

# Yongqi Dong



<https://yongqidong.github.io/>

Junior Research Group Leader @ RWTH Aachen University

Ph.D. Researcher @ Delft University of Technology

Email: [yongqi.dong@rwth-aachen.de](mailto:yongqi.dong@rwth-aachen.de) | TEL: (+31) 0616619399 / (+1) 5109711107

## EDUCATIONAL BACKGROUND

PhD in Transportation, Department of Transport and Planning, **Delft University of Technology (TU Delft)** Dec.2019-Present

**Thesis:** *Safe, Efficient, and Socially Compliant Automated Driving: Sensing, Anomaly Detection, Planning, and Control*

**Advisors:** Prof.dr.ir. [Bart van Arem](#) and Dr.ir. [Haneen Farah](#)

Master of Control Science and Engineering, Department of Automation, **Tsinghua University**

Sep.2014-Jul.2017

Minor: Master Project for Improving Ability in *Big Data*

**Thesis:** *Data-Driven Analysis on Group Behaviors of Taxi Drivers and Ridesourcing Drivers*

*Nominated for Tsinghua University Outstanding Master Thesis Dissertation*

**Advisors:** Prof. [Li Li](#) and Prof. [Zuo Zhang](#)

Bachelor of Telecommunication Engineering

Sep.2010-Jul.2014

School of Electronic and Information Engineering, **Beijing Jiaotong University**

**GPA: 91.5/100 | Rank: 1/202** | Postgraduate Recommendation to Tsinghua University without Examination

**Thesis:** *Design of vehicle-mounted data acquisition & communication unit for the WMN-based locomotive remote control*  
*Outstanding Undergraduate Thesis*

Visiting Researcher, Department of Mechanical Engineering, **University of California, Berkeley**

May.2023- Oct.2023

**Topic:** *Socially Compliant Automated Driving via Deep Reinforcement Learning and Model-based Social-aware MPC*

## PUBLICATIONS

([Google Scholar](#) ID: [L2kD-DwAAAAJ](#). The superscript <sup>#</sup> indicates equal contribution, \* indicates corresponding authors.)

### Key Journal Publications:

- 1. **Dong, Y.**, Patil, S., van Arem, B., & Farah, H. (2023). A Hybrid Spatial-temporal Deep Learning Architecture for Lane Detection. *Computer-Aided Civil and Infrastructure Engineering*, 38(1), 67-86. <https://doi.org/10.1111/mice.12829> [Top Q1, IF:8.5, SJR:2.972]
- 2. Li, R.<sup>#</sup>, & **Dong, Y.**<sup>\*,#</sup> (2023). Robust Lane Detection Through Self Pre-Training With Masked Sequential Autoencoders and Fine-Tuning With Customized PolyLoss. *IEEE Transactions on Intelligent Transportation Systems*, vol. 24, no. 12, pp. 14121-14132, doi: <https://doi.org/10.1109/TITS.2023.3305015>. (Joint first author and corresponding author) [Top Q1, IF:7.9, SJR:1.119]
- 3. Farah, H., Postigo, I., Reddy, N., **Dong, Y.**, Rydergren, C., Raju, N., & Olstam, J. (2022). Modeling Automated Driving in Microscopic Traffic Simulations for Traffic Performance Evaluations: Aspects to Consider and State of the Practice. *IEEE Transactions on Intelligent Transportation Systems*, 2022, <https://doi.org/10.1109/TITS.2022.3200176>
- 4. **Dong, Y.**, Wang, Sh., Li, L., Zhang, Z. (2018). An Empirical Study on Travel Patterns of Internet Based Ride-Sharing, *Transportation Research Part C: Emerging Technologies* 86: 1-22. <https://doi.org/10.1016/j.trc.2017.10.022> [Highly cited; Top Q1, IF:7.6, SJR:2.86]

### Key Conference Presentation & Proceeding Publications:

- 1. **Dong, Y.**<sup>\*,#</sup>, Zhang, L.<sup>#</sup>, Farah, H., Zgonnikov, A., & van Arem, B. (2023). Data-driven Semi-supervised Machine Learning with Surrogate Safety Measures for Abnormal Driving Behavior Detection, (Accepted by [TRBAM2024](#) and presented at the 35<sup>th</sup> annual meeting of International Co-operation on Theories and Concepts in Traffic Safety, **under third-round review** by Journal of Transportation Research Board, **minor revision**), [Preprint](#)
- 2. Zhang, L.<sup>#</sup>, **Dong, Y.**<sup>\*,#</sup>, Farah, H., & van Arem, B. (2023). Social-aware Planning and Control for Automated Vehicles based on Driving Risk Field and Model Predictive Contouring Control: Driving through Roundabouts as a Case Study.

