The First Annual Symposium on
Transportation Informatics

Big Data Analytics Transforming Operations, Management and Safety

August 13 & 14, 2015

Davis Hall

School of Engineering and Applied Sciences
State University of New York at Buffalo
Buffalo, New York

Presented by

Transportation Informatics

Tier I University Transportation Center

In partnership with

State University of New York at Buffalo
George Mason University
Rensselaer Polytechnic Institute (RPI)
University of Puerto Rico Mayaguez
CUBRC
Institute for Sustainable Transportation and Logistics
USDOT Office of the Assistant Secretary for Research and Technology
University Transportation Research Center

TransInfo
Tier I University Transportation Center

www.buffalo.edu/transinfo/2015Symposium.html

The First Annual Symposium On Transportation Informatics

Organizing Committee

Adel W. Sadek
Director, Transportation Informatics Tier I University Transportation Center
Professor, State University of New York at Buffalo

Joah Sapphire
President
Global Dynamic Group, LLC

Xuegang (Jeff) Ban
Associate Professor
Rensselaer Polytechnic Institute

Ivette Cruzado
Associate Professor
University of Puerto Rico at Mayaguez

Kevin Majka
Senior Scientist
CUBRC

Shanjiang Zhu
Assistant Professor
George Mason University

Panos Anastasopoulos
Assistant Professor
State University of New York at Buffalo

Qing He
Stephen Still Assistant Professor
State University of New York at Buffalo

Qian Wang
Assistant Professor
State University of New York at Buffalo

Transportation Informatics Tier 1 University Transportation Center's (TransInfo) is one of the leading transportation research centers in the United States (US) that is supporting the Internet of Things (IoT) big data revolution. Bloomberg Intelligence estimates that IoT is growing at over 20% per year and is expected to reach $7 trillion in global revenue by 2020.

To capture IoT's transformation of transportation, TransInfo formed a consortium of four National Universities including the University at Buffalo, Rensselaer Polytechnic Institute, George Mason University and the University of Puerto Rico-Mayagüez, as well as CUBRC, a not-for-profit, research corporation, to compete for a Tier 1 University Transportation Center designation after the US Congress passed new legislation entitled Moving Ahead for Progress in the 21st Century Act (MAP-21) in 2012.

In 2013, TransInfo was named one of only twenty Tier 1 University Transportation Centers in the US by the Office of the Assistant Secretary for Technology and Research (OST-R) which coordinates US Department of Transportation's research programs. TransInfo is the only Tier 1 University Transportation Center in the nation that specializes in Transportation Informatics.

Transportation Informatics is the practice of information processing and the engineering of information systems, including data mining and information analysis (collection, analysis, and visualization of complex data), to support the planning, design, management, operations, and maintenance of the surface transportation system. It employs a wide variety of methods, tools and models, including methods from Artificial Intelligence, Machine Learning, Statistics, and Database Systems. When these methods are applied to large datasets that have been appropriately compiled and fused together, the result is invaluable and actionable information that can help improve transportation systems efficiency, safety, sustainability and resiliency.

This enhanced decision making is extremely important to ensure that our transportation industry continues to innovate to stay competitive and drive economic growth. TransInfo is currently conducting cutting edge research utilizing big data analytics to improve all aspects of transportation. TransInfo award winning research ranges from developing predictive border crossing delay models to new performance metrics and operational strategies for public transportation. Our first conference will highlight this research as well as bring together leading transportation practitioners from the public and private sector.

