Yunsheng Ma

yunsheng@purdue.edu | ysma.me | Google Scholar | linkedin.com/in/yunsheng-ma

EDUCATION

Purdue University — West Lafayette, IN
Doctor of Philosophy, Research Focus: Autonomous Driving — Jan. 2023 – Present

New York University — New York, NY
Master of Science, Computer Science — Sep. 2020 – May 2022

Harbin Institute of Technology, Weihai — Weihai, China
Bachelor of Engineering, Computer Software Engineering — Sep. 2016 – May 2020

University of California, Berkeley — Berkeley, CA
Undergraduate Exchange Student — Aug. 2018 – May 2019

SUMMARY

Currently pursuing a Ph.D. at Purdue University, advised by Prof. Ziran Wang, and previously received a Master's degree in Computer Science from New York University. Published 18 peer-reviewed papers in top-tier journals and conference proceedings. Serves as an organizer of the Large Language and Vision Models for Autonomous Driving workshop series at CVPR, WACV, and ITSC, actively contributing to advancing research in this field. Reviewed more than 100 research papers in total. Completed research internships at Bosch AI, Toyota, and DiDi. Research focuses on foundation models for autonomous driving, with a particular emphasis on vision-language models, multimodal learning, and embodied intelligence.

EMPLOYMENT

Bosch Center for Artificial Intelligence — Sunnyvale, CA
Research Intern, Supervisor: Dr. Burhaneddin Yaman — Sep. 2024 – Present
Research Topic: Foundation Models for Autonomous Driving

Toyota North America — Mountain View, CA
Research Intern, Supervisor: Dr. Amr Abdelraouf — May 2024 – Aug. 2024
Research Topic: Efficient Vision-Language Models for Autonomous Driving

Purdue University — West Lafayette, IN
Graduate Research Assistant, Advisor: Prof. Ziran Wang — Aug. 2022 – Present
Research Topics: Foundation Models, BEV Perception, Driver Behavior

New York University — New York, NY
Graduate Teaching Assistant — Jan. 2021 – May 2021
Course: CSCI-GA.3033: Design and Analysis of Algorithms

DiDi — Beijing, China
Computer Vision Research Intern, Supervisor: Dr. Pengfei Xu — June 2019 – Sep. 2019
Research Topic: Video Understanding

University of California, Berkeley — Berkeley, CA
Undergraduate Researcher, Advisor: Prof. Sicheng Zhao — Nov. 2018 – May 2019
Research Topic: Domain Adaptation

REFEREED PUBLICATIONS (†denotes co-first authors)

Conference Proceedings

[C15] Yunsheng Ma, Xu Cao, Wenqian Ye, Can Cui, Kai Mei, and Ziran Wang. "Learning Autonomous Driving Tasks via Human Feedbacks with Large Language Models." In *Findings of the Association for Computational Linguistics:* **EMNLP** 2024.

[C14] Yunsheng Ma†, Can Cui†, Xu Cao†, Wenqian Ye, Peiran Liu, Juanwu Lu, Amr Abdelraouf, Rohit Gupta Kyungtae Han, Aniket Bera, James M. Rehg, and Ziran Wang. "LaMPilot: An Open Benchmark Dataset for Autonomous Driving with Language Model Programs." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2024.

[C13] Xu Cao†, Tong Zhou†, Yunsheng Ma†, Wenqian Ye, Can Cui, Kun Tang, Zhipeng Cao, Kaizhao Liang, Ziran Wang, James M. Rehg, and Chao Zheng. "MAPLM: A Real-World Large-Scale Vision-Language Benchmark for Map and Traffic Scene Understanding." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2024.

[C12] Juanwu Lu, Can Cui, Yunsheng Ma, Aniket Bera, and Ziran Wang. "Quantifying Uncertainty in Motion Prediction with Variational Bayesian Mixture." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**), 2024.

[C11] Can Cui, Zichong Yang, Yupeng Zhou, Yunsheng Ma, Juanwu Lu, and Ziran Wang "Large Language Models for Autonomous Driving: Real-World Experiments." In *IEEE International Conference on Intelligent Transportation Systems* (**ITSC**), 2024.

[C10] Yunsheng Ma, Juanwu Lu, Can Cui, Sicheng Zhao, Xu Cao, Wenqian Ye, and Ziran Wang. "MACP: Efficient Model Adaptation for Cooperative Perception." In *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision* (**WACV**), 2024.

[C9] Can Cui†, Yunsheng Ma†, Xu Cao†, Wenqian Ye†, Yupeng Zhou, Kaizhao Liang, Jintai Chen, Juanwu Lu, Zichong Yang, Kuei-Da Liao, Tianren Gao, Erlong Li, Kun Tang, Zhipeng Cao, Tong Zhou, Ao Liu, Xinrui Yan, Shuqi Mei, Jianguo Cao, Ziran Wang, and Chao Zheng. "A Survey on Multimodal Large Language Models for Autonomous Driving." In *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision* (**WACV**) *Workshops*, 2024.

