

Jinghui Yuan

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EDUCATION

University of Central Florida, Orlando, Florida, USA

- Ph.D. in Civil Engineering (Transportation) Aug 2016 – Aug 2019
 - Dissertation: Arterial-Level Real-Time Safety Evaluation in The Context of Proactive Traffic Management
 - Advisor: Prof. Mohamed Abdel-Aty
 - Focus: Real-time traffic safety, intelligent transportation system, big data analytic, deep learning.

Tongji University, Shanghai, China

- M.Eng. in Transportation Planning and Management Sep 2013 – Jun 2016
 - Thesis: Traffic Safety Oriented Research on the Planning and Management of Suburban Arterials
 - Advisor: Prof. Xuesong Wang

Central South University, Changsha, Hunan, China

- B.Eng. in Civil Engineering Sep 2009 – Jun 2013
 - Advisor: Prof. Limin Peng

RESEARCH EXPERIENCE

University of Central Florida, Orlando, Florida, USA

- Postdoctoral Research Scholar Aug 2019 – Present
- Graduate Research Assistant Aug 2016 – Aug 2019

Tongji University, Shanghai, China

- Graduate Research Assistant Sep 2013 – Jun 2016

RESEARCH INTERESTS

- Real-Time Safety Analysis and Crash Risk Prediction
- Intelligent Transportation System, Big Data, and Deep Learning
- Crash Precursor Analysis and Modeling
- Video-Based Multi-Modal Traffic Conflict Analysis
- Driving Behavior and Driving Simulator

RESEARCH PROJECTS

PRINCIPLE INVESTIGATOR OR CO-PRINCIPLE INVESTIGATOR

- [2] NCHRP 22-48: Development of Crash Prediction Models for Short-Term Durations (\$650,000)
Transportation Research Board of the National Academies. Jul 2020 – Jan 2023
- [1] Crash Predictions for Expedited Detection (CPED) (\$294,942)
U.S. Department of Transportation Safety Data Initiative. Sep 2020 – Sep 2021

LEAD RESEARCHER OR KEY RESEARCHER

- [8] Improving Multimodal Traffic Safety for Multi-Lane Arterials (\$440,000)
Florida Department of Transportation. Feb 2020 – Apr 2022
- [7] Connecting the East Orlando Communities Project-Phase I
Federal Highway Administration (FHWA) ATCMTD. Aug 2019 – Aug 2020
- [6] Investigation of Driving Behavior at Alternative Intersection Designs and Safety Improvement: A Driver Simulator Study (\$125,627)
U.S.DOT University Transportation Center (SAFER-SIM). Aug 2019 – Apr 2021
- [5] Study of Intersection Turning Movement Estimation (\$100,000)
Florida Department of Transportation. Sep 2018 – Aug 2019
- [4] Pre-Deployment Study for the Connecting the East Orlando Communities Project
Federal Highway Administration (FHWA) ATCMTD. Feb 2018 – Feb 2019
- [3] Evaluation of Innovative Alternative Intersection Designs in the Development of Safety Performance Functions and Crash Modification Factors (\$486,640)
Florida Department of Transportation. Aug 2017 – May 2020
- [2] Integrated Freeway/Arterial Active Traffic Management (\$499,861)
Florida Department of Transportation. Feb 2017 – Oct 2019

- [1] Operational and Safety-Based Analyses of Varied Toll Lane Configurations
U.S.DOT University Transportation Center (SAFER-SIM). Aug 2016 – Aug 2017

