

Yongkang Li

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RESEARCH INTERESTS

Safe and interpretable autonomous driving: trajectory prediction, accident anticipation, world models and multimodal grounding, and connected vehicles for work-zone safety — from model design to deployment on real vehicles.

EDUCATION

Purdue University

Ph.D. Student Advisor: Prof. Yiheng Feng

West Lafayette, IN

2025 – Present

PROJECTS

Work Zone Risk Prediction

Integrated Smart Work Zone project

Purdue University · with INDOT

2025 – Present

- Roadside system that flags vehicles about to intrude into a highway work zone: a 4 s time-to-collision screen, then an attention LSTM that predicts 4 s of trajectory from 2 s of radar history.
- Runs in real time on an edge computer (about 11 ms per prediction); field-tested at three Indiana work zones in 2026.

Connected Vehicles

Integrated Smart Work Zone project

Purdue University · with INDOT

2026 – Present

- Built the in-vehicle warning display and the work-zone digital-twin console, and integrated the roadside-unit to onboard-unit C-V2X link (about 14 ms latency in bench tests); field-tested in a test vehicle with INDOT in October 2026.

RESEARCH EXPERIENCE

Purdue University — CART Lab

Graduate Research Assistant, Advisor: Prof. Yiheng Feng

West Lafayette, IN

2025 – Present

- **Trace2Map.** Infers the drivable area of a work zone from a handful of vehicle trajectories with a conditional VAE, and feeds it to a cone-aware trajectory predictor built on Trajectron++; trained on simulated work zones (SUMO, CARLA) and checked on field data.
- **GenTFM.** A trajectory-prediction foundation model trained jointly on 30 driving datasets (33.5M scenes): mixture-of-experts, anchor-based multimodal decoding and representation-disentanglement losses, scaled to 66M parameters on 8×H100 GPUs, with steady gains from data scaling and cross-dataset transfer studies.
- **FINDAR.** Recognizes adversarial attacks on motion-forecasting models by fingerprinting their traces in disentangled feature subspaces, with a library of ten attack types for training and evaluation.

University of Macau — State Key Laboratory of Internet of Things for Smart City

Research Assistant, Supervisors: Prof. Zhenning Li and Prof. Chengzhong Xu

Macau, China

Jul. 2023 – Aug. 2024

- **Cognitively inspired trajectory prediction.** Developed a teacher–student model that mimics how human drivers observe and reason, with graph attention and Transformers for agent interactions; reduced prediction error by 15.5% while cutting parameters by 30% (T-IV, ECAI).
- **Accident anticipation.** Added monocular depth cues to 3D modeling of dashcam video (+4.0% precision), and built a three-stage framework with LLM scene prompting that predicts when, where and what kind of accident will occur: +14.6% precision and 16.4% earlier anticipation (ACM MM oral, AAP).

Peking University — CIS Lab

Research Assistant, Supervisor: Prof. Yuesheng Zhu · multimodal deepfake and diffusion-image detection

Beijing, China

May – Jun. 2023

Sun Yat-sen University

Research Assistant, Supervisor: Prof. Wenyuan Yang · capsule-network deepfake detection

Shenzhen, China

Aug. 2022 – Apr. 2023

PUBLICATIONS

[1] H. Liao, H. Shen, B. Wang, Y. Li, Y. Tang, C. Wang, D. Zhuang, K. Chen, et al. **Think Before You Drive: World Model-Inspired Multimodal Grounding for Autonomous Vehicles**. *IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2026.

[2] H. Liao*, Y. Li*, Z. Li, C. Wang, Y. Guan, K. H. Tam, C. Tian, L. Li, C. Xu. **When, Where, and What? A Benchmark for Accident Anticipation and Localization with Large Language Models**. *ACM International Conference on Multimedia (ACM MM)*, 2024. [Oral](#)

[3] H. Liao*, Y. Li*, Z. Li, C. Wang, C. Tian, Y. Huang, Z. Bian, K. Zhu, G. Li, Z. Pu, et al. **Less is More: Efficient Brain-Inspired Learning for Autonomous Driving Trajectory Prediction**. *European Conference on Artificial Intelligence (ECAI)*, 2024.

[4] H. Liao*, Y. Li*, Z. Li, C. Wang, Z. Cui, S. E. Li, C. Xu. **A Cognitive-Based Trajectory Prediction Approach for Autonomous Driving**. *IEEE Transactions on Intelligent Vehicles (T-IV)*, 2024.

[5] H. Liao*, Y. Li*, Z. Li, Z. Bian, J. Lee, Z. Cui, G. Zhang, C. Xu. **Real-Time Accident Anticipation for Autonomous Driving through Monocular Depth-Enhanced 3D Modeling**. *Accident Analysis & Prevention*, vol. 207, 107760, 2024.

[6] H. Liao, S. Liu, Y. Li, Z. Li, C. Wang, B. Wang, Y. Guan, C. Xu. **Human Observation-Inspired Trajectory Prediction for Autonomous Driving in Mixed-Autonomy Traffic Environments**. *IEEE International Conference on Robotics and Automation (ICRA)*, 2024.

HONORS AND AWARDS

Grand Prize, ranked 1st and ranked 2nd; 2nd Prize — China College Computer Competition (national)	2023, 2024
2nd Prize — China Students Service Outsourcing Innovation and Entrepreneurship Competition (national)	2023, 2024
2nd Prize, ranked 12th — Pangu Stone Cup Electronic Digital Forensics Competition (national)	2023
3rd Prize — China College Student Computer Design Competition (national)	2022
Registered software copyright — web link positioning and security detection system based on ChatGLM	2024

SKILLS

Programming	Python, PyTorch, TypeScript / JavaScript, React, FastAPI, Linux, LaTeX
Systems	Roadside radar and camera data, real-time edge deployment, C-V2X (SAE J2735 messages)
Design	UI design, data visualization, video editing

LEADERSHIP AND SERVICE

LingRui Studio — Vice-President and UI Team Leader	Oct. 2022 – Oct. 2023
Weiyang Volunteer Teaching Group — Head of Publicity; volunteer teaching in rural schools	Dec. 2021 – Dec. 2022