# ANIMESH GARG

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## CURRENT APPOINTMENTS

**University of Toronto** August, 2019 - Present
*Assistant Professor, Computer Science, Mechanical & Industrial Engineering (courtesy)* *Toronto, ON*

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

**Nvidia AI Research** August, 2018 - Present
*Senior Research Scientist* *Santa Clara, CA*

## 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

**Individual Awards**:

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|---|---|
| **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) |

**Paper Awards**:

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|---|---|
| **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 |

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| | 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 |

## PREVIOUS PROFESSIONAL EXPERIENCE

**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*

## RESEARCH INTERESTS & SIGNIFICANT CONTRIBUTIONS

I develop Algorithmic Foundations for **Generalizable Autonomy** for robot-learning. I focus on understanding **representational inductive biases and causal inference** in conjunction with **systematic frameworks for scalable data-driven embodied learning**. My research blends Robotics, Reinforcement Learning, Computer Vision and Causality. My current focus is on applications of intelligent manipulation in manufacturing and service robotics.

**Causal Structure Learning** . Causal Discovery improves current Deep Learning based method to perform better. However empirical performance of these methods in practical problems was not reasonable. I co-authored two papers on causal structure learning [C47] and data-augmentation using causal structure [C46], which open. a new direction in scalable causal discovery methods.

**Representation Learning in RL** . Reinforcement Learning is sample inefficient which prevents broad adoption in real robotics. I co-authored a line of work on state representation learning [C29] and action representation learning [C32], which provide a fresh perspective on these problems and empirically demonstrate how with proper representations, RL can be applied successfully on real robots at scale.

**Crowdsourcing Robot Learning** . Robot Learning has not benefited from large supervised datasets which have driven AI progress in Computer Vision and Natural Language. I have invented, RoboTurk [C27, C33, patent pending], to crowdsource data collection in robotics opening a treasure trove of human intelligence to guide robot learning enabling efficient learning [C37, C46], not achievable by pure trial and error methods.

## TEACHING

**University of Toronto**

· CSC 375: *Algorithmic Intelligence in Robotics* (Instructor) — *F20, W22*
· CSC 475: *Introduction to Reinforcement Learning* (Instructor) — *W21, F21*
· CSC 2547: *Graduate Topics in Deep Learning: 3D & Geometric Structure* (Instructor) — *W21*
· CSC 2621: *Graduate 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*

## SERVICE & OUTREACH

· **Conference Organization**:
· CoRL 2022: *Open Problems Co-Chair*
· IROS 2022-2024: *Editor, Conference Editorial Board*
· CoRL 2020: *Publicity Chair*
· **Workshop Organization**.
· NeurIPS 2021: *Deep Learning & Differential Equations*
· 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, 2022), CoRL (2020, 2021, 2022), 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*

## RESEARCH FUNDING

**University of Toronto, Dean's Strategic Fund** 2020-2023
*Co PI with T. Barfoot. J. Burgner-Kahrs, S. Waslander, A. Schoellig, J. Kelly, F. Shkurti. $325000 CAD*
Connecting the Bots: Accelerating Joint Robotics Research between UTIAS and UTM.

**LG AI Research Grant** 2021-2022
*PI* *$120,000 CAD*
Causal Models for Time-Series Forecasting.

**Huawei AI Research Grant** 2021-2022
*PI* *$180,000 CAD*
Decision Support Models in Autonomous Driving.

**NSERC Discovery Grant** 2021-2025
*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.

## MENTORING

Postdocs: 1+1 (current), PhD: 10 (current), MSc: 4+1(current)

| Status | Student | Affiliation | Year | After Graduation |
|---|---|---|---|---|
| **Postdoc** | Kourosh Darvish | Toronto CS | 2022- | |
| | Nikita Dvornik | Toronto CS | 2021-22 | Samsung AI Research |
| **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- | |

