

# Yongqi Dong



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

Research Group Leader and Senior PostDoc Researcher (TV-L E-14.2) @ RWTH Aachen University

Guest Scholar @ Delft University of Technology

Chair of IEEE ITSS Technical Committee on [Automated Mobility in Mixed Traffic](#)

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## EDUCATIONAL BACKGROUND

Doctor of Philosophy, Department of Transport & Planning, **Delft University of Technology (TU Delft)** Jan.2020-May.2025

**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](#)

Visiting PhD Researcher, Department of Mechanical Engineering, **University of California, Berkeley** May.2023-Oct.2023

*Topic: Towards Socially Compliant Automated Driving Modelling and Conceptual Design*

**Advisor:** Prof. [Masayoshi Tomizuka](#) (Life Fellow of [IEEE](#) and [ASME](#); Fellow of the [IFAC](#))

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's Thesis Dissertation*

**Advisors:** Prof. [Li Li](#) (IEEE Fellow) 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*

## PUBLICATIONS

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

### Key Journal Publications:

- 1. Dong, Y., Farah, H., & Van Arem, B. (2025). Towards Developing Socially-Compliant Automated Vehicles: Advances, Expert Insights, and a Conceptual Framework. *Communications in Transportation Research*, 5, 1-23. <https://doi.org/10.1016/j.commtr.2025.100207> [Top Q1, IF: 14.5, SJR: 2.836, CiteScore: 19.9]. Accepted by 104th TRB Annual Meeting (TRB 2025) for presentation, and presented at the 4th Symposium on Management of Future Motorway and Urban Traffic Systems (MFTS), [Preprint](#)
- 2. 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: 9.1, SJR: 2.972, CiteScore: 17.4]
- 3. Dong, Y., Wang, S., 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: 7.9, SJR: 2.86, CiteScore: 15.9]
- 4. 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*, 24(12), 14121-14132. <https://doi.org/10.1109/TITS.2023.3305015> (Joint first author and corresponding author) [Top Q1, IF: 8.4, SJR: 2.58, CiteScore: 17.8]
- 5. Dong, Y.<sup>\*,\*</sup>, Zhang, L.<sup>#</sup>, Farah, H., Zgonnikov, A., & Van Arem, B. (2025). Data-driven Semi-supervised Machine Learning with Safety Indicators for Abnormal Driving Behavior Detection. *Transportation Research Record: Journal of the Transportation Research Board*, 2679(5), 319-334. <https://doi.org/10.1177/03611981241306752>

- 6. **Dong, Y.<sup>#,\*</sup>**, Lu, X.<sup>#</sup>, Li, R., Song, W., Van Arem, B., & Farah, H. (2025). Intelligent Anomaly Detection for Lane Rendering Using Transformer with Self-Supervised Pre-Training and Customized Fine-Tuning. *Transportation Research Record: Journal of the Transportation Research Board*, 2679(8), 233-248. <https://doi.org/10.1177/03611981251333341> (accepted by and presented at [TRB2024](#))
- 7. 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*, 24(6), 6558-6574. <https://doi.org/10.1109/TITS.2022.3200176> [Top Q1, IF:8.4, SJR:2.58, CiteScore: 17.8]
- 8. Berge, S. H., De Winter, J., Dodou, D., Afghari, A. P., Papadimitriou, E., Reddy, N., **Dong, Y.**, Raju, N., & Farah, H. (2025). Understanding Cyclists' Perception of Driverless Vehicles through Eye-Tracking and Interviews. *Transportation Research Part F: Traffic Psychology and Behaviour*, 109, 399-420. <https://doi.org/10.1016/j.trf.2024.11.015> [Top Q1, IF:4.4, SJR:1.262, CiteScore: 7.0]
- 9. Liu, W., Song, L., **Dong, Y.**, Zhang, X., & Xu, L. (2025). Unified Model Predictive Control Method of Automated Vehicles for Lane Changing and Lane Keeping Maneuvers. *Journal of Intelligent Transportation Systems*, 1-21. <https://doi.org/10.1080/15472450.2025.2479235>

#### **Key Conference Proceeding Publications & Presentations:**

- 1. Huang, Y.<sup>#</sup>, **Dong, Y.<sup>#,\*</sup>**, Tang, Y.<sup>\*</sup>, & García-Hernandez, A. (2025). A Self-Supervised Transformer for Unusable Shared Bike Detection. **Accepted** by the 2025 *IEEE International Conference on Intelligent Transportation Systems (ITSC 2025)*, [Preprint](#)
- 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. *2024 IEEE 27th International Conference on Intelligent Transportation Systems (ITSC)*, Edmonton, AB, Canada, 2024, pp. 1569-1575. <http://dx.doi.org/10.1109/ITSC58415.2024.10919561>
- 3. 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](#)
- 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/ejtir.2024.24.2.7273> [Journal]
- 2. 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 28th International Conference of Hong Kong Society For Transportation Studies \(HKSTS 2024\)](#) and the [Conference in Emerging Technologies in Transportation Systems \(TRC-30\)](#) for presentation, [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*, 2676(7), 128-143. <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 in Chinese]

