

# Yongqi Dong

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

Ph.D. Researcher | Delft University of Technology

Email: [yongqidong@berkeley.edu](mailto:yongqidong@berkeley.edu) | TEL: (+31) 0616619399 / (+1) 5109711107

## EDUCATIONAL BACKGROUND

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- Visiting Scholar, Department of Mechanical Engineering, **University of California, Berkeley** May.2023- Oct.2023  
Socially Compliant Automated Driving via Integrating Deep Reinforcement Learning and Model-based Social-aware MPC
- Ph.D. Researcher, Department of Transport and Planning, **Delft University of Technology (TU Delft)** Dec.2019-Present  
**Thesis:** Expanding the Operational Design Domain of Automated Vehicles in Mixed Traffic with Artificial Intelligence  
(*Safe, Efficient, and Socially Compliant Automated Driving: Sensing, Planning, and Control*)
- 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*
- 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 and communication unit for the WMN based locomotive remote control  
*Outstanding Undergraduate Thesis*

## PUBLICATIONS & PATENTS

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- **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> [Q1, IF:11.775, SJR:2.773]
- **Dong, Y.**, van Arem, B., & Farah, H. (2023). Safe and Socially-compliant Automated Driving through Integrating Deep Reinforcement Learning with SVO and MPCC (In preparation, to be submitted to *the Proceedings of the National Academy of Sciences, PNAS*)
- **Dong, Y.**, Farah, H., & van Arem, B. (2023). Towards Developing Socially-Compliant Automated Vehicles: State of the Practice, Experts Expectations, and a Conceptual Framework (**Accepted** by the 4th Symposium on Management of Future Motorway and Urban Traffic Systems 2022 (MFTS2022), to be submitted to *Journal of Transport Reviews*).
- 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*, doi: <https://doi.org/10.1109/TITS.2023.3305015>. (Joint first author and corresponding author)
- Patil, S.<sup>#</sup>, **Dong, Y.**<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 (Joint first author and corresponding author, *Journal of Transportation Research Part C: Emerging Technologies, Under Review*), [Preprint](#)
- Zhang, L.<sup>#</sup>, & **Dong, Y.**<sup>\*,#</sup>. (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 (Co-first author,

Corresponding author, **accepted** by 2023 *IEEE International Conference on Systems, Man, and Cybernetics* (2023 SMC), accepted and presented at TRB's 2023 Automated Road Transportation Symposium), [Demo video](#)

- ✦ **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 (Hierarchical Extreme Learning Machine based Semi-supervised Learning for Fault Detection) (Joint first author and corresponding author, **accepted** by 2023 IEEE International Conference on Systems, Man, and Cybernetics (2023 SMC)), [Preprint](#)
- ✦ Lingam, N., de Winter, J., **Dong, Y.**, Tsapi, A., van Arem, B., & Farah, H. (2023). eHMI on the vehicle or just a traffic light? A driving simulator study (Journal of *Accident Analysis & Prevention*, **Under Review**), [Preprint](#)
- ✦ **Dong, Y.<sup>\*,</sup>** Lu, X.<sup>#</sup>, Li, R., & Song, W. (2023). Intelligent Anomaly Detection for Lane Rendering Using Transformer with Self-Supervised Pre-Training and Customized Fine-Tuning (**Accepted** by the 23<sup>rd</sup> COTA International Conference of Transportation Professionals, CICTP 2023, **accepted** by [TRB2024](#) and **under second-round review** by *Transportation Research Record: Journal of the Transportation Research Board*, **minor revision**), [Preprint](#)
- ✦ 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 (Co-first author, **accepted** by the IEEE 26<sup>th</sup> International Conference on Intelligent Transportation Systems, (ITSC 2023)), [Preprint](#)
- ✦ 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 (Co-first author, **accepted** by the IEEE 26<sup>th</sup> International Conference on Intelligent Transportation Systems, (ITSC 2023)), [Preprint](#)
- ✦ **Dong, Y.<sup>\*,</sup>** Li, R.<sup>#</sup>, Farah, H. (2023). Robust Lane Detection through Self Pre-training with Masked Sequential Autoencoders and Fine-tuning with Customized PolyLoss (**Presented** at the Transportation Research Board (TRB) 102<sup>nd</sup> annual meeting TRB 2023). [TRBAM-23-02979 poster](#), [Preprint](#)
- ✦ 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](#)
- ✦ **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](#)
- ✦ 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 *IEEE Transactions on Intelligent Vehicles*)
- ✦ **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, (**Accepted** by the 26<sup>th</sup> IEEE International Conference on Intelligent Transportation Systems, ITSC 2023), [Preprint](#)
- ✦ 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, (Corresponding author and PI, **accepted** by the 26<sup>th</sup> IEEE International Conference on Intelligent Transportation Systems, ITSC 2023), [Preprint](#)
- ✦ Zhang, L.<sup>#</sup>, **Dong, Y.<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** & presented at the 35<sup>th</sup> annual meeting of International Co-operation on Theories and Concepts in Traffic Safety, **accepted** by [TRBAM2024](#), **under second-round review** by *Journal of Transportation Research Board*, **minor revision**), [Preprint](#)
- ✦ 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](#)