August 13th Program

7:30 am - 8:00 am

Breakfast & Registration

8:00 am - 9:00 am

Welcome

Adel Sadek, PhD, Director of Transportation Informatics Tier I University Transportation Center
Joah Sapphire, President of Global Dynamic Group, LLC.
Satish Tripathi, PhD, President of the State University of New York at Buffalo
Venu Govindaraju, PhD, Vice President for Research & Economic Development (interim) of the State University of New York at Buffalo
Liesl Folks, PhD, MBA, Dean of the School of Engineering and Applied Sciences at the State University of New York at Buffalo
Stephen Still, PhD, Founder and Managing Director, Seabury APG
Dawn Tucker-Thomas, U.S. Department of Transportation Office of the Assistant Secretary for Research & Technology (OST-R)

Session 1: Big Data Analytics in Transportation Operations

9:00 am - 9:45 am

Academics: World class research

Adel Sadek, PhD, State University of New York at Buffalo: Developing Predictive Border Crossing ;Delay Models

Xuegang (Jeff) Ban, PhD, Rensselaer Polytechnic Institute: Arterial Performance Measurement Using Multiple Traffic Data Sources

Shanjiang Zhu, PhD, George Mason University: Incident Response System to Assist Active Traffic Management in Washington D.C.

9:45 am - 10:00 am

Networking Break

10:00 am - 10:30 am

Practitioners: Real world applications

William Geary, Erie County Deputy Commissioner of Highways: Use of AVL data for public fleet

William Smith, Improving Access to the Buffalo Niagara Medical Campus: SMART Card Initiative

Faroog Ibrahim, PhD, Savari Networks: Connected vehicle applications to improve operations

10:30 am - 10:50 am

Discussion

Identify new big data projects to address needs, gaps, issues and opportunities.

10:50 am - 11:30 am

Keynote

Michael Pack, Director, University of Maryland CATT Lab**:** Using Visualization with Big Data. Answering questions both known and unknown

Session 2: Informatics Utilization in Public Transportation

11:30 am - 12:15 pm

Academics: World class research

Qing He, PhD, State University of New York at Buffalo: Predicting Transit Volume with Social Media Data under Event Occurrences

Didier Valdés, PhD, University of Puerto Rico at Mayagüez: New Performance Metrics and Operational Strategies based on Bus Location and Passenger Count Data

John Handley, PhD, PARC, A Xerox Company: Applying Analytics to Managing Fleets of Connected Devices

12:15 pm - 12:30 pm

Networking Break

12:30 pm - 1:10 pm

Practitioners: Real world applications

Hal Morse, Executive Director of the GBNRTC: Advanced Simulation and Performance Measurement in the BNMC-CDB North Area

Thomas George, Director of Public Transportation, Niagara Frontier Transportation Authority: Public transportation challenges

Alberto Figueroa, PhD, Executive Director, Integrated Transport Authority managing Metropolitan Bus Authority and the Maritime Transport Authority

Eric Wood, Vehicle Systems Engineer, National Renewable Energy Lab: Real world data collection/analysis for light and heavy duty vehicles

1:10 pm - 1:30 pm

Discussion

Identify new big data projects to address needs, gaps, issues and opportunities.

1:30 pm - 2:20 pm

Lunch

2:20 pm - 3:00 pm

Keynote

Ram Pendyala, PhD, Frederick R. Dickerson Chair and Professor of Transportation Systems, School of Civil and Environmental Engineering, Georgia Tech: Paradigms for Integrated Modeling in an Era of Connectivity, Automation, and Real-time Big Data

Session 3: Applications of Analytics to Transportation Safety

3:00 pm - 3:30 pm

Academics: World class research

Kevin Majka, PhD, CUBRC: Highway Safety Performance Metrics in a CV Environment utilizing SHRP2 Data

Ivette Cruzado, PhD, University of Puerto Rico at Mayagüez: Application Development for Mobile Data Collection and Sharing for Vehicle Accidents

3:30 pm - 3:50 pm

Networking Break

3:50 pm – 4:20 pm

Practitioners: Real world applications

Richard McDonough, Director (Acting), Planning and Development Bureau, Office of Modal Safety and Security of NYSDOT: CV applications for truck safety

Larry Brinker, Executive Director of NUAIR Alliance: Use of Unmanned Aircraft Systems (UAS) for bridge inspection

Michael Brown, Senior Engineer, Southwest Research Institute: CV applications for safety of highway road maintenance workers

4:20 pm – 4:50 pm

Discussion

Identify new big data projects to address needs, gaps, issues and opportunities.

