# Monika Filipovska

Department of Civil and Environmental Engineering
University of Connecticut
261 Glenbrook Road, Storrs, CT 06269
monika.filipovska@uconn.edu, (860) 486-2990

## CURRENT APPOINTMENT

**Assistant Professor,** Department of Civil and Environmental Engineering, University of Connecticut — Sep 2021 - present

## EDUCATION

**Ph.D.** Civil and Environmental Engineering (Transportation Systems Analysis & Planning), Northwestern University — Aug 2021
Advisor: Hani S. Mahmassani,
Committee: David Morton, Marco Nie (Northwestern University), Jiwon Kim (University of Queensland), Ali Zockaie (Michigan State University)

**M.S.** in Civil and Environmental Engineering (Transportation Systems Analysis & Planning), Northwestern University — Mar 2019

**B.S.** in Engineering (Urban Systems), Mathematics, New York University Abu Dhabi — May 2017

## RESEARCH INTERESTS

Dynamic Transportation Networks: Reliability Modeling, Path Finding, and Routing
Traffic Flow Characteristics: Modeling, Simulation, and Prediction
Intelligent Transportation and Mobility Systems: Predictive and Prescriptive Analytics
Applications of Emerging Vehicle and Infrastructure Technologies
Transportation Applications of Big Data, Machine Learning and Artificial Intelligence

## PUBLICATIONS

### Peer-Reviewed Journal Articles

J1 **Filipovska**, M. and Mahmassani, H. S. (2021) 'Reliable Trajectory-Adaptive Routing Strategies in Stochastic, Time-Varying Networks with Generalized Correlations', *Transportation Research Part C: Emerging Technologies.* Volume 133, 2021, 103436.

J2 **Filipovska**, M., Mahmassani, H. S. and Mittal, A. (2021) 'Estimation of Path Travel Time Distributions in Stochastic Time-Varying Networks with Correlations', *Transportation Research Record*. Volume 2675(11), 2021, 498-508.

J3 **Filipovska**, M. and Mahmassani, H. S. (2020) 'Traffic Flow Breakdown Prediction using Machine Learning Approaches', *Transportation Research Record*. Volume 2674(20), 2020, 560-570. doi: 10.1177/0361198120934480.

J4 **Filipovska**, M., Mahmassani, H. S. and Mittal, A. (2019) 'Prediction and Mitigation of Flow Breakdown Occurrence for Weather Affected Networks: Case Study of Chicago, Illinois', *Transportation Research Record.* Volume 2673(11), 2019, 628–639. doi: 10.1177/0361198119851730.

J5† **Filipovska**, M. and Mahmassani, H. S. 'Spatio-temporal Characterization of Stochastic Dynamic Transportation Networks', *IEEE Transactions on Intelligent Transportation Systems.*

J6† **Filipovska**, M. and Mahmassani, H. S. 'Path Travel Time Variability in Interdependent Stochastic Dynamic Networks: Taxonomy and Estimation Approaches', *Transportation Research Part B: Methodological.*

J7† *****Green, O., Ivan, J., **Filipovska**, M., Auguste, M., Wang, K. 'Using Logistic Regression to Evaluate Pedestrian-Vehicle Interaction Severity at Side Street Green and Exclusive Phase Signals', *Transportation Research Record.*

J8† **Filipovska**, M. and Mahmassani, H. S. 'Approximate Reliable Path Finding for Multiple Objectives in Correlated Stochastic Dynamic Networks', *Transportation Science.*

J9† **Filipovska,** M., Hyland, M., and *****Bala, H. 'Anticipatory Fleet Repositioning for Shared-use Autonomous Mobility Services: An Optimization and Learning-Based Approach', *Transportation Research Part C: Emerging Technologies*. doi: 10.48550/arXiv.2210.08659.

J10† *****Lei, B., Huang, S., Ding, C., **Filipovska**, M. 'Efficient Traffic State Forecasting using Spatio-Temporal Network Dependencies: A Sparse Graph Neural Network Approach', *IEEE Transactions on Intelligent Transportation Systems.* doi: 10.48550/arXiv.2211.03033.

