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

2021	AAAI New Faculty Highlights Invited Speaker
2020	Canada CIFAR AI Chair
	Outstanding Paper Award, Object Oriented Learning Workshop, ICML 2020
2019	Best Conference Paper Award at IEEE ICRA 2019
	Best Paper Award, Robot Learning Workshop, NeurIPS 2019
	Best Cognitive Robotics Paper Finalist at IEEE ICRA 2019
	Best Cognitive Paper Finalist at IEEE IROS 2019
2018	Stanford-Coulter Translational Research Award (with PI: Silvio Savarese) ($100K)
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
	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	Best Application Paper Award at IEEE CASE 2012
	UC Berkeley International Office Tuition Award
2012–2013	Earl C. Anthony Tuition Fellowship, UC Berkeley
2010	Erasmus Mundus Fellowship (full tuition and stipend at TU Munich)

2007 – 2010 University of Delhi Academic Merit Scholarship Award (full tuition waiver)
2004 – 2010 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: Roboeye.ai, Scalar Surgical *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

- **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

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 and Materials Discovery via Human Demonstrations and Autonomous Robotics.

TEACHING

University of Toronto
· CSC 498: *Introduction to Reinforcement Learning* (Instructor) *W21*
· CSC 375: *Algorithmic Intelligence in Robotics* (Instructor) *F20*
· CSC 2621: *Topics in Robot Learning* (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*
Lecture on simulation and mentor design project.
· IEOR 170: *Industrial Design and Human Factors* (TA) *Sp15*
Lectured, designed and graded assignments, mentored design project.
· IEOR 115: *Industrial and Commercial Data Systems* (TA) *F14, F13, Sp13, F11*
Lectured on Database implementation in SQL and MS Access, mentored projects and graded exams.
· IEOR 191: *Technology Entrepreneurship* (TA) *F12*
Organized lectures, office hours, mentored projects and graded homeworks.

Georgia Institute of Technology

· CS 3451: *Computer Graphics* (Grader) *Sp11*

MENTORING

Status	Student	Affiliation	Year	After Graduation
Postdoc	Nikita Dvornik	Toronto CS	2021-	
PhD	Wei Yu	Toronto PhD (CS)	2020-	
	Yun-Chun Chen	Toronto PhD (CS)	2020-	
	Claas Voelcker	Toronto PhD (CS)	2020-	
	Dylan Turpin	Toronto MSc (CS)	2019-	
Masters (Thesis)	Homanga Bharadhwaj	Toronto MSc (CS)	2019-	
	Shunshi (Matthew) Zhang	Toronto MSc (CS)	2019-	
	Qizhen (Irene) Zhang	Toronto MSc (CS)	2019-	
	Dylan Turpin	Toronto MSc (CS)	2019-2020	PhD, UofT
Masters (Project)	Panteha Naderian	Toronto MScAC	2020	Layer6
	Keyu Long	Toronto MScAC	2020	Layer6
	Priya Thakur	Toronto MScAC	2020	
	Mohan Zhang	Toronto MScAC	2020	
	Yu-Siang Wang	Toronto MScAC	2020	
Visitors	Mayank Mittal	ETH MSc	2020-	
	Haoyu Xiong	TJU BS	2020-	
	Jiankai (Jack) Sun	CUHK BS	2020-	
	Alexandra Volokhova	MIPT MSc	2020-2021	PhD, MILA
	Sizhe (Benny) Sui	SJTU BS	2020	SJTU, MS(Robotics)
Interns	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)
	Zhaoming Xie	Nvidia	2020	UBC (PhD)
	Valts Blukis	Nvidia	2020	Cornell Tech (PhD)
	Michael Lutter	Nvidia	2020	TU Darmstadt (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**.
  - 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), ICRA (2018, 2020, 2021), IROS (2020, 2021)
  - Machine Learning: NeurIPS (2020), 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: 9+1 (under review), Conference: 50+14 (under review), Workshops: 20, Patents: 1+8 (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)

[U15] 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. *Preprint under review at AURO 2021 (journal).*

[U14] W. Yu, W. Chen, S. Easterbrook, **A. Garg**. Action Concept Grounding Network for Semantically-Consistent Video Generation. *Preprint under review at ICCV 2021.*

[U13] C. Liu, K. Long, G. Yu, M. Volkovs, **A. Garg**. SEC: Supervision Enhanced Contrastive Video Representation Learning. *Preprint under review at CVPR 2021.*

