

## Nezamuddin

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### Research Interests

Multimodal Dynamic Transportation Network Analysis, Emissions Modeling, Public Transit Assignment, Intelligent Transportation Systems, Active Traffic Management, Traffic Simulation, Transportation Logistics and Optimization, Parallel Computing

### Academic Employment

**Assistant Professor**, August 2013 – present  
Department of Civil Engineering, Valparaiso University, Indiana

### Education

**Ph.D., The University of Texas at Austin (UT Austin)**, August 2011  
Department of Civil, Environmental, and Architectural Engineering  
Dissertation: *Improving the Efficiency of Dynamic Traffic Assignment through Computational Methods Based on Combinatorial Algorithm*

**M.S., University of Central Florida, Orlando (UCF)**, August 2006  
Department of Civil, Environmental, and Construction Engineering  
Thesis: *Developing Microscopic Toll Plaza Model using PARAMICS*

**B. Tech., Indian Institute of Technology Delhi (IIT Delhi), India**, July 2003  
Department of Civil Engineering

### Work and Research Experience

**Research Fellow** **September 2011–August 2013**  
**Center for Transportation Research** **University of Texas, Austin**

Project Involvement:

- *Investigating Regional Dynamic Traffic Assignment Modeling for Improved Bottleneck Analysis*, TxDOT 0-6657 (Sponsor: Texas Department of Transportation (TxDOT)).
- *Performance Evaluation of the Proposed Construction of State Highway 45 SW in the City of Shady Hollow, Texas* (Sponsor: Capital Area Metropolitan Planning Organization (CAMPO)).
- *Developing an Interface to Emissions Modeling for Dynamic Traffic Assignment Models*, Interagency Cooperation Contract, Center for Transportation Research, UT Austin (Sponsors: TxDOT and CAMPO).

Other Research Work:

- Integrating transit assignment into the dynamic traffic assignment framework.
- Developing a continuous dynamic user equilibrium algorithm using the link transmission model.
- Leading the effort to enhance the visualization tool for Visual Interactive System for Transport Algorithms (VISTA) traffic modeling software.

**Graduate Research Assistant** **January 2008–August 2011**  
**Center for Transportation Research** **University of Texas, Austin**

Project Leadership:

- *Safety Implications of Using Active Traffic Strategies on TxDOT Freeways*, TxDOT 0-6576 (Sponsor: TxDOT).

- *Feasibility of Speed Harmonization and Peak-period Shoulder Use to Manage Urban Freeway Congestion*, TxDOT 0-5913 (Sponsor: TxDOT).
- *Graph-based Algorithms for Dynamic Traffic Assignment*, Southwest Region University Transportation Center (SWUTC) 161126 (Sponsor: SWUTC).

Other Project Involvement:

- *Investigating Regional Dynamic Traffic Assignment Modeling for Improved Bottleneck Analysis*, TxDOT 0-6657 (Sponsor: TxDOT).
- *A Graph-Theoretical Combinatorial Algorithm and Dual Approximation Scheme for Large-scale Dynamic Traffic Assignment and Calibration Problems*.

**Graduate Research Assistant**

**August 2006–December 2007**

**Center for Adv. Transportation Tech.**

**University of Maryland, College Park**

- Worked on standardizing the definition and calculation of operations performance measures as part of NCHRP Project 20-7, “Guide to Benchmarking Operations Performance Measures”.
- Contributed to Chapter 7. ‘Developing Signal Timing Plans’, and Chapter 8. ‘Signal Timing Maintenance: Operations and Monitoring’ of FHWA’s “Traffic Signal Timing Manual”.

**Graduate Research Assistant**

**July 2005–June 2006**

**Dept. of Civil, Env., & Const. Engg.**

**University of Central Florida, Orlando**

- Developed a microscopic integrated toll plaza-toll road corridor model using PARAMICS, and modeled SR 408 toll road corridor in Orlando, Florida.
- Evaluated the effectiveness of alternative toll pricing strategies on route diversion and congestion mitigation.

**Engineer Trainee**

**September 2003–June 2004**

**Bharat Heavy Electricals Limited**

**New Delhi, India**

- Designed crane girder and boiler foundation for a 2x500 Megawatts thermal power station unit.
- Modeled power house building using the 3D modeling package Plant Design Management System.

