Statement of Work
FTA Standards Development Research Program Project:
Mobility Data - Standards and Specifications for Interoperability

Proposal submitted by:
Center for Urban Transportation Research at the University of South Florida
4202 East Fowler Avenue
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March 11, 2021

FTA Standards Research Program Project: *Mobility Data - Standards and Specifications for Interoperability*

Introduction

The Federal Transit Administration (FTA) entered into a Cooperative Agreement with the Center for Urban Transportation Research (CUTR) at the University of South Florida to research areas of transit mobility, infrastructure and safety, identify existing standards and recommended practices to address those areas, and perform gap analyses to establish the need for additional standards, guidance, or recommended practices to support and further the efficient and safe operation of the nation's public transportation industry. In addition, CUTR has been directed to work with Standards Development Organizations (SDOs) and industry stakeholders to develop or modify existing standards to address these gaps.

This statement of work (SOW) for the FTA Standards Research Program project: *Mobility Data - Standards and Specifications for Interoperability* has been developed in accordance with FTA's *Standards Development Program Framework*, which includes the activities indicated above and further described in this SOW.

FTA Standards Development Research Program

FTA's Standards Development Research Program was established to:

- Address transit mobility, infrastructure and safety-related standards
- Conduct background research and analysis
    - Determine need for new transit standards in areas where standards are lacking or where there are gaps within existing standards
    - Identify existing standards deemed not adequate or not specific to transit that may be modified or enhanced for public transportation
- Work with industry stakeholders or working groups to inform the standard development process, including associated transit mobility, infrastructure and safety research reports
- Work with SDOs, such as APTA, Intelligent Transportation Society of America (ITS America), Mobility on Demand Alliance, and SAE international to develop guidance documents, standards or recommended practices for industry voluntary adoption

Standards Program Research Framework

FTA's Standards Research Program is performed in accordance with the structure presented in the *FTA Standards Development Program Framework*.

This research project: "*Mobility Data - Standards and Specifications for Interoperability"* is consistent with the research needs identified by the industry through CUTR Standard Working Group, supports FTA's research goals and initiatives, and will include the identification of

mobility data standards, protocols, and recommended practices that may serve to further FTA's transit mission.

Project Objectives

To achieve the USDOT's vision for accessible, equitable, seamless, and complete trips for all travelers, there is a need for collaboration and harmonization in standardization across industries representing various facets of the travel chain, whether they are segments of the trip or integration of trip segments (i.e., trip planning and payment integration).

The primary objective of this project is to perform research to identify the best practices and current mobility data developments leading to industry-driven Mobility on Demand (MOD) data standards and specifications.

This research will build upon ongoing USDOT efforts by focusing on data exchange and interoperability between modes, platform vendors, and operators as part of the MOD ecosystem. The research will also review international mobility data standards as appropriate to help close the gaps in the MOD data exchange specifications and standards.

The research outcomes include the identification of any gaps and areas where FTA might need to focus to continue assist or support industry-led efforts to ensure interoperability among the different components of the MOD ecosystem.

Project Description

This project will be conducted according to the tasks defined in this section and in accordance with and under the direction of FTA TRI. The FTA *Standards Development Program Framework* and the Multimodal and Accessible Travel Standardization Assessment (MATSA) effort[1],, and its associated deliverables, will be used to guide the research process and all associated activities. The work will be performed with a team comprised of researchers from the Center for Urban Transportation Research (CUTR). The project team will engage CUTR's Transit Standards Working Group, Mobility on Demand Alliance (MODA), Shared Use Mobility Center (SUMC), industry stakeholders, and APTA or other SDOs as identified in subtask 1.1.

Task 1: Perform Topic Areas Research

Consistency in method and presentation is an important element in a formal research program structure. Research reports must effectively and consistently communicate research findings and associated recommendations. The research team will utilize the background research report template included in the FTA Standards Development Program Framework that reflects the following minimum elements that focus on the topic of Mobility on Demand:

- Literature review summary
- Identification of existing standards, recommended practices, guidance documents associated with the Mobility data exchange, Interoperability specifications and

[1] Funded by the US DOT Intelligent Transportation Systems (ITS) Joint Program Office (JPO)

standards

- Participation in ongoing industry-led efforts related to mobility data standards and specifications
- Identification of needs and gaps for new voluntary standards, guidance documents, or other resources
- Identification of any existing standards, guidelines, or other industry technical assistance documents that would need to be modified or enhanced
- Identification and description of SDO coordination during research report development and in implementation options
- Research findings and corresponding recommendations
- "Implementation of Research Findings" addendum

Subtask 1.1: Literature Review and Background Research

An FTA-directed SDP project team will perform a literature review and conduct background research on the focus area topic to inform and further subsequent tasks.

The literature review will include the following reports from the recent multimodal standards work at the USDOT.