- 2023 IEEE International Conference on Systems, Man, and Cybernetics (SMC), Honolulu, Oahu, HI, USA, 2023, pp. 3297-3304. <http://dx.doi.org/10.1109/SMC53992.2023.10394462>. (Co-first author and corresponding author, accepted and presented at *TRB's 2023 Automated Road Transportation Symposium*), [Demo video](#)
- 3. **Dong, Y.<sup>\*,#</sup>**, Lu, X.<sup>#</sup>, Li, R., Song, W., van Arem, B., & Farah, H. (2023). Intelligent Anomaly Detection for Lane Rendering Using Transformer with Self-Supervised Pre-Training and Customized Fine-Tuning (**Accepted** and presented at [TRB2024](#) and **under second-round review** by *Transportation Research Record: Journal of the Transportation Research Board*, **minor revision**), [Preprint](#)
  - 4. **Dong, Y.**, Detema, T., Wassenaar, V., van de Weg, J., Kopar, T., & Suleman, H. (2023). Comprehensive Comparison of Deep Reinforcement Learning for Automated Driving on Various Driving Maneuvers with Simulation. *2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC)*, Bilbao, Spain, 2023, pp. 6165-6170, <http://dx.doi.org/10.1109/ITSC57777.2023.10422159>
  - 5. **Dong, Y.<sup>\*,#</sup>**, Patil, S.<sup>#</sup>, Farah, H., & Hellendoorn, J. (2023). Sequential Neural Network Model with Spatial-Temporal Attention Mechanism for Robust Lane Detection Using Multi Continuous Image Frames (**Presented** at the *Transportation Research Board (TRB) 102<sup>nd</sup> annual meeting TRB 2023*). [TRBAM-23-04409 poster](#)
  - 6. Yuan, H., Li, P., van Arem, B., Kang, L., Farah, H., & **Dong, Y.<sup>\*</sup>** (2023). Safe, Efficient, Comfort, and Energy-saving Automated Driving through Roundabout Based on Deep Reinforcement Learning. *2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC)*, Bilbao, Spain, 2023, pp. 6074-6079, <http://dx.doi.org/10.1109/ITSC57777.2023.10422488> (Corresponding author and PI)
  - 7. Xue, C.<sup>#</sup>, **Dong, Y.<sup>#</sup>**, Liu, J.<sup>\*</sup>, Liao, Y., & Li, L. (2023). Design of the Reverse Logistics System for Medical Waste Recycling Part I: System Architecture and Disposal Site Selection Algorithm. *2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC)*, Bilbao, Spain, 2023, pp. 1741-1746, <http://dx.doi.org/10.1109/ITSC57777.2023.10422624> (Co-first author)
  - 8. Xue, C.<sup>#</sup>, **Dong, Y.<sup>#</sup>**, Liu, J.<sup>\*</sup>, Liao, Y., & Li, L. (2023). Design of the Reverse Logistics System for Medical Waste Recycling Part II: Route Optimization with Case Study under COVID-19 Pandemic. *2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC)*, Bilbao, Spain, 2023, pp. 4011-4017. <http://dx.doi.org/10.1109/ITSC57777.2023.10422236> (Co-first author)
  - 9. **Dong, Y.<sup>\*</sup>**, Chen, K., Peng, Y., & Ma, Z. (2022). Comparative Study on Supervised versus Semi-supervised Machine Learning for Anomaly Detection of In-vehicle CAN Network. *2022 IEEE 25th International Conference on Intelligent Transportation Systems (ITSC)*, 2022, pp. 2914-2919, <https://doi.org/10.1109/ITSC55140.2022.9922235>

