

MIN LIU

Director of Syracuse University Infrastructure Institute
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A. Education Background:

- 2007 Ph.D., Dept. of Civil and Environmental Engineering, Engineering Project Management Program, University of California at Berkeley, U.S. Dissertation title: Work Flow Variability and Labor Productivity Loss for Construction Projects
- 2001 M.S., National University of Singapore, Dept. of Building Science, Singapore
- 1997 M.S.C.E., Xi'an University of Architecture and Technology, Dept. of Civil Engineering, Construction Engineering Management, P.R. China
- 1994 B.S.C.E., Qingdao Institute of Architecture and Engineering, Dept. of Civil Engineering, Structural Engineering, P.R. China

B. Professional Experience:

- 2022 - Present Professor and Abdallah H. Yabroudi Endowed Professor in sustainable Civil Infrastructure, Director of the Infrastructure Institute, Syracuse University
- 2022 Jan-July Visiting Professor, Digital Twin Construction, Construction Information Technology Lab, University of Cambridge
- 2014 - 2022 Associate Professor, *Edward I. Weisiger Distinguished Scholar*: Dept. of - Civil, Construction, and Environmental Engineering, North Carolina State University, U.S.
- 2007 - 2014 Assistant Professor: Dept. of Civil, Construction, and Environmental Engineering, North Carolina State University, U.S.
- 2001 - 2002 Research Assistant: School of Building, National University of Singapore, Singapore
- 1997 - 1999 Engineer: Loan Department, Shaanxi Branch, China Construction Bank, P.R. China
- 1996 Engineer: Department of Project Management, Bao Steel Company, P.R.China

C. Selected Awards, Professional Service, and Affiliations:

(a) Awards

- 2021 Featured on ASCE Construction Institute Newsletter and social media as Women Leader in Construction.
- 2021 2021 ASCE Thomas Fitch Rowland Prize for paper, Javanmardi, A. *, Hosseini, A. *, Liu, M.,** Hsiang, S. (2020). "Improving Effectiveness of Constraints Removal in Construction Planning Meetings: An Information-theory based Approach." *ASCE Journal of Construction Engineering and*

- Management*, 146(4), 04020015. *Ph.D. student of Dr. Min Liu, ** Corresponding author.
- 2018 Best Paper Award, Javanmardi, A., Abbasian-Hosseini, A., Hsiang, S., and Liu, M. (2018). “Constraints and Reliable Workplan: A Case Study of Bridge Project” International Group of Lean Construction, Chennai, India, 15-21 July 2018.
- 2017 Best Paper Award, “Factors Affecting Bid Let Dates on Transportation Mega Projects.” Lean and Computing in Construction Congress, Crete, Greece, 4-12 July 2017.
- 2015, 2017 Outstanding Reviewer, awarded by the ASCE Journal of Construction Engineering and Management
- 2011, 2014, 2018 Thank a Teacher Recipient

Student awards

- 2022 David Johnston Graduate Award in Construction Engineering, Awardee, Chuanni He, is Dr. Min Liu’s Ph.D. student.
- 2022 People’s Choice Award for the presentation in the Annual Three Minute Thesis Competition, Awardee, Gongfan Chen, is Dr. Min Liu’s Ph.D. student.
- 2021 Canadian Society of Civil Engineering Annual Conference, Best Student Paper Award. Li, H., Chen, G.*, Liu, M.**, Hsiang, S., and Javanmardi, A.* (2021). “Situation Awareness Based Smart Contract for the Modular Construction.” May 25-27, 2021, Virtual. *Ph.D. student of Dr. Min Liu, ** Corresponding author. The awardee, Gongfan Chen, is Dr. Min Liu’s Ph.D. student.
- 2021 Construction Industry Institute, Outstanding Student Award, Awardee, Chuanni He, is Dr. Min Liu’s Ph.D. student. He was nominated by the CII Research Team 362, Challenges and Opportunities to Promote Collaborative Scheduling.

(b) Professional Service

- 2019-Present Vice-Chair, ASCE Street and Highway Operations Committee
- 2020-2021 Chair, ASCE Construction Research Council
- 2019-2020 Vice-Chair, ASCE Construction Research Council
- 2019-2020 ASCE Journal of Management in Engineering, Best Paper Award Committee, *Member*
- 2018-2019 Secretary, ASCE Construction Research Council
- 2018-2019 Secretary, ASCE Street and Highway Operations Committee
- 2016-Present Associate Specialty Editor for ASCE Journal of Management in Engineering
- 2009-Present Assistant Specialty Editor (Labor and Personnel Issues) for ASCE Journal of Construction Engineering and Management
- 2021-Present Editorial Board for Lean Construction Journal

(c) Affiliations:

1. Transportation Research Board, Member of Standing Committee on Construction of Bridges and Structures, 2018-Present

2. Transportation Research Board, Member of Information Systems in Construction Management, subcommittee of the Construction Management Committee of Transportation Research Board, 2018-Present
3. The International Intelligent Construction Technologies Group, Scientific Committee, Member, 2017-Present
4. American Society of Civil Engineers, Associate Member, 2007-2014, 2015-Present
5. ASCE Construction Institute, Member, 2007-2014, 2015-Present
6. Lean Construction Institute, Member, 2006-Present
7. American Society for Engineering Education, Member, 2009-Present
8. Lean Construction Institute –Carolinas Chapter, one of the three founding members, Core Member, and Co-Chair of R&D committee, 2009-Present
9. Lean Construction Institute, National Community of Practice National Committee, 2014-Present
10. American Society of Civil Engineers, Construction Research Council, Member, 2007-Present

D. Publications

(a) Book Publications

1. Kwak, Y., Liu, M., Patanakul, P., and Zwikael, O. (2014). *Challenges and Best Practices of Managing Government Projects*. Project Management Institute Inc., Newtown Square, PA. ISBN 978-1-62825-065-7.