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|---|---|---|---|---|
| | Wei Yu | Toronto PhD (CS) | 2020- | |
| | Mayank Mittal | ETH PhD (Robotics) | 2021- | |
| | Shunshi (Matthew) Zhang | Toronto PhD (CS) | 2022- | |
| **Masters (Thesis)** | Liquan Wang | Toronto MSc (CS) | 2021- | |
| | Qizhen (Irene) Zhang | Toronto MSc (CS) | 2020-22 | Cohere |
| | Shunshi (Matthew) Zhang | Toronto MSc (CS) | 2020-22 | PhD, UofT |
| | Homanga Bharadhwaj | Toronto MSc (CS) | 2019-21 | PhD, CMU |
| | Dylan Turpin | Toronto MSc (CS) | 2019-21 | PhD, UofT |
| **Masters (Project)** | Anson Leung | Toronto MScAC | 2021 | Kindred/Ocado |
| | Noel Vouitsis | Toronto MScAC | 2021 | Layer6 |
| | 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 | HIT |
| | 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** | Melissa Mofizian | Nvidia | 2021 | |
| | Krishna Javatabhulla | Nvidia | 2021 | Postdoc, MIT |
| | Zhaoming Xie | Nvidia | 2020 | Postdoc, Stanford |
| | Valts Blukis | Nvidia | 2020 | Research Scientist, Nvidia |
| | Michael Lutter | Nvidia | 2020 | TU Darmstadt (PhD) |
| | 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 | Research Scientist, Nvidia |

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.

## 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*
  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*

## 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: 11+3 (under review), Conference: 76+9 (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)

[U12] M. Attarian, A. Gupta, Z. Zhou, W. Yu, I. Gilitschenski, **A. Garg**. See, Plan, Predict: Language-guided Cognitive Planning with Video Prediction. *Preprint under review at RA-L/IROS 2022.*

[U11] A. Allshire, M. Mittal, V. Lodaya, V. Makoviychuk, D. Makoviichuk, F. Widmaier, M. Wüthrich, S. Bauer, A. Handa, **A. Garg**. Transferring Dexterous Manipulation from GPU Simulation to a Remote Real-World TriFinger. *Preprint under review IROS 2022.*

[U10] M. Mittal, D. Hoeller, F. Farshidian, M. Hutter, **A. Garg**. Articulated Object Interaction in Unknown Scenes with Whole-Body Mobile Manipulation. *Preprint under review at IROS 2022.*

[U9] C. Devaguptapu, S. Sinha, V. N Balasubramanian, **A. Garg**. IONS: Input-adaptive Skip Connections for Data-Efficient Transfer Learning. *Preprint under review at ECCV 2022.*

[U8] S. Sinha, K. Roth, A. Goyal, M. Ghassemi, Z. Akata, H. Larochelle, **A. Garg**. Uniform Priors for Data-Efficient Transfer. *Preprint under review at CVPR workshops 2022.*

[U7] M. Mozifian, D. Fox, D. Meger, F. Ramos, **A. Garg**. Generalizing Successor Features to continuous domains for Multi-task Learning *Preprint under review at UAI 2022.*

[U6] M. Weissenbacher, S. Sinha, **A. Garg**, Y. Kawahara. Koopman Q-learning: Offline Reinforcement Learning via Symmetries of Dynamics *Preprint under review at ICML 2022.*

[U5] H. Bharadhwaj, D. Huang, C. Xiao, A. Anandkumar, **A. Garg**. Auditing AI models for Verified Deployment under Semantic Specifications. *Preprint under review at TMLR 2022.*

[U4] 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 WAFR 2022.*

[U3] 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.*

[U2] C. Liu, K. Long, G. Yu, M. Volkovs, **A. Garg**. LECO: Label-Efficient Contrastive Video Representation Learning *Preprint under review.*

[U1] S. Bauer et al. A Robot Cluster for Reproducible Research in Dexterous Manipulation. *Preprint under review.*

