

# Yanbing Wang, Ph.D.

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## SUMMARY

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Dr. Yanbing Wang will join Arizona State University as an Assistant Professor in Spring 2025. Her research focuses on advancing transportation cyber physical systems with modeling, control, and big data. At Vanderbilt, she led algorithm development for Tennessee's I-24 MOTION testbed. Dr. Wang received the NSF Cyber Physical Systems Rising Star award (2023), five USDOT Dwight David Eisenhower Transportation Fellowships, and was a Sidney P. Colowick Graduate Scholar and Harold Stirling Vanderbilt Scholar. She interned at Toyota Infotech Labs, MERL, and was a visiting researcher at IPAM, UCLA.

## EMPLOYMENT

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<b>Arizona State University</b> , Tempe AZ Assistant Professor, School of Sustainable Engineering and the Built Environment	Jan 2025 -
<b>Argonne National Laboratory</b> , Lemont IL Post-doctoral Researcher, Vehicle & Mobility Systems Department	Jan - Dec 2024
<b>Vanderbilt University</b> , Nashville TN (Advisor: Prof. Dan Work) Research Engineer, Institute for Software Integrated Systems Research Assistant, Institute for Software Integrated Systems	Oct - Dec 2023 June 2018 - Sept 2023
<b>Mitsubishi Electric Research Laboratories</b> , Cambridge, MA Research Intern, Control for Autonomy Group (Advisor: Dr. Marcel Menner)	Jan - Mar 2023
<b>Toyota InfoTech Labs</b> , Mountain View, CA Research Intern (Advisor: Dr. Ziran Wang)	Jan - Apr 2021
<b>University of Illinois at Urbana-Champaign</b> , Champaign, IL Research Assistant, Illinois Geometry Lab (Advisor: Prof. Richard Sowers) Instructor, NetMath	Aug 2016 - May 2018 May 2016 - May 2017

## EDUCATION

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<b>Vanderbilt University</b> Ph.D. in Civil & Environmental Engineering Dissertation: <i>Reconstruction of mixed traffic systems at micro and macro scales</i>	Sept 2023
<b>University of Illinois at Urbana-Champaign</b> B.S. in Civil & Environmental Engineering Minor: Architecture	May 2018

## PUBLICATIONS

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### Journal Articles

1. **Y. Wang**, D. Gloudemans, J. Ji, Z. N. Teoh, L. Liu, G. Zachár, W. Barbour, and D. B. Work, "Automatic vehicle trajectory data reconstruction at scale", *Transportation Research Part C: Emerging Technologies*, vol. 160, p. 104520, 2024. **Manuscript:** [download](#). Preprint: [download](#).

2. D. Gloudemans, **Y. Wang**, J. Ji, G. Zachár, W. Barbour, E. Hall, M. Cebelak, L. Smith, and D. Work, “I-24 MOTION: An instrument for freeway traffic science”, *Transportation Research Part C: Emerging Technologies*, vol. 155, p. 104311, Sep. 2023. **Manuscript:** [download](#). Preprint: [download](#).
3. P. Choobchian, G. Roscoe, T. Dick, B. Zou, D. Work, K. Zhang, **Y. Wang**, and Y. Hung, “Leveraging connected vehicle platooning technology to improve the efficiency and effectiveness of train fleetings under moving blocks”, *Transportation Research Part C: Emerging Technologies*, vol. 148, p. 104026, Jan. 2023. **Manuscript:** [download](#). Preprint: [download](#).
4. **Y. Wang**, Z. Wang, K. Han, P. Tiwari, and D. B. Work, “Gaussian process-based personalized adaptive cruise control”, *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 11, pp. 21178–21189, 2022. DOI: 10.1109/TITS.2022.3174042. **Manuscript:** [download](#). Preprint: [download](#).
5. Y. Hu, A. Qu, **Y. Wang**, and D. B. Work, “Streaming data preprocessing via online tensor recovery for large environmental sensor networks”, *ACM Transactions on Knowledge Discovery from Data (TKDD)*, vol. 16, no. 6, pp. 1–24, 2022. **Manuscript:** [download](#). Preprint: [download](#).
6. **Y. Wang** and D. B. Work, “Estimation for heterogeneous traffic using enhanced particle filters”, *Transportmetrica A: Transport Science*, vol. 18, no. 3, pp. 568–593, Jan. 2022. **Manuscript:** [download](#). Preprint: [download](#).
7. **Y. Wang**, M. L. Delle Monache, and D. B. Work, “Identifiability of car-following dynamics”, *Physica D: Nonlinear Phenomena*, no. 0167-2789, p. 133090, 2021. **Manuscript:** [download](#). Preprint: [download](#).
8. **Y. Wang**, G. Gunter, M. Nice, M. L. Delle Monache, and D. B. Work, “Online parameter estimation methods for adaptive cruise control systems”, *IEEE Transactions on Intelligent Vehicles*, vol. 6, no. 2, pp. 288–298, 2020. **Manuscript:** [download](#). Preprint: [download](#).

