



Rahul Shome

Tenure Track Lecturer
School of Computing
The Australian National University

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Appointments

2022- **Tenure Track Lecturer, The Australian National University, Canberra, AU**
Appointment to the School of Computing in the ANU College of Engineering, Computing & Cybernetics.

Past

2022 **Visiting Fellow, The Australian National University, Canberra, AU**
Appointment to the School of Computing in the ANU College of Engineering, Computing & Cybernetics.

Education

2020 **Ph.D, Rutgers University, USA** in Computer Science
The problem of many: efficient multi-arm, multi-object task and motion planning with optimality guarantees. <url>
Advisor: Prof. Kostas E. Bekris
Committee: Prof. Danica Kragic, Prof. Jingjin Yu, Prof. Abdeslam Boularias

M.S, Rutgers University, USA in Computer Science.

Work Experience and Roles

2020-22 **Postdoctoral Research Associate**, Department of Computer Science, Rice University, Houston, USA.
Fellow of the Rice Academy, Rice University, Houston, USA.

2014-20 **Graduate Research Assistant**, Department of Computer Science, Rutgers University, New Jersey, USA.

2013-20 **Teaching Assistant**, Department of Computer Science, Rutgers University, New Jersey, USA.

2016,18 **Instructor**, Department of Computer Science, Rutgers University, New Jersey, USA. *Course: Introduction to Artificial Intelligence*

Awards and Recognitions

2021 **Senior Fellow of the Rice Academy Postdoctoral Fellowship**, Rice University

2020 **Junior Fellow of the Rice Academy Postdoctoral Fellowship**, Rice University

2019 **Finalist for Best Paper in Automation Award at IEEE International Conference on Robotics and Automation (ICRA) 2019**

2017 **Best Paper Award at 1st IEEE International Symposium on Multi-robot and Multi-agent Systems**

2008 **Ranked in the top 4 percentile in the All India Engineering Entrance Examination**

2006,08 **Academic Excellence Award by the Hon'b Governor of West Bengal, India**

Funding and Research Opportunities

2024 **Chief Investigator, HMI AI for Social Good Seed Grant**, Virtues of Robot Inaction: Towards Theories of Automated Reasoning of Inaction in Human Contexts, A\$25,000. Interdisciplinary project with 1 CI, and 3 international partner investigators.

Chief Investigator, HMI AI for Social Good Seed Grant, Privacy-Preserving Perception for Robotics, A\$25,000. Interdisciplinary project in ANU with 4 CIs.

2023-28 **Chief Investigator, ARC Industrial Transformation Research Hub in Intelligent Robotic Systems for Real-Time Asset Management**, A\$10M. Inter-university and industry project with 14 CIs.

2023 **Affiliate Investigator, Humanising Machine Intelligence**

Service and Engagement

Academic Service

- 2024
 - 📌 **Area Chair** *Robotics: Science and Systems (RSS)*
 - 📌 **Website and Publicity Chair** *1st Robot Systems Winter School, Australia*
 - 📌 **Associate Editor** *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*
 - 📌 **Program Committee** *Distributed Autonomous Robotic Systems (DARS)*
 - 📌 **Associate Editor** *IEEE Conference on Robotics and Automation (ICRA)*
- 2023
 - 📌 **Website Chair** *Robotics: Science and Systems (RSS)*
- 2022 –
 - 📌 **Associate Editor** *IEEE Robotics and Automation Letters (RA-L)*
- 2022
 - 📌 **Organizer** *IROS Workshop on Evaluating Motion Planning Performance*
 - 📌 **International Program Committee** *IFAC Workshop on Cyber-Physical Human Systems*
- 2021
 - 📌 **Session Co-Chair**, *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Motion and Path Planning
 - 📌 **Session Chair**, *IEEE Conference on Automation Science and Engineering*, Task Planning and Swarms Technical Presentation
- 2019
 - 📌 **Website Chair, Session Chair, and Local Organizer**, *2nd IEEE International Symposium on Multi-robot and Multi-agent Systems*

University Service

- 2024
 - 📌 **Intelligent Systems Cluster HDR Student Retreat** Co-organized the HDR student retreat.
 - 📌 **Interview Panel** Was part of a three-member interview panel for an interim Executive Assistant to the Dean of the College of Engineering, Computing & Cybernetics.
- 2024–25
 - 📌 **Early Career Member, University Research Committee**, Appointed Early Career Researcher, the Australian National University.
- 2023–25
 - 📌 **College of Engineering, Computing & Cybernetics** Early Career Academic Representative.
- 2023
 - 📌 **School of Computing Knowledge Base** Coordinated documentation of wiki particularly targeting new academic staff. [<url>](#)
 - 📌 **Intelligent Systems Cluster HDR Student Retreat** Co-organized the second annual cluster-level HDR student retreat.

