Parv **Kapoor**

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Education

Carnegie Mellon University | School of Computer Science — *Pittsburgh, U.S.A.*
Doctor of Philosophy in Software Engineering — *Fall 2021 - Present*
CQPA: 4.06/4.00 Advisors: Eunsuk Kang and Sebastian Scherer

Manipal Institute of Technology — *Manipal, India*
Bachelor of Technology in Computer Science Engineering — *Fall 2016 - Fall 2020*
CGPA: 8.59/10 | Minor: Intelligent Systems

Graduate Coursework: Provably Safe Robotics, Human-Robot Interaction, Artificial Intelligence for Social Good, Advanced Formal Methods

Skills

Programming Python, C/C++, JAVA, Alloy, TLA+, MySQL, CUDA programming
Tools ROS, Tensorflow, PyTorch, AirSim, CARLA, Matlab

Research Experience

Carnegie Mellon University — *Pittsburgh, U.S.A.*
Graduate Research Assistant| PI: Eunsuk Kang Co-PI: Sebastian Scherer — *Aug. 2021 - Ongoing*

Université Grenoble Alpes — *Grenoble, France (Remote)*
Research Engineer | PI: Thao Dang — *Jan. 2021- Aug. 2021*

University of Southern California — *Los Angeles, U.S.A.*
Research Assistant | PI: Jyotirmoy Vinay Deshmukh — *Jan. 2020 - Jan. 2021*

Cardiff University — *Cardiff, U.K.*
Research Intern | PI: David Marshall — *May 2019 - July 2019*

Publications and Preprints

Follow The Rules: Online Signal Temporal Logic Tree Search for Guided Imitation Learning in Stochastic Domains
J. Patrikar, J. Aloor, **P. Kapoor**, S. Scherer and J. Oh — *2022*
- IEEE International Conference on Robotics and Automation (ICRA) 2023 [arxiv]

Challenges in Close-Proximity Safe and Seamless Operation of Manned and Unmanned Aircraft in Shared Airspace
J. Patrikar, J. Dantas, S. Ghosh, **P. Kapoor** et al — *2022*
- In ICRA 2022 Workshop on Intelligent Aerial Robotics: From Autonomous Micro Aerial Vehicles to Sustainable Urban Air Mobility and Operations [arxiv]

Predicting Food Insecurity in Somalia using Machine Learning
P. Kapoor, M. Feffer, S. Dodt and F. Fang — *2022*
- Working paper

Model-based Reinforcement Learning from Signal Temporal Logic Specifications
P. Kapoor, A. Balakrishnan, J. V. Deshmukh — *2020*
- Under submission [arxiv]

Predicting Time to Contact Across the Visual Image

D. Marshall, S.K. Rushton, J. Redfern, **P. Kapoor**, R.J. Moran *2020*

- In PERCEPTION (Vol. 49, No. 6, pp. 714-714) SAGE PUBLICATIONS LTD.

Selected Projects

Evaluating Robustness of Reinforcement Learning agents

Collaborators: Changjian Zhang, Romulo Meira Goes, David Garlan, Eunsuk Kang

- Employed software engineering techniques to evaluate robustness of reinforcement learning agents in the face of environmental deviations.
- Evaluated a trained policy's safety violations using logical falsification and proposed a novel analysis technique.

Trust elicitation and restoration in assistive robots

Collaborators: Angela Chen, Simon Chu, Henny Admoni

- Investigated the impact of customization and perspective on perceived trust in an assistive robotics context.
- Conducted a pilot user study and findings indicate that increased levels of customization were associated with higher trust and comfort perceptions.

Safe planning and control in shared airspace

Collaborators: Jay Patrikar, Sebastian Scherer, Jean Oh

- Devised an angular rate-based control barrier function for safe collision avoidance of autonomous aircraft.
- Evaluated safety system on a realistic flight simulator with a human pilot acting as an adversary.
- Modified logically constrained planning from STL objectives to improve vanilla LfD policies. Our method outperforms baselines policies by 60 percent.

Runtime decomposition and reordering of robotic planning objectives

Collaborators:Eunsuk Kang

- Developed a Signal Temporal Logic decomposition scheme for Task and Motion Planning for robots with holonomic constraints.
- Deployed a monte Carlo tree search-based planning algorithm over decomposed specifications with higher goal satisfaction and efficiency

Achievements & Volunteer work

2022	Selected for 11th Summer school on Formal Techniques organized by SRI International
2020	Member of the Organising Committee for the 20th International Conference on Runtime Verification held in Los Angeles.
2020	Remotely mentored UW-Madison students on applications of deep reinforcement learning for stock trading and analysis.
2019	1 out of 4 students selected out of 600 students for an all-expense paid 3 weeks Training program in Huawei Enterprises China premises.
2019	Won an internship offer at Cardiff university after competing with multiple candidates from 83 local committees worldwide
2019	Presented a Poster at Bristol Vision Colloquium at University of Exetor.