



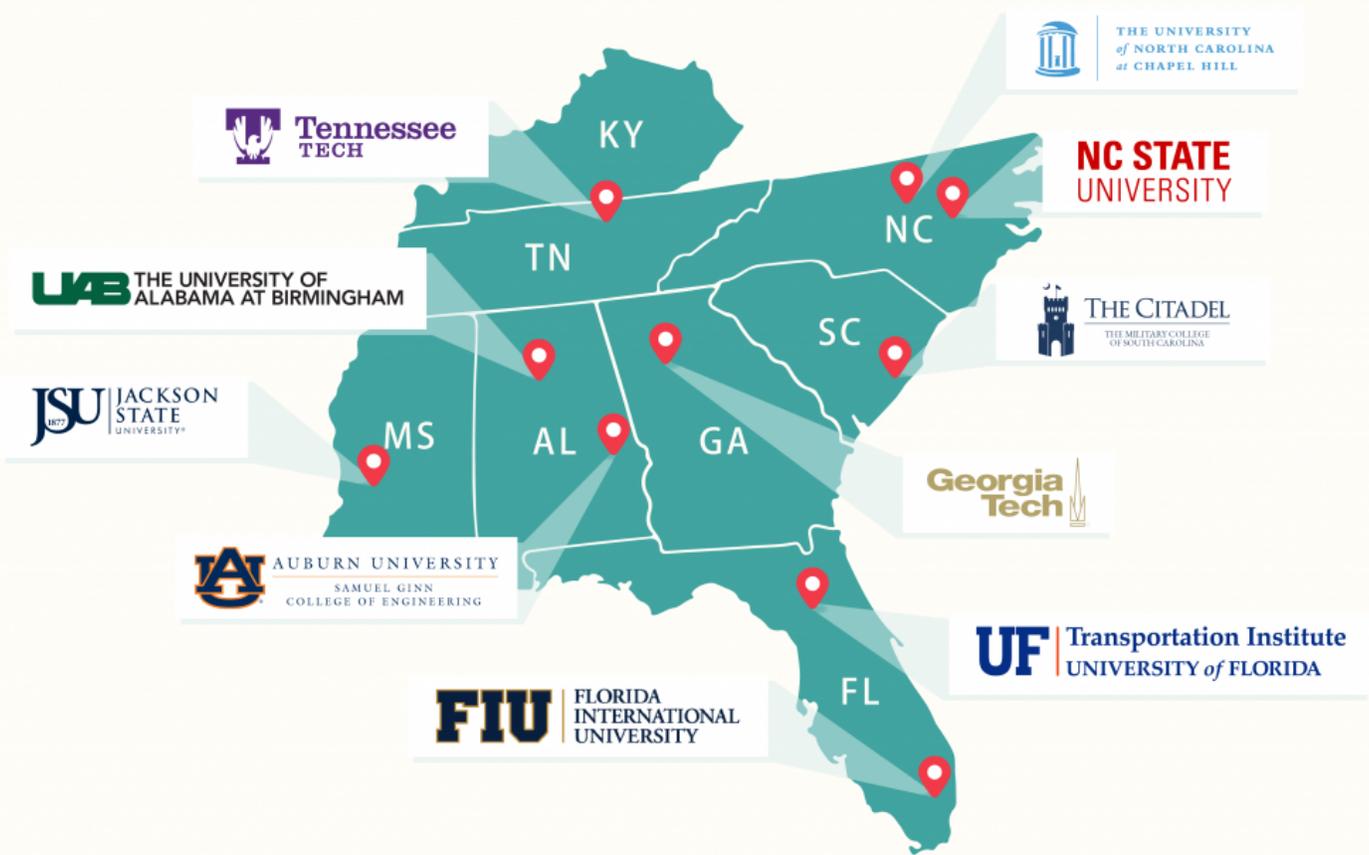
STRIDE PRODUCTS SHOWCASE

Program Booklet

November 16, 17, 18, 2021



STRIDE Partners



The STRIDE Center is the 2016 USDOT Region 4 (Southeast) University Transportation Center (UTC) housed at the University of Florida Transportation Institute (UFTI).

Our mission is to develop novel strategies for Reducing Congestion. The Center has nine partners, representing seven states in the Southeastern U.S. The UFTI and its partners in the STRIDE Center are recognized leaders at state, regional, national, and international levels.

The STRIDE Center is focused on assembling and integrating research projects throughout the region in a way that maximizes contributions to solving current and future transportation problems as well as strengthening expertise and developing new technologies.

EVENT PROGRAM

Day 1 – Transit & Mobility Options

November 16, 2021, 12 PM to 2 PM, ET (virtual)

Moderator: Noreen McDonald, Ph.D., UNC Chapel Hill

Panelists: Malisa Mccreeedy, City of Gainesville; Mathew Palmer, NC Public Schools; Xiang 'Jacob' Yan, Ph.D., UF

Opening Remarks: Lily Elefteriadou, Ph.D., UF

Presentations of STRIDE Products (Q&A will follow each presentation)

- Kai Monast, MRP, NCSU/ITRE, Product: Web Mapping Tool for Bus Delays
- Xilei Zhao, Ph.D., UF, Product: Machine Learning Methodology for Micromobility Travel Demand Forecasting and SERMO Lab's Micromobility Analytics Platform
- Justin Mason, Ph.D., UF, Product: Autonomous Vehicle User Perception Survey (AVUPS)
- Lili Du, Ph.D., UF, Product: Data-driven Approach for First/Last Mile Gaps and Hybrid Transit Services
- Virginia Sisiopiku, Ph.D., UAB Birmingham, Product: Questionnaire on Transportation User Behavior

Panel Discussion



EVENT PROGRAM

Day 2 – Advanced Strategies & Technologies for Congestion Mitigation

November 17, 2021, 12 PM to 2 PM, ET (virtual)

Moderator: Michael Hunter, Ph.D., GaTech

Panelists: Joseph Hummer, Ph.D., NCDOT and Maria Roell, MCRP, M.S., Atlanta Regional Commission

Opening Remarks: Lily Elefteriadou, Ph.D., UF

Presentations of STRIDE Products (Q&A will follow each presentation)

- Nasim Uddin, Ph.D., UAB Birmingham, Product: Real-Time Vehicle Location Model
- Nagui Roupail, Ph.D., NCSU/ITRE, Product 1) Method for Extracting High Resolution Video Data; Product 2: New Capacity Analysis Method for Ramp Weave Segments and Computational Engine to Exercise the Method
- Pruthvi Manjunatha, Ph.D., UF, Product: Simulation Extension with CAV Functionality for VISSIM
- Angshuman Guin, Ph.D., GaTech, Product: Framework for using Google Location History Data for Route Choice and Network Analysis
- Mohammed Hadi, Ph.D., FIU, Product 1) Framework and Methods to use CV Data for Estimating Performance Measurements; Product 2) Methods to use Data to Manage Traffic
- Lily Elefteriadou, Ph.D., UF, Product: Guidelines for Modeling Connected and Autonomous Vehicles

Panel Discussion



EVENT PROGRAM

Day 3 – Equity in Transportation

November 18, 2021, 12 PM to 2 PM, ET (virtual)

Moderator: Lily Elefteriadou, Ph.D., UF

Panelists: Virginia Whittington, MetroPlan Orlando; Alison Stettner, FDOT

Opening Remarks: Lily Elefteriadou, Ph.D., UF

Presentations of STRIDE Products (Q&A will follow each presentation)

- Siva Srinivasan, Ph.D., UF, Product: Community Based Participatory Research (CBPR): Application for Transportation Planning
- Mehri Mohebbi, Ph.D., UF, Product: Transportation Equity Course
- Ruth Steiner, Ph.D., UF, Product: Transit Accessibility Tool
- Noreen McDonald, Ph.D., UNC Chapel Hill, Product: Taxonomy of Shared Mobility Options for Healthcare
- Ishtiaq Ahmed, Ph.D., NCSU/ITRE, Product: Microsimulation Models of Continuous Flow Intersections for Ped-Bike Crossings
- Eleni Bardaka, Ph.D., NCSU/ITRE, Product: Accessibility Methodology

Panel Discussion



SPEAKER BIOGRAPHIES



2021 STRIDE Products Showcase – Day 1



Day 1: Transit & Mobility Options November 16th, 12 PM to 2 PM, ET (virtual)

Noreen McDonald, Ph.D., University of North Carolina at Chapel Hill

(Moderator)

Noreen McDonald, Ph.D., specializes in how infrastructure investments and technology changes influence travel and the downstream impacts on road safety, public health, energy demand and city form. She is an internationally recognized expert on the travel behavior of youth and young adults. Her work on children's travel has shown that improved pedestrian and bicycle facilities can increase travel by foot. She has assessed the causes of declines in driving in the US and UK and looked at how transportation planning practice can respond to recent behavioral shifts and those anticipated due to changing technology. Her most recent work explores disruptions associated with shared mobility, e.g., Uber/Lyft, and autonomous vehicles. Some of the projects Dr. McDonald is currently working on include: quantifying the impacts of shared mobility on non-emergency medical transport, considering the role of planning with the advent of autonomous vehicles, exploring how autonomous vehicles will impact vulnerable road users, measuring how recent changes to planning for new development have influenced practice, analyzing the travel of young adults, i.e., the millennial generation, to understand the potential transport and energy impacts, and assessing the multi-modal costs of school transportation.



Malisa McCreedy, MPA, Director of Transportation & Mobility, City of Gainesville, FL

(Panelist)

Malisa McCreedy, AICP, is currently the Director of Transportation and Mobility for the City of Gainesville, Florida and leads a team that includes the Regional Transit System (RTS), Traffic Signals Management and Operation, Transportation Planning, Autonomous Vehicle Shuttle program, Parking Operations, and Fleet Management; as well as the partnership with the University of Florida to research emerging mobility for CV-AV and ITS technology. Ms. McCreedy holds advanced degrees in Public Administration and Public Health, as well as professional certifications in planning, parking and management. In addition to serving on numerous boards, prior positions held in local government were with the cities of Portland, Oregon, Charlotte, North Carolina and Orlando, Florida.



2021 STRIDE Products Showcase – Day 1



Mathew Palmer, MURP, Executive Director for Planning, Design, & Construction, North Carolina Public Schools, Durham

(Panelist)

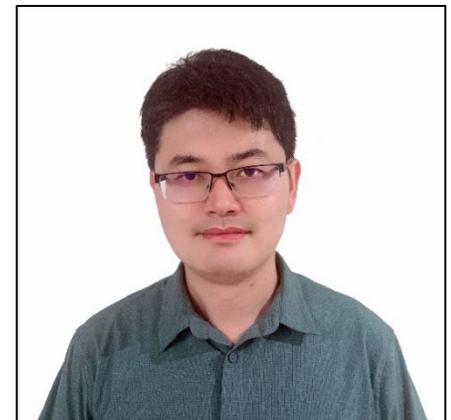
Mathew Palmer serves as the Executive Director for School Planning, Design & Construction for Durham Public Schools. He is concurrently a Doctoral Candidate in City and Regional Planning at UNC-Chapel Hill, and his dissertation is, Planning for Cities and Schools in the American South. He has a Bachelor of Arts from University of Michigan (Ann Arbor) and a Master of Urban and Regional Planning from UCLA. Through his position with DPS, Palmer leads the Plan-Design-Build process for DPS. Planning at DPS includes student enrollment growth projections (demographics), facility design and planning, long-range planning, and real estate portfolio direction. Overall, his team approaches their work in the built environment with emphasis on enhancing equity opportunities and operational efficiency. Palmer's background is in placemaking through a land use and transportation lens, with a focus on the design and function of school and transportation systems. During his career he has focused on the Safe Routes to School Program (students walking and biking to school), neighborhood connectivity to schools, and the development of strategic partnerships between public institutions and private stakeholders.



Xiang 'Jacob' Yan, Ph.D., University of Florida

(Panelist)

Xiang 'Jacob' Yan, Ph.D., is a Research Assistant Professor in Civil Engineering at the University of Florida. His work focuses on using data science and machine learning (including AI) to make transportation more equitable, sustainable, and accessible. With a diverse educational background and extensive experiences in multidisciplinary collaborations, he brings a transdisciplinary perspective to urban science (especially transportation research) that connects technological innovations with community needs. His recent projects aim to develop and evaluate strategies and policies to facilitate the integration between public transit and shared mobility such as shared e-scooters. Dr. Yan has received prestigious awards from national and international organizations such as the American Planning Association and the World Society for Transport and Land Use Research.



