

HONGCHAO LIU, Ph.D., P.E.

Curriculum vitae

Department of Civil and Environmental Engineering
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EDUCATIONAL HISTORY

University of California, Berkeley, USA
Postdoctoral
April 2001 – Aug. 2004

University of Tokyo, Tokyo, Japan
Ph.D. in Transportation Engineering

Tsinghua University, Beijing, China
M.S.C.E. in Transportation Planning
June 1996

Hebei University of Technology, Tianjin, China
B.S.C.E. in Civil Engineering
July 1990

EMPLOYMENT HISTORY

Texas Tech University, Lubbock, TX, USA
Professor, Sept. 2014 –

Texas Tech University, Lubbock, TX, USA
Associate Professor, Sept. 2009 – 2014

Texas Tech University, Lubbock, TX, USA
Assistant Professor, Sept. 2004 – Aug. 2009

University of Tokyo, Tokyo, Japan
Senior Research Associate, Sept. 2000 – Apr. 2001

University of Tokyo, Tokyo, Japan
Research Assistant, Sept. 1997 – Oct. 2000

Beijing Institute of City Planning & Design, Beijing, China
Transportation Engineer, July 1996 – Sept. 1997

Hebei Polytechnic University, Tangshan, China
Instructor, Sept. 1990 – June 1993

PROFESSIONAL REGISTRATION

Professional Engineer, No. 104513, Texas.

AWARDS AND HONORS

George T. And Gladys Abell-Hanger Faculty Award, Whitacre College of Engineering, 2015.

Early promotion to full professor, Texas Tech University, 2014.

Whitacre Research Award, Whitacre College of Engineering, Texas Tech University, 2012.

Huangshan Endowed Visiting Professor, Hefei University of Technology, China 2011.

Teacher of the Year, Department Civil & Environmental Engineering, Texas Tech University, 2010.

Early tenure and promotion to associate professor, Texas Tech University, 2009

Most Influential Professor, Edward E. Whitacre Jr. College of Engineering, 2009

Fellowship, American Society of Civil Engineers (ASCE) Excellence in Civil Engineering Education (ExCEED), 2008.

Hemphill-Wells New Professor Excellence in Teaching Award, Finalist of the Edward E. Whitacre Jr. College of Engineering, 2006.

Featured Young Faculty in ENVISION 2(2), Newsletter of the Edward E. Whitacre Jr. College of Engineering, Texas Tech University, 2006.

Japanese Government Scholarship, Sept. 1997 – Sept. 2000, Ministry of Science and Education, Japan.

PROFESSIONAL SERVICES

Professional society

Editors of Archival Journals

Editor in Chief, International Journal of Vehicle Information and Communication Systems, March 2013 – 2016.

Editorial Board, Journal of Intelligent Transportation Systems. October 2010 – Present.

Editorial Board, International Journal of Transportation Science and Technology, November 2012 - Present.

Guest Editor, IEEE Transactions on Intelligent Transportation Systems. Special Issue on Big Data and Advanced Computing in Intelligent Transportation Systems, with Profs. Wei Lin at University of Arizona and Hong Lo at Hong Kong University of Science and Technology, 2014.

Guest Editor, Journal of Intelligent Transportation Systems. Special Issue on Intelligent Vehicle Navigation Systems, with Q. A. Mohammed at Loughborough University, UK and W. Y. Ochieng at Imperial College London, UK, 2007.

Major Conference and Professional Society Committees

Member of the International Program Committee, International Conference on Vehicle Technology and Intelligent Transport Systems, April 23-24, 2016. Rome, Italy.

Member of the Advisory Board, the 6th International conference on Green Intelligent Transportation Systems and Safety, July 2-6, 2015, Beijing, China.

Member of the Advisory Board, the 5th International conference on Green Intelligent

Transportation Systems and Safety, July 1-3, 2014, Xi'an, China.
Member of the Advisory Board, the 4th International conference on Green Intelligent Transportation Systems and Safety, August 1-4, 2013, Beijing, China.
Member, Committee on Artificial Intelligence and Advanced Computing Applications, Transportation Research Board of the National Academies (ABJ70), 2008- Present.
Member, Regional Coordination Transportation Group of the South Plains Association of Governments, 2012 – Present.
Member, Technical Advisory Panel of the Texas Department of Transportation Research Program (RMC4), 2007- Present
Member of the Program Committee and Associate Editor of the conference proceedings, 10th -13th International IEEE Conference on Intelligent Transportation Systems, 2008 - 2011.
Member of the Academic Committee, 9th ICCTP Annual Meeting, Harbin, China, August 2009.
Chair of the session: “Transportation and Logistics” at the 2009 INFORMS Regional Meeting, Phoenix, AZ, April 2009.
Chair of the Session: “Network Planning and Design” at the 11th World Conference on Transport Research, Berkeley, CA, June 2007.

University

Member, Task Force of International Recruiting, Texas Tech University, 2013 - 2015

College

Member, Award Committee, 2013- 2015
Member, Tenure and Promotion Committee, 2010 – 2012.
Member, P K & Robert Koh Memorial Scholarship Committee, 2010 - present
Member, Research Task Force, 2009-2010.

Department

Member, Executive Advisory Committee, 2014-2016
Chair, Search Committee for CEE Transportation Faculty, 2013
Member, Search Committee for CEE Transportation Faculty, 2012
Member, Search Committee for CEE Transportation Faculty, 2008.
Chair, Awards Committee, 2014
Member, Awards Committee (2012, 2013, 2015)
Member, Recruiting and Public Relations (2006 - 2009)
Member, Curriculum Committee (2005 - 2006, 2016 -)

Student Organizations

Founding faculty advisor, ITE Student Chapter at Texas Tech University, 2006- present.

RESEARCH AREA

Traffic operation and control: focused on developing and assessing operational strategies for optimal control of highway and street facilities;

Intelligent Transportation Systems: focused on application of GIS and GPS technology in transportation and smart phone applications;

Transportation planning and modeling: focused on mathematic modeling and optimization of transportation systems and route choice models during evacuation;
Public transit: focused on web-based bus information system and bus rapid transit (BRT);
Traffic flow theory: focused on advanced car following models

COURSES TAUGHT

CE 4361 Transportation Engineering
CE 4330 Capstone Design (Transportation Section)
*CE 4371 Highway Geometric Design
*CE 5371 Advanced Highway System Design and Safety
*CE 5372 Advanced Traffic Engineering I: Traffic Control and Highway Capacity Analysis
*CE 5373 Advanced Traffic Engineering II: Traffic Flow Theory and Operation
*CE 5331 Transportation Planning
Denoted are the new courses I developed as part of the new graduate program in transportation system engineering at Texas Tech University.

