MEHMET ALİ SİLGU

Contact Information
Dr. Mehmet Ali SİLGU
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Employment

Postdoctoral Researcher: Koç University, 2023- Present.

Assistant Professor: Bartın University, 2022- Present.

Research Assistant: Istanbul Technical University, 2013-2022
(with Faculty Development Program on behalf of Bartın University)

Education

PhD: İstanbul Technical University, Transportation Engineering, 2022.

Thesis Title: Effects of Cooperative Vehicle Dynamics on Traffic Flow Control

MSc: İstanbul Technical University, Transportation Engineering, 2015.

Thesis Title: Multivariate and Fuzzy Clustering Approaches to Dynamic Classification of Traffic Flow States

Bachelor: Karadeniz Technical University, Geology and Civil Engineering (Double Major), 2010

Academic Profile

Transportation systems researcher specializing in traffic flow modeling, multimodal and mixed traffic systems, and simulation-based analysis of urban transportation and logistics networks. My research focuses on city logistics and data-driven demand generation, examining how demand patterns, network structure, and operational characteristics shape safety, efficiency, and emissions at corridor and network levels. I employ large-scale traffic simulation and analytical evaluation frameworks to support evidence-based planning and performance assessment in transportation and logistics systems. I have published in leading international journals including Transportation Science, Transportation Research Part C, and IEEE Transactions on Intelligent Transportation Systems, and actively contribute to the academic community through editorial and peer-review activities. I currently serve as an Assistant Professor of Transportation Engineering in the Department of Civil Engineering, Bartın University.

Publications

[1] Göncü, S., **Silgu, M. A.** & Celikoglu, H.B. (2026). Robust Gain-Scheduled Continuous-Time Linear Quadratic Regulator for Mixed-Traffic Freeways: A Multi-Class Cell Transmission Model Approach. *IEEE Transactions on Intelligent Transportation Systems.* https://doi.org/ 10.1109/TITS.2026.3678382.

[2] Inal, O., **Silgu, M.A**. & Lav, A. H. (2026). State-of-the-Art: Route Choice Decisions in Transportation Systems. Accepted for publication in *Arabian Journal for Science and Engineering*.

[3] Akova, H., Göncü, S., **Silgu, M. A**., & Celikoglu, H. B. (2025). Traffic Congestion in Routing Problems: Insights from Autonomous Mobility-on-Demand and Shared Ride Systems. *Arabian Journal for Science and Engineering*. https://doi.org/10.1007/s13369-025-10972-7.

[4] Göncü, S., & **Silgu, M. A.** (2025). Impacts of car-following models on simulation-based safety evaluation of freeways. *Arabian Journal for Science and Engineering*. https://doi.org/10.1007/s13369-025-10591-2

[5] Akyol, G., Göncü, S., & **Silgu, M. A.** (2024). Multi-objective optimization framework for trade-off among pedestrian delays and vehicular emissions at signal controlled intersections. *Arabian Journal for Science and Engineering*, 49(3), 14117–14130. https://doi.org/10.1007/s13369-024-08898-7

[6] Sadat, M., Ahmad, S. A., **Silgu, M. A**., Bajpai, S., & Pandey, D. (2024). A study on environmental impact of slow moving electric vehicles using microsimulation on Lucknow urban road with an on-ramp. *Environmental Health Insights*, 18, https://doi.org/10.1177/11786302241231706

[7] **Silgu, M. A.** (2023). A framework for evaluating the safety and homogenizing effect of freeway traffic controllers on mixed traffic conditions. *Arabian Journal for Science and Engineering*, 49(10), 4995–5010. https://doi.org/10.1007/s13369-023-08321-7

[8] **Silgu, M. A.,** Erdagi, I. G., Göksu, G., & Celikoglu, H. B. (2022). Combined control of freeway traffic involving cooperative adaptive cruise controlled and human driven vehicles using feedback control through SUMO. *IEEE Transactions on Intelligent Transportation Systems*, 23(8), 11011–11025. https://doi.org/10.1109/TITS.2021.3098640

