Yunsheng Ma

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EDUCATION

Purdue University   West Lafayette, IN
PhD, Research Focus: Autonomous Driving and Foundation Models   Jan. 2023 – Present
Advisor: Prof. Ziran Wang

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

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

University of California, Berkeley   Berkeley, CA
Undergraduate Exchange Student, Electrical Engineering and Computer Sciences   Aug. 2018 – May 2019

PUBLICATIONS

†denotes co-first authors

[1] **Y. Ma**†, C. Cui†, X. Cao†, W. Ye, P. Liu, J. Lu, A. Abdelraouf, R. Gupta, K. Han, A. Bera, J. M. Rehg, and Z. 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.

[2] X. Cao†, T. Zhou†, **Y. Ma**†, W. Ye, C. Cui, K. Tang, Z. Cao, K. Liang, Z. Wang, J. M. Rehg, and C. 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.

[3] J. Lu, C. Cui, **Y. Ma**, A. Bera, and Z. 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.

[4] **Y. Ma**, X. Cao, W. Ye, C. Cui, K. Mei, and Z. Wang. "Learning Autonomous Driving Tasks via Human Feedbacks with Large Language Models." In *Findings of the Association for Computational Linguistics:* **EMNLP**, 2024.

[5] C. Cui, Z. Yang, Y. Zhou, **Y. Ma**, J. Lu, and Z. Wang "Large Language Models for Autonomous Driving: Real-World Experiments." In *IEEE International Conference on Intelligent Transportation Systems* (**ITSC**), 2024

[6] **Y. Ma**, J. Lu, C. Cui, S. Zhao, X. Cao, W. Ye, and Z. Wang. "MACP: Efficient Model Adaptation for Cooperative Perception." In *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision* (**WACV**), 2024.

[7] C. Cui†, **Y. Ma**†, X. Cao†, W. Ye†, Y. Zhou, K. Liang, J. Chen, J. Lu, Z. Yang, K. Liao, T. Gao, E. Li, K. Tang, Z. Cao, T. Zhou, A. Liu, X. Yan, S. Mei, J. Cao, Z. Wang, and C. 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.

[8] C. Cui, **Y. Ma**, X. Cao, W. Ye, and Z. 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.

[9] C. Cui†, **Y. Ma**†, X. Cao, W. Ye, and Z. Wang, "Receive, Reason, and React: Drive as You Say, With Large Language Models in Autonomous Vehicles." *IEEE Intelligent Transportation Systems Magazine*, 2024

[10] **Y. Ma**, R. Du, A. Abdelraouf, K. Han, R. Gupta, and Z. Wang. "Driver Digital Twin for Online Recognition of Distracted Driving Behaviors." *IEEE Transactions on Intelligent Vehicles*, 2024.

[11] C. Cui, **Y. Ma**, J. Lu, and Z. Wang. "REDFormer: Radar Enlightens the Darkness of Camera Perception with Transformers." *IEEE Transactions on Intelligent Vehicles*, 2023.

[12] W. Ye, **Y. Ma**, X. Cao, and K. Tang. "Mitigating Transformer Overconfidence via Lipschitz Regularization." In *Proceedings of the Thirty-Ninth Conference on Uncertainty in Artificial Intelligence* (**UAI**), 2023.

[13] **Y. Ma**, W. Ye, X. Cao, A. Abdelraouf, K. Han, R. Gupta, and Z. 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.

[14] C. Cui, **Y. Ma**, J. Lu, and Z. 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.

[15] **Y. Ma**, L. Yuan, A. Abdelraouf, K. Han, R. Gupta, Z. Li, and Z. Wang. "M^{2}DAR: 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.

[16] L. Yuan, **Y. Ma**, L. Su, and Z. 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.

[17] **Y. Ma**, and Z. Wang. "ViT-DD: Multi-Task Vision Transformer for Semi-Supervised Driver Distraction Detection" *IEEE Intelligent Vehicles Symposium*", 2022.

[18] S. Zhao[†], **Y. Ma**[†], Y. Gu, J. Yang, T. Xing, P. Xu, R. Hu, H. Chai, and K. 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.

WORK EXPERIENCE

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

Toyota North America — Mountain View, CA
AI Research Intern — May 2024 - Aug. 2024
Supervisor: Dr. Amr Abdelraouf

- Conducted research on building efficient multimodal LLMs for autonomous driving

Purdue University — West Lafayette, IN
Graduate Research Assistant — Aug. 2022 – Present
Supervisor: Dr. Ziran Wang

- Foundation Models for Autonomous Driving

  - Proposed a LLM-based framework to enable human-centered decision-making in autonomous driving, featuring a language model program (LMP)-based planner that effectively learns from and adapt to human feedback (*accepted at CVPR 2024 and EMNLP 2024 Findings as first author*).

  - Proposed a vision-language benchmark for autonomous driving and HD map systems, enhancing cross-modal scene understanding (*accepted at CVPR 2024 as first author*).

- BEV-Based 3D Perception

  - Proposed a Parameter-Efficient Fine-Tuning (PEFT) framework that adapts pre-trained single-agent models for cooperative perception (*accepted at WACV 2024 as first author*)

- Vision-Based Driver Monitoring

  - Proposed a Human Digital Twin (HDT) framework that exploits transformer models for driver action recognition and temporal action localization. (*accepted at ITSC 2023 and IEEE T-IV as first author*)

DiDi   Beijing, China
CV Research Intern   June 2019 – Sep. 2019
Supervisor: Dr. Pengfei Xu

- Video Understanding
    - Proposed a visual-audio attention network for end-to-end video emotion recognition that integrates spatial, channel-wise, and temporal attentions in 3D CNNs. (*accepted at AAAI 2020 as first author*)

TEACHING EXPERIENCE

NYU CSCI-GA.3033 Design and Analysis of Algorithms   Spring 2021
Graduate Teaching Assistant

SERVICE

Organizer

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)

Reviewer (77 papers in total)

CVPR 2024, ECCV 2024, WACV 2025, ICLR 2025, ICML 2024, AISTATS 2025, AAAI 2025, IJCAI 2024, ITSC 2023/24, IV 2023/24, FISTS 2024, ICRA 2025, IROS 2024, ISBI 2024, CIKM 2024, ICCPS 2023, MOST 2023, IEEE IoT-J, IEEE T-IV, Taylor & Francis IJHCI, IEEE VTM, IEEE IC

Volunteer

Student Volunteer, 39th Conference on Uncertainty in Artificial Intelligence   2023
Student Volunteer, 37th AAAI Conference on Artificial Intelligence   2023
Assistant Moderator, TRB Conference on Innovations in Travel Analysis and Planning   2023
Webmaster, IEEE Technical Committee on Internet of Things in Intelligent Transportation System 2022

SELECTED AWARDS

IV Workshop on Foundation Intelligence for Vehicles: Best Paper Award   2024
NGTS Outstanding Speaker Award   2023
AAAI Travel Grant   2023
NeurIPS ML4AD Grant   2022
National Scholarship (top 1%)   2017

TECHNICAL SKILLS

Programming: Python, C++

Libraries: PyTorch, Transformers, Lightning, LangChain, MMDetection3D, OpenCV

Tools: CARLA, Chroma, Git, LaTeX, SQL, Wandb

Last updated: October 16, 2024.