TEACHING EVALUATION AT TEXAS TECH UNIVERSITY

Undergraduate Average: 4.6/5.0
Graduate Average: 4.7/5.0
Note: Average of 2004-2016

STUDENT ADVISING (2004-2014)

As major supervisor:

Postdoctoral Researchers: 4
PhD Students: 9 (6 completed, 3 in progress)
Master Students: 18 (17 completed, 1 in progress)

Honors by Students:

Hao Xu, (Ph.D., 2011) AT&T Chancellor's Fellowship, currently Tenure-track Assistant Professor, University of Nevada at Reno.

Dali Wei, (Ph.D., 2014) CH Foundation Scholarship, Horn Professor Graduate Student Achievement Award, Texas Tech University, 2014. Currently Postdoctoral researcher at the University of California at Berkeley.

Wesley Kumfer, (Ph.D., 2014), Fellowship in the Teaching Effectiveness and Career Enhance (TEACH) Program, Teaching, Learning, & Professional Development Center (TLPDC), Texas Tech University, 2013-2014; and Student of the Year in the Southern Plains Transportation Center, 2014. Currently Postdoctoral Researcher at Texas Tech.

PUBLICATIONS SINCE JOINING TEXAS TECH UNIVERSITY

Journal Publications (Marked by * are my graduate students and postdoctoral researchers)

1. Wu, D.*, W. Kumfer*, **H. Liu**, and C. Yuan* (2016). "A Life-cycle Optimization Model Using Semi-Markov Deterioration Process for Highway Bridge Maintenance." In press, *Advanced Mathematical Modeling*.
2. Feng, Z., Y. Lei, **H. Liu**, W. Kumfer*, W. Zhang, K. Wang, and S. Liu (2016). "Driving Anger in China: A Case Study on the Professional Drivers Group." In

- press, *Transportation Research, Part F*.
<http://dx.doi.org/10.1016/j.trf.2016.09.023>
3. Wei, D.*, W. Kumfer*, and **H. Liu** (2016). “Traffic Queuing at Unsignalized Crosswalks with Probabilistic Priority.” In press, *Transportation Letters*.
 4. Lin, W., **H. Liu**, and H.K. Lo (2016). “Editorial: Big Data for Driver, Vehicle, and System Control in ITS.” *IEEE Transactions on Intelligent Transportation Systems*, **17**(6), 1663-1665.
 5. Wei, D.*, *C. Yuan, **H. Liu**, *D. Wu, and *W. Kumfer (2016). “The Impact of Service Refusal to the Supply-Demand Equilibrium in Taxicab Market”. In press, *Networks and Spatial Economics*. DOI: 10.1007/s11067-016-9324-z
 6. Pang, B., H. Xu, and **H. Liu** (2016). “Calculating the Approach Capacity of Diverging Diamond Interchanges with Consideration of Internal Queue Spillback.” *Transportation Research Record*, No. 2553.
 7. Wei, D.*, **H. Liu**, and Y. Qin (2015). “Modeling Cascade Dynamics of Railway Network under Inclement Weather.” Vol.80, 95-122, *Transportation Research, Part E: Logistics and Review*.
 8. Wu, D.*, C. Yuan, and **H. Liu** (2015). “A Risk-based Optimization for Pavement Preventative Maintenance with Probabilistic LCCA: A China Case.” In press, *International Journal of Pavement Engineering*. DOI: 10.1080/10298436.2015.1030743
 9. Wei, D.*, **H. Liu**, and Z. Tian (2015). “Vehicle Delay Estimation at Unsignalized Pedestrian Crosswalks with Probabilistic Yielding Behavior.” *Transportmetrica A: Transport Science*. **11**(2), 103-118.
 10. Wei, D.*, H. Xu, W. Kumfer*, **H. Liu**, and Z. Wang (2015). “Vehicular traffic capacity at unsignalized crosswalks with probabilistic yielding behavior.” *Transportation Research Record* No. 2483, 80-90.
 11. Kumfer, W.J.*, D. Wei*, and **H. Liu** (2015). “Investigating the Effects of Demographic and Driver Factors on Single-Vehicle and Multi-Vehicle Fatal Crashes Using Multinomial Logistic Regression.” *Transportation Research Record*, No.2518, 37-45.
 12. Wei, D.*, and **H. Liu** (2013). “Analysis of Asymmetric Driving Behavior Using a Self-learning Approach.” *Transportation Research Part B: Methodological* **46**(1), 1-14.
 13. Xu, H.*, **H. Liu** and H. Gong* (2013). “Modeling the Asymmetry in Traffic Flow (a): Microscopic Approach.” *Applied Mathematical Modeling*. Vol. 37, 9431-9440.
 14. **Liu, H.**, H. Xu,* and H. Gong* (2013). “Modeling the Asymmetry in Traffic Flow (b): Macroscopic Approach.” *Applied Mathematical Modeling*. Vol. 37, 9441-9450.
 15. Chen, S.*, **H. Liu**, and H. Xu* (2013). “Timing Oversaturated Signals: What Can We Learn from Classic and State-of-the-art Signal Control Models.” *Journal of Transportation Systems Engineering and Information Technology*, **13**(1), 61-72.
 16. Wei, D.* and **H. Liu** (2013). “Adaptive Margin Support Vector Regression: Theory and Application to Short-term Traffic Forecasting.” *Journal of Intelligent Transportation Systems*. **17**(4), 1-11.