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

- 1. Patil, S.<sup>#</sup>, **Dong, Y.<sup>\*,#</sup>**, Farah, H., & Hellendoorn, J. (2025). Efficient Sequential Neural Network based on Spatial-Temporal Attention and Linear LSTM for Robust Lane Detection Using Multi-frame Images. (Joint first author and corresponding author, **Under Review** by *IEEE Transactions on Intelligent Vehicles*), [Preprint](#)
- 2. **Dong, Y.**, Saadeh, B., Kemper, D., & García-Hernandez, A. (2025). Developing Socially Compliant Automated Vehicles in Mixed Traffic: Findings from A Questionnaire Survey. *To be submitted to Transportation Research Part F: Traffic Psychology and Behaviour*.
- 3. **Dong, Y.<sup>\*,#</sup>**, Reyna, C.F.<sup>#</sup>, Klunder, G., Liao, F., & Rasouli, S. (2025). Benchmarking Emerging and Established Traffic Microsimulation Platforms for Dynamic Speed Limit Applications: A Comparative Study on Dutch Motorways. (Joint first author, corresponding author, abstract **accepted** by the *29th International Conference of Hong Kong Society for Transportation Studies*, to be submitted to *Transportation Research Part C: Emerging Technologies*)
- 4. Ji, J.<sup>#</sup>, Lu, R.<sup>#</sup>, Belkessa, L., **Dong, Y.**, Wang, L., Madadi, B., Varotto, S., Saunier, N., MacFarlane, G., & Wu, C. (2025). Exploring Artifacts Availability in Transportation Research Using Large Language Models. **Accepted** by the *2025 Transportation Research Symposium (TRS)* (**presented**), the *2025 International Symposium on Transportation Data & Modelling (ISTDM)*, and the *2025 Modelling Mobility Conference (MoMo)* for presentation; to be submitted to *Transportation Research Part C: Emerging Technologies*.
- 5. Huang, Y., **Dong, Y.<sup>\*</sup>**, Tang, Y., & Li, L. (2025). Parking Availability Prediction via Fusing Multi-Source Data with A

Self-Supervised Spatio-Temporal Inverted Transformer. (*Under Review by Transportation Research Part E: Logistics and Transportation Review*) [Preprint](#)

- 6. Zhang, Y., **Dong, Y.\*** (2025). 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 Journal of Public Transportation**). [TRBAM-23-04413 poster](#), [Preprint](#)
- 7. Zhang, Y., **Dong, Y.\***, Evans, C., Rinaldi, M., Shyrokau, B., & Farah, H. (2025). Cooperative Planning and Control for Connected and Automated Vehicles' On-ramp Merging in Mixed Traffic via Value Decomposition-based Multiagent Deep Reinforcement Learning. (Abstract **accepted** by the *29th International Conference of Hong Kong Society for Transportation Studies, to be submitted to Transportation Research Part C: Emerging Technologies*)
- 8. [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 AVs and HDVs](#)
- List of open datasets and codes: <https://data.4tu.nl/search?search=Yongqi+Dong>

## PATENTS & SOFTWARE COPYRIGHTS

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#### ✧ *European and Dutch Patent:*

- **Dong, Y., & Li, R.** (2024). Automated Lane Detection (Dutch Patent No. [NL2033551](#)). Netherlands: Netherlands Patent Office.
- **Dong, Y., Zhang, L., Farah, H., & Van Arem, B.** (2025). Socially-compliant Automated Driving in Mixed Traffic (Dutch Patent No. [NL2035943](#)). Netherlands: Netherlands Patent Office.

#### ✧ *Chinese Invention Patent:*

- Ruan, H., **Dong, Y.**, Wang, W., & Wang, F. (2016). Intelligent Demonstration Instrument of Simple Harmonic Oscillation Composition and Five Polarization States of Light (Chinese Patent No. [CN103236211B](#)). China: China National Intellectual Property Administration.