(b) Refereed Journal Publications

* Graduate student advised by Dr. Min Liu, ** Corresponding author

1. He, C.*, Liu, M.**, Zhang, Y., Wang, Z., Hsiang, S., Chen, G., Chen, J. “Space-Time-Workforce Visualization and Conditional Capacity Planning under Uncertainty” Accepted by ASCE Journal of Management in Engineering in September 2022.
2. Chen, G.*, Li, H.**, Liu, M., and Hsiang, S. “Knowing What is Going on – a Smart Contract for Modular Construction.” Accepted by Canadian Journal of Civil Engineering in June 2022.
3. Schiavone, V., Scala, N., Olivieri, H., Seppänen, O., Alves, T., Liu, M., Granja, A. (2022). “Comparative Analysis of the Implementation of Critical Path Method, Last Planner System, and Location-Based Techniques in Brazil, Finland, and the United States” Engineering Management Journal, published online in March 2022.
4. He, C.*, Liu, M.**, Scala, N., Alves, T., and Hsiang, S. (2022). “Prioritizing Collaborative Scheduling Practices based on Their Impact on Project Performance.” Accepted by Journal of Management and Economics in February 2022. Published online in March 2022.

5. Scala, N., Liu, M., Alves, T., and Hawkins, D., Schiavone, V. (2022). “The Gold Standard: A Collaborative Scheduling Maturity Model.” *Engineering, Construction, and Architectural Management*, published online in February 2022.
6. He, C.*, Liu, M.**, Wang, Z., Zhang, Y., Hsiang, S., Chen, G., Chen, J. (2022). “Exploit Social Distancing in Construction Scheduling: Visualize and Optimize Space–Time–Workforce Tradeoff.” *ASCE Journal of Management in Engineering*, 38(4): 04022027.
7. Wang, Z.*, Zhang, Y., Tian, L., and Liu, M.**(2022), “Exploring the Application of Takt Time Planning Method in Construction Management.” *Journal of Civil Engineering and Management (in Chinese)*, 39(02), 157-166.
8. Liu, Y., Javanmardi, A.*, Zhang, Y., Liu, M.**, Yang, S., Yu, X., Hsiang, S., Jiang, Z. (2021). “Comparing Factors Affecting Task Starting Time and Duration Variation – China vs. the U.S. Construction Projects.” *ASCE Journal of Construction Engineering and Management*, 147(3), 04020176.
9. McCoy, B. C.*, Bourara, Z., Lucier, G.W., Seracino, R., and Liu, M. (2021). “Prestressed MF-FRP: An Experimental Study of a Rapid Retrofit Concept for Deteriorated Prestressed C-Channel Beams.” *ASCE Journal of Performance of Constructed Facilities*, 35(1), 1-10.
10. Zhang, Y., Javanmardi, A.*, Liu, Y., Yang, S., Yu, X., Hsiang, S., Jiang, Z., and Liu, M.** (2020). “How Does Experience of Delay Shape Managers’ Making-do Decision: A Random Forest Approach.” *ASCE Journal of Management in Engineering*, 36(4), 04020030.
11. Javanmardi, A. *, Hosseini, A. *, Liu, M.,** Hsiang, S. (2020). “Improving Effectiveness of Constraints Removal in Construction Planning Meetings: An Information-theory based Approach.” *ASCE Journal of Construction Engineering and Management*, 146(4), 04020015.
12. Alves, T., Liu, M., Scala, N., Javanmardi, A.* (2020). “Schedules and Schedulers: A Study in the U.S. Construction Industry.” *Engineering Management Journal*, 32(3), 166-185.
13. Olivieri, H., Seppänen, O., Alves, T., Scala, N., Liu, M., and Granja, A. (2019) “A survey comparing Critical Path Method, Last Planner System, and Location-Based techniques.” *ASCE Journal of Construction Engineering and Management*, 145(12), 04019077.
14. Hosseini, A.*, Liu, M.**, Howell, G. (2018). “Investigating the Cost Benefit Tradeoff of Additional Planning Using Parade Game Simulation.” *ASCE Journal of Management in Engineering*, 34(2), 04017066.

15. Javanmardi, A.*, Hosseini, A., Liu, M.**, Hsiang, S. (2018). "Allocation of Incremental Benefits Derived from High-Reliability Planning among Cooperating Subcontractors." *ASCE Journal of Management in Engineering*, 34(2), 04017062.
16. Hosseini, A.*, Liu, M.**, Hsiang, S. (2017). "Social Network Analysis for Construction Crews." *International Journal of Construction Management*, 19(2), 113-127.
17. Hosseini, A.*, Liu, M.**, Hsiang, S. (2017). "Social Network Conformity and Construction Work Plan Reliability." *Automation in Construction*, 78(1), 1-12.
18. Russell, M. *, Hsiang, S., Liu, M.**, and Leming, M. (2016). "Planning for Uncertainty – Use of Structural Equation Modeling to Determine the Causal Structure of Time Buffer Allocation." *Construction Management and Economics*, 33(10), 783-798.
19. Kwak, Y., Patanakul, P., Zwikael, O., and Liu, M. (2016). "What Impacts the Performance of Large Scale Government Projects?" *International Journal of Project Management*, 34(3), 452-466.
20. Hajifathalian, K.*, Howell, G., Wambeke, B.*, Hsiang, S., and Liu, M.** (2016). "'Oops' Simulation: Cost–Benefits Trade-Off Analysis of Reliable Planning for Construction Activities." *ASCE Journal of Construction Engineering and Management*. 142(8), 04016030.
21. Hosseini, A.*, Leming, M. and Liu, M.**, (2015). "Effects of Idle Time Restrictions on Excess Pollution from Construction Equipment." *ASCE Journal of Management in Engineering*, 32(2) , 04015046.
22. Hosseini, A.*, Liu, M.**, and Leming, M., (2015). "Comparison of Least-Cost and Least-Pollution Equipment Fleet Configurations Using Computer Simulation." *ASCE Journal of Management in Engineering*, 31(6), 04015003.
23. Russell, M. *, Liu, M.**, Howell, G., and Hsiang, S. (2015). "Case Studies into the Allocation and Reduction of Time Buffer Through Uses of Last Planner System." *ASCE Journal of Construction Engineering and Management*, 141(2), 04014068.
24. Hosseini, A.*, Leming, M., Liu, M.**, Hsiang, S. (2014). "From Social Network to Data Envelopment Analysis: Identifying Benchmarks at the Site Management Level." *ASCE Journal of Construction Engineering and Management*, 140(8), 04014028.
25. Russell, M. *, Hsiang, M., Liu, M.**, and Wambeke, B.* (2014). "Causes of Time Buffer and Duration Variation in Construction Project Tasks: Comparison of Perception to Reality." *ASCE Journal of Construction Engineering and Management*, 140(6). 04014016.

