Zhipeng Bao

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EDUCATION BACKGROUND

Jilin University **Sept. 2019 – Jun. 2022 (Expected)**

- Master of Automotive Engineering
- Major GPA: 83.84/ 100

Research topics: Trajectory prediction, Deep learning, Trajectory planning, Intelligent transportation system
Courses: Functional Analysis (90/100); Numerical Computation Method (86/100); Vehicle Electronic Control: Theory and Design (93/100)

Wuhan University of technology **Sept. 2015 – Jun. 2019**

- Bachelor of Automotive Engineering (Honor Graduate)
- Major GPA: 84.84/ 100

Courses: Advanced Mathematics (88.6/100); Fundamentals of College Computer (95/100); Linear Algebra (88.2/100); Fundamentals of Electrotechnics & Electron Technology (90/100); Virtual Development Technology of Electric Vehicle (89.5/100); Numerical Calculation (95/100)

ACADEMIC EVENTS AND PUBLICATIONS

- Bao, Z., Zhang, S., He, R., & Meng, Z. TST: A Temporal-Spatial Transformer for Vehicles Trajectory Prediction in Intersection Scenario. *IEEE Transactions on Vehicular Technology (2022)* (under review).
- Zhang, S., Zhi, Y., Bao, Z., & Meng, Z. Road Geometry-Aware Multi-Modal Trajectory Prediction with Attentive Spatio-Temporal Graph. *IEEE Transactions on Vehicular Technology (2021)* (under review).
- Zhi, Y., Bao, Z., Zhang, S., & He, R. (2021). BiGRU based online multi-modal driving maneuvers and trajectory prediction. *Proceedings of the Institution of Mechanical Engineers, Part D: Journal of Automobile Engineering*, *235*(14), 3431-3441.
- Bao, Z., Lu, S., Zhi, Y., & Zhang, S. (2021, January). Automatic Parking Trajectory Planning Based on Multi-objective Optimal Trajectory Decision Algorithm. In *The 2nd International Conference on Computing and Data Science* (pp. 1-7).

AWARDS AND HONORS

1st Prize	JLU Graduate Scholarship	**Oct. 2021**
1st Prize	JLU Graduate Scholarship	**Oct. 2019**
Top 10%	WHUT Honor Graduate	**Jan. 2019**
Top 10%	WHUT Advanced individual of innovation and Entrepreneurship	**May. 2019**
Top 10%	WHUT Advanced individual of innovation and Entrepreneurship	**May. 2018**
Top 20%	WHUT the College Merit Student	**Nov. 2018**
2nd Prize	China College Students' Entrepreneurship Competition (Top 5%)	**Dec. 2018**
3rd Prize	China College Students' 'Internet+' Innovation and Entrepreneurship Competition (Top 10%)	**Oct. 2019**
3rd Prize	Formula Student Electric China, FSEC (Top 10%)	**Nov. 2017**
2nd Prize	Formula Student Electric China, FSEC (Top 5%)	**Dec. 2016**
Top 5%	WHUT Merit Student	**Nov. 2016**
3rd Prize	WHUT Scholarship	**Nov. 2016**

RESEARCH EXPERIENCE

State Key Laboratory of Automotive Simulation and Control, Jilin University **Sept. 2019 - present**
Master Student, supervised by Prof. Sumin Zhang

Deep learning for Trajectory Prediction

- Developed the Temporal-Spatial Transformer for vehicle trajectory prediction in intersection scenarios and an interactive agents selection strategy for intersections and roundabouts.
- Writing a data progressing program for pre progressing the INTERACTION trajectory dataset.
- Introduced the Attentive Spatio-Temporal Graph networks to implement the road-aware multi-modal trajectory prediction.

- Introduced Bi-GRU networks for multi-model driving behaviors prediction and trajectory prediction under the highway scenario.

Participated in the flight data anomaly detection project of the Air Force Aviation **Nov. 2020 - Mar. 2021**
Project Member, supervised by Prof. Sumin Zhang

Status and Achievement: Completed; A data anomaly detecting algorithm
- Participated in the algorithm development of time series data anomaly detection and used python to write an LSTM-based data anomaly detection algorithm. Anomaly detection for flight data with time-series characteristics is realized.

