V Shivaraman

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Education

Master of Science — **IISc Bangalore - IISER Bhopal**
BS-MS program in EECS; Minor in Physics — 2022 – 2023

Thesis: *"Graph-based Spatiotemporal-Aware Trajectory Prediction and Reinforcement Learning based Planning for Autonomous Driving in Dynamic Environments"*
Supervisors: Prof. Suresh Sundaram (IISc Bangalore) & Prof. Sujit PB (IISER Bhopal)
Final Grade: A (10.0/10.0)

Bachelor of Science — **IISER Bhopal**
BS-MS program in EECS; Minor in Physics — 2018 – 2022

Major: Electrical Engineering and Computer Science (EECS)
Minor: Physics
CGPA with MS: 8.45/10

Publications

Graph-based Prediction and Planning Policy Network (GP3Net) for scalable self-driving in dynamic environments using Deep Reinforcement Learning

Jayabrata Chowdhury, **V Shivaraman***, Suresh Sundaram, Sujit P B*
38th AAAI Conference on Artificial Intelligence (AAAI-24) [arxiv] — * equal contribution

Research Experience

Artificial Intelligence and Robotics Laboratory - IISc Bangalore — **May 2023 – Present**
Research Assistant - Advisors: Prof. Suresh Sundaram — Bengaluru, India

- Currently working on problems arising from epistemic uncertainty of learning-based models for motion planning for autonomous driving.
- Developing algorithms to adapt and recover from out-of-distribution scenarios for autonomous vehicles.

Artificial Intelligence and Robotics Laboratory - IISc Bangalore — **June 2022 – April 2023**
Master's Research Student - Advisors: Prof. Suresh Sundaram, Prof. Sujit P B — Bengaluru, India

- Proposed a novel motion planning framework for Autonomous Driving using Reinforcement Learning and Graph-Modeling to address the drawbacks of rule-based and imitation-learning methods.
- Acquired in-depth knowledge of reinforcement learning, imitation Learning and generative models.

Multi-Agent Autonomy Laboratory - IISER Bhopal — **Summer 2021**
Research Intern - Advisor: Prof. Sujit P B — Bhopal, India

- Worked to understand resilient multi-robot systems in adversarial environments.
- Researched Risk-based Task Allocation for Multi-Robot Systems and implemented a centralised framework to manage robot failures during missions.
- Implemented a decentralised framework using techniques learnt from computational geometry course.

iGEM 2021 - IISER Bhopal — **March 2021 – November 2021**
Computational Modeling Team Lead — Bhopal, India

- Led computational research team in designing models and experiments for the iGEM 2021 Cancer-therapeutic project, supporting the Wet-lab team. Collaborated with iGEM teams all over the world.
- Developed ML models to distinguish several protein biomarkers. Ran molecular dynamics simulations on high-performance computing clusters. Used concepts from systems biology.
- Won bronze medal for our work in the competition.

Projects

Minimizing Interference in Asymmetric Sensor Networks **Spring 2022**
Semester Project Bhopal, India

- Worked on a semester project focusing on algorithms/heuristics for minimising interference in a graphical network of sensors for efficient data transmission. This problem was shown to NP-Hard in literature.
- Explored and implemented algorithms and analysed their time complexity and effectiveness.

Robotic Herding using Swarms **Spring 2021**
Semester Internship - IISER Bhopal Bhopal, India

- Explored the area of Swarm Robotics and analysed several approaches used for control robotics swarms.
- Implemented ideas and methodologies presented in literature and ran simulations to analysis. One such paper involved using robots as herding dogs using artificial potential fields for steering a herd of sheep.

Control Systems for 2D VTOL **Fall 2020**
Control Systems Course - IISER Bhopal Bhopal, India

- Designed various controllers, such as a Full-state feedback controller and PID controller for a 2D VTOL implemented in Python.
- Used concepts from control theory, Lagrangian mechanics, and the Runge Kutta algorithm to solve coupled ordinary differential equations.

Classification of Fictional and Non-Fictional Text using Machine Learning **Summer 2019**
Summer Internship - IISER Bhopal Bhopal, India

- Implemented Machine Learning algorithms to develop a web application, *Fictometer*, that discriminates between fiction and non-fiction texts. Used Stanford NLP tools. Obtained 94 % accuracy.
- This model was then used to create *Fictometer: News App*, to classify news as biased/unbiased.

Technical skills

Programming Languages	Python, C/C++, Julia
Libraries	Numpy, Pytorch, Tensorflow, Scipy, Matplotlib, NLTK, Scikit-Learn
Software and Tools	Git, Linux Shell, MATLAB, Mathematica, LaTeX, CARLA, ROS (Novice).
Courses	Reinforcement Learning, Control Systems, Computational Geometry, Machine Learning, Network Science, Quantum Computing, Quantum Mechanics, Numerical Methods.

General skills

Languages	English, Hindi, Kannada (Native), Tamil, Telugu
Arts	Indian Classical Music (Vocal)

Awards and Honours

- Won third place in college coding competition called **ArmaCode**. **2023**
- Won bronze medal in **International Genetically Engineered Machine (iGEM)** competition with team IISER Bhopal. **2021**
- Got selected for **IISER Bhopal Astronomy Club (IBAC)** Computational Team for astronomical data analysis. **2021**.
- Won First Prize for our pitch in a college-wide entrepreneurial competition called **Curveball** for our *Fictometer* - Fake/Biased News detection app. **2019**
- Secured **ranks top 0.5 %** in National and State level engineering examinations. **2018**