4:50 pm – 5:30 pm

Keynote

Barry Einsig, Global Transportation Executive, Cisco: Potential of Connected Vehicles

5:30 pm – 7:30 pm

Reception and Student Poster Session

Sponsored by Seabury APG

August 14th Program

8:00 am - 8:30 am **Breakfast & Registration**

Workshop 1: Big Data Analytics in Transportation Safety

8:30 am - 8:45 am

Introductory Remarks

Kevin Majka, PhD, CUBRC: What exactly is Big Data Analytics?

8:45 am - 9:00 am

Presentation

Alan Blatt, CUBRC: Overview of the SHRP 2 Safety Research Program Naturalistic Driving Study-The Largest and Most Ambitious Driving Safety Study Conducted in the U.S.

9:00 am - 9:30 am

Roundtable Discussion

What transportation safety problems can be uniquely addressed by utilizing SHRP 2 or other 'Big Data' sources?

9:30 am - 9:45 am

Presentation

Eric Nagler, CUBRC: Applications of Knowledge Discovery In Massive Transportation Data: The Development of a Transportation Research Informatics Platform (TRIP)

9:45 am - 10:15 am

Roundtable Disucssion

What are the unique challenges of working with 'Big Data' and what are the available tools to help data managers, practitioners, and researchers?

10:15 am - 10:30 am **Networking Break**

Workshop 2: Connected Vehicles and Big Data Applications

10:30 am - 10:50 am

Presentation

Richard McDonough, Director (Acting), Planning and Development Bureau, Office of Modal Safety and Security of NYSDOT: NYS CV Testbed, Applications and Consortium

10:50 am - 11:10 am

Presentation

Faroog Ibrahim, PhD, Savari Networks: Connected vehicle applications to improve operations

11:10 am - 11:30 am

Presentation

Jo Y. Lee, PhD, New Jersey Institute of Technology: State of the Art Research in CV

11:30 am - 11:40 am

Networking Break

11:40 am - 12:30 pm

Roundtable Discussion

Xuegang (Jeff) Ban, PhD, Rensselaer Polytechnic Institute and **Qing He**, PhD, University at Buffalo moderators: Discussion of CV research, funding opportunities, and potential collaborations

12:30 pm

Concluding Remarks

Adel Sadek, PhD, Director of Transportation Informatics Tier I University Transportation Center

Light snacks available on departure

12:30 pm - 2:00 pm

Optional Presentation

Kevin F. Hulme, PhD, Center for Engineering Design and Applied Simulation (CEDAS): Applications in Simulation-based Transportation Research, such as the Integrated Traffic-Driving-Networking Simulator (ITDNS) at the University at Buffalo, presented at 106-107 Furnas Hall (adjacent to Davis Hall)

Barry Einsig, Global Transportation Executive, Cisco

Barry Einsig is the Global Public Sector and Transportation Executive for Cisco's Vertical Solutions Group, responsible for two market categories: Transportation and Public Sector. With a broad experience in the Transportation and Public Sector market, Barry has been in the industry for over 15 years serving in a variety of roles providing wired, and wireless IP communications networks, video, security and life safety systems for Transportation and Public Sector networks.

Some of the authorities Barry has worked with include: Singapore Ministry of Transport, Network Rail, Deutsche Bahn, DFW, Port of Hamburg, SFMTA, Transport For London, BNSF, Washington Metropolitan Area Transit Authority, AMTRAK, DART, PA Turnpike, as Within the Vertical Solutions Group, Barry is the business lead responsible for driving the growth strategy, business planning, thought leadership and solutions designs and validation for all modes of transportation, and public sector.

