Prof. Siddhartha Srinivasa
Activity Report 2018-20

The Personal Robotics Lab
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Honors and Awards

- ACM/HRI Best Paper Award Winner for Technical Advances in HRI [13], 2019
- ICAPS Best Student Paper Award Winner [27], 2019
- IEEE Fellow, 2018
- ICAPS Best Paper Award Winner [16], 2018
- ACM/IEEE HRI Best Paper Award Finalist [9], 2018

Mentoring

Current Students

Gilwoo Lee	Ph.D.		*Scalable Bayesian Reinforcement Learning*	2015-
Brian Hou	Ph.D.			2016-
Aditya Vamsikrishna	Ph.D.			2016-
Samuel Ainsworth	Ph.D.			2016-
Sherdil Niyaz	Ph.D.			2017-
Liyiming Ke	Ph.D.			2017-
William Agnew	Ph.D.	+Pedro Domingos		2017-
Ethan Gordon	Ph.D.			2018-
Matthew Schmittle	Ph.D.	+Dieter Fox		2018-
Amal Nanvati	Ph.D.	+Maya Cakmak		2019-

Current Postdoctoral Fellows

Tapomayukh Bhattacharjee	2017-
Christoforos Mavrogiannis	2019-

Current Staff

Rosario Scalise	2017-

Alumni - Postdoc

Sanjiban Choudhury	2018-2019 Now: Researcher, Aurora
Matthew Barnes	2018-2019 Now: Software Engineer, Google
Fereshteh Sadeghi	2019
Oren Salzman	2016-2019 Now: Assistant Professor, Technion
Daqing Yi	2016-2018 Now: Software Engineer, Google

Alumni - Ph.D.

Stefanos Nikolaidis, Ph.D. 2014-2018
Thesis: *Mathematical Models of Adaptation in Human-Robot Collaboration* Now: Assistant Professor, USC

Zita Marinho, Ph.D. (+Geoff Gordon) 2012-2018
Thesis: *Moment-based Algorithms for Structured Prediction* Now: Research Scientist, Sacoor Brothers

Laura Herlant, Ph.D. 2013-2018
Thesis: *Algorithms, Implementation, and Studies on Eating with a Shared Control Robot Arm*
Now: Senior Robotics Research Scientist, iRobot

Alumni - M.S.

Jeongseok Lee, M.S. 2016-18
Thesis: *A Linear-Time Variational Integrator for Multibody Systems* Now: Engineer, Amazon

Graduate Interns

Rishabh Madan (IIT Kharagpur)	2019-2020
Sara Sheikholeslami (UBC)	2019
Lerrel Pinto (CMU)	Summer 2019
Daniel Gallenberger (TU Munich)	Spring 2018
Daniel Gallenberger (TU Munich)	Spring 2018

Undergraduate Interns

Sumegh Roychowdhury (IIT Kharagpur)	Summer 2020
Sidharth Talia (Bharati Vidyapeeth College of Engineering)	Summer 2020
Rajat Kumar Jenamani (IIT Kharagpur)	Summer 2019
Jeffrey Maxwell	2019
Shivam Singhal	2019
Savanna Yee	2018
Nanda Sundaresan	2018
Kaiden James Field	2018
Connor Geiman	2018
Tao Jin	2018
Rahul Vernwal (IIT Kharagpur)	Summer 2018
Maha Alrashed (BU)	Summer 2018
Abdullah Albakry (NC State)	Summer 2018
Ramon (Yiren) Qu	2017-

Publications (Google Scholar)

Refereed Journals

1. J. Gammell, T. Barfoot, and S. Srinivasa. Batch Informed Trees (BIT*): Informed asymptotically optimal anytime search. *The International Journal of Robotics Research*, 2020. (To appear)

2. B. Yang, P. Lancaster, S. Srinivasa, and J. Smith. Benchmarking robot manipulation with the rubik's cube. *IEEE Robotics and Automation Letters*, 2020

3. T. Bhattacharjee, G. Lee, H. Song, and S. Srinivasa. Towards robotic feeding: Role of haptics in fork-based food manipulation. *IEEE Robotics and Automation Letters*, 2019

4. M. Chen, S. Nikolaidis, H. Soh, D. Hsu, and S. Srinivasa. Trust-aware decision making for human-robot collaboration: Model learning and planning. *ACM Transactions on Human-Robot Interaction*, 2019. (To appear)

5. R. Holladay, O. Salzman, and S. Srinivasa. Minimizing task-space fréchet error via efficient incremental graph search. *IEEE Robotics and Automation Letters*, 2019

