J7] D. P. Losey, K. Srinivasan, A. Mandlekar, **A. Garg**, D. Sadigh. Controlling Assistive Robots with Learned Latent Actions. *Robotics and Automation Letters (also appeared at IEEE ICRA) 2020.*

[J6] M. A. Lee, Y. Zhu, P. Zachares, M. Tan, K. Srinivasan, S. Savarese, L. Fei-Fei, **A. Garg**, J. Bohg. Making Sense of Vision and Touch: Learning Multimodal Representations for Contact-Rich Tasks. *Transactions of Robotics, 2020.*

[J5] K. Fang, Y. Zhu, **A. Garg**, V. Mehta, A. Kurenkov, L. Fei-Fei, S. Savarese. Learning Task-Oriented Grasping for Tool Manipulation with Simulated Self-Supervision. *Int'l Journal of Robotics Research, 2020.*

[J4] S. Krishnan, **A. Garg**, R. Liaw, B. Thananjeyan, L. Miller, F. T. Pokorny, K. Goldberg. SWIRL: A Sequential Windowed Inverse Reinforcement Learning Algorithm for Robot Tasks With Delayed Rewards, *Int'l Journal of Robotics Research, 2018.*

[J3] S. Krishnan*, **A. Garg***, S. Patil, C. Lea, G. Hager, P. Abbeel, K. Goldberg.(* equal contribution) Transition State Clustering: Unsupervised Surgical Trajectory Segmentation For Robot Learning, *Int'l Journal of Robotics Research, 2017.*

[J2] K. Mellis, T. Siauw, A. Sudhyadhom, R. Sethi, I-C. Hsu, J. Pouliot, **A. Garg**, K. Goldberg, J. A. Cunha. Material Evaluation of PC-ISO for Customized, 3D Printed, Gynecologic ^{192}Ir HDR Brachytherapy Applicators. *Journal of Applied Clinical Medical Physics (JACMP) 2014.*

[J1] **A. Garg**, T. Siauw, D. Berenson, A. Cunha, I-C. Hsu, J. Pouliot, D. Stoianovici, and K. Goldberg. Open-Loop Robot-Guided Insertion of Optimized Skew-Line Needle Arrangements for High Dose Rate Brachytherapy. *IEEE Transactions on Automation Science and Engineering, 2013.*

Conference Publications

[C67] N. Dvornik, I. Hadji, K.G. Derpanis, **A. Garg**, A.D. Jepson. Drop-DTW: Aligning Common Signal Between Sequences While Dropping Outliers. Advances in Neural Information Processing Systems (NeurIPS), 2021

[C66] M. Poli, S. Massaroli, L. Scimeca, S. J. Oh, S. Chun, A. Yamashita, H. Asama, J. Park, **A. Garg**. Neural Hybrid Automata: Learning Dynamics with Multiple Modes and Stochastic Transitions. Advances in Neural Information Processing Systems (NeurIPS), 2021.

[C65] C. Bai, L. Wang, L. Han, **A. Garg**, J. Hao, P. Liu, Z. Wang. Dynamic Bottleneck for Robust Self-Supervised Exploration. Advances in Neural Information Processing Systems (NeurIPS), 2021.

[C64] H. Xu, YR Wang, S. Eppel, A. Aspuru-Guzik, F. Shkurti, **A. Garg**. Seeing Glass: Joint Point-Cloud and Depth Completion for Transparent Objects. Conference on Robot Learning (CoRL) 2021. (**Oral**).

[C63] **S. Sinha**, **A. Mandlekar**, **A. Garg**. S4RL: Surprisingly Simple Self-Supervision for Offline Reinforcement Learning in Robotics. Conference on Robot Learning (CoRL), 2021.

[C62] V. Blukis, C. Paxton, D. Fox, **A. Garg**, Y. Artzi. A Persistent Spatial Semantic Representation for High-level Natural Language Instruction Execution. Conference on Robot Learning (CoRL) 2021

[C61] H. Xiong, Q. Li, Y-C. Chen, H. Bharadhwaj, S. Sinha, **A. Garg**. Learning by Watching: Physical Imitation of Manipulation Skills from Human Videos. *Int'l Conf. on Intelligent Robots and Systems (IROS), 2021.*

[C60] D. Turpin, L. Wang, S. Tsogkas, S. Dickinson, **A. Garg**. GIFT: Generalizable Interaction-aware Functional Tool Affordances without Labels. *Robotics Systems and Science (RSS) 2021.*

[C59] M. Lutter, S. Mannor, J. Peters, D. Fox, **A. Garg**. Robust Value Iteration for Continuous Control Tasks *Robotics Systems and Science (RSS) 2021.*

[C58] E. Heiden, F. Ramos, M. Macklin, Y. Narang, **A. Garg**, D. Fox. DiSeCT: A Differentiable Simulation Engine for Autonomous Robotic Cutting. *Robotics Systems and Science (RSS) 2021.* (**Best Student Paper Award (2/400)**).