2021 STRIDE Products Showcase – Day 1



Kai Monast, MRP, North Carolina State University/ITRE *(STRIDE Researcher/Speaker)*

Kai Monast is the Director of the Public Transportation Group at the Institute for Transportation Research and Education at North Carolina State University and a doctoral student in City and Regional Planning at the University of North Carolina, Chapel Hill. He has 15 years of experience working closely with rural and urban public transportation providers and the North Carolina Department of Transportation (NCDOT). He leads a team that provides technical assistance, planning, and training to transit providers while also advising on transit policy at the state-level. His research interests include public transportation, performance management programs, polycentric governance systems, collective action, and social justice.



Xilei Zhao, Ph.D., University of Florida *(STRIDE Researcher/Speaker)*

Xilei Zhao, Ph.D., is an Assistant Professor in the Department of Civil and Coastal Engineering at the University of Florida. Dr. Zhao received her B.E. in Civil Engineering from Southeast University, China, in 2013, her MSEs in Civil Engineering and Applied Mathematics and Statistics from Johns Hopkins University (JHU) in 2016 and 2017, respectively, and her Ph.D. in Civil Engineering from JHU in 2017. She was a Research Fellow in the Department of Industrial and Operations Engineering at the University of Michigan from 2017 to 2018, and a Postdoctoral Fellow in the School of Industrial and Systems Engineering at Georgia Tech from 2018 to 2019. She specializes in applying data science (especially data analytics, machine learning, and simulation), complex systems modeling, and risk assessment to tackle challenging problems in transportation and resilience.



2021 STRIDE Products Showcase – Day 1



Justin Mason, Ph.D., University of Florida (STRIDE Researcher/Speaker)

Justin Mason, Ph.D., is a Research Assistant Professor in the Department of Occupational Therapy at the University of Florida (UF) and Lab Director of the Institute for Mobility, Activity, and Participation (I-MAP). He completed his master's and doctoral degrees in Exercise Physiology from Florida State University and postdoctoral training in Rehabilitation Science at UF. Since joining UF, Dr. Mason has worked on six projects investigating road user interactions with automated vehicle systems. His main interests lie in studying the interactions between older drivers and automated vehicles, using a variety of methods such as experimental studies, questionnaire data, and focus groups. In particular, his research focuses on understanding how technology can mitigate age-related physical and cognitive decline in older adults to support aging in place.



Lili Du, Ph.D., University of Florida (STRIDE Researcher/Speaker)

Lili Du, Ph.D., is an Associate Professor in the Department of Civil and Coastal Engineering at the University of Florida. Her current research integrates optimization, network modeling, control, machine learning and data analytics approaches into transportation system analysis with the main focuses on AV/CV/CAV impacts, electrical vehicles, mobility on demand, network resilience, and traffic flow analysis. Her research has been well funded by NSF, STRIDE UTC, and Toyota InfoTechnology Center. Dr. Du is a recipient of the NSF CAREER award in 2016. She is the active chair of TRB subcommittee on Emerging Technologies in Network Modeling and ASCE-T&DI Committee on Artificial Intelligence in transportation.



2021 STRIDE Products Showcase – Day 1



Virginia Sisiopiku, Ph.D., University of Alabama at Birmingham

Virginia P. Sisiopiku, Ph.D., is a Professor specializing in transportation engineering. She is the founding director of the UAB TREND Lab and has more than 25 years of professional experience in the transportation field as an academic and a consulting transportation engineer. Sisiopiku studies transportation-related challenges such as congestion management, traffic safety, and performance monitoring and proposes effective strategies to address them. She utilizes traffic flow theories, simulation tools, and transportation data analytics to analyze the performance of transportation systems under present and alternative configurations. In addition to research and scholarship, Sisiopiku is dedicated to teaching undergraduate and graduate courses in transportation, advising graduate students, and mentoring postdoc fellows and junior faculty members.



2021 STRIDE Products Showcase – Day 2



Day 2: Advanced Strategies & Technologies for Congestion Mitigation November 17th, 12 PM to 2 PM, ET (virtual)

Michael Hunter, Ph.D., Georgia Institute of Technology (Moderator)

Dr. Hunter is an Associate Professor at the School of Civil and Environmental Engineering at Georgia Institute of Technology. His primary teaching and research interests are in transportation operations and design, specializing in adaptive signal control, traffic simulation, freeway geometric design, and arterial corridor operations. Dr. Hunter obtained his B.S. in Civil Engineering from Rensselaer Polytechnic University (1992), his M.S. in Civil Engineering from the University of Texas at Austin (1994), and his Ph.D. in Civil Engineering from the University of Texas at Austin (2003). After obtaining his M.S. he worked as a transportation engineer for several years at the Sear-Brown Group in Rochester, NY. He has conducted numerous traffic impact studies, signal timing projects, freeway operation evaluations, and toll plaza analyses.



Joseph Hummer, PE, Ph.D., North Carolina Department of Transportation (Panelist)

Joseph E. Hummer, Ph.D., PE, is the State Traffic Management Engineer with the North Carolina DOT (NCDOT) Mobility and Safety Division. He specializes in alternative intersection and interchange designs. He began researching the designs in 1990, has published numerous articles about them, has invented several new designs. Joe spent most of his career as a Professor at North Carolina State University before serving as Chair of Civil Engineering at Wayne State. He returned to North Carolina and joined the NCDOT in 2016 to work on the implementation of new ideas.



2021 STRIDE Products Showcase – Day 2



Maria Roell, MCRP, MS, Atlanta Regional Commission

(Panelist)

Maria Roell is a Principle Planner at the Atlanta Regional Commission (ARC) in the Transportation Group. Maria started at ARC as an intern and has been there for 8 years. Currently, her work focuses on operations planning, transportation technology, and transportation equity. Maria holds a Master of City and Regional Planning and a Master of Science in Civil Engineering from Georgia Institute of Technology.



Nasim Uddin, Ph.D., University of Alabama at Birmingham

(STRIDE Researcher/Speaker)

Nasim Uddin, Ph.D., PE, F.ASCE, is a Professor and the Graduate Program Director in the Department of Civil, Construction, and Environmental Engineering at the University of Alabama at Birmingham. Dr. Uddin's research program focuses on fly-by sensing and monitoring of built infrastructures using UAVs and robotics, natural hazard analyses and disaster risk management. He received his Ph.D. degrees in civil engineering from State University of New York (SUNY) at Buffalo, and current NSF projects include Mobile Automated Rovers Fly-By (MARS-FLY) for Bridge Network Resiliency (NSF-CNS-1645863); High Data Density Short Range Wireless Telemetry for Next Generation IoT Applications (NSF-CSR- 1813949), Aerodynamic Intelligent Morphing System (A-IMS) for Autonomous Truck Safety and Productivity in Severe Environments (NSF-S&AS-1849264); Fly-By Image Processing for Real Time Congestion Mitigation (USDOT STRIDE 2018-046).



2021 STRIDE Products Showcase – Day 2



Nagui Roupail, Ph.D., North Carolina State University/ITRE (STRIDE Researcher/Speaker)

Nagui M. Roupail, Ph.D., served as Director of the Institute for Transportation Research and Education (ITRE) at North Carolina State University, a post he held from 2001-2016. Roupail also holds the rank of *Distinguished University Professor* in the Department of Civil, Construction, and Environmental Engineering (CCEE) at North Carolina State University, where he served from 1994-2020. He published over 200 refereed journal articles, of which he received 10 best paper awards from TRB, ASCE and ITE (Google citations: 8,141; H Index: 47). Funding for Dr. Roupail research has been awarded from NSF, NCHRP, SHRP-2, FHWA, EPA, NIH, STRIDE at the University of Florida, Maryland National Transportation Center, The Health Effects Institute, ARPA-E @ DOE and the Illinois and North Carolina Departments of Transportation. Roupail previously served as a member of the TRB Highway Capacity and Quality of Service (HCQS) and Chaired the Uninterrupted Flow Group. He was a major research contributor and co-author of several chapters in the HCM 2000, 2010 and the 2016 major updates. Roupail served as Associate Editor for Transportation Science, Transportation Research Part B, Methodological, and the Journal of Intelligent Transportation Systems. He was involved in several international collaborative initiatives.



Pruthvi Manjunatha, Ph.D., University of Florida (STRIDE Researcher/Speaker)

Pruthvi Manjunatha, Ph.D. has 8 years of experience in transportation engineering, which includes teaching, research and working in the industry. His experience has been in Connected and Autonomous Vehicle (CAV) infrastructure, Human Factors and Driver Behavior, Traffic Simulation, Intelligent of Technology. Transportation in the planning and implementation of I-STREET projects. He works with project PIs and industry partners to coordinate software, hardware and application efforts and ensures consistency and interoperability of various components. He develops proposals and works on grants related to the tested development. He also writes project reports, journal articles, and manages data Dr. Pruthvi Manjunatha collection and data analysis efforts.



2021 STRIDE Products Showcase – Day 2



Lily Elefteriadou, Ph.D., University of Florida

(STRIDE Researcher/Speaker)

Lily Elefteriadou, Ph.D., is the Director of the UF Transportation Institute (UFTI), and the Barbara Goldsby Professor of Civil Engineering at the University of Florida. Her research focus is traffic operations, traffic flow theory and simulation. She is the principal investigator of the US DOT-funded Regional University Transportation Center for Region 4 (Southeast Transportation Research Innovation Development and Education, or STRIDE), which focuses on reducing congestion, and addresses research, education, tech transfer, and workforce development for transportation. Dr. Elefteriadou has served as the principal investigator for several other federal and state projects, funded by the National Cooperative Highway Research Program (NCHRP), the National Science Foundation (NSF), the Federal Highway Administration, PennDOT, and FDOT. She has authored or co-authored more than two hundred publications and reports related to traffic operational quality and highway design, as well as a textbook titled "Introduction to Traffic Flow Theory". She serves on the Editorial Board of the Transportation Research: Part B and is a former Chair of the Transportation Research Board's Highway Capacity and Quality of Service Committee. She is also a past President of the Executive Board of the Council of University Transportation Centers (CUTC).



Angshuman Guin, Ph.D., Georgia Institute of Technology

(STRIDE Researcher/Speaker)

Angshuman Guin, Ph.D., is a Senior Research Engineer in the School of Civil and Environmental Engineering at Georgia Tech. Dr. Guin's current research involves traffic operations, traffic simulation and connected and autonomous vehicles, especially the aspects of driver behavior and changes in traffic characteristics during the transition of the vehicle fleet from a zero automation and connectivity state to a fully connected and automated vehicle fleet.

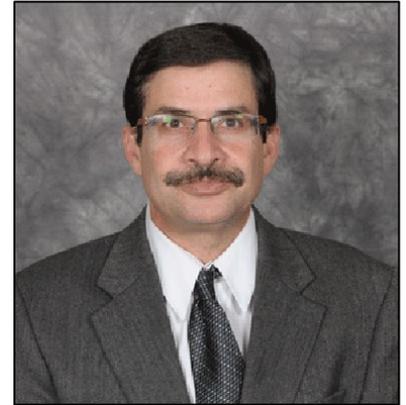


2021 STRIDE Products Showcase – Day 2



Mohammed Hadi, Ph.D., Florida International University *(STRIDE Researcher/Speaker)*

Mohammed Hadi, Ph.D., PE, is a Professor at FIU. His experience covers a wide variety of transportation engineering areas with emphasis on transportation system management and operations, Intelligent Transportation Systems (ITS), simulation and DTA, data analytics, performance measurements, planning for operations, and connected vehicles. Dr. Hadi is the chair of the TRB joint simulation subcommittee and a member and the research coordinator of the TRB Traffic Flow Theory and Characteristics Committee. He is a past member of the TRB Highway Capacity and Quality of Service Committee and the TRB ITS committee. He is a member of ITS Florida Board of Director.



