Yilin Wang

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Yilin Wang | Dylan-Wyl10 | 0000-0002-6002-0535

West Lafayette, IN - 47906, USA

EDUCATION

- **Purdue University** *Aug.2021 - Aug.2026 (Expected)*
  Doctoral of Philosophy West Lafayette, US
  - Research Area: Connected and Automated Vehicle, Cooperative Perception, Physics-informed Machine Learning, Network Operation and Control
  - GPA: 3.8/4.00

- **Carnegie Mellon University** *Aug.2019 - Dec.2020*
  Master of Science Pittsburgh, US
  - Area: Smart City, Deep Learning, Natural Language Processing
  - Course: Deep Learning, Reinforcement Learning, Geo-Informatics System,
  - GPA: 3.87/4.00

- **Tongji University** *Aug.2015 - Jun.2019*
  Bachelor of Science Shanghai, China
  - Major: Civil Engineering (Area of Geo-technical and Underground Engineering)

PROJECTS

- **Developing A Cooperative Perception System** *Jan.2023 - Present*
  Project Leader | Funded by Center of Connected and Automated Transportation
  - **Phase 1**: A Cooperative Perception System for CAV Navigation and Improving Safety
    - **Objective**: Implement a cooperative perception system to improve road safety.
    - **Contribution**:
      1. We build a cooperative perception system connected by V2X system between roadside LiDAR and CAV sensors.
      2. We develop a detecting and navigating algorithm on CAV with by sensor data fusion pipeline.
      3. We build and conduct a field testing demonstrating the safety benefits in detecting occluded VRUs through cooperative perception system.
    - **Conclusion**: Cooperative perception system helps CAVs to plan safer (i.e., higher post-encroachment time) and smoother (i.e., lower deceleration rates) trajectories.
    - **Outcome**:
      1. Publication: **Cooperative Perception System for Aiding Connected and Automated Vehicle Navigation and Improving Safety**
  - **Phase 2**: An Infrastructure-vehicle Cooperative Perception System
    - **Objective**: Develop a cooperative perception system including multiple vehicles, infrastructure sensors, and drones.
    - **Contribution**: Extract and processing multi-sensor data (Lidar, Camera, etc.)to vehicle trajectories. Release open-source dataset for futural research.
    - **Methodology**: Multi-sensor sensor fusion from infrastructure sensor, drone-view camera, and vehicle sensor.

- **Cooperative Perception based Operation for CAVs to Improve Traffic Data Collection** *Apr.2023 - Aug.2025*
  Individual Research Project [ ]
  - **Project 1**: Dynamic Routing on Connected and Automated Vehicles for Improving Network Coverage
    - **Research Question**: How to model the CAV network coverage and operate routes to improve data collection.
    - **Contribution**:
      1. We formulate the CAV routing problem considering the network coverage as one objective.

2. We propose a heuristic algorithms with greedy search to solve the multi-objective optimization.
3. We conduct a simulation experiment in a grid network to verify the feasibility and relations between travel cost and network coverage.

* **Methodology**: heuristic optimization, SUMO simulation, link-based travel time estimation.
* **Outcome**: Accepted by Transportation Research Board (TRBAM) 2024 as poster presentation.

◦ **Project 2**: A Cooperative Perception based Dynamic Vehicle Routing Framework For Urban Traffic Monitoring

* **Research Question**:
  1. A higher granularity of road network representation is needed.
  2. A proper performance metric is needed to evaluate traffic monitoring impact.
  3. There is a dynamic effect between CAV routes decision and partial network observations.
* **Contribution**:
  1. We apply Cell Transmission Model (CTM) for traffic state prediction and road network representation considering CAV detection maneuver.
  2. We propose a comprehensive MILP formulation considering the performance of traffic monitoring as well as dynamic vehicle routing in one explict equation.
  3. We conduct a microscopic simulation and evaluations under various scenarios.
* **Outcome**: Submit an Under Reviewed paper by Transportation Research: Part B.

• **IDM-Follower: A Physics-Informed Neural Network Model for Trajectory Prediction** *Jan.2022 - Feb.2024*
Individual Research Project [GitHub]

◦ **Research Question**: How to integrate explicit car-following model into learning-based model to improve training and performance.

◦ **Contribution**:

1. We introduce a physics-informed neural network (PINN) model that integrates intelligent driving model (IDM).
2. The proposed model exhibits robustness against real-time GPS noise.

◦ **Methodology**: The loss function combined by physical laws and ground-truth difference is utilized to train a customized attention-based VAE model.

