# Abhishek Gupta

EECS Department, UC Berkeley
Berkeley
CA 94720

abhigupta@eecs.berkeley.edu
+1(510)-857-4588
https://people.eecs.berkeley.edu/~abhigupta/
https://scholar.google.com/citations?user=1wLVDP4AAAAJ&hl=en

## Education

**2015–2021** **Ph.D., Computer Science**, *University of California*, Berkeley.
Advisors: Pieter Abbeel, Sergey Levine

**2011–2015** **B.S., Electrical Engineering and Computer Sciences**, *University of California*, Berkeley, *GPA − 3.91*.

## Experience

### Academic

**2015–present** **Graduate Student Researcher**, *Berkeley AI Research (BAIR) Lab*, UC Berkeley, Advisors: Pieter Abbeel and Sergey Levine.
Research Area: Deep Reinforcement Learning, Robotics

**2014–2015** **Undergraduate Researcher**, UC Berkeley, Advisor: Pieter Abbeel.
Research Areas: Task and Motion Planning, Apprenticeship Learning

### Professional

**Summer 2019** **Research Intern**, *Google Brain Robotics*, Hosts: Karol Hausman, Vikash Kumar.
Worked with the Google Brain Robotics team to solve long horizon manipulation problems

**Summer 2013** **Software Development Engineering Intern**, *Motorola Solutions Inc.*.

**Summer 2012** **Web Development Engineering Intern**, *EdX Berkeley*.

## Research Interests

**Deep RL and Robotics**, *Real world robotic learning, reward specification in RL, continual learning, imitation learning, dexterous robotic manipulation, meta-reinforcement learning*.

**Core Machine Learning**, *Meta-learning, distribution shift, Bayesian deep learning*.

## References

**Pieter Abbeel**, *Professor, UC Berkeley*, pabbeel@cs.berkeley.edu.

**Sergey Levine**, *Assistant Professor, UC Berkeley*, svlevine@eecs.berkeley.edu.

**Jacob Andreas**, *Assistant Professor, MIT*, jda@mit.edu.

**Chelsea Finn**, *Assistant Professor, Stanford University*, cbfinn@cs.stanford.edu.

**Jeff Clune**, *Associate Professor, University of British Columbia*, jclune@gmail.com.

**Satinder Singh**, *Toyota Professor of Artificial Intelligence, University of Michigan, Ann-Arbor*, baveja@umich.edu.

## Teaching

Fall 2017   **Graduate Student Instructor**, *CS285: Deep Reinforcement Learning*, Instructor: Prof. Sergey Levine.

Spring 2016   **Graduate Student Instructor**, *CS188: Introduction to Artificial Intelligence*, Outstanding Graduate Student Instructor Award, Instructors: Prof. Pieter Abbeel, Prof. Anca Dragan.

Fall 2014   **Teaching Assistant**, *CS70: Discrete Math and Probability Theory*, Instructor: Prof. Umesh Vazirani.