- ✦ Huang, Y., **Dong, Y.\*** (2024). Prediction of Parking Space Availability through Fusing Multi-source Heterogeneous Demanding Data with Transformer (Co-first author and corresponding author, in preparation for Journal of *IEEE Transactions on Intelligent Transportation Systems*)
- ✦ Yang, C., **Dong, Y.\*** (2024). Robust Lane Detection using Image Sequential Attention Based Transformer Model with Elaborated Positional Encoding (Corresponding author, in preparation for Journal of *IEEE Transactions on Intelligent Transportation Systems*)
- ✦ Wu, G., Dong, Y.\*, Farah, H. (2023). Sequential Multimodal Deep Learning for Anomaly Detection in Weakly-Labeled Videos (Corresponding author, in preparation for Journal of *IEEE Transactions on Robotics*)
- ✦ **Dong, Y.\***, 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>
- ✦ Farah, H., Postigo, I., Reddy, N., **Dong, Y.**, Rydergren, C., Raju, N., & Olstam, J. (2022). Aspects to Consider for Modeling Automated Driving in Microscopic Traffic Simulations: State of the Practice and Research Needs. *IEEE Transactions on Intelligent Transportation Systems*, 2022, <https://doi.org/10.1109/TITS.2022.3200176>
- ✦ 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>
- ✦ **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; Q1, IF:9.022, SJR:3.211]
- ✦ **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>
- ✦ 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>
- ✦ **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>
- ✦ **Dong, Y.**, Wang, Sh., Li, L., (2017) Uncovering Influence of On-Demand Ride Service on Emission Reduction and Energy Conservation through PHEM Model. [work paper]
- ✦ **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
- ✦ [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](#)
- ✦ *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, Publication Patent Date: 2016.07.06

✧ **European Patent:**

- ✦ Automated lane detection through self pre-training with masked sequential auto-encoders, fine-tuning with customised PolyLoss, and post-processing with clustering and curve fitting (IDF OCT-22-060, submitted & **filed**)
- ✦ 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**)

✧ **Software copyright:** Spatial-Temporal Attention Integrated Sequential Neural Network Model for Vision-based Robust Lane Detection Using Multi Continuous Image Frames (i-DEPOT 142731, Submitted & **filed**)

## RESEARCH EXPERIENCE

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**Traffic and Transportation Safety Lab** | Department of Transport and Planning | **TU Delft**

