TIANYU SHI

Personal Website: https://shitianyu-hue.github.io/

86+18811363098 ⋄ tianyu.s@outlook.com

EDUCATION

McGill University *January 2020 - Present*

- Master of Engineering (MEng) Thesis Option, supervised by Prof.Lijun Sun
- Graduate Excellence Fellowship (GEF)
- 2020 IVADO Excellence Scholarship (Only Five Recipients of McGill)
- Mitacs Accelerate program for Graduate Student

University of California, Berkeley *July 2018 - September 2018*

- Research Assistant at Berkeley Deep Drive, supervised by Dr.Ching-Yao Chan
- Research topic: Decision-making and Control System for Automated Vehicle.

Beijing Institute of Technology *September 2015 - July 2019*

- BA in Vehicle Engineering, Major GPA: 3.7/4.0, Comprehensive Performance Ranking: 1/66
- First Class Honors graduate

PUBLICATIONS & PATENTS

[c1] Tianyu Shi, Jiawei Wang, Yuankai Wu, Luis Miranda-Moreno, Lijun Sun. Multi-agent Graph Reinforcement Learning for Connected Automated Driving.*Workshop on AI for Autonomous Driving , International Conference on Machine Learning (ICML).*

[c2] Tianyu Shi, Chenyang Xi, Yuankai Wu, Lijun Sun. Efficient Motion Planning for Automated Lane Change based on Imitation Learning and Mixed-Integer Optimization. *The 2020 IEEE International Conference on Intelligent Transportation(ITSC).*

[c3] Tianyu Shi, Pin Wang, Ching-Yao Chan. A Data Driven Method of Optimizing Feedforward Compensator for Autonomous Driving Vehicle,*The 2019 IEEE Intelligent Vehicles Symposium (IV).*

[c4] Tianyu Shi, Pin Wang, Ching-Yao Chan. Driving Decision and Control for Automated Lane Change based on Deep Reinforcement learning,*The 2019 IEEE International Conference on Intelligent Transportation (ITSC).*

[c5] Yang Li, Jianqiang Wang, Tianyu Shi, Xiao-Yun Lu, Qing Xu, Keqiang Li. Pedestrian Trajectory Prediction at Un-Signalized Intersection Using Probabilistic Reasoning and Sequence Learning,*The 2019 IEEE International Conference on Intelligent Transportation(ITSC).*

[J1] Tianyu Shi, Ye Ma, Wei Zhang, Yu Hao, Junbing Huang, Yinan Lin. A Comprehensive Evaluation of NEV Development in China, Japan, the United States and Germany based on the AHP-EW Model, *Journal of Cleaner Production.*

[P1] CN 201810692636.5. A Path Tracking Controller for Unmanned Vehicles based on Time Series.

[P2] CN 201810696109.1. A Cooperative Adaptive Cruise Controller design based on Minimum Safe Distance between Vehicles.

[P3] CN 201810692607.9. A Path Planning Method based on Artificial Potential Field and Dynamic Window Approach.

ACADEMIC EXPERIENCE

Berkeley Deep Drive, UC Berkeley   July 2018 - September 2018

Research Assistant , supervised by [Dr.Ching-Yao Chan](#)

· **Research on Decision-making and Control System based Deep Reinforcement Learning (Project [Link](#))**

· Designed two similar Deep Q learning frameworks with quadratic approximator for deciding how to select a comfortable gap and follow the preceding vehicle.

· Proposed a novel hierarchical deep reinforcement learning for decision making and control of lane change situations.

· Explored and optimized planning and control module based on customized reference trajectory and pure pursuit controller.

· **Optimizing Control Performance based on Deep Neural Network (Project [Link](#))**

· Proposed a new methodology which combine Principal Component Analysis (PCA) and Time Delay Neural Network to evaluate automated vehicle control performance and model the behavior of low level controller.

· Designed an optimized feed-forward compensator based on deep neural network and achieved improved performance in U-turn scenario. (Video [Link](#)).

Beijing Institute of Technology   September 2018 - November 2018

Research Assistant at The National Key Research and Development Program of China

· **Control of Mobile Robot**

· Acquired obstacle information using somatosensory camera and processed the state inputs based on fuzzy logic, in order to reduce the complexity of state inputs. (Video [Link](#)).

· Compared with the dynamic window approach method, simulation and experiment results showed this method has better adaptability to dynamic and unknown environment. (Video [Link](#))

Tsinghua University   July 2019 - September 2019

Research Assistant at State Key Lab of automotive Safety and Energy

· **Research on Pedestrian Trajectory Prediction**

· Participated in designing a new hybrid model DBN-Seq2Seq for pedestrian trajectory prediction through an adaptively online weighing algorithm, which adjusts the weights of Seq2Seq and DBN models by estimating the stopping probability and their prediction errors at previous steps.

· Employed data-augmentation techniques to enlarge the original dataset for learning-based approaches.

INDUSTRIAL EXPERIENCE

Momenta.AI, Beijing   January 2019 - September 2019

Planning and Control Research Intern at L4 self-driving group, supervised by [Dr.Jie Chen](#)

· **Data-driven Motion Planning**

· Transformed the lane change mission into Mixed Quadratic Problem (MIQP) with logical constraints to guarantee safe and comfortable lane change movements.

· Proposed a hierarchical imitation learning with classification layer and action generation layer to provide online, fast and more generalized motion planning.

Megvii Technology, Beijing   September 2019 - December 2019

Computer Vision Research Intern at Base model group, supervised by [Dr.Xiangyu Zhang](#)

· **Neural Network Architecture Optimization**

· Design efficient neural network structure based on Neural Architecture Search (NAS) Method.

· Improved residual bottleneck's performance based on channel and spatial attention mechanism.

SELECTED PROJECTS

Multi-agent Graph Reinforcement Learning for Automated Driving   January 2020

COMP 767 Project (grade: 4.0/4.0) Supervised by [Prof.Donia Precup](#)

· Utilize the graph attention networks in the navigation setting of multi-agent reinforcement learning for mixed-autonomy cooperation.

· Introduce Dynamic relational index based on both velocity and position information to capture attention features among surrounding agents.

Undergraduate Physical Experiment Competition of Beijing   October 2016

Won the Second prize, top 10%

· Adopted built-in sensors of in mobile phones to conduct the calculations measurements of the moment of inertia of mobile phone and Coriolis acceleration and simulated the motion trajectory of the mobile.

· Painted the change relationships between the mobiles three-dimensional acceleration and the time via Python, and imported its internal data to the MATLAB to precede the median filtering and Kalman filtering performance.

HONORS & AWARDS

MIIT Scholarship for Scientific Innovation (**ten undergrad winners in BIT**)	*January 2019*
First Prize of the CASC Scholarship (**one winner in our department of BIT**)	*October 2018*
First Prize of the Fast Gear Scholarship(**one winner in our major of BIT**)	*November 2017*
North Industry Scholarship for All-round Development(**ten winners in BIT**)	*December 2016*
SWAT Scholarship(**ten winners in our department of BIT**)	*Fall 2018*
Grand Prize of Academic Competition of BIT (**top 1%**)	*May 2017*
Second Prize of National Undergraduate Mathematical Modeling Contest(**top 10%**)	*December 2016*
Second Prize of Undergrad Physical Experiment Competition of Beijing (**top 10%**)	*November 2016*

DATA ANALYTICS SKILLS

Programming Languages	Python, C/C++, MATLAB
Python Packages	Pandas, Matplotlib, Numpy, Scipy, Pytorch, Tensorflow
Software & Tools	LaTeX, Excel, SPSS, Photoshop , PROE , SolidWorks , CAD