

RESEARCH INTERESTS

Robotics: Robotic Manipulation, Grasping, Assistive Robotics, Robotic Perception, Tactile Sensing, Optimal Control, Motor Skills, Anthropomorphic and Biomimetic Robots, Robot Design

Artificial Intelligence: Imitation Learning, Supervised, Unsupervised, and Reinforcement Learning, Deep Learning, Policy Search, Active Learning, Automated Synthesis, Formal Specifications

Human-Robot Interaction: Human motor control, Human motion modelling, Intention prediction, Human activity recognition, Human-centered systems, Shared control, Collaborative interaction, Competitive interaction

EDUCATION

Cornell University, Ithaca, USA 2017 – 2022
Doctor of Philosophy, Mechanical Engineering, Minor: Computer Science, Research Area: Human-Robot Interaction
Academic Year 2019-20 at Ben-Gurion University of the Negev (BGU), Israel
Thesis: *Robot Controllers, Gaze Behaviors, and Human Motion Datasets for Object Handovers*
Committee: Prof. Guy Hoffman (Chair), Prof. Hadas Kress-Gazit, Prof. Mark Campbell
GPA: 4/4

Indian Institute of Technology-Madras, Chennai, India 2015 – 2017
Master of Technology, Mechanical Engineering, Specialization: Mechanical Design
Winter Semester 2016-17 at Rheinisch-Westfälische Technische Hochschule (RWTH) Aachen, Germany
Thesis: *iGPS Based Motion Control of a Robotic Manipulator using Robot Operating System*
Supervisors: Prof. Saurav Rakshit, Prof. Burkhard Corves
CGPA: 9.07/10

Indian Institute of Technology-Bombay, Mumbai, India 2010 – 2014
Bachelor of Technology, Mechanical Engineering, Minor: Aerospace Engineering
Thesis: *Design Optimization and Motion Dynamics of Mobility System for Mars Rover*
Supervisor: Prof. Anirban Guha
CGPA: 8.78/10

PROFESSIONAL EXPERIENCE

- **Postdoctoral Researcher**, Computer Science Department, Technische Universität Darmstadt, Germany. Project: The Adaptive Mind (Hessian state funding) 07/2022 – Present
- **Graduate Research/Teaching Assistant**, Sibley School of Mechanical and Aerospace Engineering, Cornell University, USA 08/2017 – 05/2022
- **Visiting Doctoral Researcher**, Department of Industrial Engineering and Management, Ben-Gurion University of the Negev, Israel 10/2019 – 08/2020
- **Visiting Student Researcher**, Institute of Mechanism Theory, Machine Dynamics and Robotics, Rheinisch-Westfälische Technische Hochschule Aachen, Germany 09/2016 – 03/2017
- **Visiting Student Researcher**, Mechanical Engineering Department, University of California Berkeley, USA 05/2016 – 07/2016
- **Junior Research Fellow**, Aerospace Engineering Department, Indian Institute of Technology Bombay, India. Project: Simulation of Breakaway Aerostat (DRDO funding) 09/2014 – 06/2015
- **Visiting Student Researcher**, Aerospace Engineering Department, Indian Institute of Science Bangalore, India 05/2013 – 07/2013
- **Student Investigator**, Mechanical Engineering Department, Indian Institute of Technology Bombay, India. Project: Design of Saree-Cutting Machine (RuTAG funding) 01/2012 – 11/2013
- **Undergraduate Summer Intern**, Mahindra and Mahindra Ltd., Nagpur, India 06/2012 – 07/2012

AWARDS/SCHOLARSHIPS

- RSS Pioneers – Selected as a member of 30 top early career robotics researchers 2024
- Postdoctoral Networking Tour in AI Fellowship by ‘German Academic Exchange Service (DAAD)’ 2022
- HRI Pioneers – Selected as a member of 14 top graduate students in human-robot interaction 2022
- Research Academic Internship Scholarship by ‘Israeli Council for Higher Education’ 2019
- IIT Master Sandwich Scholarship by ‘German Academic Exchange Service (DAAD)’ 2016
- S.N. Bose Scholarship by ‘Indo-US Science and Technology forum’ 2016
- Gandhian Young Technological Innovation Award by ‘Society for Research and Initiatives for Sustainable Technologies and Institutions, India’ 2013
- Institute Technical Special Mention, awarded to 12 out of 7000 students, for notable contribution in robotics activities at IIT Bombay 2012
- *Top 1%* in National Standard Examination in Physics, Chemistry and Astronomy 2010
- KVPY (Kishore Vaigyanik Protsahan Yojana or Young Scientist Initiative) fellowship, initiated by Department of Science and Technology, Govt. of India 2010
- National Talent Search Scholarship by NCERT, Govt. of India, awarded to top 750 high-school students in the country on the basis of 3 tier examination 2008

