

# Rohan Chitnis

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## Education

**Massachusetts Institute of Technology**, Cambridge, MA

**GPA: 4.8 / 5.0.** Minor: Econometrics.

Doctor of Philosophy in Electrical Engineering and Computer Science, May 2022 (expected).

Master of Science in Electrical Engineering and Computer Science, May 2018.

*Relevant Coursework:* Advanced Algorithms, Randomized Algorithms, Advanced Natural Language Processing, Econometrics, Time Series Analysis.

**University of California, Berkeley**, Berkeley, CA

**Graduated with Highest Honors (GPA in top 3%). GPA: 3.95 / 4.0.**

Bachelor of Science in Electrical Engineering and Computer Sciences, May 2016.

*Relevant Coursework:* Advanced Robotics, Machine Learning, Deep Reinforcement Learning, Artificial Intelligence, Computer Vision, Optimization, Graphics, Computational Geometry, Image Processing, Probability and Random Processes, Algorithms, Data Structures.

## Research Experience

**MIT Learning & Intelligent Sys. Lab** (Adviser: Leslie Kaelbling) 09/16 - Present

- Conduct research in artificial intelligence for robotics, toward a PhD.
- Focus on integrated learning and planning for solving long-horizon robotic tasks.

**Facebook AI Research, Robotics** (Research Intern with Abhinav Gupta) 06/19 - 09/19

- Researched formulations of intrinsic motivation for emergence of synergistic behavior in robotics via deep reinforcement learning.
- Built and tested my algorithms in bimanual manipulation environments, both in simulation and on real Sawyer robot arms.

**Google Brain, Robotics** (Research Intern with Sergey Levine) 05/17 - 09/17

- Researched methods for speeding up deep reinforcement learning for robotics, by regressing on event outcomes to improve exploration.
- Designed and implemented a stand-alone framework for learning-based manipulation.

**UC Berkeley Robot Learning Lab** (Adviser: Pieter Abbeel) 02/13 - 05/16

- Performed work in hierarchical combined task and motion planning for execution of long-horizon robotic tasks such as laundry.
- Integrated reinforcement learning to improve existing approaches.
- Lead coordinator of lab outreach program, providing tours to visitors of varied ages.

**UC Berkeley Oscii Lab** (Adviser: John DeNero) 04/15 - 05/16

- Conducted research in Natural Language Processing.
- Improved performance of neural machine translation using Huffman code compression.

## Journal Publications

### Integrated Task and Motion Planning

Caelan Reed Garrett, **Rohan Chitnis**, Rachel Holladay, Beomjoon Kim, Tom Silver, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

Annual Review of Control, Robotics, and Autonomous Systems, Volume 4, 2021.

## Conference Publications

### Reinforcement Learning for Classical Planning: Viewing Heuristics as Dense Reward Generators

Clement Gehring\*, Masataro Asai\*, **Rohan Chitnis**, Tom Silver, Leslie Pack Kaelbling, Shirin Sohrabi, Michael Katz.

International Conference on Automated Planning and Scheduling (ICAPS), 2022.

### Towards Optimal Correlational Object Search

Kaiyu Zheng, **Rohan Chitnis**, Yoonchang Sung, George Konidaris, Stefanie Tellex.

IEEE International Conference on Robotics and Automation (ICRA), 2022.

**Learning Symbolic Operators for Task and Motion Planning**

Tom Silver\*, **Rohan Chitnis\***, Joshua Tenenbaum, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.

**GLIB: Efficient Exploration for Relational Model-Based Reinforcement Learning via Goal-Literal Babbling**

**Rohan Chitnis\***, Tom Silver\*, Joshua Tenenbaum, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

AAAI Conference on Artificial Intelligence (AAAI), 2021.

**Planning with Learned Object Importance in Large Problem Instances using Graph Neural Networks**

Tom Silver\*, **Rohan Chitnis\***, Aidan Curtis, Joshua Tenenbaum, Tomás Lozano-Pérez, Leslie Pack Kaelbling.

AAAI Conference on Artificial Intelligence (AAAI), 2021.

**CAMPs: Learning Context-Specific Abstractions for Efficient Planning in Factored MDPs**

**Rohan Chitnis\***, Tom Silver\*, Beomjoon Kim, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

Conference on Robot Learning (CoRL), 2020.

**Efficient Bimanual Manipulation Using Learned Task Schemas**

**Rohan Chitnis**, Shubham Tulsiani, Saurabh Gupta, Abhinav Gupta.

IEEE International Conference on Robotics and Automation (ICRA), 2020.

**Intrinsic Motivation for Encouraging Synergistic Behavior**

**Rohan Chitnis**, Shubham Tulsiani, Saurabh Gupta, Abhinav Gupta.

International Conference on Learning Representations (ICLR), 2020.

**Learning Compact Models for Planning with Exogenous Processes**

**Rohan Chitnis**, Tomás Lozano-Pérez.

Conference on Robot Learning (CoRL), 2019.

**Learning Quickly to Plan Quickly Using Modular Meta-Learning**

**Rohan Chitnis**, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

IEEE International Conference on Robotics and Automation (ICRA), 2019.