Barry serves and an advisor to the Ministry of Transport for Singapore though their driverless vehicle program called CARTS, as well as on the advisory board of Prospect Silicon Valley a non-profit organization focused on new energy alternatives and connected vehicle technologies. He also has been an active member of the American Public Transportation Association, Association of American Railroads Wireless Communications Committee, and the Intelligent Transportation Society of America. Barry is also active in the Transportation Sector Coordinating Council, APTA Security Standards development, and the Committee on Public Safety. He served as Chair for the Joint Council on Transit Wireless Communications and as Chair of the ITSA Transportation Management Forum, is an active member for the Business Leadership Council, Public Safety Council, and Public Transit Council. Finally, Barry is a Board member for The Infrastructure Security Partnership. Barry has written for many industry publications, as well as presented at International Conferences such as IEEE, IWCE, APCO, ITSA, APTA, and ITS World Congress, on topics including security, wireless communications, IP networks, Connected Vehicles and Transportation Systems

Michael Pack, Director, University of Maryland CATT Lab

Michael Pack has 15 years of experience working in the information management and transportation industries. He is the Director of the Center for Advanced Transportation Technology Laboratory (CATT Lab) at the University of Maryland. He specializes in the processing, management, and analysis of massive streaming datasets from disparate sources. He has significant experience in transportation operations, planning, performance management, systems integration, image processing, information visualization, and human factors.

Michael has previously worked at the University of Virginia's Smart Travel Laboratory and the Oak Ridge National Laboratory's Center for Transportation Analysis. He was honored at the White House in 2013 as a "Champion of Change" for his work in transportation operations data sharing and information visualization

Ram Pendyala, PhD, Frederick R. Dickerson Chair and Professor of Transportation Systems in the School of Civil and Environmental Engineering at Georgia Tech

Ram Pendyala is a professor in the School of Civil and Environmental Engineering at Georgia Tech and serves as the Frederick R. Dickerson Chair in Transportation Systems effective Fall 2014. Prior to this appointment, he served on the faculty of the School of Sustainable Engineering and the Built Environment at Arizona State University for eight years. His expertise lies in the study of sustainable mobility management strategies, travel demand modeling and simulation, and modeling the land use, transportation, energy, and air quality impacts of a wide range of transportation policies and technology solutions including pricing-based strategies. He is the Chair of the Transportation Research Board Planning and Environment Group, and previously served as Chair of the Travel Analysis Methods Section and the Traveler Behavior and Values Committee. Dr. Pendyala has his PhD and MS degrees in Civil Engineering from the University of California at Davis and his undergraduate degree in Civil Engineering from the Indian Institute of Technology-Madras in India.

Adel Sadek, Director, Transportation Informatics Tier I University Transportation Center, Professor, State University of New York at Buffalo

Dr. Sadek is a Professor in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo (UB). He also serves as the Director of UB's Institute for Sustainable Transportation and Logistics, Director of the Transportation Informatics Tier I University Transportation Center, and Chair of UB2020's Strategic Strength in Extreme Events. Dr. Sadek is the recipient of the 1998 Milton Pikarsky Award for the best dissertation in the field of Transportation Science and Technology, awarded by the Council of University Transportation Centers, a National Science Foundation (NSF) CAREER award, and a 2011 IBM Smarter Planet Faculty Innovation Award.

Dr. Sadek's research interests span a wide range of topics including transportation modeling and simulation, Connected and Automated Vehicles, intelligent transportation systems, artificial intelligence applications in transportation, traffic engineering, transportation planning, and infrastructure management. Dr. Sadek is coauthor of two Transportation textbooks, along with more than 100 papers in peer-refereed journals and refereed conference proceedings. In 2007, one of his papers won the best paper award by Transportation Research Board (TRB) Committee on Operational Effects of Geometrics. He currently serves as Associate Editor of the Transportation Research – Part C journal, Regional Editor for the Internal Journal of Transportation, and Editorial Board Member of the Journal of Intelligent Transportation Systems.