#### ✧ *Software copyright:*

- Spatial-Temporal Attention Integrated Sequential Neural Network Model for Vision-based Robust Lane Detection ([i-DEPOT 142731](#), **approved & registered**)
- Vision-Based Lane Detection System with Self-supervised Pre-training Through Masked Sequential Auto-encoders (Computer Software Copyright Registration in China, 2024SR1350911, **approved & registered**)

## ACADEMIC SERVICES

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<b>Guest Editor (Special Issue)</b>   IEEE Transactions on Intelligent Transportation Systems	Sep.2025-Present
Special Issue in IEEE Transactions on Intelligent Transportation Systems: <i>AI-Empowered Automated Driving in Mixed Traffic: From Sensing, Perception, to Planning and Control</i>	
<b>Ambassador</b>   IEEE Western European Students and Young Professionals (WESYP) 2025	Jul.2025-Present
<b>Technical Committee (Chair)</b>   <a href="#">Automated Mobility in Mixed Traffic   IEEE ITSS</a>	Mar.2025-Present
Establishing and chairing the interdisciplinary community: " <a href="#">Automated Mobility in Mixed Traffic</a> "	
<b>IEEE ITSS New Initiatives Project Principal Investigator (PI)</b>   IEEE ITSS	Mar.2024-Mar.2025
Project: <i>Promoting interdisciplinary research toward the deployment of automated vehicles in mixed traffic</i>	
<b>Workshop Organizer (Primary coordinator)</b>   28 <sup>th</sup> IEEE ITSC 2025, Gold Coast, Australia	Sep.24, 2024
Workshop title: <a href="#">Automated Mobility in Mixed Traffic: Emerging Mixed Autonomy in the Era of AI</a>	
<b>Workshop Organizer (Primary coordinator)</b>   27 <sup>th</sup> IEEE ITSC 2024, Edmonton, Canada	Sep.24, 2024
Workshop title: <a href="#">Automated Mobility in Emerging Mixed Traffic</a>	
<b>Workshop Organizer (Second coordinator )</b>   26 <sup>th</sup> IEEE ITSC 2023, Bilbao, Bizkaia, Spain	Sep.24, 2023
Workshop title: <a href="#">Data-driven and Empirical Research for Emerging Mixed Traffic of Automated Vehicles and Human-driven Vehicles</a>	

Workshop title: [Development of Socially-compliant Driving Behavior 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)
- Pattern Recognition   ➤ Accident Analysis & Prevention   ➤ IEEE Intelligent Transportation Systems Magazine
- IEEE Transactions on Intelligent Transportation Systems
- IEEE Open Journal of Intelligent Transportation Systems
- Transportation Research Part C: Emerging Technologies
- 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   ➤ IET Intelligent Transport Systems
- Scientific Reports   ➤ Applied Ergonomics   ➤ Discover Artificial Intelligence
- Signal, Image and Video Processing   ➤ European Transport Research Review
- Engineering Applications of Artificial Intelligence   ➤ Archives of Computational Methods in Engineering
- International Journal of Computational Intelligence Systems
- 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

<b>Bashar Saadeh</b>   MSc. in Traffic Engineering and Mobility, RWTH Aachen University	Nov.2024-Jul.2025
Thesis title: Developing socially compliant automated vehicles in mixed traffic: Insights from questionnaire-based survey	
<b>Yuteng Zhang</b>   Master of Science in Transport, Infrastructure & Logistics, TU Delft	Jan.2024-Nov.2024
Thesis title: <a href="#">Coordinated Planning and Control for Connected and Automated Vehicles' On-ramp Merging in Mixed Traffic Through Value Decomposition-based Multiagent Deep Reinforcement Learning</a>	
<b>Cesar Flores Reyna</b>   MSc. in Sustainable Mobility Transitions, EIT, TU/Eindhoven	Jan.2024-Nov.2024
Thesis title: Investigating a Benchmarking Framework for the Large-Scale Micro Simulator (LSMS) Platform in Freeways under Dynamic Speed Limits	
<b>Mathijs den Otter</b>   MSc. in Civil Engineering–Transport and Planning, TU Delft	Sep.2022-Dec.2023
Thesis title: <a href="#">Impact of Improved Lane Marking Properties on the Performance of Lane Keeping Assistance Systems in Varying Circumstances</a>	
<b>Lanxin Zhang</b>   MSc. in Civil Engineering–Transport and Planning, TU Delft	Oct.2022-Jun.2023
Thesis title: <a href="#">Semi-supervised Machine Learning for Abnormal Driving Behavior Detection</a>	
<b>Henan Yuan</b>   Bachelor in Traffic and Transportation, BJTU & TUDelft TTE	Oct.2022-Jun.2023
Thesis title: Deep Reinforcement Learning for Driving through Roundabouts	
<b>Shiva Nischal Lingam</b>   MSc. in Civil Engineering–Transport and Planning, TU Delft	Jan.2021-Nov.2021
Thesis title: <a href="#">Effects of External Human Machine Interfaces on Automated Vehicles' Communicative</a>	