17. Xu, H.* and **H. Liu** (2013). "Optimize Evacuation Route Considering Operational Cost as a Constraint." *International Journal of Transportation Science and Technology*, **2**(1), 65-78.
18. Xu, H.*, **H. Liu**, H. Fernando*, and S. Senadheera (2013). "Volume-to-Capacity Estimation of Signalized Road Networks for Metropolitan Transportation Planning." *Transportation Research Record*, No. 2395, 93-102.
19. Lu, G., and **H. Liu** (2012). "Ramp Metering." In *Transportation Research Circular: Artificial Intelligence Applications to Critical Transportation Issues* 70-76. Transportation Research Board, National Council of Science.
20. Chen, S., H. Xu, and **H. Liu** (2012). "Timing Oversaturated Signals: What Can We Learn from Classic and State-of-the-art Signal Control Models." *Journal of Transportation Systems Engineering and Information Technology*, **13**(1), 97-110.
21. Feng, Z-X., H-Z., Yuan, J. Liu, W-H. Zhang, **H. Liu** (2012). "Influence of Driver Personal Characteristics on Vehicle Velocity." *Journal of Traffic and Transportation Engineering*. **12**(6), 89-96.
22. Sun, L.*, J. Rong, L. Yao, H. Xu*, and **H. Liu** (2011). "Entropy-based Estimation of Transfers in a Terminal." *Journal of Transportation Planning and Technology*, **5**(3), 303-315.
23. Eugene, D. H.*, **H. Liu**, and R.B. Machemehl (2011). "Assessing the Feasibility of Converting Two Way Left Turn Lane into Bus Rapid Transit Lane." *Transportation Research Record*, No. 2218, 39-47.
24. Xu, H.*, **H. Liu**, and Z. Tian (2011). "Control Delay at Diverging Diamond Interchanges." *Transportation Research Record*, No.2257, 121-130.
25. Lin, W. and **H. Liu** (2010) "Enhancing Realism in Modeling Merge Junctions in Models for System Optimal Dynamic Traffic Assignment." *IEEE Transactions on Intelligent Transportation Systems*, **11**(4), 838-846.
26. Xu, H.*, and **H. Liu** (2010). "Development and Application of a Kalman Filter and GPS Error Correction Approach for Improved Map-matching." *Journal of Intelligent Transportation Systems*, **14**(1), 27-36.
27. Xu, H.*, **H. Liu**, and Z. Tian (2010). "Control Delay at Signalized Interchanges Considering Internal Queue Spillback." *Journal of Transportation Research Record*, No.2173, 123-132.
28. Quddus, M.A., O. Washington, and **H. Liu** (2010). "Editorial: Special Issue on Intelligent Vehicle Navigation (2)." *Journal of Intelligent Transportation Systems*, **14**(1), 1-2.
29. Tian Z., M. Kyte, and **H. Liu** (2009). "Vehicle Tracking and Speed Measurement at Signalized Intersections Using Video-Image Systems." *ITE Journal*. **79**(1), 42-46.
30. Luis, G., R. L. Cheu, R. L. Machemehl, and **H. Liu** (2009). "Bus Rapid Transit Features and Deployment Phases for U.S. Cities." *Journal of Public Transportation*, **12**(2), 23-38.
31. Chen, S. *, **H. Liu**, and D. H. Jeryl (2009). "Surrogate Safety Assessment for A Tight Urban Diamond Interchange Using Micro-simulation." *Advances in Transportation Studies, an International Journal*, Vol. XVIII, 18-39.

32. Wei, H., T. Xu, and **H. Liu** (2009). "Route-Choice Models Reflecting the Use of Travel Navigation Information in a Vehicle-Based Microscopic Simulation System." *International Journal of Vehicle Information and Communication Systems*, **2**(1/2), 27-39.
33. Tan, C-W, S. Park, **H. Liu**, Q. Xu, and P. Lau (2008). "Prediction of Transit Vehicle Arrival Time for Signal Priority Control: Algorithm and Performance." *IEEE Transactions on Intelligent Transportation Systems*, **9**(4), 688-696.
34. Tan, C-W, *M. Li, S. Park, P. Lau, and **H. Liu** (2008). "Communication of Transit Signal Priority Requests." *International Journal of Vehicle Information and Communication Systems*, **1**(3/4), 249-267.
35. Quddus, M.A., O. Washington, and **H. Liu** (2008). "Editorial: Special Issue on Intelligent Vehicle Navigation." *Journal of Intelligent Transportation Systems*, **12**(4), 1-2.
36. **Liu, H.**, K. N. Balke, and W. Lin (2008). "A Reverse Causal-effect Modeling Approach for Real Time Signal Control of An Oversaturated Intersection." *Transportation Research, Part C*, **16**(6), 742-754.
37. **Liu, H.**, H. Xu*, and Y. Bao (2008). "A Virtual Differential Map-matching Algorithm with Improved Accuracy and Computational Efficiency." *Journal of Navigation*, **61**(3), 421-434.
38. **Liu, H.**, J.* Zhang, and D. Cheng (2008). "Evaluation of Transit Signal Priority Using an Analytical Approach: Analysis, Evaluation, and Statistical Test." *Journal of Transportation Systems Engineering and Information Technology*, **8**(2), 48-57.
39. Tian, Z., M. Varun, and **H. Liu**. (2008). "Effectiveness on Lead-lag Phasing on Progression Bandwidth." *Journal of Transportation Research Record*. No. 2080, 22-27.
40. Cheng, D., Z. Tian, and **H. Liu** (2008). "Implementing Actuated Signal Controlled Intersection Capacity Analysis with Pedestrians." *Journal of Transportation Research Record*, No. 2071, 125-130.
41. **Liu, H.**, W. Lin, and C-W. Tan (2007). "An Operational Strategy for Advanced Vehicle Location Based Transit Signal Priority." *ASCE Journal of Transportation Engineering*, **133**(9), 513-522.
42. Gong, H.*, **H. Liu**, and B. H. Wang (2007). "An Asymmetric Full Velocity Difference Car-following Model." *Journal of Physica A: Mathematical and Theoretical*, Vol.387, 2595-2602.
43. Li, L., W. Lin, and **H. Liu** (2006). "A Type-2 Fuzzy Logic Approach for Short-term Traffic Forecasting." *IEE Journal of Intelligent Transport Systems*, **153**(1), 33-40.
44. **Liu, H.**, A. Skabardonis, and M. Li (2006). "Simulation of Transit Signal Priority Using the NTCIP Architecture." *Journal of Public Transportation*, **9**(3), 117-136.
45. **Liu, H.**, A. Skabardonis, and M. Li (2004). "Optimal Location of Detectors for Transit Signal Priority." *Journal of Transportation Research Record*, No. 1867, 144-150.