[9] **Silgu, M. A**., Erdagi, I. G., Göksu, G., & Celikoglu, H. B. (2021). H∞ state feedback controller for ODE model of traffic flow. *IFAC-PapersOnLine*, 54(2), 19–24. https://doi.org/10.1016/j.ifacol.2021.06.003

[10] Göksu, G., **Silgu, M. A**., Erdagi, I. G., & Celikoglu, H. B. (2021). Integral input-to-state stability of traffic flow with variable speed limit. *IFAC-PapersOnLine*, 54(2), 31–36. https://doi.org/10.1016/j.ifacol.2021.06.005

[11] Celikoglu, H. B., & **Silgu, M. A**. (2016). Extension of traffic flow pattern dynamic classification by a macroscopic model using multivariate clustering. *Transportation Science*, 50(3), 966–981. https://doi.org/10.1287/trsc.2015.0653

[12] Dell'Orco, M., Marinelli, M., & **Silgu, M. A**. (2016). Bee colony optimization for innovative travel time estimation, based on a mesoscopic traffic assignment model. *Transportation Research Part C: Emerging Technologies*, 66, 48–60. https://doi.org/10.1016/j.trc.2015.10.001

Book Chapters

[1] Sadat, M., Ahmad, S. A.**, & Silgu, M. A.** (2025). Microscopic modelling of uncontrolled on-ramp at urban expressway under mixed traffic conditions. In Advances in Science, Engineering and Technology (pp. 55–59). CRC Press.

[2] Sadat, M., Ahmad, S. A., & **Silgu, M. A**. (2024). Mixed traffic modelling: An overview of car following and lane change models. In AI and Machine Learning Impacts in Intelligent Supply Chain (pp. 209–225).

[3] Göncü, S., **Silgu, M. A**., Erdagi, I. G., & Celikoglu, H. B. (2023). Sensitivity analysis for a cooperative adaptive cruise control car following model: Preliminary findings. In R. Moreno-Díaz, F. Pichler, & A. Quesada-Arencibia (Eds.), Computer Aided Systems Theory – EUROCAST 2022 (LNCS Vol. 13789). Springer. https://doi.org/10.1007/978-3-031-25312-6_43

[4] **Silgu, M. A**., Erdagi, I. G., Hulagu, S., Akti, S., Akova, H., Akyol, G., Göncü, S., Göksu, G., & Celikoglu, H. B. (2023). A methodology to consider explicitly emissions in dynamic user equilibrium assignment. In R. Moreno-Díaz, F. Pichler, & A. Quesada-Arencibia (Eds.), Computer Aided Systems Theory – EUROCAST 2022 (LNCS Vol. 13789). Springer. https://doi.org/10.1007/978-3-031-25312-6_42

[5] **Silgu, M. A.,** Erdagi, I. G., & Celikoglu, H. B. (2019). Analyzing network-wide effects of cooperative adaptive cruise control without traffic signal control at intersections. In International Conference on Computer Aided Systems Theory (pp. 79–86). Springer, Cham.

[6] **Silgu, M. A**., Akyol, G., & Celikoglu, H. B. (2019). Analysis on pedestrian green time period: Preliminary findings from a case study. In International Conference on Computer Aided Systems Theory (pp. 121–128). Springer, Cham.

[7] Sadat, M., Abuamer, I. M., **Silgu, M. A**., & Celikoglu, H. B. (2018). A comparative performance analysis of variable speed limit systems control methods using micro-simulation: A case study on D100 freeway, Istanbul. In R. Moreno-Díaz, F. Pichler, & A. Quesada-Arencibia (Eds.), Computer Aided Systems

Theory – EUROCAST 2017 (LNCS Vol. 10672). Springer. https://doi.org/10.1007/978-3-319-74726-2_46