<b>Sandeep Patil</b>   MSc. in Mechanical Engineering (Vehicular Engineering), TU Delft	Oct.2020-Aug.2021
Thesis title: <a href="#">Lane Detection using SpatioTemporal Attention</a>	
<b>Eline van der Kooij</b>   MSc. in Transport, Infrastructure & Logistics, TU Delft	Jul.2020-May.2021
Thesis title: <a href="#">Visibility of Lane Markings for Machine Vision</a>	
<b>Sanny Toonen</b>   Bachelor of Science in Civil Engineering-Transport and Planning, TU Delft	Jul.2020-May.2021
Thesis title: <a href="#">Lane Recognition for Automated Vehicles</a>	

## TEACHING ACTIVITIES

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<b>Project supervisor, Instructor</b>   EEMCS, TU Delft	Nov.2022-Feb.2024
Courses: <a href="#">Advanced Interdisciplinary AI Project (AI2P) (IFEEMCS520201)</a> ; <a href="#">Capstone Applied AI Project (T13150TU)</a> <a href="#">Fundamentals of Artificial Intelligence Programme (IFEEMCS520100)</a> ; <a href="#">Computational Intelligence (CSE2530)</a>	
<b>Teaching Assistant, Instructor</b>   TU Delft and BJTU joint bachelor program	Mar.2022 & Mar.2023
Course: Advanced Lecture "Trends in Transportation" 2022 & 2023	
<b>Lecturer</b>   DakeOffer online Platform	Mar.2020-Jun.2020 & Nov.2020-Jan.2021
Course: Introduction to Big Data and Artificial Intelligence: Fundamentals and Practice	
<b>Teaching Assistant</b>   Transport and Planning, TU Delft	Apr.2020-Aug.2020 & Apr.2021-Aug.2021
Course: <a href="#">CIE5805 – Intelligent Vehicles for Safe and Efficient Traffic</a>	
<b>Teaching Assistant</b>   Department of Automation, Tsinghua University	Sep.2016-Jan.2017
Course: Data Ethics	
<b>Teaching and Lab Assistant</b>   Electrical and Electronic Lab Center, Tsinghua University	Mar.2015-Jul.2016
Courses: Advanced Labs in Electronic Technology, Fundamentals of Electronics Power Technology	
<b>RSI Tutor</b>   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	
<b>Undergraduate Counselor</b> (Class 2012)   School of EIE, Beijing Jiaotong University	Jul.2012-Jul.2014

## TALKS & PRESENTATIONS

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<b>Human-Inspired Interactive Autonomous Driving</b>   IEEE ITSC 2024, Edmonton, Canada	Sep.26.2024
Presentation topic: Towards Understanding Worldwide Cross-cultural Differences in Implicit Driving Cues	
<b>Promoting Diversity and Leadership in ITS</b>   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	
<b>Automated Round Transportation</b>   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	
<b>AI Applications in Transportation Planning</b>   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	
<b>Research into Urban Rail Transit Operations and Design</b>   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	
<b>Connected and Automated Vehicles</b>   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	
<b>Automated mobility</b>   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

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- ❖ [Chinese CSC Award for Outstanding Self-financed Students Abroad \(6,000 \\$\)](#)
- ❖ 2025 Entrepreneurs Next Star & Million Prize Global Challenge (German AI+ Deep-Tech) Third Price (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 (Twice)
- ❖ Outstanding College Graduates of Beijing (Top 1‰)
- ❖ National Scholarship (Top 1‰)
- ❖ First Class Tsinghua University RONG Scholarship
- ❖ Second-Class Merit Scholarship for Master's Students at 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 the "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

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**AI & Automated Mobility Group** | Institute of Highway Engineering | **RWTH Aachen University** Jun.2024-Present

- **AIMo-D<sup>2</sup>RF: AI-Enhanced Hierarchical Multi-Objects Driving Risk Field Model** --- Integrating Physics-Based and Human Perception-Based Approaches with Drivers' Distraction Consideration (PI, [Individual DFG](#))
- **Explainable Mathematics-Enhanced AI Model for Multi-Modal Urban Traffic Prediction and Simulation** (Co-PI and coordinator, [DFG Research Unit Proposal](#))
- **CycleVLA: VR-Enhanced Explainable Vision–Language–Action Models for Safe, Efficient, and Human-Like Cycling Navigation in Urban Mixed Traffic** (PI and coordinator, [DFG Package Proposal](#))
- **Parameter-Efficient Fine-Tuning of Pretrained Multimodal Large Vision Model (LVM) for Privacy-Preserving Traffic Anomaly Detection with Thermal Imaging**
- **Digital Twin for Cycling Interaction in Mixed Traffic: A Multi-Sensor Data Fusion and VR Simulation Approach with CycleScene Benchmark** (PI, [mFUND Proposal](#))

