

Meixin Zhu

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EDUCATION

Tongji University, Shanghai, China

- MEng in Communication and Transportation Engineering Sep 2015 – Present
 - Thesis: Car-Following Behavior Modeling and Its Application in Intelligent Driving
 - Adviser: Prof. Xuesong Wang
 - Focus: Autonomous driving, reinforcement learning, car-following behavior, and naturalistic driving study.
 - Cumulative GPA: 92 / 100; Integrated Ranking: 1 / 237
- BSc in Traffic Engineering Sep 2011 – Jun 2015
 - Thesis: Evaluating Advanced Driving Assistance System Based on Naturalistic Driving Data
 - Focus: Active vehicle safety system, forward collision warning system, and driving simulator.
 - Cumulative GPA: 92 / 100; Integrated Ranking: 1 / 205

RESEARCH EXPERIENCE

Shanghai Naturalistic Driving Study Data Analyses

Apr 2015 – Present

- General Motors, Active Safety Advance Development Department
 - Collected 60 Chinese drivers' real-world driving data, with a total mileage of 161,055 km.
 - Extracted 108,933 car-following events, 17,309 lane change events, 7,845 cut-in events, and 3,256 vehicle-pedestrian conflicts.
 - Calibrated, validated, and cross-compared five representative car-following models and found that the full velocity difference model performed best for Shanghai drivers.
 - Investigated the impact of a forward collision warning system on drivers' car following behavior.
 - Developed a human-like autonomous car-following algorithm using deep reinforcement learning, which outperformed traditional models.

Optimized Design for Combined Road Alignment

Sep 2014 – Present

- Chinese National Science Foundation with Grant No. 51522810.
 - Evaluating the safety performance of combined horizontal and vertical alignments in mountainous freeways, to guide the design of safer mountainous freeways.
 - Replicated the full range of combined alignments used on a mountainous freeway in China using Tongji University driving simulator.
 - Investigated the effects of combined alignment on lateral acceleration, lane offset, and speed variation.

Driving Behavior Research for Intelligent Collision Avoidance Technology

Dec 2011 – Dec 2015

- China First Automobile Work (FAW) Corporation
 - Examined the effects of situational urgency on drivers' collision avoidance behaviors using Tongji University's eight-degree-of-freedom driving simulator.
 - Developed a kinematic-based forward collision warning (FCW) algorithm that is compatible with drivers' risk perceptions and behavioral responses.
 - Implemented the proposed FCW algorithm in Tongji University driving simulator, and evaluated the system's performance, warning timing, and safety benefits.

PUBLICATIONS

Journal Articles Under Review

- [1] **M. Zhu**, and X. Wang, "Reinforcement learning based velocity control for autonomous driving with multi-objectives: safety, efficiency, and comfort," *Computer-Aided Civil and Infrastructure Engineering*, submitted, under the first round review, Oct 2017.
- [2] **M. Zhu**, X. Wang, and Y. Wang, "Human-like autonomous car-following planning by deep reinforcement learning," *Transportation Research Part C: Emerging Technologies*, submitted, under the first round review, Oct 2017.
- [3] **M. Zhu**, and X. Wang, "Impact on car following behavior of a forward collision warning system with headway monitoring," *Transportation Research Part C: Emerging Technologies*, submitted, under the first round review, Oct 2017.
- [4] **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*, submitted, under the second round review, Sep 2017.

Journal Articles Published

- [1] 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.
- [2] 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.
- [3] 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*, in press, Oct 2017 (in Chinese).
- [4] 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).
- [5] 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).
- [6] 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).
- [7] 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).