†indicates under review or in revision; *****indicates mentee

## Peer-Reviewed Technical Reports

T1 Mahmassani, H. S. and **Filipovska**, M. (2021) 'Estimation of Travel Time Distributions Along User-Defined Travel Paths: Application Guide.' U.S. Department of Transportation, Federal Highway Administration. FHWA-HOP-20-### (under revision)

T2 Mahmassani, H. S. and **Filipovska**, M. (2021) 'Estimation of Travel Time Distributions Along User-Defined Travel Paths: GIS Platform User Guide.' U.S. Department of Transportation, Federal Highway Administration. FHWA-HOP-20-067

## Peer-Reviewed Conference Contributions and Proceedings

P1 *****Bala, H., and Filipovska, M. (2023) 'Anticipatory Vehicle Repositioning in Autonomous Mobility-on-Demand Systems: A Hierarchical Multi-Scale Approach', ASCE International Conference on Transportation & Development (ICTD 2023), Austin, TX.

P2 **Filipovska**, M., and Hyland, M. (2023) 'Anticipatory Fleet Operation for Shared-use Autonomous Mobility Services with Learning-based Vehicle Repositioning', The 102nd Annual Meeting of the Transportation Research Board, Washington, DC.

P3 *****Green, O., Ivan, J., **Filipovska**, M., Auguste, M., and Wang, K. (2023) 'Using Logistic Regression to Evaluate Pedestrian-Vehicle Interaction Severity at Side Street Green and Exclusive Phase Signals', The 102nd Annual Meeting of the Transportation Research Board, Washington, DC.

P4 **Filipovska**, M. (2022) 'Traffic State Forecasting Using Spatio-Temporal Network Dependencies: A Graph Neural Network Approach'. The 4th Bridging Transportation Researchers (BTR) Online Conference.

P5 *****Rezwana, S., Jackson, E., **Filipovska**, M., and Lownes, N. (2022) 'A Modified Social Force Model for Pedestrian Behavior in the Presence of Autonomous Vehicles'. ASCE International Conference on Transportation & Development (ICTD), Seattle, WA.

P6 **Filipovska**, M., and Mahmassani, H. S. (2022) 'Approximate A Priori Path Finding for Multiple Reliability Objectives in Stochastic Dynamic Networks with Correlation'. The 101st Annual Meeting of the Transportation Research Board, Washington, DC.

P7 **Filipovska**, M., Mahmassani, H. S. (2021) 'A Priori and Adaptive Reliable Routing in Stochastic Dynamic Networks with Correlations'. International Symposium on Transportation Data and Modeling (ISTDM 2020)

P8 **Filipovska**, M., Mahmassani, H. S. (2021) 'Computation and Estimation of Path Travel Time Variability with Sparse Vehicle Trajectory Data'. International Symposium on Transportation Data and Modeling (ISTDM 2021)

P9 **Filipovska**, M., Mahmassani, H. S. and Mittal, A. (2021) 'Estimation of Path Travel Time Distributions in Stochastic Time-Varying Networks with Correlations'. The 100th Annual Meeting of the Transportation Research Board, Washington, DC.

P10 **Filipovska**, M., Mahmassani, H. S. (2020) 'Reliable Least-Time Path Estimation and Computation in Stochastic Time-Varying Networks with Spatio-Temporal Dependencies'. 2020 23rd International Conference on Intelligent Transportation Systems (IEEE ITSC 2020).

P11 **Filipovska**, M. and Mahmassani, H. S. (2020) 'Traffic Flow Breakdown Prediction using Machine Learning Approaches'. The 99th Annual Meeting of the Transportation Research Board, Washington, DC.

P12 **Filipovska**, M., Mahmassani, H. S. (2020) 'Reliable Least-Time Path Estimation and Computation in Stochastic Time-Varying Networks with Spatio-Temporal Dependencies'. The 99th Annual Meeting of the Transportation Research Board, Washington, DC.

P13 **Filipovska**, M., Mahmassani, H. S., & Mittal, A. (2019) 'Prediction and Mitigation of Flow Breakdown Occurrence for Weather Affected Networks: Case Study of Chicago, Illinois'. The 98th Annual Meeting of the Transportation Research Board, Washington, DC.

P14 Jabari, S. E., Zheng, F., Liu, H., and **Filipovska**, M. (2018) 'Stochastic Lagrangian modeling of traffic dynamics', The 97th Annual Meeting of the Transportation Research Board, Washington, DC.

