

Shubhankar Patankar

☎ 530 219 2885 • ✉ spatank@seas.upenn.edu • 🌐 www.sppatankar.com
in shubhankarpatankar • 🔄 spatank

Education

University of Pennsylvania

Doctor of Philosophy, Computer Science

Master of Science in Engineering, Robotics

August 2018 - present

Philadelphia, PA

University of California - Davis

Bachelor of Science (with Honors), Mechanical Engineering (minor: Russian)

September 2014 - June 2018

Davis, CA

Experience

Tesla

Machine Learning Engineer Intern

November 2023 - May 2024

San Francisco, CA

- Developed machine learning models for predictive maintenance, root-cause analysis, process optimization, and quality evaluation in the 4680 cell manufacturing team.
- Trained high-fidelity time series and vision auto-encoder models for early outlier detection, helping identify defects at multiple upstream locations in the 4680 manufacturing process.
- Integrated inference outputs into data pipelines for dashboards and analysis at two manufacturing sites, providing real-time insights for process improvement and evaluation.

General Motors

Machine Learning Engineer Intern

May 2023 - August 2023

Detroit, MI

- Developed models using graph neural networks and transformers for downtime prediction using multivariate manufacturing time-series data, improving plant downtime forecasts by an average of 12 hours.
- Adapted large language models to automotive text data; used resulting models to build high-accuracy (>90%) text-based classifiers, significantly reducing GM's warranty costs on the order of \$XX million.

Complex Systems Group

Graduate Research Associate, Penn Engineering

August 2018 - present

Philadelphia, PA

- Trained reinforcement learning agents to explore graph-structured environments using human-like artificial curiosity signals, demonstrating learning generalization to environments 50X larger and trajectories 3X longer than those seen during training.
- Discovered three critical curiosity-based drivers of knowledge graph expansion in humans, using tools from algebraic topology, information theory, and analytical mechanics.
- Demonstrated using control theory that path-based structure in graphs determines control properties of dynamics.
- Led weekly recitations for a graduate-level deep learning course for 30 students.

Hyundai

Research Intern

January 2018 - June 2018

Davis, CA

- Designed and manufactured a driving simulator to enable hardware-in-the-loop (HIL) testing for the steering column of the Hyundai Sonata; manufacturing process involved 190+ hours of fabrication.
- Developed a control system to mitigate adverse impacts of road feel at the steering wheel through the power steering column of the Hyundai Sonata.

Technical Skills

Programming: Python, C, Julia, MATLAB, SQL, R

Libraries and Frameworks: PyTorch, TensorFlow, JAX, Apache Airflow, Apache Spark, Docker, Weights&Biases

Machine Learning: Computer Vision, Reinforcement Learning, Graph Neural Networks, Natural Language Processing

Coursework

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|---------------------------|-----------------------------|-------------------------|
| ○ Machine Learning | ○ Computational Linguistics | ○ Big Data Analytics |
| ○ Artificial Intelligence | ○ Machine Perception | ○ Linear Systems Theory |
| ○ Deep Learning | ○ Brain-Computer Interfaces | ○ Network Neuroscience |

Selected Research

1. **Shubhankar P. Patankar**, Marcel Hussing, Jorge Mendez-Mendez, Eric Eaton & Dani S. Bassett. Synthetic data generation for compositional reinforcement learning (in preparation).
2. **Shubhankar P. Patankar**, Mathieu Ouellet, Juan Cerviño, Alejandro Ribeiro, Kieran A. Murphy & Dani S. Bassett. Intrinsically motivated graph exploration using network theories of human curiosity. [Learning on Graphs \(LoG\)](#) (2023).