

# GAUTAM SALHOTRA

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 Full CV  Updated November 2022

*PhD candidate with interest in optimization & learning for robot manipulation tasks*

## SKILLS

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**Interests:** Inductive Biases in Learning, Optimization, Robotic Manipulation, Control Theory  
**Robots:** Robot Arms (e.g. UR10, Franka Panda), wheeled Manipulators, (pneumatic) soft robots  
**Programming:** Python, C++, Julia, bash, ROS, git, PyTorch, Tensorflow, MATLAB,  $\LaTeX$

## EDUCATION

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**Graduate Student, PhD Computer Science (Robotics)** Ongoing  
*University of Southern California* **Advisor:** Dr. Gaurav Sukhatme

**MS, Computer Science (Robotics and Perception)** '18  
*College of Computing, Georgia Institute of Technology* **GPA:** 4/4

**MS, Mechanical Engineering** '12  
*The University of Texas at Austin* **GPA:** 4/4

**BTech + MTech (Dual Degree), Mechanical Engineering** '10  
*Indian Institute of Technology Bombay* **GPA:** 8.59/10

## EXPERIENCE

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**Graduate Researcher, Robotic Embedded Systems Lab (RESL)** Los Angeles CA, Ongoing  
- Reinforcement learning with strong inductive biases, deformable object manipulation, robot locomotion, and adaptive sampling.

**Applied Scientist Intern, Amazon Robotics** MA, Summer '22  
- Focusing on developing manipulation policies for delicate items.

**Robotics Research Intern, Bosch Research** Bay Area CA, Summer '19  
- Reinforcement Learning for peg insertion tasks (environments, learning and classical control methods)  
- Developed ROS package to deploy a learned algorithm, tested on robot hardware.

**Senior Software Controls Engineer, Symbotic** MA, '16 - '18  
- Implement object manipulation algorithms to pick & place cases in automated storage and retrieval systems  
- Work on low-level controllers for actuator performance and stall detection

**Robotics & Technical Writing, MathWorks** MA, '12 - '15  
- Member, MathWorks ETRobocon team 2013 and 2014 (see Projects).  
- Implemented occupancy grid mapping prototype for robotics toolbox (see Projects).  
- Technical writing: Wrote user examples for features in Simulink software.

## LIST OF PUBLICATIONS

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See  Google Scholar for more information. \* means equal contribution.

### Conferences And Journals

- [1] **Gautam Salhotra\***, I-Chun Arthur Liu\*, Marcus Dominguez-Kuhne, and Gaurav S. Sukhatme. Learning Deformable Object Manipulation from Expert Demonstrations. *IEEE Robotics and Automation Letters (RA-L) and IROS*, 2022.
- [2] **Gautam Salhotra**, Shashank Hegde, Sumeet Batra, Peter Englert, and Gaurav S. Sukhatme. Guided learning of robust hurdling policies with curricular trajectory optimization. In *Southern California Robotics Symposium*, 2022.