6. J. Lee, M. X. Grey, S. Ha, T. Kunz, S. Jain, Y. Ye, S. S. Srinivasa, M. Stilman, and C. K. Liu. DART: Dynamic animation and robotics toolkit. *The Journal of Open Source Software*, 3(22):500, feb 2018

7. J. Gammell, T. Barfoot, and S. Srinivasa. Informed sampling for asymptotically optimal path planning. *IEEE Transactions on Robotics*, 34(4):966–984, 2018

8. S. Javdani, H. Admoni, S. Pellegrinelli, S. Srinivasa, and J. Bagnell. Shared autonomy via hindsight optimization for teleoperation and teaming. *The International Journal of Robotics Research*, 37(7):717–742, 2018

9. S. Nikolaidis, M. Kwon, J. Forlizzi, and S. Srinivasa. Planning with verbal communication for human-robot collaboration. *ACM Transactions on Human-Robot Interaction*, 7(3), 2018

Refereed Conferences

1. T. Bhattacharjee, E. Gordon, R. Scalise, M. Cabrera, A. Caspi, M. Cakmak, and S. Srinivasa. Is more autonomy always better? exploring preferences of users with mobility impairments in robot-assisted feeding. In *ACM/IEEE International Conference on Human-Robot Interaction*, 2020

2. V. Roulet, M. Fazel, S. Srinivasa, and Z. Harchaoui. On the Convergence of the Iterative Linear Exponential Quadratic Gaussian Algorithm to Stationary Points. In *American Controls Conference*, 2020

3. S. Ainsworth, M. Barnes, and S. Srinivasa. Mo states mo problems: Emergency stop mechanisms from observation. In *Advances in Neural Information Processing Systems*, 2019

4. M. Bhardwaj, S. Choudhury, B. Boots, and S. Srinivasa. Leveraging Experience in Lazy Search. In *Robotics: Science and Systems*, 2019

5. T. Bhattacharjee, M. Cabrera, A. Caspi, M. Cakmak, and S. Srinivasa. A community-centered design framework for robot-assisted feeding systems. In *International ACM SIGACCESS Conference on Computers and Accessibility*, 2019

6. L. Chan, D. Hadfield-Menell, S. Srinivasa, and A. Dragan. The assistive multi-armed bandit. In *ACM/IEEE International Conference on Human-Robot Interaction*, 2019

7. R. Feng, Y. Kim, G. Lee, E. Gordon, M. Schmittle, S. Kumar, T. Bhattacharjee, and S. Srinivasa. Robot-assisted feeding: Generalizing skewering strategies across food items on a plate. In *International Symposium on Robotics Research*, 2019

8. D. Gallenberger, T. Bhattacharjee, Y. Kim, and S. Srinivasa. Transfer depends on acquisition: Analyzing manipulation strategies for robotic feeding. In *ACM/IEEE International Conference on Human-Robot Interaction*, 2019. **Best Paper Award Winner for Technical Advances in HRI**

9. L. Ke, X. Li, Y. Bisk, A. Holtzman, Z. Gan, J. Liu, J. Gao, Y. Choi, and S. Srinivasa. Tactical rewind: Self-correction via backtracking in vision-and-language navigation. In *IEEE Conference on Computer Vision and Pattern Recognition*, 2019. **Oral**

10. R. Kumar, A. Mandalika, S. Choudhury, and S. Srinivasa. LEGO: Leveraging experience in roadmap generation for sampling-based planning. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2019

11. P. Lancaster, J. Smith, and S. Srinivasa. Improved proximity, contact, and force sensing via optimization of elastomer-air interface geometry. In *IEEE International Conference on Robotics and Automation*, 2019

12. G. Lee, Z. Deng, S. Ma, T. Shiratori, S. Srinivasa, and Y. Sheikh. Talking with hands 16.2m: A large-scale dataset of synchronized body-finger motion and audio for conversational motion analysis and synthesis. In *International Conference on Computer Vision*, 2019

13. G. Lee, B. Hou, A. Mandalika, J. Lee, S. Choudhury, and S. Srinivasa. Bayesian policy optimization for model uncertainty. In *International Conference on Learning Representations*, 2019

14. A. Mandalika, S. Choudhury, O. Salzman, and S. Srinivasa. Generalized Lazy Search for Robot Motion Planning: Interleaving Search and Edge Evaluation via Event-based Toggles. In *International Conference on Automated Planning and Scheduling*, 2019. **Best Student Paper Award Winner**