In Refereed Conference Proceedings

46. Wu, D.*, C. Yuan, and **H. Liu**. “A Taxi Price Equilibrium Model with the Waiting Price for Congested Cities: Beijing Case Study.” Forthcoming in the Proceedings of the 96th Transportation Research Board Annual Meeting. Paper No. 17-03431.
47. Wu, D.*, J. Zhao*, and **H. Liu**. “Evaluating the Impact of Oversize and Overweight Loads on Highways in Different Climate Zones: Texas Case Study.” Paper No. 17-03409. Forthcoming in the Proceedings of the 96th Transportation Research Board Annual Meeting.
48. Wu, D.*, C. Yuan, and **H. Liu**. “Energy Consumption, CO2 Emissions, and Growth Patterns in China’s Provincial Transport Sectors: A Grey Relational Analysis.” Paper No. 17-03438. Forthcoming in the Proceedings of the 96th Transportation Research Board Annual Meeting.
49. Wu, D.*, C. Yuan, and **H. Liu**. “A Quantitative Assessment Framework for Post-earthquake Transportation Network Resilience Using Fuzzy Logic.” Paper No. 16-3864. In the Proceedings of the 95th Transportation Research Board Annual Meeting, January 2016.
50. Pang, B.,* H. Xu, and **H. Liu**. “Calculating the Approach Capacity of Diverging Diamond Interchanges with Consideration of Internal Queue Spillback.” Paper No. 16-4674. In the Proceedings of the 95th Transportation Research Board Annual Meeting, January 2016.
51. Kumfer, W. J.,* D. Wei,* and **H. Liu** (2015). “Investigating Teenage Driver Attitudes and Behaviors through Survey Analysis and Logistic Regression. Paper No. 16-3703. In the Proceedings of the 95th Transportation Research Board Annual Meeting, January 2016.
52. Wei, D.*, and **H. Liu** (2015). “Vehicular traffic capacity at unsignalized crosswalks with probabilistic yielding behavior.” In the Proceedings of the 94th Transportation Research Board Annual Meeting, Washington, D.C., January 17, 2015.
53. Kumfer, W.J.*, D. Wei*, and **H. Liu**. “Investigating the Effects of Demographic and Driver Factors on Single-Vehicle and Multi-Vehicle Fatal Crashes Using Multinomial Logistic Regression.” Presented in the 94th Transportation Research Board Annual Meeting, Washington, D.C., January 16, 2015.
54. Ostrander, C.,* K. Wesley*, D. Wei,* and **H. Liu** “The Effect of Truck Lane Restrictions on Weaving Segments of Freeways.” In the pre-print CD-ROM, the 9^{2nd} Annual Meeting of Transportation Research Board, 2014.
55. Yuan, C.,* D. Wei,* and H. Liu. “Impact of Service Refusal to Supply-Demand Equilibrium in Taxicab Market.” In the pre-print CD-ROM, the 92nd Annual Meeting of Transportation Research Board, 2014.
56. Chen, Y., J. He, M. King, **H. Liu**, and W. Zhang. “Dynamic Load-sharing of Longitudinal-connected Air.” In the pre-print CD-ROM, the 91st Annual Meeting of Transportation Research Board, 2013.
57. Wei, D.,* **H. Liu**, and Z. Tian. “An Analytical Delay Model for Yielding Vehicles at Unsignalized Pedestrian Crossings.” In the pre-print CD-ROM, the 91st Annual Meeting of Transportation Research Board, 2013.

58. He, Q., W. H. Lin, **H. Liu**, and K.L. Head. "Heuristic Algorithms for Inline Traffic Signal Control with Cell Transmission Models." Proceedings of the 90th Annual Meeting of Transportation Research Board, 2012.
59. Luo, B., Z. Lin, Z. Dong, M. Hämäläinen, **H. Liu**, and H. Xu*. "Developing a Real-time Decision Support System for Disaster Evacuation." Proceedings of the International Conference of Decision Sciences Institute, July 12-16, Taipei, Taiwan. 2012.
60. Wei, D.* and **H. Liu**." An Adaptive Margin Support Vector Regression for Short-term Traffic Forecasting." In the pre-print CD-ROM, the 90th Annual Meeting of Transportation Research Board, 2012.
61. He, Q., W. Lin, **H. Liu**, and L. K. Head. "Heuristic Algorithms to Solve 0-1 Mixed Integer LP Formulations for Traffic Signal Control Problems." IEEE/INFORMS International Conference on Services, Logistics, and Informatics, July 15-17, 2010, Qingdao, China.
62. Xu, F., T. Zong, and **H. Liu**. "Traffic Counting Errors Due to the Occlusion Effect of Video Image Vehicle Detection System." ICCTP Annual Conference, Beijing, August 4-8, 2010, Beijing, China.
63. **Liu, H.** and H. Xu.* "Simultaneous Correction of GPS Error and Map Error for Improved Map-matching: Algorithm and Application." Proceedings of SPIE Geoinformatics Annual Meeting, Guangzhou, China, August 2008. Vol. 7145.
64. Xu, H.,* **H. Liu**, and Y. Bao. "An Enhanced Kalman Filter Approach for Improved Map-matching." Preprint CD-ROM. The 87th Annual Meeting of Transportation Research Board. January 2008.
65. Xu, H.,* **H. Liu**, and Y. Bao, Y. "A Virtual Differential Map-matching Algorithm." Proceedings of the IEEE 10th World Conference on Intelligent Transportation Systems, 448-453. June 2007.
66. Tan, C-W, M., Li, S. Park, P. Lau, and **H. Liu**. "A Supply-demand Model for Communication of Transit Signal Priority Requests." Proceedings of International Conference on Multimedia and Ubiquitous Engineering, 484-491. April 2007.
67. Zheng, J., Y. Wang, **H. Liu**, and M. E. Hallenback. "Modeling Impact of Near-side Bus Stop on Transit Delay at Signal Priority Enabled Intersections." Preprint CD-ROM. The 86th Annual Meeting of Transportation Research Board. January 2007.
68. Tan, C-W, S. Park, K. Zhou, **H. Liu**, P. Lau, and M. Li. "Prediction of Transit Vehicle Arrival Times at Signalized Intersections for Signal Priority Control." *Proceedings of the IEEE 9th International Conference on Intelligent Transportation Systems*, 1477-1482. September 2006.
69. Li, L., W. Lin, and **H. Liu**. "Traffic Signal Priority/Preemption Control with Colored Petri Nets." *Proceedings of the IEEE 8th International Conference on Intelligent Transportation Systems*, 694-699. September 2005.
70. Lin, W. and **H. Liu**. "A Mathematical Programming Module for Merge Control in System Optimal Dynamic Traffic Assignment." *Proceedings of the IEEE 8th International Conference on Intelligent Transportation Systems*, 103-108. September 2005.

