

MAYURESH SAVARGAONKAR

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Data science and analytics engineer with a demonstrated history of working in think tanks, academia, and industry on autonomous systems, predictive analytics, and energy systems. My expertise lies in building solutions using machine learning, artificial intelligence, Bayesian methods, simulation tools, and engineering and physics principles for the world of connected and automated mobility.

Education

Ph.D. in Industrial and Systems Engineering Thesis: Artificial Intelligence for Robust Predictive Analytics in Smart and Safe Mobility Technologies University of Michigan-Dearborn	GPA: 4.0	2019-2023
Master's in Industrial and Systems Engineering University of Michigan-Dearborn	GPA: 4.0	2016-2018
Bachelor's in Mechanical Engineering University of Pune (India)	GPA: 3.9	2011-2015

Research Interests

- Autonomous Vehicles ■ Connected Mobility ■ Synthetic Scenario Generation ■ Explainable Artificial Intelligence
- Customized Deep Learning ■ Spatio-Temporal Modeling ■ Predictive Analytics ■ Remaining Useful Life

Research and Professional Experience

Graduate Student Research Assistant 2019-Present
University of Michigan-Dearborn

Project: Virtual Verification and Validation of Autonomous Vehicles

Sponsor: University of Michigan; Ford Motor Company

- Led a project for uncovering unknown-unsafe scenarios. Our work uncovered over 35 abstract scenarios, some of which were later observed in real-life testing by Waymo.
- Increased safety readiness using the power of simulations and unsupervised learning techniques. Generated over 20,000 complex scenarios that accelerate safety readiness in AVs.
- Incorporated data-driven methods for improving risky situation realization in vehicle log data by over 20%. The developed method is a random forest regression model based on NHTSA and industry-used metrics.

Project: Artificial Intelligence using IoT in Connected Autonomous Driving Technology

Sponsor: University of Michigan

- Released a self-driving dataset with over 600 scenarios that promote the use of infrastructure information in trajectory or motion planning and control.
- Formulated the first trajectory prediction algorithm that integrates road level Vehicle-to-Vehicle and Vehicle-to-Infrastructure information. The use of such information increased prediction accuracy by over 50%.
- Pioneered a web-based, on-demand, scenario generation interface that generates, saves, and tags self-driving sensor information. Saved sensor information includes RGB, Radar, LiDAR, depth, and semantic segmentation.
- Integrated a statistical post-processing method that improves the performance of pre-trained perception networks by over 29% without re-training for object detection.

Project: AI-driven models for Predictive Analytics

Sponsor: University of Michigan; Honda R&D

- Published over 6 data-driven models for online prognostics and diagnostics in Lithium-ion batteries with over 99% accuracy. This project aims to develop long-term state-of-charge estimation capabilities given limited training data.
- Collaborated with 3 graduate students to develop spatio-temporal models that analyze the quality of each manufactured Lithium-ion cell in a manufacturing environment.

Project: Bayesian models for Warranty Analytics

Sponsor: University of Michigan; Ford Motor Company

- Developed a statistical Machine Learning model that predicts warranty claims for Ford Motor Company's reliability division with a 2% error over 18 months.
- Addressed a common phenomenon in warranty analytics named warranty data maturation.
- Successfully provided uncertainty quantification using Bayesian theories and unsupervised clustering.

**Summer Research Intern
Ford Motor Company**

2021

Project: Developing Synthetic Test Capabilities for Ford Motor Company's Level 4 Highway Pilot Feature

- Deployed a simulation-based testing framework for Ford's self-driving stacks. The project is estimated to save over 10,000 hours of real-life testing.
- Setup communication bridges with average latency of 10ms for interfacing Ford's autonomous driving system with a simulator. This was done by establishing Robotic Operating System (ROS) and TCP/IP pipelines using a dedicated python library.
- Replicated vehicle CAN interface for real-time communication with driving policies in Simulink. Over 200 CAN signals were replicated using CARLA.
- Designed OpenDrive maps for testing of Ford's Highway Pilot and Advanced Driver Assistance (ADAS) features.

**Industrial Engineer
Production Modeling Corporation**

2017-2019

Project: Cost, Value, and Feasibility Analysis for FCA, Ford, BMW, and Volvo Laser Scanning Programs.

- Reduced laser scanning and modeling defects by over 20% using lean techniques for continuous improvement.
- Organized a team of 6 for designing and developing parametric conveyor models in AutoCAD.
- Used agile methods for project liaisons between India, Mexico, and the USA, saving > 100hrs/month of redundancy.
- Created risk mitigation plans and performed root cause analysis to avoid production delays using a 5 Why's system.