HONORS & AWARDS

- Best Paper Award (Second Place), China Journal of Highway and Transport Dec 2019
- Stage III Winner in the USDOT's Solving for Safety Visualization Challenge, U.S. Department of Transportation Nov 2019
Lead data scientist, One of three key contributors.
- Excellence Award, U.S.DOT University Transportation Center (SAFER-SIM) Oct 2019
- UCF College of Graduate Studies Presentation Fellowship, University of Central Florida Nov 2018
- UCF College of Graduate Studies Presentation Fellowship, University of Central Florida Nov 2017
- FRONTRUNNER 5000 Top Articles in Outstanding ST Journals of China, Institute of Scientific and Technical Information of China Oct 2017
- ORC Doctoral Fellowship, University of Central Florida Aug 2016
- Second-Class Graduate Scholarship, Tongji University Sep 2013
- First Place of National Structural Design Competition, Central South University Nov 2011

PUBLICATIONS

JOURNALS

- [22] Gong, Y., Abdel-Aty, M., **Yuan, J.**, and Cai, Q., 2020. "Multi-objective reinforcement learning approach for improving safety at intersections with adaptive traffic signal control". *Accident Analysis Prevention*, 144: 105655.
- [21] Yue, L., Abdel-Aty, M., Wu, Y., **Yuan, J.**, and Morris, M., 2020. "Influence of pedestrian-to-vehicle technology on drivers' response and safety benefits considering pre-crash conditions". *Transportation Research Part F: Traffic Psychology and Behaviour*, 73: 50-65.
- [20] Yue, L., Abdel-Aty, M., Wu, Y., and **Yuan, J.**, 2020. "An Augmentation Function for Active Pedestrian Safety System Based on Crash Risk Evaluation". *IEEE Transaction on Vehicular Technology*.
- [19] Cai, Q., Abdel-Aty, M., **Yuan, J.**, Lee, J., Wu, Y., 2020. "Real-time crash prediction on expressways using deep generative models". *Transportation Research part C: emerging technologies*, 117: 102697.
- [18] **Yuan, J.***, Abdel-Aty, M., Yue, L., and Cai, Q., 2020. "Modeling Real-Time Cycle-Level Crash Risk at Signalized Intersections Based on High-Resolution Event-Based Data". *IEEE Transaction on Intelligent Transportation Systems*.
- [17] Xing, L., He, J., Abdel-Aty, M., Wu, Y., **Yuan, J.**, 2020. "Time-varying analysis of traffic conflicts at the upstream approach of toll plaza". *Accident Analysis Prevention*, 141: 105539.
- [16] Zhang, S., Abdel-Aty, M., **Yuan, J.**, Li, P., 2020. "Prediction of Pedestrian Crossing Intentions at Intersections Based on Long Short-Term Memory Recurrent Neural Network". *Transportation Research Record: Journal of the Transportation Research Board*, (2020): 0361198120912422.
- [15] Yue, L., Abdel-Aty, M., Wu, Y., Zheng, O., and **Yuan, J.***, 2020. "In-depth approach for identifying crash causation patterns and its implications for pedestrian crash prevention". *Journal of Safety Research*, 73: 119-132.
- [14] Li, Y., Abdel-Aty, M., and **Yuan, J.**, Cheng, Z., Lu, J., 2020. "Analyzing Traffic Violation Behavior at Urban Intersections: A Spatial-Temporal Kernel Density Estimation Approach Using Automated Enforcement System Data". *Accident Analysis Prevention*, 141: 105509.
- [13] Formosa, N., Quddus, M., Ison, S., Abdel-Aty, M., and **Yuan, J.**, 2020. "Predicting real-time traffic conflicts using deep learning". *Accident Analysis Prevention*, 136: 105429.
- [12] Li, P., Abdel-Aty, M., and **Yuan, J.**, 2020. "Real-Time Crash Risk Prediction on Arterials Based on LSTM-CNN". *Accident Analysis Prevention*, 135: 105371.
- [11] Xing, L., He, J., Li, Y., Wu, Y., **Yuan, J.**, and Gu, X., 2020. "Comparison of different models for evaluating vehicle collision risks at upstream diverging area of toll plaza". *Accident Analysis Prevention*, 135: 105343.