Joah Sapphire, President, Global Dynamic Group, LLC

Joah Sapphire is a catalyst for innovation and possesses over twenty years of experience leading complex public and private organizations. Mr. Sapphire is the Founder and President of Global Dynamic Group, LLC. Previously he was Founding Partner of Verulam LLC, China Representative of Ospraie Management, LLC, CFO of NROTB, Deputy Commissioner of Suffolk County, Finance Director of Nassau County and Senior Analyst for the New York State Assembly.

Mr. Sapphire serves as adjunct professor for Columbia University's School of International and Public Affairs where he teaches Financial Management and is faculty advisor for a Capstone Workshop in infrastructure. He is an industry affiliate of Cornell University's Program in Infrastructure Policy.

Mr. Sapphire received a Bachelor of Science from Cornell University and a Master of Public Administration from Columbia University.

Satish Tripathi, PhD, President, State University of New York at Buffalo

The first international-born president in UB's history, Dr. Tripathi graduated at the top of his class from Banaras Hindu University in India. In addition to a doctorate in computer science from the University of Toronto, he holds three master's degrees—one in computer science from the University of Toronto and two in statistics from the University of Alberta and Banaras Hindu University.

In 1978, Dr. Tripathi joined the faculty of the Department of Computer Science at the University of Maryland, where his 19-year tenure included serving as chair from 1988-95. While on sabbatical at the University of Maryland, he also held visiting professorships at the University of Paris-Sud in France and the University of Erlangen-Nuremberg in Germany. From 1997-2004, Dr. Tripathi served as dean of the Bourns College of Engineering at the University of California-Riverside, where he nearly quadrupled the number of students and tripled the number of

faculty at that institution and led its rise from an unranked program to a position in the upper half of the U.S. News and World Report Best Engineering Graduate Schools rankings.

Dr. Tripathi joined the University at Buffalo in 2004, serving as UB's provost and executive vice president for academic affairs until his appointment as president in 2011. As Provost, Dr. Tripathi led the recruitment of many prominent faculty to the university and oversaw a significant increase in the number of faculty hired to develop and enhance strengths in key areas of research and scholarly activity. As a result, the university achieved substantial increases in research expenditures and federally awarded research grants, putting UB in league with the top national research universities in the United States. Under Dr. Tripathi's leadership, the academic profile of UB's undergraduate and graduate students also has improved significantly. He led a number of efforts to enrich the educational experiences of UB undergraduate students by introducing programs designed to provide them with opportunities to engage in learning and research with UB's top faculty. He also oversaw the development of innovative "living-learning environments" constructed as part of "Building UB," the university's comprehensive physical plan.

Dr. Tripathi led a strategic planning process for UB's international programs that has led to significant expansion of the university's international presence and the continued globalization of its three Western New York campuses. He signed a memorandum of understanding in 2005 with Indian Prime Minister Manmohan Singh to establish the Indo-U.S. Inter-University Collaborative Initiative in Higher Education and Research, which has led to a significant partnership between UB and Amrita University. UB's educational programs in Singapore, in partnership with the Singapore Institute of Management, also have experienced significant growth under Dr. Tripathi's leadership.

Dr. Tripathi was one of the principal creators of the UB 2020 long-range academic plan, and has led the university to achieve significant growth in research and scholarly activity, enhanced student quality and diversity, and an expanded international presence. Building on this strong foundation, Dr. Tripathi's vision for UB's future focuses on moving the university into the highest ranks of the nation's leading research universities through expanding its reach and impact locally as well as globally.

The University at Buffalo continues to experience a remarkable era of growth, progress, and innovation under Dr. Tripathi's leadership as president. Within his first year as president, the university has celebrated a number of major milestones, including the passage of the NYSUNY 2020 legislation that has led to historic reforms for UB and the SUNY system of public higher education as a whole. Since Dr. Tripathi assumed the presidency in 2011, the university has also opened five major building projects on its three campuses, celebrated a $40 million bequest that is the largest gift in university history, and is moving forward with a long-anticipated plan to relocate its medical school downtown into a world-class new facility that will be the hub of a thriving life sciences community in Buffalo. The university also recently received designation of a New York State Center of Excellence in Materials Informatics, positioning the university at the forefront of the rapidly expanding field of advanced materials.