[8] **Silgu, M. A**., & Celikoglu, H. B. (2015). Clustering traffic flow patterns by fuzzy C-means method: Some preliminary findings. In R. Moreno-Díaz, F. Pichler, & A. Quesada-Arencibia (Eds.), Computer Aided Systems Theory – EUROCAST 2015 (LNCS Vol. 9520). Springer. https://doi.org/10.1007/978-3-319-27340-2_46

Conference Papers

[1] Goncu, S., **Silgu, M. A.,** & Celikoglu, H. B. (2026). Reinforcement Learning-Based Freeway traffic Control Concerning Emissions. Transportation Research Procedia, 95, 25-32. https://doi.org/10.1016/j.trpro.2026.02.004

[2] Göncü, S., **Silgu, M. A**., Akova, H., & Celikoglu, H. B. (2025). Exploring effect of CACC vehicle types on freeway traffic flow: Case study on a Bosphorus Strait. In Proceedings of the 26th EURO Working Group on Transportation Meeting (EWGT 2024). https://doi.org/10.1016/j.trpro.2025.04.059

[3] Akyol, G., **Silgu, M. A.,** Göncü, S., & Celikoglu, H. B. (2024). A bi-objective traffic signal optimization model for mixed traffic concerning pedestrian delays. In Proceedings of the 25th EURO Working Group on Transportation Meeting (EWGT 2024). https://doi.org/10.1016/j.trpro.2024.02.024

[4] Göncü, S., **Silgu, M. A**., Erdagi, I. G., & Celikoglu, H. B. (2022). Evaluation of vehicle assignment algorithms for autonomous mobility on demand. In Proceedings of the IEEE 3rd Intelligent Vehicles Symposium (IV 2022), Aachen, Germany. https://doi.org/10.1109/IV51971.2022.9827456

[5] Göncü, S., **Silgu, M. A**., & Celikoglu, H. B. (2022). Analysis on effects of driving behavior on freeway traffic flow: A comparative evaluation of two driver profiles using two car-following models. In Proceedings of the IEEE 3rd Intelligent Vehicles Symposium (IV 2022), Aachen, Germany. https://doi.org/10.1109/IV51971.2022.9827296

[6] **Silgu, M. A.,** Erdagi, I. G., & Celikoglu, H. B. (2020). Network-wide emission effects of cooperative adaptive cruise control with signal control at intersections. Transportation Research Procedia, 47, 545–552. https://doi.org/10.1016/j.trpro.2020.03.130

[7] Akyol, G., Erdagi, I. G., **Silgu, M. A.,** & Celikoglu, H. B. (2020). Adaptive signal control to enhance effective green times for pedestrians: A case study. Transportation Research Procedia, 47, 704–711. https://doi.org/10.1016/j.trpro.2020.03.150

[8] Akti, S., Erdagi, I. G., **Silgu, M. A**., & Celikoglu, H. B. (2020, September). A game-theoretical approach for lane-changing maneuvers on freeway merging segments. In 2020 IEEE 23rd International Conference on Intelligent Transportation Systems (ITSC). https://doi.org/10.1109/ITSC45102.2020.9294458

[9] **Silgu, M. A.,** Erdagi, I. G., & Celikoglu, H. B. (2019). Emission effects of cooperative adaptive cruise control: A simulation case using SUMO. In SUMO User Conference, Berlin, Germany, May 13–15, 2019.

[10] Akyol, G., **Silgu, M. A.,** & Celikoglu, H. B. (2019). Pedestrian-friendly traffic signal control using SUMO. In SUMO User Conference, Berlin, Germany, May 13–15, 2019.