#### **Other Journal and Conference Publications:**

- 1. Lingam, S. N., De Winter, J., **Dong, Y.**, Tsapi, A., Van Arem, B., & Farah, H. (2024). eHMI on the Vehicle or on the Infrastructure? A Driving Simulator Study. *European Journal of Transport and Infrastructure Research*, 24(2), 1–24. <https://doi.org/10.59490/ejtr.2024.24.2.7273> [Journal]
- 2. **Dong, Y.**, Liu, C., Wang, Y., & Fu, Zh. (2024). Towards Understanding Worldwide Cross-cultural Differences in Implicit Driving Cues: Review, Comparative Analysis, and Research Roadmap. Accepted by and [presented at the 2024 IEEE 27th International Conference on Intelligent Transportation Systems \(ITSC\)](#), [Preprint](#) [Conference]
- 3. **Dong, Y.<sup>\*,#</sup>**, Chen, K.<sup>#</sup>, & Ma, Z. (2023). Comparative Study on Semi-Supervised Learning Applied for Anomaly Detection in Hydraulic Condition Monitoring System. *2023 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, Honolulu, Oahu, HI, USA, 2023, pp. 1702-1708, <http://dx.doi.org/10.1109/SMC53992.2023.10394193> [Conference]
- 4. Raju, N., Schakel, W., Reddy, N., **Dong, Y.**, Farah, H. (2022). Car-Following Properties of a Commercial Adaptive Cruise Control System- A Pilot Field Test. *Transportation Research Record: Journal of the Transportation Research Board*, <https://doi.org/10.1177/03611981221077085> [Journal]
- 5. **Dong, Y.**, Yang, Z., Yue, Y., Pei, X., & Zhang, Z. (2018). Revealing Travel Patterns of Sharing-bikes in a Spatial-temporal Manner using Non-negative Matrix Factorization Method. In *CICTP 2018: Intelligence, Connectivity, and Mobility* (pp. 1665-1674). Reston, VA: American Society of Civil Engineers. <https://doi.org/10.1061/9780784481523.165> [Conference]

- 6. Yue, Y., Pei, X., Yang, Z., **Dong, Y.**, & Yao, D. (2018). A Trip Building and Chaining Methodology Using Traffic Surveillance Data. In *CICTP 2018: Intelligence, Connectivity, and Mobility* (pp. 2254-2262). Reston, VA: American Society of Civil Engineers. <https://doi.org/10.1061/9780784481523.224> [Conference]
- 7. **Dong, Y.**, Zhang, Z., Fu, R., Xie, N. (2016). Revealing New York Taxi Drivers' Operation Patterns Focusing on the Revenue Aspect. (2016) In *12th World Congress on Intelligent Control and Automation (WCICA)*, (pp. 1052-1057). IEEE. <https://doi.org/10.1109/WCICA.2016.7578771> [Conference]
- 8. **Dong, Y.**, Ruan, H., Cai, T., Peng, J, and Wang ,W. (2013). Using LED to Demonstrate the Composition of Simple Harmonic Motions and Five Polarization States of Light. *Physics Experimentation* 11:45-48 [Journal]

#### **Under Review and Working Papers:**

- 1. **Dong, Y.**, van Arem, B., & Farah, H. Safe and Socially-compliant Automated Driving through Integrating Multi-Agent Reinforcement Learning with SVO and MPCC (In preparation, to be submitted to *the Proceedings of the National Academy of Sciences, PNAS*)
- 2. **Dong, Y.**, Farah, H., & van Arem, B. Towards Developing Socially-Compliant Automated Vehicles: State of the Practice, Experts Expectations, and a Conceptual Framework (**Accepted** by the 104<sup>th</sup> TRB Annual Meeting (TRB 2025) for poster presentation and **presented** at the *4th Symposium on Management of Future Motorway and Urban Traffic Systems 2022 (MFTS2022)*, to be submitted to *Journal of Transport Reviews*).
- 3. Patil, S.<sup>#</sup>, **Dong, Y.**<sup>#,\*</sup>, Farah, H, & Hellendoorn, J. Sequential Neural Network Model with Spatial-Temporal Attention Mechanism for Robust Lane Detection Using Multi Continuous Image Frames (Joint first author and corresponding author, *Journal of Transportation Research Part C: Emerging Technologies*, **Under Review**), [Preprint](#)
- 4. Huang, Y.<sup>#</sup>, **Dong, Y.**<sup>#</sup>, Tang, Y., & Li, L. (2024). Leverage Multi-source Traffic Demand Data Fusion with Transformer Model for Urban Parking Prediction. **Accepted** by [the 28<sup>th</sup> International Conference Of Hong Kong Society For Transportation Studies \(HKSTS\)](#) and the [Conference in Emerging Technologies in Transportation Systems \(TRC-30\)](#) for presentation, to be submitted for a journal, [Preprint](#)
- 5. Zhang, Y., **Dong, Y.**<sup>\*</sup> (2023). Optimization of coordinated flow restriction and skip-stopping schemes for urban rail stations considering platform carrying capacity (**Presented** at the *Transportation Research Board (TRB) 102<sup>nd</sup> annual meeting TRB 2023*, **under review** by *Transportation Research Record: Journal of the Transportation Research Board*). [TRBAM-23-04413 poster](#), [Preprint](#)
- 6. Liu, W., Zhang, X., **Dong, Y.**, Xu, L. (2023). A Unified Model Predictive Control Method of Automated Vehicles for Lane Changing and Lane Keeping Maneuvers (**Under Review** by *Journal of Intelligent Transportation Systems*)
- 7. Berge, B., de Winter, J., Dodou, D., Pooyan Afghari, A., Papadimitriou, E., Reddy, N., **Dong, Y.**, Raju, N., & Farah, H., (2023). Understanding cyclists' perception of driverless vehicles through eye-tracking and interviews (**Accepted** for presentation at the *35<sup>th</sup> annual meeting of International Co-operation on Theories and Concepts in Traffic safety (ICTCT Catania 2023)*, under review by *Journal of Safety Science*), [Preprint](#)
- 8. Wu, G., **Dong, Y.**<sup>\*</sup> Sequential Multimodal Deep Learning for Anomaly Detection in Weakly-Labeled Videos (Corresponding author, in preparation for *Journal of IEEE Transactions on Robotics*)
- 9. [The Age of Smart Integrated Transportation: Practice in the Digital Transformation of Transportation Industry](#) [M]. Publishing House of Electronics Industry. [Involved as Reviewer, and Expert Editor for Preface, Chapters 1 & 13]

