Chieh (Ross) Wang

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(*Updated on 10/01/2023*)

EDUCATION

Ph.D., Civil and Environmental Engineering, Georgia Institute of Technology *2017*
M.S., Civil Engineering, National Taiwan University *2007*
B.S., Civil Engineering, National Taiwan University *2005*

EMPLOYMENT

R&D Staff, Oak Ridge National Laboratory (ORNL) *2023 – present*
R&D Associate Staff, Oak Ridge National Laboratory (ORNL) *2018 – 2023*
Staff Civil Engineer, Applied Research Associates, Inc. (full-time on-site Florida DOT) *2016 – 2018*
Graduate Research Assistant, Georgia Tech *2010 – 2016*
Teaching Assistant Faculty, National Taiwan University *2008 – 2010*
Second Lieutenant, Taiwan Ministry of National Defense *2007 – 2008*
Research Assistant, National Taiwan University *2005 – 2007*

HONORS AND AWARDS

Early Career Scientist Award, ORNL Laboratory Directed Research and Development *2023*
Best Poster Award, 19th IEEE International Conference on Mobile Ad-Hoc and Smart Systems (MASS) *2022*
EU-US Frontiers of Engineering Symposium Invitee, National Academy of Engineering *2022*
Energy I-Corps Cohort 14, Office of Technology Transitions, Department of Energy *2022*
Best Paper Award, 10th International Conference on Advances in Vehicular Systems, Technologies and Applications (VEHICULAR21) *2021*
Transportation Influencer, TR News #330 *2020*
Blue Ribbon Committees Award (AHD00(2)), TRB Technical Activities Councils *2020*
High-Value Research Project Nominee (GDOT Research Project #12-31), American Association of State Highway and Transportation Officials *2016*
CETL/BP Outstanding Teaching Assistant Award Finalist, Georgia Tech *2015*
Jerry Shea Award, International Road Federation *2015*
Bill Schutz Graduate Teaching Assistant Award, School of Civil and Environmental Engineering, Georgia Tech *2014*
Excellent Compulsory Military Service Officer, Taiwan Ministry of National Defense *2008*

RESEARCH EXPERIENCE

Oak Ridge National Laboratory (ORNL) Knoxville, Tennessee, USA
R&D Staff *2023 – present*

Volvo, A Zero Emission Freight Future, DOE SuperTruck3 Project (*PI* | $1,800,000)[starting in 2023]

- Leading a team of researchers to develop a virtual simulation of the actual vehicle demonstration of Volvo's electrified medium-duty (MD) and heavy-duty (HD) vehicle technologies into diverse geographies and climates to assess the overall impacts of Volvo's commercial vehicle electrification approach to freight system efficiency.

Cross-sector Spatiotemporal Energy Analysis Framework, Laboratory Directed Research and Development, ORNL. LOIS ID #11352 (*PI* | $300,000)[2023–present]

- Developing a framework to estimate spatial and temporal energy demands across transportation and building sectors considering transportation electrification.

Real-Twin: A Unified Scenario Generation Capability for Mobility Research, DOE VTO EEMS Core Capabilities Project (*PI* | $2,235,000)[2021–present]

- Developing a unified definition of scenario for mobility research based on traffic and vehicles modeling & simulation and everything-in-the-loop (XIL)
- Developing workflows and tools that streamline the generation of scenarios

National Travel Behavior Research, Data Analytics Tools Development, and Technical Supports, Federal Highway Administration. DOE SPP Project No. 1883-Z240-18 (*PI since 2022* | $2,116,885) [2019–present]

- Managing data quality check activites for Federal Highway Administration's (FHWA) NextGen National Household Travel Survey (NHTS)
- Developing and maintaining web-based data analysis and visualization tools and data product websites for the NHTS program
- Leading the development and maintenance of the National Household Travel Survey (NHTS) Website (https://nhts.ornl.gov)
- Leading the development of the NextGen NHTS National Origin-Destination (OD) Data website (https://nhts.ornl.gov/od), providing data analytics and visualization tools for data users to explore and use data
- Leading the development of the National Bikeway Network (NBN) Website, which serves as a national inventory for bicycle network data
- Developed the NHTS Advanced Analytics Tool Website, an interactive web-based data and visual analytics tool for NHTS add-on agency users to extract, analyze, and visualize data

R&D Associate Staff *2018 – 2023*

Applying Artificial Intelligence (AI) Based Signal Coordination and Controls to Optimize Mobility for Nimitz Highway and Ala Moana Boulevard, DOE Project #EEMS090 [2021–2023]

- Led cyber-physical systems team in implementing AI-based algorithms for real-time, 24/7 field traffic control
- Developed AI-based signal control systems modeling and control methods to optimize traffic mobility
- Developed VISSIM traffic microsimulation digital twin for the Nimitz Highway corridor with 34 intersections

Scaling Up Regional Mobility in the United States, DOE Project #EEMS061 [2021–2023]

- Developed and implemented several signal control methods for several corridors in Chattanooga in microscopic traffic simulation
- Co-developed controller interface following the National Transportation Communications for ITS (Intelligent Transportation Systems) Protocol (NTCIP) through Simple Network Management Protocol (SNMP) and Simple Transportation Management Protocol (STMP)
- Implemented real-world 24/7 adaptive signal control in Chattanooga

Integrated Control of Vehicle Speeds and Traffic Signals for Reducing Congestion and Energy Use, DOE Project #EEMS095 [2020–2023]

- Developed and implemented vehicle speed control strategy in a microscopic traffic simulation based on real-time signal timing information
- Developed a NEMA standard signal timing control strategy in a microscopic traffic simulation to minimize traffic delays
- Integrated the aforementioned speed control and signal control strategies

ORNL Digital Twin with Advanced Perception and Situational Awareness for Data-Driven Decision Making and Traffic Mitigation, Sustainable ORNL Showcase Project (*PI* | $150,000) [2021]

- Developing a real-time situational awareness system for ORNL's traffic, parking, and EV charging status for informed and sustainable decision making and planning.