2021 STRIDE Products Showcase – Day 3



Day 3: Equity in Transportation November 18th, 12 PM to 2 PM, ET (virtual)

Lily Elefteriadou, Ph.D., University of Florida (Moderator)

Lily Elefteriadou, Ph.D., is the Director of the UF Transportation Institute (UFTI), and the Barbara Goldsby Professor of Civil Engineering at the University of Florida. Her research focus is traffic operations, traffic flow theory and simulation. She is the principal investigator of the US DOT-funded Regional University Transportation Center for Region 4 (Southeast Transportation Research Innovation Development and Education, or STRIDE), which focuses on reducing congestion, and addresses research, education, tech transfer, and workforce development for transportation. Dr. Elefteriadou has served as the principal investigator for several other federal and state projects, funded by the National Cooperative Highway Research Program (NCHRP), the National Science Foundation (NSF), the Federal Highway Administration, PennDOT, and FDOT. She has authored or co-authored more than two hundred publications and reports related to traffic operational quality and highway design, as well as a textbook titled “Introduction to Traffic Flow Theory”. She serves on the Editorial Board of the Transportation Research: Part B and is a former Chair of the Transportation Research Board’s Highway Capacity and Quality of Service Committee. She is also a past President of the Executive Board of the Council of University Transportation Centers (CUTC).



Virginia L. Whittington, MPA, Director of Regional Partnerships MetroPlan Orlando, FL (Panelist)

Virginia L. Whittington, MPA, is the Director of Regional Partnerships for MetroPlan Orlando, the regional transportation planning agency for Orange, Seminole and Osceola Counties. Virginia is responsible for government relations, regional partnerships, and oversight of all aspects of the organization’s communications and marketing, community outreach and public involvement. She serves as the staff liaison to several advisory committees including the Transportation Disadvantaged Local Coordinating Board and Central Florida MPO Alliance. Prior to joining the MetroPlan Orlando team, Virginia worked for Orange County Government in the Office of Management and Budget. A transplanted native of Central Florida, Virginia received both, her undergraduate and graduate degrees, from the University of Central Florida, School of Public Administration. Virginia is an alumna of Leadership Orlando Class 45, Class Chair of Leadership Orlando Class 79, and a graduate of the Orlando Business Force Political Leadership Institute. She has served in many leadership roles with WTS Central Florida, including Membership Chair, Programs Co-Chair, Secretary, Vice-President, and President. While Chapter President, Virginia represented WTS Central Florida on the WTS International Membership Committee and Southeast Regional Council. Also, a graduate of the WTS International Executive Leadership Program, Virginia was recently appointed to serve on the National Association of Regional Councils Diversity and Equity Officers Working Group.



2021 STRIDE Products Showcase – Day 3



Alison Stettner, MURP, Director of the Office of Policy Planning Florida Department of Transportation (FDOT)

(Panelist)

Alison Stettner, AICP, serves as the Director of the Office of Policy Planning. She has worked for the Florida Department of Transportation for the past 5 years serving both at District 5 as the District Planning & Environmental Management Administrator and at Florida's Turnpike as the Planning Manager. She has more than 20 years of experience in transportation planning and growth management. Prior to her work at FDOT, she was the Development Services Director at Orange City, the Planning and Development Manager at Seminole County, and a transportation planner for both PBS&J and Orange County. She received her Bachelor of Science from Michigan State University in Environmental Science and Management and a Master's in Urban and Regional Planning from the University of Florida.



Eleni Bardaka, Ph.D., North Carolina State University

(STRIDE Researcher/Speaker)

Eleni Bardaka, Ph.D., is an Assistant Professor in the Department of Civil, Construction, and Environmental Engineering at North Carolina State University. Her work focuses on the social and economic impacts of transportation investments and policies. Dr. Bardaka holds a Ph.D. and M.S. degree in Transportation Engineering and a master's degree in economics from Purdue University. She earned a five-year diploma in Civil Engineering at the National Technical University of Athens in Greece.



Mehri Mohebbi, Ph.D., University of Florida

(STRIDE Researcher/Speaker)

Mehri "Mehrsa" Mohebbi holds, Ph.D., is the UFTI's lead the Equity in Transportation Initiative. She holds Ph.D. Urban and Regional Planning from the University of Cincinnati, College of Design, Architecture, Arts, and Planning (DAAP). Dr. Mohebbi has over 12 years of professional and academic experience focusing on equity issues in urban and regional planning in the United States and overseas. As of May 2020,-- she has been serving on the steering committee of a nationwide health equity initiative, the Planning for Health Equity, Advocacy, and Leadership (PHEAL). Additionally, Dr. Mohebbi has extensive experience in designing and leading equitable planning processes and developing online and in-person community engagement methods.



2021 STRIDE Products Showcase – Day 3



Siva Srinivasan, Ph.D., University of Florida

(STRIDE Researcher/Speaker)

Siva Srinivasan, Ph.D., is an Associate Professor in the Department of Civil & Coastal Engineering with an affiliate appointment in the Department of Urban and Regional Planning. His research expertise is in the areas of travel demand forecasting, transportation safety, and transportation analytics. He was the former chair of the TRB committee on Effects of Information and Communication Technologies on Travel Choices and is a current member of the editorial advisory board of the journal Transportation Research Part B.



Ruth Steiner, Ph.D., University of Florida

(STRIDE Researcher/Speaker)

Ruth L. Steiner, Ph.D., is a professor and director of the Center for Health and the Built Environment in the Department of Urban and Regional Planning and an affiliate faculty in the School of Natural Resources and Environment (SNRE) and the Transportation Institute (UFTI) at the University of Florida. Her research focuses on the coordination of transportation and land use, with a particular focus on planning for all modes of transportation, especially walking, bicycling, and transit, and its impact on communities, the environment, and public health. Her current research is on school transportation and safe routes to school; transportation and aging; the impacts of new transportation technologies on transportation systems; equity in planning, and the incorporation of risk into long-range transportation planning. She is co-author of Energy Efficiency and Human Activity: Global Trends and Prospects (Cambridge University Press, 1992) and author of over one hundred book chapters, journal articles, reviews, and research reports. Dr. Steiner has served on the Pedestrian Committee, Transportation and Land Development Committee and Transportation History Committee of the Transportation Research Board (TRB) and the Scientific Committee of the World Congress on Transportation Research Society (WCTRS). She received her B.A. in History from Lawrence University in Appleton, Wisconsin, a Master of Business Administration (MBA) from the University of Wisconsin in Milwaukee, and a Master of City Planning (MCP) and Ph. D. from the University of California at Berkeley.



2021 STRIDE Products Showcase – Day 3



Noreen McDonald, Ph.D., University of North Carolina at Chapel Hill (STRIDE Researcher/Speaker)

Noreen McDonald, Ph.D., specializes in how infrastructure investments and technology changes influence travel and the downstream impacts on road safety, public health, energy demand and city form. She is an internationally recognized expert on the travel behavior of youth and young adults. Her work on children's travel has shown that improved pedestrian and bicycle facilities can increase travel by foot. She has assessed the causes of declines in driving in the US and UK and looked at how transportation planning practice can respond to recent behavioral shifts and those anticipated due to changing technology. Her most recent work explores disruptions associated with shared mobility, e.g., Uber/Lyft, and autonomous vehicles. Some of the projects Dr. McDonald is currently working on include: quantifying the impacts of shared mobility on non-emergency medical transport, considering the role of planning with the advent of autonomous vehicles, exploring how autonomous vehicles will impact vulnerable road users, measuring how recent changes to planning for new development have influenced practice, analyzing the travel of young adults, i.e., the millennial generation, to understand the potential transport and energy impacts, and assessing the multi-modal costs of school transportation.



Ishtiak Ahmed, Ph.D., North Carolina State University (STRIDE Researcher/Speaker)

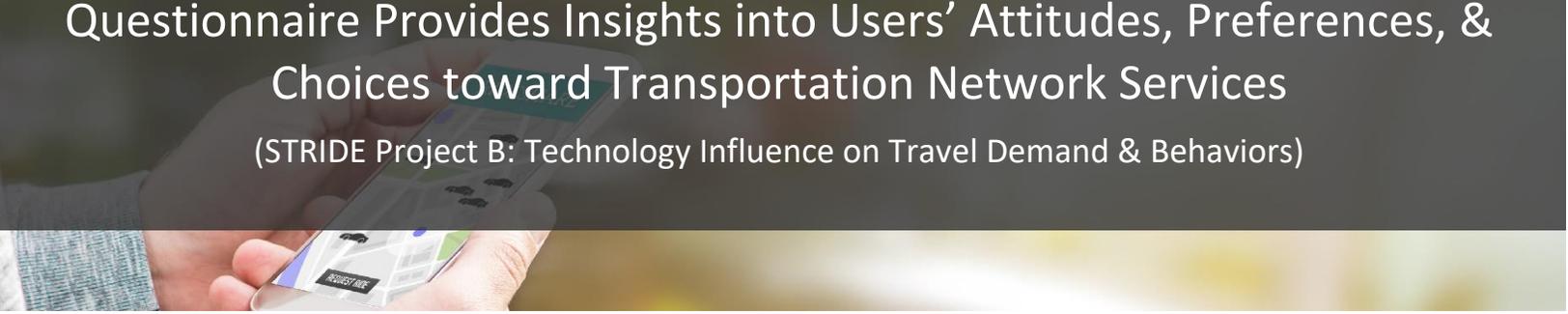
Ishtiak Ahmed, Ph.D., is a post-doctoral research scholar at Institute for Transportation Research and Education, North Carolina State University. He finished his Ph.D. in Civil Engineering from North Carolina State University in 2020. His research is related to highway capacity, alternative intersections, and freeway operations



DAY 1

PROJECT BRIEFS





Questionnaire Provides Insights into Users' Attitudes, Preferences, & Choices toward Transportation Network Services

(STRIDE Project B: Technology Influence on Travel Demand & Behaviors)

PROJECT OVERVIEW

Over the last decade, the popularity of Transportation Network Companies (TNCs) such as Uber and Lyft has been increasing at a steady pace, even in medium-sized cities. However, it is not clear how travelers respond to these smartphone-based services and how these services may influence their mode-choice or travel behavior. Data on TNC use and details on conditions that make TNC use attractive to transportation system users are still very limited due to privacy concerns, as well as technical and financial feasibility issues.

RESEARCH GOALS

The study sought to understand current travel preferences and practices of transportation users in the Birmingham, Alabama metropolitan area and document their attitudes, preferences, and choices toward TNC use as a travel mode of choice.

Researchers developed a comprehensive questionnaire to survey a TNC-aware population sample in the Birmingham Metro Area. The survey requested participants to report detailed trip information for a typical day (i.e., 24-hr travel diary) including origin and destination of each trip, travel time, trip purpose and travel mode used. Demographic data were also obtained and used in the analysis and interpretation of survey findings.

FINDINGS

The questionnaire, completed by over 450 transportation users in the Birmingham metro area, focused on travel preferences, practices and attitudes toward TNCs as a travel mode of choice.

Examination of over 1,100 reported trips indicated that approximately 6.3% of those trips were performed using TNCs, with Uber having 80% of the TNC market share in the Birmingham region. The small market share of TNC trips is consistent with expectations, given that Uber and Lyft were recently introduced in the region and that transportation users in the Birmingham

IMPACTS

The user questionnaire responses can help mid-sized cities to understand the behaviors of users when transportation network services are available. Such information can help transit agencies and TNC companies to identify needs and opportunities in the local market and facilitate collaboration and coordination among those services. Integrated system operations have a great potential to attract new customers and benefit both types of transportation services in the future.

WHO BENEFITS?

Transportation researchers, analysts, and planners.

RESEARCH TEAM

Virginia P. Sisiopiku, Ph.D. University of Alabama at Birmingham
vsisiopi@uab.edu

Ossama Ramadan, Ph.D. (formerly at University of Alabama at Birmingham)

Sahila Sarjana, University of Alabama at Birmingham

metro area largely embrace the automobile-dependent commuting culture as confirmed by previous studies. Still, 45% of survey participants reportedly have used TNC in the past year, an indication of awareness of TNC service availability.

Examination of respondents' demographics and cross tabulation analyses provided evidence that TNC users cover a wide range of age groups, with younger users being overrepresented compared to elderly. Lack of vehicle availability was associated with only a quarter of all reported TNCs, thus indicating that the majority of TNC users select TNC services as a mode of choice for certain trips.

The most important determinants that made TNCs a preferable mode to Birmingham travelers included convenience of use and reduction of concerns for traffic safety (especially for late night trips to bars and eating establishments). Lack of parking availability at the destination and lack of vehicle availability were also listed as reasons for selecting TNCs as a mode of travel.

The findings of the survey also helped define the profile of the typical TNC user in the Birmingham region as a 25-34 year old that is using the service for commuting trips or for entertainment purposes for short to medium range distances (or average of 5 miles).

