

Yuanjie Shi

PhD candidate (expect to graduate in 2026)
School of Electrical Engineering and Computer Science
Washington State University
Pullman, Washington, 99163
Homepage: <https://yuanjiesh.github.io/Yuanjie-Shi/>
GitHub: <https://github.com/YuanjieSh>

yuanjie.shi@wsu.edu
Phone: (509) 339-9168

Research Interests

Robust Machine Learning, Uncertainty Quantification, Conformal Prediction, Federated Learning, Reliable and Controllable LLM, Generative Models.

Research Summary

My research studies uncertainty-aware and reliability-centered learning at the intersection of machine learning and trustworthy AI, with an emphasis on statistically valid and distribution-free risk control. The work develops scalable and theoretically grounded methods for uncertainty quantification, reliable alignment, and reliability intervention in discriminative, federated, and large language models. Specific research thrusts include:

- Distribution-free uncertainty quantification and risk control: uncertainty quantification for robust and effective Human-ML collaborative systems using conformal prediction.
- Federated learning under decentralized heterogeneity: uncertainty-aware and privacy-preserving federated learning and federated conformal prediction under cross-client distribution shift.
- Reliable and controllable large language models: uncertainty-aware inference, order-aware preference alignment, and propagation-aware reliability analysis for factuality control, robust optimization, and intervention design in multi-step LLM pipelines.

Education

Washington State University, Pullman, WA Fall 2021 – Present
Doctor of Philosophy in Computer Science
Advisor: Prof. Yan Yan
Research Topic: *Robust Machine Learning: From Representation to Uncertainty Quantification*

Stevens Institute of Technology, Hoboken, NJ 2017 – 2019
Master of Science in Electrical Engineering
Advisor: Prof. Kevin Lu
Thesis: *An Auto-drive Car based on Raspberry Pi*

Chongqing University, Chongqing, China 2012 – 2016
Bachelor of Engineering in Automation
Advisor: Prof. Jianghong Ren
Thesis: *Research on Failure Modes of Urban Secondary Water Supply System*

Teaching and Outreach Experience

Teaching Assistant / Guest Lecturer, Washington State University, EECS January 2026 – April 2026
Assisted Prof. Yan Yan with course instruction and delivered three lectures on CptS 434: Neural Network Design and Applications (Spring 2026)

Project Assistant, Girls Who Tech Camp, Washington State University, EECS March 2026
Assisted with hands-on computing activities and project-based learning sessions for high school students in a WSU EECS outreach program.

Teaching Assistant, Washington State University, EECS January 2025 – April 2025
CptS 434: Neural Network Design and Applications (Spring 2025)

Research and Professional Experience

Research Assistant, Washington State University, EECS September 2021 – Present

Research Intern, Tsinghua University, Automation February 2017 – June 2017
Worked with Prof. Lingxuan Zhang on optimizing production scheduling of assembly lines based on genetic algorithm.

Automation Engineering Intern, No. 3 Research Institute of State-owned Dazhong Machine Works, China July 2016 – September 2016

Awards and Honors

ICML Gold Reviewer, ICML 2026

Outstanding Dissertation in EECS, College of VCEA, WSU 2026

NeurIPS Top Reviewer, NeurIPS 2025

Outstanding Research Assistant in EECS, College of VCEA, WSU 2025

Mahmoud M. Dillsi Family Graduate Fellowship, WSU 2023 – 2024

Publications

Conference Papers

1. **Y. Shi**, P. Li, X. Cao, and Y. Yan. Valid and Efficient Uncertainty Quantification for Federated Joint Shift. The Forty-Second International Conference on Uncertainty in Artificial Intelligence (**UAI 2026**).
2. T. Wang[†], **Y. Shi**[†], Y. Yan, and H. Zhang. Inference-Time Conformal Reasoning with Valid Factuality Control for Large Language Models. The Forty-Third International Conference on Machine Learning (**ICML 2026**).
3. J. Zhu[†], **Y. Shi**[†], X. Peng, X. Liu, Y. Yan, and H. Wei. Keep the Best, Forget the Rest: Reliable Alignment with Order-Aware Preference Optimization. The Fourteenth International Conference on Learning Representations (**ICLR 2026**).
4. **Y. Shi**[†], P. Li[†], J. Doppa, and Y. Yan. Conformal Margin Risk Minimization: An Envelope Framework for Robust Learning under Label Noise. The 29th International Conference on Artificial Intelligence and Statistics (**AISTATS 2026**).
5. X. Jia[†], **Y. Shi**[†], Z. Liu, Y. Xu, and Y. Yan. Cost-Sensitive Conformal Training with Provably Controllable Learning Bounds. Fortieth AAAI Conference on Artificial Intelligence (**AAAI 2026**).
6. Z. Zhang, X. Chen, **Y. Shi**, L. Ma, Z. Xu, and Y. Yan. Minimum-Length Conformal Prediction Sets for Ordinal Classification. Fortieth AAAI Conference on Artificial Intelligence (**AAAI 2026**).
7. **Y. Shi**[†], H. Shahrokhi[†], X. Jia, X. Chen, J. Doppa, and Y. Yan. Direct Prediction Set Minimization via Bilevel Conformal Classifier Training. Forty-Second International Conference on Machine Learning (**ICML 2025**).

