

# Meixin Zhu

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INTERESTS	Autonomous Driving, Artificial Intelligence, Big Data Analytics, Driving behavior, Traffic-Flow Modeling and Simulation.	
EDUCATION	<b>University of Washington, Seattle, US</b>	
	<ul style="list-style-type: none"><li>Ph.D. Candidate in Transportation Engineering Sep 2018 – Present<ul style="list-style-type: none"><li>Advisor: <b>Prof. Yinhai Wang</b></li><li>Focus: Intelligent Transportation, Driving Behavior, Autonomous Driving, Deep Learning, Deep Reinforcement Learning.</li></ul></li></ul>	
	<b>Tongji University, Shanghai, China</b>	
	<ul style="list-style-type: none"><li>MEng in Communication and Transportation Engineering Sep 2015 – Jun 2018<ul style="list-style-type: none"><li>Thesis: Car-Following Behavior Modeling and Its Application in Intelligent Driving</li><li>Focus: Autonomous driving, reinforcement learning, car-following behavior, and naturalistic driving study.</li><li>Cumulative GPA: 91.2 / 100; Integrated Ranking: 1 / 237</li><li>Core Courses: Machine Learning, Fundamentals of Software Techniques, Transport Data Analysis, Fundamental of Traffic Flow Theory and Micro Simulation Analysis, Traffic Safety Analysis and Experiment.</li><li>Online Courses: Deep Reinforcement Learning (Berkeley EECS), Deep Learning for Self-Driving Cars (MIT EECS).</li></ul></li><li>BEng in Traffic Engineering Sep 2011 – Jun 2015<ul style="list-style-type: none"><li>Thesis: Evaluating Advanced Driving Assistance System Based on Naturalistic Driving Data</li><li>Cumulative GPA: 91.62 / 100; Integrated Ranking: 1 / 205</li><li>Math Courses: Advanced Mathematics, Linear Algebra, Probability and Mathematical Statistics, Operation Research, Numerical Methods and Computer Algorithms, An Introduction to Matlab and Its Application in Engineering.</li><li>Physics Courses: General Physics, Theoretical Mechanics, Structural Mechanics, Mechanics of Materials.</li><li>Computer Courses: C/C++ Programming, Database Technology and Applications, Fundamentals of Computers, Mobile Computing Introduction, Operating System (audit), Computer Vision (audit).</li><li>Professional Courses: Statistical Analysis in Transportation Engineering, Theory of Transportation System, Traffic Information Engineering, Traffic Management and Control, Traffic Safety Engineering, Transportation Planning.</li></ul></li></ul>	
RESEARCH EXPERIENCE	<b>Shanghai Naturalistic Driving Study Data Analyses</b>	Apr 2015 – Present
	<ul style="list-style-type: none"><li>General Motors, Active Safety Advance Development Department<ul style="list-style-type: none"><li>Collected 60 Chinese drivers' real-world driving data, with a total mileage of 161,055 km.</li><li>Investigated decision-making mechanisms for essential driving behaviors based on 108,933 car-following events, 17,309 lane-change events, 7,845 cut-in events, and 3,256 vehicle-pedestrian conflicts.</li><li>Calibrated, validated, and cross-compared five representative car-following models and found that the full velocity difference model performed best for Shanghai drivers.</li><li>Investigated the impact of a forward collision warning system on drivers' car following behavior.</li><li>Developed two autonomous car-following algorithms with deep reinforcement learning: one can perform human-like car following; the other is capable of controlling vehicle velocity in a safe, efficient, and comfortable manner.</li></ul></li></ul>	
	<b>Optimized Design for Combined Road Alignment</b>	Sep 2014 – Present
	<ul style="list-style-type: none"><li>Chinese National Science Foundation with Grant No. 51522810.<ul style="list-style-type: none"><li>Evaluating the safety performance of combined horizontal and vertical alignments in mountainous freeways, to guide the design of safer mountainous freeways.</li><li>Replicated the full range of combined alignments used on a mountainous freeway in China using Tongji University driving simulator.</li><li>Investigated the effects of combined alignment on lateral acceleration, lane offset, and speed variation.</li></ul></li></ul>	
	<b>Driving Behavior Research for Intelligent Collision Avoidance Technology</b>	Dec 2011 – Dec 2015
	<ul style="list-style-type: none"><li>China First Automobile Work (FAW) Corporation<ul style="list-style-type: none"><li>Examined the effects of situational urgency on drivers' collision avoidance behaviors using Tongji University's eight-degree-of-freedom driving simulator.</li><li>Developed a kinematic-based forward collision warning (FCW) algorithm that is compatible with drivers' risk perceptions and behavioral responses.</li><li>Implemented the proposed FCW algorithm in Tongji University driving simulator, and evaluated the system's performance, warning timing, and safety benefits.</li></ul></li></ul>	

