

# Monika Filipovska

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

## CURRENT APPOINTMENT

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<b>Assistant Professor</b> , Department of Civil and Environmental Engineering, University of Connecticut	Aug 2021 - present
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## EDUCATION

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<b>Ph.D.</b> Civil and Environmental Engineering (Transportation) Northwestern University Dissertation: <i>Travel Time Reliability in Stochastic Dynamic Networks: Modeling, Path Finding and Routing</i> Dissertation Advisor: Hani S. Mahmassani Committee: David Morton, Marco Nie (Northwestern University), Jiwon Kim (University of Queensland), Ali Zockaie (Michigan State University)	Aug 2021
<b>M.S.</b> in Civil and Environmental Engineering (Transportation) Northwestern University	Mar 2019
<b>B.S.</b> 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 Systems: Predictive Analytics for Real-Time Traffic Operations  
Applications of Emerging Vehicle and Infrastructure Technologies  
Transportation Applications of Big Data, Machine Learning and Artificial Intelligence

## PUBLICATIONS

### Peer-Reviewed Journal Articles

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| J1 | <b>Filipovska, M.</b> and Mahmassani, H. S. (2021) ‘Reliable Trajectory-Adaptive Routing Strategies in Stochastic, Time-Varying Networks with Generalized Correlations’, <i>Transportation Research: Part C</i> (in production) |
| J2 | <b>Filipovska, M.</b> , Mahmassani, H. S. and Mittal, A. (2021) ‘Estimation of Path Travel Time Distributions in Stochastic Time-Varying Networks with Correlations’, <i>Transportation Research Record</i> .                   |
| J3 | <b>Filipovska, M.</b> and Mahmassani, H. S. (2020) ‘Traffic Flow Breakdown Prediction using Machine Learning Approaches’, <i>Transportation Research Record</i> .<br>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*, 2673(11), pp. 628–639.  
doi: 10.1177/0361198119851730.
- J5\*\* **Filipovska, M.** and Mahmassani, H. S. ‘Characterization and Modeling of Stochastic Dynamic Transportation Networks with Spatio-Temporal Dependencies’ (under review)

### **Manuscripts in Preparation**

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- M1 **Filipovska, M.** and Mahmassani, H. S. ‘Modeling and Estimation of Path Travel Time Distributions in Stochastic Dynamic Networks with Spatio-Temporal Dependencies.’
- M2 **Filipovska, M.** and Mahmassani, H. S. ‘Approximate A Priori Path Finding with Least-Time Reliability-Based Objectives in Interdependent Stochastic Dynamic Networks.’
- M3 **Filipovska, M.** and Mahmassani, H. S. ‘Information-Adaptive Routing Problems in Stochastic Dynamic Networks with Spatio-Temporal Dependencies.’
- M4 **Filipovska, M.** and Mahmassani, H.S. ‘Information-Adaptive Routing in a Connected Dynamic Environment.’

### **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 **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. (under review)
- P2 **Filipovska, M.**, Mahmassani, H. S. (2021) Information-adaptive Routing Strategies in Stochastic Dynamic Transportation Networks with Real-time Connected Vehicle Data. The 2021 Annual Meeting of the Institute for Operations Research and the Management Sciences (INFORMS). (accepted)
- P3 **Filipovska, M.**, Mahmassani, H. S. (2021) Information-Adaptive Routing in a Connected Dynamic Environment. 2021 24<sup>th</sup> International Conference on Intelligent Transportation Systems (ITSC). (accepted)
- P4 **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)
- P5 **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)
- P6 **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.

- P7 **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 (ITSC).
- P8 **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.
- P9 **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.
- P10 **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.
- P11 Jabari, S. E., Zheng, F., Liu, H., & **Filipovska, M. (2018).** Stochastic Lagrangian modeling of traffic dynamics. The 97th Annual Meeting of the Transportation Research Board, Washington, DC (No. 18-04170).