Take the Deep Blue Academy - Mobile Robot Motion Planning Course **Jul. 2020 – Sept. 2020**
Teacher: Prof. Fei Gao

Status and Achievement: Completed; Motion planning algorithms for UAV
- Search-based path planning algorithm, sampling-based path planning algorithm, trajectory planning under kinematic constraints, trajectory generation, trajectory optimization under soft and hard constraints, etc.
- Completed work: Using Matlab, python, C++, ROS, respectively, completed the writing of the above algorithms such as A*, Hybrid A*, RRT* under the Rviz platform.
- The motion planning task of the UAV in the static obstacle environment is realized: Given the target point, the UAV model uses the A* algorithm to search for the initial path. Then it adopts the time allocation, safety detection, and mini snap optimization methods to generate an optimized trajectory. Finally, the UAV model performs the real-time trajectory reconstruction during the movement process.

Participated in the research group Baidu Apollo smart car integration **Oct. 2019 – Jan. 2020**
Project Member, supervised by Prof. Rui He, Sumin Zhang

Status: Completed;
- Responsible for the integration and adjustment of Apollo smart car sensors. Completed the installation and adjustment of the inertial navigation system to realize the Apollo intelligent car tracking function. Cooperate with teachers to develop autonomous driving teaching courses based on Baidu Apollo smart car.

Commercialization of Intelligent Robotic System for Remanufacturing Hot Forging Dies **Dec. 2017 – Dec. 2018**
Team Leader, supervised by Prof. Xunpeng Qin

Status and Achievement: Completed; the 2nd prize in the China College Students' Entrepreneurship Competition
- Team leader, lead the team to commercialize the intelligent robotic system for remanufacturing hot forging dies, write business plans, make roadshow PPTs, and act as the main respondent.

"NIO Cup" China Student Electric Formula Competition **Mar. 2016 – Dec. 2017**
Electrical Director, supervised by Prof. Changqing Du, Xiaofei Pei

Status and Achievement: Completed;
- Electrical Director, lead the team to design and produce the electrical system of the electric formula racing car, in the team is mainly responsible for the design of the power system, the design and production of the whole vehicle circuit, the design of the whole vehicle control strategy, and the development of the whole vehicle controller.

National College Students' Innovation Training Program - Formula Electric Vehicle Control Strategy and Controller Design **April. 2017 – Dec. 2017**
Project Leader, supervised by Prof. Changqing Du

Status and Achievement: Completed; A vehicle control unit for the electric formula racing car
- Project leader, design vehicle control strategy, use C language to write the control program, implement serial communication and CAN communication between the controller and sensor, data transceiver module, motor controller, develop the vehicle controller with Freescale XS128 as the control unit, and make a budget for developing the vehicle controller.

INTERNSHIP EXPERIENCE

Jilin Province Ruiyuzongheng Intelligent Technology Co., Ltd., Changchun **Mar. 2021 – Jun. 2021**
Research Intern, supervised by Mr. Yongbo Jia

- Assisted in investigating the latest algorithm for vehicle trajectory prediction and explored whether the Transformer can be applied to trajectory prediction.
- Participated in the development of the vehicle trajectory prediction algorithm by using the LSTM networks.

EXTRACURRICULAR ACTIVITIES

COVID-19 epidemic prevention work, Changchun **Mar. 2022**
Volunteer

- Distributed supplies and food to students.
- Arranged work for volunteers.

2021 FISITA Intelligent Safety Conference, Changchun **Jul. 2021**
Volunteer

- Received and accompanied Dr. Rainer Hoffmann, the CSO of Shanghai Digauto Automobile Technology Co., Ltd.

COVID-19 epidemic prevention work, Huolinguole **Feb. 2021**
Volunteer

- Checked the itinerary code and took the temperature of people in and out of the city.
- Distributed supplies to quarantined people.
- Assisted in the disinfection of isolation sites.

College Students' Innovation and Entrepreneurship Practice Base **Jun.2016 – Jun. 2017**
Minister of the Base

- Taught students in coding in C language and 3D modeling by CATIA.
- Guided students to write applications for college students' innovation projects.
- Helped applicants find project instructors.
- Responsible for budget and daily management.

DATA ANALYTICS SKILLS

Programming Languages: Python, C/C++, MATLAB, ROS
Python Packages: Pandas, Matplotlib, Numpy, Scipy, Pytorch, YAML
Software & Tools: LaTeX, Excel, CATIA, CAD, CarSim, JOSM