[C57] M. Lutter, S. Mannor, J. Peters, D. Fox, **A. Garg**. Value Iteration in Continuous Actions, States and Time. *Int'l Conf. on Machine Learning (ICML) 2021.*

[C56] C. Bai, L. Wang, L. Han, J. Hao, **A. Garg**, P. Liu, Z. Wang. Principled Exploration via Optimistic Bootstrapping and Backward Induction. *Int'l Conf. on Machine Learning (ICML) 2021.*

[C55] B. Liu, Q. Liu, P. Stone, **A. Garg**, Y. Zhu, A. Anandkumar. Coach-Player Multi-agent Reinforcement Learning for Dynamic Team Composition. *Int'l Conf. on Machine Learning (ICML) 2021.* (**Long Talk**).

[C54] A. Mahajan, M. Samvelyan, L. Mao, V. Makoviychuk, **A. Garg**, J. Kossaifi, S. Whiteson, Y. Zhu, A. Anandkumar. Tesseract: Tensorised Actors for Multi-Agent Reinforcement Learning *Int'l Conf. on Machine Learning (ICML) 2021.*

[C53] Z. Xie, X. Da, M. van de Panne, B. Babich, **A. Garg**. Dynamics Randomization Revisited: A Case Study for Quadrupedal Locomotion. *IEEE Int'l Conf. on Robotics and Automation (ICRA) 2021.*

[C52] R. Martín-Martín, A. Allshire, C. Lin, S. Manuel, S. Savarese, **A. Garg**. LASER: Learning a Latent Action Space for Efficient Reinforcement Learning. *IEEE Int'l Conf. on Robotics and Automation (ICRA) 2021.*

[C51] H. Bharadhwaj, **A. Garg**, F. Shkurti. LEAF: Latent Exploration Along the Frontier. *IEEE Int'l Conf. on Robotics and Automation (ICRA) 2021.*

[C50] X. Pan, **A. Garg**, A. Anandkumar, Y. Zhu. Emergent Hand Morphology and Control from Optimizing Robust Grasps of Diverse Objects. *IEEE Int'l Conf. on Robotics and Automation (ICRA) 2021.*

[C49] H. Bharadhwaj, A. Kumar, N. Rhinehart, S. Levine, F. Shkurti, **A. Garg**. Conservative Safety Critics for Exploration. *International Conference on Learning Representations (ICLR) 2021.*

[C48] P. Naderian, G. Loaiza-Ganem, H. J. Braviner, A. L. Caterini, J. C. Cresswell, T. Li, **A. Garg**. C-Learning: Horizon-Aware Cumulative Accessibility Estimation. *International Conference on Learning Representations (ICLR) 2021.*

[C47] K. Xie, H. Bharadhwaj, D. Hafner, **A. Garg**, F. Shkurti. Skill Transfer via Partially Amortized Hierarchical Planning. *International Conference on Learning Representations (ICLR) 2021.*

[C46] S. Sinha, H. Bharadhwaj, A. Goyal, H. Larochelle, **A. Garg**, F. Shkurti. DIBS: Diversity inducing Information Bottleneck in Model Ensembles *Conference on Artificial Intelligence (AAAI) 2021.*

[C45] Y. Li, A. Torralba, A. Anandkumar, D. Fox, **A. Garg**. Causal Discovery in Physical Systems from Videos. *Advances in Neural Information Processing Systems (NeurIPS) 2020.*

[C44] S. Pitis, E. Creager, **A. Garg**. Counterfactual Data Augmentation using Locally Factored Dynamics. *Advances in Neural Information Processing Systems (NeurIPS) 2020.* (**Outstanding Paper award at ICML Workshop on Object Oriented Learning**).

[C43] S. Sinha, **A. Garg**, H. Larochelle. Curriculum By Smoothing. *Advances in Neural Information Processing Systems (NeurIPS) 2020* (**Spotlight**).