### Journal Publications

[J11] J. Sun, D.-A. Huang, B. Lu, Y.-H. Liu, B. Zhou, **A. Garg**. PlaTe: Visually-Grounded Planning with Transformers in Procedural Tasks. *IEEE Robotics and Automation Letters (RA-L) 2022.*

[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. *IEEE Robotics and Automation Letters (RA-L) 2020 (also 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

[C76] S. Sinha, J. Song, **A. Garg**, S. Ermon. Experience Replay with Likelihood-free Importance Weights. *Learning for Dynamics and Control (L4DC) 2022.*

[C75] Y.-C. Chen, H. Li, D. Turpin, A. Jacobson, **A. Garg**. Neural Shape Mating: Self-Supervised Object Assembly with Adversarial Shape Priors. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2022.*

[C74] W. Yu, W. Chen, S. Yin, S. Easterbrook, **A. Garg**. Modular Action Concept Grounding in Semantic Video Prediction. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2022.*

[C73] S. K. Gorti, N. Vouitsis, J. Ma, K. Golestan, M. Volkovs. **A. Garg**, G. Yu. X-Pool: Cross-Modal Language-Video Attention for Text-Video Retrieval. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR) 2022*

[C72] J. Xu, V. Makoviychuk, Y. Narang, F. Ramos, W. Matusik, **A. Garg**, M. Macklin. Accelerated Policy Learning with Parallel Differentiable Simulation. *International Conference on Learning Representations (ICLR) 2022*

[C71] C. A. Voelcker, V. Liao, **A. Garg**, A. Farahmand. Value Gradient weighted Model-Based Reinforcement Learning. *International Conference on Learning Representations (ICLR) 2022*

[C70] C. Bai, L. Wang, Z. Yang, Z.H. Deng, **A. Garg**, P. Liu, Z. Wang. Pessimistic Bootstrapping for Uncertainty-Driven Offline Reinforcement Learning. *International Conference on Learning Representations (ICLR) 2022*

[C69] Q. Zhang, C. Lu, **A. Garg**, J. Foerster. Centralized Model and Exploration Policy for Multi-Agent RL. *International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) 2022.* (**Oral**)

[C68] S. Zhang, M. Erdogdu, **A. Garg**. Convergence and Optimality for Policy Gradient Methods in Weakly Smooth Settings. *Confernce on Artificial Intelligence (AAAI) 2022.*

[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.*

[C33] 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.*

[C32] 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**

[C31] 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.*

[C30] 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.*

[C29] 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**

[C28] 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**

[C27] 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.*

[C26] 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.*

[C25] 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.*

[C24] 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**

[C23] 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.*

[C22] 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.*

[C21] 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*

[C20] 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.*

[C19] 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.*

[C18] 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.*

[C17] 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. *Workshop on Algorithmic Foundations in Robotics (WAFR), 2016.*

[C16] **A. Garg**, S. Sen, R. Kapadia, Y. Jen, S. McKinley, L. Miller, K. Goldberg. A Tumor Localization using Automated Palpation with Gaussian Process Adaptive Sampling. *IEEE Int'l Conference on Automation Science and Engineering (CASE), 2016.*

[C15] S. McKinley, **A. Garg**, S. Sen, D. V. Gealy, J. P. McKinley, Y. Jen, M. Guo, D. Boyd, K. Goldberg. An Interchangeable Surgical Instrument System with Application to Supervised Automation of Multilateral Tumor Resection. *IEEE Int'l Conference on Automation Science and Engineering (CASE), 2016.*

[C14] A. Murali*, **A. Garg***, S. Krishnan*, F. T. Pokorny, P. Abbeel, T. Darrell, K. Goldberg (* denotes equal contribution). TSC-DL: Unsupervised Trajectory Segmentation of Multi-Modal Surgical Demonstrations with Deep Learning *IEEE Int'l Conference on Robotics and Automation (ICRA) 2016*