#### **Open resource repository:**

- [Datasets, Simulation Platforms, and Relevant Publications on Emerging Mixed Traffic of Automated Vehicles and Human-driven Vehicles](#)

## **PATENTS & SOFTWARE COPYRIGHTS**

#### ✧ **European and Dutch Patent:**

- Automated lane detection (IDF OCT-22-060, **granted** on May 25, 2024, Patent number 2033551)
- Socially compliant Planning and Control for Automated Vehicles using Model-backend Deep Reinforcement Learning with Driving Risk Field and Model Predictive Contouring Control (OCT-23-056, N2035943, Submitted & **filed**)

### ✧ *Chinese Invention Patent:*

- ✧ Intelligent Demonstration Instrument of Simple Harmonic Oscillation Composition and Five Polarization States of Light, Application ID: 201310123700.5, Date: 2013.08.07, Publication Patent Number CN103236211B, Date: 2016.07.06

### ✧ *Software copyright:*

- ✧ Spatial-Temporal Attention Integrated Sequential Neural Network Model for Vision-based Robust Lane Detection Using Multi Continuous Image Frames (i-DEPOT 142731, **registered & filed**)
- ✧ Vision-Based Lane Detection System With Self-supervised Pre-training Through Masked Sequential Auto-encoders (Computer Software Copyright Registration in China, 2024R11L1180902, submitted and **under review**)

## ACADEMIC SERVICES

---

**Technical Committee (Chair)** | Automated Mobility in Mixed Traffic | IEEE ITSS May.2024-Present  
Establishing the interdisciplinary community: "Automated Mobility in Mixed Traffic"

**Workshop Organizer (Primary coordinator)** | 27<sup>th</sup> IEEE ITSC 2024, Edmonton, Canada Sep.24, 2024  
Workshop title: [Automated Mobility in Emerging Mixed Traffic](#) [Approved, to be held]

**Workshop Organizer (Second coordinator)** | 26<sup>th</sup> IEEE ITSC 2023, Bilbao, Bizkaia, Spain Sep. 24, 2023  
Workshop title: [Data-driven and Empirical Research for Emerging Mixed Traffic of Automated Vehicles and Human-driven Vehicles](#)

**Workshop Organizer (Primary coordinator)** | IEEE IV 2023, Anchorage, USA Jun.4, 2023  
Workshop title: [Development of Socially-compliant Driving Behaviour for Automated Vehicles to Enhance Safety and Efficiency in Mixed Traffic](#)

**IEEE TCoS Seeding Project Leader (PI)** | 2023 IEEE TAB Committee on Standards (TCoS) seed funding  
Project title: Enhancing the deployment of socially-compliant automated vehicles in mixed traffic ([website](#))

