CURRICULUM VITAE

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Current as of December 2023

Highlights

ZONGZHI LI is a tenured full professor at the Illinois Institute of Technology (IIT), USA, where he directs the Sustainable Transportation and Infrastructure Research (STAIR) Center and the Transportation Engineering Laboratory (TE Lab). He earned his Bachelor of Engineering from Chang'an University, China, and his MSCE, MSIE, and Ph.D. from Purdue University. After completing his Ph.D. in 2003, Dr. Li worked as a postdoctoral researcher of the Traffic Operations and Safety Laboratory (TOPS Lab) at the University of Wisconsin-Madison before joining IIT as a tenure-track assistant professor in 2004. He has served as the Principal Investigator (PI) for over $4.26 million in research funding, focusing on multimodal travel demand, transportation system performance modeling, asset management, and network economics. He has supervised more than 100 graduate students and has published four books, including Transportation Asset Management: Methodology and Applications (ISBN: 978-148-221-052-1) as the world's first graduate-level textbook in the area, and Megacity Mobility: Integrated Urban Transportation Development and Management (ISBN: 978-036-736-358-1), three book chapters, and 80 peer-reviewed papers. Additionally, Dr. Li developed three software packages, holds seven U.S. patents, and serves on the editorial boards of the *American Society of Civil Engineers (ASCE) Journal of Infrastructure Systems* and the *Elsevier Journal of Traffic and Transportation Engineering*, as well as a handling editor for the *Sage Journal of Transportation Research Record*. His accolades include the ASCE Arthur M. Wellington Prize (2011), Sigma Xi Award for Research Excellence (2011), Charley V. Wootan Award given by the U.S. Council of University Transportation Centers (2000), and the International Road Federation Fellowship Award (1998).

MAJOR ACCOMPLISHMENT HIGHLIGHTS

I.	**Research and Scholarly Achievements**	
	External research funding as Principal Investigator (PI) [one project as Co-PI]	$4.26 million
	Major research facility development	1
	Publications—books	4
	Publications—book chapters	3
	Publications—peer-reviewed journal papers	63
	Publications—peer-reviewed conference proceedings papers	20
	U.S. patents	7
	Software packages	3
	Google scholar citations:	2,458
	Google scholar h-index:	25
	Google scholar i10-index:	55
	Mentoring and supervision—visiting scholars	15
	Mentoring and supervision—Ph.D. students graduated [7 on university faculty]	14
	Mentoring and supervision—Ph.D. students current	5
	Mentoring and supervision—master's thesis (MSCE) students graduated	18
	Mentoring and supervision—master's thesis (MSCE) students current	1
	Mentoring and supervision—master's non-thesis (MTE) students graduated	81
	Mentoring and supervision—master's non-thesis (MTE) students current	12
	Mentoring and supervision—Master of Public Works (MPW) students graduated	20
	Mentoring and supervision—MPW student current	1
	Mentoring and supervision—Ph.D. thesis committees served	27
	Mentoring and supervision—MSCE thesis committees served	5
	National awards	3
	University-level research award	1
II.	**Education Achievements with Emphasis on Teaching**	
	Courses taught	6
	Course evaluation—Course	4.23–4.54/5.0
	Course evaluation—Instructor	4.34–4.73/5.0
	Teaching recognition—Dean's letters	3
III.	**Service to the University**	
	Student recruitment, counseling, and administrative assignments—Programs	2
	Faculty advisor to student organization	1
	Service on university committee	1
	Service on departmental committees	2
	Service on university administrative assignments	4
IV.	**Advancement of the Profession and Recognition as a Professional**	
	Lectures at professional society meetings	49
	Membership of governmental, technical, and scientific committees—Past	8
	Membership of governmental, technical, and scientific committees—Current	2
	Organization of conferences	4
	Service as an editor of journals	2
	Service on the editorial board of a journal	1
	Service as a referee of national research awards	3
	Service as a reviewer of book proposals	3
	Service as a reviewer of journal articles	200+
	Service as a reviewer of external agency proposals	5
	Professional licensure and credential	1
	Membership in national professional societies	3
	Honors	6

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A. GENERAL INFORMATION

A.1 Personal Identifier

Name: Zongzhi Li
Nationality: Naturalized U.S. Citizen
Title: Professor
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Programs: Transportation Engineering, Public Works

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A.2 Education

Ph.D. Transportation and Infrastructure Systems Engineering Purdue University **December 2003**
Dissertation: Multicriteria Highway Programming Incorporating Risk and Uncertainty: A Methodology for Highway Asset Management System
Advisor: Kumares C. Sinha (**Member of U.S. National Academy of Engineering**)

MSIE Operations Research Purdue University **August 2002**
Advisor: Thomas L. Morin

MSCE Transportation and Infrastructure Systems Engineering Purdue University **May 2000**
Thesis: A Methodology for the Determination of Load and Non-load Shares of Highway Pavement Routine Maintenance and Rehabilitation Expenditures
Advisor: Kumares C. Sinha

BE *Magna Cum Laude* Chang'an University, Xi'an, China

A.3 Professional History

A.3.1 Administrative

- 09/2011–Present, Director, STAIR Center, Illinois Institute of Technology, Chicago, Illinois
- 09/2006–08/2011, Associate Director, Sustainable Transportation and Infrastructure Research (STAIR) Center, Illinois Institute of Technology, Chicago, Illinois
- 08/2004–Present, Director, Transportation Engineering Laboratory, Illinois Institute of Technology, Chicago, Illinois

A.3.2 Non-Administrative

- 11/2017–Present, Professor, Illinois Institute of Technology, Chicago, Illinois
- 04/2010–10/2017, Associate Professor (with Tenure), Illinois Institute of Technology, Chicago, Illinois
- 08/2004–03/2010, Assistant Professor, Illinois Institute of Technology, Chicago, Illinois
- 10/2003–08/2004, Postdoctoral Researcher, University of Wisconsin, Madison, Wisconsin
- 07/1998–09/2003, Graduate Research Assistant, Purdue University, West Lafayette, Indiana

B. RESEARCH AND SCHOLARLY ACHIEVEMENTS

B.1 Research Interest

My research in Transportation Engineering is concentrated on four major themes: (1) multimodal travel demand forecasting; (2) transportation infrastructure and traffic network performance analysis and modeling [with emphases on facility life-cycle agency costs, user costs, mobility, safety, security, environmental impacts, resilience, quality of life, and economic development]; (3) transportation asset management [addressing issues of interdependency and integration of transportation facility, vehicle, and user/non-user components, project evaluation incorporating risk and uncertainty, innovative transportation funding and financing, and budget allocation decision-making]; and (4) new technology-, especially Artificial Intelligence (AI)-enabling transportation development and management.

B.2 Externally Funded Research as PI or a Major Co-PI after Tenure Promotion

No.	Title	Funding Agency	Amount ($)	Status
1	An Innovative Methodology for Urban Street Network Bus Signal Priority Optimization (PI)	ITS Research Initiative	500,000	09/15/2015–09/14/2019
2	Coordinated Transit Response Planning and Operations Support Tools for Mitigating Impacts of All-Hazard Emergency Events (PI)	Federal Transit Administration	375,000	07/01/2016–06/31/2018
3	Signal Timing Optimization for Large-Scale Urban Networks under Dynamic Traffic (PI)	U.S. DOT Region 5 University Transportation Center	200,000	10/01/2012–12/31/2016
4	Galvin Mobility Initiative: Innovative Methods for Accelerated Construction of Underground Intersections and Systemwide Signal Timing Optimization to Mitigate Urban Congestion (PI)	Galvin Mobility Initiative by Mr. Robert W. Galvin	319,312	02/01/2012–1/31/2014
5	Evaluating and Prioritizing Major Capital Investment Projects Proposed by the Illinois State Toll Highway Authority	Illinois State Toll Highway Authority	150,000	02/01/2012–12/31/2012
6	Galvin Mobility Initiative: Technical Support for the China Mobility Project (PI)	Reason Foundation	12,000	07/01/2010–12/31/2013
7	Galvin Mobility Initiative: A Study on Urban Fixed Guideway System Financing and Investments in China (Senior Analyst of Reason Foundation's Joint Project Team and PI of IIT Group)	Reason Foundation	50,000	07/01/2010–12/31/2013
8	Galvin Mobility Initiative: Determining the Optimal Scale of China Tollway Network (Senior Analyst of Reason Foundation's Joint Project Team and PI of IIT Group)	Reason Foundation	50,000	07/01/2010–12/31/2013
9	Galvin Mobility Initiative: A Study of Sustainable Multimodal Transportation Planning in Chongqing (Senior Analyst of Reason Foundation's Joint Project Team and PI of IIT Group)	Reason Foundation	331,750	07/01/2010–12/31/2013
10	Galvin Mobility Initiative: Impacts of China Class II Highway Toll Structure Changes Caused by Highway Fuel Tax-for Fee Policy Reform (Senior Analyst of Reason Foundation's Joint Project Team and PI of IIT Group)	Reason Foundation	63,875	07/01/2010–12/31/2013
11	Galvin Mobility Initiative: Socioeconomic Impact Assessment of BRT Deployment in China (Senior Analyst of Reason Foundation's Joint Project Team and PI of IIT Group)	Reason Foundation	51,400	07/01/2010–12/31/2013
12	Expansion of the IIT PRETRANS Program (PI)	U.S. DOT Region 5 University Transportation Center	25,000	07/01/2010–12/31/2011
	Subtotal		2,128,337	

B.3 Externally Funded Research as PI or a Major Co-PI before Tenure Promotion

No.	Title	Funding Agency	Amount ($)	Status
13	Regional Transportation Simulation Tool for Evacuation Planning (RTSTEP) (Subcontractor)	Argonne National Laboratory's Transportation Research and Computing Center	100,000	10/15/2009–07/31/2010
14	Multicommodity Flows and Algorithmic Graph Theory in Sustainable Transportation Decision-Making (PI)	IIT Educational and Research Initiative Fund	25,000	01/01/2010–12/31/2010
15	Development and Application of the TRANSIMS Toolbox for Transportation Operations Management in and around Chicago Central Area (PI)	Federal Highway Administration	678,744	11/19/2009–05/18/2011
16	Rapid Replacement/ Construction of Bridges (PI)	National Center for Freight and Infrastructure Research and Education	57,000	06/01/2009–06/30/2011
17	Methodology for Estimating Life Expectancies of Highway Assets (Subcontractor of Purdue University's Joint Research Team)	National Cooperative Highway Research Program	10,000	01/01/2009–06/30/2011
18	Safety Impacts of Highway Shoulder Attributes in Illinois (PI)	Illinois Center for Transportation	105,000	01/01/2008–09/30/2010
19	Galvin Mobility Initiative: Innovative Methods for Accelerated Construction of Overpass Structures to Mitigate Urban Traffic Congestion (PI)	Galvin Mobility Initiative by Mr. Robert W. Galvin	188,941	07/01/2007–5/30/2009
20	A Methodology for Integrating Roadway Safety Hardware Asset Management into the Overall Highway Asset Management System (PI)	Midwest Regional University Transportation Center	50,000	03/01/2007–06/30/2008
21	Tradeoff Analysis Methodology for Asset Management (PI)	Purdue University Joint Transportation Research Program	50,000	01/01/2007–12/31/2008
22	Highway Work Zone Safety Audit Guidelines Development and Training (Co-PI)	Federal Highway Administration	750,000	09/15/2006–09/15/2010
23	Crash Data Analysis and Engineering Solutions for Local Agencies in Illinois (PI)	Illinois Center for Transportation	37,500	07/01/2006–06/30/2008
24	Optimal Investment Decision-Making for Highway Transportation Asset Management under Risk and Uncertainty (PI)	Midwest Regional University Transportation Center	60,000	07/01/2006–02/29/2008
25	2006-2017 IIT Pre-College Transportation (PRETRANS) Program (PI)	American Society of Civil Engineers, ITE IL Sections	20,000 (Cumulative)	07/15–07/31 in each year
	Subtotal		2,132,185	

B.4 Internally Funded Research as PI

No.	Title	Funding Agency	Amount ($)	Status
26	IIT Fall 2007 Teaching Grants for Innovative Faculty (PI)	Illinois Institute of Technology	2,000	09/01/2007–12/31/2007
	Subtotal		2,000	
	Total		4,262,522	

C. MAJOR RESEARCH FACILITY DEVELOPMENT

As a founding member and Director of the IIT Sustainable Transportation and Infrastructure Research (STAIR) Center created in 2006, I have led extensive research in areas of urban/ metropolitan transportation congestion relief, evacuation planning/emergency management, and capital investment analysis; transportation safety analysis; and performance-based transportation asset management. Some notable research contributions include: (1) inventing continuous traffic flow overpass and underpass systems, (2) developing the world's largest high-fidelity Chicago TRANSIMS (TRansportation ANalysis SIMulation System) model as the next generation toolbox for multimodal transportation planning, traffic operations, and evacuation planning/emergency management analysis, (3) developing the Chicago transportation evacuation planning/emergency management tools, (4) discovering interdependency relationship of transportation investments, (5) introducing a method for networkwide intersection signal timing optimization/bus signal priority, (6) developing the national work zone safety audit guidelines, (7) developing a disaggregated highway safety analysis method, (8) introducing a project-level life-cycle cost analysis method under risk and uncertainty, (9) developing an interdependent investment alternative evaluation model, (10) developing alternative investment tradeoff analysis methods, and (11) publishing the world's first graduate-level textbook in the field of transportation asset management titled "Transportation Asset Management: Methodology and Applications" by Taylor & Francis Publisher/CRC Press (ISBN-13: 978-1482210521). As of June 30, 2023, more than 1,000 copies have been sold worldwide.

D. PUBLICATIONS

D.1 Refereed Textbooks and Monographs

1. Singh, V.P., Z. Li, N.A. Siddiqui, and H. Patel. 2022. *Sustainable Infrastructure Development- Select Proceedings of ICSIDIA 2020*. Springer Nature Singapore Pte Ltd., Singapore (ISBN: 978-981-166-646-9).
2. Li, Z., S. A. Moore, and S. Staley. 2021. *Megacity Mobility: Integrated Urban Transportation Development and Management*. CRC Press, Taylor & Francis Group, Boca Raton, FL (ISBN: 978-036-736-358-1).
3. Li, Z. 2018. *Transportation Asset Management*: *Methodology and Applications*, First Edition. CRC Press, Taylor & Francis Group, Boca Raton, FL (ISBN: 978-148-221-052-1).
4. Zhou, B., and Z. Li. 2015. *Interdependent Transportation Project Programming under Uncertainty:* Models and Applications for Optimal Transportation Investment Decision-Making. Scholars' Press, OmniScriptum GmbH & Co. KG, Saarbrücken, Germany (ISBN: 978-363-976-862-6).