- ISO TC204 Working Group 19 Integrated Mobility White Paper
- Mobility Marketplace – Concept of Operations Blueprint
- Multimodal and Accessible Travel Standardization Assessment (MATSA) Roadmap

Of importance are the MATSA Forward Looking Assessment, Survey of Standards and Emerging Standards, and MATSA Outreach Report that summarizes the outreach and feedback on industry priorities in standards to address multimodal and accessible travel obtained through a variety of stakeholder meetings, interviews and stakeholder outreach questionnaire. The effort focused on six key areas where gaps exist. These areas include four that support the USDOT's concept of "Complete Trip," and two that support design and operational principles around the concept of "Complete Streets." Complete trip and street areas include:

- Mobility Platform Application Programming Interfaces (API),
- Wayfinding and Navigation (WaN) related to field and presentation needs,
- Safety related to vulnerable road users (VRU) in a Center to Everything (C2X) environment
- Integrated Payment
- Curb Access and Management
- Public Right of Way (PROW) and Indoor Navigation Data

These literature review sources may include, but not be limited to:

- Relevant FTA internal or external strategic research plan/direction documents
- Research reports issued by:

    - FTA TRI
    - Reports released by USDOT's Intelligent Transportation Systems Joint Program Office (ITS JPO), including but not limited to Mobility on Demand (MOD)
    - ITS Data Access and Exchanges Program
    - TRB and its Cooperative Research Programs
    - U.S. DOT University Transportation Centers (UTC)
    - Other research bodies (including state departments of transportation)
    - State/Local/Mobility providers partnership documents and memoranda of understanding
    - SAE International standard development documents
    - European Union's Open Transport Initiative
- Guidance documents or model practices used by or with relevance to the U.S. transit industry, including those developed by the American Public Transportation Association (APTA), MobilityData, and ITS America's Mobility on Demand Alliance.

As appropriate, the research team will build in the existing outreach efforts for standards, performance metrics, and accessibility.

Subtask 1.2: Standards and Specifications Compendium

Based on the literature review and background research, the research team will identify existing standards and specifications, including those obtained through the *MATSA Survey of Standards and Emerging Standards*. Any standards established or updated since the conduct of this survey will be identified. In addition, if there are standards or specifications identified through the stakeholder involvement process established as a part of this project, they will also be added to the compendium included as an appendix to the draft and final project report.

Subtask 1.3: Gap Identification and Focus Areas Recognition

This subtask will undertake a holistic approach to a comprehensive review of existing standards, recommended practices, and protocols. The work will at a minimum cover key MOD ecosystem areas:

Trip Discovery – The research team will research and document past and ongoing initiatives to develop standards to improve data sharing among service providers and public agencies. For example, the research team will look at efforts promoted by the California Transit Association to develop MOD data sharing standards.

Payment Systems – The research will consider how technology is developing and what minimum level of data sharing are necessary to ensure a seamless integration between different payment systems for diverse traveler choices.

Operations – The research will investigate how and what data standards might be necessary to be developed for the operations of public transit and mobility to ensure travelers are best served throughout their travel journey.

Subtask 1.4: Stakeholder Input in Research

The research team will engage MOD stakeholders, industry groups, and advisory groups in consultation with and at the direction of FTA during the research.

Per direction from and approval by the FTA program manager, the research team will acquire access (e.g., through paid membership fees or other arrangements as appropriate) to participate in ongoing mobility data standards and specifications development efforts led by the industry stakeholders and organizations, including, but not limited to, MobilityData and Mobility on Demand Alliance and SAE International.

Subtask 1.5: Issue Findings and Recommendations for FTA's Consideration

Findings and recommendations will be issued based on the research performed in subtasks 1.1 through 1.4 detailing focus areas for FTA to pursue. The research team will reference the *Multimodal and Accessible Travel Standardization Assessment (MATSA) Roadmap* for all findings and recommendations as appropriate.

Output/Deliverable:

Task reports for each focus area topic that include:

1. Topic areas findings
2. Identified gaps
3. Recommendations on focus areas
4. Final report of research findings and recommendations
5. Research result briefs for FTA

Task 2: Research Report Review and Approval Process

This research activity will be performed in accordance with the work plan and schedule reflected in Table 2. The research team will support FTA's internal research report review, editing, and final approval process and will modify the research report as directed by FTA TRI. Once the final report is ready to move through FTA's publication process, the research team will provide the documentation, forms, or research briefs required to finalize that process.

Output/Deliverable (Task 2):

1. Draft Final Report for research topics
2. Final 508-compliant Reports for publication (alt text provided to FTA publication team)
3. Research Summary
4. Report Documentation Page

Task 3: Knowledge Transfer

Knowledge transfer is seminal in a robust and actionable standards research and development program, which can lead to an increased likelihood of industry implementation and improved industry outputs. This standards development research will result in a final research report and may also include guidance documents, voluntary standards, and other tools that support and

promote FTA's safety programs. The research team will support and assist FTA with its internal process to:

- Determine report publication readiness
- Direct early release of report or associated guidance
- Consider industry presentations or briefs on research results prior to document release and deliver these presentations as directed
- Establish a timeline for releasing research report (or draft report)
- Provide a method to track industry participation in presentations, webinars, or briefs on products produced through the standards program

This TRI SDP research report will include an "Implementation of Research Findings" addendum. Consistent with other industry research programs, this addendum will include:

- Recommendations on how to best put the research findings/product into practice
- Issues that may affect the industry's ability to implement findings/products and possible actions to address those issues
- Methods for identifying and measuring impacts associated with implementation of the research findings/products based on established program performance measures
- Potential venues for project presentations