Conferences

- [1] **M. Zhu**, X. Wang, and Y. Wang, “Human-like autonomous car-following planning by deep reinforcement learning,” *Accepted for Presentation in the 97th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2018.
- [2] X. Wang, M. Yang, and **M. Zhu**, “An exploration of cut-in behavior and gap acceptance using Shanghai Naturalistic Driving data,” *Accepted for Presentation in the 97th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2018.
- [3] R. Yu, H. Lin, and **M. Zhu**, “Reinforcement learning based velocity control for autonomous driving with multi-objectives: safety, efficiency, and comfort,” *Accepted for Presentation in the 97th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2018.
- [4] **M. Zhu**, X. Wang, and Y. Wang, “Human-like autonomous car-following model by deep deterministic policy gradient reinforcement learning,” *ASCE International Conference on Transportation and Development*, Pittsburgh, Pennsylvania, Jul 2018.
- [5] **M. Zhu**, X. Wang, and A. Tarko, “Calibrating car-following models on urban expressways for Chinese drivers using naturalistic driving data,” *Oral Presentation in the 96th Annual Meeting of the Transportation Research Board*, Washington D.C., USA, Jan 2017.
- [6] **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.
- [7] **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.
- [8] 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	<ul style="list-style-type: none"> ▪ National Graduate Scholarship (twice), Ministry of Education, China Top 0.2%, for outstanding graduate students in China. 	Oct 2017, Oct 2016
	<ul style="list-style-type: none"> ▪ Outstanding Student Award, Tongji University One of 44 awardees from the 13,864 graduate students in Tongji. 	Oct 2016
	<ul style="list-style-type: none"> ▪ China Post-Graduate Mathematical Contest in Modeling, Second Prize Top 20% among over 8,000 competition teams in China. 	Sep 2016
	<ul style="list-style-type: none"> ▪ "Inspirational Star", Tongji University One of 10 awardees in Tongji University. 	Jun 2015
	<ul style="list-style-type: none"> ▪ Volvo Group Scholarship, Volvo Group One of 15 awardees in China, for outstanding engineering students. 	Dec 2014
	<ul style="list-style-type: none"> ▪ National Competition of Transport Science and Technology for Students, Second Prize One of 8 winning groups in China. Project: Traffic Parameter Analysis Platform based on Unmanned Aerial Vehicle (UAV). 	May 2014
	<ul style="list-style-type: none"> ▪ Mathematical Contest in Modeling, Honorable Mention Paper: Modeling the Keep-Right-Except-To-Pass Rule Using Cellular Automaton 	Jan 2014
	<ul style="list-style-type: none"> ▪ National Endeavor Fellowship (twice), Ministry of Education, China Top 3% among all the undergraduate students in China. 	Nov 2013, Nov 2012
	<ul style="list-style-type: none"> ▪ China Undergraduate Mathematical Contest in Modeling, Second Prize Top 5% among over 30,000 competition teams in China. 	Sep 2013
	<ul style="list-style-type: none"> ▪ China National Undergraduate Physics Contest, Shanghai Division, Third Prize 	Dec 2012
VOLUNTEER EXPERIENCE	The 5th International Symposium on Transportation Safety , Tongji University, China <ul style="list-style-type: none"> • Picked up 13 international symposium attendees at the airport. • Prepared the invitation letters, and was in charge of the symposium registration. 	Sep 2017
	Transportation Safety Discipline "111 Project" Base , Tongji University, China <ul style="list-style-type: none"> • Translated resumes for 21 invited international experts. • Prepared the presentation file for the application of "111 Project" base. 	Sep 2016
WORK EXPERIENCE	Cloud Base Information Corporation , Shanghai, China <ul style="list-style-type: none"> ▪ Intern, Department of Data Science <ul style="list-style-type: none"> • Project: Traffic State Estimation Based on Mobile Phone Signaling Data. • Real time estimation of traveling speed, traveling time and traffic congestion state. 	Sep 2014 – Nov 2014
AUDIT COURSES	<ul style="list-style-type: none"> ▪ Deep Reinforcement Learning Department of Electrical Engineering and Computer Science, UC Berkeley. 	Spring 2017
	<ul style="list-style-type: none"> ▪ Deep Learning for Self-Driving Cars Department of Electrical Engineering and Computer Science, MIT. 	Spring 2017
	<ul style="list-style-type: none"> ▪ Operating System School of Software Engineering, Tongji University. 	Fall 2014
	<ul style="list-style-type: none"> ▪ Computer Vision School of Software Engineering, Tongji University. 	Spring 2014
LANGUAGES	<ul style="list-style-type: none"> ▪ Mandarin: Native language. 	
	<ul style="list-style-type: none"> ▪ English: Proficiency. <ul style="list-style-type: none"> • TOEFL: Reading: 30; Listening: 28; Speaking: 20; Writing 27; Total: 105. • GRE: Verbal: 158; Quantitative: 167; Total: 325; Analytical Writing: 3.5. 	
SKILLS	Python, MATLAB, TensorFlow, Theano, C, C++, Java, R, SAS, SQL Server.	