D.2 Refereed Book Chapters

1. Li, Z., S. Madanua, and S. Lee. 2011. Highway Transportation Project Evaluation and Selection Incorporating Risk and Uncertainty. *Stochastic Optimization: Seeing the Optimal for the Uncertain*, 321–350. INTECH, Vienna, Austria (ISBN: 978-953-307-829-8).
2. Li, Z., S. Labi, and K.C. Sinha. 2002. Highway Asset Management. *Civil Engineering Handbook, 2nd Edition*, 66-1 to 66-34. CRC Press LLC, Boca Raton, FL (ISBN: 084-930-958-1).
3. Sinha, K.C., and Z. Li. 2002. Intelligent Transportation Systems. *McGraw-Hill Encyclopedia of Science and Technology, 9th Edition*, 222–226. McGraw-Hill, New York, NY (ISBN: 978-007-052-771-7).

D.3 Refereed Journal Papers

1. Zhou, B., S. Zhang, X. Zhang, Z. Li, X. Lu, and J. Li. 2023. Exploring Factors Affecting Red-Light Running Behavior of Delivery Riders in China. *Elsevier Journal of Accident Analysis and Prevention* (In Revision).

2. Zhou, B, Q. Zhou, and Z. Li. 2024. Addressing Data Imbalance in Crash Data: Evaluating Generative Adversarial Network's Efficacy against Conventional Methods. *IEEE Access*, 13, 2929-2944. doi: 10.1109/ACCESS.2024.3524620.

3. Seilabi, S.E., M. Pourgholamali, M. Miralinaghi, G.H. de Almeida Correia, Z. Li, and S. Labi. 2024. Sustainable Planning of Electric Vehicle Charging Stations: A Bi-Level Optimization Framework for Reducing Vehicular Emissions in Urban Road Networks. *Sustainability* 2025, 17(1), 1. doi.org/10.3390/su17010001.

4. Truong, T, Z. Li. 2023. Incorporated Dempster-Shafer Theory, MACONT, and E-STEP Method (DSM-E-STEP) for Multicriteria Tradeoff Analysis in Transportation Budget Allocation. *IEEE Access*, 3298595. doi: 10.1109/ACCESS.2023.3298595.

5. Huang, Y., Z. Li, S. Zhang, B. Zhou, L. Zhang 2023. Dataset for Developing Optimal Headway-Based Bus Dispatching Strategy During Epidemic Outbreaks. *Data in Brief*, Volume 49, 109423, ISSN 2352-3409. doi.org/10.1016/j.dib.2023.109423.

6. Huang, Y., Z. Li, S. Zhang, B. Zhou, L. Zhang 2023. Optimal Headway-Based Bus Dispatching Strategy under the Influence of Epidemic Outbreaks. *Elsevier Journal of Sustainable Cities and Society*, S2210-6707(23)00079-3. doi: 10.1016/j.scs.2023.104468.

7. Yuan, Z., J. Liu, Y. Liu, Y. Li, and Z. Li. 2022. A Two-Stage Modelling Method for Multi-Station Daily Water Level Prediction. *Environmental Modelling and Software* **156**, 105468. doi: 10.1016/j.envsoft.2022.105468.

8. Terraza, M.F., J. Zhang, and Z. Li. 2021. Networkwide Vehicle Delay Reductions from Intersection Signal Timing Optimization. *PROMET Journal of Traffic and Transportation Engineering* **33**(4), 579-592. doi: 10.7307/ptt.v33i4.3694.

9. Truong, T., J. Zhang, Z. Li, and L. Wang. 2021. Incorporating Herfindahl-Hirschman Index to Compromise Programming for Optimal Transportation Investment Decisions. *TRB Journal of Transportation Research Record* 2021, doi.org/10.1177/03611981211011648.

10. Yuan, Z., J. Liu, Q. Zhang, Y. Liu, Y. Yuan, and Z. Li 2021. Prediction and Optimization of Fuel Consumption for Inland Ships Considering Real-Time Status and Environmental Factors. *Elsevier Journal of Ocean Engineering* **221**, 108530, doi: 10.1016/j.oceaneng.2020.108530.

11. Yuan, Z., J. Liu, Y. Liu, Q. Zhang, Y. Yuan, and Z. Li. 2021. A Practical Estimation Method of Inland Ship Speed Under Complex and Changeful Navigation Environment. *IEEE Access* **9**, 15643–15658. doi: 10.1109/ACCESS.2021.3052473.

12. Guo, Y., B. Li, M.D. Christie, Z. Li, M.A. Sotelo, Y. Ma, D. Liu, and Z. Li. 2020. Hybrid Dynamic Traffic Model for Freeway Flow Analysis Using a Switched Reduced-Order Unknown-Input State Observer. *MDPI Journal of Sensors* **2020**, 20, 1609. doi: 10.3390/s20061609.

13. Jiao, S., S. Zhang, Z. Li, B. Zhou, and D. Zhao. 2020. An Improved Car-Following Speed Model considering Speed of the Lead Vehicle, Vehicle Spacing, and Driver's Sensitivity to Them. *Wiley Journal of Advanced Transportation* **2020**, ID 2797420. doi: 10.1155/2020/2797420.

14. Zhou, B., X. Xu, S. Zhang, Z. Li, S. Sun, K. Shu, and Q. Sun. 2020. Comparing Factors Affecting Injury Severity of Passenger Car and Truck Drivers. *IEEE Access* **8**, 153849–153861. doi: 10.1109/ACCESS.2020.3018183.

15. Huang, Y., and Z. Li. 2020. Optimal Multimodal Travelway Design for an Urban Street Network. *IEEE Access* **2169-3536**, 1–13. doi: 10.1109/ACCESS.2020.3030234.

16. Yuan, Z., J. Liu, Y. Liu, Y. Yuan, Q. Zhang, and Z. Li. 2020. Fitting Analysis of Inland Ship Fuel Consumption Considering Navigation Status and Environmental Factors. *IEEE Access* **8**, 187441–187454. doi: 10.1109/ACCESS.2020.3030614.

17. Liu, Y., Z. Li, J. Zhang, and Y. Wang. 2020. CO_2 Emissions and User Costs for Normal Traffic and Work Zone Conditions in Highway Pavement Service Life Cycle. *Juniper Journal of Civil Engineering Research* **10**(5), doi: 10.19080/CERJ.2020.10.555799.

18. Zhou, B., X. Zhang, S. Zhang, Z. Li, and X. Liu. 2019. Analysis of Factors Affecting Real-Time Ridesharing Vehicle Crash Severity. *MDPI Journal of Sustainability* **11**, 3334, doi: 10.3390/su11123334.

19. Zhou, B., Z. Li, and S. Zhang, X. Zhang, X. Liu, and Q. Ma. 2019. Analysis of Factors Affecting Hit-and-Run and Non-Hit-and-Run in Vehicle-Bicycle Crashes: A Non-Parametric Approach Incorporating Data Imbalance Treatment. *MDPI Journal of Sustainability* **11**, 1327, doi: 10.3390/su11051327.

20. Guo, J., Y. Kong, Z. Li, W. Huang, J. Cao, and Y. Wei. 2019. A Model and Genetic Algorithm for Area-Wide Intersection Signal Optimization under User Equilibrium Traffic. *Elsevier Journal of Mathematics and Computer in Simulation* **155**(C), 92–104. doi: 10.1016/j.matcom.2017.12.003.

21. Zhang, J., H. Patel, and Z. Li. 2019. Current Trend in Transportation Engineering. *Journal of Current Trends in Civil & Structural Engineering* **4**(2): 2019, doi: 10.33552/CTCSE.2019.04.000584.

22. Zhou, B., Z. Li, and S. Zhang. 2018. Comparison of Factors Affecting Crash Severities in Hit-and-Run and Non-Hit-and-Run Crashes. *Journal of Advanced Transportation* **Nov 2018**, 1–11. doi: 10.1155/2018/8537131.

23. Liu, Y., X. Luo, J. Liu, Z. Li, and W. Liu. 2017. Mixed Models of Single Berth Inter-Arrival Time Distributions. *ASCE Journal of Waterway, Port, Coastal, and Ocean Engineering*, doi: 10.1061/(ASCE)WW.1943-5460.0000421.

24. Truong, T., Z. Li, and K. Kepaptsoglou. 2017. An Entropy-STEM Tradeoff Analysis Method for Multiobjective Transportation Decision-Making. *ASCE Journal of Transportation Engineering* **144**(1), doi: 10.1061/JTEPBS.0000100.

25. Li, Z. Dao, H., H. Patel, Y. Liu, and A.M. Roshandeh. 2017. Incorporating Traffic and Safety Hardware Performance Functions into Risk-Based Highway Segment Safety Evaluation. *PROMET Journal of Traffic and Transportation Engineering* **29**(2), 143–153. doi: 10.7307/ptt.v29i2.2041.

26. Liu, Z., J. Liu; H. Li, Z. Li, Z. Tan, R.W. Liu, and Y. Liu. 2017. Hierarchical and Coupling Model of Factors Influencing Vessel Traffic Flow. *PLOS ONE* **12**(4), e0175840. doi: 10.1371/journal.pone.0175840.

27. Liu, Z., J. Liu, Z. Li, Z. Tan, and W. Guo. 2017. Characteristics Analysis of Vessel Traffic Flow and Its Mathematical Model. *Journal of Marine Science and Technology* **25**(2), 230–241. doi: 10.6119/JMST-017-0109-1.

28. Liu, Y., Z. Li, J. Liu, and H. Patel. 2016. Vehicular Crash Data Used to Rank Intersections by Injury Crash Frequency and Severity. *Elsevier Journal of Transportation Research: Part C, Data in Brief*, Vol. **8,** 930–933. doi: 10.1016/j.dib.2016.06.046.

29. Liu, Y., Z. Li, J. Liu, and H. Patel. 2016. A Double Standards Model for Emergency Medical Services Allocation Considering Resource Uncertainty. *Elsevier Journal of Transportation Research: Part C* **69**, 120–133. doi: 10.1016/j.trc.2016.05.023.

30. Roshandeh, A.M., Z. Li, S. Zhang, H.S. Levinson, and Y. Liu. 2016. Vehicle and Pedestrian Safety Impacts of Signal Timing Optimization in a Dense Urban Street Network. *Elsevier Journal of Traffic and Transportation Engineering* **3**(1), 16–27. doi: 10.1016/j.jtte.2016.01.001.

31. Liu, J., F. Zhou, Z. Li, M. Wang, and R. Liu. 2015. Dynamic Ship Domain Models for Capacity Analysis of Restricted Water Channels. *Journal of Navigation* **69**(3), 481–503. doi: 10.1017/S0373463315000764.

32. Roshandeh, A.M., Z. Li, M. Neishapouri, H. Patel, and Y. Liu. 2015. A Tradeoff Analysis Approach for Multiobjective Transportation Investment Decision-Making. *ASCE Journal of Transportation Engineering* **141**(3), 04014085. https://doi.org/10.1061/(ASCE)TE.1943-5436.0000747.

33. Bai, Q., A. Ahmed, Z. Li, and S. Labi. 2014. A Hybrid Pareto Frontier Generation Method for Analyzing Trade-offs among Transportation Performance Measures. *Wiley Journal of Computer-Aided Civil and Infrastructure Engineering* **30**(3), 163–180. doi: 10.1111/mice.12079.

34. Lee, Y., Z. Li, S. Zhang, A.M. Roshandeh, H. Patel, and Y. Liu. 2014. Safety Impacts of Red Light Running Photo Enforcement on Signalized Urban Intersections. *Elsevier Journal of Traffic and Transportation Engineering*, **1**(5), 309–324. doi: 10.1016/S2095-7564(15)30278-6.

35. Wang, J., X. Mao, Z. Li, A. Moore, and S. Staley. 2014. Determining the Reasonable Scale of a Toll Highway Network in China. *ASCE Journal of Transportation Engineering* 1**40**(10), 04014046. doi: 10.1061/(ASCE)TE.1943-5436.0000671.

36. Liu, Y., Roshandeh, A.M., Z. Li, K. Kepaptsoglou, H. Patel, and X. Lu. 2014. Heuristic Approach for Optimizing Emergency Medical Services in Road Safety within Large Urban Networks. *ASCE Journal of Transportation Engineering* **140**(9), 04014043. doi: 10.1061/(ASCE)TE.1943-5436.0000684.

37. Wang, Y., L. Li, Z. Wang, A. Moore, S. Staley, and Z. Li. 2014. Modeling Traveler Mode Choice Behavior of a New High-Speed Rail Corridor in China. *Taylor and Francis Journal of Transportation Planning and Technology*, **37**(5), 466–483. doi: 10.1080/03081060.2014.912420.

38. Roshandeh, A.M., H.S. Levinson, Z. Li, H. Patel, and B. Zhou. 2014. New Methodology for Intersection Signal Timing Optimization to Simultaneously Minimize Vehicle and Pedestrian Delays. *ASCE Journal of Transportation Engineering*, **140**(5), 04014009. doi: 10.1061/(ASCE)TE.1943-5436.0000658.

39. Zhou, B., Z. Li, H. Patel, and A.M. Roshandeh. 2014. Risk-Based Two-Step Optimization Model for Optimal Highway Transportation Investment Decision-Making. *ASCE Journal of Transportation Engineering*, **140**(5), 04014007. doi: 10.1061/(ASCE)TE.1943-5436.0000652.

40. Li, Z., K. Kepaptsoglou, Y. Lee, H. Patel, Y. Liu, and H.G. Kim. 2013. Safety Effects of Shoulder Paving for Rural and Urban Interstate, Multilane, and Two-Lane Highways. *ASCE Journal of Transportation Engineering* **139**(10), 1010–1019. doi: 10.1061/(ASCE)TE.1943-5436.0000580.