- [1] **M. Zhu**, X. Wang, and Y. Wang, "Human-like autonomous car-following planning by deep reinforcement learning," *Transportation Research Part C: Emerging Technologies*, vol. 97, pp. 348–368, Dec 2018 (IF: 3.805).
- [2] **M. Zhu**, X. Wang, A. Tarko, and S. Fang, "Modeling car-following behavior on urban freeways in Shanghai: a naturalistic driving study," *Transportation Research Part C: Emerging Technologies*, vol. 93, pp. 425–445, Aug 2018 (IF: 3.805).
- [3] X. Wang, **M. Zhu**, M. Chen, and P. Tremont, "Drivers' rear end collision avoidance behaviors under different levels of situational urgency," *Transportation Research Part C: Emerging Technologies*, vol. 71, pp. 419–433, Oct 2016 (IF: 3.805).
- [4] X. Wang, M. Chen, **M. Zhu**, and P. Tremont, "Development of a kinematic-based forward collision warning algorithm using an advanced driving simulator," *IEEE Transactions on Intelligent Transportation Systems*, vol. 17, no. 9, pp. 2583–2591, Sep 2016 (IF: 3.724).
- [5] X. Wang, and **M. Zhu**, "Calibrating and validating car-following models on urban expressways for Chinese drivers using naturalistic driving data," *China Journal of Highway and Transport*, vol. 31, issue 9, pp. 129–138, Oct 2018 (in Chinese).
- [6] M. Yang, X. Wang, and **M. Zhu**, "Driving behavior research based on naturalistic driving study," *Traffic and Transportation*, vol. 33, no. 3 pp. 7–9, Mar 2017 (in Chinese).
- [7] X. Wang, **M. Zhu**, and M. Chen, "Dimension reduction and multivariate analysis of variance for drivers' forward collision avoidance behavior characteristic," *Journal of Tongji University*, vol. 44, no. 12 pp. 1858–1866, Dec 2016 (in Chinese, EI).
- [8] X. Wang, **M. Zhu**, and Y. Xing, "Impacts of collision warning system on car-following behavior based on naturalistic driving data," *Journal of Tongji University*, vol. 44, no. 7 pp. 1045–1051, Jul 2016 (in Chinese, EI).
- [9] X. Wang, **M. Zhu**, and M. Chen, "Impacts of situational urgency on drivers' collision avoidance behaviors," *Journal of Tongji University*, vol. 44, no. 6 pp. 876–883, Jun 2016 (in Chinese, EI).

## Conferences

- [1] **M. Zhu**, X. Wang, and J. Hu, "Impact on car following behavior of a forward collision warning system with headway monitoring," *Presentation at the 98th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2019.
- [2] X. Wang, L. He, **M. Zhu**, and C. Chai, "Calibrating car-following model on surface roads using Shanghai naturalistic driving study data," *Presentation at the 98th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2019.
- [3] **M. Zhu**, X. Wang, and Y. Wang, "Human-like autonomous car-following planning by deep reinforcement learning," *Presentation at the 97th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2018.
- [4] X. Wang, M. Yang, and **M. Zhu**, "An exploration of cut-in behavior and gap acceptance using Shanghai Naturalistic Driving data," *Presentation at the 97th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2018.
- [5] **M. Zhu**, X. Wang, and Y. Wang, "Human-like autonomous car-following model by deep deterministic policy gradient reinforcement learning," *Accepted for Oral Presentation at the ASCE International Conference on Transportation and Development*, Pittsburgh, Pennsylvania, Jul 2018.
- [6] **M. Zhu**, X. Wang, and A. Tarko, "Calibrating car-following models on urban expressways for Chinese drivers using naturalistic driving data," *Oral Presentation at the 96th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2017.
- [7] **M. Zhu**, and X. Wang, "Impact of a forward collision warning system on headway and reaction time during car following," in *Proceedings of the 14th World Conference on Transport Research*, Shanghai, China, Jul 2016.
- [8] **M. Zhu**, X.S. Wang, and X.M. Wang, "Car-following headways in different driving situations: a naturalistic driving study," in *Proceedings of the 16th COTA International Conference of Transportation Professionals*, Shanghai, China, Jul 2016.