- [10] Cai, Q., Abdel-Aty, M., Sun, Y., Lee, J., and **Yuan, J.**, 2019. "Applying a deep learning approach for transportation safety planning by using high-resolution transportation and land use data". *Transportation Research Part A: Policy and Practice*, 127: 71-85.
- [9] **Yuan, J.***, Abdel-Aty, M., Gong, Y., and Cai, Q., 2019. "Real-Time Crash Risk Prediction Using Long Short-Term Memory Recurrent Neural Network". *Transportation Research Record: Journal of the Transportation Research Board*, 2673 (4): 314-326.
(The third-most cited article in 2020 from the TRR journal)
- [8] **Yuan, J.***, Abdel-Aty, M., Cai, Q., and Lee, J., 2019. "Investigating Drivers' Mandatory Lane Change Behavior on the Weaving Section of Freeway with Managed Lane: A Driving Simulator Study". *Transportation Research Part F: Traffic Psychology and Behavior*, 62: 11-32.
- [7] Gu, X., Abdel-Aty, M., Xiang, Q., Cai, Q., and **Yuan, J.**, 2019. "Utilizing UAV Video Data for In-depth Analysis of Drivers' Crash Risk at Interchange Merging Areas". *Accident Analysis Prevention*, 123: 159-169.
- [6] **Yuan, J.***, Abdel-Aty, M., Wang, L., Lee, J., Yu, R., and Wang, X., 2018. "Utilizing Bluetooth and Adaptive Signal Control Data for Real-Time Safety Analysis on Urban Arterials". *Transportation Research Part C: Emerging Technologies*, 97: 114-127.
- [5] **Yuan, J.*** and Abdel-Aty, M., 2018. "Approach-Level Real-Time Crash Risk Analysis for Signalized Intersections". *Accident Analysis Prevention*, 119: 274-289.
- [4] Cai, Q., Saad, M., Abdel-Aty, M., **Yuan, J.**, and Lee, J., 2018. "Safety impact of weaving distance on freeway facilities with managed lanes using both microscopic traffic and driving simulations". *Transportation Research Record: Journal of the Transportation Research Board*, 2672 (39): 130-141.
- [3] Wang, X., **Yuan, J.**, Schultz, G., and Fang, S., 2018. "Investigating the safety impact of roadway network features of suburban arterials in Shanghai". *Accident Analysis Prevention*, 113: 137-148.
- [2] Wang, X., and **Yuan, J.**, 2017. "Safety Impacts Study of Roadway Network Features on Suburban Highways". *China Journal of Highway and Transport*, 30 (4): 106-114.
(In Chinese, 2019 Best Paper Award (Second Place), China Journal of Highway and Transport)
- [1] Wang, X., **Yuan, J.**, and Yang, X., 2016. "Modeling Research of Crash Types at Signalized Intersections Base on the Random Effect Model". *Journal of Tongji University (Natural Science)*, 44 (01): 81-86.
(In Chinese, FRONTRUNNER 5000 Top Articles in Outstanding ST Journals of China)

CONFERENCES

- [19] **Yuan, J.***, Abdel-Aty, M., Yue, L., and Gong, Y., 2020. "Corridor-Level Real-Time Crash Risk Prediction Using Spatial-Temporal LSTM". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [18] **Yuan, J.***, Abdel-Aty, M., Yue, L., and Cai, Q., 2020. "Cycle-by-Cycle Crash Risk Analysis at Signalized Intersections by Considering Shockwave Characteristics". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [17] Cai, Q., Abdel-Aty, M., **Yuan, J.**, Lee, J., and Wu, Y., 2020. "An Augmentation Function for Active Pedestrian Safety System Based on Crash Risk Evaluation". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [16] Yue, L., Abdel-Aty, M., Wu, Y., and **Yuan, J.**, 2020. "An Augmentation Function for Active Pedestrian Safety System Based on Crash Risk Evaluation". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [15] Gong, Y., Abdel-Aty, M., **Yuan, J.**, and Cai, Q., 2020. "Safety-Orientated Adaptive Traffic Signal Using Multi-Objective Deep Reinforcement Learning". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [14] Li, Y., **Yuan, J.**, Lu, J., and Cheng, Z., 2020. "Evaluation and Analysis of Automated Enforcement System for Traffic Violation at Urban Intersection". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [13] Wang, X., Pei, X., and **Yuan, J.**, 2020. "Meso-Level Hotspot Identification for Suburban Arterials". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.

