Shushman Choudhury

Website | Google Scholar | LinkedIn | Github
shushman@cs.stanford.edu

INTERESTS

AI for Transportation/Logistics; Multi-Agent Optimization and Decision-Making; Path Planning and Routing

EDUCATION

STANFORD UNIVERSITY | Ph.D. in Computer Science | Sep 2017 - Jun 2021
Advisors - Mykel Kochenderfer and Jeannette Bohg

CARNEGIE MELLON UNIVERSITY | M.S. in Robotics | Aug 2015 - Aug 2017
Advisor - Siddhartha Srinivasa • GPA: 4.00

IIT KHARAGPUR | B.Tech. in Computer Science | Jul 2011 - May 2015
Advisor - Partha Pratim Chakrabarti • GPA: 9.47/10

EXPERIENCE

LACUNA TECHNOLOGIES, INC. | Tech Lead, Research Team
Jul 2021 - Jul 2023 | Palo Alto, CA

- Led in-house research team of data scientists and ML engineers in building optimization and decision-making solutions for intelligent transportation problems in **multiple major US cities and airports** .
- Coordinated cross-functionally with engineering, product, and strategy teams to integrate technologies into existing systems and shape their future vision. Communicated critical insights and decisions to C-suite executives.
- **Bayesian inference** and **optimization** models for vehicle traffic at **Seattle-Tacoma Airport** ; accurately estimated the efficacy of congestion management strategies and created an algorithm to improve congestion by up to 300%.
- Designed a comprehensive optimization framework for **dynamic curbside allocation in downtown Seattle** .
- Gave multiple invited industry/academic talks, e.g., PacTrans 2022, TESC 2022, UFL Quarterly 2022, CPS-IoT 2023

STANFORD ARTIFICIAL INTELLIGENCE LABORATORY | Doctoral Researcher
Sep 2017 - Jun 2021 | Stanford, CA

- Developed state-of-the-art algorithms for hierarchical multi-agent allocation and routing.
- Best Overall Paper at AAMAS 2021 and Best Multi-Agent Finalist at ICRA 2020.
- Research featured in VentureBeat, BBC Digital Planet, and IEEE Spectrum
- Advised MIT Lincoln Lab on computing large-scale adaptive intervention strategies for COVID-19.

MICROSOFT RESEARCH REDMOND (MSR) | AI PhD Intern
Jun 2020 - Sep 2020 | Remote

- Multi-task deep reinforcement learning by computing and adapting shared representations.

CMU PERSONAL ROBOTICS LAB | Graduate Researcher
Aug 2015 – Aug 2017 | Pittsburgh, PA

- Efficient motion planning for robot manipulation, validated on a bi-manual manipulator.

ACADEMIC AWARDS

1. Best Paper, International Conference on Autonomous Agents and Multi-Agent Systems (AAMAS) 2021
2. Best Multi-Robot Systems Paper Finalist, IEEE International Conference on Robotics and Automation (ICRA) 2020
3. Stanford Department of Computer Science Graduate Fellowship 2020-21
4. Stanford School of Engineering Graduate Fellowship 2017-18

JOURNAL PUBLICATIONS

Scalable Online Planning for Multi-Agent MDPs S. Choudhury, J. K. Gupta, P. Morales, and M. J. Kochenderfer. Journal of Artificial Intelligence Research 2022 **Invited Paper**
Dynamic Multi-Robot Task Allocation under Uncertainty and Temporal Constraints S. Choudhury, J. K. Gupta, M. J. Kochenderfer, D. Sadigh, and J. Bohg. Springer Autonomous Robots Journal 2021 **Invited Paper**

Efficient Large Scale Multi-Drone Delivery Using Transit Networks S. Choudhury, K. Solovey, M. J. Kochenderfer, and M. Pavone. Journal of Artificial Intelligence Research 2021
Estimating Driver Response Rates to Variable Message Signage at Seattle-Tacoma International Airport S. Vashisht, S. Choudhury, N. Nazir, S. Zoepf, and C. Dowling. Transport Findings Journal 2022