26. Wambeke, B.*, Liu, M.** , and Hsiang, S. (2014). “Task Variation and the Social Network of Construction Trades.” *ASCE Journal of Management in Engineering*, 30(4), 05014008.
27. Russell, M. *, Howell, G., Hsiang, M., and Liu, M.** (2013). “The Application of Time Buffers to Construction Project Task Durations.” *ASCE Journal of Construction Engineering and Management*, 139(10), 04013008.
28. Vaughan, J.* , Leming, M., Liu, M.** , and Jaselskis, E. (2013). “Cost-Benefit Analysis of Construction Information Management System Implementation -A Case Study.” *ASCE Journal of Construction Engineering and Management*, 139(4), 445-455.
29. Liu, M., Rasdorf, W., Hummer, J., Hollar, D.* , and Parikh, S.* (2013). “Preliminary Engineering Cost-Estimation Strategy Assessment for Roadway Projects.” *ASCE Journal of Management in Engineering*, 29(2), 150-157.
30. Hollar, D.* , Rasdorf, W., Liu, M., Hummer, J.E., Arocho, I., and Hsiang, S. (2013). “A Preliminary Engineering Cost Estimation Model for Bridge Projects.” *ASCE Journal of Construction Engineering and Management*, 139(9), 1259–1267.
31. Wambeke, B.* , Liu, M.** , and Hsiang, S. (2012). “Using Pajek and Centrality Analysis to Identify a Social Network of Construction Trades.” *ASCE Journal of Construction Engineering and Management*, 138(10), 1192-1201.
32. Hajifathalian, K.* , Wambeke, B.* , Liu, M.** , and Hsiang, S. (2012). “Effects of Working Strategy and Duration Variance on Productivity and Work in Progress.” *ASCE Journal of Construction Engineering and Management*, 138(9), 1035-1043.
33. Wang, C.* , Liu, M.** , Hsiang, S., and Leming, M. (2012). “Causes and Penalties of Variation - A Case Study of a Precast Concrete Slab Production Facility.” *ASCE Journal of Construction Engineering and Management*, 138(6), 775-785.
34. Wambeke, B.* , Liu, M.** , and Hsiang, S. (2012). “Using Last Planner™ and a Risk Assessment Matrix to Reduce Variation in Mechanical Related Construction Tasks.” *ASCE Journal of Construction Engineering and Management*, 138(4), 491-498.
35. Wang, Y. and Liu, M. (2012). “Prices of Highway Resurfacing Projects in Economic Downturn: Lessons Learned and Strategies Forward.” *ASCE Journal of Management in Engineering*, 28(4), 391-397.
36. Wambeke, B.* , Hsiang, S., and Liu, M.** , (2011). “Causes of Variation in Construction Project Task Starting Times and Duration”, *ASCE Journal of Construction Engineering and Management*, 137(9), 663-677.

37. Chui, D. L. N., Liu, M., and Ling, Y. Y. (2011). "Adopting HR Practices to Improve Construction Safety – A Comparative Study on Construction Safety in Singapore and United States." *International Journal of Project Management*, 29(8), 1018-1032.
38. Ibbs, W. and Liu, M.** (2011). "An Improved Methodology for Selecting Similar Working Days for Measured Mile Analysis." *International Journal of Project Management*, (29)6, 773-780.
39. Liu, M.**, Ballard, G., and Ibbs, W. (2010). "Work Flow Variation and Its Relation to Labor, -- A Case Study." *ASCE Journal of Management in Engineering*, 27(4), 236-242.
40. Ling, Y. Y., Liu, M.**, and Woo, Y. C. (2009). "Construction Fatalities in Singapore." *International Journal of Project Management-Elsevier*, 27(7), 717-726.
41. Ibbs, W. and Liu, M. (2005). "An Improved Measured Mile Analysis Technique." *ASCE Journal of Construction Engineering and Management*, 131(12), 1249-1256.
42. Liu, M.** and Ling, Y. Y. (2005). "Modeling a Contractor's Markup Estimation." *ASCE Journal of Construction Engineering and Management*, 131(4), 391-399.
43. Ling, Y. Y. and Liu, M. (2005). "Factors Considered by Successful and Profitable Contractors in Mark-up Size Decision in Singapore." *Building and Environment*, Elsevier, 40(11), 1557-1565.
44. Ibbs, W. and Liu, M. (2005). "System Dynamic Modeling of Delay and Disruption Claims." *AACE Cost Engineering*, 47(6), 12-15.
45. Ling, Y. Y. and Liu, M. (2004). "Using Neural Network to Predict Performance of Design-Build Projects in Singapore." *Building and Environment*, Elsevier, 39(10), 1263- 1274.
46. Liu, M. and Ling, Y. Y. (2003). "Using Fuzzy Neural Network Approach to Estimate Contractor's Markup." *Building and Environment*, Elsevier, 38(11), 1303-1308.
47. Zhao, P., Liu, M., and Xie, X. H. (1998). "Computer Simulation for Construction Project Investment Decision." *Journal of Xi'an University of Architecture and Technology*, 30(3), 290-293 (in Chinese Using Fuzzy Neural Network Approach to Estimate Contractor's Markup).

(c) Reports

1. Alves, T., Liu, M., Scala, N., and He, C. (2020). "Challenges and Opportunities to Promote Collaborative Scheduling." Construction Industry Institute. (October 2020).