[C42] X. Da, Z. Xie, D. Hoeller, B. Boots, A. Anandkumar Y. Zhu, B. Babich, **A.Garg**. Learning a Contact-Adaptive Controller for Robust, Efficient Legged Locomotion. *Conf. on Robot Learning (CoRL) 2020.*

[C41] A. Kurenkov, J. Taglic, R. Kulkarni, M. Dominguez-Kuhne, **A. Garg**, R. Martín-Martín, S. Saverese. Visuomotor Mechanical Search: Learning to Retrieve Target Objects in Clutter. *Int'l Conf. on Intelligent Robots and Systems (IROS), 2020.*

[C40] H. Ren, Y. Zhu, J. Leskovec, A. Anandkumar, **A. Garg**. Ocean: Online Task Inference for Compositional Tasks with Context Adaptation. *Conf. on Uncertainty in Artificial Intelligence (UAI) 2020.*

[C39] B. Chen, W. Liu, **A. Garg**, Z. Yu, A. Shrivastava, J. Kautz, A. Anandkumar. Angular Visual Hardness. *Int'l Conf. on Machine Learning (ICML) 2020.*

[C38] W. Nie, T. Karras, **A. Garg**, S. Debhath, A. Patney, A. B. Patel, A. Anandkumar. Semi-Supervised StyleGAN for Disentanglement Learning. *Int'l Conf. on Machine Learning (ICML) 2020.*

[C37] M. A. Lee, C. Florensa, J. Tremblay, N. Ratliff, **A. Garg**, F. Ramos, D. Fox. Guided Uncertainty-Aware Policy Optimization: Combining Learning and Model-Based Strategies for Sample-Efficient Policy Learning. *IEEE Int'l Conf. on Robotics and Automation (ICRA) 2020.*

[C36] D-A Huang, Y-W Chao, C. Paxton, X. Deng, L Fei-Fei, J. C. Niebles, **A. Garg**, D. Fox. Motion Reasoning for Goal-Based Imitation Learning. *IEEE Int'l Conf. on Robotics and Automation (ICRA) 2020.*

[C35] A. Mandlekar, F. Ramos, B. Boots, L. Fei-Fei, **A. Garg**, D. Fox. IRIS: Implicit Reinforcement without Interaction at Scale for Learning Control from Offline Robot Manipulation Data. *IEEE Int'l Conf. on Robotics and Automation (ICRA) 2020.*

[C34] A. Kurenkov, A. Mandlekar*, R. Martín-Martín, S. Savarese, **A. Garg**. AC-Teach: A Bayesian Actor-Critic Method for Policy Learning with an Ensemble of Suboptimal Teachers. *Conf. on Robot Learning (CoRL) 2019.*

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Peer-Reviewed Non-archival Publications

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[W21] S. Pitis, E. Creager, **A. Garg**. Counterfactual Data Augmentation using Locally Factored Dynamics. *ICML Workshop on Object-Oriented Learning (OOL) 2020.* **Outstanding Paper Award.**

[W20] M. A. Lee, C. Florensa, J. Tremblay, N. Ratliff, **A. Garg**, F. Ramos, D. Fox. Combining Model-Free and Model-Based Strategies for Sample-Efficient Reinforcement Learning. *NeuRIPS Workshop on Robot Learning, 2019* **Best Paper Award.**

[W19] H. Ren, A. Anandkumar, **A. Garg**. Context-Based Meta-Reinforcement Learning with Structured Latent Space, *NeurIPS Workshop on Learning Transferable Skills, 2019*

[W18] A. Mandlekar, **A. Garg**, F. Ramos. Leveraging Large-Scale Robot Manipulation Data for Control with Selective Offline Imitation Learning. *NeurIPS Workshop on Deep RL, 2019*

[W17] A. Kurenkov, A. Mandlekar, Roberto Martin-Martin, **A. Garg**. AC-Teach: A Bayesian Actor-Critic Method for Policy Learning with an Ensemble of Suboptimal Teachers. *NeurIPS Workshop on Deep RL, 2019*

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[W15] M.C.D.P. Kaluza, C. Paxton, **A. Garg**, A. Anandkumar, R. Yu. Goal-Conditioned Dynamic Graph Model for Task and Motion Planning. *Workshop on Women in Machine Learning (WiML), 2019*

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[W11] A. Kurenkov*, V. Mehta*, J. Ji, **A. Garg**, S. Savarese (* equal contribution). Towards Grasp Transfer using Shape Deformation. *Conference on Robot Learning (CoRL) 2017.(Workshop Track)*

[W10] A. Mandlekar*, Y. Zhu*, **A. Garg***, L. Fei-Fei, S. Savarese (* equal contribution), Adversarially Robust Policy Learning through Active Construction of Physically-Plausible Perturbations *Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM), 2017.*

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[W6] S. McKinley, **A. Garg**, S. Lim, S. Patil, K. Goldberg. Automated Delivery Instrument for Stem Cell Treatment using the da Vinci Robotic Surgical System. *13th Annual Meeting of the International Society for Stem Cell Research. Stockholm, Sweden. June 2015.*