### *Ad-hoc Journal Reviewer Services*

- ✧ International Journal of Computer Vision (**IF: 19.5**; Top AI journal)
- ✧ IEEE Transactions on Intelligent Transportation Systems
- ✧ IEEE Open Journal of Intelligent Transportation Systems
- ✧ Transportation Letters: the International Journal of Transportation Research
- ✧ Journal of Intelligent Transportation Systems: Technology, Planning, and Operations
- ✧ Journal of Transportation Research Record: Journal of the Transportation Research Board
- ✧ International Journal of Human-Computer Interaction
- ✧ Journal of Advanced Transportation
- ✧ Applied Ergonomics
- ✧ European Transport Research Review
- ✧ ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering

### *Ad-hoc Conference Reviewer Services*

- ✧ IEEE Intelligent Vehicles Symposium (IV) | Associate editor
- ✧ IEEE Intelligent Transportation Systems Conference (ITSC)
- ✧ Transportation Research Board (TRB) Annual Meeting
- ✧ World Congress on Intelligent Control and Automation (WCICA)
- ✧ COTA International Conference of Transportation Professionals (CICTP)
- ✧ The International Symposium on Transport Network Resilience (INSTR)

## THESIS SUPERVISION

---

**Yuteng Zhang** | Master of Science in Transport, Infrastructure & Logistics Jan.2024-ongoing  
Thesis title: Coordinated Planning and Control for Connected and Automated Vehicles' On-ramp Merging in Mixed

**Cesar Flores Reyna** | Master of Science in Sustainable Mobility Transitions, EIT, TU/e Jan.2024-ongoing

Thesis title: Investigating a Benchmarking Framework for the Large-Scale Micro Simulator (LSMS) Platform in Freeways under Dynamic Speed Limits

**Mathijs den Otter** | Master of Science in Civil Engineering–Transport and Planning Sep.2022-Dec.2023

Thesis title: [Impact of Improved Lane Marking Properties on the Performance of Lane Keeping Assistance Systems in Varying Circumstances](#)

**Lanxin Zhang** | Master of Science in Civil Engineering–Transport and Planning Oct.2022-Jun.2023

Thesis title: [Semi-supervised Machine Learning for Abnormal Driving Behaviour Detection](#)

**Henan Yuan** | Bachelor in Traffic and Transportation, BJTU&TUDelft TTE Oct.2022-Jun.2023

Thesis title: Deep Reinforcement Learning for Driving through Roundabouts

**Shiva Nischal Lingam** | Master of Science in Civil Engineering–Transport and Planning Jan.2021-Nov.2021

Thesis title: [Effects of External Human Machine Interfaces on Automated Vehicles' Communicative Interactions With Human Drivers \(Cum Laude\)](#) | Won 2<sup>nd</sup> [Cuperusprijs prieze of KIVI](#)

**Sandeep Patil** | Master of Science in Mechanical Engineering (Vehicular Engineering) Oct.2020-Aug.2021

Thesis title: [Lane Detection using SpatioTemporal Attention](#)

**Eline van der Kooij** | Master of Science in Transport, Infrastructure & Logistics Jul.2020-May.2021

Thesis title: [Visibility of Lane Markings for Machine Vision](#)

**Sanny Toonen** | Bachelor of Science in Civil Engineering–Transport and Planning Jul.2020-May.2021

Thesis title: [Lane Recognition for Automated Vehicles](#)

## TEACHING ACTIVITIES

---

**Project supervisor, Instructor** | EEMCS, TU Delft Nov.2022-Feb.2024

Courses: [Interdisciplinary Advanced AI Project \(IFEEMCS520200\)](#); [Capstone Applied AI Project \(T13150TU\)](#)  
[Fundamentals of Artificial Intelligence Programme \(IFEEMCS520100\)](#)

**Teaching Assistant, Instructor** | TU Delft and BJTU joint bachelor program Mar.2022 & Mar.2023

Course: Advanced Lecture "Trends in Transportation" 2022 & 2023

**Lecturer** | DakeOffer online Platform Mar.2020-Jun.2020 & Nov.2020-Jan.2021

Course: Introduction to Big Data and Artificial Intelligence: Fundamental and Practice

**Teaching Assistant** | Transport and Planning, TU Delft Apr.2020-Aug.2020 & Apr.2021-Aug.2021

Course: [CIE5805 – Intelligent Vehicles for Safe and Efficient Traffic](#)

**Teaching Assistant** | Department of Automation, Tsinghua University Sep.2016-Jan.2017

Course: Data Ethics

**Teaching and Lab Assistant** | Electrical and Electronic Lab Center, Tsinghua University Mar.2015-Jul.2016

Courses: Advanced Labs in Electronic Technology, Fundamentals of Electronics Power Technology