Overall, the findings on the influence of transportation network services can help officials configure better mobility plans for their mid-sized cities where car/ridesharing platforms are active.

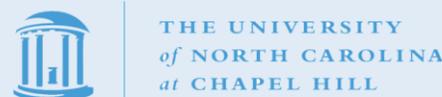
PRODUCTS

User questionnaire on transportation user behaviors – A questionnaire was developed to understand transportation users' travel behaviors in markets where ride-hailing services have taken off in terms of use and coverage in the recent years. The questionnaire can be used by other researchers and analysts who are interested in documenting users' preferences, attitudes, and mode choices in markets where Transportation Network Services (TNS) are available. Moreover, it can be used by transportation researchers that are seeking to understand determinants that drive people towards the use of TNCs services. The questionnaire was implemented in Birmingham, Alabama. A copy of the survey is available in the Final Report.

For more information on Project B (Technology Influence on Travel Demand and Behaviors), visit <https://stride.ce.ufl.edu/project-b/>

About STRIDE

The Southeastern Transportation Research, Innovation, Development & Education Center (STRIDE) is the 2016 Region 4 (Southeast) U.S. Department of Transportation University Transportation Center headquartered at the University of Florida Transportation Institute (UFTI).



How Do Older Drivers Perceive Autonomous Vehicle (AV) Technology?

(STRIDE Project D2: Older Driver Experiences with Autonomous Vehicle Technology)

PROJECT OVERVIEW

Older adults (≥ 65 years) account for 20% of the US population but are over-represented in multiple-vehicle crashes. At the same time, driving cessation has been shown to lead to poor health outcomes. Automated vehicles (AVs) may provide safety benefits, prolong independent mobility, promote community involvement, and enhance quality of life for older adults. However, these outcomes are dependent on older users' engagement, trust, and acceptance of this emerging technology.

GOALS

The project had three goals: 1) develop and validate an Autonomous Vehicle User Perception Survey (AVUPS) to assess users' perceptions of AVs, 2) develop and validate a simulated driving scenario, and 3) assess older drivers' perceptions after being exposed to a simulator and an automated shuttle.

FINDINGS

The study surveyed 104 older drivers in Florida to assess their perceptions of AV technology. Participants' perceptions were measured at the beginning of the study (baseline), after their first exposure to the technology (shuttle or simulator), and again after their second exposure to the technology (shuttle or simulator). Fifty-four of the participants experienced the shuttle first and the other 50 experienced the simulator first.

Results showed that there was no difference between the perceptions of participants who experienced the shuttle first and those that experienced the simulator first. Participants' perceptions about *safety*, *trust*, and *perceived usefulness* improved significantly the more they were exposed to the AV technology. These results provide initial evidence that exposing older drivers to an automated simulator or an on-road autonomous shuttle may promote their acceptance and adoption of AV technology.

PRODUCTS

1. **Autonomous Vehicle User Perception Survey (AVUPS)** - Assesses participants' intentions to use AV technology based on their perceptions of safety, trust, perceived usefulness, control/driving efficacy, and external variables.
2. **Autonomous Simulation Scenario** – Provides a simulated experience of riding in an autonomous vehicle comparable to a real-life experience.

IMPACTS

The operator of the autonomous shuttle made modifications including shuttle ramps and wheelchair securements based on feedback from the study participants. These modifications enabled the shuttle, originally manufactured in France, to be compliant with the America with Disabilities Act (ADA).

EQUITY IMPACTS

The study provides a broader understanding of the factors affecting the acceptance and adoption of AV technology among older adults who may be medically at risk, disadvantaged, vulnerable, or disabled.

WHO BENEFITS?

- Engineers, city planners, policy makers
- Healthcare professionals
- AV industry

RESEARCH TEAM

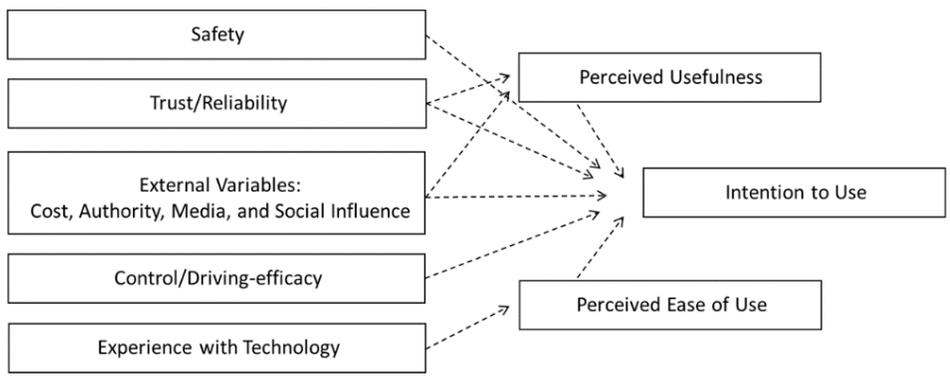
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PRODUCTS

Autonomous Vehicle User Perception Survey (AVUPS)

A 28-question survey was developed based on a conceptual model to assess participants' intention to use autonomous vehicle technology.



Twenty-four questions used a visual analogue scale (VAS) ranging from disagree to agree and four questions were open-ended. Face, content, and construct validity and test-retest reliability were established. The survey can be downloaded from the supplementary material in an open-access [publication in Frontiers](#).

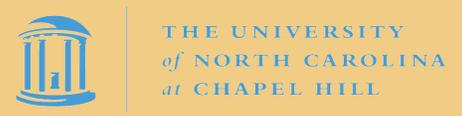
Autonomous Simulation Scenario

A driving simulation scenario was developed for the Realtime Technologies Inc. (RTI) driving simulator. This simulation scenario was built to broadly represent geographic features to emulate the route of the autonomous shuttle. Five team members with experience in transportation, simulators, occupational therapy, engineering, driving rehabilitation, computer science, and exercise physiology developed the simulation. A video of the simulation scenario may be found on [YouTube](#). Face and content validation of the simulation ensured congruence with the real-life scenario. The validation process is described in an open-access [publication in Frontiers](#).

For more information on Project D2 (Older Driver Experiences with Autonomous Vehicle Technology), visit the [STRIDE Project page](#).

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Web Mapping Tool Calculates Length and Cost of School and Transit Bus Delays

(STRIDE Project E3: Locating and Costing Congestion for School Buses and Public Transportation)

PROJECT OVERVIEW

Roadway congestion creates delays and increased costs for all roadway users, including transit and school buses. When buses are subjected to congestion, operating and capital costs increase, travel time reliability decreases, and the overall competitiveness and attractiveness of these modes decreases.

This research integrates three large datasets to develop a web mapping tool that allows transportation planners and engineers to model the relationship between traffic flow and congestion affecting public transportation and school buses. The model estimates delays and the costs resulting from these delays.

GOAL

The goal was to develop methodologies that would enable the use of three large datasets in a new web mapping tool.

PRODUCT

Web Mapping Tool

Three different datasets were used: congestion data from Regional Integrated Transportation Information System (RITIS), transit route and frequency data from General Transit Feed Specification (GTFS), and school bus routing data from Edulog. Four methodologies were developed to 1) display Edulog data spatially, 2) display GTFS data spatially, 3) merge the Edulog and GTFS datasets with RITIS data, and 4) determine minutes of delay by hour and segment.

The resulting web mapping tool allows users to examine minutes of delay for transit buses and school buses at any time of the day, using an expandable map. With the tool, transit systems, school districts, municipalities, and related stakeholders can determine congestion “bottlenecks,” streets or areas where buses and other vehicles face high congestion.

The tool also estimates of the costs incurred allowing practitioners to prioritize locations where treatments will be the most cost-effective and impactful. Possible solutions may include changing routes or times, adding special lanes, signal prioritization, etc. Regional planners can use these results to prioritize their general congestion mitigation efforts.

The tool was tested in Durham County, NC, providing results to Durham Public Schools, and the GoDurham and GoTriangle transit agencies. It is hoped that future research will further refine these methodologies so that more districts and transit agencies are able to use them.

PRODUCT

Web Mapping Tool

The tool calculates delay time and the relative costs of delays school and public transit buses experience due to congestion.

IMPACT

Practitioners can use the tool to determine cost-effective solutions.

WHO BENEFITS?

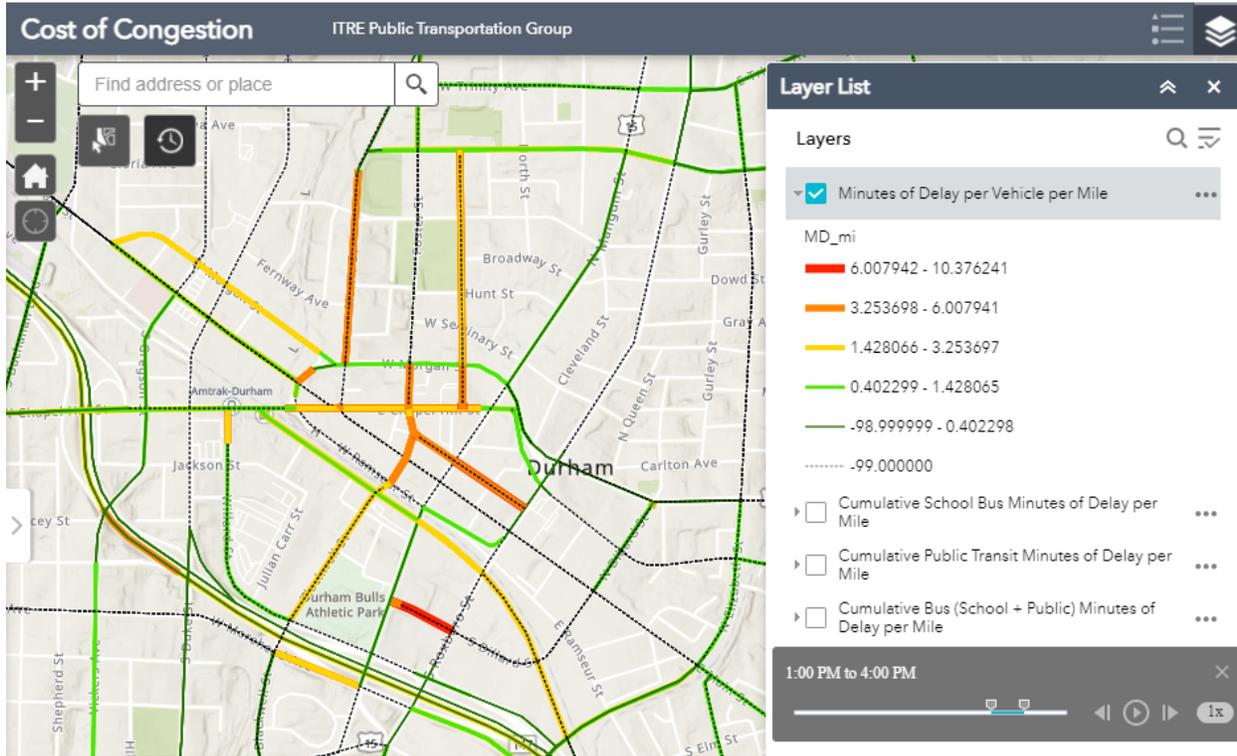
- Transit Agencies
- School Districts
- Municipalities
- Regional Planners

RESEARCHER

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The map can be accessed via www.transitportal.org/cost_of_congestion.html.



For more information on Project E3 (Locating and Costing Congestion for School Buses and Public Transportation), visit the [STRIDE Project page](#).

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Methods to Determine Market Opportunities for Public Transportation & TNC Hybrid Systems

(STRIDE Project F2: Discovering Potential Market for the Integration of Public Transportation and Emerging Shared Mobility Services)

PROJECT OVERVIEW

As Transportation Network Companies (TNCs), such as Uber and Lyft, have expanded, studies have revealed both positive and negative impacts on public transit systems. In order to create a hybrid system that benefits both public transit and TNCs (ridesharing), more needs to be understood about when and where to integrate them and who needs such services.

RESEARCH GOALS

The goal of the project was to identify potential demand and service gaps that would support a hybrid system. The research team developed and applied demand and supply models in two case study locations: Orlando, FL and Chengdu, China.

FINDINGS

Both the demand and supply models found that the first/last mile (FLM) gap of transit service provided an opportunity for hybrid systems.