TEACHING/MENTORING EXPERIENCE

Teaching Assistant

- Mechanical Synthesis, Cornell University 01/2021 – 05/2021
- Human-Robot Interaction: Algorithms and Experiments, Cornell University 08/2018 – 12/2018

Training in Teaching

- Course Design Workshop, Center for Teaching Innovation, Cornell University 01/2021 – 05/2021
- Theatre Techniques in Teaching, Cornell University 01/2018 – 05/2018

Mentored Students in Research

1. Junyi Chen (BSc, Computer Science, TU Darmstadt) 04/2024 – Present
2. Qimeng He (MSc, Autonomous Systems, TU Darmstadt) 04/2024 – Present
3. Marcus Kornamann (MSc, Computer Science, TU Darmstadt) 04/2024 – Present
4. Yasemin Göksu (MSc, Visual Computing, TU Darmstadt) 11/2022 – Present
5. Dominik Horstkötter (BSc, Computer Science, TU Darmstadt) 11/2022 – Present
6. Frederik Heller (BSc, Computer Science, TU Darmstadt) 11/2022 – Present
7. Duc Huy Nguyen (BSc, Computer Science, TU Darmstadt) 11/2022 – Present
8. Felix Nonnengießer (MSc, Computer Science, Goethe University) 12/2022 – Present
9. Anish Devnoor (BTech, Electronics & Instrumentation, BITS Hyderabad) 06/2023 – Present
10. Fabian Hahne (BSc, Computer Science, TU Darmstadt) 11/2023 – Present
11. Mengjie Wang (BSc, Computer Science, TU Darmstadt) 11/2023 – 03/2024
12. Junyu Zhou (MSc, Mechatronics, TU Darmstadt) 11/2023 – 03/2024
13. Antonio De Almeida Correia (MSc, Autonomous Systems, TU Darmstadt) 11/2022 – 10/2023
14. Aadya Pipersenia (BTech, Energy Science & Engineering, IIT Bombay) 05/2023 – 08/2023
15. Li Liu (MSc, Computational Engineering, TU Darmstadt) 11/2022 – 05/2023
16. Mario Gomez (BSc, Computer Science, TU Darmstadt) 11/2022 – 03/2023
17. Irina Rath (BSc, Computer Science, TU Darmstadt) 11/2022 – 03/2023
18. Christoph Dickmanns (BSc, Computer Science, TU Darmstadt) 11/2022 – 03/2023
19. Hanjo Schnellbacher (MSc, Computer Science, TU Darmstadt) 11/2022 – 03/2023
20. Zeyuan Sun (MSc, Computer Science, TU Darmstadt) 11/2022 – 03/2023
21. Alina Boehm (BSc, Cognitive Science, TU Darmstadt) 09/2022 – 03/2023
22. Raphael Fortuna (BS, Electrical Engineering, Cornell) 09/2021 – 07/2022
23. Zhiming Xie (MEng, Mechanical Engineering, Cornell) 01/2022 – 07/2022
24. Tair Faibish (MSc, Industrial Engineering, BGU) 01/2020 – 12/2021
25. Rahul Kumar Ravi (MS, Mechanical Engineering, Cornell) 01/2021 – 12/2021
26. Jordana Socher (BS, Computer Science, Cornell) 03/2021 – 12/2021
27. David Bruk-Rodriguez (BS, Biomedical Engineering, Cornell) 03/2021 – 12/2021
28. Sophie Keller (BS, Computer Science, Cornell) 09/2021 – 12/2021
29. Cole Dawson (BS, Mechanical Engineering, Cornell) 03/2021 – 05/2021
30. Mohammad Ali Moghaddasi (BS, Mechanical, Cornell) 03/2021 – 05/2021
31. Melanie Lim (MEng, Systems Engineering, Cornell) 04/2019 – 04/2020

32. Shemar Christian (BS, Mechanical Engineering, Cornell)	04/2019 – 04/2020
33. Julie Katz (MPS, Information Science, Cornell)	02/2019 – 05/2019
34. Song Ye (MPS, Information Science, Cornell)	02/2019 – 05/2019
35. Lucia Gomez (BS, Computer Science, Cornell)	09/2018 – 12/2018

