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 for safety-critical real-world tasks.
- **My work:** Independently proposed two model-based chance constrained RL algorithms, which used 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 navigation 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 methods for warehouse wheeled 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.
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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 to verify the proposed method.

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:** Deployed the algorithm in a real vehicle via ROS and accomplished a trajectory tracking experiment along a 300 m test road.

PUBLICATION
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." 2021th IEEE Conference on Decision and Control, CDC (2021). (Accepted)
- 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). (Published)

SCHOLARSHIPS & AWARDS
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), 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
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, served about 300 students participated)

SKILLS & CERTIFICATES
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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