- [9] X. Wang, and **M. Zhu**, “Car-following headways in different driving situations: a naturalistic driving study in China,” in *Proceedings of the 5th International Symposium on Naturalistic Driving Research*, Blacksburg, Virginia, USA, Oct 2016.

## Patents

- [1] X. Wang, **M. Zhu**, and M. Chen, “A forward collision warning algorithm considering heterogeneity of drivers’ reaction,” *C.N. Patent 105691391 A*, filed Jun 2016, and issued Sep 2017.

## AWARDS & SCHOLARSHIPS

- Outstanding Graduates of Shanghai, Shanghai Education Commission Mar 2018  
Top 5%, for outstanding graduate students in Shanghai.
- National Graduate Scholarship (twice), Ministry of Education, China Oct 2017, Oct 2016  
Top 0.2%, for outstanding graduate students in China.
- Outstanding Student Award, Tongji University Oct 2016  
One of 44 awardees from the 13,864 graduate students in Tongji.
- China Post-Graduate Mathematical Contest in Modeling, Second Prize Sep 2016
- Volvo Group Scholarship, Volvo Group Dec 2014  
One of 15 awardees in China, for outstanding engineering students.
- National Competition of Transport Science and Technology for Students, Second Prize May 2014  
One of 8 winning groups in China.  
Project: Traffic Parameter Analysis Platform based on Unmanned Aerial Vehicle (UAV).
- Mathematical Contest in Modeling, Honorable Mention Jan 2014  
Paper: Modeling the Keep-Right-Except-To-Pass Rule Using Cellular Automaton
- National Endeavor Fellowship (twice), Ministry of Education, China Nov 2013, Nov 2012  
Top 3% of all the undergraduate students in China.
- China Undergraduate Mathematical Contest in Modeling, Second Prize Sep 2013  
Top 5% among over 30,000 competition teams in China.

## VOLUNTEER & TEACHING

- The 5th International Symposium on Transportation Safety**, Tongji University, China Sep 2017
- Picked up 13 international symposium attendees at the airport.
  - Prepared the invitation letters, and was in charge of the symposium registration.
- Transportation Safety Discipline “111 Project” Base**, Tongji University, China Sep 2016
- Translated resumes for 21 invited international experts and prepared the presentation files.
- Statistical Analysis in Transportation Engineering**, Teaching Assistant, Tongji University Fall 2017
- Preparing course slides and tutoring students on SAS coding.

## WORK EXPERIENCE

- Cloud Base Information Corporation**, Shanghai, China
- Intern, Department of Data Science Sep 2014 – Nov 2014
    - Project: Traffic State Estimation Based on Mobile Phone Signaling Data.
    - Real-time estimation of traveling speed, traveling time and traffic congestion state.

## PROFESSIONAL ACTIVITIES

- Accident Analysis & Prevention**, Elsevier
- Reviewer 2017, 2018

## REFERENCES

- **Professor Yinhai Wang**, Advisor  
Department of Civil and Environmental Engineering, University of Washington
- **Professor Xuesong Wang**, Advisor  
College of Transportation Engineering, Tongji University
- **Professor Andrew P. Tarko**, Research Advisor  
Lyles School of Civil Engineering, Purdue University

## SKILLS

Python, Pytorch, Julia, MATLAB, TensorFlow, Theano, C, C++, Java, R, SAS, SQL Server.