WORKSHOP ORGANIZATION

- **Workshop on Embodiment Aware Robot Learning at Robotics Science and Systems (R:SS 2024)**, Delft, Netherlands, 15 July 2024, with Boris Belousov (DFKI) and Jan Peters (TU Darmstadt)
- **IGSTC funded Indo-German Workshop on Frontiers of Robot Learning 2024**, IIT Bombay, India, 4 – 6 March 2024, with Arpita Sinha (IIT Bombay), Leena Vachhani (IIT Bombay), and Jan Peters (TU Darmstadt)
- **Workshop on Human-Interactive Robot Learning at Human-Robot Interaction (HRI 2024)**, Boulder, USA, 15 March 2024, with Mattia Racca (Naver Labs), Reuth Mirsky (Bar Ilan Univ.), Emmanuel Senft (Idiap Research Institute), Xuesu Xiao (George Mason Univ.), Ifrah Idrees (Amazon), and Ravi Prakash (IISc Bangalore)

SERVICE

Peer-Review

Conference on Robot Learning (CoRL)	2024
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) (Associate Editor)	2024
Robotics: Science and Systems (RSS)	2024
ACM/IEEE International Conference on Human-Robot Interaction (HRI) (Special Recognition)	2024
Conference on Robot Learning (CoRL)	2023
IEEE Robotics and Automation Letters	2023
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)	2023
IEEE International Conference on Advanced Robotics and Its Social Impacts (ARSO)	2023
ACM/IEEE International Conference on Human-Robot Interaction (HRI)	2023
IEEE International Conference on Robotics and Automation (ICRA)	2023
International Conference on Social Robotics (ICSR)	2022
International Journal of Social Robotics	2022
IEEE Transactions on Instrumentation & Measurement (TIM)	2021
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)	2021
IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob)	2020
ACM/IEEE International Conference on Human-Robot Interaction (HRI) Late Breaking Reports	2020
Robotics: Science and Systems (RSS) Pioneers	2019

Volunteering

Board Member, Society for Promotion of Indian Classical Music and Culture Among Youth (SPICMACAY) - Cornell Chapter, USA	Aug 2018 – 06/2022
Leadership Team Member, Science and Research Opportunities in India (Sci-ROI), USA	01/2021 – Aug 2022
Volunteer, Group for Rural Activities IIT Bombay, India	Aug 2011 – 04/2013

TALKS

- **Learning Robotic Manipulation for Human-Robot Interaction and Tactile Exploration**, at the IGSTC Workshop on Frontiers of Robot Learning, Indian Institute of Technology Bombay, India 03/2024
- **Improving Human-Robot Interaction in Shared Workplaces**, at the Institute of Sports Science, Justus-Liebig-Universität Gießen, Germany 06/2023
- **Robot Controllers, Gaze Behaviors and Human Motion Datasets for Object Handovers**, at the Sibley Graduate Research Symposium, Cornell University, USA 04/2022

PUBLICATIONS

Book Chapters

1. G. Hoffman, **A. Kshirsagar** and M. Law. “Human-Robot Interaction Challenges in the Workplace.” *S. C. Matz (Ed.), The Psychology of Technology: Social Science Research in the Age of Big Data*, American Psychological Association, 2022

Journal Articles

1. S. Gu, P. Liu, **A. Kshirsagar**, G. Chen, J. Peters and A. Knoll. “ROSCOM: Robust Safe Reinforcement Learning on Stochastic Constraint Manifold.”, *IEEE Transactions on Automation Science and Engineering* (accepted), 2024
2. V. Prasad, **A. Kshirsagar**, D. Koert, R. Stock-Homburg, J. Peters and G. Chalvatzaki. “MoVEInt: Mixture of Variational Experts for Learning Human–Robot Interactions From Demonstrations.” *IEEE Robotics and*

Automation Letters 9 (7): 6043-6050, 2024 (The contents of this paper were also selected by IROS'24 Program Committee for presentation at the Conference)