[C8] Can Cui, Yunsheng Ma, Xu Cao, Wenqian Ye, and Ziran Wang. "Drive As You Speak: Enabling Human-Like Interaction With Large Language Models in Autonomous Vehicles." In *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision* (**WACV**) *Workshops*, 2024.

[C7] Yunsheng Ma and Ziran Wang. "ViT-DD: Multi-Task Vision Transformer for Semi-Supervised Driver Distraction Detection." *IEEE Intelligent Vehicles Symposium*, 2024.

[C6] Wenqian Ye, Yunsheng Ma, Xu Cao, and Kun Tang. "Mitigating Transformer Overconfidence via Lipschitz Regularization." In *Proceedings of the Thirty-Ninth Conference on Uncertainty in Artificial Intelligence* (**UAI**), 2023.

[C5] Yunsheng Ma, Wenqian Ye, Xu Cao, Amr Abdelraouf, Kyungtae Han, Rohit Gupta, and Ziran Wang. "CEMFormer: Learning to Predict Driver Intentions from In-Cabin and External Cameras via Spatial-Temporal Transformers." *IEEE International Conference on Intelligent Transportation Systems* (**ITSC**), 2023.

[C4] Can Cui, Yunsheng Ma, Juanwu Lu, and Ziran Wang. "Radar Enlighten the Dark: Enhancing Low-Visibility Perception for Automated Vehicles with Camera-Radar Fusion." *IEEE 26th International Conference on Intelligent Transportation Systems* (**ITSC**), 2023.

[C3] Yunsheng Ma, Liangqi Yuan, Amr Abdelraouf, Kyungtae Han, Rohit Gupta, Zihao Li, and Ziran Wang. "M^2DAR: Multi-View Multi-Scale Driver Action Recognition With Vision Transformer." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**) *Workshops*, 2023.

[C2] Liangqi Yuan, Yunsheng Ma, Lu Su, and Ziran Wang. "Peer-to-Peer Federated Continual Learning for

Naturalistic Driving Action Recognition." In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition* (**CVPR**) *Workshops*, 2023.

[C1] Sicheng Zhao†, Yunsheng Ma†, Yang Gu, Jufeng Yang, Tengfei Xing, Pengfei Xu, Runbo Hu, Hua Chai, and Kurt Keutzer. "An End-to-End Visual-Audio Attention Network for Emotion Recognition in User-Generated Videos." In *Proceedings of the AAAI Conference on Artificial Intelligence* (**AAAI**), 2020, Oral Presentation.

Journal Articles

[J3] Can Cui†, Yunsheng Ma†, Xu Cao, Wenqian Ye, and Ziran Wang, "Receive, Reason, and React: Drive as You Say, With Large Language Models in Autonomous Vehicles." *IEEE Intelligent Transportation Systems Magazine*, 2024

[J2] Yunsheng Ma, Runjia Du, Amr Abdelraouf, Kyungtae Han, Rohit Gupta, and Ziran Wang. "Driver Digital Twin for Online Recognition of Distracted Driving Behaviors." *IEEE Transactions on Intelligent Vehicles*, 2024.

[J1] Can Cui, Yunsheng Ma, Juanwu Lu, and Ziran Wang. "REDFormer: Radar Enlightens the Darkness of Camera Perception with Transformers." *IEEE Transactions on Intelligent Vehicles*, 2023.

OTHER PUBLICATIONS

[O6] Yunsheng Ma, Burhaneddin Yaman, Xin Ye, Feng Tao, Abhirup Mallik, Ziran Wang, and Liu Ren. "MTA: Multimodal Task Alignment for BEV Perception and Captioning." *arXiv*, 2024.

[O5] Can Cui, Zichong Yang, Yupeng Zhou, J. Peng, SungYeon Park, Cong Zhang, Yunsheng Ma, Xu Cao, Wenqian Ye, Yiheng Feng, Jitesh H. Panchal, Lingxi Li, Yaobin Chen, and Ziran Wang. "On-Board Vision-Language Models for Personalized Autonomous Vehicle Motion Control: System Design and Real-World Validation." *arXiv*, 2024.

[O4] Yunsheng Ma, Amr Abdelraouf, Rohit Gupta, Ziran Wang, and Kyungtae Han. "Video Token Sparsification for Efficient Multimodal LLMs in Autonomous Driving." *arXiv*, 2024.