Dec.2019-Present

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

✦ **Data-driven 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

**Research outputs:**

- A Hybrid Spatial-temporal Deep Learning Architecture for Lane Detection (Published in [CACIE](#))
- Robust Lane Detection through Self Pre-training with Masked Sequential Autoencoders and Fine-tuning with Customized PolyLoss (Published in [IEEE Transactions on ITS](#), Accepted by TRB 2023 for presentation)
- Aspects to Consider for Modeling Automated Driving in Microscopic Traffic Simulations: State of the Practice and Research Needs. (Published in [IEEE Transactions on ITS](#))
- Car-Following Properties of a Commercial Adaptive Cruise Control System- A Pilot Field Test. (Published on [Transportation Research Record: Journal of the Transportation Research Board](#))
- Sequential Neural Network Model with Spatial-Temporal Attention Mechanism for Robust Lane Detection Using Multi Continuous Image Frames (Under review by [TR C](#), Accepted by TRB 2023 for presentation)
- Towards Developing Socially-Compliant Automated Vehicles: State of the Practice, Experts Expectations, and a Conceptual Framework (Accepted by MFTS 2022, to be submitted to Journal of Transport Reviews)
- 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 (accepted by IEEE-SMC 2023)
- Intelligent Anomaly Detection for Lane Rendering Using Transformer with Self-Supervised Pre-Training and Customized Fine-Tuning (accepted by CICTP 2023 and TRB 2024).
- Safe, Efficient, and Social Compliant Autonomous Driving based on Deep Reinforcement Learning (Accepted by IEEE-ITSC 2023)
- European Patent: Robust lane detection method through self pre-training with masked sequential auto-encoders and fine-tuning with customised PolyLoss (OCT-22-060, N2033551, submitted & filed)
- European Patent: 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 and filed)

- Software copyright: Spatial-Temporal Attention Integrated Sequential Neural Network Model for Vision-based Robust Lane Detection Using Multi Continuous Image Frames (i-DEPOT 142731, submitted and filed)

**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
- Optimized dynamic dispatching and operation algorithm for on-demand shared mobility by deep learning

**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**

- Applied big data analytics and *PHEM* model to demonstrate how ridesourcing reduced total vehicle emissions

➤ **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

**Design of vehicle-mounted data acquisition and communication unit for the WMN-based locomotive remote control system**

Jun.2013-Jun.2014

- Designed basic hardware circuits, software, and algorithms to accomplish the analog and digital signal acquisition



- Applied PID control algorithm to control the locomotive's movement
- Commissioned and implemented the CAN bus protocol and Wireless Mesh Network communication

**The Freescale Cup College Students Intelligent Car Race: Intelligent car that can follow specific trajectories based on image acquisition and 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

**National Innovation Project for College Students: Design of a system to demonstrate the composition of the simple harmonic motions and five polarization states of light by using LEDs** May.2012- May.2013

- Designed a system, including the circuits hardware (*Altium Designer*) and control software (C), for the demonstration
- Participated in the "Challenge Cup" Entrepreneurship Design Contest in Beijing and won the Bronze award

## HONORS & AWARDS

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Erasmus + mobility Grants (Three times)	National Scholarship (Top 1%)
IEEE ITSS Young Professionals Fellowship (Twice)	Second-Class Merit Scholarship for Masters Tsinghua University
TU Delft-Transport Institute Award (10,500 €)	First-Class Academic Fellowship (Top 1%, Twice)
Outstanding College Graduates of Beijing (Top 1‰)	Second-Class Academic Fellowship (Top 3%, Once)
First Class Tsinghua University RONG Scholarship	Second prize of Innovation Awards by the School of Science
School-level Merit Student (Four times)	Excellent League Member
Chinese Government Award for Outstanding Self-financed Students Abroad (6,000 \$~10,000 \$)	
2023 IEEE TAB Committee on Standards (TCoS) seed funding (6,000 \$)	

➤ **Selected Contest Awards (More than 10 awards are provincial level or above)**