Public Engagement

- 2024
 - 📌 **National Gallery of Australia**, Panelist, *Discussion on Body Sculpture Robot Art Exhibit*.
 - 📌 **National Youth Science Forum**, Lecture, *Computing for Artificial Intelligence in Robots*.
- 2023
 - 📌 **Australian Defence Magazine Space Summit**, Panelist, *The role of AI, Robotics & Machine Learning in Space Exploration*.
- 2021
 - 📌 **Session Judge**, *National Consortium of Graduate Degrees for Minorities in Engineering (GEM)*,

Teaching

- 2024
 - 🏛️ Theory of Computation, Convenor, School of Computing, The Australian National University, Canberra, AU.
- 2023
 - 🏛️ Advanced Topics in AI, Guest Lecturer, School of Computing, The Australian National University, Canberra, AU.
- 2018
 - 🏛️ Introduction to Artificial Intelligence, Instructor, Department of Computer Science, Rutgers University, New Jersey, USA.
In charge of undergraduate course with 54 students. Duties included designing the course, creating assignments and evaluations, being the sole instructor, and managing teaching assistants.
- 2016
 - 🏛️ Introduction to Artificial Intelligence, Instructor, Department of Computer Science, Rutgers University, New Jersey, USA.
In charge of undergraduate course with 26 students. Duties included designing the course, creating and grading assignments, and being the sole instructor.
- TA
 - 🏛️ Data Structures and Algorithms, Introduction to Discrete Structures, Topics in Robotics, Introduction to Artificial Intelligence

Mentoring Experience

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| PhD Primary Supervisor | 🏛️ Hao Lu, HDR student, School of Computing, the Australian National University. |
| | 🏛️ Subhransu Bhattacharjee, HDR student, School of Computing, the Australian National University. |
| PhD Committee Member | 🏛️ Ruitao Leng, HDR student, School of Computing, the Australian National University. |
| | 🏛️ Yohan Karunanayake, HDR student, School of Computing, the Australian National University. |
| | 🏛️ Patrick Liston, HDR student, School of Computing, the Australian National University. |
| Honours Supervisor | 🏛️ Yunong Hao, Honours project, School of Computing, the Australian National University. |
| | 🏛️ Xinyu Yang, Honours project, School of Computing, the Australian National University. |
| Project Supervisor | 🏛️ Stephen Lindrud, High school student project with ANU School of Computing. |
| | 🏛️ Aanya Khurana, Visiting Scholar, Department of Computer Science & Engineering, Indian Institute of Technology, Delhi. |
| | 🏛️ Madison Wright, Research Methods R&D project, School of Engineering, the Australian National University. |
| Master's Supervisor | 🏛️ Yuhang Zhang, Masters Project, School of Computing, the Australian National University. |
| | 🏛️ Hao Lu, Masters Project, School of Computing, the Australian National University. National University. |
| Co-advised | 🏛️ Shlok Sobti, Doctoral student, Department of Computer Science, Rice University. |
| | 🏛️ Tianyang Pan, Doctoral student, Department of Computer Science, Rice University. |

Invited Talks

- 2024 🏛️ **University of Ulm**, Speaker, *Role of Planning and Logic in Robotics*.
- 2023 🏛️ **AI in Society Workshop**, Panelist, Panel on *Generative AI and Large Language Models*.
- 🏛️ **Australian National University**, *Making Robots Intelligent: The role of algorithms in planning and reasoning*.
- 2022 🏛️ **National Institute of Technology, Durgapur**, —"—
- 🏛️ **Lehigh University**, *Collaborative Automation: Robots working with and around humans*
- 🏛️ **Pennsylvania State University**, —"—
- 🏛️ **Stevens Institute of Technology**, —"—
- 🏛️ **University of Wisconsin-Madison**, —"—
- 🏛️ **University of California, Riverside**, —"—
- 🏛️ **University of Texas, Dallas**, —"—
- 🏛️ **University of Nevada, Reno**, —"—
- 🏛️ **University of Utah**, —"—
- 🏛️ **Australian National University**, —"—
- 2021 🏛️ **Technische Universität Berlin**, *Leveraging Structures and Theoretical Guarantees in Robotics*
- 🏛️ **University of Illinois, Urbana-Champaign**, *Efficient Planning with Theoretical Guarantees in Robotics from Multi-robot to Task and Motion Planning*
- 🏛️ **Rutgers University, New Brunswick**, *Kinodynamic Planning with Bundles of Edges*

Publications

Books and Chapters

- 2024 Shome, R., & Kavraki, L. E. (2024). A review of motion planning algorithms. In *Foundations and Trends® in Robotics*. Now Publishers, Inc. (In Preparation).
- 2021 Bekris, K. E., & Shome, R. (2021). Asymptotically optimal sampling-based planners. In M. H. Ang, O. Khatib & B. Siciliano (Eds.), *Encyclopedia of Robotics* (pp. 1–12). Springer, Berlin Heidelberg. [<url>](#) .