Design and Development of Statistical Models and Freight Data, Bureau of Transportation Statistics, DOE Project No. 2116-Z239-18 [2018–2021]

- Developed methodologies to estimate domestic freight movements among Commodity Flow Survey (CFS) areas and foreign freight movements between the US and other foreign regions.

Digital Twin with Advanced Perception for ORNL Main Campus Roadways for Data Based Decision Making and Traffic Mitigation, Sustainable ORNL Showcase Project [2020]

- Acquired satellite imagery, GIS layer, and digital elevation model of the ORNL main campus
- Developed the initial ORNL Digital Twin driving environment using MathWorks RoadRunner

Regional Mobility in the United States, DOE Project #EEMS061 [2020]

- Developed and implemented several signal control methods for the Shallowford Rd corridor in Chat-

tanooga in microscopic traffic simulation
- Implemented real-world adaptive signal control at 4 intersections along Shallowford Rd in real-time

Smart Urban Signal Infrastructure and Control, Systems and Modeling for Accelerated Research in Research in Transportation (SMART), DOE Project #EEMS019 [2019–2020]
- Co-developed and implemented multiple system models, including linear high matrix, adaptive LQR, and bilinear models, for optimizing signal timing controls.
- Mentored and supervised two research assistants conducting system modeling and control of a 35-intersection network in VISSIM.

Real-Time Mobility Control System for Connected and Automated Vehicles, Laboratory Directed Research and Development, ORNL. LOIS ID #9376 [2018–2020]
- Developed and calibrated VISSIM traffic simulation model for CAV speed control in Chattanooga.

Future Urban Bus for Autonomous Research, Laboratory Directed Research and Development, ORNL. LOIS ID #9191 [2018–2019]
- Led the research and development of machine vision components, including stop sign detection and lane detection, of ORNL's autonomous bus - Ground-based Robotic Omnidirectional Vehicle for Electric-mobility Research (GROVER)
- Developing computer vision algorithms for the autonomous bus using OpenCV in Python and C++

Multi-Scenario Assessment of Optimization Opportunities due to Connectivity and Automation, Systems and Modeling for Accelerated Research in Research in Transportation (SMART) Mobility Consortium, DOE Project #EEMS020 [2018–2019]
- Developed and calibrated a VISSIM microscopic traffic simulation model for an I-75 corridor.

Georgia Institute of Technology Atlanta, Georgia, USA

Graduate Research Assistant *2010 – 2016*

An Enhanced GDOT Pavement Preservation Guide with Optimal Timing, Georgia Department of Transportation, Project No. #14-06 [2016–2016]
- Coordinated field tests on crack sealing test sites
- Developed an interactive web-based guide for pavement preservation treatment selection using HTML, CSS, and JavaScript (D3.js)

A Remote Sensing and GIS-enabled Asset Management System (RS-GAMS), Georgia Department of Transportation, Project No. #12-10 [2013–2016]
- Collected 3D sensing data on interstate highways and selected routes in Georgia
- Developed a framework to enable multi-year spatial and temporal data comparison for monitoring pavement rutting deterioration behaviors
- Developed a clustering analysis method to classify pavement rutting types based on multiple years of 3D pavement data

Developing a GDOT Pavement Marking Handbook Using Field Test Deck Evaluation and Long-term Performance Analysis, Georgia Department of Transportation, Project No. #12-31 [2012–2016]
- Collected/retrieved, processed, and analyzed pavement marking retroreflectivity data on Georgia's test deck and National Transportation Product Evaluation Program (NTPEP) test decks using SQL and R
- Developed statistical models in R to predict pavement marking retroreflectivity for various materials under different traffic and weather conditions
- Conducted life-cycle cost analysis on available pavement marking materials based on test deck data and literature
- Developed a GDOT pavement marking handbook and an interactive web-based tutorial for material selection and training purposes using HTML, CSS, and JavaScript

Spatial Traffic Volume Estimation and Projection Methodology for Pavement Resurfacing Prioritization, Georgia Department of Transportation, Project No. #11-03 [2011–2013]
- Developed a web scraper in R to programmatically extract traffic data from GDOT's Traffic Counts website for all permanent and portable traffic count locations
- Analyzed traffic data collected by GDOT's traffic monitoring program
- Developed a spatiotemporal framework that utilizes spatial and temporal information for estimating traffic at unmeasured locations
- Wrote the final report

Georgia Concrete Pavement Performance and Longevity, Georgia Department of Transportation, Project No. #10-10 [2012]

- Organized historical pavement inventory and distress data using SQL, and performed concrete pavement service life analysis
- Wrote part of the final report

Developing a Sensing Methodology for Intelligent and Reliable Work Zone Hazard Awareness, National Cooperative Highway Research Program - Innovations Deserving Exploratory Analysis (IDEA) Project #139 [2011–2012]

- Led the research team to develop a vision-based highway and work zone vehicle detection and tracking system in Matlab and C++
- Conducted study using the developed vehicle detection and tracking system to analyze the impact of different traffic and roadway characteristics on driving behaviors in work zone
- Wrote the final report

Optimization of Safety on Pavement Preservation Projects, Georgia Department of Transportation, Project No. #09-11 [2011]

- Consolidated data from multiple sources including traffic safety and pavement survey data using SQL
- Proposed a framework for incorporating safety considerations in pavement preservation prioritization
- Assisted in final report writing