71. **Liu, H.**, J. Song and Y. Yin. "A Simplified Method for Estimation of Back of Queue and its Application." *Proceedings of IEEE Intelligent Vehicle Symposium*, 662-668. June 2005.
72. Zhu, L., J. Song, Q. Huang, M. Zhang, and **H. Liu**. "A Novel Module of Tracking Vehicles with Occlusion." *Proceedings of IEEE Intelligent Vehicle Symposium*, 893-899. June 2005.
73. Li, M., Y. Yin, K. Zhou, **H. Liu**, and C-W. Tan. "Adaptive Transit Signal Priority on Actuated Signalized Corridors." Preprint CD-ROM. *The 84th Annual Meeting of Transportation Research Board*. January, 2005.
74. **Liu, H.**, M. Li, A. Skabardonis, K. Zhou, C-W. Tan, and S. Park. "Development and Application of a Simulation Tool for Transit Signal Priority." Preprint CD-ROM. *The 83rd Annual Meeting of Transportation Research Board*. January 2005.
75. **Liu, H.**, and A. Skabardonis. "A Dynamic Model for Adaptive Bus Signal Priority." Preprint CD-ROM. *The 83rd Annual Meeting of Transportation Research Board*. January 2005.
76. Yin, Y., **H. Liu**, and H. Benouar. "A Note on Equity of Ramp Metering." *Proceedings of IEEE 7th International Conference on Intelligent Transportation Systems*, 497-502. October, 2004.

Edited Journal Issues and Book Chapters

1. Special Issue on Transportation Big Data. *IEEE Transactions on Intelligent Transportation Systems*, 17(6). With W. Lin and H.K. Lo.
2. Special Issue on Intelligent Vehicle Navigation (1). *Journal of Intelligent Transportation Systems*, 12(4), 2008. With Quddus, M.A. and O. Washington.
3. Special Issue on Intelligent Vehicle Navigation (2). *Journal of Intelligent Transportation Systems*, 14(1), 2010. With: Quddus, M.A. and O. Washington.
4. Transportation Research Circular EC168: Artificial Intelligence Applications to Critical Transportation Issues, 2012. Co-editors: Transportation Research Board of the National Academies Committee on Artificial Intelligence and Advanced Computing, ABJ70.

RESEARCH PROJECTS AND PROPOSALS AT TEXAS TECH (2004-2014)

Funded Research Projects

1. P.I., 50%. Understanding Older Teenage Drivers: Expansion of the Interactive Animation Tool for Education of Teenage Drivers with Data from Long-Distance Traveling College Students. National Highway Traffic Safety Administration and Texas Department of Transportation. October 2016 – September 2017.
Contracted: \$144,274
Prorated: \$72,187
2. P.I., 100%. Implementation of the Interactive Animation Tool for Education of Teenager Drivers on Rural Roads: National Highway Traffic Safety

Administration and Texas Department of Transportation. October 2015 – September 2016.

Contracted: \$143,482

Prorated: \$143,482

3. P.I., 80%. (Co-PIs: Moon Won, Sanjaya Senadheera, Cynthia McKenney, Alon Kvashny.). Technical Assistance to Texas Department of Transportation, \$500,000, September 2015-August 2017.
Contracted: \$500,000
Prorated: \$400,000
4. P.I., 100%. Development of an Interactive Animation Tool for Education of Teenager Drivers: Phase I. National Highway Traffic Safety Administration through Texas Department of Transportation. October 2014 – September 2015.
Contracted: \$168,441
Prorated: \$168,441
5. P.I., 100%. Data Analysis of Teenage Driver Accidents in Texas, Farmers Insurance. March - December 2015.
Contracted: \$25,000
Prorated: \$25,000
6. P.I., 80%. (Co-PIs: Moon Won, Sanjaya Senadheera, Cynthia McKenney, Alon Kvashny.). Technical Assistance to Texas Department of Transportation, \$500,000, September 2013-August 2015.
Contracted: \$500,000
Prorated: \$400,000
7. Co-P.I. 30%. (PI: Sanjaya Senadheera), Southern Plains Regional Transportation Center (SPRTC), \$442,500. US Department of Transportation, 2014-2017.
Contracted: \$442,500
Prorated: \$132,750
8. P.I., 52%. (Co-PIs: Phil Nash, Moon Won, Sanjaya Senadheera, Cynthia McKenney, and Alon Kvashny). Technical Assistance to Texas Department of Transportation. \$500,000, September 2011-August 2013.
Contracted: \$500,000
Expenditure: \$353,759
9. P.I., 100%. Mobility Study of Highway Corridors: Phase II: Interchanges and Frontage Roads. Lubbock Metropolitan Planning Organization, \$58,000, September 2011- August 2012.
Contracted: \$58,000
Expenditure: \$58,000

10. P.I., 45%. (Co-PIs: Phil Nash and Sanjaya Senadheera). Synthesis of Successful Bicycle Planning in Mid-size Cities. Texas Department of Transportation, \$80,000, September 2009 – August 2010.
Contracted: \$80,000
Expenditure: \$54,000
11. P.I., 60%. (Co-PIs: Phil Nash and Sanjaya Senadheera). Technical Assistance to Texas Department of Transportation: Traffic Modeling and Simulation, \$150,000, September 2009 – August 2011.
Contracted: \$150,000
Expenditure: \$149,917
12. P.I., 100%. Technical Support for Data Collection and Analysis for Traffic Management Center. City of Lubbock, \$20,758, 2010.
Contracted: \$20,758
Expenditure: \$20,758.
13. P.I., 100%. Technical Support for Data Collection and Analysis for Traffic Management Center. City of Lubbock, \$21,174, 2009.
Contracted: \$21,174
Expenditure: \$21,174.
14. P.I., 100%. Technical Support for Data Collection and Analysis for Traffic Management Center. City of Lubbock, \$20,758, 2008.
Contracted: \$20,758
Expenditure: \$20,758
15. P.I., 100%. Technical Support for Data Collection and Analysis for Traffic Management Center. City of Lubbock, \$20,758, 2007.
Contracted: \$20,758
Expenditure: \$20,758
16. P.I., 100%. Mobility Study of Highway Corridors – Phase I: I-27 to Spur 327. Lubbock Metropolitan Planning Organization, \$49,588, September 2007 - August 2008.
Contracted: \$49,588
Expenditure: \$49,588
17. P.I.*, 100%. Testing of Pavement Marking Materials. Federal Highway Administration and Texas Department of Transportation, \$30,000, September 2007 – August 2010.
Contracted: \$30,000
Expenditure: \$30,000.
(*:In collaboration with Texas Transportation Institute (TTI). Total grant is \$300,000; Project P.I. is Paul Carlson at TTI, I am the P.I. of Texas Tech University.)

