Zhengwei Bai

Curriculum Vitae

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Google Scholar Link
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Education

2020–Current **Ph.D. in Electrical and Computer Engineering**, *University of California Riverside*, U.S.
GPA – 4.00/4.00

2017–2020 **M.S. in Electronics Information and Engineering**, *Beijing Jiaotong University*, China.
GPA – 3.70/4.00

2013–2017 **B.E. in Electronics Information and Engineering**, *Beijing Jiaotong University*, China.
GPA – 3.61/4.00

Experience

Sep 2020 – Current **Graduate Student Researcher**, *UCR*, Center for Environmental Research and Technology.
- Conducted deep learning-based models for 3D object detection, tracking and reconstruction for enabling driving automation.
- Developed real-world perception system including roadside system, onboard system and cloud.
- Developed Game Engine-based autonomous driving simulators to support model training and testing.

Sep 2021 – Current **Graduate Teaching Assistant**, *UCR*, Electrical and Computer Engineering.
- Conducted 40 hours of discussion sessions independently as a teaching assistant of the course *Signal and System (EE110A) in Fall2021 and Winter2022*.
- Introduced the linear time-invariant (LTI) systems, Fourier analysis, frequency response, and Laplace transforms for LTI systems.

Jun 2019 – Aug 2019 **Summer Intern**, *UC, Riverside*.
- Developed a reinforcement learning simulator by using **Unity3D** and **Tensorflow**.
- Proposed a Eco-Driving Approach for CAVs under signalized intersections with mixed traffic.

Research

2020–Current **Computer Vision for Cooperative Driving Automation**, *TSR Group at CE-CERT*, University of California, Riveside.

Our study is mainly on the object perception tasks for enabling cooperative driving automation (CDA) applications. My research topics focus on multi-sensor-based cooperative perception for 3D object detection, tracking and reconstruction.
- Deep learning-based 3D object perception [J6][C7][J8][C9][C10].
- Multi-node multi-sensor cooperative perception [C7][C10].
- CARLA-based co-simulation design and Dataset generation [J6][C10].

2019–2020 **Eco-Driving for Connected and Automated Vehicles**, *TSR Group at CE-CERT*, University of California, Riveside.

My research topics focus on deep reinforcement learning-based Eco-Driving Strategies for Connected and Automated Vehicle under the mixed traffic at signalized intersections [C3][J5][R4].

2016–2020 **Motion Planning and Decision Making for Autonomous Driving**, *GNSS&ITS Lab.*, Beijing Jiaotong University.

My research focused on Machine Learning-based motion planning and decision-making methods for Autonomous Driving and the development of Game Engine-based simulation [C1][C2].

Publications

Currently I have published 10 papers with 44 total citations and have an h-index of 3 (Google Scholar). Below are publications of mine.

2022 [C10] **Z. Bai**, G. Wu, X. Qi, M. J. Barth, Y. Liu, A. Sisbot and K. Oguchi, "PillarGrids: Multi-LiDAR-Based Cooperative Perception for 3D Object Detection," *arXiv preprint Uploading In Progress* (2022).

[C9] Z. Wei, X. Qi, **Z. Bai**, G. Wu, S. Nayak, P. Hao, M. Barth, Y. Liu, K. Oguchi, "Spatiotemporal Transformer Attention Network for 3D Voxel Level Joint Segmentation and Motion Prediction in Point Cloud," *arXiv preprint arXiv:2203.00138* (2022).

[J8] **Z. Bai**, S. Nayak, X. Zhao, G. Wu, M. J. Barth, X. Qi, Y. Liu, K. Oguchi, "Cyber Mobility Mirror: Deep Learning-based Real-time 3D Object Perception and Reconstruction Using Roadside LiDAR," *arXiv preprint arXiv:2202.13505* (2022).

[C7] **Z. Bai**, G. Wu, X. Qi, Y. Liu, K. Oguchi, M. J. Barth, "Infrastructure-Based Object Detection and Tracking for Cooperative Driving Automation: A Survey," *arXiv preprint arXiv:2201.11871* (2022).

[J6] **Z. Bai**, G. Wu, X. Qi, K. Oguchi, M. J. Barth, "Cyber Mobility Mirror for Enabling Cooperative Driving Automation: A Co-Simulation Platform," *The 101st Annual Meeting for Transportation Research Board (TRB2022)* (2022).