## Honors and Awards

2019   UC Berkeley Nominee for Google PhD Fellowship

2019   Best Paper Runners Up at the NeurIPS 2019 Meta-Learning Workshop

2018   Finalist for Best Reviewer at Conference on Robot Learning (CoRL) 2018

2018   Best Paper Award at the ICML 2018 Exploration in RL Workshop

2018   Best Paper Runners Up at the ICML 2018 LLARLA Workshop

2016   National Science Foundation Graduate Research Fellowship

2016   National Defense Science and Engineering Graduate Fellowship (*declined*)

2016   UC Berkeley Outstanding GSI Award

2015   EECS Berkeley Departmental Fellowship

2011   Edward Kraft Award for Freshmen

2009   KVPY Fellowship, Govt. of India

## Talks and Presentations

2020   Invited talk at MIT CSAIL: Learning Systems for Dexterous Manipulation

2020   Guest lecture at NYU Deep RL course on Offline and Meta RL

2020   Presented at CMU RI Reading Group on Ingredients of Real World Robotic Reinforcement Learning

2020   Invited talk at ICLR Workshop: Beyond tabula rasa in reinforcement learning

2020   Invited talk at International Computer Vision Summer School(ICVSS) (Postponed)

2019   Talk at Google Alphabots seminar

2019   Invited talk at ReWORK Deep Reinforcement Learning Summit

2019   Guest lecture in EE 106 B - Introduction to Robotics at UC Berkeley

2019   Invited talk at IROS Workshop on "Same Goal, Different Approaches to Robotic Manipulation"

2018   Spotlight talk at NeurIPS 2018

2018   Invited talk at Uber AI Symposium

2018   Invited talk at OpenAI

2018   Invited talk at ReWORK Deep Robotic Learning Summit

2018   Talk at BAIR/BDD Seminar: Unsupervised Meta RL

| 2018 | Contributed talk at ICML ERL workshop |
| 2018 | Contributed talk at ICML LLARLA workshop |
| 2017 | Invited talk at Google Brain on Multi Task and Multi Robot Transfer |

## Selected Publications (* denotes equal contribution)

[1] Henry Zhu*, Justin Yu*, **Abhishek Gupta**\*, Dhruv Shah, Kristian Hartikainen, Avi Singh, Vikash Kumar, and Sergey Levine. The ingredients of real-world robotic reinforcement learning. In *Int. Conf. on Learning Representations (ICLR)*, 2020, PDF (Spotlight at ICLR 2020)

[2] **Abhishek Gupta**, Russell Mendonca, YuXuan Liu, Pieter Abbeel, and Sergey Levine. Meta-reinforcement learning of structured exploration strategies. In *NeurIPS*, 2018 (Best paper at Exploration in RL workshop at ICML 2018, Spotlight at NeurIPS 3.4% acceptance), PDF

[3] YuXuan Liu*, **Abhishek Gupta\***, Pieter Abbeel, and Sergey Levine. Imitation from observation: Learning to imitate behaviors from raw video via context translation. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2018, PDF

## Conference Publications (* denotes equal contribution)

[1] **Abhishek Gupta\***, Kevin Li*, Vitchyr Pong, Ashwin Reddy, Aurick Zhou, Justin Yu, and Sergey Levine. Mural: Meta-learning uncertainty-aware rewards for outcome-driven reinforcement learning. In *ICML*, 2021

[2] **Abhishek Gupta\***, Justin Yu*, Tony Zhao*, Vikash Kumar*, Kelvin Xu, Thomas Devlin, Aaron Rovinsky, and Sergey Levine. Reset-free reinforcement learning via multi-task learning: Learning dexterous manipulation behaviors without human intervention. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2021

[3] Dibya Ghosh*, **Abhishek Gupta\***, Ashwin Reddy, Justin Fu, Benjamin Eysenbach, Coline Devin, and Sergey Levine. Learning to reach goals via iterated supervised learning. In *Int. Conf. on Learning Representations (ICLR)*, 2021, PDF(Oral at ICLR 2021)

[4] Tianhe Yu, Saurabh Kumar, **Abhishek Gupta**, Sergey Levine, Karol Hausman, and Chelsea Finn. Gradient surgery for multi-task learning. In *NeurIPS*, 2020, PDF

[5] Aviral Kumar, **Abhishek Gupta**, and Sergey Levine. Discor: Corrective feedback in reinforcement learning via distribution correction. In *NeurIPS*, 2020, PDF(Spotlight at NeurIPS 2.9% acceptance)

[6] Henry Zhu*, Justin Yu*, **Abhishek Gupta**\*, Dhruv Shah, Kristian Hartikainen, Avi Singh, Vikash Kumar, and Sergey Levine. The ingredients of real-world robotic reinforcement learning. In *Int. Conf. on Learning Representations (ICLR)*, 2020, PDF (Spotlight at ICLR 2020)

[7] **Abhishek Gupta**, Vikash Kumar, Corey Lynch, Sergey Levine, and Karol Hausman. Relay policy learning: Solving long-horizon tasks via imitation and reinforcement learning. In *Conference on Robot Learning (CoRL)*, 2019, PDF

[8] Michael Ahn, Henry Zhu, Kristian Hartikainen, Hugo Ponte, **Abhishek Gupta**, Sergey Levine, and Vikash Kumar. Robel: Robotics benchmarks for learning with low-cost robots. In *Conference on Robot Learning (CoRL)*, 2019, PDF

[9] Russell Mendonca, **Abhishek Gupta**, Rosen Kralev, Pieter Abbeel, Sergey Levine, and Chelsea Finn. Guided meta-policy search. In *NeurIPS*, 2019 (Spotlight at NeurIPS 2.5% acceptance, Oral presentation at Workshop on Multi-Task and Lifelong Learning at ICML 2019), PDF