**Executive Trainee**

**June 2003–August 2003**

**Sapient Corporation**

**New Delhi, India**

- Designed Java 2 Platform, Enterprise Edition (J2EE) application for Library Management System.
- Worked on the development of online travel reservation portal ‘Opodo’.

## Teaching and Mentoring Experience

**Assistant Professor**

**Fall 2013 – present**

**Dept. of Civil Engineering**

**Valparaiso University**

- Designing, teaching, and grading CE 202: Statistical Applications in Civil Engineering and CE 490: Traffic Engineering courses. I am also transportation engineering faculty advisor to students on their senior design capstone projects in which the student work on real-life problems that are of importance to the community. In addition, three students are working on undergraduate research under my supervision and we submitted an undergraduate research grant proposal for internal funding at the University.

**Guest Lecturer**

**Fall 2011, Fall 2012**

**Dept. of Civil, Arch., & Env. Engineering**

**University of Texas, Austin**

- Guest lectured for the graduate courses CE 392C Transportation Network Analysis (Fall 2011) and CE 392D Dynamic Transportation Network Analysis (Fall 2012) taught by Dr. Stephen Boyles at The University of Texas at Austin. I taught advanced traffic assignment algorithms, showcased applications of dynamic multimodal network modeling in several Central Texas projects that we completed at the Center for Transportation Research, and talked about the practical challenges of gathering input data and model building.

**Teaching Effectiveness Colloquium  
INFORMS**

**October 2011  
Charlotte, NC**

- Nominated by the Department of Civil, Architectural, and Environmental Engineering at UT Austin and selected by The Institute for Operations Research and the Management Sciences (INFORMS) to participate in a two-day Teaching Effectiveness Colloquium for future academicians in operations research, management sciences and related fields.

**Tutor  
Dept. of Civil, Arch., & Env. Engineering**

**Summer 2010, Summer 2011  
University of Texas, Austin**

- Conducted weekly review sessions at the request of the Department for a total of seventeen transportation engineering Ph.D. students preparing for the qualifying exam.

**Teaching Assistant  
Dept. of Civil, Env., & Const. Engg.**

**August 2004–June 2005  
University of Central Florida, Orlando**

- Conducted discussion classes, evaluated homework assignments, and held office hours for the undergraduate course TTE 4004 Transportation Engineering.

**Undergraduate students mentored:**

Matthew Berning, Civil Engineering, Valparaiso University (Fall 2013–present)  
Douglas Coeur, Civil Engineering, Valparaiso University (Fall 2013–present)  
Jon Sherrick, Civil Engineering, Valparaiso University (Fall 2013–present)  
Michael Levin, Computer Science, The University of Texas at Austin (Spring 2010–Summer 2013)  
Karen Karasevich, Civil Engineering, The University of Texas at Austin (Fall 2011–Spring 2012)  
Jeseth Delgado Vela, Civil Engineering, The University of Texas at Austin (Summer 2010–Spring 2011)

**Graduate students mentored:**

Rohan Shah, M.S. in Civil Engineering, The University of Texas at Austin (Fall 2012–present)  
Tarun Rambha, M.S./Ph.D. in Civil Engineering, The University of Texas at Austin (Fall 2011–Fall 2012)  
Chris Melson, M.S. in Civil Engineering, The University of Texas at Austin (Fall 2011–Spring 2012)  
Joseph W. Yu, M.S. in Civil and Environmental Engineering, California Polytechnic State University, San Luis Obispo (Spring 2011–Fall 2011)  
Steven Kilbert, M.S. in Industrial Engineering, California Polytechnic State University, San Luis Obispo (Fall 2010–Spring 2011)

**Thesis Committee:**

Joseph W. Yu, M.S. in Civil and Environmental Engineering, California Polytechnic State University, San Luis Obispo, 2011.

**Journal Publications and Papers Under Review**

J. Yu, A. Pande, N. Nezamuddin, F. Edwards and V. Dixit. Routing Strategies for Emergency Management Decision Support Systems during Evacuation. *Journal of Transportation Safety & Security* (accepted).

N. Nezamuddin, J. Crunkleton, P. J. Tarnoff and S. T. Waller. Speed Distribution Profile of Traffic Data and Sample Size Estimation. *Traffic Engineering and Control*, Vol. 51, No. 4, April 2010, pp. 147–152.