Journal Articles

- 2024 Shome, R., Pan, T., & Kavraki, L. E. (2024). Task and motion planning for execution in the real. *IEEE Transactions on Robotics*.

- 2021 **Shome, R.**, Solovey, K., Yu, J., Bekris, K., & Halperin, D. (2021). Fast, high-quality two-arm rearrangement in synchronous, monotone tabletop setups. *IEEE Transactions on Automation Science and Engineering*, 18(3), 888–901.
- 2021 **Shome, R.** (2021). Roadmaps for robot motion planning with groups of robots. *Current Robotics Reports*, 1–10. [<url>](#) .
- 2020 Mitash, C., **Shome, R.**, Wen, B., Boularias, A., & Bekris, K. (2020). Task-driven perception and manipulation for constrained placement of unknown objects. *IEEE Robotics and Automation Letters (RA-L)* [Also accepted to appear at the 2020 IEEE International Conference on Robotics and Automation (ICRA)]. [<url>](#) .
- 2020 Kimmel, A., **Shome, R.**, & Bekris, K. E. (2020). Anytime motion planning for prehensile manipulation in dense clutter. *Advanced Robotics*. [<url>](#) .
- 2019 **Shome, R.**, Solovey, K., Dobson, A., Halperin, D., & Bekris, K. E. (2019). dRRT*: Scalable and informed asymptotically-optimal multi-robot motion planning. *Autonomous Robots*. [<url>](#) .
- 2019 Feld-Cook, E., **Shome, R.**, Zaleski, R., Mohan, K., Kourtev, H., Bekris, K. E., Weisel, C., & Shin, J. (2019). Exploring the utility of robots in exposure studies. *Journal of exposure science & environmental epidemiology*. [<url>](#) .
- 2018 Dodson, T., Grothues, T. M., Eiler, J. H., Dobarro, J. A., & **Shome, R.** (2018). Acoustic-telemetry payload control of an autonomous underwater vehicle for mapping tagged fish. *Limnology and Oceanography: Methods*, 16(11), 760–772. [<url>](#) skip.
- 2016 Rennie, C., **Shome, R.**, Bekris, K. E., & Ferreira De Souza, A. (2016). A dataset for improved rgb-d-based object detection and pose estimation for warehouse pick-and-place. *IEEE Robotics and Automation Letters (RA-L)* [Also accepted to appear at the 2016 IEEE International Conference on Robotics and Automation (ICRA)], 1, 1179–1185. [<url>](#) .
- 2015 Bekris, K., **Shome, R.**, Krontiris, A., & Dobson, A. (2015). Cloud automation: Precomputing roadmaps for flexible manipulation. *IEEE Robotics & Automation Magazine*, 22(2), 41–50. [<url>](#) .