18. P.I.*, 100%. Comprehensive Planning and Design Guidelines for Incorporating a Bus Rapid Transit Scenario to the Analysis of Texas Highway Corridors. Texas Department of Transportation, \$72,856, September 2006 – August 2008.
Contracted: \$72,856
Expenditure: \$72,856.
(*: In collaboration with University of Texas at Austin and University of Texas at El Paso. Total grant is: \$245,000. I am the P.I. of Texas Tech University.)
19. P.I.*, 100%. Managing Freeway Operation during Weather Events. Federal Highway Administration and Texas Department of Transportation, \$34,944, September 2005 – August 2006.
Contracted: \$34,944
Expenditure: \$32,531
(*: In collaboration with Texas Transportation Institute. Total grant is \$130,328. I am the P.I. of Texas Tech University)
20. P.I., 100%. Development of Hardware-in-the-loop (HiL) Simulation and Virtual 170/2070 Controller. California Department of Transportation, \$185,000, September 2004 – August 2006.
Contracted: \$185,000
Expenditure: \$60,000

At the University of California at Berkeley

21. PI*. Red Light Running Avoidance. California Department of Transportation, \$309,639, July 2004 – June 2006. (*: not performed due to employment change)
22. Team member. Toward Development of Adaptive Transit Signal Priority Systems. California Department of Transportation, \$191,184, September 2003 – August 2004.
23. Team member. Development of an Integrated Microscopic Traffic Simulation and Signal Timing Tool. California Department of Transportation, \$193,363, July 2004 – June 2005.
24. Team member. Development of Deployment Strategy for an Integrated BRT System. Federal Transit Administration and California Department of Transportation, \$204,690, July 2002 – June 2004.
25. Team member. Field Evaluation of VTA Line 22 Bus Signal Priority System. California Department of Transportation, \$100,000, July 2003 – June 2004.
26. Team member. Development of Bus Rapid Transit (BRT) Information Clearing House. California Department of Transportation, \$200,000, July 2002 – June 2004.

OTHER SCHOLARLY ACTIVITIES

Invited Lectures and Seminars

1. Technical Seminar, “Next Generation Traffic Signals in the Era of Driverless Vehicles.” Zhong Ke Long An Co. Ltd., Hefei, China. July 6th, 2016.

2. Graduate Seminar, "On Data-driven Transportation Research." Jilin University, Changchun, China. July 10th, 2015.
3. Graduate Seminar, "Analytics for Transportation Data from Single and Multiple Sources." Zhejiang University, Hangzhou, China. June 25th, 2015.
4. Graduate Seminar, "A Reversal Causal-effect Approach for Oversaturated Traffic Signal Control." Hong Kong University of Science and Technology, May 10th, 2014.
5. Graduate Seminar, "Recent Advancements in Data and Big Data Studies in Transportation." The University of Science and Technology of China, Hefei, China, June 20, 2014.
6. College of Transportation Engineering Seminar, "Revisit Traffic Flow Theories Using Data-oriented Self-learning Approach." Hefei University of Technology, Hefei, China, June 21st, 2014.
7. Semester Seminar Series, "A Reverse Causal-effect Approach for Real-time Signal Control of Oversaturated Intersections." The Department of System and Industrial Engineering, University of Arizona. October 30, 2013.
8. Summer Seminar Series on Modern Transportation Engineering. "Recent Advances in Intelligent Transportation Systems." Hebei University of Technology, July 2013, Tangshan, China.
9. Summer Seminar Series on Modern Transportation Engineering. "Recent Advances in the Four-stages Method for Transportation Planning." Hebei University of Technology, July 2012, Tangshan, China.
10. Summer Seminar Series on Modern Transportation Engineering. "Recent Advances in Traffic Operation and Control." Hebei University of Technology. July 2011, Tangshan, China.
11. The 2nd International Symposium on Human Factor and Highway Safety. "The Asymmetry in Car-following and Its Impact to Highway Safety." November 2011, Beijing, China.
12. Tsinghua University Graduate Seminar. "Transportation Education and Profession." November 2011, Beijing, China.
13. The 3rd Asia-Pacific Conference on Integrated Transportation Planning. "Integrated Transportation Planning, Design, and Operation." August 2011, Wuhan, China.
14. Traffic Congestion and Emission Workshop, Technical University Munich and Hefei University of Technology. "Disconnections between Transportation Planning, Design and Operation." July 2011, Hefei, China.
15. University of Science and Technology of China. "Strategies for Signal Control of Oversaturated Intersections." August 2010, Hefei, China.
16. Hefei University of Technology. "Advances in Car-following Models." Hefei, China, July 2010.
17. Hebei University of Technology. "Transportation Education in the United States." August 2009, Tianjin, China.
18. Hebei Polytechnic University. "Towards Low-Carbon Transportation Planning." August 2009, Tangshan, China.
19. University of California at Davis. "Approximation of Stop-and-Go Traffic to Continuum Flow for Advanced Traffic Control." June 2008, Davis, California.

20. Student Government Association of Texas Tech University. "Web-based Public Transit Information System." October 2008, Lubbock, Texas.
21. University of Texas at El Paso. "Design, Control, and Operation of Bus Rapid Transit." April 2007, El Paso, Texas.
22. JiLin University. "Calibration and Validation of Microscopic Traffic Simulation Models." July 2006. Changchun, China.