## Conference Proceedings

1. **Y. Wang**, F. de Souza, J. Han, and D. Karbowski, “Is it necessary to calibrate all parameters for each driver?”, in *2024 Modeling, Estimation and Control Conference (MECC2024)*, To appear, 2024.
2. J. Ji, **Y. Wang**, D. Gloudemans, G. Zachár, W. Barbour, and D. B. Work, “Virtual trajectories for I-24 MOTION: Data and tools”, in *IEEE Forum for Innovative Sustainable Transportation Systems (FISTS)*, 2024. **Manuscript:** [download](#). Preprint: [download](#).
3. **Y. Wang**, K. Berntorp, and M. Menner, “Physics-informed road monitoring and suspension control using crowdsourced vehicle data”, in *European Control Conference (ECC)*, 2024. Preprint: [download](#).
4. D. Gloudemans, **Y. Wang**, G. Gumm, W. Barbour, and D. B. Work, “The interstate-24 3d dataset: A new benchmark for 3d multi-camera vehicle tracking”, in *British Machine Vision Conference (BMVC)*, To appear., 2023. **Manuscript:** [download](#). Preprint: [download](#).
5. Y. Hu, Y. Zhang, **Y. Wang**, and D. B. Work, “Detecting socially abnormal highway driving behaviors via recurrent graph attention networks”, in *The Web Conference 2023, Austin, Texas, USA*, ACM, 2023, pp. 1–6. **Manuscript:** [download](#).
6. **Y. Wang**, J. Ji, W. Barbour, and D. B. Work, “Online min cost circulation for multi-object-tracking on fragments”, in *2023 IEEE International Intelligent Transportation Systems Conference (ITSC)*, IEEE, 2023. **Manuscript:** [download](#). Preprint: [download](#).
7. J. Ji, **Y. Wang**, W. Barbour, and D. B. Work, “Platoon trajectory reconstruction with conflict resolution using semidefinite relaxation”, in *2023 IEEE International Intelligent Transportation Systems Conference (ITSC)*, IEEE, 2023. **Manuscript:** [download](#).
8. D. Gloudemans, G. Zachár, **Y. Wang**, J. Ji, M. Nice, M. Bunting, W. Barbour, J. Sprinkle, B. Piccoli, M. L. D. Monache, *et al.*, “So you think you can track?”, in *IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)*, 2023. Preprint: [download](#).

9. **Y. Wang**, Z. Wang, K. Han, P. Tiwari, and D. B. Work, “Personalized adaptive cruise control via gaussian process regression”, in *2021 IEEE International Intelligent Transportation Systems Conference (ITSC)*, IEEE, 2021, pp. 1496–1502. **Manuscript:** [download](#). Preprint: [download](#).
10. **Y. Wang**, G. Gunter, and D. B. Work, “Online parameter estimation of adaptive cruise control models with delays and lags”, in *2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC)*, IEEE, 2020, pp. 1–6. **Manuscript:** [download](#). Preprint: [download](#).
11. A. Qu, Y. Wang, Y. Hu, **Y. Wang**, and H. Baroud, “A data-integration analysis on road emissions and traffic patterns”, in *Driving Scientific and Engineering Discoveries Through the Convergence of HPC, Big Data and AI: 17th Smoky Mountains Computational Sciences and Engineering Conference, SMC 2020, Oak Ridge, TN, USA, August 26-28, 2020. (Best student paper award)*, Springer, 2020, pp. 503–517. **Manuscript:** [download](#). Preprint: [download](#).
12. **Y. Wang** and D. B. Work, “Heterogeneous traffic estimation with particle filtering”, in *2019 IEEE Intelligent Transportation Systems Conference (ITSC)*, IEEE, 2019, pp. 2551–2556. **Manuscript:** [download](#). Preprint: [download](#).
13. G. Gunter, **Y. Wang**, D. Gloudemans, R. Stern, D. B. Work, M. L. D. Monache, R. Bhadani, M. Bunting, R. Lysecky, J. Sprinkle, *et al.*, “Wip abstract: String stability of commercial adaptive cruise control vehicles”, in *Proceedings of the 10th ACM/IEEE International Conference on Cyber-Physical Systems*, 2019, pp. 328–329. **Manuscript:** [download](#). Preprint: [download](#).
14. Y. Hu **Y. Wang**, C. Jiao, R. Sankaran, C. Catlett, and D. Work, “Automatic data cleaning via tensor factorization for large urban environmental sensor networks”, in *NeurIPS Workshop on Tackling Climate Change with Machine Learning*, 2019. Preprint: [download](#).