- [3] Chris Denniston, **Gautam Salhotra**, David A. Caron, and Gaurav S. Sukhatme. Learned parameter selection for robotic information gathering. In *Under review*, 2022.
- [4] **Gautam Salhotra\***, Christopher E. Denniston\*, David A. Caron, and Gaurav S. Sukhatme. Adaptive Sampling using POMDPs with Domain-Specific Considerations. In *2021 IEEE International Conference on Robotics and Automation (ICRA)*, pages 2385–2391, 2021.
- [5] Sung-Kyun Kim\*, Amanda Bouman\*, **Gautam Salhotra**, et al. Plgrim: Hierarchical value learning for large-scale exploration in unknown environments. In *Proceedings of the International Conference on Automated Planning and Scheduling*, volume 31, pages 652–662, 2021.
- [6] Ali Agha, Kyohei Otsu, Benjamin Morrell, et al. NeBula: Quest for Robotic Autonomy in Challenging Environments; TEAM CoSTAR at the DARPA Subterranean Challenge. *Journal of Field Robotics*, abs/2103.11470, 2021, 2103.11470.
- [7] Jun Yamada, Youngwoon Lee, **Gautam Salhotra**, et al. Motion Planner Augmented Reinforcement Learning for Robot Manipulation in Obstructed Environments. In *Conference on Robot Learning*, Nov 2020.
- [8] Charles Kim, Alexandria Guo, **Gautam Salhotra**, Sara Sprinkhuizen, Keerthi Shetty, and David Sun Kong. Sonifying Data from the Human Microbiota: Biota Beats. *Computer Music Journal*, 44(1):51–70, 2020.
- [9] Justin Lee Clough, Patricia Chaffey, **Gautam Salhotra**, Colin G Cess, Rey Pocius, and Katie Mills. Building Early Elementary Teacher Confidence in Teaching Computer Science Through a Low-Cost, Scalable Research-Practitioner Collaboration. In *2020 ASEE Virtual Annual Conference Content Access*, 2020.
- [10] **Gautam Salhotra**. Model-based controller design and simulation of a marine chiller. Master’s thesis, University of Texas Austin, 2012.
- [11] **Gautam Salhotra**, Vivek Bajpai, and Ramesh K Singh. Finite Element Modeling of Orthogonal Cutting of Pyrolytic Carbon. In *International Manufacturing Science and Engineering Conference*, volume 44304, pages 153–160, 2011.
- [12] Vivek Bajpai, **Gautam Salhotra**, and Ramesh K Singh. Micromachining characterization of anisotropic pyrolytic carbon. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, 225(9):1591–1605, 2011.
- [13] **Gautam Salhotra**. Simulation of machining of pyrolytic graphite. Master’s thesis, Indian Institute of Technology Bombay, 2010.
- [14] Vivek Bajpai, **Gautam Salhotra**, and Ramesh K. Singh. Orthogonal Micro-grooving of Anisotropic Pyrolytic Carbon. In *International Conference on MicroManufacturing (ICOMM)*, Madison WI, 2010.

## Workshops

- [1] **Gautam Salhotra\***, I-Chun Arthur Liu\*, Marcus Dominguez-Kuhne, and Gaurav S. Sukhatme. Learning Deformable Object Manipulation from Expert Demonstrations. In *3rd Workshop on Robotic Manipulation of Deformable Objects (RoMaDO-SI)*, Kyoto, Japan, Oct 2022.
- [2] **Gautam Salhotra\***, I-Chun Arthur Liu\*, Marcus Dominguez-Kuhne, and Gaurav S. Sukhatme. Learning Deformable Manipulation from Expert Demonstrations. In *2nd Workshop on Representing and Manipulating Deformable Objects*, Philadelphia, PA, 2022.
- [3] **Gautam Salhotra**, Peter Englert, and Gaurav S. Sukhatme. Curricular policy search for quadruped jumping. In *ICRA Workshop on Recent Advances in MPC and RL for legged robots*, 2021.
- [4] Venkata Pradeep Kadubandi, **Gautam Salhotra**, Gaurav S. Sukhatme, and Peter Englert. Motion Planner Guided Visuomotor Policy Learning. In *Machine Learning for Motion Planning Workshop, ICRA 2021*, 2021.
- [5] Jun Yamada, **Gautam Salhotra**, Youngwoon Lee, Max Pflueger, Karl Pertsch, and Peter Englert. Motion planner augmented reinforcement learning for robot manipulation in obstructed environments. In *NeurIPS 2020 Workshop on Deep Reinforcement Learning*, Dec 2020.

- [6] Jun Yamada, **Gautam Salhotra**, Youngwoon Lee, Max Pflueger, Karl Pertsch, and Peter Englert. Motion Planner Augmented Spaces for Reinforcement Learning. In *RSS 2020 Workshop on Action Representations for Learning in Continuous Control*, Jul 2020.
- [7] Jun Yamada, **Gautam Salhotra**, Youngwoon Lee, Max Pflueger, Karl Pertsch, and Peter Englert. Motion Planner Augmented Reinforcement Learning for Robot Manipulation in Obstructed Environments. In *NeurIPS 2020 3rd Robot Learning Workshop*, Dec 2020.