Task 4: Project Management

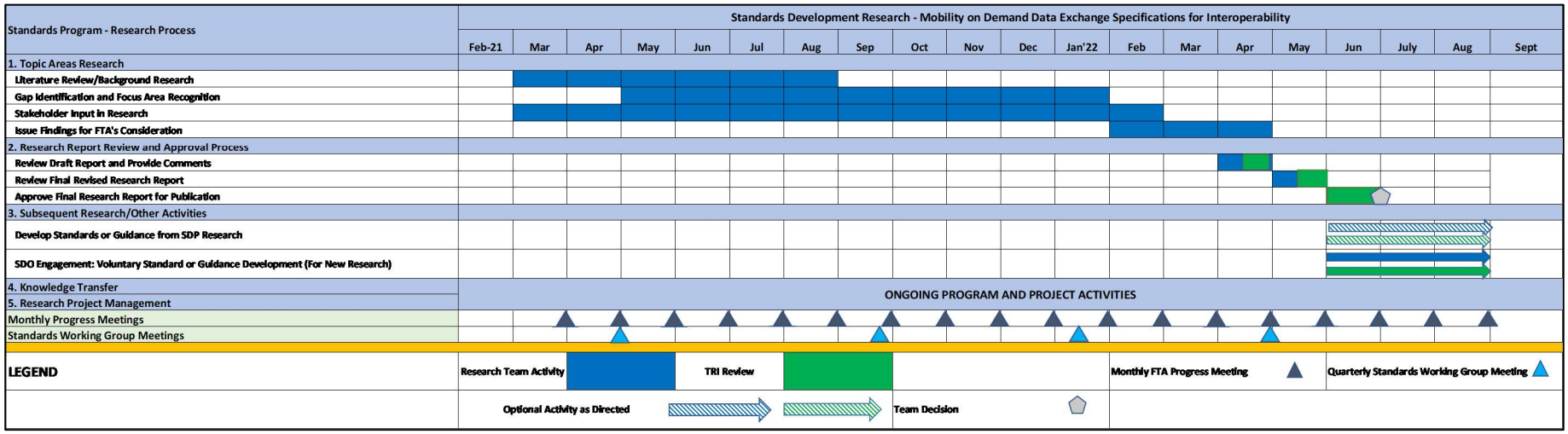
The research team will perform all activities described in this SOW and all management functions required to successfully perform these duties and responsibilities. At a minimum, this will include:

- Biweekly TRI updates, as required
- Monthly program progress meetings, as required
- Quarterly CUTR independent Transit Standards Working Group meetings
- Project presentations to industry groups, as directed and/or approved
- Implementation of Research Findings Addendum

Outputs/Deliverables (Task 4):

1. Progress meeting PowerPoint presentations
2. Content for Working Group meeting packets
3. Documentation of other industry collaboration, presentation, and discussion

Table 2. Standards Development Research: Mobility on Demand Data Exchange/Specification for Interoperability



Appendix A - Primary Assigned Personnel

CUTR will assign personnel to this project who have extensive relevant experience that corresponds with the tasks assigned. Those individuals who will lead CUTR's efforts are identified below. CUTR primary assigned personnel will be supported by individuals who have demonstrated expertise in task areas included within this statement of work. This may include other CUTR and College of Engineering faculty, as well as CUTR/USF Affiliated Faculty members.

The research team leads will include the following University of South Florida faculty and staff members (detailed resumes/CVs included):

- Sisinnio Concas, Program Director | Associate Professor, CUTR
- Jodi Godfrey, Senior Research Associate, CUTR
- Vishal Kummetha, Post-doctoral Scholar, CUTR
- Mohsen Kamrani, Postdoctoral Research Scholar

Sisinnio Concas, Ph.D., Director | Associate Professor

Autonomous and Connected Mobility Evaluation (ACME) Program

Dr. Concas leads CUTR's Autonomous & Connected Mobility Evaluation (ACME) Program. Dr. Concas brings over 15 years of experience as a transportation economist conducting economic impact and benefit-cost analyses for public transportation, airport and roadway projects. He has performed numerous research projects for the U.S. Federal Transit Administration, Federal Highway Administration, the Florida Department of Transportation, and state and local transportation authorities.

His research group, ACME, specializes in performing economic analyses and performance evaluation of autonomous and connected transportation solutions. Researchers are skilled in advanced econometric methods, traffic engineering and safety, data mining, machine learning and artificial intelligence applications to produce quick-response solutions to better inform practitioners and policy maker in selecting and prioritizing cost-feasible alternatives. ACME's projects cover these main areas of research:

Infrastructure Investment and Economic Development

The group's analytical expertise helps organizations assess the economic impacts and effectiveness of policy, planning, and investment decision making.

The Economic and Social Consequences of Connected and Autonomous Vehicles

ACME conducts evaluation and performance assessments of connected and autonomous vehicles in terms of safety, mobility, economic productivity, energy and environmental benefits. ACME is currently leading the performance evaluation and assessment of the Federal Highway Administration (FHWA) Connected Vehicle Pilot Deployment Program – Tampa Pilot.

Travel Behavior, Land Use and Urban Form

ACME researchers develop theoretical models of the relationship between urban form, residential location and travel patterns to formulate empirically implementable models that

define how household travel behavior responds to changes in urban form. The underlying interest in these areas is in providing scientific investigation to evaluate mechanisms supporting livable and sustainable communities.