15. S. Niyaz, A. Kuntz, O. Salzman, R. Alterovitz, and S. Srinivasa. Optimizing motion-planning problem setup via bounded evaluation with application to following surgical trajectories. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2019

16. V. Roulet, S. Srinivasa, D. Drusvyatskiy, and Z. Harchaoui. Iterative Linearized Control: Stable Algorithms and Complexity Guarantees. In *International Conference on Machine Learning*, 2019

17. R. Rowe, S. Singhal, D. Yi, T. Bhattacharjee, and S. Srinivasa. Desk organization: Effect of multimodal inputs on spatial relational learning. In *IEEE International Symposium on Robot and Human Interactive Communication*, 2019

18. B. Saund, S. Choudhury, S. Srinivasa, and D. Berenson. The blindfolded robot : A bayesian approach to planning with contact feedback. In *International Symposium on Robotics Research*, 2019

19. R. Scalise, J. Thomason, Y. Bisk, and S. Srinivasa. Improving robot success detection using static object data. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2019

20. H. Song, T. Bhattacharjee, and S. Srinivasa. Sensing shear forces during food manipulation: Resolving the trade-off between range and sensitivity. In *IEEE International Conference on Robotics and Automation*, 2019

21. T. Weng, L. Perlmutter, S. Nikolaidis, S. Srinivasa, and M. Cakmak. Robot object referencing through situated legible projections. In *IEEE International Conference on Robotics and Automation*, 2019

22. R. Aronson, T. Santini, T. Kübler, E. Kasneci, S. Srinivasa, and H. Admoni. Eye-hand behavior in human-robot shared manipulation. In *ACM/IEEE International Conference on Human-Robot Interaction*, 2018

23. M. Chen*, S. Nikolaidis*, H. Soh, D. Hsu, and S. Srinivasa. Planning with trust for human-robot collaboration. In *ACM/IEEE International Conference on Human-Robot Interaction*, 2018. **Best Conference Paper Award Finalist**

24. S. Choudhury, S. Srinivasa, and S. Scherer. Bayesian active edge evaluation on expensive graphs. In *International Joint Conference on Artificial Intelligence*, 2018

25. N. Haghtalab, S. Mackenzie, A. Procaccia, O. Salzman, and S. Srinivasa. The Provable Virtue of Laziness in Motion Planning. In *International Conference on Automated Planning and Scheduling*, 2018. **Best Conference Paper Award Winner**

26. A. Hefny, Z. Marinho, W. Sun, S. Srinivasa, and G. Gordon. Recurrent predictive state policy networks. In *International Conference on Machine Learning*, 2018

27. J. Lee, D. Yi, and S. Srinivasa. Sampling of pareto-optimal trajectories using progressive objective evaluation in multi-objective motion planning. In *IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2018

28. A. Mandalika, O. Salzman, and S. Srinivasa. Lazy Receding Horizon A* for Efficient Path Planning in Graphs with Expensive-to-Evaluate Edges. In *International Conference on Automated Planning and Scheduling*, 2018

29. S. Niyaz, A. Kuntz, O. Salzman, R. Alterovitz, and S. Srinivasa. Following surgical trajectories with concentric tube robots via nearest-neighbor graphs. In *International Symposium on Experimental Robotics*, 2018

30. S. Sheikholeslami, G. Lee, J. Hart, S. Srinivasa, and E. Croft. A study of reaching motions for collaborative human-robot interaction. In *International Symposium on Experimental Robotics*, 2018

31. D. Yi, R. Thakker, C. Gulino, O. Salzman, and S. Srinivasa. Generalizing informed sampling for asymptotically-optimal sampling-based kinodynamic planning via markov chain monte carlo. In *IEEE International Conference on Robotics and Automation*, 2018

Reports and Theses

1. S. S. Srinivasa, P. Lancaster, J. Michalove, M. Schmittle, C. Summers, M. Rockett, J. R. Smith, S. Choudhury, C. Mavrogiannis, and F. Sadeghi. MuSHR: A low-cost, open-source robotic racecar for education and research. *CoRR*, abs/1908.08031, 2019

2. T. Bhattacharjee, D. Gallenberger, D. Dubois, L. L'Écuyer-Lapiere, Y. Kim, A. Mandalika, R. Scalise, R. Qu, H. Song, E. Gordon, and S. Srinivasa. Autonomous robot feeding for upper-extremity mobility impaired people: Integrating sensing, perception, learning, motion planning, and robot control. In *Conference on Neural Information Processing Systems*, 2018. **Best Demo Award Winner**

3. B. Newman, R. Aronson, S. Srinivasa, K. Kitani, and H. Admoni. HARMONIC: A multimodal dataset of assistive human-robot collaboration. *CoRR*, abs/1807.11154, 2018

Seminars

Army Research Laboratories	2019
Carnegie Mellon University	2019
Northwestern	2018
Toyota Technological Institute at Chicago	2018
Georgia Tech	2018
Amazon	2018

Others: Too numerous to count.