3. B. Dreyfuss, O. Heffetz, G. Ishai, G. Hoffman and **A. Kshirsagar**. "Additive vs. Subtractive Earning in Shared Human-Robot Work Environments." *Journal of Economic Behavior and Organization (JEBO)*, 2024
4. S. Gu*, **A. Kshirsagar***, Y. Du*, G. Chen, J. Peters and A. Knoll. "A Human-Centered Safe Robot Reinforcement Learning Framework with Interactive Behaviors." *Frontiers in Neurorobotics*, 2023 (*co-first author)
5. **A. Kshirsagar**, R. Fortuna, Z. Xie, and G. Hoffman. "Dataset of Bimanual Human-to-Human Object Handovers." *Data in Brief*, 2023
6. T. Faibish*, **A. Kshirsagar***, G. Hoffman and Y. Edan. "Human Preferences for Robot Eye Gaze in Human-to-Robot Handovers." *International Journal of Social Robotics*, 2022 (*co-first author)
7. **A. Kshirsagar**, G. Hoffman and A. Biess. "Evaluating Guided Policy Search for Human-Robot Handovers." *IEEE Robotics and Automation Letters* 6 (2): 3933-3940, 2021 (The contents of this paper were also selected by ICRA'21 Program Committee for presentation at the Conference)
8. **A. Kshirsagar**, M. Lim, S. Christian and G. Hoffman. "Robot Gaze Behaviors in Human-to-Robot Handovers." *IEEE Robotics and Automation Letters* 5(4):6552-6558, 2020 (The contents of this paper were also selected by IROS'20 Program Committee for presentation at the Conference)
9. **A. Kshirsagar** and A. Guha. "Design optimization of rocker bogie system and development of look-up table for reconfigurable wheels for a planetary rover." *International Journal of Vehicle Structures and Systems*, 2016
10. S. Loharkar, **A. Kshirsagar** and R. Pant. "Design and Fabrication of a portable semi-rigid airship." *Annual Technical Volume of Aerospace Engineering Division Board, Institution of Engineers (India)*, 2015-16

Conference Proceedings

1. R. Spartakov, **A. Kshirsagar**, D. Mühl, R. Schween, D.M. Endres, F. Bremmer, C. Melzig and J. Peters. "Balancing on the Edge: Review and Computational Framework on the Dynamics of Fear of Falling and Fear of Heights in Postural Control." *Annual Meeting of the Cognitive Science Society (CogSci)*, Rotterdam, Netherlands, 24 July – 27 July 2024.
2. L. Lin, A. Böhm, B. Belousov, **A. Kshirsagar**, T. Schneider, J. Peters, K. Doerschner and K. Drewing. "Task-Adapted Single-Finger Explorations of Complex Objects." *Eurohaptics Conference*, Lille, France, 30 June – 3 July 2024.
3. A. Boehm, T. Schneider, B. Belousov, **A. Kshirsagar**, L. Lin, K. Doerschner, K. Drewing, C. Rothkopf, J. Peters. "What Matters for Active Texture Recognition with Vision-Based Tactile Sensors." *IEEE International Conference on Robotics and Automation (ICRA)*, Yokohama, Japan, 13 May – 17 May 2024
4. **A. Kshirsagar***, T. Faibish*, G. Hoffman and A. Biess. "Lessons Learned from Utilizing Guided Policy Search for Human-Robot Handovers with a Collaborative Robot." *International Conference on Robotics, Automation and Artificial Intelligence (RAAI)*, Singapore, 9 December – 11 December 2022 (*co-first author)
5. **A. Kshirsagar***, R. Ravi*, H. Kress-Gazit and G. Hoffman. "Timing-specified Controllers for Human-Robot Handovers." *IEEE International Conference on Robot & Human Interactive Communication (RO-MAN)*, Naples, Italy, 29 August – 2 September 2022 (*co-first author)
6. **A. Kshirsagar**, H. Kress-Gazit and G. Hoffman. "Specifying and Synthesizing Human-Robot Handovers." *IEEE/RSJ International Conference on Intelligent Systems and Robots (IROS)*, Macau, 4-8 November 2019
7. **A. Kshirsagar**, B. Dreyfuss, G. Ishai, O. Heffetz and G. Hoffman. "Monetary-Incentive Competition between Humans and Robots: Experimental Results." *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, Daegu, South Korea, 11-14 March 2019
8. **A. Kshirsagar**, R. Pant and K. Bodi. "Dynamic simulation of breakaway aerostat with emergency deflation valves." *16th AIAA Aviation Technology, Integration and Operations Conference*, AIAA Aviation, Washington D.C., USA, 13-17 June 2016
9. **A. Kshirsagar**, D. Harursampath and B. R. Gupta. "VAM applied to Dimensional Reduction of Non-linear Multifunctional Film Fabric Laminates." *12th International Conference of Numerical Analysis and Applied Mathematics*, Rhodes, Greece, 22-28 September 2014
10. **A. Kshirsagar**, A. Tejwani, V. Singh, G. Bhat, N. Singh, A. Yadav, A. Berlia, K. Saboo, U. Patil and S. Prasad. "Mechatronic Design, Fabrication and Analysis of a Small-Size Humanoid Robot-Parinat.", *International Conference on Design, Manufacturing and Mechatronics*, Pune, India, April 2014