41. Li, Z., A.M. Roshandeh, B. Zhou, and S.H. Lee. 2013. Optimal Decision-Making of Interdependent Tollway Capital Investments Incorporating Risk and Uncertainty. *ASCE Journal of Transportation Engineering* **139**(7), 686–696. doi: 10.1061/(ASCE)TE.1943-5436.0000540.

42. Wang, Y. Z. Wang, Z. Li, A. Moore, S. Staley, and Y. Gao. 2013. Study of Modal Shifts to Bus Rapid Transit in Chinese Cities. *ASCE Journal of Transportation Engineering* **139**(5), 515–523. doi: 10.1061/(ASCE)TE.1943-5436.0000523.

43. Ahmed, A., S., Labi, Z. Li, and T. Shields. 2013. Aggregate and Disaggregate Statistical Evaluation of the Performance-based Effectiveness of LTPP SPS-5 Flexible Pavement Rehabilitation Treatments. *Journal of Structure and Infrastructure Engineering* **9**(2), 172–187. DOI: 10.1080/15732479.2010.524224.

44. Li, Z., H. Kaul, S. Kapoor, E. Veliou, B. Zhou. 2012. New Methodology for Transportation Investment Decisions with Consideration of Project Interdependencies. *TRB Journal of Transportation Research Record* **2285**, 36–46. doi: 10.3141/2285-05.

45. Kepaptsoglou, K., M.G. Karlaftis, and Z. Li. 2010. Optimizing Pricing Policies in Park-and-Ride Facilities: A Model and Decision Support System with Application. *International Journal of Transportation Systems Engineering and Information Technology* **10(**5), 53–65. doi: 10.1016/S1570-6672(09)60063-5.

46. Li, Z. 2010. Highway Work Zone Safety Audits for Safety Improvements. *Engineering, Construction and Architectural Management* **17**(5), 512–526. doi: 10.1108/09699981011074592.

47. Li, Z., S. Madanu, Y. Wang, M. Abbas, and B. Zhou. 2010. A Heuristic Approach for Selecting Highway Investment Alternatives. *Wiley Journal of Computer-Aided Civil and Infrastructure Engineering* **25**(6), 427–439. doi: 10.1111/j.1467-8667.2010.00653.x.

48. Madanu, S., Z. Li, and M. Abbas. 2010. Life-Cycle Cost Analysis of Highway Intersection Safety Hardware Improvements. *ASCE Journal of Transportation Engineering* **136**(2), 129–140. doi: 10.1061/(ASCE)TE.1943-5436.0000082.

49. Li, Z., S. Labi, M. Karlaftis, K. Kepaptsoglou, M. Abbas, B. Zhou, and S. Madanu. 2010. Project-Level Life-Cycle Benefit/Cost Analysis Approach for Evaluating Highway Safety Hardware Improvements. *TRB Journal of Transportation Research Record* **2160**, 1–11. doi: 10.3141/2160-01.

50. Li, J., Y. Sheng, Z. Li, and B. Zhou. 2010. A Disaggregated Approach for the Computation of Network Level Highway User Costs. *International Journal of Pavement Research and Technology* **3**(1), 24–33.

51. Sinha, K.C., V. Patidar, Z. Li, S. Labi, and P. Thompson. 2009. Establishing the Weights of Performance Criteria- Case Studies in Transportation Facility Management. *ASCE Journal of Transportation Engineering* **135**(9), 619–631. doi: 10.1061/(ASCE)TE.1943-5436.0000039.

52. Li, Z., and S. Madanu. 2009. Highway Project-Level Life-Cycle Benefit/Cost Analysis under Certainty, Risk, and Uncertainty: A Methodology with Case Study. *ASCE Journal of Transportation Engineering* **135**(8), 516–526. doi: 10.1061/(ASCE)TE.1943-5436.0000012.

53. Li, Z. 2009. Stochastic Model and $O(N^2)$ Algorithm for Highway Investment Decision-Making under Budget Uncertainty. *ASCE Journal of Transportation Engineering* **135**(6), 371–379. doi: 10.1061/(ASCE)0733-947X(2009)135:6(371).

54. Li, Z., and K.C. Sinha. 2009. Methodology for the Determination of Relative Weighs of Highway Asset Management System Goals and Performance Measures. *ASCE Journal of Infrastructure Systems* **15**(2), 95–105. doi: 10.1061/(ASCE)1076-0342(2009)15:2(95).

55. Li, Z., and K.C. Sinha. 2009. Application of Shackle's Model and System Optimization for Highway Investment Decision-Making under Uncertainty. *ASCE Journal of Transportation Engineering* **135**(3), 129–139. doi: 10.1061/(ASCE)0733-947X(2009)135:3(129).

56. Pittou, M., M.G. Karlaftis, and Z. Li. 2009. Nonparametric Binary Recursive Partitioning Method for Deterioration Prediction of Bridge Deck Elements. *Journal of Advances in Civil Engineering* **2009**, Article ID 809767, 1–12. doi: 10.1155/2009/809767.

57. Lamptey, G., S. Labi, and Z. Li. 2008. Decision Support for Optimal Scheduling of Highway Pavement Preventive Maintenance within Resurfacing Cycle. *Journal of Decision Support Systems* **46**(1), 376–387. doi: 10.1016/j.dss.2008.07.004.

58. Rodriguez, M.M., S. Labi, and Z. Li. 2006. Enhanced Bridge Replacement Cost Models for Indiana's Bridge Management System. *TRB Journal of Transportation Research Record* **1958**, 13–23. doi: 10.1177/0361198106195800102.

59. Li, Z., K.C. Sinha. 2004. Methodology for Multicriteria Decision Making in Highway Asset Management. *TRB Journal of Transportation Research Record* **1885**, 79–87. doi: 10.3141/1885-12.

60. Sinha, K.C., D. Bullock, C.T. Hendrickson, H.S. Levinson, R.W. Lyles, A.E. Radwan, and Z. Li. 2002. Development of Transportation Engineering Research, Education, and Practice in a Changing Civil Engineering World. *ASCE Journal of Transportation Engineering* **128**(4), 1–13. doi: 10.1061/(ASCE)0733-947X(2002)128:4(301).

61. Li, Z., K.C. Sinha, and P.S. McCarthy. 2001. Methodology to Determine Load and Non-Load Shares of Highway Pavement Rehabilitation Expenditures. *TRB Journal of Transportation Research Record* **1747**, 79–88. doi: 10.3141/1747-10.

62. Li, Z., K.C. Sinha, and P.S. McCarthy. 2001. A Determination of Load and Non-Load Shares of Highway Pavement Routine Maintenance Expenditures. *Journal of Road and Transport Research* **11**(2), 3–13. ARRB Transport Research Ltd., Melbourne, Australia.

63. Li, Z., and X. Li. 1994. Dry Compaction Techniques Developed Abroad for Highway Construction in Desert and Dry Areas. *Xinjiang Highway Transportation Science* **44**(3), 58–66.

D.4 Refereed Papers in Conference Proceedings

1. Hafizi, F., M. Miralinaghi, S. Kazemzadehazad, Z. Li, and M. Shahidehpour. 2025. Permanent/Mobile Combined Charging Stations for a Drone-based Delivery Network under Uncertain Demand. *2025 Annual Transportation Research Board Meeting*, Washington, D.C.

2. Kazemzadehazad, S., M. Miralinaghi, S. Sahebi, Z. Li, and F. Hafizi. 2025. The Impacts of Pandemic-Induced Productivity Changes on Future Working from Home Policies: A Comparative Study of Two Waves of COVID-19. *2025 Annual Transportation Research Board Meeting*, Washington, D.C.

3. Chen, Z., Z. Ni, P. Guan, L. Wang, L. Cai, M. Hashemi, and Z. Li. 2024. Optimizing NOMA Transmissions to Advance Federated Learning in Vehicular Networks. *2024 IEEE Global Communications Conference: Machine Learning for Communications*, Cape Town, South Africa.

4. Huang, Y., B. Zhou, Z. Li, and L. Zhang. 2021. Evaluation of Travel Lane Narrow Configurations and Inflow Restrictions on Congested Arterials. In *Proceedings of the 21st COTA International Conference of Transportation Professionals* (CICTP2021), Xi'an, China, 1808–1815. doi: 10.1061/9780784483565.174.

5. Yuan, Z., J. Liu, Y. Liu, B. Tu, Y. Li, Y. Liu, and Z. Li. Prediction Model of Inland Ship Fuel Consumption Considering Influence of Navigation Status and Environmental Factors. 2020. In *Proceedings of the IEEE 5th International Conference on Intelligent Transportation Engineering* (ICITE), Beijing, China, 71–75. doi: 10.1109/ICITE50838.2020.9231506.

6. Miralinaghi, M., Q. Bai, S. Labi, Z. Li, and K.C. Sinha. 2020. Trade-off Analysis under Uncertainty in Multiobjective Optimization for Transportation Asset Management. *2021 Annual Transportation Research Board Meeting*, Washington, D.C.

7. Zhang, S., L. Zhang, D. Wang, B. Zhou, and Z. Li. 2019. Research on the Stability of Urban Bus Network Based on Complex Networks Theory. In *Proceedings of the 19th COTA International Conference of Transportation Professionals* (CICTP2019), Nanjing, China, 1763–1775.

8. Labi, S., A. Shirole', A. Amekudzi-Kennedy, Z. Li, Q. Bai, and P. Chakraborty. 2019. Developing and Using Scaling Functions to Align Evaluation Criteria in Transportation Decision Making- A Synthesis and Case Study. *2019 World Conference on Transport Research*, Mumbai, India.

9. Moore, A.T., S.R. Staley, and Z. Li. 2012. Financing Rail Transit Projects in China: Challenges of Fiscal Sustainability. *Proceedings of the 17h HKSTS International Conference on Transportation and Geography*, 81–88.
10. Wang, Y., L. Wang, L. Li, S. Staley, A. Moore, and Z. Li. 2011. The Impact of High Speed Rail Development on Intercity Travel Choice in China. *Proceedings of the 16th HKSTS International Conference on Transportation and Geography*, 649–656.
11. Wang, Y., Y. Gao, Z. Wang, S. Staley, A. Moore, and Z. Li. 2011. The Impact of Bus Rapid Transit Development on Travel Choices in Chinese Cities. *Proceedings of the 16th HKSTS International Conference on Transportation and Geography*, 641–648.
12. Moore, A. S. Staley, Z. Li, and S. Oklobdzija. 2011. Public Private Partnerships for Highway Infrastructure: Lessons Learned from "Problem" Projects in the U.S. *Proceedings of the 16th HKSTS International Conference on Transportation and Geography*, 549–556.
13. Lee, Y., S. Lee, A. Moore, S. Staley, Z. Li, and B. Zhou. 2011. A Methodology for Assessing Safety Impacts of Highway Shoulder Paving. *Proceedings of the 16th HKSTS International Conference on Transportation and Geography*, 541–548.
14. Zhou, B., A. Moore, S. Staley, and Z. Li. 2010. A Two-Stage Optimization Model for Optimal Highway Transportation Investment Decision-Making. *Proceedings of the 15th HKSTS International Conference on Transportation and Geography*, 849–856.
15. Moore, A., S. Staley, and Z. Li. 2010. Meeting Mobility Needs in Megacities Using 3-D Transportation Planning: Concept and Applications. *Proceedings of the 15th HKSTS International Conference on Transportation and Geography*, 125–132.
16. Li, Z., S. Staley, and A. Moore. 2010. Geographically-Weighted Regression Models for Improved Predictability of Urban Intersection Vehicle Crashes. *Proceedings of the 15th HKSTS International Conference on Transportation and Geography*, 73–80.
17. Li, Z., S. Staley, and S. Madanu. 2009. A New Life-Cycle Cost Analysis Approach for Highway Project Evaluation under Risk and Uncertainty. *Proceedings of the 14th HKSTS International Conference on Transportation and Geography* **2**, 749–758.
18. Madanu, S., Z. Li, A. Moore, and S. Staley. 2009. A Life-Cycle Cost Analysis Approach for Assessing Highway Intersection Safety Hardware Improvements. *Proceedings of the 14th HKSTS International Conference on Transportation and Geography* **2**, 625–634.
19. Li, Z., and M. Puyan. 2006. A Stochastic Optimization Model for Highway Project Selection and Programming under Budget Uncertainty. *Proceedings of the 9th International Conference on Applications of Advanced Technology in Transportation*, 74–80.
20. Li, Z., and K.C. Sinha. 2006. Application of Shackle's Model for Highway Project Evaluation under Uncertainty. *Proceedings of the 9th International Conference on Applications of Advanced Technology in Transportation*, 67–73.

D.5 Publication in Peer Review

D.5.1 Refereed Journal Paper

1. Wang, J., Z. Li, and B. Zhou. 2025. On the Optimization of Bus Bridging Service. *Elsevier Journal of Sustainable Cities and Society* (In Peer Review).
2. Huang, Y., J. Wang, Z. Li, and B. Zhou. 2025. On the Optimization of Bus Bridging Service. *Elsevier Journal of Sustainable Cities and Society* (In Peer Review).

3. Wang, L., Z. Li. 2025. Random Parameter Interval Regression Model for Crash Frequency Data Analysis Involving Unreported Crash Cases. *Elsevier Journal of Transportation Research Interdisciplinary Perspectives* (In Peer Review).
4. Wang, L., Z. Li. 2025. Doubly Truncated Hurdle Model for Vehicle injury Crash analysis. *Elsevier Journal of Transportation Research Interdisciplinary Perspectives* (In Peer Review).
5. Wang, L., Huang, Y., and Z. Li. 2025. Temporal Instability and Unobserved Heterogeneity in Means and Variances of Random Parameters across Single-Vehicle Crash Severity Factors. *Elsevier Journal of Transportation Research Interdisciplinary Perspectives* (In Peer Review).

D.6 Publications in Progress

D.6.1 Refereed Textbooks and Monographs

1. Li, Z. 2022-2025. Editor/author for a book series of 11 books titled "Resilient and Sustainable Urban Transportation. *CRC Press Taylor and Francis Group* (In Preparation).