Teaching

CSE 490R Robotics Winter 2017-
Paul G. Allen School for Computer Science & Engineering
Brand new undergraduate-level robotics course on robotics in the real world. The course covers state estimation (particle filters, motion models, sensor models etc), planning/control (search based planners, lattice based planners, trajectory following techniques etc), and perception and learning (object detection, learning from demonstrations etc.). Student teams implement algorithms on the RACECAR platform developed by Prof. Srinivasa for the course.

CSE 599 Advanced Robotics Fall 2017-
Paul G. Allen School for Computer Science & Engineering
Brand new graduate-level robotics course on motion planning algorithms. The course covers the Piano Movers Problem, sampling-based planning, minimum dispersion graphs, efficient search, lazy and anytime planning, planning under uncertainty with application to mobile manipulators and humanoid robots, with a focus on algorithmic foundations and theorem proving.

Professional Activities

Board Member	RSS Foundation	2016-
Editor	International Journal of Robotics Research (IJRR)	2014-

Selected Organization

Organizer	UW CSE MSR Summer Institute on Social Robotics	2018

Grants Active in Period

US Army Research Laboratory 2020-21
Scalable, Adaptive, and Resilient Autonomy $150,000
Title: *Safe, Fluent, and Generalizable Outdoor Autonomy*
co-PI, PI: Byron Boots, UW

HONDA 2018-21

HONDA Research Institute — $2,700,000
Title: *Formalizing Mathematical Models of Curiosity*
PI

Office of Naval Research (#ONR N00014-16-R-BA01) — 2017-20
Long Range BAA for Navy and Marine Corps Science and Technology — $2,096,633
Title: *Enabling dexterous physics-based manipulation via a learning framework for shared autonomy*
PI

National Science Foundation (#1839371) — 2018-21
Division of Mathematical Sciences, the Division of Computing and Communication Foundations, and the Division of Information and Intelligent Systems — $125,000
Title: *Safe Imitation Learning for Robotics*
co-PI, PI: Zaid Harchaoui, UW

RCTA T3 — 2017-18
Robotics Collaborative Technology Alliance — $355,594
Title: *Robust Outdoor Mobile Manipulation*
PI

Amazon — 2017-18
Amazon Research Award — $80,000
Title: *Data Efficient Policy Search for Reinforcement Learning*
PI

National Science Foundation (#1748582) — 2017-19
National Robotics Initiative (NRI) — $453,379
Title: *NRI: Collaborative Research: Learning Deep Sensorimotor Policies for Shared Autonomy*
PI, co-PI: Sergey Levine, Berkeley

National Science Foundation (#1544797) — 2015-18
Cyber-Physical Systems (CPS) — $435,928
Title: *CPS: Synergy: Collaborative Research: Learning control sharing strategies for assistive cyber-physical systems*
PI, co-PI: Brenna Argall, Northwestern

National Science Foundation (#1409003) — 2014-18
Robust Intelligence, Division of Information & Intelligent Systems (IIS) — $358,737
Title: *RI: Medium: The Foundations of a Manipulation Repertoire*
Co-PI, PI: Matt Mason, Co-PI: Michael Erdmann, CMU

Selected Press Coverage (Longer list)

2019

Fast Company	The best interactive design of the year
Geek Wire	Robotic race car platform from Univ. of Washington designed to speed research around A.I.
BBC News	Robot arm can feed people with mobility issues

2018

MIT Tech Review	Research robots sometimes left unsecured on the internet, study finds
KUOW Public Radio	The Record: Robotics
Washington Post	An expert explains how close we are to 'The Jetsons.'
GeekWire	UW's HERB robot makes cameo on X-Files as automated sushi waiter

2017 (moved to UW)

BBC World Live	Autonomous Weapons that use AI
IEEE The Institute	IEEE Members Build Robots to Help People with Disabilities Live Independently
New York Times	Learning to love our robot co-workers
GeekWire	Robotics expert moves entire team to UW, including famous Oreo-cracking robot