Dr. Concas has also managed and coordinated the economic impact evaluation of urban circulator and streetcar systems for the Office of the Secretary of Transportation. He has been a recipient of more than $1 million in grant-funded research on transportation accessibility measures and economic development and has extensive experience in performing economic impact and feasibility studies of highway, mass transit, and toll-road projects for federal, state, and local transportation authorities.

Refereed Publications

- Measuring Travel Behavior Changes to Variably Priced Carsharing Using Mobile Applications (2014), in Mobile Technologies for Activity-Travel Data Collection and Analysis (S. Rasouli, H. Timmermans Editors), pp.276-292.
- The Interaction between Urban Form, Residential Location, and Transit Travel (2014), with DeSalvo J.S., *Journal of Public Transportation*, Vol.17, pp.16-38.
- Investigating Changes in Willingness to Pay for Managed Lane Systems: Quasi-Panel Approach (2014), with Patil S., Burris M., *Transportation Research Record: Journal of the Transportation Research Board*, No 2382, pp.37-45.
- Accessibility and Housing Price Resilience: Evidence from Limited-Access Roadways (2013), *Transportation Research Record: Journal of the Transportation Research Board*, No 2357, pp.66-76.
- Variation in the Value of Travel Time and Its Impact on the Benefits of Managed Lanes (2010), with Burris M., Shaw W.D., and Patil S., *Transportation Planning and Technology*, Vol. 34, pp. 547-567.
- Impact of Carpooling on Trip-Chaining Behavior and Emission Reductions (2007), with Winters P.L., *Transportation Research Record: Journal of the Transportation Research Board*, No.2010, pp. 83-91.
- Fare Pricing Elasticity, Subsidies, and Demand for Vanpool Services (2005), with Winters P.L., *Transportation Research Record: Journal of the Transportation Research Board*, No.1924, pp. 215-224.

Selected Refereed Conference Papers and Presentations

- "Planning the Performance Evaluation and Assessment of the Tampa CV Pilot Deployment: Opportunities and Challenges." TRB 97th Annual Meeting, January 7-11, 2018.
- "Streetcar Investments and Economic Development: Evidence from Five U.S. Systems." TRB 97th Annual Meeting, January 7-11, 2018.
- "Assessing the Impact of Roadway Rehabilitation on Small Businesses." TRB 97th Annual

Meeting, January 7-11, 2018.

- "The Flood is Coming: Build an Ark for Automated and Connected Vehicle Data". Co-authored with Steve Novosad and Robert Frey ITS World Congress, Montréal, October 29 – November 2, 2017.
- "Role of Density in Supporting Sustainable Modes: New Perspective on Interaction Between Urban Form and Transit Travel." Paper presentation, Transportation Research Board 91st Annual Meeting, Washington, D.C., January 22-26, 2012.
- "The Interaction between Urban Form, Residential Location, Trip Chaining and Transit Travel." International Economics Association Kuhmo Nectar Conference, June 21-22, 2012, Berlin, Germany
- "Life-cycle Assessment of Alternative Fuels for Mass Transit Systems." ISATS2010: First International Symposium on Advances in Transport Sustainability, Arizona, November 17-19, 2010.
- "The Activity Locator: A Platform to Personalize Cost Externalities From Daily Car Trips." SIDT 2010 International Conference, Rome, June 17-18, 2010.
- "Estimating the Social Costs and Benefits of Transportation Demand Management Programs Using TRIMMS," TRB Integrated Corridor System Management Modeling-Best Practices Workshop, Irvine, CA, September 14-15, 2009.
- "Transportation Demand Management: The United States Experience." Technical Conferences on Mobility Management, Madrid, May 19-20, 2009.
- "Integrating Transit Travel Behavior and Urban Form." 12th International Conference on Travel Behavior Research, Jaipur, India, December 13-18, 2009.

Education

University of South Florida 2010
Ph.D., Economics
Fields of Concentration: Urban Economics and Applied Econometrics

University of South Florida 2000
M.A., Economics
Fields of Concentration: Economic Policy Analysis and Applied Econometrics

Universitá degli Studi di Sassari, Italy 1997
Laurea di Dottore (Doctoral Degree) in Political Sciences
Fields of Specialization: Macroeconomics and Political Economy

Jodi Godfrey, Senior Research Associate

Jodi has performed research on both transit and general transportation safety-related topics.

Education

- B.S. 2013, Civil Engineering, University of South Florida
- M.S. 2015, Civil Engineering (focus in Transportation Engineering), University of South Florida

Project Experience

- FTA Transit Safety Standards Strategic Plan – Co-Project Investigator
- FTA Transit Standards Development Program – Co-Project Investigator
- FTA Transit Standards Development and Technical Assistance Program – Co-Project Investigator
- FDOT Construction Cost Trends – Project Investigator