[10] Allan Jabri, Kyle Hsu, **Abhishek Gupta**, Benjamin Eysenbach, Sergey Levine, and Chelsea Finn. Unsupervised curricula for visual meta-reinforcement learning. In *NeurIPS*, 2019 (Spotlight at NeurIPS 2.5% acceptance)PDF

[11] John D. Co-Reyes, **Abhishek Gupta**, Suvansh Sanjeev, Nick Altieri, Jacob Andreas, John DeNero, Pieter Abbeel, and Sergey Levine. Guiding policies with language via meta-learning. In *Int. Conf. on Learning Representations (ICLR)*, 2019(Best paper runner up at Workshop on Meta-Learning at NeurIPS 2018), PDF

[12] Dibya Ghosh, **Abhishek Gupta**, and Sergey Levine. Learning actionable representations with goal-conditioned policies. In *Int. Conf. on Learning Representations (ICLR)*, 2019, PDF

[13] Benjamin Eysenbach, **Abhishek Gupta**, Julian Ibarz, and Sergey Levine. Diversity is all you need: Learning skills without a reward function. In *Int. Conf. on Learning Representations (ICLR)*, 2019, PDF

[14] Michael Chang, **Abhishek Gupta**, Thomas Griffiths, and Sergey Levine. Automatically composing representation transformations as a means for generalization. In *Int. Conf. on Learning Representations (ICLR)*, 2019, PDF

[15] **Abhishek Gupta***, Henry Zhu*, Aravind Rajeswaran, Sergey Levine, and Vikash Kumar. Dexterous manipulation with deep reinforcement learning: Efficient, general, and low-cost. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2019, PDF

[16] **Abhishek Gupta**, Russell Mendonca, YuXuan Liu, Pieter Abbeel, and Sergey Levine. Meta-reinforcement learning of structured exploration strategies. In *NeurIPS*, 2018 (Best paper at Exploration in RL workshop at ICML 2018, Spotlight at NeurIPS 3.4% acceptance), PDF

[17] John D. Co-Reyes*, Yuxuan Liu*, **Abhishek Gupta***, Benjamin Eysenbach, Pieter Abbeel, and Sergey Levine. Self-consistent trajectory autoencoder: Hierarchical reinforcement learning with trajectory embeddings. In *ICML*, 2018, PDF

[18] YuXuan Liu*, **Abhishek Gupta***, Pieter Abbeel, and Sergey Levine. Imitation from observation: Learning to imitate behaviors from raw video via context translation. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2018, PDF

[19] Aravind Rajeswaran*, Vikash Kumar*, **Abhishek Gupta**, John Schulman, Emanuel Todorov, and Sergey Levine. Learning complex dexterous manipulation with deep reinforcement learning and demonstrations. In *Robotics: Science and Systems (RSS)*, 2018, PDF

[20] **Abhishek Gupta\***, Coline Devin\*, YuXuan Liu, Pieter Abbeel, and Sergey Levine. Learning invariant feature spaces to transfer skills with reinforcement learning. In *Int. Conf. on Learning Representations (ICLR)*, 2017, PDF

[21] Coline Devin\*, **Abhishek Gupta\***, Trevor Darrell, Pieter Abbeel, and Sergey Levine. Learning modular neural network policies for multi-task and multi-robot transfer. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2017, PDF

[22] **Abhishek Gupta**, Clemens Eppner, Sergey Levine, and Pieter Abbeel. Learning dexterous manipulation for a soft robotic hand from human demonstration. In *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, 2016, PDF

[23] Rohan Chitnis, Dylan Hadfield-Menell, **Abhishek Gupta**, Siddharth Srivastava, Edward Groshev, Christopher Lin, and Pieter Abbeel. Guided search for task and motion plans using learned heuristics. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2016, PDF

[24] Siddharth Srivastava, Shlomo Zilberstein, **Abhishek Gupta**, Pieter Abbeel, and Stuart Russell. Tractability of planning with loops. In *AAAI conference on Artifical Intelligence*, 2015, PDF

[25] Alex X Lee, Henry Lu, **Abhishek Gupta**, Sergey Levine, and Pieter Abbeel. Learning force-based manipulation of deformable objects from multiple demonstrations. In *Proc. IEEE Int. Conf. Robotics and Automation (ICRA)*, 2015,PDF