Refereed Conferences

- 2024 Sung, Y., **Shome, R.**, & Stone, P. Asynchronous task plan refinement for multi-robot task and motion planning. In: In 2024 International Conference on Robotics and Automation (ICRA). IEEE, 2024.
- 2023 **Shome, R.**, Kingston, Z., & Kavraki, L. E. Robots as AI Double Agents: Privacy in Motion Planning. In: In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. Detroit, USA, 2023, September. [<url>](#) .
- 2023 Quintero-Pena, C., Kingston, Z., Pan, T., **Shome, R.**, Kyriallidis, A., & Kavraki, L. E. Optimal grasps and placements for task and motion planning in clutter. In: In 2023 International Conference on Robotics and Automation (ICRA). IEEE, 2023, May. [<url>](#) .
- 2023 Sobti, S., **Shome, R.**, & Kavraki, L. E. Efficient inference of temporal task specifications from human demonstrations using experiment design. In: In 2023 International Conference on Robotics and Automation (ICRA). IEEE, 2023, May. [<url>](#) .
- 2022 Pan, T., Wells, A. M., **Shome, R.**, & Kavraki, L. E. Failure is an option: Task and motion planning with failing executions. In: In 2022 international conference on robotics and automation (icra). IEEE, 2022, May. [<url>](#) .
- 2021 Pan, T., Wells, A. M., **Shome, R.**, & Kavraki, L. E. A general task and motion planning framework for multiple manipulators. In: In *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. Prague, Czech Republic, 2021, September. [<url>](#) .
- 2021 Sobti, S., **Shome, R.**, Chaudhuri, S., & Kavraki, L. E. A Sampling-based Motion Planning Framework for Complex Motor Actions. In: In *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. Prague, Czech Republic, 2021, September. [<url>](#) .
- 2021 **Shome, R.**, & Kavraki, L. E. Asymptotically optimal kinodynamic planning using bundles of edges. In: In *Proceedings of the 2021 International Conference on Robotics and Automation (ICRA)*. Xian, China, 2021, May. [<url>](#) .
- 2020 Alikhani, M., **Shome, R.**, Khalid, B., Mitash, C., Bekris, K. E., & Stone, M. That and there: Judging the intent of pointing actions with robotic arms. In: In *Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI-20)*. New York, NY, 2020, February. [<url>](#) .
- 2020 **Shome, R.**, & Bekris, K. E. Synchronized multi-arm rearrangement guided by mode graphs with capacity constraints. In: In *Workshop on the Algorithmic Foundations of Robotics (WAFR)*. Oulu, Finland, 2020, June. [<url>](#) .
- 2020 **Shome, R.**, Nakhimovich, D., & Bekris, K. E. Pushing the boundaries of asymptotic optimality in integrated task and motion planning. In: In *Workshop on the Algorithmic Foundations of Robotics (WAFR)*. Oulu, Finland, 2020, June. [<url>](#) .
- 2019 **Shome, R.**, & Bekris, K. E. Anytime multi-arm task and motion planning for pick-and-place of individual objects via handoffs. In: In *2nd IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS)*. New Brunswick, NJ, USA, 2019, August. [<url>](#) .

- 2019 **Shome, R.**, Tang, W. N., Song, C., Mitash, C., Kourtev, C., Yu, J., Boularias, A., & Bekris, K. E. Towards robust product packing with a minimalistic end-effector. In: In *IEEE International Conference on Robotics and Automation (ICRA)*. Montreal, Canada: [Finalist for Best Paper in Automation Award], 2019, May. [<url>](#) .
- 2018 Kimmel, A., **Shome, R.**, Littlefield, Z., & Bekris, K. E. Fast, anytime motion planning for prehensile manipulation in clutter. In: In *2018 IEEE-RAS 18th International Conference on Humanoid Robots (HUMANOIDS)*. Beijing, China, 2018, November. [<url>](#) .
- 2018 **Shome, R.**, Solovey, K., Yu, J., Bekris, K. E., & Halperin, D. Fast and high-quality dual-arm rearrangement in synchronous, monotone tabletop setups. In: In *Workshop on the Algorithmic Foundations of Robotics (WAFR)*. Mérida, México, 2018, December. [<url>](#) .
- 2017 Dobson, A., Solovey, K., **Shome, R.**, Halperin, D., & Bekris, K. E. Scalable asymptotically-optimal multi-robot motion planning. In: In *1st IEEE International Symposium on Multi-Robot and Multi-Agent Systems (MRS)*. Los Angeles, CA, USA: [Best Paper Award], 2017, December. [<url>](#) .
- 2017 **Shome, R.**, & Bekris, K. E. Improving the scalability of asymptotically optimal motion planning for humanoid dual-arm manipulators. In: In *IEEE International Conference on Humanoid Robots*. Birmingham, UK, 2017, November. [<url>](#) .
- 2016 Littlefield, Z., Zhu, S., Kourtev, C., Psarakis, Z., **Shome, R.**, Kimmel, A., Dobson, A., Ferreira De Souza, A., & Bekris, K. E. Evaluating end-effector modalities for warehouse picking: A vacuum gripper vs a 3-finger underactuated hand. In: In *12th IEEE International Conference on Automation Science and Engineering (IEEE CASE)*. Fort Worth, TX, 2016, August. [<url>](#) .
- 2014 Krontiris, A., **Shome, R.**, Dobson, A., Kimmel, A., & Bekris, K. E. Rearranging similar objects with a manipulator using pebble graphs. In: In *IEEE-RAS International Conference on Humanoid Robots (HUMANOIDS)*. Madrid, Spain, 2014, November. [<url>](#) .
- 2014 Littlefield, Z., Krontiris, A., Kimmel, A., Dobson, A., **Shome, R.**, & Bekris, K. E. An extensible software architecture for composing motion and task planners. In: In *International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAN)*. Bergamo, Italy, 2014, October. [<url>](#) .
- 2014 Zhao, M., **Shome, R.**, Yochelson, I., Bekris, K. E., & Kowler, E. An experimental study for identifying features of legible manipulator paths. In: In *International Symposium on Experimental Robotics (ISER)*. Marrakech/Essaouira, Morocco, 2014, June. [<url>](#) .