[U12] D. Turpin, L. Wang, S. Tsogkas, S. Dickinson, **A. Garg**. Self-Supervised Discovery of Contact-Aware Tool Affordances. *Preprint under review at CVPR 2021.*

[U11] H. Xiong, Q. Li, Y-C. Chen, H. Bharadhwaj, S. Sinha, **A. Garg**. Learning by Watching: Physical Imitation of Manipulation Skills from Human Videos. *Preprint under review at ICRA 2021.*

[U10] Z. Xie, X. Da, M. van de Panne, B. Babich, **A. Garg**. Dynamics Randomization Revisited: A Case Study for Quadrupedal Locomotion. *Preprint under review at ICRA 2021.*

[U9] R. Martín-Martín, A. Allshire, C. Lin, S. Manuel, S. Savarese, **A. Garg**. LASER: Learning a Latent Action Space for Efficient Reinforcement Learning. *Preprint under review at ICRA 2021.*

[U8] H. Bharadhwaj, **A. Garg**, F. Shkurti. LEAF: Latent Exploration Along the Frontier. *Preprint under review at ICRA 2021.*

[U7] X. Pan, **A. Garg**, A. Anandkumar, Y. Zhu. Emergent Hand Morphology and Control from Optimizing Robust Grasps of Diverse Objects. *Preprint under review at ICRA 2021.*

[U6] S. Sinha, H. Bharadhwaj, A. Srinivas, **A. Garg**. D2RL: Deep Dense Architectures in Reinforcement Learning. *Preprint under review at ICML 2021.*

[U5] S. Sinha, K. Roth, A. Goyal, M. Ghassemi, H. Larochelle, **A. Garg**. Uniform Priors for Data-Efficient Transfer. *Preprint under review at ICML 2021.*

[U4] B. Liu, Q. liu, P. Stone, **A. Garg**, Y. Zhu, A. Anandkumar. A Coach-Player Framework for Dynamic Team Composition. *Preprint under review at ICML 2021.*

[U3] S. Sinha, J. Song, **A. Garg**, S. Ermon. Experience Replay with Likelihood-free Importance Weights. *Preprint under review at ICML 2021.*

[U2] R. Islam, S. Sinha, H. Bharadhwaj, S. Y. Arnob, Z. Yang, Z. Wang, **A. Garg**, L. Li, D. Precup. Offline Policy Optimization with Variance Regularization. *Preprint under review at ICML 2021.*

[U1] 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 *Preprint under review at ICML 2021.*

Journal Publications

[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

[C50] H. Bharadhwaj, A. Kumar, N. Rhinehart, S. Levine, F. Shkurti, **A. Garg**. Conservative Safety Critics for Exploration. *International Conference on Learning Representations (ICLR) 2021.*

[C49] 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.*

[C48] K. Xie, H. Bharadhwaj, D. Hafner, **A. Garg**, F. Shkurti. Skill Transfer via Partially Amortized Hierarchical Planning. *International Conference on Learning Representations (ICLR) 2021.*

[C47] 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.*

[C46] 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.*

[C45] 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**).

[C44] S. Sinha, **A. Garg**, H. Larochelle. Curriculum By Smoothing. *Advances in Neural Information Processing Systems (NeurIPS) 2020* (**Spotlight**).

[C43] 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.*

[C42] 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.*

[C41] 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.*

[C40] 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.*

[C39] 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.*

[C38] 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.*

[C37] 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.*

[C36] 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.*

[C35] 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.*

[C34] K. Fang, Y. Zhu, **A. Garg**, S. Savarese, L. Fei-Fei. Dynamics Learning with Cascaded Variational Inference for Multi-Step Manipulation. *Conf. on Robot Learning (CoRL) 2019.*

[C33] A. Mandlekar, J. Booher, M. Spero, A. Tung, A. Gupta, Y. Zhu, **A. Garg**, S. Savarese, L. Fei-Fei. Scaling Robot Supervision to Hundreds of Hours with RoboTurk: Robotic Manipulation Dataset through Human Reasoning and Dexterity. *Int'l Conf. on Intelligent Robots and Systems (IROS), 2019.* **Best Cognitive Robotics Paper Finalist**

[C32] R. Martín-Martín, M. A. Lee, R. Gardner, S. Savarese, J. Bohg, **A. Garg**. Variable Impedance Control in End-Effector Space: An Action Space for Reinforcement Learning in Contact-Rich Tasks. *Int'l Conf. on Intelligent Robots and Systems (IROS), 2019.*