N. Nezamuddin and H. Al-Deek. Developing Microscopic Toll Plaza and Toll Road Corridor Model with PARAMICS. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2047, TRB, National Research Council, Washington, D.C., 2008, pp. 100–110.

N. Nezamuddin and S. Boyles. A Continuous Dynamic User Equilibrium Algorithm Using the Link Transmission Model. *Networks and Spatial Economics* (2<sup>nd</sup> revision).

M. Levin, S. Boyles and N. Nezamuddin. Warm-Starting Dynamic Traffic Assignment with Static Solutions. *Transportmetrica B: Transport Dynamics* (in review).

N. Nezamuddin, N. Jiang, J. Ma, T. Zhang and S. T. Waller. Operational and Safety Benefits of Variable Speed Limits and Peak-Period Shoulder Use. *Journal of Intelligent Transportation Systems* (in review).

### Refereed Conference Proceedings

A. Pande, N. Nezamuddin and C. Nuworsoo. Workforce of the Future: Ideas for Improving K-12 Outreach by Transportation Engineering Educators through Near-Peer Involvement and Leveraging Contextual Exposure. *121<sup>st</sup> American Society for Engineering Education Annual Conference*, June 2014, Indianapolis, IN, USA (accepted).

R. Shah and N. Nezamuddin. Custom-Domain Emissions Modeling and Comparison with Disaggregated County-Level Modeling – Insights from the Austin Metropolitan Area. *2014 Transportation, Land Use Planning and Air Quality Conference*, March 2014, Charlotte, NC, USA (accepted).

A. Pande, N. Nezamuddin, J. Loy and A. Das. Understanding Characteristics of Severe Crashes by Examining Patterns in Latent Classes. Proceedings of the *Transportation Research Board 93<sup>rd</sup> Annual Meeting*, January 2014, Washington, DC (accepted).

N. Nezamuddin and S. Boyles. A Continuous Dynamic User Equilibrium Algorithm Using the Link Transmission Model. Proceedings of the *4<sup>th</sup> International Symposium on Dynamic Traffic Assignment*, June 2012, Martha's Vineyard, MA, USA.

N. Nezamuddin and S. T. Waller. Improving the Efficiency of Dynamic Traffic Assignment through Computational Methods Based on Combinatorial Algorithm. Proceedings of the *Transportation Research Board 91<sup>st</sup> Annual Meeting*, January 2012, Washington, DC.

N. Nezamuddin, D. Fajardo and S. T. Waller. Combinatorial Algorithm and Warm Start Method for Dynamic Traffic Assignment. Proceedings of the *14<sup>th</sup> International IEEE Annual Conference on Intelligent Transportation Systems*, October 2011, Washington, DC. (Invited Paper)

N. Nezamuddin, N. Jiang, J. Ma, T. Zhang and S. T. Waller. Active Traffic Management Strategies: Implications for Freeway Operations and Traffic Safety. Proceedings of the *Transportation Research Board 90<sup>th</sup> Annual Meeting*, January 2011, Washington, DC.

M. Levin, R. Kumar, N. Nezamuddin, N. Ruiz-Juri and S. T. Waller. Utilizing a Static-based Initial Feasible Solution to Expedite the Convergence of Dynamic Traffic Assignment Problems. Proceedings of the *Transportation Research Board 90<sup>th</sup> Annual Meeting*, January 2011, Washington, DC.

N. Nezamuddin, J. Crunkleton and P. J. Tarnoff. Speed Distribution Profile of Traffic Data and Sample Size Estimation. Proceedings of the *Transportation Research Board 88<sup>th</sup> Annual Meeting*, January 2009, Washington, DC.

N. Nezamuddin, J. Crunkleton and P. J. Tarnoff. Statistical Patterns of Traffic Data and Sample Size Estimation. Proceedings of the *10<sup>th</sup> International Conference on Applications of Advanced Technology in Transportation*, May 2008, Athens, Greece.

N. Nezamuddin and H. Al-Deek. Developing Microscopic Toll Plaza and Toll Road Corridor Model

with PARAMICS. Proceedings of the *Transportation Research Board 87<sup>th</sup> Annual Meeting*, January 2008, Washington, DC.