A Remote Sensing and GIS-enabled Asset Management System (RS-GAMS), Research and Innovative Technology Administration, U.S. DOT, Contract #DTOS59-10-H-00003 [2010–2011]

- Developed traffic sign inventory graphic user interface in C#, which allowed user to extract ground truth traffic sign information (e.g., pixel color and location in the image), execute the automated traffic sign detection and recognition systems, and compare results

National Taiwan University — Taipei, Taiwan

Research Assistant — *2005 – 2007*

Advanced Safe Smart Vehicle: A Multi-model On-Board Unit and Advanced Driving Assistance System, National Science Council Project #NSC95-2218-E-002-028 [2005–2007]

- Developed a real-time on-board advanced vehicle safety warning system in C++ for inattentive driving behaviors including rear-end collision and lane departure warning
- Installed and connected the developed system with in-vehicle computer so warnings can be issued through the on-board A/V system
- Conducted over 2,000 km real-time on-road testing on the national freeways in Taiwan

PUBLICATIONS

(*corresponding author; †presenter; student/postdoc mentored)

Book Chapters

[B2] H. Xu*, A. Berres, Y. Shao, **C. Wang**, J. New, and F. Omitaomu, "Toward a Smart Metaverse City: Immersive Realism and 3D Visualization of Digital Twin," in *Advances in Scalable and Geospatial Analytics: New Trends, Challenges and Applications* (S. Durbha, J. Sanyal, L. Yang, S. Chaudhari, U. Bhangale, U. Bharambe, and K. Kurte, eds.), CRC Press, 2023

[B1] **C. Wang*** and Y.-C. J. Tsai, "Categorizing 3D Pavement Rut Shapes Using 3D Laser Imaging Technology," in *Pavement and Asset Management* (M. Crispino, ed.), pp. 3–10, London: CRC Press, 2019

Refereed Journal Articles

[J21] Y. Shi, Z. Wang*, **C. Wang**, and Y. Shao, "Pseudospectral convex optimization for on-ramp merging control of connected vehicles," *Journal of the Franklin Institute*, 2023. (doi: 10.1016/j.jfranklin.2023.08.017)

[J20] H. Xu, Y. Shao*, J. Chen, **C. Wang**, and A. Berres, "A semi-automatic GIS framework for creating photo-realistic digital twin cities to support autonomous driving research," *Transportation Research Records*, 2023. [Accepted]

[J19] Z. Yin*, T. Liu, **C. Wang**, H. Wang, and Z.-P. Jiang, "Reducing urban traffic congestion using deep learning and model predictive control," *IEEE Transactions on Neural Networks and Learning Systems*, 2023. (Early Access. doi: 10.1109/TNNLS.2023.3264709)

[J18] Y. Shi, Z. Wang*, T. J. LaClair, **C. Wang**, Y. Shao, and J. Yuan, "A novel deep reinforcement learning approach to traffic signal control with connected vehicles," *Applied Sciences*, vol. 13, no. 4, 2023. (doi: 10.3390/app13042750)

[J17] Y. Shi, Z. Wang*, T. J. LaClair, **C. Wang**, and Y. Shao, "Real-Time Control of Connected Vehicles in Signalized Corridors Using Pseudospectral Convex Optimization," *Optimal Control, Applications and Methods*, vol. 44, no. 4, pp. 2257–2277, 2023. (doi: 10.1002/oca.2978)

[J16] A. B. Subramaniyan, **C. Wang***, Y. Shao, W. Li, H. Wang, G. Zhang, and T. Ma, "Hybrid Recurrent Neural Network Modeling for Traffic Delay Prediction at Signalized Intersections Along an Urban Arterial," *IEEE Transactions on Intelligent Transportation Systems*, vol. 24, no. 1, pp. 1384–1394, 2023. (doi: 10.1109/TITS.2022.3201880)

[J15] H. Wang*, M. Zhu, W. Hong, **C. Wang**, W. Li, G. Tao, and Y. Wang, "Network-Wide Traffic Signal Control Using Bilinear System Modeling and Adaptive Optimization," *IEEE Transactions on Intelligent Transportation Systems*, vol. 24, no. 1, pp. 79–91, 2023. (doi: 10.1109/TITS.2022.3215537)

[J14] S. Ou, Z. Lin*, **C. Wang**, S. Davis, S. Jiang, M. Hilliard, H.-L. Hwang, X. Hao, and R. Yu, "Improving the Effectiveness and Equity of Fuel Economy Regulations with Sales Adjustment Factors," *iScience*, vol. 25, no. 9, p. 104902, 2022. (doi: 10.1016/j.isci.2022.104902)

[J13] N. E. Brown*, J. F. Rojas, N. A. Goberville, H. Alzubi, Q. AlRousan, **C. Wang**, S. Huff, J. Rios-Torres, A. R. Ekti, T. J. LaClair, R. Meyer, and Z. D. Asher, "Development of an Energy Efficient and Cost Effective Autonomous Vehicle Research Platform," *Sensors*, vol. 22, no. 16, 2022. (doi: 10.3390/s22165999)

[J12] Y. Shao*, D. Deter, A. Cook, **C. Wang**, B. Thompson, and N. Perry, "Real-Sim Interface: Enabling Multi-resolution Simulation and X-in-the-Loop Development for Connected and Automated Vehicles," *SAE International Journal of Connected and Automated Vehicles*, vol. 5, no. 4, 2022. (doi: 10.4271/12-05-04-0026)

[J11] W. Hong, G. Tao, H. Wang*, and **C. Wang**, "Traffic Signal Control With Adaptive Online-Learning Scheme Using Multiple-Model Neural Networks," *IEEE Transactions on Neural Networks and Learning Systems*, 2022. (Early Access. doi: 10.1109/TNNLS.2022.3146811)