- [12] Xing, L., He, Q., Cai, Q., and **Yuan, J.**, 2020. "Time-varying Analysis of Traffic Conflicts in Up Stream Toll Plaza Diverging Area". *The 99th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [11] **Yuan, J.** and Abdel-Aty, M., 2019. "Cycle-by-Cycle Crash Risk Prediction at Signalized Intersections by Using LSTM". *The 26th ITS World Congress*, Singapore.
- [10] **Yuan, J.** and Abdel-Aty, M., 2019. "Arterial-Level Real-Time Crash Risk Prediction Using Deep Learning". *The 1st International Conference on Smart Tourism, Smart Cities and Enabling Technology*, Orlando, U.S.
- [9] **Yuan, J.** and Abdel-Aty, M., 2019. "Real-Time Crash Risk Analysis for Signalized Intersections". *The 98th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [8] **Yuan, J.**, Abdel-Aty, M., Gong, Y., and Cai, Q., 2019. "Real-Time Crash Risk Prediction Using Long Short-Term Memory Recurrent Neural Network". *The 98th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [7] **Yuan, J.**, Abdel-Aty, M., Cai, Q., and Lee, J., 2019. "A Driving Simulator Study to Investigate Drivers' Lane Change Behavior on The Weaving Section of a Freeway with Managed Lane". *The 98th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [6] Gu, X., Abdel-Aty, M., Xiang, Q., Cai, Q., and **Yuan, J.**, 2019. "Analyzing Crash Risk at Interchange Merging Areas using Aerial Data". *The 98th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [5] Cai, Q., Abdel-Aty, M., Sun, Y., Lee, J., and **Yuan, J.**, 2019. "Applying Deep Learning and High-Resolution Data to Predict Crashes for Transportation Safety Planning". *The 98th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [4] **Yuan, J.**, Abdel-Aty, M., Wang, L., Lee, J., Wang, X., and Yu, R., 2018. "Real-Time Crash Risk Analysis of Urban Arterials Incorporating Bluetooth, Weather, and Adaptive Signal Control Data". *The 97th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [3] Cai, Q., Saad, M., Abdel-Aty, M., **Yuan, J.**, and Lee, J., 2018. "Safety Impact of Weaving Distance on Freeway Facilities with Managed Lanes Using Both Microscopic Traffic and Driving Simulations". *The 97th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [2] Wang, X., **Yuan, J.**, Schultz, G., and Meng, W., 2016. "Investigating the Safety Impacts of the Roadway Network Features of Suburban Arterials in Shanghai". *The 95th Annual Meeting of the Transportation Research Board*, Washington D.C., U.S.
- [1] **Yuan, J.** and Wang, X., 2015. "Modeling the Safety Effect of Access and Signal Density on Suburban Arterials: Using Macro Level Analysis Method". *The 10th Annual Meeting of China Intelligent Transportation System Association*, Wuxi, China.

PATENTS & COPYRIGHTS

- [2] Abdel-Aty, M., Wu, Y., **Yuan, J.**, and Zheng, O., 2019. "Real-Time Pro-active Traffic Safety Management UCF System including Operator and Decision-Making Components". *Provisional Patent*, application number 62/959,473, filed on January 10, 2020.
- [1] "Real-Time Pro-active Traffic Safety Management UCF System including Operator and Decision-Making Components". *Software and User Manual Copyright*, UCF CPY No. 34291.