## Under Review/In Preparation

1. J. W. Lee, H. Wang, K. Jang, A. Hayat, M. Bunting, A. Alanqary, W. Barbour, Z. Fu, X. Gong, G. Gunter, *et al.*, “Traffic control via connected and automated vehicles: An open-road field experiment with 100 cavs”, *arXiv preprint arXiv:2402.17043*, 2024.
2. Y. Zhang, M. Quinones-Grueiro, Z. Zhang, **Y. Wang**, W. Barbour, G. Biswas, and D. Work, “Marvel: Multi-agent reinforcement-learning for large-scale variable speed limits”, 2023, *under review at Transportation Research Part C: Emerging Technologies*. Preprint: [download](#).

## PATENTS

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1. R. Gupta, **Y. Wang**, Z. Wang, K. Han, and P. Tiwari, *Hybrid deterministic override of probabilistic advanced driving assistance systems (adas)*, US Patent No. 20230048774, Feb. 2023.
2. R. Gupta, Z. Wang, **Y. Wang**, K. Han, and P. Tiwari, *Systems and methods for protecting a vehicle at an intersection*, US Patent No. 20230065859, Mar. 2023.
3. **Y. Wang**, Z. Wang, K. Han, R. Gupta, and P. Tiwari, *Systems and methods for personalizing adaptive cruise control in a vehicle*, US Patent No. 20230047354, Feb. 2023.
4. R. Gupta, Z. Wang, **Y. Wang**, K. Han, and P. Tiwari, *Detection, classification, and prediction of bacteria colony growth in a vehicle passenger cabin*, US Patent No. 20230008646, Jan. 2023.
5. R. Gupta, **Y. Wang**, Z. Wang, K. Han, and P. Tiwari, *Student-t process personalized adaptive cruise control*, US Patent No. 20230035228, Feb. 2023.
6. R. Gupta, Z. Wang, **Y. Wang**, K. Han, and P. Tiwari, *Vehicular topple risk notification*, US Patent No. 20230029036, Jan. 2023.

## HONORS AND AWARDS

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<b>Cyber-Physical Systems (CPS) Rising Star</b> , University of Virginia Link Lab	2023
<b>Dwight D. Eisenhower Transportation Fellowship</b> , USDOT	2018, 2019, 2020, 2021, 2022
Five-time award recipient	
<b>Sidney P. Colowick Graduate Scholar</b> , Vanderbilt University	2021
One of the three graduate scholars named across the entire campus	
<b>Harold Stirling Vanderbilt (HSV) Award</b> , Vanderbilt University	2021
<b>Best Paper Award</b> , 17th Smoky Mountains Computational Sciences and Engineering Conference	2020
<b>Fred S. Bailey Undergraduate Scholarship for Cause-Driven Leaders</b> , University YMCA	2017
<b>Duane Edward and Phyllis Ann Erickson Memorial Scholarship</b> , University of Illinois	2017
<b>Samuel C. Roberts Award</b> , University of Illinois	2016
<b>Edmund J. James Scholar</b> , University of Illinois	2014, 2015, 2016, 2017, 2018
<b>Dean's List</b> , University of Illinois	2014, 2015, 2016, 2017, 2018

