

GANDHIMATHI (MATHI) PADMANABAN

Ph.D. Candidate

University of Michigan-Dearborn

gmathi@umich.edu

[Website](#) - [GitHub](#) - [LinkedIn](#)

EDUCATION

- Apr 2026 **Ph.D., Industrial and Systems Engineering** - *University of Michigan-Dearborn, USA*
Dissertation: “Enhancing Transportation Safety: Research on Driver Behaviors Using Advanced Machine Learning”
Advisor: [Dr. Fred Feng](#)
- 2021 **M.S., Human Centered Design and Engineering** - *University of Michigan-Dearborn, USA*
Thesis: “Computational Human Performance Modeling using Queuing Network in an Open-Source Platform”
Advisor: [Dr. Fred Feng](#)
- 2013 **B.E., Computer Science and Engineering** - *Anna University, India*
Thesis: “Automated Detection of Modifications in Software Requirement Traceability Links”
Advisor: Prof. Ramachandran Alagarsamy
Certifications: Connected & Automated Transportation Certificate (*Dec 2025*); Rackham DEI Certificate (2025); Post Graduate Diploma in Computer Applications (2011)

PUBLICATIONS (4 PEER-REVIEWED; 2 UNDER REVIEW; 1 IN PREPARATION)

Peer-Reviewed Papers

1. [Gandhimathi Padmanaban](#), Nathaniel P. Jachim, Hala Shandi, Lilit Avetisyan, Garrett Smith, Howrah Hammoud, and Feng Zhou. “An Autonomous Driving System - Dedicated Vehicle for People with ASD and their Caregivers”. *AutomotiveUI '21 Adjunct: 13th International Conference on Automotive User Interfaces and Interactive Vehicular Applications*. Association for Computing Machinery, 2021, pp. 142–147. DOI: <https://doi.org/10.1145/3473682.3480282>.
2. [Gandhimathi Padmanaban](#), Fred Feng, Edward Dai, Ankit Saini, Guopeng Hu, and Yanan Zhao. “A Comparative Analysis of Acceleration and Deceleration Profiles for Aggressive Driving Styles and Fuel Economy Test Cycles”. *WCX SAE World Congress Experience*. 2025. DOI: <http://dx.doi.org/10.4271/2025-01-8605>.
3. [Gandhimathi Padmanaban](#), Rayane Moustafa, and Fred Feng. “A Geometry-Informed Computer Vision Method for Detecting and Examining Overtaking Vehicles From A Bicycle”. *TRB Annual Meeting (Accepted)*. 2026.
4. Rayane Moustafa, [Gandhimathi Padmanaban](#), and Fred Feng. “Quantifying Drivers-Overtaking-Bicyclists with Surrogate Safety Measures Derived from High-Resolution Digital Lidar”. *TRB Annual Meeting (Accepted)*. 2026.

Papers Under Review & In Preparation

1. “A Machine Learning Pipeline Framework to Identify Aggressive Driving Based on Vehicle Kinematics and Driver’s Pedal Operations”. *Under review*.
2. “Geometry-Informed Distance Estimation from 2D Bounding Boxes for Vehicle Overtaking Analysis”. *Under Review*.
3. “Does Vehicle Type Influence Cyclist Overtaking Behavior? A Fine-Grained Vehicle Detection and Geometry-Informed Analysis Framework”. *In Preparation*.

AWARDS AND GRANTS

- **Student Visionary Award** - International Forum on Research Excellence Conference(IFoRE' 25), Sigma Xi-The Scientific Research Honor Society, 2025
- **Upsilon Pi Epsilon (UPE) Scholarship** - Awarded for exceptional academic performance, extracurricular involvement, and leadership within the computing community, 2024

- Global Finalist - NASA Space Apps Challenge, 2023
- Irma M. Wyman Scholar, *Center for the Education of Women (CEW+), University of Michigan*, 2020-2021 (\$11,500)
- Non-Resident Graduate Student Scholar, *University of Michigan-Dearborn*, 2020-2021 (\$13,000)
- Deloitte Hackathon Special Mention, 2017 | Syncfusion Hackathon 2nd Place, 2015 (INR 35,000)

TALKS AND PRESENTATIONS

Talks

- [WOC] Code – University of Michigan Ann Arbor, Feb 2024
NASA SpaceApps Experience: DigitwiML – Open-Source Project to model Digital Twin of C.elegans in Space
- University of Michigan–Dearborn, Sep 2021
Guest Talk: IMSE 501 Human Factors & Ergonomics