- Honourable Mention in the Interdisciplinary Contest in Modeling
- Second Prize in the 2012 & 2013 Undergraduate Electronic Design Contest in Beijing
- Second Prize in the Physical Experiment Competition in Beijing
- Bronze award in "Challenge Cup" Entrepreneurship Design Contest in Beijing
- First Prize in Beijing Jiaotong University "Challenge Cup" Entrepreneurship Design Contest
- First Prize in Freescale Cup University Students Intelligent Car Race (Rank 2<sup>nd</sup>)
- 2019 Microsoft Discover AI Challenge: *Sustainable Life* Top (10%)

## THESIS SUPERVISION

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<b>Mathijs den Otter</b>   Master of Science in Civil Engineering–Transport and Planning	Sep.2022- <i>Ongoing</i>
Thesis title: Effects of Improved Lane Markings on Lane Keeping Assistance Systems and Human Detection	
<b>Lanxin Zhang</b>   Master of Science in Civil Engineering–Transport and Planning	Oct.2022-Jun.2023
Thesis title: <a href="#">Semi-supervised Machine Learning for Abnormal Driving Behaviour 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>   Master of Science in Civil Engineering–Transport and Planning	Jan.2021-Nov.2021
Thesis title: <a href="#">Effects of External Human Machine Interfaces on Automated Vehicles' Communicative Interactions With Human Drivers (Cum Laude)</a>   Won 2 <sup>nd</sup> <a href="#">Cuperusprijs prieze of KIVI</a>	
<b>Sandeep Patil</b>   Master of Science in Mechanical Engineering (Vehicular Engineering)	Oct.2020-Aug.2021
Thesis title: <a href="#">Lane Detection using SpatioTemporal Attention</a>	

<b>Eline van der Kooij</b>   Master of Science in Transport, Infrastructure & Logistics	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	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="#">Interdisciplinary Advanced AI Project (IFEEMCS520200)</a> ; <a href="#">Capstone Applied AI Project (T13150TU)</a> <a href="#">Fundamentals of Artificial Intelligence Programme (IFEEMCS520100)</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: Fundamental 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.2016-Jul.2016
Course: Advanced Labs in Electronic Technology	
<b>Teaching and Lab Assistant</b>   Electrical and Electronic Lab Center, Tsinghua University	Mar.2015-Jul.2015
Course: Fundamentals of Electronics Power Technology	
<b>RSI Tutor</b>   <b>Center for Excellence in Education, USA</b>	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>Automated Round Transportation</b>   TRB ARTS 2023, San Francisco, USA	Jul.12.2023
Presentation topics: 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

## PROFESSIONAL SERVICES & EXPERIENCE

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**Workshop Organizer (Main)** | IEEE Intelligent Vehicles Symposium (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](#)

**Workshop Organizer (Vice)** | IEEE International Conference on Intelligent Transportation Systems (ITSC), Bilbao, Bizkaia, Spain, Sep. 24, 2023  
Workshop title: [Data-driven and Empirical Research for Emerging Mixed Traffic of Automated Vehicles and Human-driven Vehicles](#)

**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 Reviewer Services

#### *Journals*

- IEEE Transactions on Intelligent Transportation Systems
- IEEE Open Journal of Intelligent Transportation Systems
- Transportation Letters: the International Journal of Transportation Research
- Journal of Transportation Research Record: Journal of the Transportation Research Board
- International Journal of Human-Computer Interaction
- Journal of Advanced Transportation
- Applied Ergonomics
- Journal of Internet Technology
- European Transport Research Review
- ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering

#### *Conferences and Proceedings*

- 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)



**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

**System architect for control of shuttle machine** | Beijing IBOSST for Logistics Co., Ltd. May.2016-Aug.2017

**Data Analyst** | Beijing Municipal Commission of Transport: TOCC Jun.2016- Jul.2016

**Data Analysis Engineer** | DiDi Chuxing Company May.2016-Jun.2016

- Determined the approximate trajectory of ride-sharing by transfer learning from private car trajectories
- Calculated the daily total vehicle emissions reductions by using the PHEM model

**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

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

- 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

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- 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**, Chess, Yoga, Reading, Mountain climbing