**Learning What Information to Give in Partially Observed Domains**

**Rohan Chitnis**, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

Conference on Robot Learning (CoRL), 2018.

**Integrating Human-Provided Information Into Belief State Representation Using Dynamic Factorization**

**Rohan Chitnis**, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018.

**Finding Frequent Entities in Continuous Data**

Ferran Alet, **Rohan Chitnis**, Leslie Pack Kaelbling, Tomás Lozano-Pérez.

International Joint Conference on Artificial Intelligence (IJCAI), 2018.

**Sequential Quadratic Programming for Task Plan Optimization**

Dylan Hadfield-Menell, Christopher Lin, **Rohan Chitnis**, Stuart Russell, Pieter Abbeel.

IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2016.

**Guided Search for Task and Motion Plans Using Learned Heuristics**

**Rohan Chitnis**, Dylan Hadfield-Menell, Abhishek Gupta, Siddharth Srivastava, Edward Groshev, Christopher Lin, Pieter Abbeel.

	IEEE International Conference on Robotics and Automation (ICRA), 2016.
	<b>Variable-Length Word Encodings for Neural Translation Models</b> Rohan Chitnis, John DeNero. Conference on Empirical Methods in Natural Language Processing (EMNLP), 2015.
	<b>Modular Task and Motion Planning in Belief Space</b> Dylan Hadfield-Menell, Edward Groshev, Rohan Chitnis, Pieter Abbeel. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2015.
	<b>Combined Task and Motion Planning Through an Extensible Planner-Independent Interface Layer</b> Siddharth Srivastava, Eugene Fang, Lorenzo Riano, Rohan Chitnis, Stuart Russell, Pieter Abbeel. IEEE International Conference on Robotics and Automation (ICRA), 2014.
Honors / Awards	<p><b>Facebook Fellowship Finalist, 2020.</b> Top 4% of applicants for the Facebook Fellowship, Machine Learning track.</p> <p><b>NSF GRFP Fellow, 2016.</b> Awarded NDSEG Fellowship (declined).</p> <p><b>Hertz Fellowship Finalist, 2016.</b> One of 40 finalists for the Hertz Fellowship, a highly reputable fellowship for student researchers in the physical, biological, and engineering sciences.</p> <p><b>Runner-up for the Computing Research Association (CRA) Outstanding Undergraduate Researcher Award (Male, PhD-granting institution), 2016.</b> Highly prestigious award recognizing North American undergraduate students who show outstanding research potential in a field of computing.</p> <p><b>Sole recipient of the EECS Mark D. Weiser Excellence in Computing Scholarship, 2015.</b> Merit-based scholarship awarded to one student in the Berkeley EECS department each year for excellence in research.</p> <p><b>Member of the EECS Honors Degree Program, concentration in Mathematics.</b> Honors program with 20-30 students. Requirements include research and extended studies in concentration outside EECS.</p> <p><b>UC Berkeley Outstanding Graduate Student Instructor (OGSI) Award recipient, 2015.</b> Awarded to top 10% of Teaching Assistants across the university each year.</p> <p><b>UC Berkeley Regents' and Chancellor's Scholar.</b> Merit-based scholarship awarded to top 1.5% of applicants to UC Berkeley each year.</p> <p><b>National Merit Scholar.</b> Merit-based scholarship awarded to high-achieving high school students for partial college tuition payment.</p>
Teaching Assistantships	<p><b>CS106A: Code In Place.</b> <i>Stanford, free online course during COVID-19.</i> Summer 2020.</p> <p><b>6.036: Introduction to Machine Learning.</b> <i>MIT.</i> Fall 2018.</p> <p><b>CS189: Introduction to Machine Learning.</b> <i>UC Berkeley.</i> Spring 2016.</p> <p><b>CS188: Introduction to Artificial Intelligence.</b> <i>UC Berkeley.</i> Fall 2015.</p> <p><b>CS61A: Structure and Interpretation of Computer Programs.</b> <i>UC Berkeley.</i> Spring 2015, Spring 2014, Summer 2013.</p> <p><b>CS61C: Great Ideas in Computer Architecture.</b> <i>UC Berkeley.</i> Fall 2014.</p>
Industry	<p><b>Nuro Inc., Planning</b> (Software Engineering Intern) 06/21 - 09/21</p> <ul style="list-style-type: none"> <li>Explored integrated data-driven and rule-based reasoning to improve planning stack.</li> </ul>

- Developed a synergistic approach that improves behavior in 20-40% of challenge scenes.

**Airbnb Inc., Search Ranking** (Software Engineering Intern) 06/16 - 08/16

- Worked on incorporating mobile data into machine learning models used by the Search Ranking team. Collected and organized data using tools in Hive, Presto, and Scala.

**eBay Inc., Checkout** (Software Engineering Intern) 05/14 - 08/14

- Developed an end-to-end pipeline to create a model that classifies checkout transactions.
- Collected data using Hadoop MapReduce under the Apache Pig framework.

## Technical Skills

**Languages:** Python, C++, Java, Scala, LaTeX.

**Software:** PyTorch, TensorFlow, Theano, Unix/Linux, Robot Operating System (ROS), OpenCV, Apache Pig, Apache Spark, Hadoop MapReduce.