- Book 1: Integrated urban mixed-use development and multimodal transportation planning
- Book 2: Urban travel demand management
- Book 3: Resilient urban freeway, arterial, street, and pedestrian walkway networks
- Book 4: Sustainable urban transit network
- Book 5: Sustainable urban freight transportation/logistics network
- Book 6: Technology-enabled urban mobility
- Book 7: Urban transportation safety and security
- Book 8: Urban transportation and the environment
- Book 9: Urban transportation economy, funding and financing, and budget allocation
- Book 10: Resilient waterway transportation system
- Book 11: Sustainable and resilient air transportation system

D.6.2 Refereed Journal Papers

1. Neishapouri, M., H. Patel, and Z. Li. 2025. Optimization of Snow Removal Program for a Large-Scale Metropolitan Area. *Sustainability* (Ready for review submission).
2. Zhang, J., H. Patel, and Z. Li. 2025. Mobility Improvement Benefit Analysis of Signal Timing Optimization for an Urban Street Network. *Elsevier Journal of Traffic and Transportation Engineering* (Ready for review submission).
3. Zhang, J., H. Patel, and Z. Li. 2025. Signal Timing Optimization for an Urban Street Network: Methodology and Computational Study. *Elsevier Journal of Traffic and Transportation Engineering* (Ready for review submission).
4. Li, Z., and X. Lu. 2025. Optimal Intersection Signal Timing Design for an Urban Street Network Incorporating Dynamic Network Loading Considerations. *Wiley Journal of Computer-Aided Civil and Infrastructure Engineering* (Ready for review submission).
5. Ma, Z., W. Zhao, Z. Li, and D. Hu. 2025. Impacts of High-Speed Rail on Intercity Highway Passenger Travel. *Elsevier Journal of Traffic and Transportation Engineering* (In Refinement).
6. Li, Z., and X. Lu. 2025. Lane-Based Mesoscopic Dynamic Network Loading Model for Congested Urban Network. *Elsevier Journal of Transportation Research: Part C* (In Preparation).
7. Lee, Y., S. Labi, Z. Li, and K. Kepaptsoglou. 2025. A Propensity Score Method for Highway Safety Improvements. *ASCE Journal of Transportation Engineering* (In Preparation).
8. Lee, Y., H. Patel, and Z. Li. 2025. A New Model for Intersection Fatal and Severe Injury Crash Predictions within Urban Street Networks. *Elsevier Journal of Accident Analysis and Prevention* (In Preparation).

9. Liu, Y., and Z. Li. 2025. Geographically and Temporally Weighted Regression Models for Improved Predictability of Urban Intersection Vehicle Crashes. *ASCE Journal of Transportation Engineering* (In Preparation).
10. Liu, Y., L. Du, and Z. Li. 2025. Optimal Intersection Signal Timing Design under User Equilibrium Based Traffic Conditions. *Springer Journal of Networks and Spatial Economics* (In Preparation).
11. Patel, H., J. Zhang, and Z. Li. 2025. An Interactive Approach for Informing Pre-College Students about Engineering Fields - The IIT PreTRANS Program. *Journal of Pre-College Engineering Education Research* (In Preparation).
12. Zhang, J., H. Patel, and Z. Li. 2025. Parking Demand Forecasting for a Large-Scale Metropolitan Area. *ASCE Journal of Transportation Engineering* (In Preparation).
13. Sinha, K.C., H. Patel, Z. Li, and S. Labi. 2025. A Historical Overview of the U.S. Transportation Research. *ASCE Journal of Transportation Engineering* (In Preparation).
14. Li, Z., B. Zhou, A. Moore, and S. Staley. 2025. China Surface Transportation Financing and Investment Characteristics. *ASCE Journal of Urban Planning and Development* (In Preparation).
15. Labi, S., A. Shirole', A. Amekudzi-Kennedy, Z. Li. 2025. Developing and Using Scaling Functions to Align Evaluation Criteria in Transportation Decision Making- A Synthesis and Case Study. *Wiley Journal of Multi-Criteria Decision Analysis* (In Preparation).

D.7 Citations in Published Research

Google Scholar: https://scholar.google.com/citations?user=8TqyJ4YAAAAJ&hl=en
Google scholar citations: 2,458
Google scholar h-index: 25
Google scholar i10-index: 55
Publons: https://publons.com/researcher/5009440/zongzhi-li/
ORCID: https://orcid.org/0000-0002-6500-7460

E. PATENTS

E.1 Patents Awarded

1. U.S. Patent Publication US20200402392A1: Systems and Methods Involving Features of Adaptive and/or Autonomous Traffic Control
   Assignee: FASTec International LLC (Li, Zongzhi)
   Date of Patent (Allowed): 08/10/2022
2. U.S. Patent US10699561B2: Systems and Methods Involving Features of Adaptive and/or Autonomous Traffic Control
   Assignee: FASTec International LLC (Li, Zongzhi)
   Date of Patent: 06/30/2020
3. China Patent CN8109690: Underpass System for Continuous Vehicular Travel on Crossing Roadways
   Inventors: Neishapouri, Mohammad; Li, Zongzhi; Shi, Chun
   Date of Patent: 02/23/2018
4. U.S. Patent US9761131B2: Systems and Methods Involving Features of Adaptive and/or Autonomous Traffic Control
   Assignee: FASTec International LLC (Li, Zongzhi)
   Date of Patent: 09/12/2017
5. U.S. Patent US8825350B1: Systems and Methods Involving Features of Adaptive and/or Autonomous Traffic Control
   Assignee: FASTec International LLC (Li, Zongzhi)

Date of Patent: 09/02/2014

6. U.S. Patent US8366342B2: System for Continuous Vehicular Travel on Crossing Roadways
   Inventors: Sutchiewcharn, Narathip; Li, Zongzhi; Budiman, Jeffry; and Shen, Jay
   Date of Patent: 02/05/2013
7. U.S. Patent US8221023B2: System for Continuous Vehicular Travel on Crossing Roadways
   Inventors: Sutchiewcharn, Narathip; Li, Zongzhi; Budiman, Jeffry; and Shen, Jay
   Date of Patent: 07/17/2012
8. U.S. Patent US8109690B2: System for Continuous Vehicular Travel on Crossing Roadways
   Inventors: Sutchiewcharn, Narathip; Li, Zongzhi; Budiman, Jeffry; and Shen, Jay
   Date of Patent: 02/07/2012

E.2 Patent in Progress

1. U.S. Patent Application No. 16/916882: Systems and Methods Involving Features of Adaptive and/or Autonomous Traffic Control
   Assignee: FASTec International LLC (Li, Zongzhi)
   Filing Date: 11/10/2022

F. SOFTWARE DEVELOPMENT

1. Chicago TRANSIMS Model, 2011
2. Indiana Highway Asset Management System, 2003
3. Indiana Bridge Management System (Contributor), 1999

G. INVITED LECTURES/KEYNOTE PRESENTATIONS

1. Li, Z. Random Parameter Interval Regression Model for Crash Frequency Data Analysis Involving Unreported Cases, General Chair Lecture. *2025 International Conference on Intelligent Transportation and Smart Cities (ICITSC2025)*, Luoyang, China. March 21–22, 2025.
2. Chen, Z., Z. Ni, P. Guan, L. Wang, L. Cai, M. Hashemi, and Z. Li. Optimizing NOMA Transmissions to Advance Federated Learning in Vehicular Networks. 2024 IEEE Global Communications Conference (GLOBECOM): SAC-Machine Learning for Communications, Cape Town, South Africa. December 8–12, 2024.
3. Li, Z. Doubly Truncated Hurdle Model for Vehicle Crash Frequency Analysis, Technical Committee Chair Lecture. *8th International Conference on Intelligent Traffic and Transportation (ICITT2024)*, Florence, Italy. September 16–18, 2024.
4. Li, Z. Temporal Instability and Unobserved Heterogeneity in Means and Variances of Random Parameters across Single-Vehicle Crash Severity Factors, Keynote Speaker. *12th International Conference on Traffic and Logistic Engineering (ICTLE 2024)*, Macau, China. August 23–25, 2024.
5. Li, Z. Megacity Transportation Development and Management, Keynote Speaker. *2023 11th International Conference on Traffic and Logistic Engineering (ICTLE 2023)* with its workshop *2023 9th International Conference on Innovation and Industrial Logistics (ICIIL 2023)*, Macau, China. August 25–27, 2023.
6. Li, Z. Resilient and Sustainable Urban Transportation Development and Management, Keynote Speaker. *International Meeting on Infrastructure and Construction*, Chicago, USA. November 10–12, 2022.
7. Li, Z. Megacity Mobility: Integrated Transportation Development and Management. *Dean's Lecture*. Wuhan University of Technology, Wuhan, China, December 15, 2021.
8. Li, Z. Megacity Mobility: Integrated Transportation Development and Management. *IEEE Illinois Chapter Seminar*, August 18, 2021.

9. Li, Z. Moving from Intelligent Transportation to Smart Transportation: A Big Data Driven Approach. *Dean's Lecture*. Wuhan University of Technology, Wuhan, China, September 19, 2020.
10. Li, Z. Megacity Mobility: Integrated Transportation Development and Management. *Dean's Lecture*. Chang'an University, Xi'an, China, December 18, 2019.
11. Li, Z. Moving from Intelligent Transportation to Smart Transportation: A Big Data Driven Approach. *Dean's Lecture*. Chang'an University, Xi'an, China, June 27, 2017.
12. Li, Z. Moving from Intelligent Transportation to Smart Transportation: A Big Data Driven Approach. *Global Service Outsourcing Summit*, Nanjing, China, September 10, 2016.
13. Li, Z. Big Data Driven Smart Transportation. *Dean's Lecture*. Inner Mongolian University, Hohhot, China, July 6, 2016.
14. Li, Z. Optimal Decision-Making of Interdependent Transportation Investments. *Dean's Lecture*. Wuhan University of Technology, Wuhan, China, July 5, 2016.
15. Li, Z. Towards Sustainable and Smart Transportation: A Big Data Driven Approach. *8th International Conference on Maintenance and Rehabilitation of Pavements, S*ingapore. July 28, 2016.
16. Li, Z. Optimal Decision-Making of Interdependent Transportation Investments under Risk and Uncertainty. *Seminar at Purdue University*, West Lafayette, Indiana, November 18, 2014.
17. Li, Z. Smart City and Smart Transportation: TRANSIMS Toolbox as an Analytical Tool. Keynote Speaker for the *Seminar at Southeast University*, Nanjing, China, October 31, 2014.
18. Li, Z. Smart City and Smart Transportation: TRANSIMS Toolbox as an Analytical Tool. Keynote Speaker for the *Seminar at Zhejiang University*, Hangzhou, China, January 13, 2014.
19. Li, Z. Megacity Transportation Development and Management: The Chicago Experience. Keynote Speaker for the *Seminar at Chang'an University*, Xi'an, China, January 12, 2014.
20. Sinha, K.C., and Z. Li. The U.S. Transportation Development, Management, and Education. *Seminar at Xinjiang University*, Urumqi, China, September 19, 2013.
21. Li, Z. Evacuation Planning Methods for Mitigating Surface Transportation Weather Hazards Using TRANSIMS Toolbox. Keynote Speaker for the *Research Forum at the National Engineering Laboratory for Surface Transportation Weather Hazards Prevention*. Kunming, Yunnan, China. November 22, 2012.
22. Li, Z. Chicago TRANSIMS Model: Next Generation Transportation Planning, Operations, and Security Analysis Tool. *2012 MCASTA Annual Symposium*. St. Louis, MO, September 8, 2012.
23. Li, Z. Optimal Decision-Making of Interdependent Transportation Investments under Risk and Uncertainty. Keynote Speaker for the *Seminar at Shanghai Jiaotong University*, Shanghai, China, May 14, 2012.
24. Li, Z. Development and Application of Chicago TRANSIMS Model. *Presentation at the 2010 Annual Meeting of ITS Midwest*, Argonne, Illinois, November 4, 2010.
25. Li, Z. and A. Moore. Galvin Mobility Initiative: China Mobility Project- Travel Demand Management. *Seminar at Chongqing Municipality Government*, Chongqing, China, October 22, 2009.
26. Li, Z. and A. Moore. Galvin Mobility Initiative: China Mobility Project- Towards Sustainable Transportation. Keynote Speaker for the *Seminar at Chongqing Municipality Government*, Chongqing, China, October 22, 2009.
27. Li, Z. On the Methodology for Transportation Asset Management. *IIT Applied Mathematics Colloquium*, Chicago, Illinois, August 31, 2009.

28. Li, Z. Optimization Modeling for Tradeoff Analysis of Highway Investment Alternatives. *IIT Networks and Optimization Seminar*, Chicago, Illinois, February 2, 2009.

29. Li, Z. Highway Asset Management System Development: A Methodology with Computational Study. Keynote Speaker for the *Seminar at Chang'an University*, Xi'an, China, March 4, 2009.

30. Li, Z. Integrating Roadway Safety Hardware Management into the Overall Asset Management Program: A Methodology with Case Study. Keynote Speaker for the *Seminar at China Academy of Transportation Sciences*, Beijing, China, December 4, 2008.

31. Li, Z. Optimal Highway Investment Decision-Making under Risk and Uncertainty: A Methodology with Case Study. Keynote Speaker for the *Seminar at China Academy of Transportation Sciences*, Beijing, China, December 4, 2008.

32. Li, Z. Highway Asset Management System Development. Keynote Speaker for the *Seminar at China Academy of Transportation Sciences*, Beijing, China, December 4, 2008.

33. Moore, A.T., S.R. Staley, and Z. Li. Highway Infrastructure Investment Public Private Partnerships: China and U.S.A. Perspectives and Recommendations. *Seminar at Tongji University*, Shanghai, China, November 21, 2008.

34. Moore, A.T., S.R. Staley, and Z. Li. Transportation, Mobility and Air Quality in the 21st Century City. *Seminar at Chang'an University*, Xi'an, China, May 14, 2007.

35. Moore, A.T., S.R. Staley, and Z. Li. Transportation, Mobility and Air Quality in the 21st Century City. *Seminar at Chang'an University*, Chengdu, China, May 11, 2007.

36. Li, Z. A Stochastic Model and $O(N^2)$ Algorithm for Highway Investment Decision-Making under Budget Uncertainty. *Seminar at Northwestern University*, Evanston, Illinois, March 3, 2006.