Presentations and Posters Given at Conferences

1. "A Quantitative Assessment Framework for Post-earthquake Transportation Network Resilience Using Fuzzy Logic." Paper No. 16-3864. Presented at the 95th Transportation Research Board Annual Meeting, January 2016.
2. "Calculating the Approach Capacity of Diverging Diamond Interchanges with Consideration of Internal Queue Spillback." Paper No. 16-4674. Presented at the 95th Transportation Research Board Annual Meeting, January 2016.
3. "A Quantitative Assessment Framework for Post-earthquake Transportation Network Resilience Using Fuzzy Logic." Paper No. 16-3864. Presented at the 95th Transportation Research Board Annual Meeting.
4. "Calculating the Approach Capacity of Diverging Diamond Interchanges with Consideration of Internal Queue Spillback." Paper No. 16-4674. Presented at the 95th Transportation Research Board Annual Meeting.
5. "Vehicular traffic capacity at unsignalized crosswalks with probabilistic yielding behavior." Presented in the 94th Transportation Research Board Annual Meeting, Washington, D.C., January 17, 2015.
6. "Investigating the Effects of Demographic and Driver Factors on Single-Vehicle and Multi-Vehicle Fatal Crashes Using Multinomial Logistic Regression." Presented in the 94th Transportation Research Board Annual Meeting, Washington, D.C., January 16, 2015.
7. "The Effect of Truck Lane Restrictions on Weaving Segments of Freeways." Presented by C Ostrander at the 92nd Annual Meeting of Transportation Research Board, 2014.
8. "Impact of Service Refusal to Supply-Demand Equilibrium in Taxicab Market." Presented by H. Liu at the 92nd Annual Meeting of Transportation Research Board, 2014.
9. "Dynamic Load-sharing of Longitudinal-connected Air." Presented by Y. Chen at the 91st Annual Meeting of Transportation Research Board, 2013.
10. "An Analytical Delay Model for Yielding Vehicles at Unsignalized Pedestrian Crossings." In the pre-print CD-ROM, the 91st Annual Meeting of Transportation Research Board, 2013.
11. "An Adaptive Margin Support Vector Regression for Short-term Traffic Forecasting." Presented by D. Wei at the 90th Annual Meeting of Transportation Research Board, 2012.
12. "Developing a Real-time Decision Support System for Disaster Evacuation." Presented by Z. Lin at the International Conference of Decision Sciences Institute, July 12-16, Taipei, Taiwan.

13. "Assessing the Feasibility of Converting Two Way Left Turn Lane into Bus Rapid Transit Lane." Presented by H. Liu at the 90th Transportation Research Board Annual Meeting, Washington D.C., January 2011.
14. "Control Delay at Diverging Diamond Interchanges." Presented by H. Xu at the 90th Transportation Research Board Annual Meeting, Washington D.C., January 2011.
15. "Control Delay at Signalized Diamond Interchanges Considering Internal Queue Spillbacks." Presented by H. Liu at the 89th Transportation Research Board Annual Meeting, Washington D.C., January 2011.
16. "Control Delay at Signalized Interchanges Considering Internal Queue Spillback." Presented at the 89th Transportation Research Board Annual Meeting, Washington D.C., January 2010.
17. "Calibration of Asymmetric Full Velocity Car-following Models Using the NGSIM Data." Presented at the 9th ICCTP International Conference, Harbin, China, August 5-9, 2009.
18. "Continuum Approximation of Traffic Flow at Signalized Intersections." Presented by Hongchao Liu at the INFORMS regional meeting, Phoenix, AZ, April, 2009.
19. "Coordinate or Not to Coordinate: A Case Study on an Arterial Street with an Over-saturated Diamond Interchange." Presented by Hongchao Liu at the 2009 TexITE winter meeting.
20. "Convertibility of Two-way Left Turn Lanes into BRT lanes." Presented by Trey Dawson at the 2009 TexITE winter meeting.
21. "A New Method for Delay Calculation of Diamond Interchanges with Internal Queues." Presented by Hao Xu at the 2009 TexITE winter meeting.
22. "An Asymmetric Full Velocity Model with Field Data Validation." Presented by Huaxin Gong at the 2009 TexITE winter meeting.
23. "Modeling Transfer Demand at Intermodal Transportation Terminals." Presented by Lishan Sun at the 9th NACOTA Transportation Research Symposium, Washington D.C., January 2009.
24. "A Linear Relaxation Approach to Analytical Traffic Signal Control Problems." Presented by Qing He at the 2008 INFORMS annual meeting, Washington D.C., October 2008.
25. "Simultaneous Correction of GPS Error and Map Error for Improved Map-matching: Algorithm and Application." Presented by Yuanlu Bao at the 2008 Geoinformatics annual meeting, Guangzhou, China, June 2008.
26. "Effectiveness on Lead-lag Phasing on Progression Bandwidth." Presented by Zong Tian at the 87th Annual Meeting of Transportation Research Board, Washington, D.C., January 2008.
27. "An Enhanced Kalman Filter Approach for Improved Map-matching." Presented by Hao Xu and Hongchao Liu at the 87th Annual Meeting of Transportation Research Board (Poster Session), Washington, D.C., January 2008.
28. "Implementing Actuated Signal Controlled Intersection Capacity Analysis with Pedestrians." Presented by Dingxin Cheng at the 87th Annual Meeting of Transportation Research Board, Washington, D.C., January 2008.

29. "A Virtual Differential Map-matching Algorithm." Presented by Hongchao Liu at the IEEE 10th International Conference on Intelligent Transportation Systems, Seattle, WA, June 2007.
30. "A Supply-demand Model for Communication of Transit Signal Priority Requests." Presented at the International Conference on Multimedia and Ubiquitous Engineering, Seoul, Korea, April 2007.
31. "Prediction of Transit Vehicle Arrival Times at Signalized Intersections for Signal Priority Control." Presented at the IEEE 9th International Conference on Intelligent Transportation Systems, Toronto, Canada, September 2006.
32. "Traffic Signal Priority/Preemption Control with Colored Petri Nets." Presented at the IEEE 8th International Conference on Intelligent Transportation Systems, Vienna, Austria, September 2005.
33. "A Mathematical Programming Module for Merge Control in System Optimal Dynamic Traffic Assignment." Presented at the IEEE 8th International Conference on Intelligent Transportation Systems, Vienna, Austria, September 2005.
34. "A Simplified Method for Estimation of Back of Queue and its Application." Presented at the IEEE Intelligent Vehicle Symposium, Las Vegas, June 2005.
35. "A Novel Module of Tracking Vehicles with Occlusion." Presented by Lin Zhu at the IEEE Intelligent Vehicle Symposium, Las Vegas, June 2005.
36. "Adaptive Transit Signal Priority on Actuated Signalized Corridors." Presented at the 84th Annual Meeting of Transportation Research Board. Washington, D.C., January 2005.
37. "A Note on Equity of Ramp Metering." Presented at the IEEE 7th International Conference on Intelligent Transportation Systems, Washington, D.C., October 2004.
38. "Development and Application of a Simulation Tool for Transit Signal Priority." Presented at the 83rd Annual Meeting of Transportation Research Board, Washington, D.C., January 2004.
39. "A Dynamic Model for Adaptive Bus Signal Priority." Presented at The 82nd Annual Meeting of Transportation Research Board, Washington, D.C., January 2003.
40. "An Approach on Network Traffic Signal Control Under The Real-time And Over-saturated Flow Condition." Presented at the 81st Annual Meeting of Transportation Research Board, Washington, D.C., January 2001.
41. "A Study on Real-time Signal Control for an Isolated Over-saturated Signalized Intersection." Presented at the 7th World Congress on Intelligent Transportation Systems. Turin, Italy, November 2000.
42. "Toward Deployment of Intelligent Transportation Systems in China." Presented at the 3rd Asian-Pacific ITS conference, Beijing, China, August 1996.