SELECTED CONFERENCE PUBLICATIONS

Optimal, centralized dynamic curbside parking space zoning N. Nazir, C. Dowling, S. Choudhury, S. Zoepf, and K. Ma. 2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)
Coordinated Multi-Agent Pathfinding for Drones and Trucks over Road Networks S. Choudhury, K. Solovey, M. J. Kochenderfer, and M. Pavone. International Conference on Autonomous Agents and Multi-Agent Systems 2022
Scalable Anytime Planning for Multi-Agent MDPs S. Choudhury, J. K. Gupta, P. Morales, and M. J. Kochenderfer. International Conference on Autonomous Agents and Multi-Agent Systems 2021. **Best Paper**
Dynamic Multi-Robot Task Allocation under Uncertainty and Temporal Constraints S. Choudhury, J. K. Gupta, M. J. Kochenderfer, D. Sadigh, and J. Bohg. Robotics: Science and Systems 2020
Efficient Large Scale Multi-Drone Delivery Using Transit Networks S. Choudhury, K. Solovey, M. J. Kochenderfer, and M. Pavone. IEEE International Conference on Robotics and Automation 2020 **Best Multi-Robot Finalist**
Adaptive Informative Path Planning with Multimodal Sensing S. Choudhury, N. Gruver, and M. J. Kochenderfer. International Conference on Automated Planning and Scheduling (ICAPS) 2020
Dynamic Real-time Multimodal Routing with Hierarchical Hybrid Planning S. Choudhury, J. P. Knickerbocker, and M. J. Kochenderfer. IEEE Intelligent Vehicles 2019
Densification Strategies for Anytime Motion Planning over Large Dense Roadmaps S. Choudhury, O. Salzman, S. Choudhury and S. S. Srinivasa. IEEE International Conference on Robotics and Automation 2017.
Incorporating Qualitative Information into Quantitative Estimation via Sequentially Constrained Hamiltonian Monte Carlo D. Yi, S. Choudhury, and S. S. Srinivasa. IEEE Intelligent Robots and Systems (IROS) 2017
Pareto-Optimal Search over Configuration Space Beliefs for Anytime Motion Planning S. Choudhury, C. M. Dellin, and S. S. Srinivasa. IEEE Intelligent Robots and Systems (IROS) 2016.
A System for Multi-Step Mobile Manipulation: Architecture, Algorithms, and Experiments S. S. Srinivasa et al. International Symposium on Experimental Robotics 2016

LANGUAGES/TOOLS/TECHNIQUES

• Python (5+ yrs) • C++ (5+ yrs) • Julia (5 yrs) • Python-MIP •Pandas • PyMC • Scikit-Learn • Pytorch • AWS
• Hierarchical Multi-Agent Methods • Decision-Making under Uncertainty • Combinatorial Optimization • Heuristic Search
• Statistical Inference • Geospatial Analysis

INVITED PRESENTATIONS

1. Bridging Learning and Algorithmic Fairness in the Operation of Urban Infrastructure and Network Systems 2023
2. Urban Freight Lab Quarterly 2022
3. Transportation Engineering and Safety Conference 2022
4. PacTrans Student Conference 2022
5. International Joint Conference on Artificial Intelligence 2022

LEADERSHIP & OUTREACH

STANFORD COMPUTER SCIENCE DEPT. | Student Service

Sep 2017 - Jun 2021 | Stanford, CA

1. Co-Instructor for CS239 Winter 2020 (Advanced Topics in Sequential Decision Making).
2. Course Assistant for CS238 Fall 2018 (Decision Making under Uncertainty).
3. Student Member of Ph.D. Admissions Committee for Autumn 2019 class.
4. Co-organizer of the AI Salon for the 2019-20 academic year.
5. Mentor in the 2018 and 2020 Stanford AI Lab undergraduate mentorship program.

STANFORD IGNITE PROGRAM | Mentor

Summer 2018 | Stanford, CA
Mentored math teacher to develop a curated set of robotics-inspired exercises for Sequoia High School, Redwood City.