H. SUPERVISION OF THESIS RESEARCH LEADING TO ADVANCED DEGREES AND/OR PUBLICATION

H.1 Supervision of Visiting Scholars

1. Patricia Faria	August 2024- August 2025
2. Marcos Noronha	August 2024- August 2025
3. Liang Luo	December 2017- November 2018
4. Yuanzhou Zheng	January 2017- December 2017
5. Zhirong Tan	January 2017- December 2017
6. Xifeng Tang	August 2016- August 2017
7. Zhuanglin Ma	October 2015- September 2016
8. Wei Zhang	November 2014- October 2015
9. Yuping Wang	October 2014- September 2015
10. Chaoqun Ma	October 2014- September 2015
11. Peng Xu	October 2014- September 2015
12. Jingxian Liu	November 2013- October 2014
13. Shengrui Zhang	January-August 2013
14. Liuqing Yang	August 2012- July 2013
15. Murat Puyan	August 2005-July 2006

H.2 Supervision of Ph.D. Students

H.2.1 Current

1. Mohammad Mahyar	Expected in May 2026
2. Jianpo Wang (Co-Advisor)	Expected in December 2025
3. You Zhou	Expected in May 2025
4. Lu Wang	Expected in May 2025
5. Yongdoo Lee	Expected in December 2024

H.2.2 Past

1. Ji Zhang December 2023
   Dissertation Title: Parking Demand Forecasting Using Asymmetric Discrete Choice Models with Applications
   Current Position: Bigdata Analyst, Hejun Consulting, Shanghai, China
2. Yan Huang (Co-Advisor) December 2023
   Dissertation Title: Optimal Mobility Performance for Urban Bus Transit Network Under Varying Travel Demand and System Operational Conditions
   Current Position **[Faculty]**: Lecturer/Assistant Professor, Chongqing University of Technology, Chongqing, China
3. Tong Truong July 2022
   Dissertation Title: Multicriteria Decision-Making Methodology with Tradeoff Analysis for Transportation Budget Allocation
   Current Position: Transportation Operations Analyst, Vicostone, Chicago, USA
4. Yuanyuan Liu (Co-Advisor) September 2017- August 2018
   Dissertation Title: Modeling and Uncertainty-Based Life-Cycle Analysis and Case Study of CO2 Emissions from a Multimodal Urban Transportation System in China
   Current Position **[Faculty]**: Senior Lecturer/Assistant Professor, Guangdong Polytechnical University, Guangzhou, China
5. Pu Lu December 2016
   Dissertation Title: Methodology for Vehicle Emission Impacts Analysis from Signal Timing Optimization of an Urban Street Network
   Current Position **[Faculty]**: Associate Professor, Chang'an University, Xi'an, China
6. Xi Lu December 2016
   Dissertation Title: Lane Group Based Mesoscopic Dynamic Network Loading Modeling of Congested Urban Network with Application
   Current Position: Senior Analyst, China Academy of Transportation Science, Beijing, China
7. Lei Wei (Co-Advisor) May 2016
   Dissertation Title: Innovative Solutions for Urban Transportation Congestion Mitigation, Mobility and Safety Tradeoffs, and Optimal Resource Allocation
8. Hoang H. Dao July 2016
   Dissertation Title: Network-Level Vehicle Crash Predictions Incorporating Time-Dependent Effects into Considerations
   Current Position **[Faculty]**: Lecturer/Assistant Professor, Hanoi Architectural University, Hanoi, Viet Nam
9. Mohammad Neishapouri December 2015
   Dissertation Title: Methodology for Urban Area Snow Removal Using New Machine and Performance-Based Analysis
   Current Position: Senior Project Manager, R.M. Chin & Associates, Inc., Naperville, Illinois, USA
10. Yi Liu May 2015
    Dissertation Title: Optimal Signal Timing Design for Urban Street Networks under User Equilibrium Based Traffic Conditions
    Current Position **[Faculty]**: Associate Professor, Wuhan University of Technology, Wuhan, China
11. Harshingar Patel May 2015
    Dissertation Title: Methodology for Performance Based Transportation Systems Management Simultaneously Considering Demand and Supply, with Pricing Consideration

Current Position **[Faculty]**: Associate Professor, Anadi University, Ahmedabad, India

12. Arash M. Roshandeh July 2013
    Dissertation Title: Systemwide Intersection Signal Timing Optimization Simultaneously Minimizing Vehicle and Pedestrian Delays
    Current Position: Transportation Engineering Manager, City of Alpharetta, and Instructor at Georgia State University, Atlanta, Georgia

13. Bei Zhou July 2012
    Dissertation Title: Optimal Decision-Making of Interdependent Transportation Investment Alternatives under Risk and Uncertainty
    Current Position **[Faculty]**: Associate Professor, Chang'an University, Xi'an, China

14. Sang Hyuk Lee December 2010
    Dissertation Title: Optimal Highway Investment Decision-Making under Risk and Uncertainty
    Current Position: Senior Researcher, Korea Institute of Civil Engineering and Building Technology, Goyang, South Korea

H.3 Supervision of Master of Science in Civil Engineering (MSCE) Thesis Students

H.3.1 Current

1. Cheng Yin (Co-Advisor) July 2024
   Thesis Title: Truncated Quantile Regression Analysis of Factors Contributing to the Frequency of Highway Vehicle Crashes

H.3.2 Past

1. Yu Zhao December 2021
   Thesis Title: Safety and Mobility Impacts Assessment of the Chicago Bike Lane Program

2. Peng Jiao (Co-Advisor) May 2016
   Thesis Title: Dynamic Split Optimization in Intersection Signal Design for Urban Street Network

3. Siyang Feng December 2015
   Thesis Title: Safety Impacts of Signal Timing Optimization on Urban Intersections with Red Light Running Photo Enforcement

4. Ji Zhang May 2015
   Thesis Title: Mobility Improvement Benefit Analysis of Signal Timing Optimization for Urban Street Network

5. Karen Poghosyan December 2014
   Thesis Title: Minimum Cost Design of Logistics Networks with Expedited Shipping Services

6. Wade Taylor Van Nortwick July 2013
   Thesis Title: Bicycle Crash Analysis in the City of Chicago

7. Han Gyol Kim December 2012
   Thesis Title: Safety Performance Evaluation of Intersection Traffic and Safety Assets: Methodology and Application

8. Xiao Meng December 2012
   Thesis Title: Statistical Methods for Large-Scale Transportation Network Traffic Volume Forecasting

9. Hoang H. Dao July 2012
   Thesis Title: Incorporating Safety Hardware Performance Functions into Risk-Based Highway Segment Safety Evaluation

10. Xi Lu July 2012

Thesis Title: A Methodology for Major Bus Route Rescheduling to Improve Transit Performance

11. Christina Arthur — July 2012
    Thesis Title: Improvement of Bus Transit Operations by Minimizing Non-Revenue Costs
12. Eirini Veliou — December 2011
    Thesis Title: A New Methodology for Transportation Decision-Making Considering Project Interdependencies
13. Yongdoo Lee — July 2011
    Thesis Title: Safety Impacts of Intersection Red Light Enforcement in the City Of Chicago
14. Radhika Bamsai — December 2010
    Thesis Title: Safety Impacts of Highway Shoulder Attributes in Illinois
15. Sunil Madanu — July 2008
    Thesis Title: A Methodology for Integrating Roadway Safety Hardware Management into the Overall Highway Asset Management Program
16. Harshingar Patel — July 2008
    Thesis Title: Development of Highway Safety Performance Functions, Crash Reduction Factors, and Optimization Models for State-Level Safety Project Programming and Selection
17. Siddharth Gokhale — December 2007
    Thesis Title: Development of Highway Safety Performance Functions Using Indiana Data
18. Srijan Adhikari — July 2006
    Thesis Title: Spatial Autocorrelation and Geographically-Weighted Regression Analyses for Improved Predictability of Urban Intersection Vehicle Crashes

H.4 Supervision of Graduate Projects for Master of Transportation Engineering (MTE) Students

H.4.1 Current

1. Raghuram Udyavara Bhadya — Expected in May 2025
2. Nirmal Gadhavi — Expected in May 2025
3. Parth Patel — Expected in May 2025
4. Ander Atin Ruiz De Vinaspre — Expected in May 2024
5. Richard Hugo — Expected in May 2024
6. Micah Cisneros — Expected in May 2024
7. Nabil Fawaz — Expected in May 2024
8. Ronaldo J. Okello — Expected in May 2024
9. Manuel Rosencrantz — Expected in May 2024
10. Anna Slominski — Expected in May 2024
11. Zachary J. Walberg — Expected in May 2024
12. Xiaolu Zhao — Expected in May 2024

H.4.2 Past

1. Xiaochen Gao — December 2023
2. Siwei Liang — July 2023
3. Thomas J. Ciezobka — May 2023
4. Christopher J. Rohn — May 2023
5. Sydney A. Silver — May 2023
6. Theodore C. Tai — May 2023
7. Brian P. McDonnell — December 2022
8. Shreyas K. Pawar — May 2022
9. Antonio Gimenez Macias — May 2022
10. Jingting Qiu — May 2021

11. Yimin Yang	May 2021
12. Pedro Guedes Brito Miele	December 2020
13. Victor Valero Nunez	August 2020
14. Yichun Zhao	May 2020
15. Nandan C. Baheti	May 2019
16. Haobo Zhai	May 2020
17. Utsav K. Domadia	May 2020
18. Olivia J. Kochanek	May 2020
19. Nishang D. Modi	May 2020
20. Connor D. Mullane	May 2020
21. Kurt A. Ordillas	May 2020
22. Oriol Alamany Muniz	August 2019
23. Pablo Heras Mateo	August 2019
24. Clara Soler Bañuelos	July 2019
25. Alexander Jimenez	May 2019
26. Connor D. Mullane	May 2019
27. Raymond Weah	May 2019
28. Yunseung Noh	December 2018
29. Sasan Naghieh	December 2018
30. Clara Soler Bañuelos	August 2018
31. Sarah Hamelin	July 2018
32. Derek Jordan Jimenez	July 2018
33. Elise E. Purguette	July 2018
34. Xavier Tomas I Rodriguez	July 2018
35. Alvaro Garcia Torres	July 2018
36. Hongyang Li	May 2018
37. Chaofan Li	December 2017
38. Chandrapal Suyeeba Yadav	December 2017
39. Javier Martín Sánchez	July 2017
40. Megha Parameswaraiah	May 2017
41. Hao Shi	July 2016
42. Russell Coate	May 2016
43. Ziyad Dadabhoy	May 2016
44. Chuanbin Zang	May 2016
45. Milen Grouev	July 2015
46. Paulin Hakizimana	July 2015
47. Laura Colino Ortuno	December 2014
48. Bharathi Perumal	December 2014
49. Ge Yang	July 2014
50. Lan Chen	July 2014
51. Luis Maria Ainchil Cayuela	May 2014
52. Zhelun Hong	May 2014
53. Xuanyu Duan	December 2013
54. Manel Terraza Farre	December 2013
55. Anna Kutryn	December 2013
56. Jing Li	December 2013
57. Alba Maria Cura Bosch	July 2013
58. Elena Balañà Pedrol	July 2013
59. Lulu Xu	July 2013
60. Tejaswi Guppataiah Gangadharaiah	May 2013
61. Zhenyu Yuan	December 2012

62. Yifang Liu — December 2012
63. Bo Yi — July 2012
64. Fei Qu — July 2012
65. Asadur Rahman — July 2012
66. Yousef M. Zaatar — May 2012
67. Enkhtuvshin Ganbold — December 2011
68. Scott C. Schiemann — May 2011
69. Ionut R. Parv — December 2010
70. Prince Tamba — December 2010
71. Libertad Machordom — July 2010
72. Manmith Kunduru — December 2009
73. Aubrey L. Hall — May 2009
74. Yinghong Zhang — December 2008
75. Praveen Kaini — May 2008
76. Ketankumar Patel — May 2008
77. Rathin K. Shah — May 2008
78. Amaresh Jena — May 2008
79. Depenkumar Shah — December 2005
80. Rosa Warlam Barniol — July 2005
81. Gaurav Rai — May 2005

H.5 Master of Public Works Students (Non-Thesis)

H.5.1 Current

1. Bachelor, Carl — Expected May 2025

H.5.2 Past

1. Justine Lavoisier — August 2021
2. Santiago-Juan Urrutia Campomanes — August 2020
3. Jose Luis Suarez Lopez — July 2020
4. Rafael Gallego Sanz — July 2020
5. Paul Jacobs — May 2020
6. Lauren M. Schuld — May 2020
7. Jorge Guarga Navarro — August 2019
8. Jose Antonio Martinez Montalvo — August 2019
9. Miguel Angel Serrano Leo — July 2018
10. Cristina Martinez Navarro — July 2018
11. Luis Doreste Henriquez — July 2018
12. Jenelle E. Hill — July 2018
13. Nuria Ferres Amat — July 2015
14. Oluwatomisin F. Omotoso — July 2015
15. Zhenyu Yuan — May 2015
16. Estelle Schnabele — December 2014
17. Alix Le Ray — July 2011
18. Boris Cassan — July 2011
19. Ionut R. Parv — December 2010
20. Justin Planasch — December 2007

H.6 Membership on Graduate Degree Committees

H.6.1 Ph.D. Committees

Larissa Affilabi (ECE, December 2022), Anahita Bahrami (ECE, December 2022), Matin Farhoumandi (ECE, December 2022), Mohamed Ali Saafi (MMAE, December 2022), Mehrdad Sheikholeslami (ECE, May 2022), Runnan Xu (ECE, July 2021), Jiayu Han (ECE, May 2021), Lei Yan (ECE, May

2021), Mingyu Yan (ECE, May 2021), Zhice Hu (EnvE, September 2020), Yu-Ting Yu (EnvE, June 2020), Adam Arumpf (AMath, May 2020), Hanyi Yang (CE/TE, December 2019), Sheng Xiang (EnvE, June 2019), Alireza Mohammadi (CE, July 2019), Chi Chen (CE/STE, 2018), Masoud Barati (ECE, July 2013), Bin Guo (ECE, May 2012), Jiachun Guo (ECE, July 2009), Hassan K. Zadeh (ECE, July 2008), Lei Wu (ECE, July 2008), Michael Urbina (ECE, July 2008), Jae Hyung Roh (ECE, July 2008), Lisias Abreu (ECE, July 2008), Nithiphong Vikiset (ECE, May 2006), Burcin Kaplanoglu (CE/CEM, December 2005)

H.6.2 MSCE Committees

Andri A Kurnia (December 2007), Serhan Akin (May 2007), Bin Wang (December 2006), Thanat Pattanakitchamroon (December 2005), Samuel Sugiarto (May 2005)

H.7 PreTRANS Program for Undergraduate and High School Research

The IIT PreTRANS (Pre-College Transportation Engineering) Program created using a small grant from the American Society of Civil Engineers (ASCE) in 2006 has provided an innovative means of involving undergraduate and high school students with multicultural and women background in transportation research. The program consists of two phases. The first phase is arranged in every Spring semester. In this phase, three high schools near the IIT campus are identified for participation. Each school selects 30 to 40 multicultural and/or woman juniors to spend one day on IIT main campus with activities of classroom visits, lecture attendance, and interactions with faculty and students. In the second phase, six to ten high school students are selected from the first-phase students to work one-on-one with CAEE Department faculty and undergraduate and graduate students to attend a two-week summer internship. The Program has been influencing students' understanding of engineering fields and career choices as some PreTRANS interns joined engineering programs at IIT and other universities in the country. It is now a permanent program at IIT, jointly sponsored by ASCE and ITE each year.