**RSI Tutor** | Center for Excellence in Education, USA Jul.2017-Aug.2017

Research writing and presentation tutor for the 2017 Research Science Institute Program at Tsinghua University

**Undergraduate Counselor** (Class 2012) | School of EIE, Beijing Jiaotong University Jul.2012- Jul.2014

## TALKS & PRESENTATIONS

---

**Promoting Diversity and Leadership in ITS** | IEEE WiE/YP Workshop & Forum, Cairo, Egypt Nov.21.2023

Presentation topic: Resource Repository: Datasets, Simulation Platforms, and Relevant Publications for Emerging Mixed Traffic of Automated Vehicles and Human-driven Vehicles

**Automated Round Transportation** | TRB ARTS 2023, San Francisco, USA Jul.12.2023

Presentation topic: Social-aware Planning and Control for Automated Vehicles Based on Driving Risk Field and Model Predictive Contouring Control: Driving through Roundabouts as a Case Study



- AI Applications in Transportation Planning** | TRB 2023, Washington D.C., USA Jan.11.2023  
Presentation topics: (1) Robust Lane Detection through Self Pre-training with Masked Sequential Autoencoders and Fine-tuning with Customized PolyLoss  
(2) Sequential Neural Network Model with Spatial-Temporal Attention Mechanism for Robust Lane Detection Using Multi Continuous Image Frames
- Research into Urban Rail Transit Operations and Design** | TRB 2023, Washington D.C., USA Jan.11.2023  
Presentation topic: Optimization of coordinated flow restriction and skip-stopping schemes for urban rail stations considering platform carrying capacity
- Connected and Automated Vehicles** | MFTS 2022, Dresden, Germany Dec.01.2022  
Presentation topic: Towards Developing Socially-Compliant Automated Vehicles: State of the Practice, Experts Expectations, and a Conceptual Framework
- Automated mobility** | IEEE ITSS Young Professionals Fellowship Symposium, Chania, Greece Nov.25.2022  
Presentation topic: Multi-goal proactive traffic management for mixed traffic of automated vehicles (AVs) and human-driven vehicles (HDVs) using explainable physics-informed Artificial Intelligence
- AI, Security, Privacy and Safety Systems in ITS Applications** | ITSC2022, Macow, China Oct.08.2022  
Presentation topic: Comparative Study on Supervised vs Semi-supervised ML for Anomaly Detection of CAN Network
- Research on AI and Advancing Computing Applications** | TRB 2022, Washington D.C., USA Jan.12.2022  
Presentation topic: A Hybrid Spatial-temporal Sequence-to-one Neural Network Model for Lane Detection
- Challenges of Automated Vehicles and Traffic** | University of Győr, Hungary May.28.2021  
Talk topic: Deep learning for automated vehicles' operational design domain: problems, challenges, and case studies
- SAMEN User Committee Annual Meeting** | Dutch Research Council (NWO), Delft, Netherlands Jan.28.2021  
Talk topic: Data-driven research for automated vehicles' operational design domain: a case study on perception
- Intelligence, Connectivity, and Mobility** | COTA CICTP 2018, Tsinghua University, China Jul.07.2018  
Presentation topic: Revealing travel patterns of sharing-bikes in a spatial-temporal manner using the NFM method
- World Congress on Intelligent Control and Automation** | IEEE WCICA 2016, Guilin, China Jun.12.2016  
Presentation topic: Revealing New York Taxi Drivers' Operation Patterns Focusing on the Revenue Aspect

## HONORS & AWARDS

---

- [Chinese CSC Award for Outstanding Self-financed Students Abroad \(6,000 \\$\)](#)
- TU Delft-Transport Institute Interdisciplinary Research Award (10,500 €)
- 2023 IEEE TAB Committee on Standards (TCoS) seed funding (6,000 \$)
- 2024 IEEE ITSS New Initiatives Proposal Funding (5,000 \$)
- IEEE ITSS Young Professionals Fellowship (Twice)
- Erasmus + mobility Grants (Three times)
- Outstanding College Graduates of Beijing (Top 1‰)
- National Scholarship (Top 1%)
- First Class Tsinghua University RONG Scholarship
- Second-Class Merit Scholarship for Masters Tsinghua University
- Merit Student (Four times)
- First-Class Academic Fellowship (Top 1%, Twice)
- Second Prize in the 2012 & 2013 Undergraduate Electronic Design Contest in Beijing
- Bronze award in “Challenge Cup” Entrepreneurship Design Contest in Beijing
- First Prize in Freescale Cup University Students Intelligent Car Race (Rank 2<sup>nd</sup>)
- Second Prize in the Physical Experiment Competition in Beijing
- 2019 Microsoft Discover AI Challenge: *Sustainable Life* | [Data-Driven All-in-one Shared Mobility](#) | Top (10%)