[C31] D.-A. Huang, D. Xu, Y. Zhu, **A. Garg**, S. Savarese, L. Fei-Fei, J. C. Niebles. Continuous Relaxation of Symbolic Planner for One-Shot Imitation Learning. *Int'l Conf. on Intelligent Robots and Systems (IROS), 2019.*

[C30] D.-A. Huang, S. Nair, D. Xu, Y, Zhu, **A. Garg**, L. Fei-Fei, S. Savarese, J. C. Niebles. Neural Task Graphs: Generalizing to Unseen Tasks from a Single Video Demonstration, under review at *IEEE Conf. on Computer*

Vision & Pattern Recognition (CVPR), 2019. **Oral**

[C29] M.A. Lee*, Y. Zhu*, K. Srinivasan, P. Shah, S. Savarese, L. Fei-Fei, **A. Garg**, J. Bohg (* equal contribution). Making Sense of Vision and Touch: Self-Supervised Learning of Multimodal Representations for Contact-Rich Tasks, under review at *IEEE Int'l Conference on Robotics and Automation (ICRA) 2019.* **Best Paper Award 1/2500+, Best Cognitive Robotics Paper Finalist**

[C28] M. Danielczuk, A. Kurenkov, A. Balakrishna, M. Matl,R. Martín-Martín, **A. Garg**, S. Savarese, K. Goldberg. Mechanical Search: Multi-Step Retrieval of a Target Object Occluded by Clutter, under review at *IEEE Int'l Conference on Robotics and Automation (ICRA) 2019.*

[C27] A. Mandlekar, Y. Zhu, **A. Garg**, J. Booher, M. Spero, A. Tung, J. Gao, J. Emmons, A. Gupta, E. Orbay, S. Savarese, L. Fei-Fei. ROBOTURK: A Crowdsourcing Platform for Robotic Skill Learning through Imitation, *Conference on Robot Learning (CoRL) 2018.*

[C26] 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. *Robotics Systems and Science (R:SS), 2018.*

[C25] D.-A. Huang, S. Buch, L. Dery, **A. Garg**, L. Fei-Fei, J. C. Niebles. Finding "It": Weakly-Supervised Reference-Aware Visual Grounding in Instructional Video, *IEEE Conf. on Computer Vision & Pattern Recognition (CVPR), 2018.* **Oral**

[C24] D. Xu*, S. Nair*, Y. Zhu, J. Gao, **A. Garg**, L. Fei-Fei, S. Savarese (* equal contribution). Neural Task Programming: Learning to Generalize Across Hierarchical Tasks, *IEEE Int'l Conference on Robotics and Automation (ICRA) 2018, arXiv 1710.01813.*

[C23] A. Kurenkov*, J. Ji*, **A. Garg**, V. Mehta, J. Gwak, C. Choy, S. Savarese (* equal contribution). DeformNet: Free-Form Deformation Network for 3D Shape Reconstruction from a Single Image. *(IEEE Winter Conf. on Applications of Computer Vision (WACV) 2018), arXiv 1708.04672.*

[C22] J. Harrison*, **A. Garg***, B. Ivanovic, Y. Zhu, S. Savarese, L. Fei-Fei, M. Pavone (* equal contribution). AdaPT: Zero-Shot Adaptive Policy Transfer for Stochastic Dynamical Systems, *Int'l Symposium on Robotics Research (ISRR) 2017. arXiv 1707.04674*

[C21] J. Gwak, C. Choy, **A. Garg**, M.Chandraker, S. Savarese. Weakly supervised 3D Reconstruction with Adversarial Constraint, *Int'l Conf. on 3D Vision (3DV) 2017.*

[C20] A. Mandlekar*, Y. Zhu*, **A. Garg***, L. Fei-Fei, S. Savarese (* equal contribution), Adversarially Robust Policy Learning through Active Construction of Physically-Plausible Perturbations, *Int'l Conf. on Intelligent Robots and Systems (IROS), 2017.*

[C19] B. Thananjeyan, **A. Garg**, S. Krishnan, C. Chen, L. Miller, K. Goldberg. Multilateral Surgical Pattern Cutting in 2D Orthotropic Gauze with Deep Reinforcement Learning Policies for Tensioning. *IEEE Int'l Conference on Robotics and Automation (ICRA) 2017.*

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[W19] 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.**

[W18] H. Ren, A. Anandkumar, **A. Garg**. Context-Based Meta-Reinforcement Learning with Structured Latent Space, *NeurIPS Workshop on Learning Transferable Skills, 2019*

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Patents

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