Gandhimathi (Mathi) Padmanaban

University of Michigan-Dearborn
Industrial and Manufacturing Systems Engineering
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Personal Website
GitHub - LinkedIn

Research interests

Application of advanced machine learning and behavioral data analytics for transportation safety.

Integration of human factors principles with computational models for safe, efficient and sustainable transportation systems.

Interpretable physics-informed machine learning models for behavioral prediction and transportation safety.

Multi-modal sensing and human-centered design frameworks for intelligent systems.

Education

Aug 2025 **Ph.D., Industrial and Systems Engineering**
University of Michigan-Dearborn, USA
Dissertation: "Enhancing Transportation Safety: Research on Driver Behaviors Using Machine Learning and Data Analytics"
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

Aug 2025 **Connected and Automated Transportation Certificate**
Center for Connected and Automated Transportation, USA

Apr 2025 **Rackham Professional Development Diversity, Equity, and Inclusion Certificate**
University of Michigan-Rackham Graduate School, USA

2011 Post Graduate Diploma in Computer Applications
Computer Software Research Institution, India

Employment

2022-Now	**Graduate Student Research Assistant** *University of Michigan-Dearborn, USA*
2017–2018	**Development Lead/Consultant** *Deloitte (Offices of the US) – Bangalore, India*
2015–2017	**Programmer Analyst** *Cognizant – Chennai, India*
2013–2015	**Software Engineer Level-II** *Syncfusion – Chennai, India*
2011–2013	**Research / Project Assistant** *Anna University, India*

Publications

Peer-Reviewed Conference 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". SAE WCX Technical Paper (Accepted), 2025.

Journal Papers Under Review

1. Gandhimathi Padmanaban, Fred Feng, Edward Dai, Ankit Saini, Guopeng Hu, and Yanan Zhao. "A Machine Learning Approach to Identify Aggressive Driving Patterns based on Vehicle Longitudinal Jerk". *IEEE Transactions on Intelligent Transportation Systems (Submitted)* (2025).

Working Papers

1. "Using High-Resolution LiDAR to Study Cycling Safety - Automatic Distance Estimation of Passing Vehicles via Machine Learning".
2. "HybridLaneNet: Physics-Informed TCN for Lane Change Behavior Modeling".
3. "Mixed Methods Study on Data Privacy in Messenger Applications: A Comparison between WhatsApp and Signal".

Open-source Projects

- DigitwiML - Open-Source Project to model Digital Twin of C.elegans in Space (Software repository)

Presentations & Demos

- "A Comparative Analysis of Acceleration and Deceleration Profiles for Aggressive Driving Styles and Fuel Economy Test Cycles", *SAE World Congress (WCX) - Detroit*, *Apr 2025 (Upcoming)*
- "An Autonomous Driving System - Dedicated Vehicle for People with ASD and their Caregivers", *Automotive User Interfaces (Auto UI) Conference*, 2021

Invited Talks

- "DigitwiML - Open-Source Project to model Digital Twin of C.elegans in Space - NASA SpaceApps 2023 Experience", *[WOC] Code - University of Michigan-Ann Arbor*, Feb 2024
- "An Autonomous Driving System - Dedicated Vehicle for People with ASD and their Caregivers", *Guest Lecture - IMSE 501 Human Factors & Ergonomics, UM-Dearborn*, 2021

Workshops & Tutorials

- "Software Carpentry Workshop - CZI Foundation Accelerate Precision Health", *The Carpentries*, Nov 2024 (Instructor)
- "UM Software Carpentry Workshop - Python", *The Carpentries - University of Michigan Chapter*, Mar 2024 (Instructor)
- "Workshop on Machine learning", *[WOC] Code - University of Michigan-Ann Arbor*, Feb 2024
- "UM Software Carpentry Workshop - Python pilot", *The Carpentries - University of Michigan Chapter*, Dec 2023 (Helper)
- "[WOC] Code Summer 2023 Boot Camp", *[WOC] Code - University of Michigan-Ann Arbor*, May 2023 (workshop content), (schedule)

Teaching Experience

2013	**Artificial Intelligence**, Teaching Assistant, *UCEP - Anna University, India*
2012	**Probability and Queuing Theory**, Student Instructor, *UCEP - Anna University, India*
2012	**Transforms and PDEs**, Teaching Assistant, *UCEP - Anna University, India*
2011	**Systems Software Laboratory**, Student Lab Instructor, *UCEP - Anna University, India*

Scholarships and Awards

- Upsilon Pi Epsilon (UPE) Scholarship 2024 - Awarded for exceptional academic performance, extracurricular involvement, and leadership within the computing community, *UPE* ($1,000)
- 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*, S2020, F2020, W2021 ($13,000)
- Hackathon special mention, *Deloitte, India*, 2017 (Opportunity to attend JSFoo by Has Geek [India's premier JS conference])
- Second place in Hackathon, *Syncfusion, India*, 2015 (INR 35,000)

Skills

Areas	Human-Centered Computing, Human Factors Engineering, Applied Machine Learning, Intelligent Systems, AI for Science and Engineering
Domains	Driver Behavior Analysis & Modeling, Transportation Safety, Decision-Making in Complex Systems, Human Computational Modeling
Methods	Traditional and Scientific (Physics-Informed) Machine Learning, Deep Learning, Computer Vision, Behavioral Data Analytics, Computational Modeling, Applied Statistics
Technical	Python, R, Julia, MATLAB, TensorFlow, PyTorch, SQL, C#, JavaScript, Git, LaTeX
Research	Experimental Design, Human Subject Studies, Qualitative and Quantitative Research Methods, Literature Review, Scientific Writing, Proposal Development
Professional	Industry-Academia Collaboration, Project Management, Team Leadership, Workshop Organization

Membership in Societies

Honorary	Upsilon Pi Epsilon (UPE) [The **only** International Honor Society for Computing and Information Disciplines] *President - Michigan Beta Chapter*, Jan 2024 - Present
Professional	Association for Computing Machinery (ACM) - *Member*, 2023 - Present Human Factors & Ergonomic Society (HFES) - *Member*, 2023 - Present Society of Women Engineers (SWE) - *Member*, 2023 - Present

Services

Reviewer

- International ACM Conference on Automotive User Interfaces (AutoUI), 2024
- Conference on Human Factors in Computing Systems, 2024
- Americas Conference on Information Systems, 2024
- International ACM Conversational User Interfaces conference, 2024
- ACM International Conference on Interactive Media Experiences (IMX), 2024
- ACM Conference on Designing Interactive Systems (DIS), 2024

Volunteer

- Instructor/Mentor, WocCode - University of Michigan, 2023 - Present
- Organizer, CECS Career Panel, 2024
- Judge, NASA SpaceApps Challenge - Pittsburgh, 2024
- Judge, MHacks, 2024
- Student Volunteer, U-M Annual Data Science & AI Summit, 2023
- Panelist, CECS Open Lab Day, 2023
- Website Designer & Developer, BSE Human-Centered Engineering Design, 2021
- Tutor, For middle and high school students in mathematics, physics, chemistry, and computer science, 2010-2013, 2018-2020
- Organizer, 2-Day International Conference for Software Professionals, ASPRO'12

Last updated: January 29, 2025