VIRAJ PARIMI

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EDUCATION

Massachusetts Institute of Technology (MIT) — Pittsburgh, PA
Doctor of Philosophy in EECS — Present
Relevent Coursework: Algorithms for Inference, Robotic Manipulation

Carnegie Mellon University (CMU) - School of Computer Science — Pittsburgh, PA
Master of Science in Robotics | GPA: 4.08/4 — August 2021
Relevent Coursework: Computer Vision, Mathematical Fundamentals for Robotics,
Graduate Artificial Intelligence, Statistical Techniques in Robotics,
Planning and Decision Making in Robotics, Mechanics of Manipulation

Indraprastha Institute of Information Technology (IIIT) — Delhi, India
Bachelor of Technology in Computer Science and Engineering (Honors) | GPA: 8.96/10 — May 2019
Relevant Coursework: Statistical Machine Learning, Deep Learning,
Advanced Operating Systems, Graph Theory, Numerical Methods, Computer Graphics
Natural Language Processing, Network and Systems Security, Parallel Programming

EXPERIENCE

MERS — Cambridge, MA
Research Assistant — August 2021 - Present
· Working on safe skill learning by combining multiple hybrid-constraint concurrent automata with safety constraints.
· Developing a formalism for the framework to deploy on multi-agent systems working in shared environments.

NASA HOME STRI — Pittsburgh, PA
Research Assistant — August 2019 - August 2021
· Developed a robust multi-agent planner by combining timeline-based planning and hierarchical task planning frameworks.
· Designed and deployed the planner in a test-bed designed to mimic deep space habitats.

RISS — Pittsburgh, PA
Research Scholar — June 2018 - August 2018
· Developed a computationally scalable bayesian sequential learning framework for time-series forecasting with up to **4 orders of magnitude speed improvement** compared to other benchmarks.

Precog — Delhi, India
Data Analytic Intern — May 2017 - September 2017
· Devised data analytic tool for National Bomb Data Center (NBDC) working under National Security Guards (NSG) to generate analysis based on historic data.
· Assembled tool that automates whole process from input stage to output stage where useful insights are passed upon user request.

PUBLICATIONS

T-HTN: Timeline based HTN Planning for Multiple Robots
V. Parimi, Z. Rubinstein, S. Smith — 2022
ICAPS, Hierarchical Planning

T-HTN: Timeline based HTN Planning for Multi-Agent Systems
V. Parimi — 2021
Master's Thesis, CMU

[On the Vulnerability of Community Structure in Complex Networks](#)
<u>V. Parimi</u>, A. Pal, S. Ruj, P. Kumaraguru, T. Chakraborty   2021
Principles of Social Networking, Springer

[Hierarchical Bayesian Framework for Bus Dwell Time Prediction](#)
I. Isukapati, C. Igoe, E. Bronstein <u>V. Parimi</u>, S. Smith   2020
IEEE Transactions on Intelligent Transportation Systems

[Analysis of DSRC accuracy for pedestrian localization](#)
A. Lakshman*, <u>V. Parimi</u>*, S. Smith   2018
RISS 2018 Working Paper Journal

SELECTED PROJECTS

Automatic Reward Densification   MIT | May 2022
Prof. Pulkit Agrawal
· Implemented a system that is able to leverage classical planning over human specified PDDL models to automatically increase the density of robotic tasks with sparse, goal-based reward

Catching a Ping Pong Ball with an iiwa   MIT | November 2021
Prof. Russ Tedrake
· Programmed the kinematics of a Kuka iiwa using Drake to catch a ping pong ball with a ping pong paddle
· Applied finite-state machine (FSM) techniques to model the paddle's trajectory off equations of motion of projectiles while in a pre-initial-contact mode, while we switched to a PD controller with offset stabilization in the post-initial-contact mode

Sampling-based Planning in Discrete Space   CMU | November 2020
Prof. Maxim Likhachev
· Proposed a hierarchical decomposition algorithm where we discretize the continuous sample space of PRM/RRT algorithms in order to provide tighter completeness guarantees.
· Demonstrated the performance improvement of the proposed approach for 6-link robotic arm.