Publications

- Staes, L., and J. Godfrey. Characteristics and Elements of Non-Punitive Employee Safety Reporting Systems for Public Transportation. Pre-publication draft of TCRP Research Report 218. Transportation Research Board, Washington, D.C. June 2020. https://www.nap.edu/download/25852
- Staes, L., Godfrey, J., Flynn, J., Spicer, M., Saliceto, G. Yegidis, R. Transit Cooperative Research Program Synthesis 145: Current Practices in the Use of Onboard Technologies to Avoid Transit Bus Incidents and Accidents. Published February 7, 2020 DOI: 10.17226/25716
- Godfrey, J., Polzin, S., Roessler, T. Public Transit in America: Observations from the 2017 National Household Travel Survey. August 2019. https://doi.org/10.5038/CUTR-NCTR-RR-2018-08
- Godfrey, J., Saliceto, G., Yegidis, R. Role of Public Transportation in a Natural Disaster State of Emergency Declaration. Transportation Research Record: Journal of the Transportation Research Board. Published March 21, 2019 https://doi.org/10.1177/0361198119835814
- Godfrey, J., Bertini, R. Attracting and Retaining Women in the Transportation Industry. San Jose State University. Mineta Transportation Institute. February 2019. http://transweb.sjsu.edu/sites/default/files/1893-Godfrey-Attract-Retain-Women-Transportation.pdf
- Staes, L., Godfrey, J., Flynn, J., and Yegidis, R. Successful Practices and Training Initiatives to Reduce Accidents and Incidents at Transit Agencies – an abridged version of TCRP Synthesis 126. Accepted for Publication in Transportation Research Record (TRR), Journal of the Transportation Research Board; 2018.

http://www.trb.org/Publications/PubsTRRJournal.aspx

- Driscoll, R., Lehmann, K., Polzin, S., Godfrey, J. The Effect of Demographic Changes on Transit Ridership Trends. Accepted for Publication in Transportation Research Record (TRR), Journal of the Transportation Research Board; 2018. http://www.trb.org/Publications/PubsTRRJournal.aspx
- Staes, L., Godfrey, J., Flynn, J., and Yegidis, R. Successful Practices and Training Initiatives to Reduce Accidents and Incidents at Transit Agencies. Submitted for Publication as Transit Cooperative Research Program (TCRP) Synthesis 126; February 2017. http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3979
- Staes, L., Davis, J., and Godfrey, J. December 2015. *Examination of Passenger Assaults*
- *On Bus Transit Systems*. National Center for Transit Research. http://www.floridatsn.org/wp-content/uploads/2016/02/Passenger-Assaults-FINAL.pdf
- Godfrey, J. September 2015. *Risk Taking Characteristics as Explanatory Variables in Variations of Fatality Rates in the Southeastern United States*. Journal of the Institute of Transportation Engineers Volume 85 No. 9, pp. 42-47.
- Polzin, S., Chu, X., and Godfrey, J. December 2014. *The Impact of Millennials Travel Behavior on Future Personal Vehicle Travel*. Elsevier Energy Strategy Review Journal, Volume 5, pp.59-65. http://www.sciencedirect.com/science/article/pii/S2211467X14000431

Presentations

- Current Practices in the Use of Onboard Technologies to Avoid Transit Bus Incidents and Accidents. FPTA/FDOT/CUTR Safety and Operations Summit. July 2020.
- Characteristics and Elements of Non-Punitive Employee Safety Reporting Systems for Public Transportation – Final Report. FPTA/FDOT/CUTR Safety and Operations Summit. June 2020.
- Characteristics and Elements of A Successful Employee Safety Reporting Program for Public Transportation Agencies. FPTA/FDOT/CUTR Safety and Operations Summit, Tampa, Florida, June 2019.
- Attracting and Retaining Women in the Transportation Industry. FPTA/FDOT/CUTR Professional Development Workshop, Tampa, Florida, June 2019.
- Event Data Recorders for Transit Bus Application. Transportation Research Board Annual Meeting, Washington D.C., January 2019.
- Public Transit Bus Crashworthiness. Transportation Research Board Annual Meeting, Washington D.C., January 2019.
- Role of Public Transportation in a Natural Disaster State of Emergency Declaration. Transportation Research Board Annual Meeting. Washington D.C., January 2019.
- Successful Practices and Training Initiatives to Reduce Bus Accidents and Incidents at Transit Agencies – an abridged version of TCRP Synthesis 126. Transportation Research Board Annual Meeting, Washington D.C., January 2018

- FTA Safety Standards Strategic Plan: Comprehensive NTD Data Analysis and Exposure Risks Across Person Types. Transportation Research Board Annual Meeting, Task Force on Transit Safety & Security Meeting, Washington D.C., January 2018
- TCRP Synthesis 126: Successful Practices and Training Initiatives to Reduce Accidents and Incidents at Transit Agencies. Center for Urban Transportation Research Webcast, August 2017
- Strategies for Kindergarten through Grade 12 Engagement in Transportation Engineering. International Institute of Transportation Engineers Annual Meeting, Toronto, Canada, July 2017
- TCRP Synthesis 126: Successful Practices and Training Initiatives to Reduce Accidents and Incidents at Transit Agencies. National Transit Institute Webinar, July 2017
- Reducing Accidents and Incidents at Transit Agencies. Florida Section Institute of Transportation Engineers Summer Meeting, Naples Beach, Florida, June 2017
- The Art of Defusing Conflict: De-Escalation Techniques for Transit Operators, 2017 FPTA/FDOT/CUTR Professional Development Workshop, Tampa, Florida, June 2017
- TCRP Synthesis 126: Successful Practices and Training Initiatives to Reduce Bus Accidents and Incidents at Transit Agencies, 2017 FPTA/FDOT/CUTR Professional Development Workshop, Tampa, Florida, June 2017
- TCRP Synthesis 126: Successful Practices and Training Initiatives to Reduce Accidents and Incidents at Transit Agencies. APTA Bus Safety Committee Meeting, 2017 APTA Bus and Paratransit Conference, Reno, Nevada, May 2017