H.8 Prizes and Awards for Research

1. Sigma Xi Award for Excellence in Research, Illinois Institute of Technology, 2011
2. Arthur M. Wellington Prize, American Society of Civil Engineers, 2011
3. Charley V. Wootan Award, U.S. Council of University Transportation Centers, 2001
4. IRF Fellowship, International Road Federation, 1998

I. EDUCATIONAL ACHIEVEMENTS WITH EMPHASIS ON TEACHING

I.1 Teaching Interests

Transportation systems analysis (demand and supply modeling), evaluation (life-cycle cost analysis, multicriteria analysis), asset management (statistical and econometric methods, optimization techniques, risk and uncertainty modeling, large-scale simulation, and new technologies for improved transportation system performance in economic, social, and environmental dimensions), and new technology, especially AI applications in transportation.

I.2 Transportation Engineering Laboratory Improvement

Over the last decade, significant efforts have been made to improve the IIT Transportation Engineering (TE) Laboratory to support TE-related teaching. Computing capabilities at the Lab include multiple high-performance personal computers. Software includes multiple licenses of current versions of software for word processing, spreadsheet manipulation, database management, statistical and econometric analysis (SPSS, SAS, and NLOGIT), geo-spatial analysis (ArcGIS 9 and GWR3x), optimization (XPRESS Solver Engine), risk modeling (@Risk, Risk Solver Pro), engineering drawings (AutoCAD, 3DMax), among others. Current versions of transportation software such as Highway Capacity Software, Synchro, CORSIM, VISSIM, and TRANSIMS are available. Books on multimodal transportation planning, network analysis, asset management, safety analysis, evacuation planning/emergency management, Intelligent Transportation Systems, public transportation, and railway engineering; Transportation Research Board (TRB) Syntheses and Reports; and TE-related technical journals can be found at the Lab's Herbert S. Levinson Transportation Engineering Library.

I.3 Course Development and Initiation

Updated course contents of the following new graduate-level courses:

- CAE544: Urban Transportation Planning (4 Hrs): Lectures, handouts, HW, term paper, exams
- CAE568: Transportation Asset Management (3 Hrs): Lectures, handouts, HW, term paper, exams

I.4 Continuing Education

Instructor, Transportation Area Refresher Course for the Professional Engineering Exam, Since 2005

I.5 Pre-College Transportation Engineering Education

Instructor, Transportation Area Refresher Course for the Professional Engineering Exam, Since 2005

I.6 Teaching Evaluation

Course	Semester	Enrolled	Surveyed	Rating (1-5 Scale)	
				Course	Instructor
CAE419: Introduction to transportation engineering and design	Fall 2004	22	18	4.17	4.44
	Fall 2005	25	22	4.14	4.27
	Fall 2006	34	25	3.96	4.04
	Fall 2007	49	21	3.81	4.14
	Fall 2009	47	32	4.13	4.03
	Fall 2010	43	33	4.52	4.52
	Fall 2011	37	29	4.45	4.55
	Fall 2012	39	30	4.23	4.10
	Fall 2013	55	30	4.30	4.23
	Fall 2014	57	40	4.45	4.40
	Fall 2015	42	30	4.60	4.63
	Fall 2016	45	34	4.56	4.65
	Fall 2017	43	24	4.58	4.71
	Fall 2018	47	22	4.00	4.41
	Fall 2019	29		Not enough data	
	Fall 2020	28	8	4.00	4.25
	Fall 2021	40	25	4.54	4.42
	Fall 2022	35	17	3.46	3.92
	Fall 2023	34	24	Most students rated strongly agreed	
	Fall 2025			TBA	
CAE544: Urban transportation planning	Spring 2005	7	7	4.86	4.71
	Spring 2007	13	8	4.25	4.50
	Fall 2010	17	17	4.53	4.71
	Fall 2012	15	14	4.43	4.36
	Fall 2014	14	11	4.91	5.00
	Fall 2016	11	10	4.40	4.60
	Fall 2018	8	7	4.43	4.71
	Fall 2020	6	6	4.33	4.33
	Fall 2022	8		Not enough data	
	Fall 2024	8	8	Most students rated strongly agreed	
CAE545: Traffic operations and flow theory	Fall 2004	4	3	4.67	4.67
CAE555: Transportation systems evaluation	Fall 2005	7	7	4.14	4.43
	Fall 2007	14	8	4.12	4.38
	Spring 2010	12	10	4.70	4.70
	Spring 2012	16	15	4.33	4.53
	Spring 2013	11	9	4.78	4.89
	Spring 2015	13	12	4.83	4.83
	Spring 2017	16	15	4.80	4.67
	Spring 2019	12	12	4.05	5.00
	Spring 2021	6	6	4.50	4.50
	Spring 2023	11	11	Most students rated strongly agreed	
	Spring 2025	7		TBA	

Course	Semester	Enrolled	Surveyed	Rating (1-5 Scale)	
				Course	Instructor
CAE568: Transportation asset management	Spring 2006	4	4	4.50	4.75
	Spring 2008	13	8	4.00	4.63
	Spring 2009	6	6	4.33	4.83
	Spring 2011	20	19	4.05	4.32
	Spring 2014	12	9	4.56	4.56
	Spring 2016	12	7	4.86	5.00
	Spring 2018	16	2	4.50	4.50
	Spring 2020	8	8	5.00	5.00
	Spring 2022	8	4	5.00	5.00
	Spring 2024	7	7	Most students rated strongly agreed	
CAE580: Intelligent transportation systems	Fall 2006	9	7	4.29	4.29
	Fall 2009	6	3	4.17	4.33
	Fall 2011	14	11	4.36	4.36
	Fall 2013	15	10	4.80	4.70
	Fall 2015	11	11	4.64	4.73
	Fall 2017	15	10	4.40	4.80
	Fall 2019	9		Not enough data	
	Fall 2021	3	3	4.50	5.00
	Fall 2023	8	8	Most students rated strongly agreed	
	Fall 2025			TBA	

I.7 Teaching Recognitions

Three-Time Recipient of IIT Armour College of Engineering Dean's Teaching Excellence Recognitions

J. SERVICE TO THE UNIVERSITY

J.1 Student Recruitment, Counseling, and Administrative Assignments

- Director, IIT Transportation Engineering Program (BSCE with Transportation Engineering Minor, BSCE with Railroad Engineering Minor, Transportation Systems Planning Certificate, MSCE, MTE, and Ph.D.)
- Director, IIT Public Works Program (Infrastructure Engineering and Management Certificate, MPW)

Primary duties include, but are not limited to, student advising, curriculum revisions, initiating new courses, networking with prospective students, and graduate application review and recruitment

J.2 Faculty Advisor to Student Organization

Faculty Advisor, the IIT Institute of Transportation Engineers (ITE) Student Chapter, Since 2004.

J.3 Service on University Committee

- Member, IIT Campus Committee on Promotion and Tenure (CAMCOPT), Since 2024
- Member, IIT University Faculty Council (UFC), Since 2014

J.4 Service on the Department Activities

1. Student Recruitment

Chair, Graduate student admissions for TE and PW Programs

2. CAEE Departmental Curriculum Development

- Chair, Academic Unit Committee on Promotion and Tenure (AUCOPT)
- Member, Curriculum Committee on Transportation Engineering and Public Works Programs

3. Service to IPRO315/Capstone Design in Civil Engineering
Faculty Advisor, Providing guidance to students in IPRO315 topics, methodology development, and applications, Since 2008

4. CAEE Departmental Seminars
Speaker, CAEE Departmental research seminars

5. External Research Funding Growth
Transportation Research Team Leader, maintaining close communications with IIT Vice President for University External Affairs, and Vice Provost for Research to seek for potential transportation research funding opportunities

6. External Research Funding Growth
Transportation Research Team Leader, maintaining close communications with IIT Vice President for University External Affairs, and Vice Provost for Research to seek for potential transportation research funding opportunities

7. Community Engagement
Speaker, Perspectives/IIT Math and Science Academy

J.5 Service on the University Administrative Assignments

- Director, Transportation Engineering Program
- Director, Public Works Program
- Director, IIT Sustainable Transportation and Infrastructure Research Center, Since 2007
- Director, IIT Transportation Engineering Laboratory, Since 2004

K. ADVANCEMENT OF THE PROFESSION AND RECOGNITION AS A PROFESSIONAL

K.1 Membership of Governmental, Technical, and Scientific Committees

- Member, the U.S. National Academies' Transportation Research Board (TRB) Committee on Economics and Finance (AJE50), 2024–Present
- Member, TRB Committee on Truck and Bus Safety (AT060), 2022–2025
- Member, TRB Committee on Workforce Development and Organizational Excellence (AJE15), 2020–2022
- Member, TRB Committee on Management and Productivity (ABC20), 2015–2020
- Member, TRB Committee on Trucking Industry Research (AT060), 2013–2022
- Member, TRB Special Task Force on Data for Decisions and Performance Measures (A0030T), 2013–2016
- Member, TRB Task Force on Logistics of Disaster Response and Business Continuity (AT065T), 2013–2014
- Member, the National Cooperative Highway Research Program (NCHRP) Project Panel, Guidance for the Management of Traffic and Safety Assets (D0721), 2012–2015
- Secretary, TRB Committee on Transportation Asset Management (ABC40), 2010–2016
- Member, TRB Committee on Transportation Asset Management (ABC40), 2007–2010
- Member, American Railway Engineering and Maintenance-of-Way Association (AREMA) National Committee on Education and Training, Since 2005
- Director, American Society of Civil Engineers Illinois Section, 2009

K.2 Organization of Conferences

- Program Chair, IEEE-2024 3rd International Conference on Mechanical Engineering and Power Engineering (MEPE), Wuhan, China. December 28–30, 2024.
- Technical Committee Chair, The 8th International Conference on Intelligent Traffic and Transportation (ICITT2024), Florence, Italy. September 16–18, 2024.
- Traffic Safety Analysis and Improvement Technical Committee Chair, 2024 World Transport Convention, Qingdao, China. June 26–29, 2024.

- Member, Advisory Committees of 2023 11th International Conference on Traffic and Logistic Engineering (ICTLE 2023) with its workshop 2023 9th International Conference on Innovation and Industrial Logistics (ICIIL 2023), Macau, China, 2023
- Member, Technical Committee, the 5th International Conference on Transportation and Traffic Engineering, International Academy of Computer Technology, Lucerne, Switzerland, 2016
- Co-Chair, Program Committee, the 2008 Institute of Transportation Engineers (ITE) Midwest Region Annual Meeting, Chicago, Illinois, 2008
- Member, Scientific Committee, the 10th International Conference on Applications of Advance Technology in Transportation, Athens, Greece, 2008
- Session Moderator, the 9th International Conference on Applications of Advance Technology in Transportation, Chicago, U.S.A., 2006

K.3 Service as an Editor of Journals

- Handling Editor, Sage Journal of Transportation Research Record, Since 2023
- Associate Editor, Elsevier Journal of Traffic and Transportation Engineering, Since 2016

K.4 Service on the Editorial Board of a Journal

- Member, Editorial Board, *ASCE Journal of Infrastructure Systems*, Since 2008

K.5 Service as a Referee of National Research Awards

Transportation Area Master's Thesis and Ph.D. Dissertation Competition Prizes
- Charley V. Wootan Memorial Award
- Milton Pikarsky Memorial Award
- Neville A. Parker Award

For U.S. Council of University Transportation Centers (CUTC), Since 2014

K.6 Service as a Reviewer of Book Proposals

1. Book Proposal titled "Data Analytics for Intelligent Transportation Systems" submitted to CRC Press, 2022
2. Book Proposal titled "Transport Geomorphology" submitted to CRC Press, 2021
3. Book Proposal titled "Transportation Systems Management and Operations" submitted to CRC Press, 2017

K.7 Service as a Reviewer of Journals Articles

Journal	Number
ASCE Journal of Infrastructure Systems	50
ASCE Journal of Transportation Engineering	82
ASCE Journal of Urban Planning and Development	17
IEEE Access	10
IEEE Intelligent Transportation Systems Society	7
International Journal of Injury Control and Safety Promotion	2
Elsevier Journal of Accident Analysis and Prevention	15
Elsevier Journal of Applied Mathematical Modelling	2
Elsevier Journal of Automation in Construction	4
Elsevier Journal of Expert Systems with Applications	10
Elsevier Journal of Knowledge-Based Systems	32
Elsevier Journal of Research in Transportation Economics	2
Elsevier Journal of Traffic and Transportation Engineering	20
Elsevier Journal of Transport Geography	2
Elsevier Journal of Transport Policy	2
Elsevier Journal of Transportation Research Part A	5
Emerald Journal of Engineering, Construction and Architectural Management	13

Journal of Innovative Infrastructure Solutions	5
MDPI Journal of Sustainability	20
Prime National Journal of Emergency Management	4
Springer/Nature Journal of Neural Computing and Applications	10
Taylor and Francis Journal of Intelligent Transportation Systems	7
Taylor and Francis Journal of Transportmetrica A: Transport Science	5
Sage Journal of Transportation Research Record	90
Wiley/Hindawi Journal of Advanced Transportation	10
Wiley Journal of Computer-Aided Civil and Infrastructure Engineering	10

K.8 Service as a Reviewer of External Agency Proposals

Organization	Number
Netherlands Organization for Scientific Research	1
Georgia National Science Foundation	3

K.9 Licensure

Engineer in Training for State of Wisconsin

K.10 Membership in National Professional Societies

- Member, American Society of Civil Engineers, Since 2004
- Member, Institute for Operations Research and the Management Sciences, Since 2000
- Member, Institute of Transportation Engineers, Since 1998

K.11 Honors

- Outstanding Reviewer, Elsevier Journal of Traffic and Transportation Engineering, 2016
- Outstanding Reviewer, ASCE Journal of Infrastructure Systems, 2016
- Outstanding Reviewer, ASCE Journal of Transportation Engineering, 2012
- Featured in ASCE Newsletter, 2012
- Senior Research Fellow, Reason Foundation, 2009
- Finalist, INFORMS Transportation Science and Logistics Section Dissertation Prize Competition, 2004

L. PERSONAL STATEMENT

Transportation engineering, a specialized field within civil engineering, is dedicated to facilitating the secure and effective movement of people and commodities across diverse transportation networks, encompassing highways, railways, air routes, waterways, and pipelines. Upon my arrival at the Illinois Institute of Technology (IIT) in August 2004, I assumed the role of Director for both the Transportation Engineering Program and the Public Works (Infrastructure Engineering and Management) Program within the Department of Civil, Architectural, and Environmental Engineering (CAEE). The subsequent sections delineate my current endeavors and achievements, as well as outline the future trajectory of my research, teaching, and service commitments at IIT.

