

# Baiyu Peng

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## EDUCATION

### Tsinghua University (QS ranking:15)

Beijing, China

*Master in Vehicle Engineering*

July 2022 (Expected)

- Courses: Machine Learning:4.0; Optimal Control: 4.0.

### Tsinghua University (QS ranking:15)

Beijing, China

*Bachelor in Vehicle Engineering*

July 2019

- GPA: 3.74/4.0, Ranking: 8/75
- Graduated with the honor of “**Outstanding Graduates of Beijing**”. (Top 5%)
- Graduated with the honor of “**Excellent Graduates of Tsinghua University**”. (Top 10%)
- Courses: Calculus: 4.0; Linear Algebra: 4.0; Physics for Scientists and Engineers: 4.0; Introduction to Complex Analysis: 4.0; Diploma Project (Thesis): 4.0

## RESEARCH EXPERIENCE

### Safe Reinforcement Learning

04/2020-present

*Intelligent Driving Lab, Tsinghua University*

Advisor: Prof. Shengbo Eben Li

- **Project aim:** Design reinforcement learning (RL) algorithms with safety constraints.
- **My work:** Independently proposed two chance constrained RL algorithms, which uses a stochastic dynamic model to learn a policy with high probability of being safe. The proposed methods were shown to reduce the oscillations and conservatism with a fast learning process. Accomplished two papers as first author and a real robot obstacle-avoidance experiment with the proposed algorithm. (Robot experiment video: <https://youtu.be/iKGYaDzYwB0> Paper presentation: <https://youtu.be/lsOE4nWvjoA>)

### Multi-Robot Distributed Control

10/2020-present

*Intelligent Driving Lab, Tsinghua University*

Advisor: Prof. Shengbo Eben Li

- **Project aim:** Develop a distributed planning and control algorithm for warehouse mobile robots.
- **My work:** Independently developed a distributed MPC method via an integrated decision-making and control framework. Accomplished a multi-robot simulation, where the developed algorithm achieved an efficient and safe planning and controlling of at least 10 robots. Implemented the algorithm into real robots with ROS (Robot Operation System) and carried out an experiment.

### Model-based Reinforcement Learning

10/2019-04/2020

*Intelligent Driving Lab, Tsinghua University*

Advisor: Prof. Shengbo Eben Li

- **Project aim:** Design a model-based RL algorithm, where a prior model is constantly updated with data by Bayesian estimation and then used for model-based policy optimization. The algorithm has the capability of improving both learning accuracy and training speed.
- **My work:** Derived the Bayesian estimator for model uncertainty. Designed and accomplished a simulation for the project paper.

### Robust-Control-Based RL Driving Policy Transfer

07/2018-09/2018

*Mechanical Systems Control Lab, UC Berkeley*

Advisor: Prof. Masayoshi Tomizuka

- **Project aim:** To reject the disturbance induced by the modeling gap, a robust-control-based driving policy transfer scheme is proposed, where a RL policy is used to generate a reference trajectory and a robust controller is designed to track the trajectory.
- **My work:** Implemented the algorithm in a real vehicle with ROS and conducted a trajectory tracking experiment.

## PUBLICATION

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### Conference Proceedings

- **Baiyu Peng**, Yao Mu, Jingliang Duan, et al. “[Separated Proportional-Integral Lagrangian for Chance Constrained Reinforcement Learning](#).” 2021th IEEE Intelligent Vehicle Symposium (2021). (Published, **Finalist for Student Best Paper Award**)
- **Baiyu Peng**, Yao Mu, Yang Guan, et al. “[Model-Based Actor-Critic with Chance Constraint for Stochastic System](#).” ArXiv abs/2012.10716 (2021). (Accepted, 2021th IEEE Conference on Decision and Control, CDC)
- Mu, Yao, **Baiyu Peng**, Ziqing Gu, et al. “[Mixed Reinforcement Learning for Efficient Policy Optimization in Stochastic Environments](#).” 20th International Conference on Control, Automation and Systems (ICCAS) (2020). (Published, **Student Best Paper Award**)

### Journal

- **Baiyu Peng**, Qi Sun, Shengbo Eben Li, et al. “End-to-End Autonomous Driving through Dueling Double Deep Q-Network.” Automotive Innovation. (2020). (Accepted)

## SCHOLARSHIPS & AWARDS

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### Scholarships

- National Scholarship, 2017, **Top 1%**
- Infineon Science and Technology Scholarship, 2018, **Top 5%**
- Comprehensive Excellence Scholarship, 2018, **Top 10%**
- Academic Excellence Scholarship, 2016, **Top 20%**

### Honors

- Outstanding Graduates of Beijing, 2019, **Top 5%**
- Excellent Graduates of Tsinghua University, 2019, **Top 10%**

### Academic Competitions Awards

- Student Best Paper Award in the 20th International Conference on Control, Automation, and Systems, (**Top 1%** (5/500) among accepted papers from 25 countries), 2020
- Student Best Paper Award Finalist in the 2021th IEEE Intelligent Vehicle Symposium, (**Top 1%** (3/220)), 2021
- The Provincial First-Class Prize of National Olympiad in Informatics (NOIP), 2014

## DUTIES & ACTIVITIES

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### Workshop Lecturer, Center for Student Studying and Development

2018-present

*Tsinghua University*

- Organize regular workshops and give lecture to new students about the study and life on campus. (8 workshops, about 300 students participated)

## SKILLS & CERTIFICATES

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**Programming:** Python(Expert), Pytorch(Expert), ROS(Expert), Matlab(Expert), C(Intermediate).

**English:** TOEFL: 102 (Reading: 30, Listening: 28, Speaking:21, Writing:23)

## CONTACT

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