- 1) First/last mile (FLM) trips to the airport or university, trips with longer distances to transit services, and trips made by persons with higher household income have the highest potential demand for TNCs.
- 2) Areas with a higher mix of employment and housing and/or higher employment rates showed a higher use of micromobility (bike share, bike, scooter, skateboard) and walking, and reduced the probability of using motorized modes, including TNCs, in the first mile. Higher land use diversity at the destination encouraged the use of TNCs in the last mile.
- 3) FLM gaps were identified where new micro-transit services, transit lines, and stations would improve ridership by connecting to ridesharing.
- 4) Researchers were able to predict when and where first/last mile services gaps would occur.

PRODUCT DESCRIPTIONS

1) Transit User Demand Models for First/Last Mile Trips

Several multinomial logit (MNL) models classified how passengers chose to arrive at their transit stop (first mile) and depart their transit stop (last mile) while also determining what factors may have influenced their choices. Mode choices were categorized as driving alone, TNC/Taxi, carpool, micromobility (bike-sharing, scooters, etc.), wheelchair, and walking. Factors that may have influenced users' choices included, trip attributes, density, land use diversity, accessibility, and personal and household attributes.

PRODUCTS

- 1) The **Transit User Demand Models** show what factors influence individuals' use of TNCs (ridesharing) in the first and last mile of travel.
- 2) The **Data-driven Approach for First/Last Mile Gaps** reveals when and where service gaps occur that would benefit from new transit stations or micro-transit hubs.

IMPACT

The products identify opportunities where hybrid systems can potentially increase transit ridership, address the first/last mile problem, and mitigate congestion and emissions.

WHO BENEFITS?

- Transit agencies and planners
- Transportation Network Companies (TNC)

RESEARCH TEAM

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Jinhua Qiu, Ph.D. student
University of Florida

2) Data-driven Approach for First/Last Mile Gaps

A multi-step data analysis method used ridesharing GPS trajectory data and bus trip data to identify service gaps that could be addressed through a hybrid transit system. The method, shown in Figure 1 and described below, has three main steps including statistical data analysis and machine learning and optimization approaches.

Step 1

Ridesharing GPS trajectory data and bus trip data was placed into a 3D grid with uniform cubes. Statistical and machine learning methods revealed complementary or competitive relationships between cubes over the entire 3D space.

Step 2

Bus or ridesharing service rate was collected from each cube to form heatmaps. Heatmaps revealed regions where ridesharing services were dominant, called a ridesharing swarm (RS). These RS regions attract significant ridesharing demand but have limited transit service. As such, they reveal opportunities for new transit stations or micro-transit hubs as well as areas with high first/last mile demand (FLM zones).

Step 3

Heatmaps were fed into an existing ConvLSTM deep learning model to make predictions about when and where service gaps would occur.

The model was validated using the second ring region of Chengdu, China as a case study.

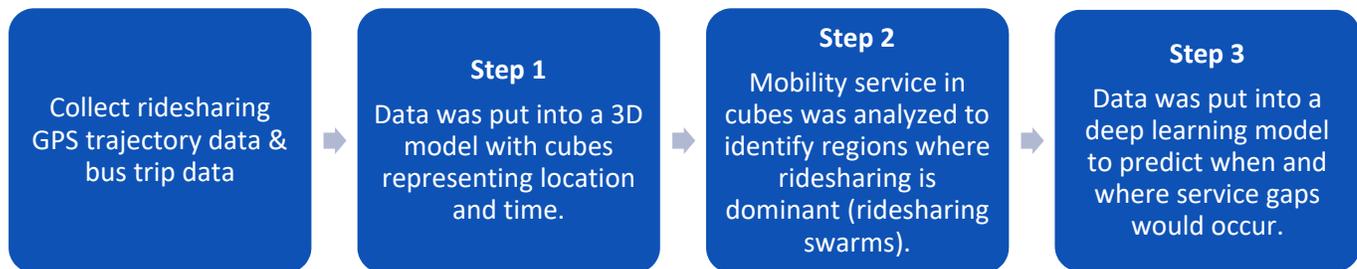


Figure 1: Steps of the Data-driven Approach for First/Last Mile Gaps

For more information on Project F2 (Discovering Potential Market for the Integration of Public Transportation and Emerging Shared-Mobility Services), visit the [Stride Project website](#).

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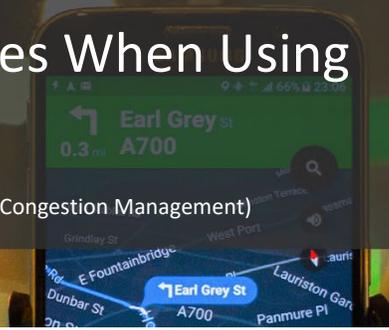
DAY 2

PROJECT BRIEFS



How Do Drivers Change Their Routes When Using Navigation Apps?

(STRIDE Project A: Impact of Smartphone Applications on Trip Routing and Congestion Management)



PROJECT OVERVIEW

Smartphone navigation applications (apps) such as Google Maps and Waze provide drivers with options to make informed decisions about their route. It is important to understand how these apps affect drivers' behavior as governments invest in variable message signs (VMS) and other Active Transportation and Demand Management (ATDM) strategies. In addition, several communities have attributed disruptions to typical traffic patterns and increased local cut-through traffic to the use of navigation apps.

RESEARCH GOALS

The goal of the study was to understand how smartphone navigation apps impact users' trip routing. Objectives were to evaluate (1) trip re-routing potential of route guidance apps, (2) how drivers utilize the information provided, and (3) the impact of traffic re-routing on roadway facility usage, congestion, and prevailing speeds.

Researchers conducted an interview-administered questionnaire (N=237) about preferences and behaviors related to using navigation apps and collected drivers' location data (N=27) that provided empirical evidence of smartphone routing app usage. The location data consisted of four months of Google Location History (GLH) data, collected before and after the shutdown of a bridge on I-85 in Atlanta, GA as well as one year after the incident for a control period.

FINDINGS

- Users do not use navigation apps uniformly. App users have distinct travel patterns and app usage preferences which may lead to the unequal distribution of road and navigation app usage.
- First time trips (78%) and infrequent trips (74%) are the two most common types of trips for which drivers use apps for directions.
- A 3 to 5-minute time savings was required for users to accept a routing change.
- 46% of respondents used navigation apps for regular commute trips.
- 46% of smartphone app users follow the suggested route for at least 80% to 99% of trips and another 25% of users follow the suggested route for 100% of trips.
- The data collection process resulted in a small sample size of GLH data. Future research could include larger GLH datasets.

PRODUCT

Framework and web-based interface for collecting Google Location History (GLH) data from participants.

IMPACT

This study is one of the first attempts to objectively quantify how drivers respond to navigation apps and rerouting information. Transportation Management Agencies can use this information to determine strategies for active travel demand management and operations to reduce congestion.

WHO BENEFITS?

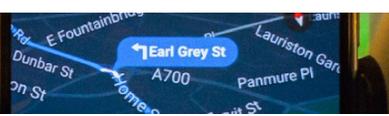
Researchers and practitioners who need detailed trip location data to study travel behavior and trip routing.

RESEARCH TEAM

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Kari E. Watkins, Ph.D. Georgia Institute of Technology



PRODUCT

Framework for Collecting Google Location History (GLH) Data

Google Location History (GLH) data is stored in individuals' Google accounts (if they opt in). GLH can provide large sets of historical data in a non-intrusive fashion at a fraction of the cost as compared to instrumenting individual vehicles with dedicated GPS devices.

Researchers developed a web-based interface to receive GLH data from participants. The interface allows the investigator to obtain informed consent from the participants, provides an easy way for the participants to retrieve the necessary data from their Google accounts restricted to the period required by the survey, and a way to securely upload the data to the survey database.

The use of this tool requires participation from volunteers like any other study that involves collection of vehicle trace data. There are potential selection bias issues in obtaining data in this fashion, since the data is available primarily from users of Android smartphones. However, such issues can be resolved by obtaining a large sample of users and using subsequent screening of the data to balance the sample for demographic and other biases.

The software code can be accessed on GitHub. (*navigation apps* repository by GTI-Gatech at https://github.com/gti-gatech/navigation_apps)

For more information on Project A (Impact of Smartphone Applications on Trip Routing and Congestion Management), visit the [STRIDE project page](#).

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Performance Measurement & Management using Connected & Automated Vehicle Data

(STRIDE Project C)

PROJECT OVERVIEW

Estimating performance measurements of a transportation system is a key component in congestion management. The currently used measures include travel time, travel time reliability, volume, density/occupancy, vehicle classification, incident occurrence, queue length, back of queue, and emissions. These measures are currently estimated from data gathered using existing technologies such as point detectors, vehicle matching technologies, and probe vehicles.

Data from connected vehicles (CV) can also be used to estimate these performance measurements while also providing additional measures that cannot be estimated based on existing technologies such as stops, accelerations, and decelerations, shockwave speed, traffic flow disturbance measures, detailed signalized intersection movement-level measures, potential for crashes, weather impacts, and emissions.

GOAL

The goal of this study was to identify how data collected from connected vehicles (CV) can be used alone or in combination with data from other sources to support transportation system performance measurement for transportation planning and operation purposes.

FINDINGS

The study found that even at lower market penetrations, CV data can be sufficient to support some critical transportation performance measurement and management functions. Other measures will require high market penetrations to produce accurate results.

The study developed a framework, methods, and algorithms for using CV data to measure mobility, safety, reliability, and environmental impacts.

PRODUCTS

Three products were developed to use CV data for estimating performance measurements.

1. Framework to estimate mobility, reliability, and environmental metrics
2. Methods to estimate new mobility and safety metrics
3. Method to estimate pollutant emission

IMPACTS

The products support enhanced traffic management strategies to improve safety, mobility, and environmental impacts while also reducing the costs associated with collecting data.

CLIMATE CHANGE IMPACTS

The performance measurements according to the study findings will provide support for implementing and activating strategies to reduce emissions.

WHO BENEFITS?

- Transportation system management and operations (TSM&O) programs
- Traffic management centers (TMCs)
- Planning organizations
- Transportation system decision makers

RESEARCH TEAM

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University of Alabama at Birmingham

Sivaramkrishnan (Siva) Srinivasan, Ph.D.
University of Florida

PRODUCTS

1) Framework to estimate mobility, reliability, and environmental metrics using connected vehicle (CV) data

The framework is for the use of connected vehicle data to estimate mobility, reliability, and environmental metrics that are currently being estimated using traditional (existing) sources. The estimated performance measures can be used by a system operator, planner, or an automated system to support their decisions. The measurements can be also used to derive information for dissemination to travelers, third-party data aggregators, traveler information service providers, and other agencies.

2) Methods to estimate new mobility and safety metrics

The methods estimate new mobility and safety metrics that cannot be estimated based on existing sources of data. The methods can be used in real-time operations by traffic management centers (TMCs) to determine the traffic conditions on the freeway segments. In addition, machine learning models were developed that can be used by TMCs for short-term prediction of traffic conditions that can be used to proactively activate operational plans to mitigate potential deterioration in mobility and safety performance.

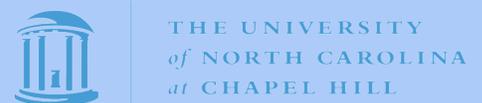
3) Method to estimate pollutant emission

The method estimates pollutant emissions based on a limited number of connected vehicles. This method can be used in off-line and real-time analysis of traffic conditions to determine the pollutant emission levels under different traffic conditions. The method can be used in making decisions regarding strategies and plans to reduce pollution.

For more information on Project C (Performance Measurement & Management using Connected & Automated Vehicle Data), visit the [STRIDE Project page](https://stride.ce.ufl.edu/project-c/) (<https://stride.ce.ufl.edu/project-c/>).

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Simulation Extension to Evaluate the Impact of CAVs on Traffic Congestion & Emissions

(STRIDE Project D: Evaluation of Advanced Vehicle & Communication Technologies through Traffic Microsimulation)

PROJECT OVERVIEW

As connected and autonomous vehicles (CAVs) begin operating alongside conventional vehicles on roads, there are many “what if” scenarios that need to be considered. Specifically, how do CAVs impact traffic management and emissions? Researchers developed an extension to be used with the traffic simulation software VISSIM that would test the impact of potential “what if” scenarios.

GOAL

The goal of this project was to develop a robust microscopic simulation extension for VISSIM that evaluates traffic operational quality and emissions considering the presence of CAVs.

FINDINGS

In this project, the researchers developed and tested a simulation extension with CAV functionality. This extension was integrated with emissions modeling.