INVITED TALKS

- [3] "Automatic ATSPM Detector Mapping". *FDOT District Five*, Orlando, U.S. Sep 2020
- [2] "Arterial-Level Real-Time Crash Risk Prediction Using Deep Learning". *The 1st International Conference on Smart Tourism, Smart Cities and Enabling Technology*, Orlando, U.S. May 2019
- [1] "Approach-Level Real-Time Crash Risk Prediction at Signalized Intersection by Incorporating Bluetooth, Weather, and Adaptive Signal Control Data". *University of Central Florida 2018 Graduate Research Forum*, Orlando, U.S. Apr 2018

PROFESSIONAL AFFILIATIONS & ACTIVITIES

Membership

- Younger Committee Member, ASCE Transportation Development Institute Transportation Safety Committee 2019 – Present
- Member, American Society of Civil Engineers (ASCE) 2017 – Present
- Member, Institute of Transportation Engineers (ITE) 2017 – Present
- Member, Chinese Overseas Transportation Association (COTA) 2017 – Present

Referee

▪ Accident Analysis and Prevention	2017 – Present
▪ Transportation Research Part F: Psychology and Behavior	2018 – Present
▪ Transportation Research Record: Journal of the Transportation Research Board	2018 – Present
▪ Journal of Intelligent Transportation Systems: Technology, Planning, and Operations	2019 – Present
▪ Traffic Injury Prevention	2018 – Present
▪ Journal of Advanced Transportation	2019 – Present
▪ Transportmetrica A: Transport Science	2018 – Present
▪ Journal of Transportation Safety Security	2017 – Present
▪ Journal of Traffic and Transportation Engineering	2017 – Present
▪ Advances in Mechanical Engineering	2017 – Present
▪ Transportation Research Board Annual Meeting	2017 – Present
▪ ASCE International Conference on Transportation Development	2018 – Present
▪ COTA International Conference of Transportation Professionals	2017 – Present
▪ Automated Vehicle Symposium	2018 – Present

Editorship

▪ Guest Editor, Journal of Advanced Transportation, Special Issue on Emerging Technologies in Traffic Safety Risk Evaluation, Prevention, and Control	2019
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TEACHING & ADVISING EXPERIENCE

University of Central Florida, Orlando, Florida, USA

Guest Lecturer

▪ CGN 5341: Interdisciplinary Introduction to Smart Cities' Applications	Fall 2020
• Lecture: Smart Transportation (Transportation Systems Management and Operations (TSMO))	
• Lecture: Smart Transportation (Deep Learning Based Traffic Prediction and Visualization)	
• Lecture: Smart Transportation (Connected and Automated Vehicles)	
• Lecture: Smart Transportation (Shared (Micro) Mobility)	
▪ TTE 4274: Transportation System Engineering	Fall 2020
• Lecture: Artificial Intelligence in Transportation	

Advisory Committee Member

▪ Zubayer Islam	Fall 2020 - Spring 2021
• Ph.D. Dissertation: Using Machine Learning Algorithms in Critical Traffic Engineering Applications	
▪ Ma'en Mohammad Ali Al-Omari	Summer 2020 - Spring 2021
• Ph.D. Dissertation: Evaluation of Unconventional Signalized Intersections on Arterial Roads and a Proposition for a Novel Intersection Design	

TECHNICAL SKILLS

- Programming Languages: Python, R
- Databases: SQL Server, PostgreSQL, MongoDB
- Deep Learning: PyTorch, TensorFlow, Talos, H2O
- Big Data: Dask, PySpark, Hadoop, h5py
- Data Sharing and Accessing: REST, urllib, requests
- Video Processing: OpenCV
- Statistics: R, SAS, WinBUGS, statsmodels
- Visualization: Shiny
- Spatial Analysis: ArcGIS
- Simulation: VISSIM, Synchro, SUMO, CARLA

[CV compiled on 2020-09-21]