[J10] H. Wang*, **C. Wang**, Y. Shao, W. Li, A. B. Subramaniyan, G. Zhang, T. Ma, J. Ringler, and D. Chou, "Hybrid Neural Network Learning for Multiple Intersections along Signalized Arterials: A Microscopic Simulation vs. Real System Effect," *International Journal on Advances in Networks and Services*, vol. 14, no. 1, 2022

[J9] H. Wang*, M. Zhu, W. Hong, **C. Wang**, G. Tao, and Y. Wang, "Optimizing Signal Timing Control for Large Urban Traffic Networks Using an Adaptive Linear Quadratic Regulator Control Strategy," *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 1, pp. 333–343, 2022. (doi: 10.1109/TITS.2020.3010725)

[J8] H. Xu*, **C. Wang**, A. Berres, T. LaClair, and J. Sanyal, "Interactive Web Application for Traffic Simulation Data Management and Visualization," *Transportation Research Record*, vol. 2676, no. 1, pp. 274–292, 2021. (doi: 10.1177/03611981211035760)

[J7] H. Xu*, A. Berres, S. A. Tennille, S. K. Ravulaparthy, **C. Wang**, and J. Sanyal, "Continuous Emulation and Multiscale Visualization of Traffic Flow Using Stationary Roadside Sensor Data," *IEEE Transactions on Intelligent Transportation Systems*, vol. 23, no. 8, pp. 10530–10541, 2021. (doi: 10.1109/TITS.2020.3010725)

[J6] A. S. Berres*, T. J. LaClair, **C. Wang**, H. Xu, S. Ravulaparthy, A. Todd, S. A. Tennille, and J. Sanyal, "Multiscale and Multivariate Transportation System Visualization for Shopping District Traffic and Regional Traffic," *Transportation Research Record*, vol. 2675, no. 6, pp. 23–37, 2021. (doi: 10.1177/0361198120970526)

[J5] D. Deter*, **C. Wang**, A. Cook, and N. K. Perry, "Simulating the Autonomous Future: A Look at Virtual Vehicle Environments and How to Validate Simulation Using Public Data Sets," *IEEE Signal Processing Magazine*, vol. 38, no. 1, pp. 111–121, 2021. (doi: 10.1109/MSP.2020.2984428)

[J4] B. Choubane*, J. Sevearance, C. Holzschuher, J. Fletcher, and **C. Wang**, "Development and Implementation of a Pavement Marking Management System in Florida," *Transportation Research Record*, vol. 2672, no. 12, pp. 209–219, 2018. (doi: 10.1177/0361198118787081)

[J3] **C. Wang***, Z. Wang, and Y.-C. Tsai, "Piecewise Multiple Linear Models for Pavement Marking Retroreflectivity Prediction Under Effect of Winter Weather Events," *Transportation Research Record*, vol. 2551, no. 1, pp. 52–61, 2016. (doi: 10.3141/2551-07)

[J2] **C. Wang*** and Y. Tsai, "Use of Reduction-Effectiveness Ratios to Evaluate Reduced Traffic Data Collection Plans," *Transportation Research Record*, vol. 2339, no. 1, pp. 13–18, 2013. (doi: 10.3141/2339-02)

[J1] T.-H. Chang*, C.-S. Hsu, **C. Wang**, and L.-K. Yang, "Onboard Measurement and Warning Module for Irregular Vehicle Behavior," *IEEE Transactions on Intelligent Transportation Systems*, vol. 9, no. 3, pp. 501–513, 2008. (doi: 10.1109/TITS.2008.928243)

Manuscripts Under Review/Revision/Preparation

[J22] S. Liao, A. Y. Chen*, and **C. Wang** "System-Wide Planning with Branch-and-Price for Pavement Marking Assessment Using Mobile Retroreflectivity Units," in *Journal of Computing in Civil Engineering* [*under review*]

Refereed Papers in Conference Proceedings

[CP17] Y. Shao*†, P. Chambon, A. Cook, **C. Wang**, and D. Deter (2023). "Evaluating Connected and Automated Vehicles in Co-Simulation Environment of Traffic Microsimulation and Vehicle Dynamics," in *ASCE International Conference on Transportation and Development 2023*, pp. 207-217, Austin TX (doi: 10.1061/9780784484876.019)

[CP16] S. Sharma*†, J. F. Rojas, A. R. Ekti, **C. Wang**, Z. Asher, and R. Meyer (2023). "Vehicle Lateral Offset Estimation Using Infrastructure Information for Reduced Compute Load," SAE Technical Paper (doi: 10.4271/2023-01-0800)

[CP15] H. Xu*†, J. Yuan, **C. Wang**, Y. Shao, A. Berres, and T. LaClair (2022) "A Mobile App for Intersectional Traffic Optimization through Real-Time V2I Cyber-Physical Control," *2022 IEEE International Conference on Mobile Ad-Hoc and Smart Systems* (*MASS*), Denver, CO (doi: 10.1109/MASS56207.2022.00044)[**Best Poster Award**]

[CP14] S. Sharma*†, A. Ekti, J. Rojas, N. Brown, N. Brown, D. Pesin, **C. Wang**, S. Huff, T. LaClair, Z. Asher, and R. Meyer (2022) "Development and Evaluation of Chip-Enabled Raised Pavement Markers for Lane Line Detection," *2022 IEEE Sensors*, Dallas, TX (doi: 10.1109/SENSORS52175.2022.9967036)