2. Liu, M., Rasdorf, W. and Bonilla, M. (2019). "How to Account for Seasonal Population Shift in Distributing the Powell Bill Allocation Funds." North Carolina Department of Transportation, Raleigh, NC (December 2019).
3. Liu, M. and Rasdorf, W. (2018). "How to Account for Seasonal Population Shift in Distributing the Powell Bill Allocation Funds." North Carolina Department of Transportation, Raleigh, NC (December 2018).
4. Liu, M., Jaselskis, E. J., Rasdorf, W., Goode, L., and Alsharif, A. (2015). "Design of a Construction Expenditure Forecasting and Monitoring Tool for NCDOT Mega Projects," Technical Report, FHWA/NC 2015-22, North Carolina Department of Transportation, Raleigh, NC (August 2015).
5. Kwak, Y., Liu, M., Patanakul, P., and Zwikael, O. (2013). "Challenges and Best Practices of Managing Government Projects." Technical Report Project Management Institute, 134 pages, submitted in August 2013.
6. Ibbs, W., and Liu, M. (2013). "Quantifying the Impact of Change from Project Authorization to Start-Up." Technical Report, 189 pages, under final stage of preparation, submitted in November 2013.
7. Liu, M., Hummer, J., Rasdorf, W., and Hollar, D.* (2011). "Preliminary Engineering Cost Trends for Highway Projects." Technical Report HWY-2010-10, North Carolina Department of Transportation. Raleigh, NC, 92 pages.
8. Ballard, G., Kim, Y.W., Jang, J., and Liu, M. (2007). "Roadmap for Lean Implementation at Project Level." Construction Industry Institute Research Report. Austin, TX, 275 pages.

(d) Conference Papers Published in Proceedings (all paper reviewed)

* Graduate student advised by Dr. Min Liu, ** Corresponding author

1. Li, H., Chen, G.*, Liu, M.**, and Hsiang, S. "Situation Awareness Based Smart Contract for Modular Construction." (2023). Canadian Society of Civil Engineering Annual Conference, 363-373.
2. He, C.*, Liu, M.**, Wang, Z., Chen, G.*, Zhang, Y., Hsiang, S., (2022). "Facilitating the Robustness and Adaptivity of Smart Contract during and after COVID Impact - A Choquet Fuzzy Integral Approach." Accepted by 2022 Construction Research Congress 2022, March 9-12, 2022 Arlington, Virginia.
3. Alves, T., Liu, M., Scala, N. (2021). "Contract Language, Schedules, and Collaboration." 29th International Group of Lean Construction Conference, July 12-18, virtual.

4. Rybkowski, Z., Alves, T., and Liu, M. (2021). "The Emergence and Growth of the On-line Serious Games and Participatory Simulation Group "APLSO" During COVID-19. 29th International Group of Lean Construction Conference, July 12-18, virtual.
5. Li, H., Chen, G.*, Liu, M.***, Hsiang, S., and Javanmardi, A.* (2021). "Situation Awareness Based Smart Contract for the Modular Construction." Canadian Society of Civil Engineering Annual Conference, May 25-27, 2021, Virtual.
6. Rasdorf, W., Bonilla, M.*, Liu, M.***, Tippett, R., and Al-Ghandour, M. (2021), "Seasonal Population Determination for Road Maintenance Fund Distribution." Canadian Society of Civil Engineering Annual Conference, May 25-27, 2021, Virtual.
7. Bonilla, M.*, Rasdorf, W., Liu, M., and Al-Ghandour, M. (2020). "Impact of Population on Municipal Road Construction Funding." Proceedings of the Construction Research Congress, Construction Research Council, American Society of Civil Engineers, March 8-10, 2020, Tempe, AZ.
8. Javanmardi, A.*, Zhang, Y., Liu, Y., Yang, S., Yu, X., Liu, M.***, and Hsiang, S. (2019). "Causes for Starting Time and Duration Delay for Construction Activities in Projects in China." 27th International Group of Lean Construction, July 1-7, Dublin, Ireland.
9. Bonilla, M.*, Rasdorf, W., Liu, M., and Al-Ghandour, M., (2019). "Impact of Population on Municipal Road Construction Funding." Abstract accepted by Proceedings of the Construction Research Congress, Construction Research Council, American Society of Civil Engineers, March 8-10, 2020, Tempe, AZ. Full paper accepted in October 2019.
10. Javanmardi, A.*, Zhang, Y., Liu, Y., Yang, S., Yu, X., Liu, M.***, and Hsiang, S. (2019). "Causes for Starting Time and Duration Delay for Construction Activities in Projects in China." 27th International Group of Lean Construction, July 1-7, Dublin, Ireland.
11. Rasdorf, W., Alsharif, A., Liu, M., Jaselskis, E., Bowen, F., Al-Ghandour, M., and Goode, L. (2019). "Factors Affecting Bid Let Dates and Construction Payout Curves on Transportation Mega Projects." Canadian Society of Civil Engineering Annual Conference 2019. June 12-15, 2019, Greater Montreal, Canada.
12. Javanmardi, A., Abbasian-Hosseini, A., Hsiang, S., and Liu, M. (2018). "Constraints and Reliable Workplan: A Case Study of Bridge Project" International Group of Lean Construction, July 15-20, Chennai, India. Received the Best Paper Award by the 26th International Group of Lean Construction.