H. Al-Deek and N. Nezamuddin. Microscopic Toll Plaza Model: Development, Calibration and Transferability. Proceedings of the *13<sup>th</sup> World Congress and Exhibition on Intelligent Transportation Systems and Services*, October 2006, London, United Kingdom.

H. Al-Deek and N. Nezamuddin. Developing Microscopic Integrated Freeway-Toll Plaza Model. Proceedings of the *9<sup>th</sup> International Conference on Applications of Advanced Technology in Transportation*, August 2006, Chicago, USA, pp. 430–436.

### **Other Conference Presentations**

N. Nezamuddin and S. T. Waller. A Combinatorial Algorithm and Warm Start Method for Multi-destination Dynamic User Optimal Problem. *INFORMS Annual Meeting*, November 2011, Charlotte, NC.

N. Nezamuddin, N. Jiang, J. Ma, T. Zhang and S. T. Waller. Active Traffic Management Strategies: Implications for Freeway Operations and Traffic Safety. Proceedings of the *Texas Freight: Beyond 2014, Center for Transportation Research Symposium 2011*, April 2011, Austin, TX. (Invited Talk)

N. Nezamuddin and S. T. Waller. Parallelization of Traffic Assignment Algorithms. *INFORMS Annual Meeting*, November 2010, Austin, TX.

S. T. Waller, Roshan Kumar and N. Nezamuddin. A Graph-Theoretical Combinatorial Algorithm and Dual Approximation Scheme for Large-scale Dynamic Traffic Assignment and Calibration Problems. *3<sup>rd</sup> International Symposium on Dynamic Traffic Assignment*, July 2010, Takayama, Japan.

N. Nezamuddin and S. T. Waller. Speed Harmonization and Peak-period Shoulder Use to Manage Urban Freeway Congestion. *INFORMS Annual Meeting*, October 2009, San Diego, CA.

S. Boyles, N. Nezamuddin and S. T. Waller. The Contingent Routing Problem: Exact Algorithms and Heuristics. *INFORMS Annual Meeting*, October 2008, Washington, DC.

### **Technical Reports**

“Congress Avenue Geometric Changes: Analyzing the Impact of Cross-Section Changes to Congress Avenue,” with J. Duthie and N. Ruiz-Juri. For the City of Austin by the Network Modeling Center at The University of Texas at Austin, September 2013.

“Investigating Regional Dynamic Traffic Assignment Modeling for Improved Bottleneck Analysis: Final Report,” with J. Duthie, N. Ruiz-Juri, T. Rambha, C. Melson, C. M. Pool, S. Boyles, S. T. Waller, R. Kumar. Texas Department of Transportation Report 0-6657-1, October 2012.

“Downtown Austin: Analyzing the Impact of Converting 7<sup>th</sup> and 8<sup>th</sup> Streets to Two-ways on Evening Peak Traffic Conditions,” with J. Duthie and N. Ruiz-Juri. For the City of Austin by the Network Modeling Center at The University of Texas at Austin, June 2012.

“MoPac Expressway Managed Lanes: Analysis of the Impact on Cesar Chavez and 5<sup>th</sup> Streets,” with J. Duthie and N. Ruiz-Juri. For the Texas Department of Transportation by the Network Modeling Center at The University of Texas at Austin, May 2012.

“Traffic Operations and Safety Benefits of Active Traffic Strategies on TxDOT Freeways,” with N. Jiang, T. Zhang, S. T. Waller and D. Sun. Texas Department of Transportation Report 0-6576-1, October 2011.

“Speed Harmonization and Peak-period Shoulder Use to Manage Urban Freeway Congestion,” with S. T. Waller, M. Ng, E. Ferguson and D. Sun. Texas Department of Transportation Report 0-5913-1, October 2009.

“Guide to Benchmarking Operations Performance Measures,” with P. J. Tarnoff, S. E. Young and J. Crunkleton. For National Cooperative Highway Research Program (NCHRP) Project 20-7 by Center for Advanced Transportation Technology, University of Maryland, January 2008.

“Traffic Study of North Gemini Boulevard and Greek Park Drive Intersection on UCF Campus,” with H. Al-Deek, R. Chandra, J. Rogers, C. Geci, B. Andrewla and N. Yousef. For Parking and Transportation Services, University of Central Florida, Orlando by Transportation Systems Institute, University of Central Florida, July 2006.