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[W3] S. McKinley, **A. Garg**, S. Sen, R. Kapadia, A. Murali, K. Nichols, S. Lim, S. Patil, P. Abbeel, A. M. Okamura, K. Goldberg. Preliminary Report on the Design of a Palpation Probe for Robot-Assisted Minimally Invasive Surgery. *ICRA Workshop on Shared Frameworks for Medical Robotics Research, 2015/* **Best Poster/Demo Award.**

[W2] A. Murali*, S. Sen*, B. Kehoe, **A. Garg**, S. McFarland, S. Patil, W D. Boyd, S. Lim, P. Abbeel, K. Goldberg.(* denotes equal contribution). Multilateral Cutting on the da Vinci Research Kit (dVRK): Surgical Subtask Automation using Learning by Observation. *ICRA Workshop on Shared Frameworks for Medical Robotics Research, 2015*

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Patents

[P17] Policy Learning with Parallel Differentiable Simulation. **A. Garg**, F. T. Ramos, J. Xu, M. Macklin, , T. Kim , V. Makoviichuk, Y. Narang, 2021.

[P16] Solving embodied intelligence with decoupled high-level reasoning and low-level execution. **A. Garg**, C. Paxton, D. Fox, V. Blukis, Y. Zhou, Y. Zhu. 2021

[P15] Auditing AI models for Verified Deployment under Semantic Specifications. A. Anandkumar, **A. Garg**, C. Xiao, D.-A. Huang, H. Bharadhwaj. *US Patent Application No. 17/482,209.*

[P14] A differentiable simulator for robotic cutting. **A. Garg**, D. Fox, E. Heiden, F.T. Ramos, M. Skolones, M. Macklin, Y. Narang. *US Patent Application No. 63/180,917.*

[P13] Methods and Systems to Remotely Operate Robotic Devices. A.Mandlekar, Y. Zhu, **A. Garg**, S. Savarese, L. Fei-Fei. *PCT Application No. PCT/US2020/058542.*

[P12] Emergent Hand Morphology and Control from Optimizing Robust Grasps of Diverse Objects. A. Anandkumar, **A. Garg**, Y. Zhu, X. Pan. *US Patent Application No. 17/316,564.*

[P11] Language-Guided Distributional Tree Search for Mobile Manipulation **A. Garg**, C. Paxton, D. Fox, V. Blukis. *US Patent Application No. 17/316,564.*

[P10] Online Task Inference for Compositional Tasks with Context Adaptation. A. Anandkumar, **A. Garg**, Y. Zhu, H. Ren. *US Patent Application No. 16/945,753.*

[P9] A method for learning from large-scale robotic demonstrations. A. Mandlekar, **A. Garg**, B. Boots, D. Fox, F. T. Ramos. *US Patent Application No. 16/998,941.*

[P8] Video Interpolation and Prediction with Unsupervised Landmarks. A. Tao, A. **Garg**, A. Dundar, B. Catanzaro, K. Shih, R. Pottorff. *US Patent Application No. 16/558,620.*

[P7] Unsupervised disentanglement of pose, appearance, and background from images and videos. A. Tao, A. **Garg**, A. Dundar, B. Catanzaro, K. Shih, R. Pottorff. *US Patent Application No. 16/786,057.*

[P6] System and Method for Controllable Generation of High-Resolution Images. A. Anandkumar, A. **Garg**, A. Patney, S. Debnath, T. Kerras, W. Nie. *US Patent Application No. 16/925,085.*

[P5] Bayesian optimization of sparsity ratios in model compression. **A. Garg**, M. Garland, S. Muralidharan, V. Joseph. *US Patent Application No. 16/785,044.*

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[P3] Guided Uncertainty-Aware Policy Optimization: Combining Model-Free and Model-Based Strategies for Sample-Efficient Learning. **A. Garg**, C. Florensa, D. Fox, F. T. Ramos, J. Tremblay, M, A. Lee, N. Ratliff. *US Patent Application No. 16/780,465.*

[P2] Precision Injector/Extractor for Robot-Assisted Minimally Invasive Surgery. Susan M.L. Lim, S. McKinley, **A. Garg**, S. Patil, K. Goldberg. *International Patent Application No. PCT/US2016/039026.*

[P1] Patient-Specific Temporary Implants For Accurately Guiding Local Means of Tumor Control Along Patient-Specific Internal Channels to Treat Cancers. J. Pouliot, K. Goldberg, I-C. Hsu, JAM Cunha, **A. Garg**, S. Patil, P. Abbeel, T. Siauw. *U.S. Patent 10,286,197, issued May 14, 2019.*