[11] **Silgu, M. A**., Muderrisoglu, K., Unsal, A., & Celikoglu, H. B. (2018). Approximation of emission for heavy duty trucks in city traffic. In Proceedings of the 2018 IEEE International Conference on Vehicular Electronics and Safety (ICVES 2018), Madrid, Spain, September 12–14, 2018. https://doi.org/10.1109/ICVES.2018.8519596

[12] Abuamer, I. M., Sadat, M.**, Silgu, M. A.,** & Celikoglu, H. B. (2017). Analyzing the effects of driver behavior within an adaptive ramp control scheme: A case-study with ALINEA. In Proceedings of the 2017 IEEE International Conference on Vehicular Electronics and Safety (ICVES 2017), 109–114. https://doi.org/10.1109/ICVES.2017.7991910

[13] Sadat, M., Abuamer, I. M., **Silgu, M. A**., & Celikoglu, H. B. (2017). A comparative performance analysis of variable speed limit systems control methods using micro-simulation: A case study on D100 freeway, Istanbul. In Proceedings of the 16th International Conference on Computer Aided Systems Theory

(EUROCAST 2017), Las Palmas, Spain, February 19–24, 2017.

[14] Abuamer, I. M., **Silgu, M. A**., & Celikoglu, H. B. (2016). Micro simulation based ramp metering on Istanbul freeways: An evaluation adopting ALINEA. In Proceedings of the 2016 IEEE 19th International Conference on Intelligent Transportation Systems (ITSC), 695–700. https://doi.org/10.1109/ITSC.2016.7795629

[15] **Silgu, M. A.,** & Celikoglu, H. B. (2014). Non-hierarchical clustering methods to classify freeway traffic flow states. In Proceedings of the 11th International Congress on Advances in Civil Engineering (ACE 2014), Istanbul, Turkey, October 21–24, 2014.

[16] Deniz, O., **Silgu, M. A**., & Celikoglu, H. B. (2014). Comparative evaluation of a cellular automata model and cell transmission model with Istanbul freeway data. In Proceedings of the 11th International Congress on Advances in Civil Engineering (ACE 2014), Istanbul, Turkey, October 21–24, 2014

Work in Progress

[1] Duman, Z.N., Goncu, S., & **Silgu, M.A.** (2026) "Mobility-on-Demand and Public Transport Integration: A Survey of Modeling, Operations, Policy, and User-Centric Impacts", under review for *IEEE Transactions on Intelligent Transportation System*s.

[2] **Silgu, M.A**., Rehman, M.F., Gencel. O., Sarı, A., Karaca,F., & Memon, S. A. (2026) "Unverified sustainability: circularity evidence gaps in phase change materials for buildings and energy systems", under review for *Nature Sustainability*.

[3] Çanakçı, A. B., **Silgu, M. A**., & Yıldız, B. (2026) "Perceived Safety and Participation in Bicycle-Based Crowdshipping: A Hybrid Choice Model of Urban Delivery Behavior", under review for *Travel Behavior and Society*.

[4] Nalbant, A., **Silgu, M. A.**, Şardağ, A., & Yıldız, B. (2026) "Measuring Urban Transport Sustainability with Indicators: Trends, Gaps, and a Vision Forward", under review for *Transportation Science*.

Projects

[1] **Postdoctoral Researcher**, A New Perspective on City Logistics: Concepts, Theory, and Models for Designing and Managing Logistics as a Service (Acr: GoodMobility), European Research Council, PI: Barış Yıldız, 2023-Ongoing.

Dr. Silgu is responsible for the development and calibration of traffic simulation models, the formulation, implementation, and testing of network design and traffic management algorithms, and the technical documentation and reporting of project methodologies, results, and deliverables.

[2] **Researcher**, "Improving routing solutions for on-demand mobility systems through simulation: an integrated modeling and optimization framework and its evaluation through the case of a low emission zone, The Historical Peninsula, İstanbul", PI: Hilmi Berk Celikoglu , 2024- Ongoing.

Dr. Silgu is responsible for the development of simulation models, the formulation and evaluation of policy scenarios, the design and execution of data collection processes, and the development of the optimization framework used to assess routing solutions for on-demand mobility systems under low-emission zone constraints in the Historical Peninsula of Istanbul

[3] **Researcher**, "Effects of Cooperative Vehicle Dynamics in Traffic Flow Modeling: Simulation and Control," the Scientific and Technological Research Council of Turkey (TUBITAK) National Research Project No. 120M576, PI: Hilmi Berk Celikoglu, 2023.