* indicates mentee

## Other Conference Contributions, Presentations, Invited Talks

O1 **Filipovska**, M. (2022) 'Optimization and Learning-based Decision Making for Matching and Rebalancing in Autonomous Fleet Operations for Mobility-on-Demand Services'. INFORMS Annual Meeting 2022, Indianapolis, IN

O2 **Filipovska**, M. (2022) 'Traffic State Forecasting with Spatio-Temporal Network Dependencies via a Graph Neural Network Approach'. *Invited Talk*, NSF Research Experiences for Undergraduates (REU) Seminar Series, University of Texas at San Antonio

O3 **Filipovska**, M. (2022) 'Congestion-Aware Adaptive Routing for Connected and Autonomous Vehicles'. *Seminar Talk*, Mathematical Challenges and Opportunities for Autonomous Vehicles Program, Institute for Pure and Applied Mathematics, University of California, Los Angeles (UCLA)

O4 **Filipovska**, M., Mahmassani, H.S., (2021) 'Information-adaptive Routing Strategies In Stochastic Dynamic Transportation Networks With Real-time Connected Vehicle Data'. INFORMS Annual Meeting 2021

O5 **Filipovska,** M., Mahmassani, H. S., (2021) 'Information-Adaptive Reliable Routing in Dynamic Connected Environments'. *Workshop Talk*, 24th International Conference on Intelligent Transportation Systems (IEEE ITSC 2021).

O6 **Filipovska,** M., Mahmassani, H. S., Du, L., (2021) 'Next Generation Transportation Networks: Emerging Technologies, Data Analytics, and Perspectives'. *Workshop Chair and Organizer*, 24th International Conference on Intelligent Transportation Systems.

O7 **Filipovska**, M., Mahmassani, H. S. (2020) 'Performance Assessment of Machine Learning Methods for Traffic Flow Breakdown Prediction'. *Invited Talk*, Machine Learning in Science and Engineering Virtual Conference: Transportation Track, Data Science Institute, Columbia University in the City of New York

O8 **Filipovska**, M. (2020) 'Travel Time Reliability Modeling and Optimization in Stochastic Dynamic Networks'. *Seminar Talk*, Mathematical Challenges and Opportunities for Autonomous Vehicles Program, Institute for Pure and Applied Mathematics, University of California, Los Angeles (UCLA) (virtual due to COVID-19)

O9 **Filipovska**, M., Mahmassani, H. S. (2019) 'Leveraging Connected and Autonomous Vehicles for Flow Breakdown Prediction and Mitigation'. *Presentation*, Workshop on Autonomous Vehicles, Institute for Pure and Applied Mathematics, UCLA

## RESEARCH GRANTS

**Total funded: > $2.4 M; Filipovska share: > $804 K**

**CTfastrak Automated Bus Data Repository and Analysis**, CT Department of Transportation and Federal Transit Administration (FTA), Role: **Principal Investigator**, Collaborators: Eric Jackson (Co-PI), Kai Wang (Co-PI), Sep 2022 – Dec 2024, $600 K

**Interpretable Mobility-on-Demand Prediction and Hierarchical Data-Driven Fleet Coordination**, Office of the Vice President for Research (OVPR), University of Connecticut, Role: **Principal Investigator**, Collaborator: Suining He (Co-PI), Aug 2022 – Jun 2023, $50 K

**Development of a CMV Parking Information Management System for Real-time Information Dissemination**, Federal Motor Carrier Safety Administration (FMCSA), CT Department of Motor Vehicles, Role: **Co-Principal Investigator**, Collaborators: Mohammad Shaon (PI), Niloufar Shirani (Co-PI), Sep 2022 – Sep 2025, $1.726 M

**Assessing the Suitability of Wejo Mobility Intelligence Data for Transportation Research Applications**, Department of Civil and Environmental Engineering Mini Grant, University of Connecticut, Role: **Co-Principal Investigator,** Collaborators: John Ivan (PI), Davis Chacon-Hurtado (Co-PI), Eric Jackson (Co-PI), Jin Zhu (Co-PI), May – Aug 2022, $30 K