Several traffic scenarios were simulated using different demand and CAV penetration levels. The results showed a net improvement in traffic operational measures (travel time and speed) when CAVs were in the traffic stream.

However, emissions did not follow the same trend. While increasing AV penetration rates resulted in emissions reductions, increasing CV and CAV penetration rates resulted in higher emissions. A deeper analysis showed that while VISSIM’s CV logic seeks to maximize the likelihood of vehicle arrival-on-green, the algorithm likely results in oscillation of the second-by-second speeds leading to overall higher emissions. The results are based on a small and relatively simple network, and operations may be different for larger and more complex networks.

PRODUCT

A **simulation extension with CAV functionality** was developed for VISSIM. The extension evaluates how CAVs may impact traffic management and emissions when operating alongside conventional vehicles.

IMPACTS

Adoption of the simulation extension would enable wide-scale assessment of how CAVs impact traffic congestion and emissions.

CLIMATE CHANGE IMPACTS

The simulation extension is helpful in evaluating the impact on CAVs emissions. When suitably integrated with an optimization algorithm with a goal to reduce emissions, this extension can have significant impact on mitigating climate change impacts.

WHO BENEFITS?

- CAV research community
- Simulation modeling research groups
- State Departments of Transportation (DOTs)
- Federal Highway Administration (FHWA)

RESEARCH TEAM

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University of Florida

PRODUCT

Simulation Extension with CAV functionality for VISSIM (Version 10.0)

The simulation extension evaluates the impact of CAVs on traffic management and emissions.

The extension was developed by leveraging the strengths of both the internal and external interfaces in VISSIM. The research team used the Component Object Model (COM) Application Programming Interface (API) to access network elements and the External Driver Model (EDM) to maintain the longitudinal control of vehicles.

The trajectory data from VISSIM were used to estimate energy, fuel consumption, and greenhouse gas emissions. The calculations follow the Motor Vehicle Emission Simulator (MOVES) methods developed and mandated by the US Environmental Protection Agency (USEPA).

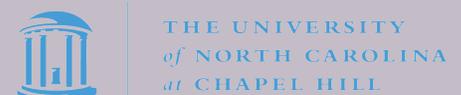
The extension could be used to evaluate CAV strategies for a variety of networks and scenarios. Future work includes incorporating a CAV-based signal optimization algorithm developed by the University of Florida into the extension, enhancing the optimization to include emissions, and applying the tool developed to large-scale transportation challenges.

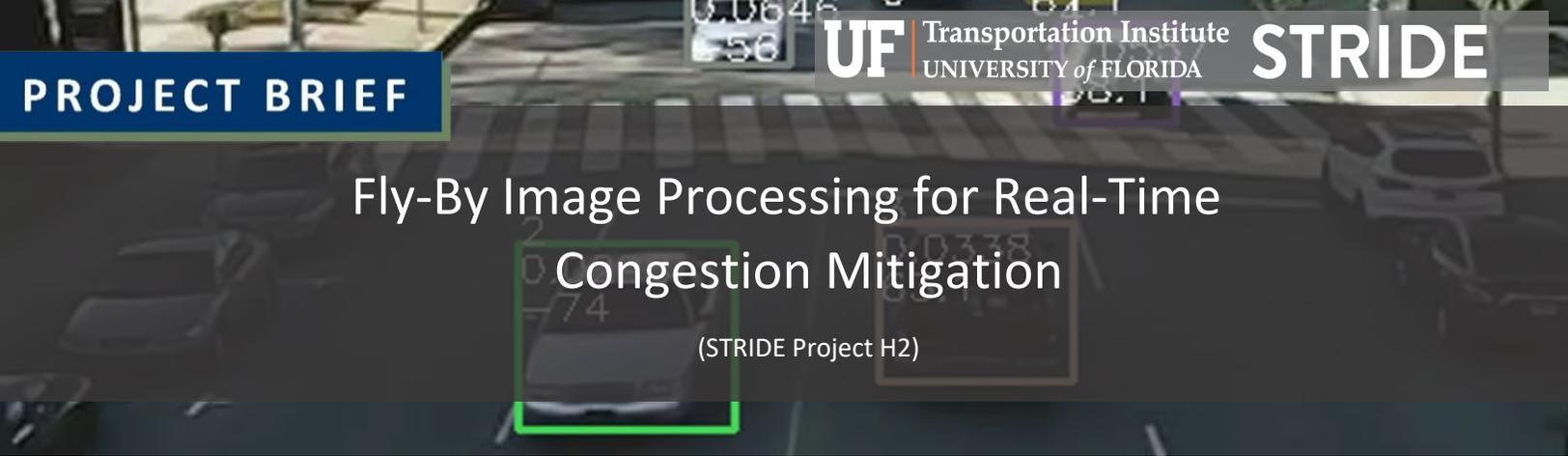
The extension is available upon request from the researchers.

For more information on Project D (Evaluation of Advanced Vehicle and Communication Technologies through Traffic Microsimulation), visit the [STRIDE Project page](#).

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PROJECT BRIEF

Fly-By Image Processing for Real-Time Congestion Mitigation

(STRIDE Project H2)

PROJECT OVERVIEW

Traffic monitoring is the key to detecting and easing congestion, but current state-of-the-art systems cannot detect or predict immediate congestion problems. Unmanned aerial vehicles (UAVs), also called drones, have the potential to provide real-time remote surveillance of high traffic areas. However, getting information about vehicle velocity from these images is not an easy task because the images are distorted due to the height of the camera, the camera’s resolution and focal properties, and the camera orientation.

GOAL

To determine the congestion on a road by using drone-mounted cameras.

PROCESS

Cameras mounted on drones were calibrated using a newly developed mathematical model. Lanes were defined to separate vehicle flows. The calibrated camera detected the location of vehicles using an existing object detection algorithm YOLOv3 (You Only Look Once). Then congestion was evaluated based on the calculated location and velocity of vehicles (Figure 1).

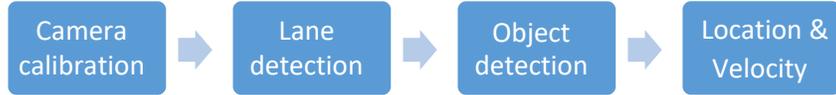


Figure 1: Detection Program Flowchart

Since the analysis required immense computational power, a Graphics Processing Unit (GPU) was used to process the videos in near real-time.

PRODUCTS

- The **Drone Perching Mechanism** allows drones to land on vertical or horizontal steel surfaces.
- The **Real-Time Vehicle Location Model** calculates the exact location of vehicles using images captured from cameras mounted on drones.

IMPACTS

A single drone can monitor a larger roadway segment compared to a fixed camera and/or embedded sensors in the roadway pavement. Drones can travel at higher speeds compared to ground vehicles without any restriction on traveling over a road network. The ability to collect real-time information on traffic can lower costs and reduce congestion.

WHO BENEFITS?

- U.S. Department of Transportation
- State Departments of Transportation
- Federal Highway Administration

RESEARCH TEAM

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PRODUCT DESCRIPTIONS

Drone Perching Mechanism

Drones were equipped with a perching mechanism that allowed it to land on vertical walls or upside down under horizontal steel surfaces such as a traffic light column or advertising board. Perching enabled the drones to shut down their power-consuming motors, thereby allowing the cameras to acquire video over an extended period from a fixed location.



Real-Time Vehicle Location Model

A mathematical model was created that relates the locations of objects on the image to real-world coordinates of the objects. Using the model, cameras were calibrated and real-time locations of vehicles could be determined. The model was experimentally verified.

PRODUCT APPLICATIONS

Currently, many state DOTs monitor and manage traffic at critical roadway segments using fixed infrastructure (e.g., roadside traffic cameras). Unlike fixed cameras, drones can be rapidly deployed to monitor or manage recurring (e.g., peak hour traffic congestion) and nonrecurring traffic congestion (e.g., major events and traffic incidents). In addition, drones can be used when traffic infrastructure is damaged due to extreme events (e.g., a hurricane, earthquake or wildfire) or along roadway work zones.

For more information on Project H2 (Fly-By Image Processing for Real-Time Congestion Mitigation), visit the [STRIDE Project page](#).

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Framework for the Operational Analysis of Ramp Weaves

(STRIDE Project K2: Assessing and Addressing Deficiencies
in the HCM Weaving Segment Analyses)

PROJECT OVERVIEW

The Highway Capacity Manual (HCM) is one of the most widely used references in transportation engineering, both for planning and operational analyses. The 6th edition of the HCM (HCM6) offers a wide spectrum of analyses ranging from freeway segments to facility travel time reliability. Weaving segments are often critical components of freeway facilities, as they can act as bottlenecks. Any bias or errors within the HCM weave procedure can significantly impact facility-wide or reliability analyses, and in the process bring into question the validity of the entire facility analysis methodology.

The research project identified deficiencies in the current Highway Capacity Manual (HCM6) weaving method and developed a new, simpler framework for evaluating operations at freeway ramp weaves.

RESEARCH GOALS

The main research goals pursued were to

1. Conduct a critical review of the HCM6 weaving method and identify deficiencies that this research can address for a subset of weaving segments;
2. Create a new framework for freeway segment analyses that can ensure consistency across segment type namely basic, merge, diverge and weaving segments; and
3. Apply the proposed framework to ramp weave sites in the field and generate a simplified operational method for LOS estimation that is transferable to other segment configurations.

FINDINGS

This new framework uses the basic freeway model and a speed impedance factor that represents the weaving turbulence, which proved to be simpler and more accurate than the models in the HCM6. Speed and capacity models were developed for Type A weaves, which directly predicts the overall segment speed in the weaving segment. The team concluded that the HCM6 model tended to underestimate speed within the weaving section compared to field data. A sensitivity analysis showed that the proposed model behaves reasonably well when varying the segment length, lanes and weaving volumes.

PRODUCTS

- 1) A new **Capacity Analysis Method** for ramp weave segments
- 2) **Method** for extracting high resolution video data
- 3) **Computational Engine** to exercise the method

IMPACTS

The products can improve mobility on the nation's freeway by producing more accurate measures for estimating the quality of service on weaving segments, which are likely to become network bottlenecks.

WHO BENEFITS?

- State Departments of Transportation
- Consultants who use the HCM methods on a regular basis
- Researchers involved in HCM development (e.g. NCHRP 07-26)
- International researchers who use the US HCM for operational analyses

RESEARCH TEAM

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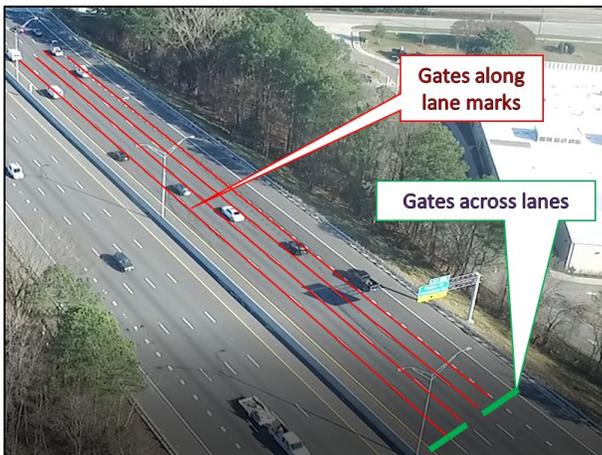
PRODUCT DESCRIPTIONS

1) A new Capacity Analysis Method for ramp weave segments

A new method was developed for evaluating operations at freeway weaves. This new method uses the basic freeway model and a speed impedance factor that represents the weaving turbulence. The model predicts the average speed of the weaving segment directly without using intermediate models to predict the number of lane changes. The new method provides an approach that is **simpler** than the current HCM6 method, **consistent** across all freeway segment analyses, and **adaptable** to other types of weaves (B & C) and merge and diverge segments when recalibrated.

2) Method for extracting high resolution video data

An unmanned aircraft system (UAS), or drone, was used to collect video 400 feet above the highway, capturing a length of up to 3,000 feet of roadway. The video was analyzed using a third party video imaging processor (VIP). Additionally, longitudinal and lateral “gates” were generated by the research team and superimposed on the processed video to capture the volume of weaving and non-weaving traffic. This enabled the team to track where vehicles started, when and where they entered, lane changed and exited at the approach.