Selected Appointments/Positions

- Appointed Communication Officer Tampa Bay Women Transportation Seminar (WTS), August 2020
- Elected Tampa Bay Institute of Transportation Engineers Vice President, November 2019
- Appointed as member of International ITE's STEM Subcommittee, 2018
- Appointed as member of International ITE's Women in ITE Task Force, 2018
- Elected Tampa Bay Institute of Transportation Engineers Treasurer, November 2017
- Appointed as Young Member of TRB's Task Force on Transit Safety & Security, 2017
- Appointed as Secretary for TRB's Task Force on Transit Safety & Security, 2017

Vishal C. Kummetha, Postdoctoral Research Scholar

Dr. Kummetha has significant research experience in the areas of human factors and transportation safety.

Education

- Ph.D. 2020, Civil Engineering (emphasis in transportation), University of Kansas
- M.S. 2017, Civil Engineering (emphasis in transportation), University of Kansas
- B.S. 2014, Civil Engineering, University of Cape Town

Project Experience

- Project Manager: "Modeling Driver Behavior and Aggressiveness Using Biobehavioral Methods." Project funded by Mid-America Transportation Center, University of Kansas, 2017 – Present. Supervisor: Dr. Alexandra Kondyli
- Graduate Researcher: "Integration and Verification of a Low-Cost Haptic Anti-Lock Braking System in a Driving Simulator." University of Kansas, 2018 – 2019. Supervisor: Dr. Alexandra Kondyli
- Graduate Researcher: "Evaluation of Ramp Metering Effectiveness Along the I-35 Corridor in the Kansas City Metropolitan Area." Project funded through Kansas Department of Transportation, University of Kansas, 2016 – 2018. Supervisor: Dr. Alexandra Kondyli
- Project Participant: "Improving the Accuracy and Applicability of Kansas' Traffic Data." Project funded through Kansas Department of Transportation, University of Kansas, 2016 – 2017. Supervisor: Dr. Alexandra Kondyli
- Graduate Researcher: "Analysis of the Effects of Adaptive Cruise Control on Driver Behavior and Awareness Using a Driving Simulator." University of Kansas, 2016 – 2017. Supervisor: Dr. Alexandra Kondyli
- Graduate Researcher: "Improving the Traffic Safety Culture in Kansas." University of Kansas, 2015 – 2016. Supervisor: Dr. Steven Schrock
- Undergraduate Researcher: "Effects of Re-vibration on the Compressive Strength of Concrete." University of Cape Town, 2014. Supervisor: Dr. Hans Beushausen

Publications

- Kummetha, V. C., A. Kondyli, and H. Devos. "Evaluating Driver Comprehension in Various Simulated Environments by Using Performance, Total Gaze Duration, and Probe Questions." Transportation Research Part F, September 2020. (Under review)
- Kummetha, V. C., A. Kondyli, E. Chrysikou, and S. Schrock. "Safety Analysis of Work Zone Complexity with Respect to Driver Characteristics – A Simulator Study Employing Performance and Gaze Measures." Accident Analysis & Prevention, April 2020.

- Kummetha, V. C. and A. Kondyli. “Evaluating Driver Comprehension in Complex Environments by Using Total Gaze Duration and Probe Questions.” Frontiers in Psychology, February 2020. (Abstract only)
- Kondyli, A., E. G. Chrysikou, and V. C. Kummetha. “Modeling Driver Behavior and Aggressiveness Using Biobehavioral Methods – Phase II”. Mid-America Transportation Center, Report No. 25-1121-0005-153-2, January 2020.
- Kummetha, V. C., M. Johnson, T. Woodruff, Y. Li, A. Pope, A. Subirana, A. Kondyli, T. DeAgostino, and C. Depcik. “Integration and Verification of a Low-Cost Haptic Anti-Lock Braking System in a Driving Simulator.” Road Safety & Simulation, August 2019.
- Kondyli, A., E. G. Chrysikou, C. H. Ramey, and V. C. Kummetha. “Modeling Driver Behavior and Aggressiveness Using Biobehavioral Methods – Phase I”. Mid-America Transportation Center, Report No. 25-1121-0005-153-1, December 2018.
- Manjunatha, P., V. C. Kummetha, A. Kondyli, and L. Elefteriadou. “Validating the Task-Capability Extension to the Intelligent Driver Model (IDM) Using Driving Simulator Data.” Transportation Research Board 98th Annual Meeting, November 2018.
- Kummetha, V. C., A. Kondyli, and S. Schrock. “Analysis of the Effects of Adaptive Cruise Control on Driver Behavior and Awareness Using a Driving Simulator.” Journal of Transportation Safety and Security, November 2017.
- Schrock, D. S., A. Bruner, V. C. Kummetha, T. Shrider, and E. J. Fitzsimmons. “Improving the Traffic Safety Culture in Kansas.” Kansas Department of Transportation, Report No. K-TRAN: KU-15-2, January 2017.