[O3] Wenqian Ye, Guangtao Zheng, Yunsheng Ma, Xu Cao, Bolin Lai, James M. Rehg, and Aidong Zhang. "MM-SpuBench: Towards Better Understanding of Spurious Biases in Multimodal LLMs." *NeurIPS 2024 Workshop on Responsibly Building the Next Generation of Multimodal Foundational Models*, 2024, Oral Presentation.

[O2] Xu Cao, Bolin Lai, Wenqian Ye, Yunsheng Ma, J. Heintz, Jintai Chen, Jianguo Cao, and James M. Rehg. "What is the Visual Cognition Gap between Humans and Multimodal LLMs?" *arXiv*, 2024.

[O1] Wenqian Ye, Guangtao Zheng, Xu Cao, Yunsheng Ma, and Aidong Zhang. "Spurious Correlations in Machine Learning: A Survey." *ICML 2024 Workshop on Data-Centric Machine Learning Research*, 2024.

PATENTS

[P2] Rohit Gupta, Yunsheng Ma, Amr Abdelraouf and Kyungtae Han. "Context-Aware External Object Detection and Vehicle Guidance." *U.S. Patent Application 19/004,331.* Filed Dec. 2024

[P1] Rohit Gupta, Yunsheng Ma, Amr Abdelraouf and Kyungtae Han. "Adaptive Road Sign Interpretation and Vehicle Response System." *U.S. patent application 19/004,333.* Filed Dec. 2024

PROFESSIONAL ACTIVITIES

As a Workshop Organizer

- CVPR 2025 Workshop on Distillation of Foundation Models for Autonomous Driving (WDFM-AD)
- WACV 2025 Workshop on Large Language and Vision Models for Autonomous Driving (3rd LLVM-AD)
- ITSC 2024 Workshop on Large Language and Vision Models for Autonomous Driving (2nd LLVM-AD)
- WACV 2024 Workshop on Large Language and Vision Models for Autonomous Driving (1st LLVM-AD)

As a Program Committee Member

- IEEE/CVF Computer Vision and Pattern Recognition Conference (CVPR 2024/25)
- The European Conference on Computer Vision (ECCV 2024)
- IEEE/CVF Winter Conference on Applications of Computer Vision (WACV 2025)
- The International Conference on Learning Representations (ICLR 2025)
- AAAI Conference on Artificial Intelligence (AAAI 2025)
- The International Joint Conference on Artificial Intelligence (IJCAI 2024)
- IEEE Intelligent Vehicles Symposium (IV 2023/24)
- IEEE Intelligent Transportation Systems Conference (ITSC 2023/24)
- IEEE Forum for Innovative Sustainable Transportation Systems (FISTS 2024)
- IEEE International Conference on Robotics and Automation (ICRA 2025)
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2024)
- IEEE International Symposium on Biomedical Imaging (ISBI 2024)
- The Conference on Information and Knowledge Management (CIKM 2024)
- ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2023)
- IEEE International Conference on Mobility: Operations, Services, and Technologies (MOST 2023)

As a Journal Reviewer

- IEEE Transactions on Intelligent Transportation Systems (T-ITS)
- IEEE Transactions on Intelligent Vehicles (T-IV)
- International Journal of Human Computer Interaction (IJHCI)
- IEEE Vehicular Technology Magazine (VTM)
- IEEE Internet Computing
- IEEE Internet of Things Journal (IoT-J)
- IEEE Robotics and Automation Letters (RA-L)

As a Volunteer

- Student Volunteer of the Conference on Uncertainty in Artificial Intelligence, Pittsburgh, PA 2023
- Student Volunteer of TRB Innovations in Travel Analysis and Planning Conference, Indianapolis, IN 2023
- Student Volunteer of AAAI Conference on Artificial Intelligence, Washington, DC 2023
- Webmaster of IEEE Technical Committee on Internet of Things in ITS 2022

As a Society Member

- Student Member of Institute of Electrical and Electronics Engineers (IEEE) 2023 – Present
- Member of Intelligent Transportation Systems Society (ITSS), IEEE 2023 – Present
- Student Member of Association for the Advancement of Artificial Intelligence (AAAI) 2023 – Present
- Student Member of Association for Computing Machinery (ACM) 2023 – Present

Honors and Awards

- AAAI Student Scholarship 2023
- Annual Conference on Next Generation Transportation Systems (NGTS): Outstanding Speaker Award 2023
- Purdue University Graduate Research Assistantship 2023
- NeurIPS Workshop on Machine Learning for Autonomous Driving (ML4AD): Travel Award 2022

Technical Skills

- **Programming:** Python, C++
- **Libraries:** PyTorch, Transformers (Hugging Face), Lightning, LangChain, MMDetection3D, OpenCV
- **Tools:** CARLA, Chroma, Git, Wandb, LaTeX