Postdoctoral Researchers and Visiting Scholars

Postdoctoral Researchers

Researcher	Research Topic	Year of Completion	Current Employer
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Lishan Sun	Entropy-based Transit Terminal Operation Models	December 2009	Associate Professor, Beijing Institute of Technology
Hao Xu	Asymmetric Car-following and ITS	June 2013	Assistant Professor, University of Nevada, Reno
Changwei Yuan	Best Pricing Strategies for Beijing's Taxi Systems	August 2013	Professor, Chang'an University
Dexin Yu	Advanced Traffic Modeling and Control Using Artificial Intelligence Method	August 2016	Associate Professor, Jilin University
Xiao dong Zang	Operational Strategies for Multilayer Interchanges	--	Professor, Guangzhou University

Chaired Doctoral Degrees

Student	Dissertation Title	Year of Completion	Current Employer
Shuaiyu Chen	Real-Time Traffic Signal Control for Over-Saturated Networks	December 2007	Walter P. Moore and Associates
Huaxin Gong	Numerical Approximation of the Aw-Rascole and Zhang's Model Using the WENO Approach	August 2010	Humana
Hao Xu	Realtime Adjustment of Evacuation Plan During Hazardous Events (tentative)	August 2011	University of Nevada, Reno
Bo Pang	Capacity Analysis of DDI and Tool Development for Comparison with Conventional Interchanges	August 2017 (expected)	---
Dali Wei	Multisource Traffic Data Assimilation for Reliable Traffic State Estimation and Prediction	May 2014	Postdoc University of California at Berkeley
Wesley Kumfer	Using Texas Data to Calibrate Safety Functions and Parameters in HSM	May 2015	Postdoc Texas Tech University
Dayong Wu	Risk Analysis and Resilience of Transportation Network	May 2016	Postdoc TTU

Junxuan Zhao	TBD	May 2019 (expected)	---
Armando Rosario	TBD	May 2020 (expected)	---

Chaired and Supervised Master's Students

Student	Thesis / Non-Thesis	Thesis/Paper Title	Year of Completion	Current Employer
Jie Zhang	Thesis	Evaluation of Transit Signal Priority Using Analytical Method	August 2007	KBR, Inc.
Huaxin Gong	Thesis	Asymmetric Full Velocity Difference Car-following Model	December 2007	Private Investment Bank
Gyujin Joo	Thesis	Capacity Analysis of Urban Diamond Interchanges	December 2006	Wayland Baptist University
Pavan R. Evuri	Thesis	Comprehensive Evaluation of LOS of South Loop 289 Using Vissim Simulation	August 2008	---
Adinath Godse	Thesis	Synthesis of Technologies, Costs, Infrastructure and the Design Innovative for Comprehensive BRT Systems	August 2008	Southwest Consultant Inc.
Rhett Dollins	Report	Delay of Diamond Interchanges with two way frontage roads	December 2010	Savanna Consultant Inc.
Trey Dawson	Report	Assessing the Feasibility of Converting The Two Way Left Turn Lane into A Bus Rapid Transit Lane	August 2009	Dawson Consulting Group, Tx.
Taylor Perrine	Report	A Comprehensive Literature Review on Green Transportation	August 2009	---
Rajesh Bhupatiraju	Report	Comprehensive Literature Review on Bus Rapid Transit	August 2010	---
Jonathan Griffin	Report	Green Transportation: Literature and State-of-the-Practice	August 2009	---

Chintaluri Bhargari	Report	Synthesis of Successfully Bicycle Planning in Mid-sized Cities	December 2010	---
Hao Xu	Report	Revised Kalman Filter Approached for Map-matching	December 2009	Assistant Professor, University of Nevada
Chinranjeevi Muppaneni	Course	N/A	December 2009	---
Jared A. Squyres	Report	South Loop 289 Capacity Analysis	August 2012	Parkhill, Smith & CooperInc
Dali Wei	Course	Analysis of Asymmetric Car-following Behavior Using Data-driven Approach	August 2012	TTU PhD Program
Henok Tezera	Thesis	Using Synchro to Time Oversaturated Signals	December 2011	Kimley Horn Inc.
Hiron Fernando	Thesis	Volume-to-Capacity Estimation for Metropolitan Transportation Planning	December 2012	Kimley Horn Inc.
Meron Shiferaw	Course	N/A	May 2012	Savanna Consultant Inc
Chad Ostrander	Thesis	Revisiting the Texas Regulations on Truck Lanes	May 2014	A&J Consultant Inc
Alvarez, Julio	Course	N/A	May 2015	--
Bhargavi Rumandla	Course	N/A	May 2015	--
Anvesh Puli	Course	N/A	May 2015	--
Castillo-Rodriguez Ariel	Thesis	TBD	May 2019	

Member of Ph.D. Committees

Student	Dissertation Title	Year of Completion	Current Employer
Paul Abhijit	Integrated Approach to Network Modeling of Vehicular Demand: Space Syntax and Trip Assignment	December 2008	---
Javid Roxana	Quantifying the Environmental Impacts of Applied Sustainable Transportation Policies	August 2016	Savannah University

Member of M.S. Committees

Student	Thesis Title	Year of Completion	Current Employer
Mishra Debakanta	Maintenance Strategies to Prevent Water Intrusion at Bridge Ends	August 2006	University of Illinois, PhD program
Nakul S Datre	Sustainable Pavement Design: A Case Study	December 2009	--
Malasani Santhi	Review of Asphalt Emulsion	December 2009	--
Lei Niu	Advances in Asphalt Pavement Emulsion	December 2010	--