## AWARDS & HONORS

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|---|---|
| **Research Excellence Program Award**, Office of the Vice President for Research (OVPR), University of Connecticut | 2022 |
| **Lof Scholar (Haimanti Bala, advisee)**, John Lof Leadership Academy, School of Engineering, University of Connecticut | 2022-24 |
| **ITSC 2020 Best Presentation Award, *Third prize*,** 23rd IEEE Intelligent Transportation Systems Conference (ITSC) | 2020 |
| **ILITE Graduate Scholarship Award**, Institute of Transportation Engineers Illinois | 2020 |
| **Fellow and Core Participant,** Mathematical Challenges and Opportunities for Autonomous Vehicles, Institute for Pure and Applied Mathematics, University of California, Los Angeles (UCLA) (remote due to COVID-19) | 2020 |
| **CIRTL Scholar Certificate,** Center for Integration of Research, Teaching and Learning (CIRTL) Network | 2020 |
| **CIRTL Associate Certificate,** Center for Integration of Research, Teaching and Learning (CIRTL) Network | 2019 |
| **Walter P. Murphy Fellow**, McCormick School of Engineering, Northwestern U | 2017-18 |

## TEACHING AND ADVISING EXPERIENCE

### Instructor

**CE 2251 & 3251 Probability and Statistics in Civil and Environmental Engineering**, Civil and Environmental Engineering, University of Connecticut — Spring 2023

**CE 5030 Seminar in Transportation and Urban Engineering**, Civil and Environmental Engineering, University of Connecticut — Fall 2022

**CE 6725 Statistical and Econometric Methods for Transportation Data Analysis,** Civil and Environmental Engineering, University of Connecticut — Spring 2022

**CE 4730 & 5730 Transportation Planning,** Civil and Environmental Engineering, University of Connecticut — Fall 2021

### Co-Instructor

**Civil and Environmental Engineering Systems Analysis,** Department of Civil and Environmental Engineering, Northwestern University — Spring 2021
*Co-Instructor:* Pablo Durango-Cohen

**Data Analytics for Transportation and Urban Infrastructure Systems,** Department of Civil and Environmental Engineering, Northwestern University — Spring 2020
*Co-Instructor:* Ying Chen

### Teaching Assistant

**Engineering Analysis-3 Systems Dynamics,** Department of Mechanical Engineering, Northwestern University — Spring 2018

**Calculus I,** Courant Institute of Mathematical Sciences, New York University — Spring 2016

### Student Advising

**Ph.D. Advisor**

| Student | Institution | Year Expected |
|---|---|---|
| Haimanti Bala | University of Connecticut | 2026 |
| Syed Islam | University of Connecticut | 2026 |

**Ph.D. Associate Advisor (Committee Member)**

| Student | Institution | Year Expected |
|---|---|---|
| Sruthi Mantri | University of Connecticut | 2023 |
| Saki Rezwana | University of Connecticut | 2024 |
| Umar Jamil | University of Texas, San Antonio | 2024 |
| Manmohan Joshi | University of Connecticut | 2025 |
| Oluwaseun Olufowobi | University of Connecticut | 2025 |

**M.S. Associate Advisor (Committee Member)**

| Student | Institution | Year |
|---|---|---|
| Quinn Packer | University of Connecticut | 2022 |
| Akira Dunham | University of Connecticut | 2022 |
| Jeffrey McLamb | University of Connecticut | 2022 |

## Teaching Training and Certification

**Teaching Certificate Program**, Searle Center for Advancing Learning and Teaching, Northwestern University — 2020-21

**CIRTL Network Scholar,** Center for the Integration of Research, Teaching and Learning (CIRTL) Network — 2020

**Searle Teaching-As-Research (STAR),** CIRTL at Northwestern University — 2020

**Introduction to Evidence-Based Undergraduate STEM Teaching,** Massive Online Open Course, Center for the Integration of Research, Teaching and Learning (CIRTL) Network — 2019

## PROFESSIONAL DEVELOPMENT

**DELTA Junior Faculty Institute**, American Society for Engineering Education — 2022

**Faculty Success Program**, National Center for Faculty Development and Diversity — 2022

**Mathematical Challenges and Opportunities for Autonomous Vehicles Program**, *Fellow and Core Participant*, Institute of Pure and Applied Mathematics, University of California, Los Angeles (UCLA) — 2020-21