“Application of a Micro-Simulation Model to Estimate the Effectiveness of Toll Pricing Alternatives on the Diversion of Traffic to Toll Facilities,” with H. Al-Deek, E. Emam and R. Chandra. For Florida Department of Transportation, Contract No. BD-550, RPWO #1 by Transportation Systems Institute, University of Central Florida, March 2005.

### **Honors and Fellowships**

Committee to Enhance Learning and Teaching (CELT) Grant, Valparaiso University, 2013  
Graduate Student Professional Development Award at UT, Austin, 2011  
Intelligent Transportation Society (ITS) Texas Scholarship, 2010  
Mary Kate (Kitty) Collins Memorial Endowed Presidential Scholarship in Civil Engineering at UT, Austin, 2009–2010  
Dwight D. Eisenhower Graduate Fellowship, Federal Highway Administration (FHWA), 2009–2010  
Graduate Student Professional Development Award at UT, Austin, 2010  
Kolodzey Travel Grant at UT, Austin, 2010  
Robert D. Kersten Graduate Fellowship at UCF, 2004–2006  
American Society of Highway Engineers (ASHE) Scholarship at UCF, 2005  
Center for Advanced Transportation Systems Simulation Scholarship at UCF, 2005  
Merit-cum-means Scholarship at IIT Delhi, 1999–2003  
Islamic Development Bank, Jeddah Scholarship, 1999–2003

### **Professional Affiliations and Services**

#### **Invited to chair sessions at:**

“Regional Transportation Systems Management and Operations” session, *Transportation Research Board 91<sup>st</sup> Annual Meeting*, January 2012, Washington, DC

“Advances in Traffic Equilibrium” session, *Institute for Operations Research and the Management Sciences 2011 Annual Meeting*, November 2011, Charlotte, NC

#### **Membership:**

Council on Undergraduate Research (CUR)  
American Society of Civil Engineers (ASCE)  
Institute of Transportation Engineers (ITE)  
Intelligent Transportation Society of America (ITS America)  
Transportation Research Board (TRB)  
Institute for Operations Research and the Management Sciences (INFORMS)

#### **Journals Refereed:**

*Transportation Research Part C: Emerging Technologies*  
*Computer-Aided Civil and Infrastructure Engineering*  
*Journal of Intelligent Transportation Systems: Technology, Planning, and Operations*

*IET Intelligent Transport Systems*  
*Transportation Research Record: Journal of the Transportation Research Board*  
*Journal of Transportation Safety and Security*

**Conferences Refereed:**

*Transportation Research Board Annual Meetings, 2006–2014:*

- Freeway Operations Committee–AHB20
- Regional Transportation Systems Management and Operations Committee–AHB10
- Traffic Flow Theory Committee–AHB45
- Transportation Network Modeling Committee–ADB30

*121<sup>st</sup> American Society for Engineering Education (ASEE) Annual Conference*, June 2014, Indianapolis, IN, USA

*20<sup>th</sup> International Symposium on Transportation and Traffic Theory (ISTTT)*, July 2013, The Netherlands

*14<sup>th</sup> International IEEE Annual Conference on Intelligent Transportation Systems*, October 2011, Washington, DC, USA

*Transportation Planning and Implementation Methodologies for Developing Countries (TPMDC) 2008*, IIT Bombay, India

**Offices Held in Student Organizations:**

Vice President, Intelligent Transportation Society (ITS), University of Maryland, 2006–2007

Treasurer, Institute of Transportation Engineers (ITE), University of Central Florida, 2005–2006

**University Services**

Faculty Learning Community for The Flipped Classroom, Valparaiso University, August 2013 – present

ABET Committee, Department of Civil Engineering, Valparaiso University, November 2013 – present

**Computer Skills**

**Transportation Simulation:** Synchro, HCS, PARAMICS, VISSIM, CORSIM, VISTA

**Emissions and Air Quality Modeling:** MOVES

**Traffic Safety Analysis:** SSAM

**Data and Statistical Analysis:** SAS, SPSS, LIMDEP

**Computer Programming:** C, C++, MATLAB

**Parallel Programming:** OpenMP, MPI