3) Computational Engine to exercise the method

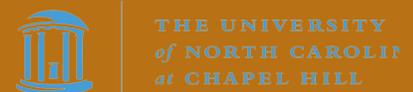
To enable end users to test and verify the methodology, a computational engine on an Excel platform has been developed that exercises the computations for the method. The data the method requires is similar to – and in some instances fewer than – the current HCM method requires. The engine is available upon request from the project PI at rouphail@ncsu.edu.

These products will provide state agencies with a reliable tool for estimating capacity and quality of service at ramp weaves, and will enable them to improve their decision making for the design and operations of planned freeway improvements aimed at congestion mitigation.

For more information on Project K2 (Assessing and Addressing Deficiencies in the HSM Weaving Segment Analyses), visit the [STRIDE project page](#).

About STRIDE

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DAY 3

PROJECT BRIEFS



Community-Based Participatory Research (CBPR): Application for Transportation Planning

(STRIDE Cost-Share Project, *Transportation Mobility Assessment and Recommendations for Smart City Planning*, BDV31-977-115, sponsored by Florida Department of Transportation)

PROJECT OVERVIEW

It is through the community's transportation network that residents experience their city as they travel to work, stores, medical services, and recreational spots. Every community has unique transportation infrastructure characteristics and shortcomings. Understanding the experiences of residents at a neighborhood-level can help inform transportation planning efforts.

Community-Based Participatory Research (CBPR) methodology is commonly employed by researchers and professionals in the health and medical science fields, but there are very few applications in the transportation field. This project developed and evaluated a transportation focused CBPR methodology that was implemented in two communities in Gainesville, Florida. Researchers developed guidelines for applying this methodology in other communities.

GOAL

The objective of this project was to develop and evaluate a transportation focused Community-Based Participatory Research (CBPR) methodology.

FINDINGS

The CBPR methodology was tested and refined in two Gainesville, Florida neighborhoods with contrasting demographics and transit usage characteristics. Participants from both neighborhoods desired more alternative transportation options and had concerns about the quality of transportation infrastructure. However, one neighborhood emphasized challenges for the medically disadvantaged, concerns about safety, and limited service times and routes of public transportation. In contrast, the other neighborhood focused on the use of personal vehicles and the fixed-route bus to access their community. It was concluded that facilitating the participation of people belonging to all income levels and from different demographics is crucial to ensure future transportation investment decisions are equitable and comprehensive.

PRODUCT

Community-Based Participatory Research (CBPR) Methodology

The methodology engages community members in all stages of the project to inform future transportation mobility plans.

EQUITY IMPACT

The CBPR approach provides opportunities for community members to meaningfully contribute to the transportation planning process ensuring future transportation investments are more equitable.

WHO BENEFITS?

- Transit Agencies
- Municipalities
- Planners

RESEARCHERS

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PRODUCT

Community-Based Participatory Research Methodology

The Community-Based Participatory Research (CBPR) approach ensures that people within a community are involved in all project stages of developing transportation outcomes for their community. A CBPR requires iterative interaction between the project staff and community members for serving the project goals.

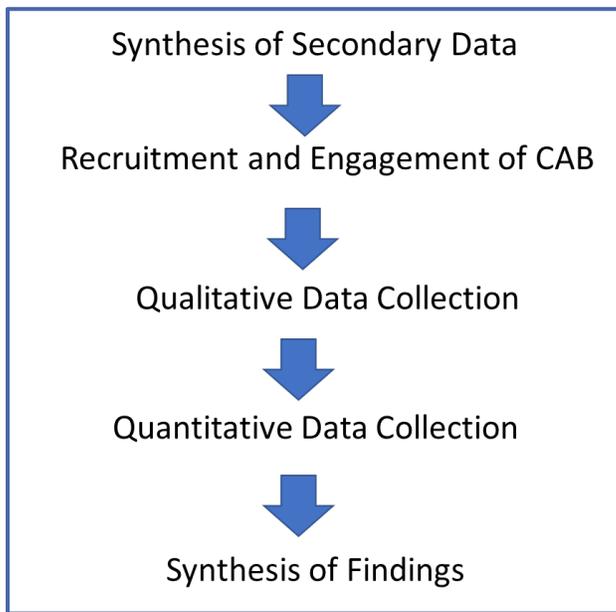


Figure 1: Steps of the CBPR process for transportation planning

The methodology employed public engagement at two scales: a small group of representatives on a community advisory board (CAB) over the entire process and a larger representative subset of community members to provide data and opinions via qualitative methods (focus groups) or quantitative methods (surveys). These persons, unlike the members of the advisory board, were not involved in all stages of the CBPR (for example, they do not contribute to designing surveys).

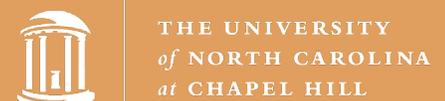
The project team used the Five A's identified by the Beverly Foundation and National Volunteer Transportation Center (NVTC) as mobility indicators (availability, accessibility, affordability, acceptability, and adaptability). This framework addresses needs, opportunities, and constraints in shaping the travel outcomes. Further, this framework can be extended to consider new and emerging modes (shared mobility, micro-mobility, autonomous vehicles, etc.).

Implementing the CBPR at the neighborhood level provided a better understanding of community travel needs and empowered community members to become leaders in the process.

This STRIDE cost-share project *Transportation Mobility Assessment and Recommendations for Smart City Planning*, BDV31-977-115, was sponsored by Florida Department of Transportation.

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Geospatial Model to Identify Gaps in Service to Transportation Disadvantaged Populations

(Part 3 of STRIDE Project A2: Changing Access to Public Transportation and the Potential for Increased Travel)

PROJECT OVERVIEW

Transportation options are crucial for not just the general public but for transportation disadvantaged (TD) populations, such as individuals with disabilities, older adults, or people who do not own a vehicle. Transportation Network Companies (TNCs), such as Uber and Lyft, provide additional transportation options, but little is known about their relationship with public transportation and specialized transportation services or if they can meet the needs of the transportation disadvantaged.

RESEARCH GOALS

The goals of the project were to

- 1) Locate transportation service gaps for transportation disadvantaged (TD) populations in metro Orlando and
- 2) Identify opportunities and challenges for Transportation Network Companies (TNCs) partnerships to fill these service gaps.

For simplicity, this research focused on older adults, a segment of the TD population.

FINDINGS

For the first goal, the research team developed a geospatial model to identify specific service gaps facing the transportation disadvantaged. Service gaps were identified as areas with low supply (very low or low) and a high demand (very high or high). The gap areas included 31 census block groups with 41,947 older adults (16.8% of total 249,352 older adults).

For the second goal, the team interviewed transit and social service agencies to ascertain the requirements and challenges associated with partnerships between public transportation, specialized transportation services, and TNCs. Challenges to establishing effective and sustainable partnerships with TNCs that serve TD populations include limited budgets, a lack of evaluation data, equity concerns, technology barriers, safety concerns, and difficulties in the integration of myriad choices.

PRODUCT

The **geospatial model** identifies gaps in transportation services for transportation disadvantaged (TD) populations.

IMPACTS

Transportation agencies and TNCs can use the model to identify opportunities for partnerships with TNCs to expand transportation options for transportation disadvantaged populations.

WHO BENEFITS?

- Transit agencies
- Transportation Network Companies (TNCs)

RESEARCH TEAM

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PRODUCT DESCRIPTION

Geospatial Model

The geospatial model identifies gaps in transportation services for transportation disadvantaged (TD) populations. The model analyzes the interaction between the supply of transportation services and the travel demand:

- 1) Transportation service supply was measured by the transportation accessibility of each census block group. Accessibility scores were calculated by considering the number of destinations, travel time using transit route, and walking time from/to transit stop.
- 2) Transportation demand was measured as the size of the older-adult population.

Each census block group was categorized into seven categories (very low, low, medium low, medium, medium high, high, very high) of supply or demand based on the computed supply and demand scores. Census block groups labelled as having a low supply (very low or low) and a high demand (very high or high), were identified as gap areas (Figure 1).

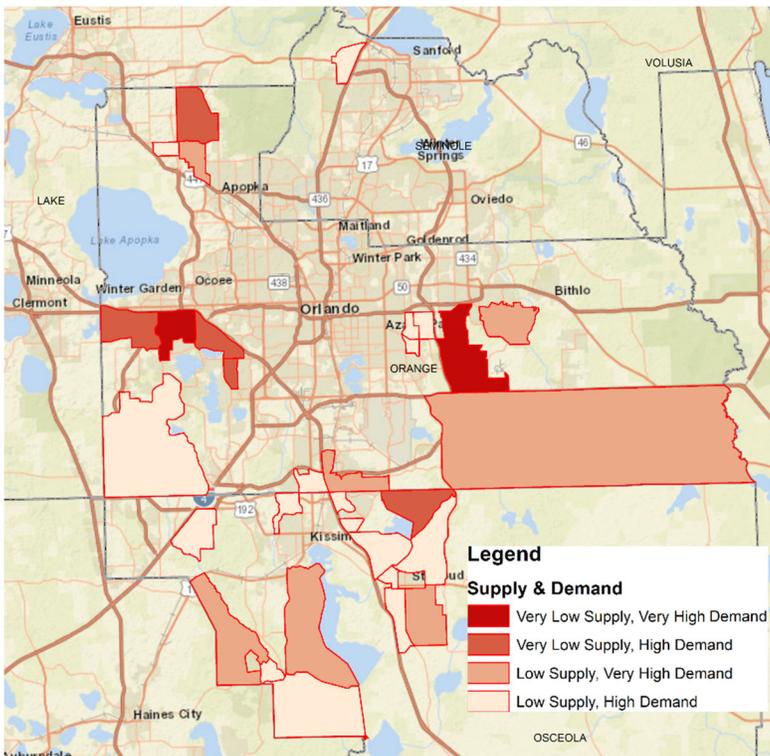


Figure 1. Transportation Service Gaps for Older Adults in Metro Orlando

For more information on Project A2 (Changing Access to Public Transportation and the Potential for Increased Travel), visit the [STRIDE project website](#).

About STRIDE

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Comparing Transit Ridership Fluctuations through Transit Agency Peer Groups

(Part 1 of Transit in the Era of Shared Mobility)

PROJECT OVERVIEW

Transit ridership has decreased steadily each year from 2014 to 2017 despite increasing urban populations and transit service investment. There are likely many reasons for changing ridership. Automobile ownership, parking availability, cheap fuel, ride-hailing services, poor network coverage, and low-frequency service have been cited as causing decreased ridership. These analyses have examined trends in national transit ridership levels or within specific agencies or regions. However, the magnitude and causes of ridership changes are likely to vary from place to place. Thus, comparing transit agencies and the areas they operate against similar peers may yield more informative results than examining national trends or only trends amongst large agencies. There is a wide range of transit agencies that serve different populations, operate different services, and have drastically different budgets. These and many other factors are likely to substantially affect operations and ridership.

RESEARCH GOALS

The study team compared trends within similar groups of agencies and metropolitan areas. Metropolitan areas that operate transit service were grouped based on a set of variables that affect ridership but are outside of agencies' control: total population, density, percent of zero vehicle households, and transit agency operating expenditures. Using Ward's method, metropolitan regions were clustered by mode family, separating mixed and dedicated right-of-way.

FINDINGS

Use of these clusters in ridership analysis suggests that changes in ridership are not uniform across modes and clusters. In addition, by conducting disaggregate level research in three cities (Portland, Minneapolis, and Miami), the study team found that the most productive routes are those losing the most ridership. Models also indicated that economic displacement of transit-dependent patrons may be causing ridership to decline in three systems studied. Future studies by the research team will extend this work by considering housing prices and ride-hailing usage.

IMPACTS

Identification of the peer agencies from the cluster analysis has enabled the analysis of transit ridership change by both the researchers and internally within transit agencies. This understanding of ridership is helping agencies improve the sustainability of transportation by identifying areas that are the greatest threat to their business practices. As agencies work to improve performance, they can use the peer agency metrics to identify areas for improvement.

WHO BENEFITS?

Transit agencies

RESEARCHER

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About STRIDE

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PRODUCT

Cluster analysis of transit agencies – The research produced a cluster analysis showing which transit agencies can be grouped as peers based on factors that influence transit ridership. Agencies can use their cluster to choose peer agencies for future benchmarking studies, a key component of strategic planning and process improvement.