## TEACHING EXPERIENCE

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### Teaching Assistant, University of Southern California

- Co-created, produced and TA'ed a master's level course: Introduction to Robotics CS 545 Fall '19, '21
- TA for multiple other courses: Introduction to Robotics (undergraduate, CS 445), Seminar (CS 591), Data Structures (CS104)

### Teaching Assistant, IIT Bombay

- Manufacturing Processes II, Metrology '09 - '10

## STUDENTS ADVISED

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### Angel Ivan Gonsalez Garcia

- Master's student at USC CS, graduated 2019. Fall '18 - Spring '19

### Karkala Shashank Hegde

- Master's student in USC EE, graduated 2021. After graduation: PhD student at USC RESL. Summer '21

### Arthur I-Chun Liu

- Master's student in USC CS, graduating 2023 (expected). Summer '21 - Present

## TALKS AND PRESENTATIONS

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- Learning Deformable Manipulation from Expert Demonstrations  
2nd Workshop on Representing and Manipulating Deformable Objects @ ICRA May '22
- Invited lecture, curricular trajectory optimization, CS 545 at USC Nov '21
- Robots: Past, Present, and Future. USC Robotics week opening talk Apr '21
- Introduction to Task and Motion Planning, invited lecture to CS 545 at USC Nov '19
- Introduction to Reinforcement Learning, Bosch Research LLC Jun '19
- Simulation and Control of a Marine Chiller, Electric Ship Research and Development Consortium Workshop, Austin TX Jun '12
- Micromachining Characterization of Pyrolytic Graphite, thesis at IIT Bombay Jun '10
- Regenerative Braking Strategies, IIT Bombay, India Apr '08
- Nitrous Boost in cars, IIT Bombay technical presentation Jan '06

## SERVICE

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### Professional Service

- Reviewed papers for ISER 2020, ICRA 2021, Autonomous Robots (2022), IEEE RAL (2022) and workshops.
- ICRA 2021 chair for session on "Field Robotics: Control" May '21
- Reviewed grant proposals for the US Department of Energy, office of SBIR/STTR '21 - '22
- Panelist on advising first year CS PhD students on internships Nov '19
- Panelist on advising undergraduate REU students on graduate student life Jul '21, Jun '22

### University Service

- Mentor at USC Viterbi Graduate Mentorship Programming Spring '22 - Present

- Volunteer at USC VAST K-12 outreach, to teach robotics & programming Dec '18 - Present
- Volunteer at USC Robotics Open House (outreach to school children) Apr '19, Apr'21
- Volunteer, Girls Empowerment Day USC: Encouraging high school girls to pursue robotics Dec '19
- Editor, Politics, Nazar student magazine, University of Texas '11 - '12
- Head, IIT Bombay Chapter of PiTech, Pan IIT Technical Magazine '09 - '10
- Institute Student Mentor for Freshmen '09 - '10
- Student Journalist, InsIghT student newspaper, IIT Bombay '06 - '10
- Chief Editor, Mechanical Engineering Department Magazine, MEME '09 - '10
- Head, Mech. Engg. Dept. Academic Mentorship Programme '09 - '10
- Cultural Activities Councillor '07 - '08
- Founder and Chief Editor, Hostel 3 magazine - 3BUNE '07 - '09
- Debating Activities Secretary, Hostel 3, IIT Bombay '06 - '07

### **Volunteering**

- USC RESL lab volunteer: student host for speakers, lab coordinators, Slack admin, etc. '18 - Present
- Volunteer at StreetBio, a community bio-lab in Cambridge MA Feb '17 - Apr '19
- Community Farming Volunteer, Stearns Farm, Framingham MA May '15
- Cleanup of Lake Cochituate and nearby trails, Natick MA Jun '13, Jun '14

### **AWARDS AND HONORS**

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- Amazon Research Award '18
- DAAD WISE Scholarship 2008, by German Academic Exchange Service, for internships in Germany '08
- Indian Institute of Technology Joint Entrance Exam (JEE): 858th out of 400,000 students nationwide '05
- Certificate of Excellence in Mathematics in Grade XII, State Govt. of Maharashtra, India '04
- State of Maharashtra High School Scholarship (HSS), 29th in state '99

### **EXTRACURRICULAR ACTIVITIES**

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- Adventure sports (climbing, kayaking, etc.), photography, environmental conservation, parliamentary debates.
- Member, Biota Beats project at the intersection of arts & life sciences (see [8]) '17 - '20
- Winner, UTexas Graduate Student Photography Showcase Apr '12
- Institute Cultural Colour, IIT Bombay '08 - '09  
Given to 6 in 6000 students, for excellence in cultural activities that year
- Hostel/Dorm Awards for Organizational & Cultural activities, IIT Bombay '06 - '07