13. Javanmardi, A.*, Liu, M.**, and Hsiang, S. (2018). "Effects of General Contractor's Loading Strategies on Project and Trades' Performance." Construction Research Congress 2018, April 2-5, New Orleans, LA.
14. Jaselskis, E., Rasdorf, W., Liu, M., Alsharif, A., Bowen, F., Al-Ghandour, M., and Goode, L. (2017). "Factors Affecting Bid Let Dates on Transportation Mega Projects." Lean and Computing in Construction Congress, July 4-12, Crete, Greece. Received the Best Paper Award by the Lean and Computing in Construction Congress 2017.
15. Hosseini, A.*, Liu, M.**, and Hsiang, M. (2016). "Relationship between On-Site Planning Effort and Work Plan Reliability." Construction Research Congress 2016, May 31-June 2, San Juan, Puerto Rico.
16. Javanmardi, A.* and Liu, M.** (2016). "Analysis of Workflow Variability's Impacts on Trade and Project Performance." International Conference on Sustainable Design, Engineering and Construction, May 18-20, Tempe, AZ.
17. Hosseini, A.*, Liu, M.**, and Hsiang, S. (2015). "Social Network Analysis for Construction Specialty Trade Interaction and Performance." Proceedings of the 20th Annual conference of the International Group for Lean Construction (IGLC 23), July 28-31, Perth, Australia, pp. 871-880.
18. Hosseini, A.*, Liu, M.**, Leming, M. (2014). "Relationship between Minimum Cost and Minimum Excess Pollution in Construction Crew Configuration." Proceedings of 2014 International Conference on Sustainable Design, Engineering, and Construction, September 19-22, BeiJing, China.
19. Hosseini, A.*, Liu, M.**, Hsiang, S. (2014). "Construction Specialty Trade Interaction and Performance – A Social Network Analysis Approach." Proceedings of 2014 International Conference on Sustainable Design, Engineering, and Construction, September 19-22, BeiJing, China.
20. Kwak, Y., Liu, M., Patanakul, P., and Zwikael, O. (2014). "Challenges and Best Practices of Managing Government Projects." Proceedings of Project Management Institute Research and Education Conference 2014, July 27-29, Portland, OG.
21. Russell, M.*, Hsiang, S., Liu, M.** (2012). "Causes of Time Buffer and Variation in Construction Project Tasks: A Comparison of Perception versus Reality." Proceedings of 2012 International Conference of Construction and Real Estate Management (ICCREM 2012), Oct. 1-2, Kansas City, MO, pp. 303-309.
22. Xiang, N.*, Hsiang, S., Ibbs, W., Liu, M.** (2012). "Identification of PDRI Factors Affecting Changes." Proceedings of 2012 International Conference of Construction and Real Estate Management (ICCREM 2012), Oct. 1-2, Kansas City, MO, pp. 282-287.

23. Hosseini, A.*, Liu, M.**, Hsiang, S. (2012). "Informal Decision Making for Construction Projects Inspired by Flocks of Birds. Proceedings of 2012 International Conference of Construction and Real Estate Management (ICCREM 2012), Oct. 1-2, Kansas City, MO, pp. 277-281.
24. Russell, M.*, Liu, M.**, and Hsiang, S. (2012). "Causes of Time Buffer in Construction Project Task Durations." Proceedings of the 20th Annual conference of the International Group for Lean Construction (IGLC 20), July 17-22, San Diego, CA, pp. 871-880.
25. Howell, G., and Liu, M.** "The Oops Game: How Much Planning Is Enough?" (2012). Proceedings of the 20th Annual conference of the International Group for Lean Construction (IGLC 20), July 17-22, San Diego, CA, pp. 591-660.
26. Liu, M.**, Rasdorf, W., Hollar, D.*, Hummer, J., and Parikh, S.* (2012). "Predicting the preliminary Engineering Duration for Bridge Projects." Proceedings of the ASCE Construction Research Congress (CRC 2012), May 21-23, Purdue University, West Lafayette, IN, pp. 505-514.
27. Kwak, Y., Patanakul, P., Zwikael, O., Liu, M. (2012). "Strategic Management of High-Risk Government Mega Projects and Programs." Proceedings of the 2012 Project Management Institute Research and Education Conference, July 15-18, University of Limerick, Limerick, Ireland.
28. Wambeke, B.*, Liu, M.**, and Hsiang, S. (2011). "A Case Study into Trade Organizational Structure and Construction Task Variation." Proceedings of the 19th International Group of Lean Construction (IGLC 19), July 13-15, Lima, Peru. #049 under the Planning Control track.
29. Wang, C.*, Hsiang, S., Liu, M.** (2011). "Causes and Penalties of Variation – Case Study of a Concrete Slab Prefabrication Shop." Proceedings of the 19th International Group of Lean Construction (IGLC 19), July 13-15, Lima, Peru. #014 under the Planning Control track.
30. Rasdorf, W., Liu, M.**, Hummer, J., and Hollar, D.* (2011). "Predicting Preliminary Engineering Costs of Highway Projects." Proceedings of the ASCE Construction Research Congress 2011 (CRC 2011), July 14-17, Ottawa, Canada, CN-015.
31. Wambeke, B.*, Liu, M.**, and Hsiang, S. (2011). "Planning to Reduce Variation in Mechanical Related Construction Tasks." Proceedings of the ASCE Construction Research Congress 2011 (CRC 2011), July 14-17, Ottawa, Canada, CN-206.
32. Wambeke, B.*, Liu, M.**, and Hsiang, S. (2010). "Root Causes of Variation in Construction Task Start Times and Duration." Proceedings of the ASCE Construction Research Congress 2010 (CRC 2010), May 8-11, Banff, Canada, pp. 980-989.

33. Hollar, D.*, Arocho, I.*, Hummer, J., Liu, M.**, and Rasdorf, W. (2010). "Development of a Regression Model to Predict Preliminary Engineering Costs." Proceedings of the 2010 Technical Conference and Exhibit: Meeting Transportation's 21st Century Challenges, Institute of Transportation Engineers 2010 Technical Conference and Exhibit Compendium (ITE 2010), March 14-17, Savannah, GA, Technical Papers on CD-ROM.
34. Liu, M.** and Ballard, G. (2009). "Factors Affecting Work Flow Reliability – A Case Study." Proceedings of the 17th Annual Conference of the International Group for Lean Construction (IGLC 17), July 15-16, Taipei, Taiwan, pp.657-666.
35. Liu, M.** and Ballard, G. (2008). "Improving Labor Productivity through Production." Proceedings of the 16th Annual Conference of the International Group for Lean Construction (IGLC 16), July 16-18, Manchester, UK, pp.411-420.
36. Chao, L.C. and Liu, M. (2000). "Fuzzy neural network model for mark-up estimation." Proceedings of the 17th International Symposium on Automation and Robotics in Construction, September 2000, Taipei, Taiwan, pp. 777-782.
37. Liu, M. and Xie, X. H. (1997). "Using computer simulation to estimate the investment." Proceedings of the 3rd National Project Management Conference, September, Xi'an, China, pp. 136-142 (in Chinese).

