Zhengwei **Bai**

POSTGRADUATE STUDENT · ELECTRONIC INFORMATION AND ENGINEERING

Rm.0501, Beijing Jiaotong University Technology Mansion, Haidian District, Beijing, China

☐ (+86) 188-1309-6440 | ✉ zwbai@bjtu.edu.cn | 🏠 www.zhengweibai.com | ⓞ zwbai

Summary

I'm now a 2nd-year master student in Beijing Jiaotong University (BJTU), School of Electronic and Information Engineering, jointly advised by Prof. Baigen Cai and Prof. Wei Shangguan. My major is Transportation Information Engineering and Control. My research intersets lie in Connected and Autonomous Vehicle (CAV) and Intelligent Vehicle Infrastructure Cooperative System (i-VICS). My current focus is to explore efficient and robust control methods for connected and autonomous vehicle in various heterougeneous traffic situations. My core skills are the application of deep learning and machine learning algorithms, autonomous control algorithm, and development of software and embedded system.

Education

Beijing Jiaotong University
Beijing, China

M.S. IN ELECTRONIC INFORMATION AND ENGINEERING
Sept. 2017 - Jul. 2020 (Participated)

- Majored in Transportation Information Engineering and Control.
- Research interests: I-VICS (Intelligent Vehicle Infrastructure Cooperative Systems) and CAV (Connected and Autonomous Vehicle).

Beijing Jiaotong University
Beijing, China

B.S. IN ELECTRONIC INFORMATION AND ENGINEERING
Sept. 2013 - Jun. 2017

- Majored in Rail Transportation Signal and Control.
- Awarded the title of outstanding graduates in Beijing Jiaotong University.

Skills

Programming	**Python**: Application of Deep Learning and Reinforcement Learning Algorithms
	C: Application of the embedded systems
	C++: Application of the MFC software development
	C#: Application of the Unity-ML Based Simulation Environment Development
	Java: Application of a spring framework based Java EE project (Siemens: ITIMS)
	HTML/CSS/Javascript: Application of the Personal Website development
Embedded Systems	**STM32**: Application of the Novel CTCS (Chinese Train Control System) simulation system
	C51/MSP430: Application of the Beijing Electronic Design Competition
Algorithms	**Deep Learning**: Application for A Research About The Steering Angle Control Method (Spatiotemporal LSTM Network)
	Reinforcement Learning: Application for a Research About The High Level Driving Policy Determination Method
	Deep Neural Network: 2D-CNN, 3D-CNN, Faster-RCNN, Mask-RCNN, RNN, LSTM, ConvLSTM

Research & Work Experience

Siemens Ltd. – ITIMS (Intelligent Transportation Information Management System)
Zhuhai, China

SOFTWARE ENGINEER
Jun. 2018 - Oct. 2018

- Designed and Developed Five Software Modules of the ITIMS including bus, taxi, intersection, traffic signal, and flow detection modules.
- Developed several high-reliable multi-source data API (Application Programming Interface) which connects to major transportation information database such as The Traffic Police Database in Zhuhai.
- Management and maintenance overall service infrastructure utilizing remote controller(Using Teamviewer, Xshell and Xftp), Oracle & Mysql database.

BJTU ITS Lab. – Machine Learning Based Autonomous Vehicle Control Methods
Beijing, China

PROJECT RESEARCHER & SOFTWARE ENGINEER
Oct. 2017 - PRESENT

- Proposed a deep neural network called spatiotemporal LSTM to generalize the steering angle output by fitting in the raw image data.
- Proposed a deep Reinforcement Learning (deep RL) based high-level driving behavior decision-making algorithm.
- Developed a simulation environment based on the Unity3D Engine for the training and testing processes of the deep RL algorithm.

Siemens Ltd. – Sangtian Island Autopilot Test Site Construction Proposal (Winning bid)
Suzhou, China

PROPOSAL AUTHOR
Jul. 2018 - Aug. 2018

- Analysis of equipment layout requirements (such as video perceptive equipment, V2X communication equipment, geomagnetic sensors, etc.) of the Sangtian Island test site.
- Designed the automatic driving test scenarios based on site characteristics (such as the car-flowing scenario, overtaking scenario, obstacles recognition, etc).
- Wrote the most part (over 80%) of the whole proposal (20134 words in total) and made a presentation to the local transportation department.

BJTU GNSS Lab. – High-speed Railway Based BeiDou Fusion Positioning Performance Test *Shenyang, China*

SOFTWARE ENGINEER *May. 2018 - Jun. 2018*

- Setup the test environment for the testing of the performance of the GPS, BeiDou and IMU fusion positioning under high-speed motion scenario.
- Using device SPAN, UB380 recorded IMU and GPS/BeiDou information separately.
- Continuous testing on the Beijing-Zhangjiakou Railway (On the CR400 Train) for 7 days, 10 hours a day.

China Railway Urumqi Railway Administration Group Co.,Ltd – Field Strength Test System *Urumqi, China*

PROJECT RESEARCHER & SOFTWARE ENGINEER *Sep. 2016 - Jun. 2017*

- Design and developed a MFC framwork based windows software (about 15000 lines of C++ code) for the novel wireless field strength test (FST) system .
- Developed and tested the hardware system (collecting and packaging the sensor data such as ODO, GPS and TAX) of the FST system.
- Testing the whole FST system between Urumqi railway station and Akesu railway station (2018km in total).