[C13] S. Sen*, **A. Garg***, D. V. Gealy, S. McKinley, Y. Jen, K. Goldberg (* denotes equal contribution). Autonomous Multiple-Throw Multilateral Surgical Suturing with a Mechanical Needle Guide and Optimization based Needle Planning. *IEEE Int'l Conference on Robotics and Automation (ICRA) 2016*

[C12] 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. *International Symposium on Robotics Research (ISRR), 2015.*

[C11] S. McKinley, **A. Garg**, S. Sen, R. Kapadia, A. Murali, K. Nichols, S. Lim, S. Patil, P. Abbeel, A. M. Okamura, K. Goldberg. A Disposable Haptic Palpation Probe for Locating Subcutaneous Blood Vessels in Robot-Assisted Minimally Invasive Surgery. *IEEE Int'l Conference on Automation Science and Engineering (CASE), 2015.*

[C10] A. Murali, S. Sen, B. Kehoe, **A. Garg**, S. McFarland, S. Patil, W. D. Boyd, S. Lim, P. Abbeel, K. Goldberg. Learning by Observation for Surgical Subtasks: Multilateral Cutting of 3D Viscoelastic and 2D Orthotropic Tissue Phantoms. *IEEE Int'l Conference on Robotics and Automation (ICRA) 2015.* **Best Medical Robotics Paper Finalist**

[C9] **A. Garg**, T. Siauw, G. Yang, S. Patil, J. A. M. Cunha, I-C. Hsu, J. Pouliot, A. Atamtürk, K. Goldberg. Exact Reachability Analysis for Planning Skew-Line Needle Arrangements for Automated Brachytherapy. *IEEE Int'l Conference on Automation Science and Engineering (CASE), 2014.*

[C8] T. Siauw, J. A. M. Cunha, **A. Garg**, K. Goldberg, I-C. Hsu, and J. Pouliot. Customized Needle Guides for Inserting Non-Parallel Needle Arrangements in Prostate HDR Brachytherapy: A Phantom Study.

*Brachytherapy 13 (2014): S126-S126.*

[C7] **A. Garg**, S. Patil, T. Siauw, J. A. M. Cunha, I-C. Hsu, P. Abbeel, J. Pouliot, and K. Goldberg. An Algorithm for Computing Customized 3D Printed Implants with Curvature Constrained Channels for Enhancing Intracavitary Brachytherapy Radiation Delivery. *IEEE Int'l Conference on Automation Science and Engineering (CASE), 2013.*

[C6] **A. Garg**, T. Siauw, D. Berenson, A. Cunha, I-C. Hsu, J. Pouliot, D. Stoianovici, and K. Goldberg. Initial Experiments toward Automated Robotic Implantation of Skew-Line Needle Arrangements for HDR Brachytherapy. *IEEE Int'l Conference on Automation Science and Engineering (CASE), 2012.* **Best Applications Paper Award**

[C5] JAM Cunha, T. Siauw, **A. Garg**, N. Zhang, K. Goldberg, D. Stoianovici, M. Roach III, I-C. Hsu, J. Pouliot. Robotic Brachytherapy Demonstration: Implant of HDR Brachytherapy Needle Configuration Computer-Optimized to Avoid Critical Structures Near the Bulb of the Penis. *Medical Physics, vol. 39, p.3931, 2012.*

[C4] JAM Cunha, **A. Garg**, T. Siauw, N. Zhang, Y. Zuo, K. Goldberg, D. Stoianovici, M. Roach, J. Pouliot. Robot-Guided delivery of Brachytherapy needles along Non-Parallel paths to avoid Penile Bulb puncture. *J. of Radiotherapy and Oncology, vol.103,p.S45-S46, May 2012.*

[C3] S. Thakkar, **A. Garg**, A. Midha, P. Gaur. Low-cost Teleoperation of Remotely Located Actuators Based on Dual Tone Multi-frequency Data Transfer. *Advanced Materials Research 403 (2012): 3884-3891. (Also in IEEE Intl Conf. of Cybernetics, Robotics and Controls, 2011)*