◦ **Outcome**:

1. Presentation: Research Presentation on IEEE-IV 2024 at Jeju Island, KR.
2. Publication: **IDM-Follower: A Model-Informed Deep Learning Method for Car-Following Trajectory Prediction**

• **Developing V2X System for Traffic Signal Control** *Sept.2021 - Present*
Multiple Projects, Funded by US-DOT, Michigan DOT, and Leidos Inc

◦ **Part 1: Smart Intersection Project**

* **Overview**: Implement CV2X system for Transit Signal Priority(TSP) in City of Ann Arbor.
* **Contribution**:
  1. Redevelop Multi-Modal Intelligent Traffic Signal System (MMITSS). GitHub
  2. Maintain and update versions on road-side and vehicle-side applications.
  3. Field testing, installment, and data-processing for buses and real intersections. GitHub

◦ **Part 2: Michigan-DOT ATCMTD Project**

* **Overview**: Implementing MMITSS system in Q-Line in Detriot, MI.
* **Contribution**: Update MMITSS to to accommodate NTCIP 1211 operation protocol. GitHub

◦ **Part 3: CDA-sim Update: Integration MMITSS on a Co-simulation Platform**

* **Overview**: Integrating MMITSS into CARMA-CARLA-SUMO co-simulation.
* **Contribution**:
  1. New features on time-synchronization, message brokers, and parallel process to support MMITSS in CDA-Sim platform. GitHub
  2. Build integration testing and demo with released configuration.

Patents and Publications

C=Conference, J=Journal, P=Patent, S=In Submission, T=Thesis

[J.1] Ya-Dong Xue, Wei Zhang, **Yi-Lin Wang***, et al. (2023). Serviceability evaluation of highway tunnels based on data mining and machine learning: A case study of continental United States in *Tunneling and Underground Space Technology*, Volume 142, 2023, 105418, ISSN 0886-7798, https://doi.org/10.1016/j.tust.2023.105418

[C.1] **Yilin Wang**, Yiheng Feng* (2024). Dynamic Routing of Connected and Automated Vehicles for Improving Network Coverage. In *Transportation Research Board Annual Meeting 2024*, Accepted by Poster Presentation.

[J.2] **Y. Wang** and Y. Feng* (2024). IDM-Follower: A Model-Informed Deep Learning Method for Car-Following Trajectory Prediction in *IEEE Transactions on Intelligent Vehicles*, vol. 9, no. 6, pp. 5014-5020, June 2024, doi: 10.1109/TIV.2024.3367654

[J.3] Hanlin Chen, Vamsi K Bandaru, **Yilin Wang**, Mario A Romero, Andrew Tarko, Yiheng Feng* (2024). Cooperative Perception System for Aiding Connected and Automated Vehicle Navigation and Improving Safety in *Transportation Research Record*, 2678(12), 1498-1510. https://doi.org/10.1177/03611981241252779

[S.1] **Yilin Wang**, Yiheng Feng* (2025). **A Cooperative Perception Based Dynamic Vehicle Routing Framework for Urban Traffic Monitoring**. Manuscript submitted for publication in *Transportation Research: Part B*.

Skills

- **Programming Languages:** Python, C++, MATLAB, JavaScript
- **Data Science & Machine Learning:** PyTorch, CUDA, Hugging Face
- **Cloud Technologies:** AWS, SSH
- **DevOps & Version Control:** Linux, Docker, Conda
- **Cooperation Platform & Project Management:** Jira, Slack, Git-Hub
- **Other Tools & Technologies:** Microsoft Office, Auto-CAD, Arc-GIS
- **Research Skills:** Critical Thinking, Research Talk, Comprehensive Writing, Literature Review

Honors and Awards

- **Honorable Mention** *2018*
  Mathematical Contest in Modeling of USA [🌐]

Peer Review & Service

- **Transportation Research Part C: Emerging Technologies** *Journal Reviewer* *2024, 2025*
- **Multimedia Tools and Applications** *Journal Reviewer* *2023-2025*
- **IEEE Transaction of Intelligent Vehicle** *Journal Reviewer* *2024, 2025*
- **Journal of Intelligent Transportation System** *Journal Reviewer* *2023-2025*
- **IEEE Intelligent Transportation System Conference (ITSC)** *Conference Reviewer* *2024*
- **IEEE-IV24 workshop on Socially Interactive Autonomous Mobility** *Committee Member* *2024*

Additional Information

Languages: English (Proficiency), Chinese Mandatory (Native)
Interests: Soccer, Skateboarding, Range and Gaming

References

1. **Yiheng Feng**
   Assistant Professor, Civil and Construction Engineering
   Assistant Director, Center for Road Safety (CRS)
   Lyles School of Civil and Construction Engineering, Purdue University
   Email: feng333@purdue.edu
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   Relationship: Ph.D Advisor

2. **Pingbo Tang**
   Associate Professor, Civil and Environment Engineering
   Carnegie Mellon University
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   Phone: +1(412)268-8215
   Relationship: Master Research Advisor

3. **Anthony Gasiorowski**
   Lead System Engineer, WSP Inc.
   Relationship: Project College, Coordinator