✦ **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 difficult driving scenes
- Incorporated spatial-temporal attention for automated vehicles' perception
- Designed reliable data-driven algorithms for anomaly and abnormal behavior prediction
- Implemented Deep Reinforcement Learning (DRL) models for safe, reliable, and socially compliant automated driving under challenging maneuvers involving both longitudinal and lateral control
- Gaze behavior of road users when interacting with an automated vehicle at an intersection: *Understanding cyclists' perception of driverless vehicles through eye-tracking and interviews*

**Mechanical Systems Control ([MSC](#)) Lab** | Department of Mechanical Engineering | UC Berkeley May.2023-Oct.2023

**Advisor:** Prof. [Masayoshi Tomizuka](#) (Life Fellow of [IEEE](#) and [ASME](#); Fellow of the [IFAC](#))

✦ **Socially Compliant Automated Driving through DRL and Model-based Social-aware MPC**

- Reviewed state-of-the-art socially compliant automated driving methods in the literature
- Developed model-enhanced multi-agent deep reinforcement learning

**Waterloo Artificial Intelligence Institute** | Faculty of Engineering | University of Waterloo

May.2018-Sep.2019

✦ **Applied Machine Learning, Artificial Intelligence, and Big Data Research**

- 2018 Railroad Problem Solving Contest: Exploring deep learning to forecast train delays
- A Deep Learning Framework for Traffic Forecasting: Exploring GCN joint with LSTM to predict traffic flow
- Data-driven Anomaly Detection (Unsupervised): Auto-Encoder, Hierarchical Extreme Learning Machines
- Kaggle Competition: Employ LSTM, LightGBM, and XGBoost to predict stock movements with news data
- Deep Reinforcement Learning for Car Racing Control in Simulation: DQN, A3C, and PPO

**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](#) (Member of [National Academy of Engineering](#)), Dr. [Bat-hen NAHMIAS-BIRAN](#)

✦ **Constructing a model tackling the taxi roaming (taxi service) problem, embedded into *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 ride-sourcing vs. traditional taxi based on machine learning and big data analytics**

- Uncovered the differences between taxi service and ride-sourcing using big data analysis and clustering
- Applied non-negative matrix factorization (NMF) to obtain basis patterns of Taxi, Hitch, and Express service

✦ **Influence of on-demand ride-sourcing 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 & 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 the basic technical framework and the overall demonstration of IVICS



- 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 and the core control circuit based on MC9S12XS256
  - **Software Aspect:** Developed specific control strategies/algorithms for intelligent cars to follow given trajectories
  - **Actuator:** Customized specific steering linkage, applied and tuned PID algorithms to control diversion and speed

## WORKING EXPERIENCE

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- 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 and coordinator:** main responder and drafter for **three** 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)
- PhD Researcher** | [TTS Lab](#) | Department of Transport & Planning | **TU Delft** Dec.2019-Jun.2024
- Carried out PhD research work under the Dutch Research Council (NWO) funded [SAMEN](#) project
  - Provided teaching assistance and evaluation support for various courses and supervised seven MSc students
  - Published scientific papers and patents, presented research works at conferences, and organized workshops
- Visiting PhD Researcher** | [MSC Lab](#) | Department of Mechanical Engineering | **UC Berkeley** May.2023-Oct.2023
- Carried out the literature review and research work related to Socially Compliant Automated Driving
- Research Assistant** | Waterloo Artificial Intelligence Institute | **University of Waterloo** May.2018-Sep.2019
- Carried out research work related to applied Machine Learning, Artificial Intelligence, and Big Data in Transportation
- Research Assistant** | Transport Data Analyst | **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
- Data Analyst & 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

## LEADERSHIP & VOLUNTEER EXPERIENCE

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

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- Programming: Python (PyTorch, TensorFlow, Keras), Matlab, R, C/C++, Java, VHDL | Database: MySQL
- AI Certificates: [Deep Learning](#), [Deep Reinforcement Learning](#), [TRAIL Research School Diploma](#)
- 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, Kung Fu, Meditation, Yoga, Chess, Reading, Mountain Hiking**