#### **Other Conference Contributions, Presentations, Invited Talks**

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- O1 **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). (accepted)
- O1 **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.
- O2 **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
- O3 **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)
- O4 **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, University of California, Los Angeles (UCLA)

## RESEARCH GRANTS

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**Co-Principal Investigator**, “Development of a Truck Parking Information Management System for Real-time Dissemination of Commercial Vehicle Parking Information”, Federal Motor Carrier Safety Administration (FMCSA), Connecticut Department of Motor Vehicles (CTDMV), \$1,726,540

## RESEARCH EXPERIENCE

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<b>Dissertation Research</b> , Travel Time Reliability in Stochastic Dynamic Networks: Modeling, Path Finding and Routing, Northwestern University Transportation Center	2020 – 21
<b>Lead Graduate Research Assistant</b> , Estimation of Travel Time Distributions Along User-Defined Travel Paths, U.S. Department of Transportation, Federal Highway Administration	2018 – 20
<b>Graduate Student Researcher</b> , Implementation of Analysis, Modeling and Simulation Tools for Road Weather Connected Vehicle Applications, U.S. Department of Transportation, Federal Highway Administration	2019
<b>Graduate Student Researcher</b> , Integrated Modeling for Road Condition Prediction, U.S. Department of Transportation, Federal Highway Association	2018 – 19
<b>Postgraduate Research Assistant</b> , Traffic State Estimation for Real-time Traffic Analysis, New York University Abu Dhabi	2017

## AWARDS & HONORS

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<b>ILITE Graduate Scholarship Award</b> , Institute of Transportation Engineers (ITE) - Illinois Section	2020
<b>ITSC 2020 Best Presentation Award, <i>Third prize</i></b> , 23 <sup>rd</sup> IEEE Intelligent Transportation Systems Conference (ITSC)	2020
<b>CIRTL Scholar Certificate</b> , Center for Integration of Research, Teaching and Learning (CIRTL) Network	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 Associate Certificate</b> , Center for Integration of Research, Teaching and Learning (CIRTL) Network	2019
<b>Walter P. Murphy Fellow</b> , McCormick School of Engineering, Northwestern University	2017-18

## TEACHING AND ADVISING EXPERIENCE

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### Instructor

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<b>Transportation Planning</b> , Department of Civil and Environmental Engineering, University of Connecticut	Fall 2021
<b>Operations Research in Civil and Environmental Engineering</b> , Department of Civil and Environmental Engineering, University of Connecticut	Spring 2022

**Co-Instructor**


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<b>Civil and Environmental Engineering Systems Analysis</b> , Department of Civil and Environmental Engineering, Northwestern University <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 <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

**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 Project: <i>Content Relevance and Social Pedagogies: Fostering Student Motivation in a Blended Learning Environment</i> , Course Context: Data Analytics for Transportation and Urban Infrastructure Applications	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

**PROFESSIONAL DEVELOPMENT**


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<b>Mathematical Challenges and Opportunities for Autonomous Vehicles Program</b> , <i>Fellow and Core Participant</i> , Institute of Pure and Applied Mathematics, University of California, Los Angeles (UCLA)	2020-21
<b>Workshop on Autonomous Vehicles</b> , Institute of Pure and Applied Mathematics, University of California, Los Angeles (UCLA)	2019

## SERVICE

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### Professional Service

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#### Journal Referee Service:

Transportation Research Board Annual Meeting / Transportation Research Record  
 IEEE International Conference on Intelligent Transportation Systems  
 IEEE Transactions on Intelligent Transportation Systems  
 Journal of Intelligent Transportation Systems

#### Conferences:

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

### Professional Activities

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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

Member, Transportation Research Forum (TRF)

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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Northwestern University Chapter of the American Society of Civil Engineers (NU-ASCE)

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

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

Graduate Chapter of the Society of Women Engineers (GradSWE), Northwestern University

Undergraduate Curriculum Committee Student Representative, New York University Abu Dhabi

Engineering Division Student Representative: New York University Abu Dhabi