ANIMESH GARG

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RESEARCH INTERESTS

I develop algorithmic methods to enable efficient robot learning for long-term sequential tasks through **Generalizable Autonomy**. The principal focus of my research is to understand representations and algorithms to enable the efficiency and generality of learning for interaction in autonomous agents My research spans Robotics, Reinforcement Learning, Computer Vision and Optimal Control. I work on applications of intelligent manipulation in surgical, personal and warehouse 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

2020	Canada CIFAR AI Chair
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*

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 Priors in Robot Learning**
MIT Deep Learning, MIT — *Jan 2020*
Fields Institute, Toronto — *Jan 2020*
Huawei Noah's Ark Research — *Oct 2019*
School of Engineering, University of Toronto — *Oct 2019*
EASE Summer school, University of Bremen — *Sept 2019*

· **Generalizable Autonomy in Robotics**
Google X — *July 2019*
Re:Work Deep Reinforcement Learning — *June 2019*
Vector Institute — *Apr 2019*
ETH Zurich — *Apr 2019*

· **Deep Reinforcement Learning for Medical Applications**
MICCAI 2018 Tutorial in Deep RL — *Sept 2018*

· **Generalizable Robot Learning: Manipulation and Mobility**
Re:Work Deep Learning for Robotics — *June 2018*
CVPR Fine-Grained Instructional Video understanding Workshop — *June 2018*
NVIDIA GTC 2018 — *Mar 2018*
Toyota Research Institute Symposium (Stanford-MIT-Michigan) — *Dec 2017*

· **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 *Jan 2018*
MIT (AA), CalTech (MCE), UNC (CS) *Nov-Dec 2017*

· **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 *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*

TEACHING

University of Toronto
· CS 2621: *Topics in Robot Learning* *W20*
Stanford University
· CS 332: *Advanced Survey of Reinforcement Learning* *F17*
Co-Instructor with Emma Brunskill
University of California, Berkeley
· IEOR 131: *Simulation of Industrial Engineering Systems* *Sp16*
TA, Lecture on simulation and mentor design project.
· IEOR 170: *Industrial Design and Human Factors* *Sp15*
TA, Lectured, designed and graded assignments, mentored design project.
· IEOR 115: *Industrial and Commercial Data Systems* *F14, F13, Sp13, F11*
TA, Lectured on Database implementation in SQL and MS Access, mentored projects and graded exams.
· IEOR 191: *Technology Entrepreneurship* *F12*
TA, Organized lectures, office hours, mentored projects and graded homeworks.
Georgia Institute of Technology
· CS 3451: *Computer Graphics* *Sp11*
Grading of Assignments and Exams.

SERVICE & OUTREACH

· **Service, Workshop and Tutorials Organization**
· *IEEE Int'l Conf on Robotics and Automation (ICRA)* – Associate Editor 2018, 2020
· RSS 2018:*Causal Learning in Robotics*
· ICML 2018:*Machine Learning in Robotics*
· MICCAI 2018:*Deep Reinforcement Learning for Medical Applications*
· NASA Proposal Review in Medical Robotics 2017
· ICRA 2017:*C4 Surgical Robots: Compliant, Continuum, Cognitive, and Collaborative*
· 3DV 2016: *Understanding 3D and Visuo-Motor Learning*
· Student Committee Member for UC Berkeley EECS and IEOR faculty Searches 2015.

· **Reviewing**
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
·**Robotics**: *IEEE Int'l Conf on Robotics and Automation (ICRA)* – 2014-19; *IEEE Int'l Conf. on Intelligent Robots and Systems (IROS)* – 2015-19; *IEEE Int'l Conf on Automation Science and Engineering (CASE)* – 2013-16;
·**Computer Vision**: *IEEE Conf on Computer Vision and Pattern Recognition (CVPR)* – 2018-19; *European Conf on Computer Vision (ECCV)* – 2018;
·**Machine Learning**: *Internal Conference on Learning Representations (ICLR)* – 2019-2020; *Neural Information Processing Systems (NeurIPS)* – 2018-19; *Conference on Robot Learning (CoRL)* – 2017-19; *Conference on Artificial Intelligence (AAAI)* – 2017-18.

· **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.
· *2009–2010*: *NSIT Alumni Association* (www.nsitalumni.org)
Co-Founded an online alumni network and started bi-annual publication *Reminisce*
· *2009–2010*: *NSIT Recruitment Placement Team*
Recruitment Liaison for the undergraduate batch of 2010.

MENTORING

PhD Kuan Fang, Stanford PhD (CS) 2017-Current
De-An Huang, Stanford PhD (CS) 2017-Current
Andrey Kurenkov, Stanford PhD (CSs) 2018-Current
Michelle Lee, Stanford PhD (CS) 2018-Current
Ajay Mandlekar, Stanford PhD (CS) 2018-Current
Danfei Xu, Stanford PhD (CS) 2016-Current
Yuke Zhu, Stanford PhD (CS) 2016-Current

Masters Sidharth Sen (EECS Berkeley, 2014-16) Next: Intuitive Surgical
Julian Gao (CS, Stanford) Next: Dexterity
Boris Ivanovic (CS, Stanford) Next: PhD (Stanford)
Andrey Kurenkov (CS, Stanford) Next: PhD (Stanford)

M.Eng. Anwaar El-Zireeni (IEOR Berkeley, 2013-14)
Jennifer Wong (IEOR Berkeley, 2013-14),
Rashmi Ramtani (IEOR Berkeley, 2013-14).

