Ziyan An

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EDUCATION

Vanderbilt University | *Nashville, TN* **Sept 2022 – May 2027**

Doctor of Philosophy in Computer Science (Ph.D.) | *GPA:* 3.95/4.00 | *Advisor:* Meiyi Ma, Ph.D.

- *Research Interests:* Formal Methods, Machine Learning, Trustworthy AI, Cyber-Physical Systems
- *Courses:* Advanced Artificial Intelligence, Automated Verification, ML for Dynamical Systems, AI for CPS, Deep Learning

New York University | *New York, NY* **Sept 2018 – May 2022**

Bachelor of Science in Computer Science (B.S.) | *GPA:* 3.69/4.00 (Cum Laude)

- *Courses:* Data Structures, Machine Learning, Computer Networks, Operating Systems

PUBLICATIONS

Journal Papers

[1] He, G., **An, Z.**, & Ma, M. Formal Logic Inference Guided Uncertainty Quantification for Personalized Federated Learning. Journal of Artificial Intelligence Research (JAIR), 2026. Accepted.

[2] Yan, Y., Liao, Y., Xu, G., Yao, R., Fan, H., Sun, J., Wang, X., Sprinkle, J., **An, Z.**, Ma, M., Cheng, X., Liu, T., Ke, Z., Zou, B., Barth, M., & Kuo, Y.-H. Large Language Models for Traffic and Transportation Research: Methodologies, State of the Art, and Future Opportunities. Information Fusion, 2026.

[3] **An, Z.**, Zhao, Y., Gao, X., Mukhopadhyay, A., & Ma, M. Formal Logic-Guided Harnessing Heterogeneous Fairness Rules in Smart Cities. ACM Transactions on Cyber-Physical Systems, 2025.

[4] Wang, X., Yang, Y., Shangguan, Y., Yan, W., **An, Z.**, Bunting, M., Nice, M., Beckers, T., Ma, M., Work, D., & Sprinkle, J. A Safety-Driven Interpretable Model for Vehicle Control with Impact on Traffic. IEEE Transactions on Intelligent Transportation Systems, 2025.

[5] Li, Y., Ma, D., **An, Z.**, Wang, Z., Zhong, Y., Chen, S., & Feng, C. V2X-Sim: Multi-Agent Collaborative Perception Dataset and Benchmark for Autonomous Driving. IEEE Robotics and Automation Letters, 7(4), 10914–10921, 2022.

Conference Papers

[1] **An, Z.**, Wang, X., Baier, H., Chen, Z., Dubey, A., Johnson, T. T., Sprinkle, J., & Ma, M. LogiEx: Integrating Formal Logic and LLMs for Explainable Transit Planning. In Proceedings of the 17th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2026.

[2] Nguyen, D. T., **An, Z.**, Johnson, T. T., Ma, M., & Leach, K. Formal Logic-Guided Robust Federated Learning against Poisoning Attacks. In Proceedings of the 17th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2026.

[3] Wang, J., Yang, S., **An, Z.**, Han, S., Zhang, Z., Mangharam, R., Ma, M., & Miao, F. Multi-Agent Reinforcement Learning Guided by Signal Temporal Logic Specifications. In Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2025.

[4] Chen, Z., **An, Z.**, Reynolds, J., Mullen, K., Martini, S., & Ma, M. LogiDebrief: A Signal-Temporal Logic Based Automated Debriefing Approach with Large Language Models Integration. In Proceedings of the International Joint Conference on Artificial Intelligence (IJCAI), 2025.

[5] **An, Z.**, Moyer, D., Oguz, I., Johnson, T. T., & Ma, M. ISL: Monitoring Image Segmentation Logic in Medical Imaging Analysis. In Proceedings of the International Conference on Runtime Verification (RV), 2025.

[6] **An, Z.**, Baier, H., Dubey, A., Mukhopadhyay, A., & Ma, M. Enabling MCTS Explainability for Sequential Planning Through Computation Tree Logic. In Proceedings of the European Conference on Artificial Intelligence (ECAI), 2024.

[7] **An, Z.**, Johnson, T. T., & Ma, M. Formal Logic Enabled Personalized Federated Learning through Property Inference. In Proceedings of the AAAI Conference on Artificial Intelligence, 38(10), 10882–10890, 2024.

[8] Wang, X., Yang, Y., Shangguan, Y., Yan, W., **An, Z.**, Bunting, M., Nice, M., Beckers, T., Ma, M., Work, D., & Sprinkle, J. Interpretable Finite State Machine Controller: A Case Study on Lane Merge Yield Mode. In Proceedings of the IEEE International Conference on Intelligent Transportation Systems (ITSC), 2024.

