Priyam Parashar

phone: 412-265-8809 | email: pparasha@eng.ucsd.edu, priyam8parashar@gmail.com

Education

2016-Present **Ph.D. Researcher** in Computer Science — **UC, San Diego**
Advisor: Dr. Henrik I. Christensen, Dr. Ashok K. Goel
Expected: Summer 2021

2015-2016 **Ph.D. Researcher** in Robotics — **IRIM, Georgia Institute of Technology**
Advisor: Dr. Henrik I. Christensen, Dr. Ashok K. Goel
CGPA: 3.50 / 4.00

2015 M.Sc. in Robotics — **Robotics Institute, CMU**
Advisor: Dr. Reid Simmons
CGPA: 3.90 / 4.00

2013 B.Tech. in Elec. and Comm. — **International Institute of Information Technology, Hyderabad**
Advisor: Dr. K. Madhava Krishna
CGPA: 8.55 / 10.00

Academic Research Experience

2015-Present **Cognitive Robotics Lab - UC San Diego, CA**

- Ph.D. research on plan execution monitoring and subsequent repair using model-based reasoning and guided learning with application on manipulators
- Modelled dual-arm product assembly as a decision-making problem using domain-specific search-based planning with hierarchical task descriptions for search control
- Exploring plan repair for novel task configurations by grounding semantic constraints into qualitative representations of assembly objects and robot gripper
- Designed and implemented multiple robot system projects for competition and exhibitions in my capacity as team member as well as team lead
- Mentored multiple MS and Ph.D. students in the lab

2013-2014 **Robotics Institute - CMU - Pittsburgh, PA**

- Modelled the problem of identifying traffic patterns in indoor navigation as a cascaded classification and regression problem for my Master's research
- Applied Gaussian Mean-shift on longitudinal travel-time data of a mobile robot to identify complex map-routes with multiple modes of travel-time as random variable
- Trained a traffic mode predictor using decision tree with mid-term features like time of day and day of week amongst others
- Trained a random forest travel-time predictor the route-id, predicted mode from last stage, and last travel-time on route as features
- 5% of total corridors were identified as being complex and our system predicted travel-time with <2.7 sec error

Professional Experience

Summer 2017 **Honda Research Institute - US - San Jose, CA** — Dr. Akansel Cosgun, Dr. Alireza Nakhaei

- Modelled, designed and implemented an imitation learning solution for learning trajectory constraints for maximizing safety in suburban settings in 2 months
- Designed an algorithm based on Learning from Keyframes framework to learn maximum and minimum bounds on car's velocity and trajectory while driving near possible occlusions like parked vehicles
- Implemented a driving simulator in Gazebo with PS driving rig to collect driving data which was segregated into safe and unsafe driving behaviors based on collisions
- Solution was generalized to novel situations using linear combinations of learned cases where situations were classified into whether the vehicle is large or small and whether it is close or far
- HRI-US patented the solution as a novel invention

Summer 2014 **Vecna Robotics - Cambridge, MA** — Dr. Frederik Heger

- Implemented the research pipeline designed in CMU as a prediction component for QC Bot's stack in 2 months
- Tuned the generic pipeline for QC Bot specific purpose based on data monitoring of in-house runs

Projects

Q4 2019 - Q4 2020 — World Robot Summit - Assembly Challenge 2020 with RPDC Robotics

- Served as technical team lead and project manager for a team of 2-3 MS students to participate in World Robot Summit's Assembly Challenge 2020 (later postponed)
- Performed a range of duties from hardware setup to ROS architecture design and inter-team communications with our sponsors
- Designed assembly as a search-based planning problem with domain-knowledge represented as semantic constraints
- Designed and implemented the high-level planner for generating a sequence of assembly actions given a product description in YAML
- Supervised the team on their implementation and applied research, scoping the problem as per requirements and timeline
- The system was selected for the finals taking place in summer 2021
- Publications: [arxiv-1], [arxiv-2], [video]

Q1 2017 - Q3 2017 — RoboCup @ Home Competition

- Project involved person detection, person following, grocery handling and other household tasks
- Served as a member of team of 5 students to implement the platform and provide on-field support during competition
- Designed the person tracking and following pipeline
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- Covered by UC San Diego news release

Awards and Honors

- Paper [2] won the Visionary Paper award at AAMAS 2017
- Received Georgia Robotics Fellowship for Women and Underrepresented Minorities
- Awarded on the Dean's List of Academic Excellence: Monsoon-2010, Monsoon-2011, Monsoon-2009, and Spring-2012
- Work on [1] and [2] featured in news articles [article-1], [article-2]

Skills and Other Experience

Mentoring — Served as teaching assistant for: 'Pattern recognition' (CSE291-SP17) at UCSD; 'Introduction to Robotics and Perception ' (CSE3630-SP16) at GT; 'Electronics Workshop II' (SP12) and 'Embedded Hardware Design' (FA11) at IIIT-H
Mentored a number of undergraduate and graduate students for research projects and writing papers

Leadership & Volunteering — Founding member of Women in Robotics at UC San Diego
Active member of RoboGrads @ UC San Diego Outreach committee
Participated in project showcase at Contextual Robotics Insitute/San Diego Robotics Forum @ UC San Diego 2017, 2018, 2019
Reviewed papers for conferences like IROS, ICRA, and AAAI; and for journals like T-RO, IJRR and RA-Letters

Languages — Python, C++, MATLAB, LaTeX

Tools — Linux, ROS, Gazebo, Agile Development, Git , SHOP

Publications

[1] **Parashar, Priyam**, Ashok K. Goel, Bradley Sheneman, and Henrik I. Christensen. "Towards life-long adaptive agents: using metareasoning for combining knowledge-based planning with situated learning."
The Knowledge Engineering Review 33 (2018): e24

[2] **Priyam Parashar**, Bradley Sheneman, Ashok K. Goel "Adaptive Agents in Minecraft: A Hybrid Paradigm for Combining Domain Knowledge with Reinforcement Learning."
In: *International Conference on Autonomous Agents and Multiagent Systems* (pp.86-100). Springer, 2017

[3] **Parashar, Priyam**, Robert Fisher, Reid Simmons, Manuela Veloso, and Joydeep Biswas. "Learning context-based outcomes for mobile robots in unstructured indoor environments."
In *IEEE 14th International Conference on Machine Learning and Applications*, pp. 703-706. IEEE, 2015

[4] Goel, Ashok K., Tesca Fitzgerald, and **Priyam Parashar**. "Analogy and metareasoning: Cognitive strategies for robot learning."
In *Human-Machine Shared Contexts*, pp. 23-44. Academic Press, 2020

[5] **Parashar, Priyam**, Kikuo Fujimura, Alireza Nakhaei Sarvedani, and Akansel Cosgun. "Keyframe based autonomous vehicle operation."
U.S. Patent 10,739,774, issued August 11, 2020.

[6] **Parashar, Priyam**, Lindsay M. Sanneman, Julie A. Shah, and Henrik I. Christensen. "A Taxonomy for Characterizing Modes of Interactions in Goal-driven, Human-robot Teams."
In IROS, pp. 2213-2220. 2019.

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