E. Related Research Projects

1. PI, China National Science Foundation, "Social Network Analysis for Construction Project Site Management." 1/1/2017-12/31/2021. \$80,000 (Direct Cost).
2. PI, Construction Industry Institute, "Challenges and Opportunities to Promote Collaborative Scheduling in Construction Projects." Other PIs: Thais Alves of San Diego State University and Natalie Scala of Townson University. Contract period: 1/1/2019-1/31/2021. \$224,626.
3. PI, *North Carolina Department of Transportation*, "How to Account for Seasonal Population Shifts in Distributing the Powell Bill Allocation Funds" Co-PI: William Rasdorf of NCSU. Awarded in February 2018. Contract period: 8/16/2018-12/31/2019. \$149,805.
4. PI, *North Carolina Department of Transportation*, "Preliminary Study on Seasonal Population Shifts in Powell Bill Allocation Funds Distribution" Co-PI: William Rasdorf of NCSU. Contract period: 9/16/2017-12/31/2017. \$8,900.
5. PI, *Construction Industry Institute*, "Breaking Through to Collaborative Scheduling: Approaches and Obstacles." Other PIs: Thais Alves of San Diego State University and Natalie Scala of Townson University. 5/1/2016-10/30/2016. \$24,881.
6. PI, *North Carolina Department of Transportation*, "Design of a Construction Expenditure Forecasting and Monitoring Tool for NCDOT Mega Projects" Co-PI:

Edward Jaselskis, William Rasdorf of NCSU. Contract period: 10/1/2014-6/30/2015. \$63,089.

7. *PI, Lean Construction Institute*, “Cooperation within project teams: Connecting the social and engineering aspects of planning” Contract period: 9/1/2013-8/31/2014. \$25,000.
8. *Co-PI, Construction Industry Institute*, “Quantifying the Impact of Change from Project Authorization to Start-up.” Contract period: 9/1/2011-8/31/2013. PI: William Ibbs of UC Berkeley. Contract period: 9/1/2011-8/31/2013. \$49,100.
9. *Co-PI, Project Management Institute*, “Project, Program, and Portfolio Management in Government: Application and Performance.” PI: Young Kwak of George Washington University. Contract period: 3/14/2011-12/31/2012. \$50,000.
10. *PI, Skanska Inc.*, “Evaluation of Vela Systems to Increase Worker Productivity and Field Efficiency.” 8/16/2011-12/31/2011. \$13,000.
11. *PI, North Carolina Department of Transportation*, “Preliminary Engineering Cost Trends for Highway Projects.” Co-PIs: William Rasdorf, Joseph Hummer. Full proposal submitted in December 2008 and awarded in May 2009. Contract period: 8/16/2009-12/31/2010. \$148,570.
12. *PI, Skanska Inc.*, “Cost Benefit Evaluation of Vela Implementation.” Contract period: 8/16/2010-12/31/2010. \$18,704.

F. Teaching

(a) Instructional Development

1. Developed graduate course material for CE 762 *Construction Productivity* in Fall 2008
This course addresses 1) construction productivity measurement methods, 2) construction productivity improvement methods, 3) construction productivity loss calculation methods, and 4) factors impacting construction productivity performance. This course also presents applications of techniques such as time-lapse photography, flow charts, process charts and time standards to improvement of construction productivity. Safety and human factors in construction and their relation to construction productivity are also discussed.
2. Developed graduate course material for CE 592 *Lean Construction* in Fall 2010
This course address: Lean production, Lean Construction, Lean Design, Lean Assembly, Lean Supply, Production Control, and Work Process Design. The course is intended for students to: 1) describe the history and evolution of production paradigms, 2) describe and apply the principles of Lean Construction, 3) use lean-based productivity improvement techniques to study and improve construction operations (Linear Scheduling, discrete-event computer modeling and simulation,

System Dynamics modeling, Value Stream Mapping in Construction, etc.), and 4) learn and apply the Last Planner™ system for production planning and control.

3. Co-developed course material for CE 297 *Introduction to Construction Engineering* in Spring 2013

This course is intended to introduce the students in Civil, Construction, or Engineering to the basics of the general topics and to prepare the Construction Engineer for study of the following topics in detail. It includes: 1) design of the construction process including selection of appropriate means and methods, 2) understanding contracts, the legal issues involved in both construction and general business operations, and the requirements of social obligations on construction preparations, 3) selecting appropriate equipment and crew sizes, how to estimate the productivity and costs of these crews alone and in combination with other crews or subcontractors functioning, and 4) estimating quantities and cost for a project, and when and how and whether to bid, schedule and control a project.

4. Co-developed course material and course coordinator for CE 498/CE 610 *Introduction to Building Information Modeling* in Spring 2014

This course introduces current Building Information Modeling (BIM) technologies. Includes the role of BIM in the Architecture, Engineering and Construction industry; tools and features common to Revit Architecture, Structure, and MEP; creating sets, building elements, structural systems, and MEP systems; using clash detective; and introduction of quantity takeoff and schedule functions.

(b) Thesis Advisor

PhD Students Graduated:

Dr. Brad McCoy, 2019 April

Thesis Title: Design and Implementation of a New Retrofit for Prestressed Concrete Bridge Elements Using Mechanically-Fastened Fiber-Reinforced Polymer

Current Position: Permanent Professor, Director of Engineering Design, Dept. of Civil and Mechanical Engineering, West Point

Dr. Ashtad Javanmadi, 2019 April

Thesis Title: Strategies and Predictive Models for Reducing Workflow Variability in Construction Production Systems

Dr. Alizera Abbasian, 2015 October

Thesis Title: Social Network Analysis for Site Management of Construction Projects

Current Position: Project Engineer, PCL Construction Cooperation.