Presentations

- Khan, I. R., V. C. Kummetha, A. Kondyli, and S. Schrock. “Effectiveness of Non-traffic Related Messages on Dynamic Message Signs.” Transportation Research Board 100th Annual Meeting, October 2020.
- Kondyli, A. and V. C. Kummetha. “Modeling Driver Behavior and Aggressiveness Using Biobehavioral Methods.” University Transportation Centers (UTC), Webinar, September 2020.
- Kummetha, V. C. “Incorporating Biobehavioral Architecture into Car-Following Models Using Techniques with Potential Real-World Applications.” The University of Florida Transportation Institute, Gainesville, Florida, March 2020.
- Kummetha, V. C., A. Kondyli, E. Chrysikou, and S. Schrock. “Incorporating Biobehavioral Architecture into Car-Following Models.” Roadway Safety & Simulation conference at the Graduate Hotel, Iowa City, Iowa, October 2019.
- Kummetha, V. C., M. Johnson, T. Woodruff, Y. Li, A. Pope, A. Subirana, A. Kondyli, T. DeAgostino, and C. Depcik. “Integration and Verification of a Low-Cost Haptic Anti-Lock Braking System in a Driving Simulator.” Roadway Safety & Simulation conference at the Graduate Hotel, Iowa City, Iowa, October 2019.
- Kummetha, V. C. “Effects of Adaptive Cruise Control on Driver Behavior: A Simulator-

Based Study." 12th Annual Engineering Research Showcase: Graduate Engineering Association (GEA) and the University of Kansas School of Engineering Research and Graduate Program, Lawrence, Kansas, March 2019.

- Manjunatha, P., V. C. Kummetha, A. Kondyli, and L. Elefteriadou. "Validating the Task-Capability Extension to the Intelligent Driver Model (IDM) Using Driving Simulator Data." Transportation Research Board 98th Annual Meeting, Washington, DC, January 2019.
- Kummetha, V. C. "Analysis of the Effects of Adaptive Cruise Control on Driver Behavior and Awareness Using a Driving Simulator." Kansas City of Transportation Engineers (KCITE), Lawrence, Kansas, September 2017.

Selected Appointments/Positions

- Peer-reviewer for the Transportation Research Record, August 2020
- Peer-reviewer for the Accident, Analysis, & Prevention Journal, May 2020
- President, University of Kansas Institute of Transportation Engineers, May 2018–May 2019
- Social chair, University of Kansas Institute of Transportation Engineers, May 2016–May 2017
- Member, Institute of Transportation Engineers, August 2015
- Member, South African Institution of Civil Engineers, November 2013–November 2014

Mohsen Kamrani, Postdoctoral Research Scholar

Experienced in the areas of connected vehicles safety, data analytics, transportation safety and driving behavior

Education

- University of Tennessee, Knoxville - Ph.D. in Civil Engineering (Transportation)
- University of Tennessee, Knoxville - M. Sc. in Statistics
- Universiti Teknologi Malaysia - M. Eng. in Industrial Engineering
- Mazandaran University of Sci. & Tech.- B. Sc. in Industrial Engineering

Project Experience

- Proactive Congestion Management, National Institute for Congestion Reduction, 2020, Role: Co-PI
- Development of a Real-Time Roadway Debris Hazard Spotting Tool Using Connected Vehicle Data to Enhance Roadway Safety and System Efficiency, Center for Transportation Equity, Decisions and Dollars, 2019, Grant # CTEDD 018-06, Role: Research Scholar
- Tampa Connected Vehicles Pilot, 2018 – present, Role: Research Scholar
- Study of Driving Volatility in Connected and Cooperative Vehicle Systems, National Science Foundation (NSF) Grant # 1538139, 2016 – 2018, Role: Research Assistant
- Connected and Automated Vehicles: What are the implications of partial adoption? Southeastern Transportation Center O&E Grant, 2016 – 2018, Role: Research Assistant

Publications

- **Kamrani, Mohsen**, Aravinda Ramakrishnan Srinivasan, Subhadeep Chakraborty, and Asad J. Khattak. "Applying Markov decision process to understand driving decisions using basic safety messages data." Transportation Research Part C: Emerging Technologies 115 (2020): 102642.
- **Kamrani, Mohsen**, Behram Wali and Asad J Khattak. "Can Data Generated by Connected Vehicles Enhance Safety? Proactive Approach to Intersection Safety Management." Transportation Research Record: Journal of the Transportation Research Board, no. 2659 (2017): 80-90.
- **Kamrani, Mohsen**, S. M. Hashemi .E. A. and S. Rahimpour. G. “Traffic Simulation of two Adjacent Unsignalized T-Junctions During Rush Hours Using Arena Software.” Simulation Modelling Practice and Theory, December 2014.
- **Kamrani, Mohsen**, Ramin Arvin, and Asad J. Khattak. "Extracting useful information from Basic Safety Message Data: an empirical study of driving volatility measures and crash frequency at intersections." Transportation Research Record (2018): 0361198118773869.
- Arvin, Ramin, **Mohsen Kamrani**, and Asad J. Khattak. "How instantaneous driving

behavior contributes to crashes at intersections: extracting useful information from connected vehicle message data." Accident Analysis & Prevention 127 (2019): 118-133.