## TALKS & LECTURES

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1. "Transportation Cyber-Physical Systems: Nnew Instruments for Traffic Science", Arizona State University, 2024,
2. "Transportation Cyber-Physical Systems: Sensing for Intelligence", University of Pittsburgh, 2024,
3. "Personalized Driving Assistance", Guest lecture for *CE-5999: Autonomous Vehicles and Traffic*, Vanderbilt University, 2023
4. "Automatic Trajectory Data Reconstruction: Application to I-24 MOTION", *Transportation Research Board Annual Meeting*, Washington, D.C., 2023
5. "Intelligent Solutions for Traffic Improvements", Guest lecture for *Vanderbilt Summer Academy*, 2022
6. "The Future of Advanced Driving Assistance Systems (ADAS)", Guest speaker for *Massachusetts General Hospital, Professional Development Workshops*, 2022
7. "Automatic Trajectory Data Reconstruction", *IPAM AVRC1 Lake Arrowhead Reunion Conference*, 2022
8. "Personalized Adaptive Cruise Control via Gaussian Process", *1st CIRCLES Workshop on traffic and Autonomy*, 2021
9. "Personalized Adaptive Cruise Control via Gaussian Process", *IEEE Conference on Intelligent Transportation Systems*, 2021
10. "Interstate-24 MOTION: Enabling smart mobility with high-fidelity trajectory extractions." *The 32nd IEEE Intelligent Vehicle Symposium Workshop: Cooperative Driving in Mixed Traffic*, 2021
11. "Identifiability of Car-Following Dynamics", *Transportation Research Board Annual Meeting*, Washington, D.C., 2021
12. "Parameter Identifiability of Car-Following Models", *IPAM Mathematical Challenges and Opportunities for Autonomous Vehicles Workshop*, UCLA, 2020
13. "Online Parameter Estimation for Adaptive Cruise Control Systems", *Transportation Research Board Annual Meeting*, Washington, D.C., 2020
14. "Online parameter estimation of adaptive cruise control models with delays and lags", *IEEE 23rd International Conference on Intelligent Transportation Systems*, 2020
15. "Tensor Factorization for Preprocessing Urban Sensor Networks". *CCAI NeurIPS*, 2019
16. "Heterogeneous Traffic Estimation with Particle Filtering", *IEEE Conference on Intelligent Transportation Systems*, Auckland, NZ, 2019

17. “Video as a Sensor”, *13th Coordinated Science Laboratory Student Conference*, Urbana, IL, 2018

## LEADERSHIP & MENTORING

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### Mentor for Summer Internship

2024 -

Argonne National Lab

**Zhaobin Mo**, PhD student @ Columbia University

### Mentor for Independent Research

2019 - Present

Vanderbilt University, Research Experience for Undergraduates (REU)

**Jane Sun**, Undergraduate in Computer Science and Psychology

**Lisa Liu**, Undergraduate in Electrical Engineering

**Zi Nean Teoh**, Undergraduate in Computer Science and Math

**David Gao**, Undergraduate in Computer Science

**Arthur Sung**, Undergraduate in Computer Science

**Ao Qu**, Undergraduate in Computer Science, now PhD student @ MIT

**Canwen Jiao**, Undergraduate in Computer Science, now @ Google

### Course Instructor at NetMath

2017 - 2018

University of Illinois at Urbana-Champaign

Instructed an online course on *Differential Equations*

### Co-founder and Team Lead for Engineers in Action (EIA) Bridge Chapter

2016 - 2017

University of Illinois at Urbana-Champaign

Organized fundraising events for travel and construction materials

Led design and construction of two cable suspended footbridges in Patzula, Joyabaj, Guatemala and Bajo Maiz, Panama

## PROFESSIONAL SERVICES & DEVELOPMENT

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### Journal & Conference Reviewer

Data Science for Transportation

British Machine Vision Conference (BMVC)

Transportation Research Part C: Emerging Technologies

International Symposium on Transportation and Traffic Theory (ISTTT)

IEEE Conference on Decision and Control

IEEE Transactions on Intelligent Transportation Systems

IEEE Intelligent Vehicle Symposium

ICLR Workshop “Tackling Climate Change with Machine Learning”

### Workshop Participation

**CPS Rising Stars Workshop** at University of Virginia

2023

**Long Program: Mathematical Challenges and Opportunities for Autonomous Vehicles** at

Institute for Pure and Applied Mathematics (IPAM)

2020

**Workshop on Control for Networked Transportation Systems (CNTS)** at American Control

Conference

2019