Dr. Marion M. Russell, 2013 June

Thesis Title: Allocation of Time Buffer to Construction Project Task Durations

Current Position: Major, Academy Professor, U.S. Air Force Academy, Dept. of Civil Engineering

Dr. Brad W. Wambeke, 2011 May

Thesis Title: Identifying, Prioritizing, and Reducing Variation of Construction Related Tasks

Current Position: Colonel, Associate Professor, Director of Engineering Design, Dept. of Civil and Mechanical Engineering, West Point

Dr. Donna Hollar, 2011 July

Thesis Title: Predicting Preliminary Engineering Costs for Highway Projects

Current Position: Assistant Professor, East Carolina University, Dept. of Construction Management

Master Students by Thesis Graduated:

NingNing Liu, December 2020

Thesis Title: Using Information Theory Approach to Improve Construction Planning Meeting Efficiency

NaiShan Xiang, 2015 May

Thesis Title: Benchmark, Predict and Mitigate the Impact of Change for Construction Projects

Current Position: Business Intelligence Engineer II, Amazon

Joshua L. Vaughan, 2012 December

Thesis Title: Effects of an Innovative Technology on Construction Management Time

Current Position: Assessment Engineer, North Carolina Department of Transportation

Kiarash Hajifathalian, 2011 May

Thesis Title: Effects of Working Strategy and Duration Variance on Productivity and Work in Process a Simulation-Based Investigation

Current Position: Project Manager, Baker Concrete Construction

Chao Wang, 2010 July

Thesis Title: Causes and Penalties of Variation - Case Study of a Concrete Slab Prefabrication Shop

Current Position: Project Manager, Bureau Veritas Group

Jaime M. Perez, 2009 May

Thesis Title: Implementing Target Costing Principles in Green Building

Current Position: Project Manager, Odebrecht

(c) Mentoring Activities

Undergraduate Academic Advising: 19 students per semester on average

Graduate Academic Advising 16 students per semester on average

(d) Courses Taught

No	Course Code	Term	Level	Credits	Number of Students
1	CE 365	S 21	UG	3	16
2	CE 762	S 21	GR	3	7
3	CE 562	F 20	GR	3	15
4	CE 365	S 20	UG	3	25
5	CE 762	S 20	GR	3	7
6	CE 562	F 19	GR	3	15
7	CE 365	S 19	UG	3	16
8	CE 762	S 19	GR	3	16
9	CE 562	F 18	GR	3	17
10	CE 263	S 18	UR	3	32
11	CE 365	S 18	UR	3	27
12	CE 562	F 17	GR	3	24
13	CE 365	S 17	UG	3	27
14	CE 762	S 17	GR	3	11
15	CE 562	F 16	GR	3	31
16	CE 762	S 16	GR	3	15
17	CE498/610**	S 16	UG/GR	1	17
18	CE 562	F 15	GR	3	27
19	CE498/610**	F 15	UG/GR	1	38
20	CE 465	S 15	UR	3	26
21	CE498/610**	S 15	UG/GR	1	35
22	CE 592	F 14	GR	3	27
23	CE498/610**	F 14	UG/GR	1	39
24	CE 762	S 14	GR	3	21
25	CE 465*	S 14	UG	3	31
26	CE498/610**	S 14	UG/GR	1	40
27	CE 297	F 13	UG	3	29
28	CE 592	F 13	GR	3	12
29	CE 762	S 13	GR	3	20
30	CE 297*	S 13	UG	3	54
31	CE 465/592*	S 13	UG/GR	3	28
32	CE 592	F 12	GR	3	20
33	CE 261	S 12	UG	3	29
34	CE 762	S 12	GR	3	10
35	CE 603/803	F 11	GR	1	10
36	CE 592	F 11	GR	3	17
37	CE 762	S 11	GR	3	14
38	CE 261	S 11	UG	3	30
39	CE 603/803	S 11	GR	1	14

*Co-teach with Dr. Michael Leming; **Course Coordinator.

No.	Course Code	Term	Level	Credits	Number of Students
40	CE 592	F 10	GR	3	26
41	CE 603/803	F 10	GR	1	19
42	CE 261*	S 10	UG	3	25
43	CE 762	F 09	GR	3	20
44	CE 603/803	F 09	GR	1	26
45	CE 261	S 09	UG	3	54
46	CE 261	S 08	UG	3	45
47	CE 762	F 08	GR	3	12

*Co-teach with Dr. Michael Leming; **Course Coordinator.

G. Service to Professional Societies:

(a) Paper Review for the following Journals: (2007-Present)

1. ASCE Journal of Construction Engineering and Management (113)
2. ASCE Journal of Management in Engineering (25)
3. Automation in Construction (11)
4. International Journal of Project Management (8)
5. Lean Construction Journal (4)
6. International Journal of Construction Management (4)
7. Production Planning & Control Journal (3)
8. Journal of Computer-Aided Civil and Infrastructure Engineering (1)
9. Built Environment Project and Asset Management (3)
10. Canadian Journal of Civil Engineering (2)

(b) Service for International Conferences:

1. *Chair* for ASCE Construction Research Council Business Meeting, the 2021 Canadian Society for Civil Engineering Annual Conference, May 26, 2021, virtual meeting.
2. *Moderator* ASCE three Keynote Speeches: Dr. Keith Molenaar for the Peurifoy Construction Research Award; Dr. Jessica KaminSky for the Daniel W. Halpin Award; and Mr. John Dunham for the Roebling Award. May 26, 2021, virtual meeting at the 2021 Canadian Society for Civil Engineering Annual Conference.
3. *Session Moderator* for two sessions: Infrastructure Construction and Management Track I & II, 2021, the Canadian Society for Civil Engineering Annual Conference, May 26-28, virtual meeting.
4. *Technical Advisory Board, Editor, and Session Moderator* for Production Planning and Control Track, 2020, the 28th Annual Conference of the International Group for Lean Construction, July 6-12, Planned to be in Cusco, Peru, and changed to virtual conference.
5. *Session Chair and Reviewer* of the 27th Conference of the International Group for Lean Construction (IGLC), July 1-7, 2019, Dublin, Ireland.