[C2] **A. Garg**, A. Toor, S. Thakkar, S. Goel, S. Maheshwari, S. Chand. The Autotrix: Design and Implementation of an Autonomous Urban Driving System. *Advanced Materials Research 403 (2012): 4727-4734. (Also in IEEE Intl Conf. of Cybernetics, Robotics and Controls, 2011.)*

[C1] **A. Garg**, A. Toor, S. Thakkar, S. Goel, S. Maheshwari, S. Chand. Object Identification and Mapping using Monocular Vision in an Autonomous Urban Driving System. *Intl Conf. of Machine Vision, 2010.*

### Peer-Reviewed Non-archival Publications

[W22] S. Sinha, H. Bharadhwaj, A. Srinivas, **A. Garg**. D2RL: Deep Dense Architectures in Reinforcement Learning. *Neurips Workshop in Deep Reinforcement Learning 2020.*

[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*

[W16] G. Portwood, P. Mitra, M. Ribeiro, T.-M. Nguyen, B. Nadiga, J. Saenz, M. Chertkov, **A. Garg**, A. Anandkumar, A. Dengel, R. Baraniuk, D. Schmidt. Turbulence forecasting via Neural ODE *NeurIPS Workshop on Machine Learning & Physical Sciences, 2019*

[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*

[W14] T. Nguyen, **A. Garg**, R. Baraniuk, A. Anandkumar. On Mixed Conditional FFJORD with Large-Batch Training. *ICML Workshop on Invertible Neural Networks and Normalizing Flows, 2019.*

[W13] B. Chen, W. Liu, **A. Garg**, Z. Yu, A. Shrivastava, A. Anandkumar. Angular Visual Hardness. *ICML Workshop on Identifying and Understanding Deep Learning Phenomena, 2019.*

[W12] D. Xu, Y. Zhu, **A. Garg**, J. Gao, L. Fei-Fei, S. Savarese. Neural Task Programming: Learning to Generalize Across Hierarchical Tasks. *Conference on Robot Learning (CoRL) 2017. (Workshop Track)*

[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.*

[W9] R. Liaw, S. Krishnan, **A. Garg**, D. Crankshaw, J. E. Gonzalez , K. Goldberg. Composing Meta-Policies for Autonomous Driving Using Hierarchical Deep Reinforcement Learning, *Tech Report, 2017. arXiv 1711.01503*

[W8] S. Krishnan, **A. Garg**, R. Liaw, L. Miller, F. T. Pokorny, and K. Goldberg. HIRL: Hierarchical Inverse Reinforcement Learning for Long-Horizon Tasks with Delayed Rewards. *R:SS Workshop on Bootstrapping Manipulation Skills, 2016.*

[W7] **A. Garg***, S. Krishnan*, A. Murali, F. T. Pokorny, P. Abbeel, T. Darrell, K. Goldberg (* denotes equal contribution). On Visual Feature Representations for Transition State Learning in Robotic Task Demonstrations. *NeuRIPS Workshop on Feature Extraction, 2015.*

[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.*

[W5] S. McKinley, S. Sen, **A. Garg**, Y. Jen, D. Gealy, W. D. Boyd, P. Abbeel, K. Goldberg. Autonomous Tumor Localization and Extraction. *Surgical Robot Challenge, Hamlyn Symposium, 2015.* **Best Video Award.**

[W4] **A. Garg**, K. Goldberg. Learning, Optimization Design for Healthcare Systems. *Ph.D. Forum at ICRA 2015.*

[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*

[W1] A. Majewicz, J. Swensen, T. Wedlick, K. Reed, R. Alterovitz, V. Kallem, W. Park, **A. Garg**, G. Chirikjian, K. Goldberg, N. Cowan, and A. Okamura. A Robotic System for Needle Steering. *IEEE IROS 2011 Demonstrations.*

## 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.*

[P4] Imitation learning system. **A. Garg**, C. Paxton, D-A. Huang, D. Fox, Y.W. Chao. *US Patent Application No. 16/931,211.*

[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.*