Undegraduate Heimdall Siao (EECS Berkeley, 2011-12)
Nikitha Singh (IEOR Berkeley, 2013-14)
Zach Mulder (IEOR Berkeley, 2013-14)
Adithya Murali (EECS Berkeley, 2014-15)Next: PhD (CMU)
Yiming Jen (EECS Berkeley 2015-16) Next: Pinterest
Richard Liaw Berkeley BS (2017) 2015-16 PhD (Berkeley)
Brijen Thananjeyan (EECS Berkeley 2015-16), Next: PhD (Berkeley)
Lucio Dery (CS, Stanford) Next: PhD (Cornell)
Viraj Mehta (CS/Math, Stanford) Next: PhD (CMU)
Suraj Nair (CS, Caltech) Next: PhD (Stanford)
Max Spero (CS, Stanford) Next: Google
Jonathan Booher (CS, Stanford)

Independent Yourong You (CS, SJTU), Next: PhD (Cornell)

REFERENCES

Available upon Request

PEER-REVIEWED PUBLICATIONS

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.

Journal Publications

[J6] M. A. Lee, Y. Zhu, P. Zachares, M. Tan, K. Srinivasan, S. Savarese, L. Fei-Fei, **A. Garg**, Jeannette 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, 2019.*

[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 192Ir 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 and Preprints

[C55] Y. Li, A. Torralba, A. Anandkumar, D. Fox, **A. Garg**. Causal Discovery in Physical Systems from Videos. *Preprint.*

[C54] J. Song, S. Sinha, **A. Garg**, S. Ermon. Experience Replay with Likelihood-free Importance Weights. *Preprint.*

[C53] S. Pitis, E. Creager, **A. Garg**. Counterfactual Data Augmentation using Locally Factored Dynamics. *Preprint.*

[C52] 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.*

[C51] R. Islam, S. Sinha, H. Bharadhwaj, Z. Yang, **A. Garg**, Z. Wang. Constrained Optimization via Variance Minimization for Offline Off-Policy Optimization. *Preprint.*

[C50] S. Sinha, A. Goyal, **A. Garg**. Maximum Entropy Models for Faster Adaptation. *Preprint.*

[C49] H. Bharadhwaj, **A. Garg**, F. Shkurti. LEAF: Latent Exploration Around the Frontier. *Preprint.*

[C48] S. Sinha, H. Bharadhwaj, A. Goyal, H. Larochelle, **A. Garg**, F. Shkurti. DIBS: Diversity inducing Information Bottleneck in Model Ensembles *Preprint*

[C47] S. Sinha, **A. Garg**, H. Larochelle. Curriculum By Texture. *Preprint.*

[C46] T. M. Nguyen, **A. Garg**, R. G. Baraniuk, A. Anandkumar. InfoCNF: Efficient Conditional Continuous Normalizing Flow Using Adaptive Solvers. *Preprint.*

[C45] V. Joseph, S. Muralidharan, **A. Garg**, M. Garland, G. Gopalakrishnan. A Programmable Approach to Model Compression. *Preprint.*

[C44] A. Dundar, K. J. Shih, **A. Garg**, R. Pottorf, A. Tao, B. Catanzaro. Unsupervised Disentanglement of Pose, Appearance and Background from Images and Videos. *Preprint.*

[C43] 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.*

[C42] 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.*

[C41] 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.*

[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] 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.

[C38] 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.*

[C37] 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.*

[C36] D. P. Losey, K. Srinivasan, A. Mandlekar, **A. Garg**, D. Sadigh. Controlling Assistive Robots with Learned Latent Actions. *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.*

[C18] R. Liaw, S. Krishnan, **A. Garg**, D. Crankshaw, J. E. Gonzalez , K. Goldberg. Composing Meta-Policies for Autonomous Driving Using Hierarchical Deep Reinforcement Learning, *preprint, 2017. arXiv 1711.01503*

[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

[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*

[W17] 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*

[W16] 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*

[W15] 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*

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[W13] 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.*

[W12] 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.*

[W11] 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)*

[W10] 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)*

[W9] 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.*

[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.*

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Patents

[P3] Precision Injector/Extractor for Robot-Assisted Minimally Invasive Surgery. Susan M.L. Lim, S. McKinley, **A. Garg**, S. Patil, and K. Goldberg. International Patent Application No. PCT/US2016/039026.

[P2] Single-use Palpation Probe For Robotic Minimally-invasive Surgery. S. McKinley, K. Goldberg, **A. Garg**, S. Patil, K. Nichols, A. Okamura, D. Boyd. *Provisional Patent*

[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.*