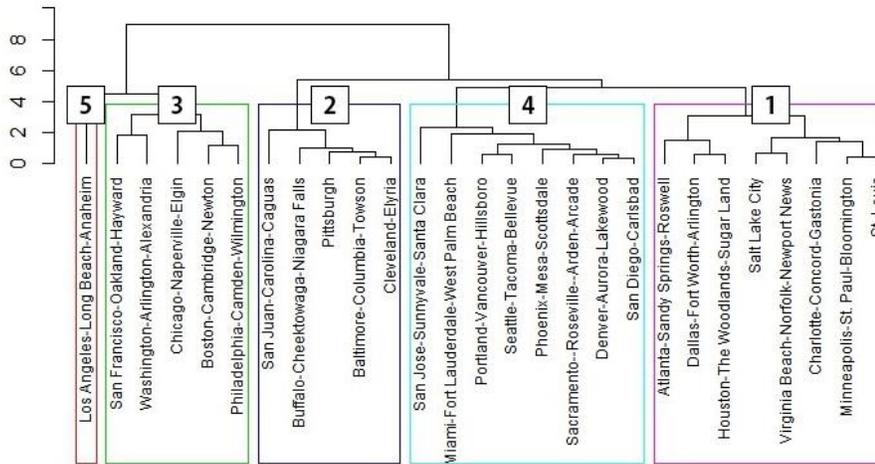


Figure 1. Dedicated Right-of-way (Rail) Cluster Peer Agencies

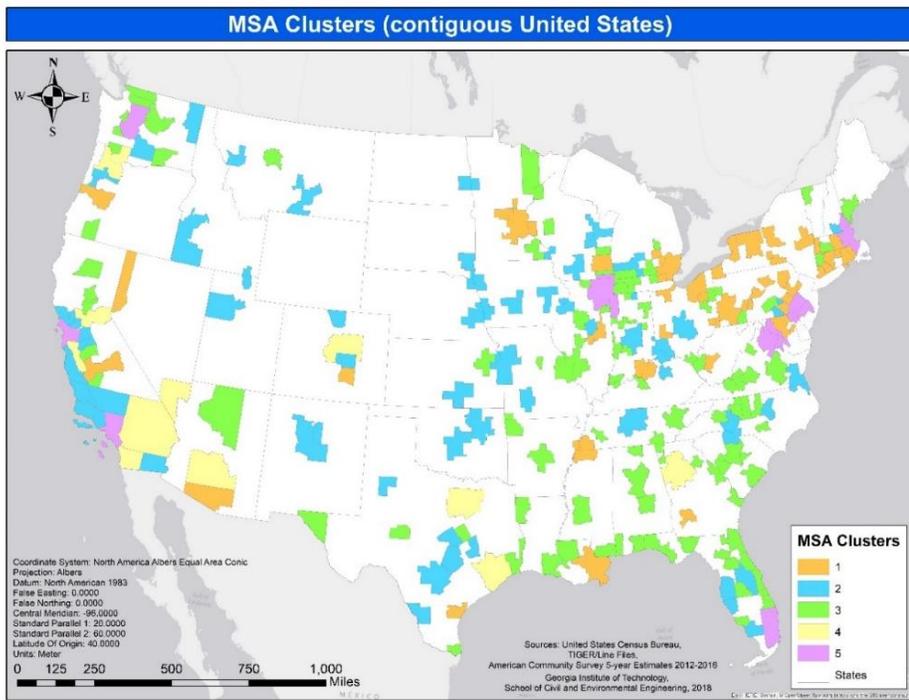


Figure 2. Mixed Right-of-way (Bus) Cluster Peer Agencies

This research is part of STRIDE Project G (Transit in the Era of Shared Mobility). For more information, visit <https://stride.ce.ufl.edu/project-g/>

Accommodating Pedestrians & Bicyclists at Continuous Flow Intersections

(STRIDE Project F: Integrated Implementation of Innovative Intersection Designs)

PROJECT OVERVIEW

Continuous Flow Intersections (CFIs), also known as Displaced Left-Turn intersections (DLTs) have grown in popularity primarily due to the reduced number of signal phases for vehicles. However, due to its large footprint and unconventional displaced left-turn movement, pedestrians and bicycles experience unique mobility challenges at this type of intersection.

GOALS

This study evaluated the performance of pedestrian-bicycle crossing alternatives at Continuous Flow Intersections (CFI). Three CFI crossing alternatives were tested: Traditional, Offset, and Midblock crossings. In total, 24 alternative scenarios were generated by incorporating two bicycle path types, two right-turn control types, and two CFI geometry types. These scenarios were analyzed through microsimulation on the basis of stopped delay (length of time a pedestrian/bicyclist is waiting), travel time from their origin to destination, and number of stops from the same origin to the destination.

FINDINGS

The results indicated that Traditional crossing (Figure A) would generate the least number of stops for pedestrians and bicyclists; an Offset crossing (Figure B) would perform best in terms of stopped delay; and a Midblock crossing (Figure C) would incur very short travel times only along some routes that start and end near the midblock locations. The most notable differences observed are between the stopped delays in Offset and Midblock crossing. If adequate space is available, an exclusive bicycle path is operationally preferable to the shared-use path in most cases.

Regarding the tradeoffs between a standard intersection and a CFI, a CFI with Traditional or Offset crossing would incur less stopped delay because of the reduced number of signal phases. However, a CFI with an Offset or a Midblock crosswalk would generate a higher number of stops than a standard intersection because of the increased number of phases.

PRODUCT

Microsimulation Models of 24 Continuous Flow Intersection (CFI) designs were developed that can be run in VISSIM. The models represent different geometries and pedestrian-bicycle crossing scenarios.

IMPACTS

Many intersection designs are selected for vehicular operational benefits with little-to-no consideration for pedestrian and bicycle impacts. This is due in part to the lack of information regarding crossing designs and their impact on pedestrians and bicyclists. This project provides guidance broken down by crossing design. With this research, engineers can work to minimize the delays and, therefore, minimize the unsafe behavior of pedestrians and bicyclists crossing against the signal indication.

WHO BENEFITS?

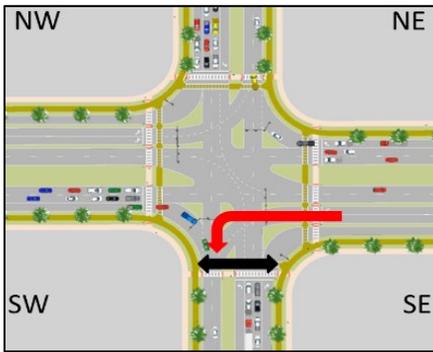
- Engineers
- Pedestrians and bicyclists

RESEARCH TEAM

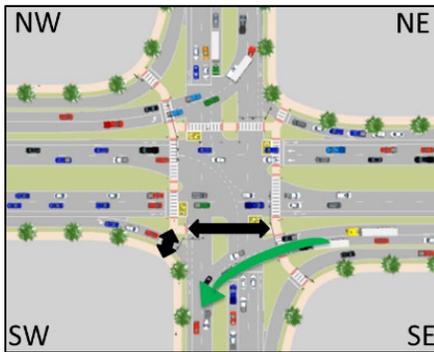
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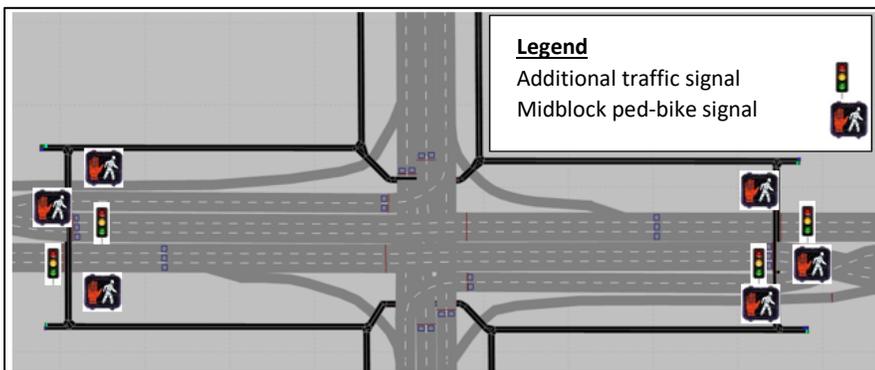
William J. Davis, P.E., Ph.D.
The Citadel



A) Schematic of **Traditional Crossing** - vehicular left-turn movement from one approach (red) conflicts with the parallel pedestrian-bicycle crossing (black)



B) Schematic of **Offset Crossing** - crosswalks are "offset" toward the inside of the intersection (black) and do not conflict with the parallel left turns (green)



C) Schematic of a **Midblock Crossing** - pedestrians have a very short travel path between the left corners of the NW and SW quadrant and between the right corners of NE and SE quadrant. However, some other routes experience significant out of direction travel.

PRODUCT

Microsimulation Models of Continuous Flow Intersection Designs

Researchers developed 24 microsimulation models of different CFIs (Continuous Flow Intersections) geometries and pedestrian-bicycle crossing facilities that can be run in VISSIM. The simulations included various timing plans for three alternative CFI designs (traditional, offset, and midblock) and included considerations for on- and off-road bicyclists.

For more information on Project F (Integrated Implementation of Innovative Intersection Designs), visit the [STRIDE Project page](#).

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Method for Determining Low-Income Population Access to Transit and Jobs

(Part 1 of STRIDE Project A2: Changing Access to Public Transportation and the Potential for Increased Travel)

PROJECT OVERVIEW

Between 1990 and 2013, the poverty rate in suburban areas increased significantly compared to other areas. As the low-income population moves to suburban areas in the United States, they may experience longer commutes or have reduced access to jobs. Transportation accessibility is defined as how easily an individual can reach their destination by one or multiple transportation modes. Analyzing accessibility over time can show if transit system improvements are providing adequate access to the suburbanized low-income population.

RESEARCH GOALS

The goal of the project was to assess if transit improvements in the Triangle region (Raleigh–Durham–Chapel Hill, North Carolina), have resulted in higher or lower transit accessibility for low-income populations while taking into account the poverty suburbanization trends. Accessibility to transit was defined as how easily a low-income individual reaches a bus station by walking, while accessibility to employment was defined as how easily a low-income individual reaches a low-wage or low-skill job by transit.

FINDINGS

Overall, accessibility to transit increased over time in all areas of the Triangle Region. However, suburban areas experienced a less than proportional improvement in transit access compared to the high increase in poverty rate. With respect to employment accessibility, between 2006 and 2015, access to low-wage and low-skill jobs by transit decreased for low-income populations throughout the Triangle Region.

These findings indicate that despite the expansion of the transit network, accessibility between residential locations and employment centers did not improve.

PRODUCT

The developed **Accessibility Methodology** shows how easy or hard it is for low-income populations to access transit and access employment by transit from different locations (city center, suburban, rural).

IMPACTS

Transit agencies and planners can use the methodology to understand if past transit improvements are helping and also evaluate where service can be improved in the future.

WHO BENEFITS?

- Regional and local transit agencies
- Transportation planners
- Low-income populations

RESEARCH TEAM

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North Carolina State University

PRODUCT DESCRIPTION

Accessibility Methodology

The research team developed a methodology to assess whether two simultaneous changes—suburbanization of low-income populations and the expansion of the transit system—made it easier or harder for low-income residents to access public transportation and jobs.

The methodology calculated two factors:

- 1) Accessibility to transit (number of bus stops, walking time) and
- 2) Accessibility to employment by transit (accessibility to qualified jobs in all zones, the number of qualified jobs, the demand for jobs, and travel time by transit between zones).

The methodology was applied at the census block group level over time in different geographical regions in the Triangle region.

The majority of previous research on accessibility focuses on one point in time and does not differentiate between different locations. This study makes an important contribution by analyzing the *changes* in access to transit or to employment by transit over time and space for socially disadvantaged populations.

For more information on Project A2 (Changing Access to Public Transportation and the Potential for Increased Travel), visit the [STRIDE Project page](#).

About STRIDE

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RESOURCES

- STRIDE Product Videos: https://youtube.com/playlistlist=PLmx5yo5tmGZ_gMA7dPweU4QPZUWcGib6O
- STRIDE Products: <https://stride.ce.ufl.edu/technology-transfer/products/>
- STRIDE Research Projects: <https://stride.ce.ufl.edu/stride-research/active-research-projects/>
- STRIDE Data Project Collection Curated at: <https://zenodo.org/communities/stride-utc/?page=1&size=20>
- STRIDE Recorded Webinars: <https://stride.ce.ufl.edu/technology-transfer/workshops-webinars-conferences/>

