

# Monika Filipovska

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## CURRENT APPOINTMENT

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

## EDUCATION

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**Ph.D.** Civil and Environmental Engineering (Transportation Systems Analysis & Planning), Northwestern University Aug 2021

Advisor: Hani S. Mahmassani, Committee: David Morton, Marco Nie (Northwestern), 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

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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

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### Peer-Reviewed Journal Articles

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- 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<sup>†</sup> **Filipovska**, M. and Mahmassani, H. S. ‘Spatio-temporal Characterization of Stochastic Dynamic Transportation Networks’, *IEEE Transactions on Intelligent Transportation Systems*.
- J6<sup>†</sup> **Filipovska**, M. and Mahmassani, H. S. ‘Path Travel Time Variability in Interdependent Stochastic Dynamic Networks: Taxonomy and Estimation Approaches’.
- J7<sup>†</sup> \*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’.
- J8<sup>†</sup> **Filipovska**, M. and Mahmassani, H. S. ‘Approximate Reliable Path Finding for Multiple Objectives in Correlated Stochastic Dynamic Networks’.
- J9<sup>†</sup> **Filipovska**, M., Hyland, M., and \*Bala, H. ‘Anticipatory Fleet Repositioning for Shared-use Autonomous Mobility Services: An Optimization and Learning-Based Approach’. doi: 10.48550/arXiv.2210.08659.
- J10<sup>†</sup> \*Lei, B., Huang, S., Ding, C., **Filipovska**, M. ‘Efficient Traffic State Forecasting using Spatio-Temporal Network Dependencies: A Sparse Graph Neural Network Approach’. doi: 10.48550/arXiv.2211.03033.

<sup>†</sup>indicates under review or in revision; \*indicates mentee

### Peer-Reviewed Technical Reports

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- 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

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- 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 102<sup>nd</sup> 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 102<sup>nd</sup> 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 4<sup>th</sup> 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 101<sup>st</sup> 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 100<sup>th</sup> 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 23<sup>rd</sup> 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 99<sup>th</sup> 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 99<sup>th</sup> 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 98<sup>th</sup> 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 97<sup>th</sup> 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**

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**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 (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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|                                                                                                                                                                                                                           |         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>Research Excellence Program Award</b> , Office of the Vice President for Research (OVPR), University of Connecticut                                                                                                    | 2022    |
| <b>Lof Scholar (Haimanti Bala, advisee)</b> , John Lof Leadership Academy, School of Engineering, University of Connecticut                                                                                               | 2022-24 |
| <b>ITSC 2020 Best Presentation Award, Third prize</b> , 23 <sup>rd</sup> IEEE Intelligent Transportation Systems Conference (ITSC)                                                                                        | 2020    |
| <b>ILITE Graduate Scholarship Award</b> , Institute of Transportation Engineers Illinois                                                                                                                                  | 2020    |
| <b>Fellow and Core Participant</b> , 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    |
| <b>CIRTL Scholar Certificate</b> , Center for Integration of Research, Teaching and Learning (CIRTL) Network                                                                                                              | 2020    |
| <b>CIRTL Associate Certificate</b> , Center for Integration of Research, Teaching and Learning (CIRTL) Network                                                                                                            | 2019    |

Walter P. Murphy Fellow, McCormick School of Engineering, Northwestern University 2017-18

## TEACHING AND ADVISING EXPERIENCE

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### Instructor

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|                                                                                                                                                              |             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>CE 2251 &amp; 3251 Probability and Statistics in Civil and Environmental Engineering</b> , Civil and Environmental Engineering, University of Connecticut | Spring 2023 |
| <b>CE 5030 Seminar in Transportation and Urban Engineering</b> , Civil and Environmental Engineering, University of Connecticut                              | Fall 2022   |
| <b>CE 6725 Statistical and Econometric Methods for Transportation Data Analysis</b> , Civil and Environmental Engineering, University of Connecticut         | Spring 2022 |
| <b>CE 4730 &amp; 5730 Transportation Planning</b> , Civil and Environmental Engineering, University of Connecticut                                           | Fall 2021   |

### Co-Instructor

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Civil and Environmental Engineering Systems Analysis</b> , Department of Civil and Environmental Engineering, Northwestern University<br><i>Co-Instructor: Pablo Durango-Cohen</i>     | Spring 2021 |
| <b>Data Analytics for Transportation and Urban Infrastructure Systems</b> , Department of Civil and Environmental Engineering, Northwestern University<br><i>Co-Instructor: Ying Chen</i> | Spring 2020 |

### Teaching Assistant

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|----------------------------------------------------------------------------------------------------------------|-------------|
| <b>Engineering Analysis-3 Systems Dynamics</b> , Department of Mechanical Engineering, Northwestern University | Spring 2018 |
| <b>Calculus I</b> , Courant Institute of Mathematical Sciences, New York University                            | Spring 2016 |

### Teaching Training and Certification

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>Teaching Certificate Program</b> , Searle Center for Advancing Learning and Teaching, Northwestern University                                                              | 2020-21 |
| <b>CIRTL Network Scholar</b> , Center for the Integration of Research, Teaching and Learning (CIRTL) Network                                                                  | 2020    |
| <b>Searle Teaching-As-Research (STAR)</b> , CIRTL at Northwestern University                                                                                                  | 2020    |
| <b>Introduction to Evidence-Based Undergraduate STEM Teaching</b> , Massive Online Open Course, Center for the Integration of Research, Teaching and Learning (CIRTL) Network | 2019    |

**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 |

**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**, 2020-21  
*Fellow and Core Participant*, Institute of Pure and Applied Mathematics, University of California, Los Angeles (UCLA)
- Workshop on Autonomous Vehicles**, Institute of Pure and Applied Mathematics, 2019  
University of California, Los Angeles (UCLA)

**SERVICE ACTIVITIES**

**Professional Service**

**Project and Panel Review Service:**

- Panel Member**, Civil Infrastructure Systems (CIS), CMMI, National Science Foundation
- 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
- Award Reviewer and Judge**, Council of University Transportation Centers (CUTC), 2022 Milton Pikarsky Memorial, Transportation Science and Technology Master’s Thesis Award

**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

**Conferences:**

- Workshop Co-Chair and Co-Organizer**, Early Academic Successful Careers: Resources and Advice. *Workshop, Sponsored by Young Members Coordinating Council (YMCC)*, 102<sup>nd</sup> Annual Meeting of the Transportation Research Board (TRBAM 2023)
- Workshop Chair and Co-Organizer**, 2<sup>nd</sup> 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)

**Professional Memberships**

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- 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**

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- 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)

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

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

Women in Science and Engineering Research (WISER), Northwestern University (2019-21)

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

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

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