[J5] **Z. Bai**, P. Hao, W. Shangguan, B. Cai and M. J. Barth, "Hybrid Reinforcement Learning-Based Eco-Driving Strategy for Connected and Automated Vehicles at Signalized Intersections," in *IEEE Transactions on Intelligent Transportation Systems*, doi: 10.1109/TITS.2022.3145798.

2020 [R4] P. Hao, Z. Wei, **Z. Bai**, M. J. Barth, "Developing an Adaptive Strategy for Connected Eco-Driving Under Uncertain Traffic and Signal Conditions (No. NCST-UCR-RR-20-03)," *National Center for Sustainable Transportation*, (2020).

[C3] **Z. Bai**, P. Hao, M. J. Barth, "Hybrid Reinforcement Learning for Multi-Sensor Based Connected Eco-Driving at Signalized Intersections," *The 99th Annual Meeting for Transportation Research Board (TRB2020)* (2020).

2019 [C2] **Z. Bai**, W. Shangguan, B. Cai and L. Chai, "Deep Reinforcement Learning Based High-level Driving Behavior Decision-making Model in Heterogeneous Traffic," *2019 Chinese Control Conference (CCC), 2019*, pp. 8600-8605, doi: 10.23919/ChiCC.2019.8866005..

2018 [C1] **Z. Bai**, B. Cai, W. ShangGuan and L. Chai, "Deep Learning Based Motion Planning For Autonomous Vehicle Using Spatiotemporal LSTM Network," *2018 Chinese Automation Congress (CAC)*, 2018, pp. 1610-1614, doi: 10.1109/CAC.2018.8623233..

Awards and Honors

2021 **Honorable Mention**, *ASCE T&DI Artificial Intelligence Student Competition*

2020 **Dean's Distinguished Fellowship**, *University of California, Riverside*

2018 **The First Prize Scholarship**, *Beijing Jiaotong University*

2018 **The Second Prize Award**, *BJTU Graduate Academic Culture Festival Essay Competition*

2016 **The First Prize Award**, *"Nokia Cup" Innovation Competition Final*

2016 **The Second Prize Award**, *Beijing Electronic Design Competition Final*

2015 **China National Scholarship**, *Ministry of Education of the P. R. China*

2015 **Excellent Student Cadre Scholarship**, *Beijing Jiaotong University*

Skills

Coding	Python, Matlab, C/C++, Java, LaTeX
Frameworks	MMDetection3D, PyTorch, Keras, Tensorflow
Web	HTML/CSS, JavaScript
Embedded	STM32, MSP430, C51
Language	English, Chinese

Professional Activity

As a Presenter

Jun 2022	International Conference on Transportation & Development (ICTD) 2022.
Jan 2022	The 101st Annual Meeting for Transportation Research Board (TRB2022).
Jun 2019	The 2019 Chinese Control Conference (CCC2019).
Dec 2018	The 2018 Chinese Automation Congress (CAC2018).

As a Society Member

2022-Current	Student Member of American Society of Civil Engineers (ASCE).
2021-Current	Friend of Transportation Research Board (TRB) Standing Committees: Vehicle-Highway Automation(ACP30), Artificial Intelligence and Advanced Computing Applications(AED50), and Intelligent Transportation Systems(ACP15).
2021-Current	Student Member of IEEE Intelligent Transportation Systems Society (ITSS)
2019-Current	Student Member of Institute of Electrical and Electronics Engineers (IEEE).

As a Reviewer

2022-Current	Reviewer of IEEE Transactions on Intelligent Transportation Systems.
2022-Current	Reviewer of IEEE Vehicular Technology Magazine.
2022-Current	Reviewer of Transportation Research Record (TRR).
2022-Current	Reviewer of IEEE International Conference on Intelligent Transportation Systems (ITSC).
2022-Current	Reviewer of IEEE Intelligent Vehicles Symposium (IV).
2019-Current	Reviewer of Chinese Control Conference (CCC).
2018-Current	Reviewer of Chinese Automation Congress (CAC).

MISC.

2015–2016	Student Secretary, *The School League general branch, BJTU*
2014–2015	Deputy Director, *The College Youth League Committee, BJTU*
Nov. 2014	Student Volunteer, *The 2014 APEC Youth Program*