[CP13] Q. Wang*†, J. Severino, H. Sorensen, J. Sanyal, J. Ugirumurera, **C. Wang**, A. Berres, W. Jones, A. Kohls, and R. Paleti (2022) "Deploying a Model Predictive Traffic Signal Control Algorithm: A Field Deployment Experiment Case Study," in *2022 IEEE International Intelligent Transportation Systems Conference* (*ITSC*), Virtual (doi: 10.1109/ITSC55140.2022.9921839)

[CP12] J. Park*†, T. Liu, **C. Wang**, A. Berres, J. Severino, J. Ugirumurera, A. Kohls, H. Wang, J. Sanyal, and Z. Jiang (2022) "Adaptive Urban Traffic Signal Control for Multiple Intersections: An LQR Approach," in *2022 IEEE International Intelligent Transportation Systems Conference* (*ITSC*), Virtual (doi: 10.1109/ITSC55140.2022.9922033)

[CP11] Y. Shao*†, A. Cook, N. Perry, D. Deter, and **C. Wang** (2022), "Real-Sim: A Multi-resolution X-in-the-loop Experimental Approach for Testing Connected and Automated Vehicles," in *2022 American Control Conference* (*ACC*), pp. 3365-3365, Atlanta, GA (doi: 10.23919/ACC53348.2022.9867647)

[CP10] Y. Shi, Z. Wang*†, T. J. LaClair, **C. Wang**, and J. Yuan (2022) "Real-Time On-Ramp Merging Control of Connected and Automated Vehicles using Pseudospectral Convex Optimization," in *2022 American Control Conference* (*ACC*), pp. 2000-2005, Atlanta GA (doi: 10.23919/ACC53348.2022.9867422)

[CP9] Y. Shao†, **C. Wang***, A. Berres, J. Yoshioka, A. Cook, and H. Xu (2022) "Computer Vision-Enabled Smart Traffic Monitoring for Sustainable Transportation Management," in *ASCE International Conference on Transportation & Development 2022: Application of Emerging Technologies*, pp. 34-45, Seattle WA (doi: 10.1061/9780784484319.004)

[CP8] W. Li, **C. Wang**, Y. Shao, H. Wang*†, G. Zhang, T. Ma, J. Ringler, and D. Chou (2021) "Hybrid Neural Network Modeling for Multiple Intersections along an Arterial in Honolulu," in the *Tenth International Conference on Advances in Vehicular Systems, Technologies and Applications*, Virtual [**Best Paper Award**]

[CP7] H. Xu*†, A. Berres, **C. Wang**, T. LaClair, and J. Sanyal (2021) "Visualizing Vehicle Acceleration and Braking Energy at Intersections along a Major Traffic Corridor," in *e-Energy '21: Proceedings of the Twelfth ACM International Conference on Future Energy Systems*, Virtual (doi: 10.1145/3447555.3466603)

[CP6] J. Rios-Torres*†, Z. Khattak, J. Han, **C. Wang**, and H. Lim (2021) "Assessing the Implications of Automated Merging Control in a Mixed and Heterogeneous Traffic Environment," in *2021 IEEE International Intelligent Transportation Systems Conference* (*ITSC*), *2021*, pp. 1098–1104, Virtual (doi: 10.1109/ITSC48978.2021.9564523)

[CP5] H. Wang*†, **C. Wang**, M. Zhu, and W. Hong (2019) "Globalized Modelling and Signal Timing Control for Large-scale Networked Intersections," in *Proceedings of the 2nd ACM/EIGSCC Symposium on Smart Cities and Communities* (*SCC 19*). Association for Computing Machinery, New York, NY, USA, Article 12, pp. 1–7 (doi: 10.1145/3357492.3358635)

[CP4] Y. Lin, S. Liao, **C. Wang**, and A. Chen*† (2019) "VRP-based Model for Lane Marking Assessment with MRU Vehicle," *4th International Conference on Civil and Building Engineering Informatics* (*ICCBEI2019*), pp. 170-176, Sendai, Miyagi, Japan (proceeding link)

[CP3] T. J. LaClair*†, Z. Gao, **C. Wang**, J. Rios-Torres, J. Sanyal, R. Karthik, P. Nugent, S. Ravulaparthy, and A. Berres (2019) "Development of a Real-Time Mobility Control and Visualization System with Predictive Vehicle Speed Control for Connected and Automated Vehicles (CAVs)," *32nd International Electric Vehicle Symposium* (*EVS32*), Lyon, France

[CP2] Y. J. Tsai, **C. Wang***†, and Y. Wu (2011) "A Vision-Based Approach to Study Driver Behavior in Work Zone Areas," in *3rd International Conference on Road Safety and Simulation*, Indianapolis, IN

[CP1] T.-H. Chang*† and **C. Wang** (2010) "Vision-Based Onboard Unit for Inattentive Driving Warning and Car-Following Control," in *2010 IEEE Intelligent Vehicles Symposium*, San Diego, CA, pp. 585–590 (doi: 10.1109/IVS.2010.5548064)

Refereed Conference Papers (No Published Proceedings)

[C13] A. Subramaniyan, **C. Wang***, Y. Shao, W. Li, H. Wang, G. Zhang, and T. Ma (2022) "Hybrid Recurrent Neural Network Modeling for Traffic Delay Prediction Along Signalized Intersections: A Case Study in Hawaii," in *Transportation Research Board 101st Annual Meeting*, Washington D. C.

[C12] Y. Shao*, D. Deter, A. Cook, **C. Wang**, B. Thompson, and N. Perry (2022) "A Flexible Real-Sim Interface for Integrated Hardware-in-the-Loop Simulation for Connected and Automated Vehicles," in *Transportation Research Board 101st Annual Meeting*, Washington D. C.