As an extension of his doctoral dissertation, **Dr. Silgu** was responsible for the design and implementation of the data collection process, the development of simulation models, the integration of car-following models into both commercial and open-source traffic microsimulation softwares, and the evaluation of the performance of control algorithms for mainstream and on-ramps.

[4] **Researcher**, “"Environment Friendly Optimization of Transportation Networks: Analysis Over Small Sized Real Network," the Scientific and Technological Research Council of Turkey (TUBITAK) National Research Project No. 218M307, PI: Hilmi Berk Celikoglu, 2022.

Dr. Silgu was responsible for the formulation of the environmentally sensitive traffic assignment problem within the network design framework, as well as for data collection and management, and the development of dynamic and simulation-based solutions for network traffic assignment.

[5] **Researcher,** “Micro simulation based ramp metering on Istanbul freeways: An evaluation adopting ALINEA”, İTÜ BAP, 2016.

Dr. Silgu was responsible for adapting a local ramp metering strategy for implementation within traffic simulation and computational software environments.

[6] **Researcher**, "Analysis of network flow propagation: model development and utilization of simulation models in calibration process," the Scientific and Technological Research Council of Turkey (TUBITAK) - EU COST International Research Project No. 111M415, PI: Hilmi Berk Celikoglu, 2013.

Dr. Silgu was responsible for the review and assessment of simulation-based approaches and software for dynamic traffic assignment, as well as for data collection and management, and for the calibration and validation processes within the simulation framework.

Advanced Training & Professional Development

[1] “Discrete Choice Analysis: Predicting Individual Behavior and Market Demand”, EPFL, 2025.

[2] Short Mediterranean Ph.D School on “Impacts of Climate Change and Sustainable Engineering Responses”, Naples, Italy, 2019.

[3] 2017 Summer School on "Cooperative Interacting Automobiles", Schwäbisch Gmünd, Germany.

[4] EURO Winter Institute on “Methods and Models in Transportation Problems”, Bressanone, Italy, 2017.

[5] 4th Multitude Summer School, Chios, Greece, 2013.

Editorial Roles

[1] IEEE Transactions on Intelligent Transportation Systems, Associate Editor

[2] Nature *Scientific Reports*, Editorial Board Member

[3] Nature *Scientific Reports* “Smart Transportation Systems” Special Issue Editor

Reviewing Activities

[1] Accident Analysis & Prevention

[2] Heliyon

[3] IEEE Access

[4] IEEE Intelligent Transportation Systems Magazine

[5] IEEE Open Journal of Intelligent Transportation Systems

[6] IEEE Transactions on Intelligent Transportation Systems

[7] IEEE Transactions on Vehicular Technology

[8] IEEE/CAA Journal of Automatica Sinica

[9] IET Control Theory & Applications

[10] IET Intelligent Transportation Systems

[11] Journal of Traffic and Transportation Engineering

[12] Modern Physics Letters B

[13] Transportation Letters
[14] Transportation Letters: the International Journal of Transportation Research
[15] Transportation Research Part B: Methodological
[16] Transportation Research Part C: Emerging Technologies
[17] Transportation Research Part D: Transport and Environment
[18] Transportmetrica A: Transport Science
[19] Transportmetrica B: Transport Dynamics

Teaching Experience

[1] "Highway Engineering", Bachelor level- University of Djibouti
[2] "Railway Engineering", Bachelor level- University of Djibouti
[3] "Railway Engineering", Bachelor level- Bartin University
[4] "Traffic Engineering", Bachelor level- Bartin University
[5] "Modern Railways and Design Principles", MSc level- Bartin University

Professional Memberships

[1] Civil Engineering Chamber of Turkiye
[2] Geology Engineering Chamber of Turkiye
[3] IEEE Intelligent Transportation Systems Society
[4] IEEE Vehicular Systems Society
[5] IEEE Vehicular Technology Society Committee Member on Autonomous Vehicles