[26] Alex X Lee, **Abhishek Gupta**, Henry Lu, Sergey Levine, and Pieter Abbeel. Learning from multiple demonstrations using trajectory-aware non-rigid registration with applications to deformable object manipulation. In *IEEE/RSJ Int. Conf. on Intelligent Robots and Systems (IROS)*, 2015, PDF

## Pre-prints and Workshop Papers (\* denotes equal contribution)

[1] Charles Sun, Coline Devin, Jedrzej Orbik, Glen Berseth, **Abhishek Gupta**, and Sergey Levine. Realmm:real world mobile manipulation with applications to room cleaning. *Under Review*, 2020

[2] John D Co-Reyes, Suvansh Sanjeev, Glen Berseth, **Abhishek Gupta**, and Sergey Levine. Ecological reinforcement learning. In *ArXiv Preprint*, 2020, PDF

[3] Marvin Zhang, Henrik Marklund, **Abhishek Gupta**, Sergey Levine, and Chelsea Finn. Adaptive risk minimization: A meta-learning approach for tackling group shift. In *Under Review*, 2020, PDF

[4] Giulia Vezzani, **Abhishek Gupta**, Lorenzo Natale, and Pieter Abbeel. Learning latent state representation for speeding up exploration. In *ArXiv Preprint*, 2019, PDF

[5] **Abhishek Gupta\***, Benjamin Eysenbach\*, Chelsea Finn, and Sergey Levine. Unsupervised meta-learning for reinforcement learning. In *ArXiv Preprint*, 2018(Best paper runners up at Lifelong Learning a Reinforcement Learning Approach (LLARLA) workshop at ICML 2018), PDF

[6] Tuomas Haarnoja, Aurick Zhou, Kristian Hartikainen, George Tucker, Sehoon Ha, Jie Tan, Vikash Kumar, Henry Zhu, **Abhishek Gupta**, Pieter Abbeel, and Sergey Levine. Soft actor-critic algorithms and applications. In *ArXiv Preprint*, 2018, PDF

[7]   Ashvin Nair*, **Abhishek Gupta\***, Murtaza Dalal, and Sergey Levine. Accelerating online reinforcement learning with offline datasets. In *Under Review*, 2021, PDF

## Research Mentorship

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| Undergraduate | Kevin Li, Aaron Rovinsky, Tony Zhao, Ashwin Reddy, Justin Yu, Henry Zhu (now Ph.D student at Stanford University), Dibya Ghosh (now Ph.D student at UC Berkeley), Russell Mendonca (now Ph.D student at CMU), Xinyi Ren (now at Google), YuXuan Liu (now Ph.D student at UC Berkeley), Suvansh Sanjeev (now Ph.D student at CMU), Thomas Devlin |
| Graduate | Aviral Kumar, John D Co-Reyes, Michael B. Chang, Giulia Vezzani, Kelvin Xu, Qiyang Li, Olivia Watkins |

## Grant Writing and Funding Awards

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| 2020 | Co-author on NSF proposal on Bootstrapping Natural Feedback for Reinforcement Learning with Pieter Abbeel (UCB), Jacob Andreas (MIT), Noah Goodman (Stanford) |
| 2020 | Awarded BAIR commons project with Karol Hausman and Sergey Levine |
| 2019 | AWS Research Proposal accepted for $40,000$ |
| 2018 | AWS Research Proposal accepted for $15,000$ |

## Service

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| 2019 | Co-organized workshop on Multi-Task and Lifelong Learning at ICML 2019 |
| 2019 | Co-organized workshop on Structure and Priors in RL at ICLR 2019 |
| 2018 | Outstanding Reviewer at CoRL 2018 |
| 2015–present | Reviewer for NeurIPS, ICML, ICLR, ICRA, IROS, JMLR, CoRL, RA-L |

## Outreach and Inclusion

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| 2019 | Mentor with BAIR Mentorship Program |
| 2018 | Talk at Thayimane Children's home |
| 2016 | Invited talk at Bay Area Teen Science Conference |
| 2015-2016 | Outreach co-ordinator for Robot Learning Lab |
| 2013-2014 | Mentor with Berkeley Engineers and Mentors (BEAM) |