6. Scientific Committee and Reviewer of the International Intelligent Construction Technologies Group Conference. April 16-17, 2019, BeiJing, China.
7. Scientific Committee and Reviewer of the CIB World Building Congress – Constructing Smart Cities. June 18-21, 2019, Hong Kong.
8. Dean of Summer School, Track Chair of “Teaching Lean”. 26th Conference of the International Group for Lean Construction (IGLC 26), July 9-12, 2018, Indian.
The Summer School will attract international PhD candidates and will offer presentations, discussions and guidance from international experts in the field. The Dean is responsible for selecting candidates, award scholarship, design & organize the program, and administrate the school activities.
9. Scientific Committee of the Research and Innovation in Building and Construction World Building Congress – Constructing Smart Cities. June 18-21, 2019, Hong Kong.
10. Technical Committee of the International Conference on Maintenance and Rehabilitation of Constructed Infrastructure Facilities: July 19 – 21, 2017, South Korea.
11. Reviewer of the 25th Conference of the International Group for Lean Construction (IGLC 25), July 9-12, 2017, Heraklion, Greece.
12. Reviewer for Construction Research Congress (CRC), 2016, May 31-June 2, 2016 San Jose, Puerto Rico.
13. Reviewer of the 24th Conference of the International Group for Lean Construction (IGLC 24), July 20-22, 2016, Boston, U.S
14. Reviewer and Session Chair of Construction Track of International Conference on Sustainable Design, Engineering and Construction (ICSDEC), May 18-20, 2016, Tempe, AZ
15. Reviewer of the 23rd Annual conference of the International Group for Lean Construction (IGLC 23), July 29-31, 2015, Perth, Australia.
16. Conference Technical Committee and Conference Technical Committee and Track Chair of “Quantitative Methods” for 2014 ASCE Construction Research Congress (CRC 2014), May 18-21, 2014, Atlanta, GA. Responsibility includes: 1) handle the review of abstracts and papers, 2) serve as chair for a particular subject area or track, and 3) coordinate the selection of track moderators.
17. Reviewer of the 21st Conference of the International Group for Lean Construction (IGLC 21), July 31-August 3, 2013, Fortaleza, Brazil.

18. Conference co-chair, associate editor, co-chair of technical committee, scientific Committee member, and session chair for session “1B: Risk Management & Partnership and Strategic Management Including Public-Private Partnerships (PPPs)” for 2012 International Conference on Construction and Real Estate Management (2012 ICCREM), October 1-2, 2012, Kansas City, MO.
19. Reviewer for 2012 Construction Research Congress (CRC 2012), May 21-23, 2012, West Lafayette, IN.
20. Reviewer for the 20th Conference for International Group for Lean Construction (IGLC 20), July 17-22, 2012, San Diego, CA.
21. Reviewer for the 19th Conference for International Group for Lean Construction (IGLC 19), July 18-20, Lima, Peru.
22. Reviewer and chair of 2 sessions (“Project Planning and Control III” and “Information Technology and Computer Applications III”) for 2011 Annual Conference of the Canadian Society for Civil Engineering and ASCE Construction Research Congress (CRC 2011), June 14-17, 2011, Ottawa Canada.
23. International Scientific Committee for International Symposium on “Advancement of Construction Management and Real Estate (CRIOCM2010), August 7-8, 2010, Iskandar, Malaysia.
24. Advisory Committee for the 17th Conference for International Group for Lean Construction (IGLC 17), July 17-22, 2009, Taipei, Taiwan.
25. International Scientific Committee for 2009 International Symposium on “Advancement of Construction Management and Real Estate (CRIOCM2009), October 29-31, 2009, Nanjing, P.R. China.

(c) Service for Proposal Panel Review:

Served for NSF CMMI – Civil Infrastructure Systems
 Served for Project Management Institute – May 2013, June 2014, June 2015
 Serve as Project Panel for National Cooperative Highway Research Program, 2015 – Present

(d) Book Review

Review for Taylor & Francis Group, “Lean Construction: 25 years of development”, by Patricia Tzortzopoulos, Mike Kagioglou, and Lauri Koskela, October 2018.

Reviewer for ASCE book manuscript “Fundamental Principles of Site Construction Management and Labor Productivity Improvement” by H. Randolph Thomas and Ralph D. Eliis, ASCE Press, June 2016.

(e) Professional Service on NC State Campus:

At University Level:

1. 2018-2020 Faculty Senator
2. 2018-2020 University Course and Curriculum Committee
3. 2018-2020 University Academic Policy Committee

At Department Level:

1. 2017- present Undergraduate Program Committee *Chair*
2. 2014- present Student Awards Subcommittee *Member*
3. 2013-present National Association of Home Builders Student Group *Adviser*
4. 2010-present Operation Research *Faculty*
5. 2007-2016 ABET - Applications and Techniques Assessment Committee *Member*
6. 2007-present Construction Engineering and Management Program, *Member*
7. 2016 - 2019 Participated “We are Women in Engineering Program”
8. 2018 Feb&Oct Organized and moderated the Construction Technology Forum
9. 2018 Spring Technology Forum for CON students, Organizer
10. 2018 Spring Outreaching event for CEM faculty, Organizer
11. 2018 Spring Ad Hoc Committee for Tenure and Promotion, *Member*
12. 2018 Ad-Hoc Committee for Brina Montoya, *Member*
13. 2018 Jan. Organized and moderated the Outreaching event for CEM faculty
14. 2007 - 2016 ABET - Applications and Techniques Assessment Committee, *Member*
15. 2015 - 2017 Undergraduate Program Committee, *Member*
16. 2015- 2017 Undergraduate Program Committee *Member*
17. 2017 Aug. Held networking sessions on the Faculty Development Program of College of Engineering for New Faculty Orientation of NCSU
18. 2010-2016 Center for Nuclear Power Plant Structures, Equipment and Piping, *Member*
19. 2013-2015 Department Publicity Committee, *Member*
20. 2011-2015 Graduate Program *Coordinator* for Construction Engineering Management Program
21. 2010-2014 Department Graduate Program/Distance Education Committee, *Member*
22. 2010-2012,2014 Search Committee for Edward I. Weisiger Distinguished Professor, *Member*
23. 2010-2011 Search Committee for Lecturer and Construction Extension Specialist, *Member*
24. 2007-2011 Departmental Seminar Committee, *Member*
25. 2007-2011 Computer-Aided Engineering Program, *Member*
26. 2008-2019 Graduate School *Representative* for twenty eight Ph.D. students’ exams
27. 2007-2019 Engineering Open House
28. 2007-Present Translated over forty five diplomas from Chinese to English for Human Resource Office