Lossy Compression using Neural Networks   CMU | May 2020
Prof. Zico Kolter
· Formulated quantization techniques to generate discrete latent space representations among image and text based autoencoder models without significant performance implications.
· Showcased that incorporating commit-loss to the learning process improved the compression ratio of both image and text based models while maintaining the quality of reconstructions.

COTTON   IIIT-Delhi | November 2018
Prof. Vivek Kumar
· Developed a light-weight work-stealing runtime for async-finish task parallelism which was energy efficient without incurring significant impact on the performance.
· Used different power saving drivers in combination with `cpufreq` to change the CPU frequency based on some task based heuristics.

Understanding Vulnerability of Communities in Complex Networks   IIIT-Delhi | May 2018
Prof. Tanmoy Chakraborty & Prof. Ponnurangam Kumaraguru
· Identified vulnerable nodes in communities defined in a complex network by investigating several global and community centric properties to observe their effects on underlying community structure of the network.
· Proposed a hierarchical greedy heuristic based approach with a novel task based extrinsic evaluation strategy to measure its robustness.

Autoencoder based Recommender System   IIIT-Delhi | November 2017
Prof. Angshul Majumdar
· Engineered a new recommender system for GitHub where users are suggested with relevant repositories to contribute towards based on profiles while leading a group of 2.

- Applied similar technique to single-celled RNA-seq data and showed better gene expression recovery compared to other alternatives.

Advanced Application for Social Media Analytics (AASMA). IIIT-Delhi | November 2016
Prof. Ponnurangam Kumaraguru
- Collaborated with a team of 7 people to extend a tool launched by CERC Lab by incorporating sentiment model along with improvements in efficient data handling and depiction using redis queue for real-time utilization by more than 75 agencies.

Smart Glasses IIIT-Delhi | April 2015
Prof. Alexander Fell
- Created a prototype to help blind people understand text and allow them to identify people they know.
- Selected as top 10 projects of the year and was showcased at the Delhi Mini-Maker Faire.

HONORS

Full scholarship from advisors at CMU	2020
Robotics Institute Summer Scholar (35 selected from ~ 800 applicants)	2018
FICCI Scholarship, CMU	2018
GSoC Internship	2018
Dean's List, IIIT-Delhi	2017
Secured 99.7^{th} percentile among 1.5 million students in JEE Mains Examination	2015

ACTIVITIES

Graduate Research Assistant August 2021 - Present
Model-Based Embedded and Robotics Systems Group - MIT CSAIL Research Group

Graduate Research Assistant August 2019 - August 2021
Intelligent Coordination and Logistics Laboratory - CMU Research Group

RISS Admissions Committee January 2020 - March 2020
CMU

Undergraduate Researcher August 2017 - May 2019
Laboratory for Computational Social Systems - IIIT-Delhi Research Group

Undergraduate Researcher August 2016 - May 2019
Precog - IIIT-Delhi Research Group

Teaching Assistant August 2017
Advanced Programming

INVITED TALKS

Planning under Uncertainty for Joint-Task Execution October 2020
NASA HOME STRI Pittsburgh, PA

Computationally Scalable Bayesian Inference Framework June 2020
Rapid Flow Technologies Pittsburgh, PA

Analysis of DSRC accuracy for pedestrian localization October 2018
Hi-tech Robotics Systemz Ltd. Delhi, India

SKILLS

Programming Languages	Python, C, C++, Lisp, Java
Tools and Technologies	ROS, Tensorflow, Pytorch, Keras, HCLIB, CUDA, Git, Django, Processing, OpenCV, Docker, MongoDB, MySQL
Languages	English (Fluent), Hindi (Native), Telugu (Native)