An active leader in the national higher education community, Dr. Tripathi is a member of the Mid-American Conference Council of Presidents Executive Committee and the board of directors of the Council for Higher Education Accreditation (CHEA). A fellow of the IEEE and the American Association for the Advancement of Science, he has published more than 200

scholarly papers, supervised more than 30 doctoral and postdoctoral students and served on program committees of numerous international conferences. Among his numerous community leadership roles, Dr. Tripathi was appointed by New York State Governor Andrew Cuomo as co-chair of the regional economic development advisory council for Western New York and is a member of the board of directors of the Buffalo Urban League.

In 2006, Dr. Tripathi was awarded the honorary doctorate of sciences from the prestigious Indian Institute of Information Technology, Allahabad, the university's highest degree. He also has been honored with the 2009 Distinguished Alumnus Award from Banaras Hindu University.

Venu Govindaraju, PhD, Vice President for Research and Economic Development, State University of New York at Buffalo

Venu Govindaraju manages UB's research enterprise, university/industry relations and economic development, contributing to our regional and global economy.

He is a recognized authority in the field of pattern recognition and his research was core to the first handwritten address interpretation system used by the U.S. Postal Service. Govindaraju has an extraordinary sponsored funding record, having been primary or co-investigator on roughly $65 million in research funding, including active awards from the National Science Foundation, the Department of Defense, and industrial sponsors such as Qualcomm and Raytheon BBN Technologies. He has a BS degree from the Indian Institute of Technology, and MS and PhD degrees from UB.

He holds four patents and has received many peer honors and professional society awards. He is noted for advancing the field with five books, nearly 400 refereed publications and invited talks, keynotes, plenaries and seminars, along with mentoring doctoral students. He served or serves on the editorial boards of several premier journals.

Govindaraju is among the elite computer scientists named fellows of both the Association for Computing Machinery and the Institute of Electrical and Electronic Engineers. He also is a fellow of the American Association for the Advancement of Science and the International Society of Optics and Photonics.

Liesl Folks, PhD, MBA, Dean of the School of Engineering & Applied Sciences, State University of New York at Buffalo

Upon graduation Professor Folks joined the faculty at The University of Western Australia (UWA) as a Teaching and Research Fellow, with research interests in the domain of time dependent phenomena of novel nanoscale permanent magnet materials.

In 1997, she spent time at IBM Almaden Research Center in California as a Visiting Scientist, and in 1998 she became a Research Staff Member with IBM. During her years there, she was engaged in fundamental research topics to support to the magnetic data storage business, including advancing magnetic force microscopy imaging capabilities, exploring techniques to make nanoscale bit-patterned media, and processing optimization to support the introduction of Magnetic Tunnel Junction (MTJ) sensor technologies into product.

When IBM sold its Hard Disk Drive business to Hitachi in 2003, Folks moved to Hitachi to continue in related research. During her time with Hitachi Global Storage Technologies she researched innovative magnetic field sensors created from non-magnetic materials, and on advanced development projects related to conventional magnetic recording media.

In 2003-2004, she briefly left the world of research to obtain an MBA degree from Cornell, taking advantage of that school's Twelve Month Option.

In 2012, Folks left industry to return to academia, and she now holds the post of Dean of the School of Engineering and Applied Sciences at the University at Buffalo-SUNY. She was also the President of the IEEE Magnetics Society for 2013/2014.