L.1 Research

L.1.1 Graduate Research Training at Purdue University

I completed my graduate research training at Purdue University in West Lafayette, Indiana, USA, spanning from 1998 to 2003. During this time, I obtained both a Master of Science in Civil Engineering (MSCE) and a Ph.D. degree, specializing in transportation and infrastructure systems engineering. My academic journey was under the guidance of Dr. Kumares C. Sinha, the Edgar B. and Hedwig M. Olson Distinguished Professor of Civil Engineering and a Member of the U.S. National Academy of Engineering. Concurrently pursuing my Ph.D., I also earned a Master of Science in Industrial Engineering (MSIE) with a focus on operations research, under the supervision of Dr. Thomas L. Morin, an esteemed expert in integer programming and multicriteria decision-making.

My MSCE research delved into the Indiana highway cost allocation study, aiming to discern the impacts of various types of vehicles and travelers on transportation agency costs. This encompassed construction, rehabilitation, and maintenance expenses, as well as user costs like vehicle operation, travel time, crashes, and air emissions. A primary technical challenge involved quantifying the shares of pavement damages necessitating rehabilitation and maintenance treatments, attributable to traffic loading and non-load factors such as pavement design standards, material types, subgrade conditions, and climatic features. To address this, econometric models were calibrated using the Tobit model, initially introduced by Nobel Laureate Dr. James Tobin of Princeton University in 1958. My MSCE thesis documenting this innovative work received the Charley V. Wootan Award for the Best Master's Thesis Research in Transportation Policy and Planning Research in 2000, awarded by the U.S. Council of University Transportation Centers.

My Ph.D. research focused on the development and application of a methodology and software package for Indiana highway asset management, pioneering the world's first integrated management approach for physical highway infrastructure. This encompassed pavements, bridges, traffic control and safety hardware, such as signs, signals, lighting, pavement markings, guardrails, and intermodal terminals. Additionally, it accounted for system usage, including vehicle operating costs, user costs, mobility, safety, and environmental impacts. The dissertation was selected as one of the finalists in the 2004 International Ph.D. Dissertation Prize Competition in the Transportation Science and Logistics Area, organized by the Institute for Operations Research and the Management Sciences (INFORMS). Furthermore, the research products were collected by the American Association of State Highway and Transportation Officials (AASHTO) for broader nationwide distribution.

L.1.2 Postdoctoral Research Training at University of Wisconsin- Madison

From October 2003 to August 2004, I held the position of Researcher at the Traffic Operations and Safety (TOPS) Laboratory, affiliated with the Department of Civil and Environmental Engineering at the University of Wisconsin-Madison. During this tenure, I spearheaded the Wisconsin freeway system operation assessment (FSOA) study, taking charge of its application-oriented initiatives. My responsibilities included leading the development of guidelines for freeway system operational performance assessment. This involved the creation of the Milwaukee microsimulation model, which encompassed over 300 central-line miles of freeways utilizing PARAMICS software. Additionally, I oversaw the calibration and validation procedures for the model and its subsequent applications. These applications ranged from utilizing tools such as Highway Capacity Software, traffic pattern analysis tools, vehicle crash analysis tools, Synchro, and advanced GIS analysis tools. The primary objectives of these efforts were to identify safety issues within the freeway system, propose solutions to enhance safety, and facilitate economic appraisal and investment decision-making processes. Notably, the Milwaukee model remains unparalleled, representing the largest PARAMICS-based microsimulation model ever developed for real-world traffic safety management.

L.1.3 Transportation Research at IIT

External Funding Evolution. In 2004, the Transportation Engineering and Public Works Programs at IIT faced a dearth of external research funding, with only one non-thesis master's student enrolled. Additionally, the Transportation Engineering Laboratory lacked suitable desktop computers for conducting basic transportation research. Over the past decade, I have effectively secured 26 research grants, totaling $4.26 million. Notably, 12 of these grants, amounting to $2.13 million, were secured following my tenure promotion in 2011. This achievement consistently positions me at the forefront within the CAEE Department, measured by total funding per faculty, total funding per program, and the largest single grant received.

Grant Sponsors. My research endeavors have received funding from various esteemed organizations, including the U.S. Department of Transportation (DOT) through the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA). Additionally, support has been provided by the U.S. Department of Homeland Security via Argonne National Laboratory, the U.S. National Center for

Freight and Infrastructure Research and Education (CFIRE), and the Midwest Regional University Transportation Center, both affiliated with the University of Wisconsin-Madison. Furthermore, funding has been sourced from the U.S. DOT-sponsored U.S. Region V University Transportation (NEXTRANS) Center and Joint Transportation Research Program at Purdue University, the Illinois Center for Transportation at the University of Illinois-Urbana-Champaign, the National Cooperative Highway Research Program (NCHRP), the Robert W. Galvin Mobility Initiative, and international collaborative entities such as the Beijing AG ITS Center.

Research Focuses. A holistic understanding of transportation systems encompasses three key components: transportation infrastructure, vehicles, and users/freight, with the latter two often framed within the context of system usage. The system delivery process encompasses planning, programming, design, construction, and operations management under normal traffic conditions, as well as evacuation planning and emergency management during emergent traffic conditions. Effective transportation management necessitates addressing both infrastructure and system usage, with management goals spanning infrastructure preservation, agency costs, vehicle operating/user costs, mobility, safety, security, environmental impacts, and economic development.

Presently, my funded research endeavors encompass topics spanning planning, programming, operations management, evacuation planning, and emergency management within the system delivery process. These efforts place emphasis on individual management goals such as infrastructure preservation, mobility, safety, security, as well as the integration of all aforementioned goals. The research focus areas can be categorized into three main domains: i) urban/metropolitan transportation congestion relief, security, and capital investment analysis; ii) transportation safety analysis; and iii) performance-based transportation asset management.

i) Urban/Metropolitan Transportation Congestion Relief, Security, and Capital Investment Analysis. In densely populated urban areas, traffic congestion often occurs due to insufficient transportation system capacity that is not expandable for the reason of land scarcity and prohibited high costs. This requires exploring radically new solutions for travel demand management in aspects of traveler's/freight departure time, destination location and arrival time, transportation mode, and travel path choices; people/freight capacity expansion with the existing right-of-way that would ensure reasonable costs, minimum traffic disruption during construction, and promote multimodal integration; and efficient utilization of the existing capacity.

In this research area, I have conducted 14 funded research studies totaling $3.07 million on multimodal transportation planning, fuel tax reform, continuous traffic flow queue jumper system development, tollway, tunnel, bus rapid transit (BRT), and fixed guideway deployments, Chicago TRANSIMS model development, networkwide optimal traffic signal timing designs, and networkwide bus signal priority. Some major research contributions are highlighted below:

Research Contribution 1: *Continuous Traffic Flow Overpass and Underpass Systems*. Radically new designs of continuous flow overpass and underpass systems have been developed to significantly improve the operational efficiency of intersections in an urban street network. Based on the research products, three U.S. patents US8109690B2 (02/07/2012), US8221023B2 (07/17/2012), and US8366342B2 (02/05/2013) under the titled "System for Continuous Vehicular Travel on Crossing Roadways" were issued.

Research Contribution 2: *World's Largest High-Fidelity Simulation-Based Chicago TRANSIMS (TRansportation ANalysis SIMulation System) Model*. With participation of Chicago DOT and Chicago Metropolitan Agency for Planning (CMAP), IIT transportation research group led the development of the Chicago TRANSIMS model that covers road, transit, and pedestrian walking network details of over 10,000 square-miles (25,900 square-kilometers) of entire Chicago metropolitan area. The properly calibrated and validated Chicago model can readily capture each of the 28.5 million daily person-trips generated by 9.7 million population in Chicagoland on one-sixth of a second basis, which is specified

as the next generation tool for transportation planning, operations management, and evacuation planning/emergency management analysis in the United States. The Chicago model has been used for some major applications such as traffic impacts analysis of the 14-mile-long Lake Shore Drive closure as experienced in the 2011 Chicago blizzard.

Research Contribution 3: *Chicago Metropolitan Area Transportation Evacuation Planning/Emergency Management Tools*. Funded by the U.S. Department of Homeland Security/National Urban Area Security Initiative (UASI) via the Chicago Office of Emergency Management and Communications (OEMC), the Transportation Research and Analysis Computing Center (TRACC) at Argonne National Laboratory and IIT transportation research group jointly developed the Chicago Regional Transportation Simulation Tool for Evacuation Planning (RTSTEP) augmented from Chicago model for Chicago metropolitan area emergency evacuation. The RTSTEP tool is currently utilized by OEMC's emergency responders to pre-plan and prioritize evacuation planning/emergency response strategies.

In June 2016, Argonne National Laboratory via University of Chicago was awarded a $2.86 million research grant by Federal Transit Administration, jointly with IIT (the largest subcontractor), University of Illinois at Chicago, Michigan Technical University, Illinois DOT, PACE Suburban Bus Service, METRA Rail, and Herbert S. Levinson Transportation Consultant, to develop and apply the POLARIS EvacPlan Toolbox based on the Chicago model as a coordinated transit response planning and operations support tool for mitigating impacts of all-hazard emergency events in Chicagoland. Currently, the POLARIS tool is under development. The RTSTEP and POLARIS tools are the world's largest transportation security modeling tools that will contribute significantly to safeguard U.S. homeland security.

Research Contribution 4: *Discovery of Interdependency Relationship of Transportation Investments*. In 2013, the Illinois State Toll Highway Authority (IL Tollways) contacted the IIT transportation research group for evaluation and prioritization of the $17.4 billion IL Tollways capital investment program, including I-294/I-57 Interchange, I-90 Corridor from O'Hare to Rockford, Elgin-O'Hare/Western Bypass, IL 53 North Extension, Illiana Expressway from I-65 in Indiana to I-55 in Illinois, and Prairie Parkway connecting I-88 to I-80. With the aid of Chicago model, the implementation of each of the above mega investment alternatives was found to trigger significant traffic redistributions. Also, the combined effect of jointly implementing multiple investment alternatives was revealed to differ from (either greater or smaller than) direct addition of effects of separately implementing individual alternatives one at a time or jointly implementing some alternatives with each alternative considered to be implemented once among all possible combinations. This discovery virtually invalidates the current state-of-the-art method for transportation impacts analysis where the total effect of simultaneously implementing multiple alternatives is treated to be equivalent to the summation of effects of individually implementing all alternatives or jointly implementing some alternatives.

Research Contribution 5: *Networkwide Intersection Signal Timing Optimization/Bus Signal Priority*. One of the biggest hurdles of traffic congestion in a dense urban area is vehicle and pedestrian delays at intersections. Intuitively, intersection signal timing optimization aimed to minimize such delays has been considered as the solution. The conventional methods focus on achieving delay minimization for an isolated intersection, multiple intersections within an urban street corridor or parallel corridors. However, the delay reductions for vehicular and pedestrian traffic along one or more corridors will inevitably lead to delay increases for traffic on perpendicular streets and corridors. With the assistance of Chicago model that could accurately predict vehicular and pedestrian volumes entering all intersection approaches for an urban area in a future time interval, the predicted traffic can be used to design optimal signal timing plans for all intersections in the urban area that will led to networkwide overall delay reductions. Signal timing optimization can be progressed in consecutive time intervals for a 24-hour period proactively. The top-down signalized adaptive traffic control method has been successfully implemented for Chicago Central Business District (CBD) that contains approximately one

thousand major signalized intersections, leading to 10 percent reductions in CBD vehicle and pedestrian delays. Further, the networkwide intersection signal timing optimization method has been refined to incorporate signal priorities for buses without and with dedicated travel lanes. This results in a new bus signal priority method capable of improving bus operational efficiency for an urban street network.

ii) Transportation Safety Analysis. Safety was identified as the overarching goal of the U.S. transportation system by the previous transportation law, SAFETY-LU. In this research domain, I have conducted three major funded research studies totaling $0.89 million. These studies aimed to develop national work zone safety audit guidelines, establish statewide local road safety programs, and assess safety impacts of shoulder paving for Interstate, multilane, and two-lane highways. Additionally, in-kind support was provided to evaluate the safety impacts of intersection red light running photo enforcement systems deployed in the city of Chicago, which is the largest deployment of its kind in the country. Below are some of the major research contributions:

Research Contribution 1: *The U.S. National Work Zone Safety Audit Guidelines/STAIR Center*. Each year, a significant number of traveling public and construction workers are involved in fatal crashes within work zones, presenting a critical societal concern. In 2006, the Federal Highway Administration awarded a substantial research grant to IIT for the development of U.S. national work zone safety audit guidelines. These guidelines aimed to prevent crashes during the pre-construction phase, mitigate crash impacts during construction, and assess post-construction effectiveness of transportation management strategies, temporary traffic control measures, and traveler information systems. This research experience equipped the IIT research team with a profound understanding of safety analysis methodology and practical applications. The expertise gained facilitated the acquisition of additional research grants and led to the establishment of the IIT Center for Work Zone Safety and Mobility, later renamed the IIT Sustainable Transportation and Infrastructure Research (STAIR) Center. As one of the four founding members, I currently serve as the Director.