Workshop Papers/Late-breaking Reports

1. **A. Kshirsagar**, F. Heller, M. Gomez Andreu, B. Belousov, T. Schneider, P. Y. Lisa, K. Doerschner, K. Drawing and J. Peters. "Hardness Similarity Detection Using Vision-Based Tactile Sensors." *40th Anniversary of the IEEE International Conference on Robotics and Automation (ICRA@40)*, Rotterdam, Netherlands, 23 – 26 September 2024 (accepted)
2. V. Prasad, **A. Kshirsagar**, D. Koert, R. Stock-Homburg, J. Peters and G. Chalvatzaki. "MoVEInt: Mixture of Variational Experts for Learning Human–Robot Interactions From Demonstrations." *Workshop on Structural Priors as Inductive Biases for Learning Robot Dynamics at Robotics: Science and Systems*, Delft, Netherlands, 15 July 2024
3. M. Racca, R. Mirsky, E. Senft, X. Xiao, I. Idrees, **A. Kshirsagar** and R. Prakash. "3rd Workshop on Human-Interactive Robot Learning (HIRL)." *ACM/IEEE International Conference on Human-Robot Interaction (HRI) - Workshop*, Boulder, United States, 15 March 2024
4. Y. Goeksu, A. Almeida-Correia, V. Prasad, **A. Kshirsagar**, D. Koert, J. Peters, G. Chalvatzaki. "Kinematically Constrained Human-like Bimanual Robot-to-Human Handovers.", *ACM/IEEE International Conference on Human Robot Interaction (HRI) Late Breaking Report*, Boulder, United States, 11 March – 15 March 2024.
5. F. Hahne, V. Prasad, **A. Kshirsagar**, D. Koert, R. M. Stock-Homburg, J. Peters, G. Chalvatzaki. "Transition State Clustering for Interaction Segmentation and Learning", *ACM/IEEE International Conference on Human Robot Interaction (HRI) Late Breaking Report*, Boulder, United States, 11 March – 15 March 2024.
6. A. Boehm, T. Schneider, B. Belousov, **A. Kshirsagar**, L. Lin, K. Doerschner, K. Drawing, C. A. Rothkopf and J. Peters. "Tactile Active Texture Recognition With Vision-Based Tactile Sensors", *NeurIPS Workshop on Touch Processing: a new Sensing Modality for AI*, New Orleans, United States, 25 September 2023
7. **A. Kshirsagar** and G. Hoffman. "Empowering Robots for Object Handovers." *ACM/IEEE International Conference on Human-Robot Interaction (HRI) - Pioneers Workshop*, Online, 7 March 2022
8. **A. Kshirsagar**, H. Kress-Gazit and G. Hoffman. "Human-Robot Handovers with Signal Temporal Logic Specifications." *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, New Delhi, India, 14-18 October 2019 (Best Late Breaking Report Award)
9. **A. Kshirsagar**, V. Sharma and R. S. Pant. "Design and Development of a Dismantable Semi Rigid Remotely Controlled Airship." *10th International Airship Convention and Exhibition*, Friedrichshafen, Germany, 16-18 April 2015
10. A. Rajagopal, P. Bende, S. Yadav, R. Agarwal and A. Sathawane, **A. Kshirsagar**, M.C. Hemanth, N. Kumar, P. Gatkine. "Design, Modelling and Control of a 6 Degrees of Freedom Robotic Arm with specific applications in Planetary Exploration Missions." *65th International Astronautical Congress*, Toronto, Canada, 29 September-3 October 2014

Theses

1. **A. Kshirsagar**. "Robot Controllers, Gaze Behaviors and Human Motion Datasets for Object Handovers." *Ph.D. Thesis*, Sibley School of Mechanical and Aerospace Engineering, Cornell University, 2022
2. **A. Kshirsagar**. "iGPS Based Motion Control of a Robotic Manipulator using Robot Operating System." *Master's Thesis*, Department of Mechanical Engineering, Indian Institute of Technology Madras, 2017
3. **A. Kshirsagar**. "Design Optimization and Motion Dynamics of Mobility System for Mars Rover." *Bachelor's Thesis*, Department of Mechanical Engineering, Indian Institute of Technology Bombay, 2014