Honors & Awards

HONORS

2017	**Graduate students first-class scholarship**, Beijing Jiaotong University	*Beijing, China*
2017	**Outstanding graduates**, Beijing Jiaotong University	*Beijing, China*
2015	**China National Scholarship**, Beijing Jiaotong University	*Beijing, China*
2015	**Merit Student**, Beijing Jiaotong University	*Beijing, China*
2015	**Excellent Student Cadre**, Beijing Jiaotong University	*Beijing, China*

AWARDS

2018	**2nd Prize**, "BJTU Huiguang Cup" Graduate Academic Culture Festival Essay Competition	*Beijing, China*
2016	**1st Prize**, "Nokia Cup" Innovation Competition Final	*Beijing, China*
2016	**3rd Prize**, College Students' innovation and entrepreneurship projects	*Beijing, China*
2016	**2nd Prize**, Beijing Electronic Design Competition Final	*Beijing, China*
2014	**3rd Prize**, BJTU C Language Programming Competition Final	*Beijing, China*
2014	**3rd Prize**, National College Student Physics Competition Final	*Beijing, China*
2014	**3rd Prize**, BJTU Mathematical Modeling Competition Final	*Beijing, China*

Papers

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), Xi'an, China, 2018, pp. 1610-1614. *Accepted by CAC2018*

Oct. 2018

- proposed a deep learning based control modal (named as spatiotemporal LSTM network), which is able to generate a real-time steering angle reflection based on raw image input.
- Compared with the Geo Hotz's method (Comma.ai open source method) and got a better performance.
- The experimental demonstrate that the proposed model can generate a robust and accurate visual motion planning results for autonomous vehicle.
- Dataset : The comma.ai driving dataset (http://research.comma.ai/)

Z. Bai, B. Cai, W. Shangguan and L. Chai, "Deep Reinforcement Learning Based High-level Driving Behavior Decision-making Model in Heterogeneous Traffic", arXiv:1902.05772v2 *Submitted to CCC2019*

Jan. 2019

- Proposed a mapping approach to transfer the raw V2X data into a unified data format call Hyper Grid Matrix (HGM).
- Proposed a deep reinforcement learning based method that can generate the high-level driving policy to make the CAV driving through a heterogenous dense traffic flow at a higher speed with less lane change.
- Developed a Unity-ML based simulation environment for the training and testing processes.

Z.Bai, Design and Implementation of Novel Wireless Field Strength Test System *Undergraduate Thesis*

May. 2017

- Designed a novel wireless filed strength test system and implemented in China Railway Urumqi Railway Station.
- Developed a embedded system that pre-processes the multi-sensor data (Encoding the multi-sensor raw data).
- Developed a windows software system for package decoding (Multi-sensor data transition), data analysis (Fusion position) and results visualization on the monitor (Mileage and field strength real-time curve).

Webpage & Blog

Personal Website: www.zhengweibai.com

Founder, Developer & Writer   *Mar. 2018 - PRESENT*
- Introductions & Tutorials about personal research, machine learning algorithm, and autonomous vehicle development

Github Page: github.com/zwbai

Founder & Writer   *Mar. 2017 - PRESENT*
- Open source to share the code and tutorials with developers all around world.

CSDN Blog: blog.csdn.net/Michael_Bzw

Founder & Writer   *May. 2018 - PRESENT*
- Tutorials for developers in simulation development, Autonomous Driving and Linux based development.

Presentation

Suzhou Autonomous Driving Test Field   *Suzhou, China*

Presenter for <The Integrated Solution for Suzhou Autonomous Driving Test Field>   *Jul. 2018*
- Introduced the integrated solution for Suzhou Autonomous Driving Test Filed (Research Background, Current development, Proposed solution, Development Planning)

Deep Learning Based Motion Planning For Autonomous Vehicle Using Spatiotemporal LSTM Network   *Xi'an, China*

Presenter for <Chinese Automatic Congress 2018: Unmanned Control System Session>   *Dec. 2018*
- Introduced the proposed framework for motion planning for autonomous vehicle (Self Intro., Project Intro., DL algorithm, Experiment & Result, Conclusion)

Extracurricular Activity

Propaganda Department of Youth League Committee of Beijing Jiaotong University

Deputy Director   *Fall 2014 - Spring 2015*
- Responsible for the operation of the new media center, including daily news editing of the WeChat public account, content planning, etc.

The School League general branch of BJTU

Secretary   *Fall 2015 - Spring 2016*
- Responsible for assisting college counselors to complete the daily work of the college, including day-to-day management, student affairs counseling, event planning, etc.

The 18th China International Photograph and Electrical Imaging Machinery and Technology Fair

Volunteer   *Apr. 2015*
- My main task is to organize and manage student volunteers, photography, and information consultation.

The 2014 APEC Youth Program

Volunteer   *Nov. 2014*
- My main task is photography and information consultation.

References

Dr.Baigen Cai (Advisor)   *Beijing Jiaotong University*

School of Electronic and Information Engineering   *Professor*

Tel: +86-010-51688020 , E-mail: bgcai@bjtu.edu.cn , Addr: No.3 Shangyuancun, Haidian district, Beijing, China, 100044

Dr.Wei ShangGuan (Advisor)   *Beijing Jiaotong University*

School of Electronic and Information Engineering   *Professor*

Tel: +86-010-51687111 , E-mail: wshg@bjtu.edu.cn , Addr: No.3 Shangyuancun, Haidian district, Beijing, China, 100044