- Arvin, Ramin, **Mohsen Kamrani**, and Asad J. Khattak. "The role of pre-crash driving instability in contributing to crash intensity using naturalistic driving data." Accident Analysis & Prevention 132 (2019): 105226.
- Arvin, Ramin, Asad J. Khattak**, Mohsen Kamrani**, and Jackeline Rio-Torres. "Safety evaluation of connected and automated vehicles in mixed traffic with conventional vehicles at intersections." Journal of Intelligent Transportation Systems (2020): 1-18.
- Behram Wali, Asad J. Khattak, Hamparsum Bozdogan and **Mohsen Kamrani**. "How is driving volatility related to intersection safety? A Bayesian heterogeneity-based analysis of instrumented vehicles data." Transportation Research Part C: Emerging Technologies 92 (2018): 504-524.
- **Kamrani, Mohsen**, Ramin Arvin, Asad J Khattak. "The Role of Aggressive Driving and Speeding in Road Safety: Insight from SHRP2 Naturalistic Driving Study Data." Transportation Research Board 98th Annual Meeting 2019.
- Ramin Arvin, **Mohsen Kamrani**, Asad J Khattak. "Instantaneous Driving Behavior at Intersections: Insights on Rear-end and Head-on Crash Frequencies Using Connected Vehicle Data." Transportation Research Board 98th Annual Meeting 2019.
- Mohammad Hoque, **Mohsen Kamrani**, Clayton Davis, Asad J Khattak. "Real-time Alerting of Hazardous Driving Behavior Using Internet of Things (IOT) and Connected Vehicles." Transportation Research Board 98th Annual Meeting 2019.
- Sevin Mohammadi, **Mohsen Kamrani**, Asad J Khattak. "Social Influence on Driver Decisions Using Modeling and Gossip Algorithm." Transportation Research Board 98th Annual Meeting 2019.
- Kamrani, Mohsen, Asad J Khattak and Tenglong Li. "A Framework to Process and Analyze Driver, Vehicle and Road Infrastructure Volatilities in Real-Time." Transportation Research Board 97th Annual Meeting 2018.
- **Kamrani, Mohsen**, Ramin Arvin and Asad J Khattak. "Analyzing Highly Volatile Driving Trips Taken by Alternative Fuel Vehicles." Transportation Research Board 97th Annual Meeting 2018.
- Ramin Arvin, **Mohsen Kamrani**, Asad J Khattak and Jackeline Rios-Torres. "Safety Impacts of Automated Vehicles in Mixed Traffic." Transportation Research Board 97th Annual Meeting 2018.
- **Kamrani, Mohsen**, S. Shariatmadari, R. Hassanzadeh A., N. Mohd. Yusof and J. Mohd. Rohani. "Improving customer waiting time by using Six Sigma methodology." Delivered at the Fourth International Conference on Engineering, Science and Humanities (IGCESH 2013), N24 Hall, Universiti Teknologi Malaysia, April 17, 2013.

Honors and Awards

- ITS Tennessee Scholarship 2018 1st Place Award by Tennessee Chapter Intelligent Transportation Society of America, topic "Connected Vehicles: Public Sector Regulation vs. Private Sector Innovation."
- 2017 Outstanding Paper Award TRB Safety Data, Analysis and Evaluation Committee (ANB20) for the paper "Can Data Generated by Connected Vehicles Enhance Safety? Proactive Approach to Intersection Safety Management."
- ITS Tennessee Scholarship 2017 1st Place Award by Tennessee Chapter Intelligent Transportation Society of America, topic "The Future of Autonomous Vehicles in Tennessee."
- Best Student Award of Industrial Engineering 2014 recognizing excellent academic achievement

Appointments and Positions

- Postdoctoral Scholar - Center for Urban Transportation Research, 12.2018 – present
- Adjunct Instructor - University of South Florida, College of Engineering, 03.2019 – 12.2020
- Graduate Research/Teaching Assistant - University of Tennessee, Knoxville, 01.2015 – 12.2018
- Graduate Teaching Assistant - Oregon State University, 08.2014 – 12.2014
- Internal Manager - Tala Roshd Nami Co., 01.2011 – 08.2012
- Vice-manager and Supervisor - After Sale Service Dep., Faragaman Sanat & Tejarat Co., 06.2009 – 12.2010

Professional Development and Certifications

- Introduction to Machine Learning for Data Science, License: r8-vQgi-TlqdfSNRg4U1ww (2020)
- SQL for Data Science, Coursera License: SQDZQSHEDL4Y (2019)
- Bayesian Statistics: From Concept to Data Analysis, Coursera License: CNUPCEE7LZD3 (2018)
- Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization, Coursera License: 6EJWL2GZPTFB (2017)
- Structuring Machine Learning Projects, Coursera License: ZGFCJYGMQKQK (2017)
- Neural Networks and Deep Learning, Coursera License: 3L5E6YXFZFBB (2017)
- 2-day Problem Solving Workshop for Personal Development By Dr. Friedhelm Pohl (2013)
- 1-day Specialized Workshop of After Sale Service Management By Professor Fariborz Partoee (2009)