Research Contribution 2*: Disaggregated Highway Safety Analysis Method*. The empirical-Bayesian (EB) before-after comparison group method has traditionally served as the standard approach for highway safety analysis. However, the EB method often overlooks simultaneous considerations of factors contributing to crash frequencies and severity levels, particularly concerning traffic control and safety hardware such as signs, lighting, signals, pavement markings, guardrails, and crash cushions. This limitation was notably recognized in the 2010 Highway Safety Manual published by AASHTO. To address this gap, the IIT transportation research group developed a disaggregated method for computing the safety index (SI) of highway segments or intersections. This method considers crash-contributing factors related to geometric design, consistency of geometric design, pavement condition, traffic control and safety hardware, and roadside features. Field experiments have demonstrated that the SI method outperforms the EB method in terms of accuracy and precision of crash predictions.

iii) Transportation Asset Management. The current transportation law, the Infrastructure Investment and Jobs Act (IIJA) of 2022, mandates U.S. transportation agencies to implement performance-based asset management for pavement and bridge assets on the National Highway System. Central to transportation asset management is the principle of making cost-effective investment decisions across short-, mid-, and long-term horizons. This involves simultaneously addressing issues related to physical infrastructure maintenance, renewal, and expansion (economic dimension), as well as considering system usage in terms of vehicle operating/user costs, mobility, safety, and security (social dimension), along with environmental impacts (environmental dimension). These efforts are aimed at supporting national, regional, and local economic prosperity and are crucial for achieving sustainable transportation.

The research in transportation asset management at IIT, supported by six grants totaling $0.25 million, begins with the development of asset management methodologies for highway pavement, bridges, and traffic control and safety hardware, and gradually expands to include system operational components

concerning safety and mobility, leading to asset management of the overall transportation system. Risk and uncertainty of travel demand, agency costs, vehicle operating/user costs, and discount rates, as well as the uncertainty of available budget are explicitly addressed in the evaluation and selection of transportation investment alternatives. Further, methods are introduced for asset service life estimation, tradeoff analysis, and addressing the interdependency relationship of jointly implementing multiple investment alternatives. Some major research contributions are highlighted as follows:

Research Contribution 1: *Project-Level Life-Cycle Cost Analysis Method under Risk and Uncertainty*. The current state-of-the-art method for transportation project life-cycle cost analysis largely incorporates risk consideration where the mathematical expectation is computed and used as the basis of evaluation and prioritization of investment alternatives. However, the input factors for life-cycle cost analysis may exhibit mixed cases of certainty (a single value), risk (multiple possible values and a firm probability distribution sufficient to compute the mathematical expectation), and uncertainty (multiple possible values without knowing their full range or without a reliable probability distribution). A new method has been developed for transportation project-level life-cycle cost analysis under mixed cases of certainty, risk, and uncertainty, which was awarded the 2011 Arthur M. Wellington Prize by the American Society of Civil Engineers (ASCE).

Research Contribution 2: *Interdependent Investment Alternative Evaluation Model*. As mentioned in Research Contribution 4 of research area i), due to significant traffic redistributions, the overall effect of jointly implementing multiple investment alternatives may differ from the direct addition of effects of individually implementing or jointly implementing some of the alternatives. Dr. Sanjiv Kapoor of College of Computer Science, Dr. Hemansh Kaul of Applied Mathematics Department, and the transportation research group at IIT defined the interdependency problem and developed the Hypergraph Knapsack model to quantify the overall impacts of interdependent investment alternatives. This development has established a new area for evaluating interdependent investment alternatives extending beyond transportation infrastructure systems to the broader context of critical civil infrastructure systems.

Research Contribution 3: *Alternative Investment Tradeoff Analysis Methods*. The transportation decision-making is multiple objectives in nature. Tradeoffs exist among planning, programming, design, construction, operations management, and evacuation planning/emergency management steps of the transportation delivery process, and among various transportation infrastructure preservation and system usage goals. The IIT transportation research group has introduced the surrogate worth tradeoff analysis method and entropy-STEP method for tradeoff analysis of transportation investment alternatives that will advance .

Research Contribution 4: *World's First Graduate-Level Textbook on Transportation Asset Management*. Leveraging nearly two decades of experience in graduate research focused on transportation system analysis, evaluation, and asset management, I entered into a contract with Taylor & Francis/CRC Press in 2014. The objective was to create the inaugural graduate-level textbook in this field. The resulting textbook, titled "Transportation Asset Management: Methodology and Applications," was successfully published in 2018, marking a significant milestone in the academic literature of transportation asset management.

L.2 Teaching

In the last decade, the transportation engineering and public works curriculums leading to the Master's and Ph.D. degrees have undergone two rounds of revisions to align with the latest technological advancements in the field. Through these efforts, I have successfully revitalized the graduate program, transitioning from having only one M.S. student (supported as a teaching assistant) to admitting approximately 30 graduate students to the IIT Transportation Engineering Program and Public Works Program each academic year, with 7-10 research assistants supported by research grants. I have also thoroughly updated and taught key courses such as CAE419- Introduction to Transportation

Engineering and Design, CAE544- Urban Transportation Planning, and CAE545- Traffic Operations and Flow Theory across multiple semesters. Additionally, I introduced four new graduate-level courses, including CAE555- Transportation Systems Evaluation, CAE568- Transportation Asset Management, CAE580- Intelligent Transportation Systems, and CAE581- Algorithms in Transportation, to enrich the educational offerings of these programs.

The research and education missions are closely intertwined, and I have systematically integrated new research materials, findings, and products into both existing and new courses. This integration has significantly benefited graduate students in transportation engineering and public works majors, as well as students in civil engineering more broadly. Incorporating research findings into CAE419, for instance, sparked considerable interest among IIT undergraduate students, leading some to adjust their study focus by transferring from different sub-disciplines within civil engineering to transportation engineering. Evidence of this includes undergraduate students taking research credit hours to participate in ongoing research projects and past IIT graduates returning to pursue graduate studies in transportation engineering and public works majors. Moreover, a significant number of undergraduate students in the CAEE Department have opted to continue co-terminal studies to earn professional Master's degrees. The enrollment in CAE416- Facility Design of Transportation Systems has consistently increased in recent semesters, and in CAE544, three-dimensional transportation planning concepts derived from our research have been incorporated into the course syllabus. Furthermore, in CAE555 and CAE568, extensive case studies documenting major research findings have been added to the course notes to facilitate the broader dissemination of new knowledge and enhance students' problem-solving abilities in real-world scenarios.

L.3 Future Perspectives

This section primarily outlines my vision for the future growth and expansion of the Transportation Engineering Program and Public Works Program at IIT, aligning closely with the strategic plans of both IIT as a whole and the CAEE Department in particular.

L.3.1 Intellectual Collaboration with First-Class Scholars

At present, I collaborate with renowned scholars nationwide. Internally at IIT, I have teamed up with several colleagues in the CAEE Department, including Dr. Jamshid Mohammadi (Structural Engineering), Dr. David Arditi, and Dr. Ivan Mutis Sin (Construction Engineering and Management). Additionally, I have held discussions with Dr. Michael Pelsmajer and Dr. Hemanshu Kaul of the Applied Mathematics Department, as well as Dr. Sanjiv Kapoor of the Computer Science Department, to foster innovative research ideas. These collaborations aim to apply statistical and econometric methods for transportation data analysis and optimization techniques for optimal investment decision-making, thereby advancing the theoretical foundation of transportation asset management.

Externally, I have partnered with esteemed researchers such as Dr. Kumares Sinha and Dr. Samuel Labi of Purdue University, Dr. Teresa Adams of the University of Wisconsin, and Dr. Konstantinos Kepaptsoglou from the National Technical University of Athens, Greece, focusing on Transportation Asset Management. Additionally, collaborations with Dr. Fred Mannering of the University of Central Florida (Safety Performance Modeling) and Dr. Zhong-Ren Peng of the University of Florida (Transit Planning and Operations) have enriched our research endeavors.

Since 2004, Dr. John Birge of the University of Chicago, a globally recognized authority in stochastic modeling of systems with uncertainty, has provided invaluable assistance. His expertise has been instrumental in introducing stochastic optimization models to transportation asset management, facilitating optimal transportation investment decisions while considering risk and uncertainty.

L.3.2 Future Research Focal Areas

Based on our research strengths and the anticipated trends in transportation research development, I have identified the following focal areas for future transportation research at IIT.

i) Innovative Solutions for Urban/Metropolitan Congestion Mitigation. In densely populated urban/metropolitan areas, recurrent congestion often arises due to inadequate highway capacity that cannot be easily expanded on the surface. This necessitates the exploration of radically new solutions to increase highway capacity within existing right-of-way constraints, while ensuring cost-effectiveness and minimizing traffic disruption during construction. Continuous exploration of innovative designs, materials, and construction methods is essential for expanding highway capacity in these challenging environments.

ii) Innovative Solutions for Safety Improvements and Emergency Preparedness. Transportation safety and mobility are intricately linked. Reduced mobility can lead to changes in user behavior that may increase safety risks. Conversely, higher mobility, often indicated by vehicle traveling speed reaching a certain threshold, is associated with elevated safety risks. It is imperative to explore innovative solutions to mitigate safety risks while optimizing transportation mobility.

Development of analytical tools is crucial for emergency planners to create effective response plans that maintain safety and mobility during emergency situations. These tools should enable planners to anticipate and address potential safety hazards while minimizing disruptions to transportation systems. By integrating safety and mobility considerations into emergency planning efforts, communities can better prepare for and respond to emergencies while ensuring the well-being of their residents.

iii) Dynamic/Smart Transportation Asset Management. Ensuring optimal investment decision-making is paramount for sustainable transportation development. While addressing various aspects such as infrastructure construction, maintenance, user costs, mobility, safety, security, and environmental impacts, it is essential to explore innovative solutions from the supply side to maximize return on investments. This requires maintaining sufficient financial resources and adopting new approaches for transportation financing. One such innovative approach is the implementation of a road pricing scheme through public-private partnerships or privatization. This pricing-based financing strategy aims to apply user charges to different types of vehicles or users to recover the total costs associated with building and maintaining transportation facilities. These costs are calculated based on the damages caused by traffic loading and additional deterioration over the service life-cycle of the infrastructure. Moreover, pricing-based financing involves imposing user charges on individual components of system user costs, including vehicle operation, travel time, crashes, air emissions, and noise pollution. The user charge rates are set to reflect the marginal external costs imposed by users, thereby eliminating inefficient system usage. By adopting this pricing-based financing methodology, transportation authorities can secure the funding needed to maintain infrastructure conditions and optimize system usage performance. However, to fully realize the benefits of this approach, several key issues must be explicitly addressed.

Emerging Issue 1: *Consideration of Traffic Dynamics*. The accuracy and precision of data regarding transportation facilities and system usage play a crucial role in determining the fairness of user charges under the pricing-based methodology. However, the vast amount of traffic data, including vehicle volumes, composition, speed, and speed changes, is prone to errors originating from various sources. Utilizing high-quality data with detailed measurement information is essential for accurately assessing the impacts of traffic on physical facilities and system usage, including vehicle operation, travel time, safety, air emissions, and noise pollution.

With the availability of fine-grained cross-sectional data from counting stations and smart devices, traffic impacts can be calculated with much greater refinement. By analyzing traffic dynamics at a microscopic level, individual vehicles and travelers can be traced with high temporal resolution. This allows for a more precise estimation of impacts, enabling the determination of more effective user charges to recover facility preservation costs and mitigate inefficiencies in system usage. Therefore, it is imperative to incorporate the time-dependency of traffic dynamics into the pricing-based financing framework.

Furthermore, user charges can influence travel demand, leading to changes in trip frequencies, departure times, destinations, travel modes, and paths. Tradeoffs exist between minimizing total travel time costs and minimizing costs associated with facility construction and preservation, as well as system usage inefficiencies. Therefore, user charges must be established considering these tradeoffs to ensure efficient preservation of transportation facilities and promote system usage efficiency. Integrating traffic dynamics across time and space domains into the impacts analysis will add complexity but is essential for ensuring that user charges effectively mitigate impacts and sustain overall transportation system performance.

Emerging Issue 2: *Accommodation of Advanced Vehicle Technologies*. As advanced vehicle technologies continue to evolve, the market penetration of vehicles such as battery-operated vehicles, biofuel vehicles, and connected and automated vehicles is expected to increase. This will result in significant changes to traffic flow patterns and characteristics, necessitating adjustments to user charges to effectively manage transportation systems in response to these changes.

Emerging Issue 3: *Integration of Transportation Infrastructure, Vehicle, and User/Non-User Components*. Technological advancements are leading to increased integration of transportation infrastructure, vehicles, and system users/non-users. Data collection, processing, analysis, and exchange of information are becoming increasingly interconnected across these components. As a result, life-cycle cost analysis will extend beyond infrastructure to include vehicles and system users, considering their respective service lives and life spans. This integrated approach offers opportunities for dynamic and smart transportation system management, with user charges serving as a catalyst to support integration, dynamic management, and sustainable development of the transportation system.

L.3.3 Future Teaching Considerations

By involving young talent in various research projects at IIT, we can foster effective learning and facilitate broader dissemination of information. Integrating the existing IIT PreTRANS (Pre-Transportation Engineering) Program with transportation research activities at IIT has the potential to enrich IIT's educational mission by involving undergraduate students and Chicago high school students, particularly those from multicultural and women backgrounds, in transportation research. Additionally, incorporating state-of-the-art findings from tools such as the Chicago TRANSIMS model, RTSTEP tool, and POLARIS tool into graduate transportation engineering courses at IIT (e.g., CAE544, CAE545, CAE547, CAE568, CAE580, and CAE581) is expected to enhance experiential learning for graduate students and produce highly skilled professionals for the transportation sector. This integration can also aid in attracting qualified students to the transportation engineering program.

With the Chicago TRANSIMS model, RTSTEP tool, and POLARIS tool available, IIT will be well-equipped to support the U.S. Department of Transportation (DOT) in delivering training sessions tailored to the needs of transportation planners, traffic engineers, transit operators, and emergency responders across the country. These training sessions can focus on developing customized models for various transportation analyses, including planning, programming, operations management, and evacuation planning/emergency management.