[C11] Q. Wang*†, J. Severino, H. Sorensen, J. Sanyal, J. Ugirumurera, **C. Wang**, A. Berres, W. Jones, A. Kohls, and R. Paleti (2022) "Deploying A Model Predictive Traffic Signal Control Algorithm – A Field Deployment Experiment Case Study," in *Transportation Research Board 101st Annual Meeting*, Washington D. C.

[C10] H. Xu*†, **C. Wang**, A. Berres, T. LaClair, and J. Sanyal (2021) "An Interactive Web App for the Sharing and Visualization of Traffic Simulation Results," in *Transportation Research Board 100th Annual Meeting*, Virtual

[C9] S. Ou*†, **C. Wang**, S. Davis, S. Jiang, Z. Lin, M. Hilliard, H. Hwang, X. He, S. Przesmitzki, and J. Bouchard (2021) "Investigating the Impacts of Travel Patterns on Vehicle Fuel Use in the U.S. and China," in *Transportation Research Board 100th Annual Meeting*, Virtual

[C8] Y. Lin, **C. Wang**†, and A. Chen* (2020) "Optimizing Routing of Mobile Retroreflectivity Units for Pavement Marking Performance Assessment," in *Transportation Research Board 99th Annual Meeting*, Washington D. C.

[C7] B. Choubane*, J. Sevearance, C. Holzschuher†, J. Fletcher, and **C. Wang** (2018) "Development and Implementation of a Pavement Marking Management System in Florida," in *Transportation Research Board 97th Annual Meeting*, Washington D. C.

[C6] **C. Wang***† and Y. J. Tsai (2017) "Characterizing Rut Deterioration Using 3D Pavement Data: A Pilot Study on Georgia State Route 26," in *Transportation Research Board 96th Annual Meeting*, Washington D. C.

[C5] **C. Wang***† and Y. J. Tsai (2017) "Registration of 3D Pavement Data over Multiple Timestamps for Rut Deterioration Analysis: A Semi-automated Method," in *Transportation Research Board 96th Annual Meeting*, Washington D. C.

[C4] **C. Wang***†, Z. Wang, and Y. J. Tsai (2016) "Piecewise Multiple Linear Models for Pavement Marking Retroreflectivity Prediction under Effect of Winter Weather Events," in *Transportation Research Board 95th Annual Meeting*, Washington D. C.

[C3] Y. J. Tsai, **C. Wang***†, Z. Wang, R. Douds, and B. Bui (2015) "Improving Reliability of Pavement Marking Performance Evaluation by Identifying and Removing Irregular Variability in Field Retroreflectivity Measurements," in *Transportation Research Board 94th Annual Meeting*, Washington D. C.

[C2] **C. Wang***† and Y. J. Tsai (2013) "Evaluation of Reduced Traffic Data Collection Plans Using Reduction-Effectiveness Ratios," in *Transportation Research Board 92nd Annual Meeting*, Washington D. C.

[C1] Y. J. Tsai, Y. Wu*, **C. Wang**†, E. Pitts, and N. Cressman (2012) "Integrating Safety into Resurfacing Project Reprioritization for Minimizing Pavement-Deficiency-Induced Safety Risk," in *Transportation Research Board 91st Annual Meeting*, Washington D. C.

Technical Reports

[R8] H. Hwang, H. Lim, S. Chin, M. Uddin, A. Biehl, F. Xie, S. Hargrove, Y. Liu, and **C. Wang** (2021) "Freight Analysis Framework Version 5 (FAF5) Base Year 2017 Data Development Technical Report," Oak Ridge National Laboratory (ORNL), Oak Ridge, TN, ORNL/TM-2021/2154 (doi.org/10.2172/1844893)

[R7] H. Hwang, H. Lim, S. Chin, **C. Wang**, and B Wilson (2019) "Exploring the Use of FHWA Truck Traffic Volume and Weight Data to Support National Truck Freight Mobility Study," Oak Ridge National Laboratory (ORNL), Oak Ridge, TN, ORNL/TM-2019/1385 (doi.org/10.2172/1615795)

[R6] **C. Wang**, E. Offei, D. Kane, C. Holzschuher (2018) "2018 Statewide Pavement Marking Management System Facts and Figures," State Materials Office, Florida Department of Transportation, FL/DOT/SMO/18-591

[R5] **C. Wang** and C. Holzschuher (2017)"2017 Statewide Pavement Marking Management System Facts and Figures," State Materials Office, Florida Department of Transportation, FL/DOT/SMO/17-584, 2017

[R4] Y. Tsai, Z. Wang, and **C. Wang** (2015) "Developing a GDOT Pavement Marking Handbook Using Field Test Deck Evaluation and Long-term Performance Analysis," Final Report, Research Project #12-31, Georgia Department of Transportation, December, 2015 [nominated as a High-Value Research Project and featured in *Research Impacts: Better-Faster-Cheaper*, an annual publication of AASHTO's Research Advisory Committee (RAC)]

[R3] Y. Tsai, Y. Wu, and **C. Wang** (2013) "Spatial Traffic Volume Estimation and Projection Methodology for Pavement Resurfacing Project Prioritization," Final Report, Research Project #11-02, Georgia Department of Transportation, February, 2013

[R2] Y. Tsai, Y. Wu, and **C. Wang** (2013) "Georgia Concrete Pavement Performance and Longevity," Final Report, Research Project #10-10, Office of Materials and Research, Georgia Department of Transportation, December, 2011

[R1] Y. Tsai, Y. Wu, and **C. Wang** (2011) "Optimization of Safety on Pavement Preservation Projects," Final Report, Research Project #09-11, Office of Materials and Research, Georgia Department of Transportation, September, 2011