## RESEARCH EXPERIENCE

---

- AI & Automated Mobility group** | Institute of Highway Engineering | **RWTH Aachen University** Jun.2024-Present
- **AI-Enhanced Hierarchical Multi-objects Driving Risk Field Model Integrating Physics-Based and Human Perception-Based Approaches with Drivers' Distraction**
  - **Explainable Mathematics-Enhanced AI Model for Multi-Modal Urban Traffic Prediction and Simulation**
  - **Realistic Modelling of Cycling Behaviour and Interaction with Other Road Users in Mixed Traffic**
- Traffic and Transportation Safety Lab** | Department of Transport and Planning | **TU Delft** Dec.2019-Jun.2024
- **Data-driven and AI-based research for expanding Automated Vehicles' Operational Design Domain in mixed traffic (part of [SAMEN](#) project)**
    - Developed a hybrid sequence-to-one model for lane detection in extremely-hard driving scenes
    - Incorporated spatial-temporal attention for automated vehicles' perception
    - Designed reliable data-driven algorithms for peculiarities identification, recognition, and prediction
    - Implemented Deep Reinforcement Learning (DRL) models for safe, reliable, and socially-compliant automated driving under challenging manoeuvres involving both longitudinal and lateral control
    - Gaze behaviour of road users when interacting with an automated vehicle at an intersection
- Mechanical Systems Control ([MSC](#)) Lab** | Department of Mechanical Engineering | **UC Berkeley** May.2023-Oct.2023  
**Advisor:** Prof. [Masayoshi Tomizuka](#)
- **Socially Compliant Automated Driving via Deep Reinforcement Learning and Model-based Social-aware MPC**
    - Reviewed State-of-the-art Socially Compliant Automated Driving Methods in Literature
    - Developed Model-enhance Multi-agent Deep Reinforcement Learning with Social-aware MPC
- Waterloo Artificial Intelligence Institute** | Faculty of Engineering | **University of Waterloo** May.2018-Sep.2019
- **Applied Machine Learning, Artificial Intelligence, and Big Data Research**
    - The 2018 Railroad Problem Solving Contest: Use CNN-LSTM-Dense Concatenated model to forecast train delays
    - A Deep Learning Framework for Traffic Forecasting: Exploring GCN joint with LSTM to predict traffic flow
    - Data-driven anomaly/fraud detection (Unsupervised): Auto-Encoder, Hierarchical Extreme Learning Machines
    - Kaggle Competition: Employ LSTM, LightGBM and XGBoost models to predict stock movements with news data
    - Deep reinforcement learning in traffic control: DQN, A3C, and PPO methods
    - Real-time Road Surface Condition Monitoring: Adopt Convolutional Neural Network to RSC image classification
- Singapore-MIT Alliance for Research and Technology (SMART)** Aug.2016-Sep.2016  
**Future Urban Mobility (FM) IRG** | **Project:** *SimMobility* | **Topic:** Taxi Roaming  
**Advisors:** Prof. [Moshe BEN-AKIVA](#), Postdoctoral Associate [Bat-hen NAHMIAS-BIRAN](#)
- **Constructing a model tackling the taxi roaming (taxi service) problem, to be embedded into the *SimMobility* platform**
    - Proposed one advisable solution of cruising along hotspots through a cell-based logit-opportunity model improved by a data-driven method
    - Participated in building the architecture of the final model embedded in *SimMobility*
- Intelligent Transportation Laboratory, Tsinghua National Laboratory for Information Science and Technology (TNList)** | **Advisors:** Prof. [Zuo Zhang](#) and Prof. [Li Li](#) (*IEEE Fellow*) Sep.2014-May.2018  
*Transportation Research based on machine learning and data-driven methods*
- **Revealing New York taxi drivers' operation patterns focusing on revenue**
    - Developed a method for classifying drivers into 3 groups based on their revenue: top, ordinary, low earner
    - Excavated the population operation patterns of different taxi driver groups through big data analytics