8. Z. Ma[†], **Y. Shi**[†], Y. Yan, and J. Chen. Federated Rényi Fair Inference in Federated Heterogeneous System. Forty-First International Conference on Uncertainty in Artificial Intelligence (**UAI 2025**).
9. Z. Ma, Z. Li, **Y. Shi**, and J. Chen. FedSum: Data-Efficient Federated Learning under Data Scarcity Scenario for Text Summarization. Thirty-Ninth AAAI Conference on Artificial Intelligence (**AAAI 2025**).
10. **Y. Shi**, S. Ghosh, T. Belkhouja, Y. Yan, and J. Doppa. Conformal Prediction for Class-wise Coverage via Augmented Label Rank Calibration. Thirty-Eighth Annual Conference on Neural Information Processing Systems (**NeurIPS 2024**).
11. S. Ghosh[†], **Y. Shi**[†], T. Belkhouja, Y. Yan, J. Doppa, and B. Jones. Probabilistically Robust Conformal Prediction. Thirty-Ninth International Conference on Uncertainty in Artificial Intelligence (**UAI 2023**).

Workshops

1. **Y. Shi**. Reliable Uncertainty Quantification in Machine Learning via Conformal Prediction. Thirtieth AAAI/SIGAI Doctoral Consortium 2025.

Under Review Papers

1. **Y. Shi**, and Y. Yan. A Latent-Load Framework for Reliability Analysis and Intervention Design in LLM Pipelines. Submitted to the Forty-Third International Conference on Machine Learning (**Neurips 2026**).
2. **Y. Shi**, H. Shahrokhi, Z. Zhang, J. Doppa, and Y. Yan. Conformal Classification on Conformity Spectrum: A Probabilistic Geometric Framework. Submitted to the Forty-Third International Conference on Machine Learning (**Neurips 2026**).

(†) indicates equal contribution.

Professional Service

Program Committee Member

- Forty-Second International Conference on Uncertainty in Artificial Intelligence (UAI), 2026
- The 29th International Conference on Artificial Intelligence and Statistics (AISTATS), 2026
- The Fourteenth International Conference on Learning Representations (ICLR), 2026
- The Fortieth AAAI Conference on Artificial Intelligence (AAAI), 2026
- Conference on Neural Information Processing Systems (NeurIPS), 2025 and 2026
- International Conference on Machine Learning (ICML), 2025 and 2026

Mentoring Experience

I am mentoring junior PhD students and undergraduate students at WSU on research problems related to uncertainty quantification in machine learning using conformal prediction. Since 2022, I have mentored around 8 students in total (2–3 per year), including undergraduate research assistants and first-year PhD students starting their independent research.

References

- Prof. Yan Yan
Assistant Professor
School of Electrical Engineering and Computer Science
Washington State University
Email: yan.yan1@wsu.edu

- Prof. Jana Doppa
Huie-Rogers Endowed Chair Professor of Computer Science
Berry Distinguished Professor in Engineering
School of Electrical Engineering and Computer Science
Washington State University
Email: jana.doppa@wsu.edu
- Prof. Honghao Wei
Assistant Professor
School of Electrical Engineering and Computer Science
Washington State University
Email: honghao.wei@wsu.edu
- Prof. Ziquan Liu
Lecturer (Assistant Professor)
School of Electronic Engineering and Computer Science
Queen Mary University of London
Email: ziquanliu.cs@gmail.com
- Prof. Huan Zhang
Assistant Professor
Department of Electrical and Computer Engineering
University of Illinois Urbana-Champaign
Email: huan@huan-zhang.com