[9] **An, Z.**, Wang, X., Johnson, T. T., Sprinkle, J., & Ma, M. Runtime Monitoring of Accidents in Driving Recordings with Multi-Type Logic in Empirical Models. In Proceedings of the International Conference on Runtime Verification (RV), 2023.

[10] Zhao, Y., **An, Z.**, Gao, X., Mukhopadhyay, A., & Ma, M. Fairguard: Harness Logic-Based Fairness Rules in Smart Cities. In Proceedings of the ACM/IEEE Conference on Internet of Things Design and Implementation (IoTDI), 2023.

[11] Cai, Z., **An, Z.**, & Xiong, A. Evaluation of an Online Survey Instrument to Measure Users' Privacy Perception and Decision of V2X Communication in Connected Autonomous Vehicles. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 2022.

Workshop and Extended Abstracts

[1] Wang, X., **An, Z.**, Zhang, Y., Ma, M., Work, D. B., & Sprinkle, J. Drive Like Humans, Plan Like Machines: An Explicit Sense and Safety Aware Autonomous Driving Framework. In AUTOPILOT Workshop, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2026.

[2] He, G., Deng, L., **An, Z.**, & Ma, M. X-CPS: A Top-Down Hierarchical Framework for Explaining Learning-Enabled Cyber-Physical Systems. In the 3rd International Workshop on Foundation Models for Cyber-Physical Systems & Internet of Things (FMSys), CPS-IoT Week, 2026.

[3] **An, Z.**, Wang, X., Baier, H., Chen, Z., Dubey, A., Johnson, T. T., Sprinkle, J., Mukhopadhyay, A., & Ma, M. Combining LLMs with a Logic-Based Framework to Explain MCTS. In Proceedings of the International Conference on Autonomous Agents and Multiagent Systems (AAMAS), 2025.

[4] **An, Z.**, & Ma, M. Guiding Federated Learning with Inferred Formal Logic Properties. In Proceedings of the ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2023.

[5] Li, Y., **An, Z.**, Wang, Z., Zhong, Y., Chen, S., & Feng, C. V2X-Sim: A Virtual Collaborative Perception Dataset for Autonomous Driving. In ICCV Workshop on Simulation Technology for Embodied AI (SEAI), 2021.

Preprints

[1] Zhao, Y., **An, Z.**, Ma, M., & Johnson, T. T. EduSAT: A Pedagogical Tool for Theory and Applications of Boolean Satisfiability. arXiv preprint arXiv:2308.07890, 2023.

RESEARCH EXPERIENCE

Graduate Research Assistant, *Vanderbilt University* **Sept 2022 – Present**
Advisor: Meiyi Ma, Ph.D.

- Develop novel algorithms and frameworks that incorporate formal-logic-based domain knowledge into deep learning models to improve performance, reduce uncertainty, and provide algorithmic guarantees
- Build explainable AI systems for domain practitioners that bridge domain knowledge and AI decision-making, enabling trustworthy and human-in-the-loop AI
- Design runtime monitoring frameworks for deep learning systems, including vehicle accident detection and medical image segmentation, to provide timely, multi-level feedback to users

Undergraduate Research Assistant, *New York University* **Sept 2020 – May 2022**
Advisor: Chen Feng, Ph.D.

- Implemented state-of-the-art perception algorithms for connected autonomous vehicles, with a focus on vehicle-to-vehicle and vehicle-to-infrastructure communication
- Developed a data generation and retrieval system to create a large-scale, multi-agent, multi-modal autonomous driving dataset with roadside auxiliary data using CARLA and Unreal Engine 4 for algorithm benchmarking

Summer Research Assistant, *New York University* **May 2020 – Aug 2020**
Advisor: Li Jin, Ph.D.

- Cleaned and analyzed large-scale, multi-year highway traffic sensor data at multiple spatial and temporal granularities to support downstream training of deep prediction models
- Designed and implemented machine learning algorithms for urban transportation prediction and modeling under noisy and incomplete training data
- Developed an encoder-based representation learning module to capture latent traffic patterns and support online traffic data imputation, improving data quality and reducing the impact of noisy samples

Summer Research Assistant, *New York University* **May 2019 – Aug 2019**
Advisor: Dzung Luong, Ph.D.