Invited Talks & Other Presentations

[T19] "NextGen NHTS OD Data Product Tools and Resource," NHTS Data to Support Planning Activities in Small and Medium Urban Areas Workshop at the 2022 TRB 17th National Tools of the Trade Conference, Boise, ID, August, 2022

[T18] "NextGen NHTS Origin Destination Data Analysis and Visualization Tools," Wisconsin MPO/RPC Directors Meeting, Wisconsin DOT, Virtual, July, 2022

[T17] "Demonstration of NextGen Data Analysis Tools," NextGen NHTS Technical Advisory Committee Meeting, Atlanta, GA, July, 2022

[T16] "Real-Twin: Scenario Generation Capability for Mobility Research," DOE,EPA,DOT Scenario Interoperability Working Group (SIWG) Meeting, Virtual, April, 2022

[T15] "Real-Twin: A Unified Scenario Generation Capability for Mobility Research," Department of Energy, Vehicle Technology Office, Energy Efficient Mobility Systems Program, SMART All-Hands Meeting, Virtual, March, 2022

[T14] "Real-Twin: A Unified Scenario Generation Capability for Mobility Research," Monthly Meeting of the 2022 U.S. DRIVE Mobility Systems Working Group, Virtual, March, 2022

[T13] "Data-Driven Mobility – Through the Lens of CAVs," NTRC Transportation Forum (TransForm), Oak Ridge National Laboratory, Knoxville, TN, July, 2019

[T12] "Assessment and Management of Transportation Assets: An Intelligent Approach," Transportation Engineering Seminar, Department of Civil and Environmental Engineering, The University of Tennessee, Knoxville, October, 2018 [Link to recording]

[T11] "How to Get Involved in a TRB Standing Committee: Secrets from the Pros," Transportation Research Board Webinar, October, 2018 [Moderator]

[T10] "Transportation Practices – Emerging Technologies for Transportation Asset Management," Guest Lecture to the Public Works Planning course at University of Florida, January, 2018 [Course instructor: Dr. Fazil Najafi]

[T9] "Valuable Things I Learned in and after Graduate School," University of Florida ITE Student Chapter, October, 2017

[T8] "A Web-based Video Log Tool for State Materials Office Pavement Section," FDOT District Materials and Research Engineers (DMRE) meeting, October, 2017

[T7] "A Web-based Video Log Tool for State Materials Office Pavement Section," FDOT District Innovators meeting, October, 2017

[T6] "Utilizing Emerging Technologies for Transportation Asset Management," University of Florida Transportation Institute, April, 2017

[T5] "Registering 3D Pavement Data for Rut Deterioration Analysis," State Materials Office, Florida Department of Transportation, April, 2017

[T4] "Better Data for Better Roads – The Charm of 3D Sensing Data," Monthly meeting of the Institute of Transportation Engineers Georgia Section (Georgia ITE), April, 2016

[T3] "New Data Collection and Connectivity Technologies – Benefit and Challenges," Monthly meeting of the Intelligent Transportation Society of Georgia (ITS Georgia), February, 2016

[T2] "Developing Sensing Methodology for Intelligent and Reliable Work Zone Hazard Awareness, NCHRP IDEA Project 139," Transportation Research Board Annual Meeting , Washington DC, January, 2012 & 2013

[T1] "Research on Advanced Vehicle Control and Safety Systems (AVCSS)," Transportation Engineering Seminar, Graduate Institute of Civil Engineering, National Taiwan University, September, 2009

SERVICE – PROFESSIONAL

Committees - Leadership & Membership

Member, 21st Century Truck Partnership Data and Analytics Working Group	*2021 – present*
Member, TennSMART Technical Advisory Committee	*2020 – present*
Member, TRB Freight Transportation Data Committee	*2020 – present*
Triennial Strategic Plan Coordinator, TRB Freight Transportation Data Committee	*2020 – present*
Member, TRB Traffic Control Devices Committee	*2020 – present*
Communications Coordinator, TRB Traffic Control Devices Committee	*2020 – present*
Paper Reviewer Coordinator, TRB Traffic Control Devices Committee	*2020 – present*
Member, TRB Infrastructure Management and System Preservation Section	*2020 – present*
Cochair, TRB Joint Young Members Subcommittee (AKR00 and AKT00)	*2020 – present*
Paper Review Coordinator, TRB Signing and Marking Materials Committee	*2018 – 2020*
Member, TRB Maintenance and Preservation Section	*2017 – 2020*
Chair, Young Members Subcommittee, TRB Maintenance and Preservation Section	*2017 – 2020*
Cochair, Subcommittee on Young Professionals, TRB Operations and Preservation Group	*2018 – 2019*
Member, TRB Signing and Marking Materials Committee	*2015 – 2020*
Communications Coordinator, TRB Signing and Marking Materials Committee	*2015 – 2020*

Editorial

Handling Editor, Transportation Research Record Editorial Board (10)	*2019 – present*
Review Coordinator, Transportation Research Board Annual Meeting (21)	*2018 – present*

Journal Reviewer

International Journal of Sustainable Transportation (1)	*2022 – present*
IEEE Vehicular Technology Magazine (1)	*2022 – present*
Transportation Research Part D: Transport and Environment (1)	*2022 – present*
International Journal of Transportation Science and Technology (2)	*2021 – present*
IEEE Transactions on Intelligent Transportation Systems (2)	*2021 – present*
International Journal of Pavement Research and Technology (2)	*2020 – present*
ASCE Journal of Computing in Civil Engineering (2)	*2016 – present*
Journal of Modern Transportation (1)	*2014 – present*
ASCE Journal of Infrastructure Systems (6)	*2012 – present*
Transportation Research Record (20+)	*2012 – present*