**Workshop on Autonomous Vehicles**, Institute of Pure and Applied Mathematics, University of California, Los Angeles (UCLA) — 2019

## SERVICE ACTIVITIES

### Professional Service

**Journal and Conference Review Service:**

Transportation Research Board (TRB) Annual Meeting
Transportation Research Record
IEEE International Conference on Intelligent Transportation Systems
IEEE Transactions on Intelligent Transportation Systems
Journal of Intelligent Transportation Systems
International Journal of Transportation Science and Technology
Bridging Transportation Researchers (BTR) Conference

**Award Reviewer and Judge**, Council of University Transportation Centers (CUTC), 2022
Milton Pikarsky Memorial, Transportation Science and Technology Master's Thesis Award

**Conferences:**

**Workshop Co-Chair and Co-Organizer**, Early Academic Successful Careers: Resources and Advice. *Workshop, Sponsored by Young Members Coordinating Council (YMCC)*, 102nd Annual Meeting of the Transportation Research Board (TRBAM 2023)

**Workshop Chair and Co-Organizer**, 2nd Workshop on Next Generation Transportation Networks: Emerging Technologies, Data Analytics, and Perspectives. *Workshop*, 25th International Conference on Intelligent Transportation Systems (IEEE ITSC 2022).

**Workshop Chair and Co-Organizer**, Next Generation Transportation Networks: Emerging Technologies, Data Analytics, and Perspectives. *Workshop*, 24th International Conference on Intelligent Transportation Systems (IEEE ITSC 2021)

**Session Chair**, Advances in Transportation Management. 2021 Annual Meeting of the Institute for Operations Research and the Management Sciences (INFORMS)

**Project and Panel Review Service:**

**Panel Member**, National Cooperative Highway Research Program (NCHRP), Project 20-44(48): Peer Exchanges on Data Management and Governance Practices

**Panel Member**, National Cooperative Highway Research Program (NCHRP), Project 23-29: Enterprise Data Warehouse Implementation Guide

**Research Progress Committee Member**, Transportation Consortium of South-Central States (Trans-SET), Project 21-034-ITS: Establishing a Simulation Package and Testbed for Traffic Congestion Reduction Using Deep Reinforcement Learning

## Professional Memberships

Member, IEEE Intelligent Transportation Systems Society (ITSS)

Member, Institute for Operations Research and the Management Sciences (INFORMS)

Member, Transportation Science and Logistics Society (TSL) of INFORMS

Member, Institute of Transportation Engineers (ITE)

Member, Institute of Transportation Engineers (ITE) Councils and Committees:

Transportation Systems Management & Operation (TSM&O) Council

Connected and Autonomous Vehicles Standing Committee

Traffic Engineering Council

Transportation Education Council

Friend, Transportation Research Board (TRB) Standing Committees on:

Transportation Network Modeling (AEP40)

Traffic Flow Theory and Characteristics (ACP50)

Intelligent Transportation Systems (ACP15)

Statistical Methods (AED60)

## Leadership and Institutional Service

**Seminar Coordinator**, Transportation and Urban Engineering, Department of Civil and Environmental Engineering, University of Connecticut, Fall 2022

**INCLUDE Project Team (I-Team) Member**, Department of Civil and Environmental Engineering, University of Connecticut (2022-23)

**PhD General Exam Committee Member**, Department of Civil and Environmental Engineering, University of Connecticut (2021-22, 2022-23)

**Search Committee Member**, Transportation and Urban Engineering, Department of Civil and Environmental Engineering, University of Connecticut (2021-22)

**Graduate Program Application Reviewer**, Department of Civil and Environmental Engineering, University of Connecticut (2021 - ongoing)

**Graduate Courses and Curriculum Committee Member**, Department of Civil and Environmental Engineering, University of Connecticut (2021 - ongoing)

Member, Northwestern University Chapter of the American Society of Civil Engineers (2020-21)

Member, Northwestern University Student Chapter of the Institute for Operations Research and the Management Sciences (INFORMS) (2020-21)

Member, Women in Science and Engineering Research (WISER), Northwestern U. (2019-21)

Member, Graduate Chapter of Society of Women Engineers, Northwestern University (2019-21)

Student Representative, Curriculum Committee, New York University Abu Dhabi (2016-17)

Engineering Division Student Representative, New York University Abu Dhabi (2016-17)