- Applied data analytics and machine learning methods to characterize polymer-based material properties from experimental and computational data
- Developed machine learning models using Scikit-Learn and TensorFlow to analyze stress–strain curves of syntactic foams and support mechanical property prediction
- Curated and integrated a comprehensive dataset from multiple sources covering the mechanical properties of diverse syntactic foam materials

TEACHING EXPERIENCE

Teaching Assistant, *Vanderbilt University* **Jan 2025 – May 2026**
Courses: Explainable AI (Spring 2026), AI for Cyber-Physical Systems (Spring 2025)

- Designed homework assignments, answer keys, grading rubrics, and automated grading tools to support consistent evaluation across programming, written, and project-based coursework
- Graded homework, project reports, and presentations; provided detailed technical feedback to students on explainability methods, AI/CPS concepts, experimental design, and research communication

Teaching Assistant, *New York University* **Jan 2021 – May 2021**
Course: Introduction to Operating Systems (Spring 2021)

- Held office hours, led review sessions, and supported students in understanding core operating systems concepts and programming assignments
- Assisted with assignment and exam design, grading, and feedback to support consistent evaluation of student learning
- Provided regular guidance on assignments and exam preparation through Brightspace and direct student interactions

STUDENT MENTORSHIP

Cici Luo, Mia Nguyen, Undergraduate Research **Jan 2026 – May 2026**

- *Project:* Logic-Guided Enhancement of Deep Learning Models for Image Segmentation

Ziyao Zhang, Undergraduate Research **Sept 2023 – May 2024**

- *Project:* Uncertainty-Aware Signal Temporal Logic Specification Mining

Yiqi Zhao, Xuqing Gao, Undergraduate Research **Sept 2022 – May 2023**

- Project: Logic-Based Fairness Rule Integration for Smart City Applications

HONORS AND AWARDS

IEEE Technical Community on Real-Time Systems Travel Grant, *Washington D.C.* **May 2026**
Lacy-Fischer Interdisciplinary Research Grant, *Vanderbilt University, Nashville TN* **June 2025**
2025-2026 Graduate School Travel Grant, *Vanderbilt University, Nashville TN* **June 2025**
2024-2025 Graduate School Travel Grant, *Vanderbilt University, Nashville TN* **Sept 2024**
AAAI-24 Student Travel Grant, *AAAI, Washington D.C.* **Dec 2023**
2023-2024 Graduate School Travel Grant, *Vanderbilt University, Nashville TN* **Sept 2023**
CPS-IoT Week 2023 NSF Student Travel Award, *CPS Week, San Antonio TX* **Mar 2023**
Dean's Graduate Fellowship, *Vanderbilt University, Nashville TN* **Sept 2022**
University Founders Day Award, *New York University, New York NY* **May 2022**
Dean's List (Years 2019, 2020, 2022), *New York University, New York NY* **May 2022**

REVIEW ACTIVITIES

Conference

- IEEE International Conference on Intelligent Transportation Systems (ITSC), 2024 – 2026
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2026
- IEEE Intelligent Vehicles Symposium (IV), 2026
- AUTOPILOT Workshop, CVPR, 2026
- FLUID Workshop, AAAI Conference on Artificial Intelligence (AAAI), 2025
- *Sub-reviewer:* AAMAS, ICLR, NeurIPS, IJCAI, ACM/IEEE CHASE, CVPR, SenSys

Journal

- IEEE Robotics and Automation Letters (RA-L), 2024 – 2026
- ACM Transactions on Computing for Healthcare (ACM HEALTH), 2024 – 2026
- Smart Health, 2026
- IEEE Internet of Things Journal, 2025
- IEEE Transactions on Emerging Topics in Computing (TETC), 2024

Technical Program Committee

- Artifact Evaluation Committee, ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS), 2026

INDUSTRY EXPERIENCE

Ph.D. Software Engineering Intern, *Uber,* Sunnyvale CA **May 2026 – Aug 2026**

- Leverage large-scale, cross-functional internal datasets to improve risk-preventive asset access security models through feature engineering, model tuning, and data-driven evaluation
- Build comprehensive benchmarking pipelines to assess feature distribution, data quality, and model performance, providing actionable recommendations to support model selection and business decision-making

- Analyze historical access logs, internal risk factors, and security incidents to identify security patterns, generate business insights, and support proactive risk mitigation strategies

AI Engineer Intern, *UiPath,* Bellevue WA **June 2025 – Aug 2025**

- Built an internal cross-domain benchmarking suite for OCR, summarization, and document-understanding evaluation across state-of-the-art LLMs; developed custom evaluation metrics, expanded test coverage across diverse document types, and enhanced automated pipelines to enable rigorous, data-driven model selection and accelerate agent deployment to production
- Designed and developed a scalable LLM agent framework for business-process optimization and operational analytics; delivered end-to-end functionality including efficient data preprocessing, context-aware tool integration, and structured output handling

ML Software Engineering Intern, *Sunthetics,* Austin TX **Jan 2021 – May 2021**

- Developed and evaluated active learning workflows to accelerate chemical product discovery by predicting reaction outcomes from limited experimental data
- Optimized machine learning codebase using deep learning tools, enabling reliable reaction-outcome prediction with few labeled training examples and reducing reliance on costly trial-and-error experimentation