Selected Publications

1. **Mayuresh Savargaonkar** and Abdallah Chehade. Optimal Bayesian Experimentation for Scenario Exploration in Autonomous Vehicles, 2023. (Under Review).
2. **Mayuresh Savargaonkar** and Abdallah Chehade. VTrackIT: A Synthetic Self-Driving Dataset with Infrastructure and Pooled Vehicle Information, 2022. (Under Review).
3. **Mayuresh Savargaonkar**, Abdallah Chehade. Uncorrelated Sparse Autoencoded LSTM for State-of-Charge Estimations of Battery Cells. IEEE Transactions on Automation Science and Engineering, 2022.
4. **Mayuresh Savargaonkar**, Abdallah Chehade, Ala A. Hussein. A Novel Neural Network with Gaussian Process Feedback for Modeling the State-of-Charge of Battery Cells. IEEE Transactions on Industry Applications, 2022.
5. Abdallah Chehade, **Mayuresh Savargaonkar**, Vasiliy Krivstov. Conditional Gaussian Mixture Model for Warranty Claims Forecasting. Reliability Engineering & System Safety, 2022.
6. **Mayuresh Savargaonkar**, Isaiah Oyewole, and Abdallah Chehade. Sparse Autoencoded Long Short-Term Memory Network for State-of-Charge Estimations. 2021 IEEE Transportation Electrification Conference & Expo.
7. Isaiah Oyewole, **Mayuresh Savargaonkar**, Abdallah Chehade, and Youngki Kim. A Hybrid Long Short-Term Memory Network for SOC Estimation of Li-ion Batteries. 2021 IEEE Transportation Electrification Conference & Expo.
8. **Mayuresh Savargaonkar** and Abdallah Chehade. An Adaptive Deep Neural Network with Transfer Learning for State-of-Charge Estimations of Battery Cells. 2020 IEEE Transportation Electrification Conference & Expo.
9. Abhishek Kumbhar, **Mayuresh Savargaonkar**, and Mohamed Abouelenien. Keyword Extraction Performance Analysis. 2019 IEEE Conference on Multimedia Information Processing and Retrieval.

Selected Presentations

1. Importance of Infrastructure Information in the Development of AVs. 2022 INFORMS Annual Meeting.
2. A Synthetic Self-Driving Dataset with Infrastructure and Pooled Vehicle Information. 2022 INFORMS Annual Meeting, QSR Workshop.
3. DirectSim: A Platform for Virtual Verification and Validation of Autonomous Vehicles under ISO 21448, 2021 INFORMS Annual Meeting.

4. USAL: Uncorrelated Sparse Autoencoder With Long Short-term Memory For State-of-charge Estimations, 2021 INFORMS Annual Meeting.
5. A Cycle-based Recurrent Neural Network for State-of-Charge Estimation of Li-ion Battery Cells, 2020 IEEE Transportation Electrification Conference & Expo.
6. Building Robustness in Vision Systems Using Effective Post-processing. 2020 IISE Annual Meeting, QCRE Workshop.

Awards

- INFORMS Conference Travel Award ■ Dearborn Difference Maker 2022 ■ IISE Student Chapter, Gold Award
- IISE-QCRE Best Student Paper Finalist (2020) ■ Graduate Student Scholarship (\$12000) ■ Distinguished Academic Performance, Gold Medal, University of Pune

Professional Memberships and Associations

- INFORMS (QSR; DMDA) ■ IISE (DAIS; QCRE) ■ IEEE ■ Alpha Pi Mu ■ President IISE, UM-Dearborn Chapter
- Treasurer, Alpha Pi Mu, UM-Dearborn Chapter ■ Steward, Graduate Employees' Organization, UM-Dearborn

Professional Service

- QSR Workshop Co-Chair, 2022 INFORMS Annual Meeting ■ Student Member, QSR Academic Subcommittee
- Reviewer for IEEE T-ASE 2021-2023, IEEE ITEC 2021-2023, and IEEE CASE 2021-2022

Other Skills

Programming: Python, Matlab, R, C++

Software: Carla Simulator, ROS, Unreal Engine, Sumo, Simulink, Tableau, Git, Catia V5R16, Inventor, Ansys

Professional References

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Prof. Onur Ulgen
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Mr. Mark Malone
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