Conference Reviewer

International Workshop on Computational Transportation Science (IWCTS) (2)	*2020 – present*
11th International Conference on Managing Pavement Assets (ICMPA) (1)	*2020*
Transportation Research Board Annual Meeting (20+)	*2012 – present*
IEEE International Conference on Intelligent Transportation Systems (ITSC) (7)	*2010 – present*
GeoHubei International Conference 2014 (9)	*2013*
IEEE Intelligent Vehicle Symposium (IV) (1)	*2010*

Workshop and Program Organization

Panel, Sixth International Transport Energy Modeling (iTEM) Consortium Workshop	*2023*
Member, Sustainable Transportation Networks Task Force, National Science Foundation Engineering Research Visioning Alliance	*2022*
Co-founder & co-organizer, TRB Three-Minute Thesis Workshop	*2019 – present*
Member, Program Committee of International Workshop on Computational Transportation Science (IWCTS)	*2020 – present*
Co-chair (2014-present)/Secretary (2013)/Webmaster, Organizing Committee of Taiwan Transportation Professionals Technical Information Exchange	*2012 – present*

Publicity Chair and Webmaster, Planning Committee of the 8th Annual Inter-university Symposium on Infrastructure Management (AISIM) *2011 – 2012*

Affiliation

Associate Member, American Society of Civil Engineers (ASCE) *2020 – present*
Member, American Association for the Advancement of Science (AAAS) *2020 – present*
Member, Institute of Electrical and Electronics Engineers (IEEE) *2019 – present*
Student Member, American Society of Civil Engineers (ASCE) *2011 – 2017*
International Member, Institute of Transportation Engineers (ITE) *2011 – 2016*
Student Member, American Society of Highway Engineers (ASHE) *2013 – 2016*

Student Chapters - Leadership

President, American Society of Highway Engineers at Georgia Tech *2015 – 2016*
Treasurer, American Society of Engineering Education at Georgia Tech *2015 – 2016*
Technology Chair, American Society of Engineering Education at Georgia Tech *2014 – 2015*
Vice President of Finance, Institute of Transportation Engineers at Georgia Tech *2013 – 2014*
Treasurer, Women's Transportation Seminar at Georgia Tech *2013 – 2014*

SCHOLARSHIPS AND FELLOWSHIPS

Transportation Engineering Scholarship, Georgia Institute of Transportation Engineers *2015, 2013*
Wayne Shackelford Engineering Scholarship, Intelligent Transportation Society of Georgia *2015, 2013*
CETL Teaching Assistant Fellow, Georgia Tech *2015–2016*
IRF Road Scholar Program Fellow, International Road Federation *2015*
Babs Abubakari Memorial Scholarship, Georgia American Society of Highway Engineers *2014*
Government Scholarship for Studying Abroad, Taiwan Ministry of Education *2013–2015*
Rotary Educational Foundation Scholarship, Chung Hua Rotary Educational Foundation *2006*
RSEA Engineering Corporation Scholarship, RSEA Engineering Corporation *2006*

TEACHING EXPERIENCE

Oak Ridge National Laboratory — Knoxville, Tennessee, USA

Mentor

National Transportation Research Center *2019 – present*

- Served as the primary and co-mentor of individuals ranging from high school through postdocs. Students mentored include Nickolas Karrick (undergraduate junior), Wanshi Hong (Ph.D. student), Meixin Zhu (Ph.D. student), Brennan Wilson (post-BS), Jovan Yoshioka (high school and undergraduate), Guanhao Xu (postdoc), Abhilasha Saroj (postdoc), Arun Subramaniyan (postdoc), and Kaylee Bae (undergrad).

Georgia Institute of Technology — Atlanta, Georgia, USA

Graduate Teaching Assistant

CEE 3000 Civil Engineering Systems *Fall 2014, Spring 2016*

- Co-instructed lectures in engineering economics, covered topics including cash flows, project evaluation, inflation, and depreciation
- Held office hours and review sessions for homework and exam preparation; led in-class practices; prepared and graded homework assignments; provided solutions for practice exam problems and exams
- Received 4.4 and 4.9/5.0 overall effectiveness rating from Georgia Tech's Teaching Assistant Opinion Survey

CEE 6621 GIS in Transportation *Spring 2013, Fall 2013*

- Co-instructed introductory and advanced GIS lectures and labs, including projection, ArcGIS Python Add-ins, spatial data analysis, and geostatistics

Teaching Assistant Fellow *2015 – 2016*

Center for the Enhancement of Teaching and Learning, Georgia Tech

- Led groups of new TAs through orientation sessions, including a body and voice (communication) workshop, a roles and responsibility session, and a policies and procedures session to help prepare new TAs for the fall 2015 and spring 2016 semesters

Graduate Mentor *Summer 2011*

National Science Foundation – Collaborative Research Experiences in Advanced Technology and Engineering (NSF-CREATE) Program, Georgia Tech Savannah

- Advised undergraduate student John Paul Moore on his research that quantifies water holding capacity and hydroplaning hazards of asphalt pavement surfaces using the ridge-to-valley depth characteristics of the surface texture

National Taiwan University Taipei Taiwan

Full-time Teaching Assistant | **Faculty Member** *2008 – 2010*

Department of Civil Engineering

- Assisted in design, instruction, and assessment of civil/transportation engineering courses, including Engineering Mathematics, Environmental Engineering, Applied Mechanics, Transportation Engineering, Transportation Systems, Engineering Statistics, Engineering Economics, Fluid Mechanics Experiments, and Civil Engineering Materials
- Administered the operations of the Transportation Engineering Division and coordinated with the Department and other divisions