Conference Presentations

- Transportation Research Board Annual Meeting, Jan 2026 (*Poster-Upcoming*)
A Geometry-Informed Computer Vision Method for Detecting and Examining Overtaking Vehicles From A Bicycle
- International Forum on Research Excellence (IFoRE' 25), Oct 2025 (*Workshop Session*)
Hybrid Physics-Data Modeling for Sustainable Transportation: Bridging Classical Models and Modern AI
- Automotive User Interfaces (AutoUI) Conference, Apr 2025 (*Paper Presentation*)
A Comparative Analysis of Acceleration and Deceleration Profiles for Aggressive Driving Styles and Fuel Economy Test Cycles
- WCX SAE World Congress Experience, Sep 2021 (*Paper Presentation*)
An Autonomous Driving System – Dedicated Vehicle for People with ASD and their Caregivers

RESEARCH SOFTWARE & OPEN SOURCE PROJECTS

- **DigitwiML**: Digital Twin modeling platform for C.elegans in space (NASA SpaceApps Project) - [GitHub](#)
- **Human Performance Modeling Tools**: Open-source queuing network simulation platform for computational human performance modeling (Python)
- **Geometry-informed overtaking tracker** - Computer Vision system for tracking of vehicle overtaking bicyclist (Python)

RESEARCH EXPERIENCE

2022–Now **Graduate Student Research Assistant** - *University of Michigan-Dearborn, USA*
Advisor/PI: [Dr. Fred Feng](#)

2011–13 **Research Assistant** - *Anna University, India*
Advisor/PI: Prof. Ramachandran Alagarsamy

PROFESSIONAL EXPERIENCE (INDUSTRY)

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| 2017–18 | Development Lead/Consultant Deloitte (Offices of the US) – Bangalore, India |
| 2015–17 | Programmer Analyst Cognizant – Chennai, India |
| 2013–15 | Software Engineer Level-II Syncfusion – Chennai, India |

TEACHING AND MENTORING

- 2024–Now **Certified Instructor - The Carpentries**
 Hands-on Data Science & Programming Workshops (Python data analysis, visualization, Git).
[University of Tennessee Knoxville \(May 2025\)](#) | [CZI Foundation \(Nov 2024\)](#) | [University of Michigan \(Mar 2024\)](#)
- 2023–Now **Instructor & Mentor - WoCCode - University of Michigan-Ann Arbor**
 Machine Learning and Python workshop: materials open-sourced. [Machine Learning Workshop \(Feb 2024\)](#) | [Summer 2023 Boot Camp](#)
- 2010–12 **Student Instructor / Teaching Assistant - Anna University, India**
 Courses: Artificial Intelligence, Probability and Queuing Theory, Transforms and PDEs, Systems Software Laboratory

SERVICE AND LEADERSHIP

Leadership: President, Upsilon Pi Epsilon Michigan Beta Chapter (2024-2025) • Member: SAE International (AI in Simulation Task Force), Sigma Xi, Alpha Pi Mu, Society of Industrial and Applied Mathematics, ACM, HFES

Reviewer: TRB Annual Meeting 2026, ICIS 2025, AutoUI 2024, CHI 2024, AMCIS 2024, CUI 2024, IMX 2024, DIS 2024

Community: MIDAS AI Summit Student Volunteer (2023,2025) • WoC|CodeNova Hackathon Judge (2025) • WocCode Mentor • Certified Instructor & Lesson Maintainer • NASA SpaceApps & MHacks Judge • STEM High School Tutor (2010-13)

TECHNICAL EXPERTISE

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| <i>AI/ML Methods</i> | Geometry-Informed Computer Vision, Deep Learning (CNN, RNN, Transformers), Supervised Learning, Ensemble Methods, Time Series Analysis, Bayesian Methods, Physics-Informed Machine Learning, Uncertainty Quantification and Calibration, Out-of-Distribution Detection |
| <i>Domains</i> | Transportation Safety, Driver Behavior Analysis, Driver-Bicyclist Interactions, Human Factors Engineering, Naturalistic Driving Studies |
| <i>Tools & Frameworks</i> | OpenCV, YOLOv5, RT-DETR, ByteTrack, Multi-Object Detection & Tracking, Multi-Modal Data Fusion, LiDAR |
| <i>Programming</i> | Expert: Python (TensorFlow, PyTorch, scikit-learn, OpenCV, pandas), Git, L ^A T _E X; Proficient: Julia, R, MATLAB, C#, UI Frameworks, SQL; HPC: Great Lakes cluster (Slurm), Docker |
| <i>Research</i> | Experimental Design, Statistical Analysis, Scientific Writing, Peer Review, Institutional Review Board (IRB) Protocols, Cross-Validation, Academic Collaboration |
| <i>Foundations</i> | Optimization, statistical learning, multivariable calculus, mathematical modeling, geometric computer vision, vision transformers, multimodal/VLM (pretraining, attention, evaluation) |