

# Parv Kapoor

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## Education

### Carnegie Mellon University | School of Computer Science

DOCTOR OF PHILOSOPHY IN SOFTWARE ENGINEERING

CQPA: 4.08/4.00 Advisors: Eunsuk Kang and Sebastian Scherer

Pittsburgh, U.S.A.

Fall 2021 - Present

### Manipal Institute of Technology

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE ENGINEERING

CGPA: 8.59/10 | Minor: Intelligent Systems

Manipal, India

Fall 2016 - Fall 2020

Selected Coursework: Human Robot Interaction, AI for Social Good, Formal Methods, Machine Learning, Artificial Intelligence, Natural Language Processing, Social Network Analysis, Probability Theory and Statistics.

## Skills

**Programming** Python, C/C++, JAVA, OpenCL, MySQL, CUDA programming, PLSQL, Verilog, LaTeX

**Tools** ROS, OpenCV, Tensorflow, PyTorch, AirSim, CARLA, Pyglet, Tesseract, Matlab, ZED SDK, ADO.NET

## Experience

### Carnegie Mellon University

GRADUATE RESEARCH ASSISTANT | PI: EUNSUK KANG CO-PI: SEBASTIAN SCHERER

- Developing safe and robust planning methods for autonomous aircraft control. We use a combination of STL specifications and control barrier functions to ensure reliable heterogeneous aerial robot behavior. This work is done in collaboration with AirLab.
- Developing Behavioral description formalisms for efficient synthesis and improved trust guarantees for reinforcement learning-based agents.

Pittsburgh, U.S.A.

Aug. 2021 - Ongoing

### VERIMAG, Université Grenoble Alpes

RESEARCH ENGINEER | PI: THAO DANG

- Formalized the notions and concepts for uniform random stimulus generation based on timed automata. This work was done for quantitative validation of autonomous systems.
- Deployed them in simulation environment SUMO for autonomous vehicle applications.

Grenoble, France (Remote)

Jan. 2021- Aug. 2021

### CPS-VIDA Lab, University of Southern California

RESEARCH ASSISTANT | PI: JYOTIRMOY VINAY DESHMUKH

- Implemented novel model based RL, model free RL and evolutionary strategies algorithms for optimising over Signal Temporal Logic defined safety constraints.
- Developed multiple in house environments to deploy methods alongside CARLA, AirSim and Gazebo simulators.
- A research paper based on our unprecedented optimisation for STL Quantitative Semantics is currently due for submission.

Los Angeles, U.S.A.

Jan. 2020 - Jan. 2021

### Visual Computing Researchers Lab, Cardiff University

RESEARCH INTERN | PI: DAVID MARSHALL

- Developed a bioinspired deep learning and computer vision virtual guidedog project for safe trajectory prediction. The project aimed at obstacle avoidance to aid partially blind people.
- The implementation predicts subject trajectory and suggests optimal user action. Visual odometry, Optical flow, Human Perception, scene translation and convolution neural nets were used to create a real time solution. The project was programmed using Tensorflow for python and ZED stereo camera API.
- An abstract on our research findings was accepted at Applied Vision Associations held in December 2019.

Cardiff, U.K.

May 2019 - July 2019

### RapidQube Digital solutions Pvt. Ltd.

RESEARCH INTERN

- Implemented an obstacle avoidance project utilizing Computer Vision knowledge and a Convolutional neural network capable of logging data onto a blockchain network. The project was constructed using Tensorflow for python and NEM SDK.
- The project alerts drivers in case of anticipated accidents using depth perception networks, object tracking algorithms(YOLO) and OnBoard diagnostics device and logs driver information obtained using Optical Character Recognition(Tesseract) on Number plates, onto the NEM Blockchain network.

Mumbai, India

May 2018 - July 2018

## Publications and Preprints

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### 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

- submitted to ICRA 2023

### 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

### Model-based Reinforcement Learning from Signal Temporal Logic Specifications

**P. KAPOOR**, A. BALAKRISHNAN, J. V. DESHMUKH

2020

- Under submission

### 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.

## Achievements & Volunteer work

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- 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 in Cardiff university after competing with multiple candidates from 83 local committees worldwide
- 2019 Presented a Poster at Bristol Vision Colloquium at University of Exeter.