- **Influence of on-demand ridesourcing versus traditional taxi based on machine learning and big data analytics**
  - Uncovered the differences between taxi service and ridesourcing using big data analyzing and clustering methods
  - Applied non-negative matrix factorization (NMF) to obtain basis patterns of Taxi, Hitch and Express service
- **Influence of on-demand ridesourcing on vehicle emissions with big data analytics and PHEM model**
- **Fundamental research on intelligent parking guidance and recommendations based on machine learning**
  - Forecast models of travel time to parking lots (*Random Forest*); Guidance and optimization models for parking
  - Personalized recommendation research on parking (Collaborative Filtering and Content-based algorithm)
- **Study on key technology in Intelligent Vehicle Infrastructure Cooperative Systems (IVICS) (863 Program)**
  - Contributed to the design report of basic technical framework and the overall demonstration of IVICS in China

**The Freescale Cup College Students Intelligent Car Race: Intelligent car that can follow specific trajectories based on image processing, pattern recognition, and PID controller** Jun.2012-Jun.2013

- **Hardware Aspect:** Designed the signal acquisition circuit as well as the core control circuit based on MC9S12XS256
- **Software Aspect:** Developed a specific control strategy and algorithm for the intelligent car to follow a given trajectory
- **Actuator:** Customized specific steering linkage and applied different PID algorithms to control diversion and speed

## WORKING EXPERIENCE

---

**Junior Research Group Leader** | AI & Automated Mobility Group | **RWTH Aachen University** Jun.2024-Present

- **Research** proposal initialization, preparation, and writing: German Research Foundation ([DFG](#)) and [mFUND](#)
- **Co-PI:** main responder and drafter for 3 DFG research proposals
- **Lead** the group and supervise the PhD/MSc students
- **Teaching** support for *Road Planning II* and *Machine Learning in Civil Engineering* (master's level)

**Research Assistant** | Transport Big Data Analytics | **ITS Lab, TNList@Tsinghua University** Aug.2017- May.2018

- Cross-domain data fusion for full-time trip chain reconstruction and anomaly detection;
- City Computing: Applying NMF methods to evaluate indicators describing urban function, land use, mobility, etc.
- Revealing collective travel patterns of *Shared Mobility* in a spatial-temporal manner

**Carryout service data analysis Project Manager** | Beijing Gooagoo Technical Service Co., Ltd. Jul.2016-Aug.2016

- Integral process of Big Data Analytics: Crawled carryout service data using Python crawler; executed data storage, data analysis, and data processing in a relational database (MySQL); visualization, clustering, and web application

**Commentator** | China International Congress on Intelligent & Connected Vehicles (CICV) Oct.2015-Oct.2015

- Introduced the i-VICS systems to audiences; received executives from automobile manufacturers BMW, Volvo, VW

**Test Engineer Assistant** | China Unicom southern district IPv6 renovation project, MIIT CTTL Nov.2013-Dec.2013

- Tested all kinds of typical applications on the Internet under the IPv6 environment

**Research Intern** | Broadband Network & Digital Media: Qionghai Dai's Lab, Tsinghua University Jul.2013-Aug.2013

- Review of technical investigation for controlling waves in space and time for imaging and focusing in complex media

## LEADERSHIP & VOLUNTEER EXPERIENCE

---

**Webmaster** | **Traffic and Transportation Safety (TTS) Lab Website, TU Delft** Mar.2020-June.2024

- Responsible and volunteering for the [TTS Lab website](#) development and maintenance

**Project Leader** | **Asian Youth Center:** Leadership Development Training Program for Masters Jul.2015-Aug.2016

- Responsible for activities and competitions between overseas and Chinese students in the Asian Youth Center project
- **Volunteer Leader** in the 5<sup>th</sup> Joint School Symposium for the Asian Youth Center Project

**iTalk Group Leader** | International Department, Tsinghua University Postgraduate Association Oct.2014-Oct.2015

- Committed to speech in English given by students or alumni stars, held a special performance for overseas students

**Volunteer** | National Doctor Forum on Traffic and Transportation Engineering, Beijing Jiaotong University Jun.2011



## SKILLS & MISCELLANEOUS

---

- ✦ Programming: Python (Tensorflow, PyTorch, Keras), Matlab, R, C/C++, Java, VHDL | Database: MySQL
- ✦ [Deep Learning](#), [Deep Reinforcement Learning](#)
- ✦ Hardware circuit design: Altium Designer | Software development on Linux and Windows
- ✦ Big data analytics and visualization methods | Cross-domain Data Fusion | Data-driven anomaly/fraud detection
- ✦ Languages: Chinese (Native); English (Professional); **Dutch** (Elementary)
- ✦ Hobbies: **Tai Chi**, **Meditation**, **Kung Fu**, Yoga, Chess, Reading, Mountain climbing