Stephen Still, PhD, Founder and Managing Director, Seabury APG

Dr. Stephen Still is founder and Managing Director of Seabury Airline Planning Group, LLC. He has more than 25 years of experience in consulting and management of transportation systems, including 20 years of hands-on experience in aviation planning. Dr. Still has managed aviation projects worldwide including assignments for airlines, equipment manufacturers, and financial advisory firms. Recent projects include wide body fleet analysis leading to a multi-billion dollar fleet order, optimization of network structure for a major U.S. carrier, development of new planning methods for a large Asian airline, and an assessment and outlook for the US. He specializes in a variety of corporate planning functions including route and fleet strategy, financial analysis, and revenue management.

Prior to Seabury APG, he was Director, Corporate Planning, with US Airways, Inc., responsible for development of strategic initiatives for routes, fleets and alliances. He was responsible for formulating and coordinating the airline's fleet plans, including analysis leading up to a multi-billion dollar fleet purchase. Prior to US Airways, Dr. Still was Manager of Domestic Planning at United Airlines, Inc., where he was responsible for developing United's five-year route and fleet plan. Other positions at United included Manager of Airline Profitability Analysis, where he was responsible for financial and economic analyses of complex fleet and route decisions including fleet acquisition and route purchases. He started at United in the Operations Research group where he designed and developed advanced revenue forecasting models.

Dr. Still is a frequent presenter at airline and transportation conferences, and teaches professional courses for the International Air Transport Association (IATA), and holds a PhD in Civil Engineering and Operations Research from Princeton University with a specialty in Transportation Systems and Economics. He earned a BS in Engineering from the University at Buffalo, magna cum laude, with a concentration in transportation planning. He has also completed courses in advanced demand modeling at the Massachusetts Institute of Technology.

Dawn Tucker-Thomas, Grants Manager, Office of the Assistant Secretary for Research and Technology, United States Department of Transportation

Dawn Tucker-Thomas currently serves as a Grants Manager with the Office of the Assistant Secretary for Research and Technology, U.S. Department of Transportation (US DOT). She oversees several federally-funded transportation research grants administered to institutes of higher education. Additionally, she supports US DOT's Civil Rights Program to strengthen the capacity of minority serving institutions to participate in federal grant programs. Ms. Tucker-Thomas has worked in the transportation industry for over 20 years in both the public and private sector. Previous positions held required her to develop transportation rules and regulations, support multi-modal research and development of US DOT's research and development activities, conduct transportation research studies to help better understand major transportation issues, and conduct long range transportation planning and impact analyses.

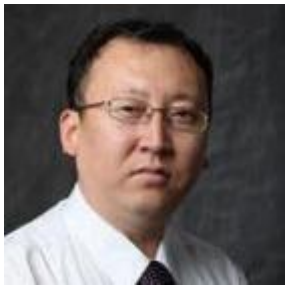
Ms. Tucker-Thomas received an undergraduate degree in Airway Science, a graduate degree in Transportation Planning, and a law degree. Born and raised in Harrisburg, Pennsylvania, she presently resides in northern Virginia.

Adel Sadek, Director, Transportation Informatics Tier I University Transportation Center, Professor, State University of New York at Buffalo

Dr. Sadek is a Professor in the Department of Civil, Structural and Environmental Engineering at the University at Buffalo (UB). He also serves as the Director of UB's Institute for Sustainable Transportation and Logistics, Director of the Transportation Informatics Tier I University Transportation Center, and Chair of UB2020's Strategic Strength in Extreme Events. Dr. Sadek is the recipient of the 1998 Milton Pikarsky Award for the best dissertation in the field of Transportation Science and Technology, awarded by the Council of University Transportation Centers, a National Science Foundation (NSF) CAREER award, and a 2011 IBM Smarter Planet Faculty Innovation Award.

Dr. Sadek's research interests span a wide range of topics including transportation modeling and simulation, Connected and Automated Vehicles, intelligent transportation systems, artificial intelligence applications in transportation, traffic engineering, transportation planning, and infrastructure management. Dr. Sadek is coauthor of two Transportation textbooks, along with more than 100 papers in peer-refereed journals and refereed conference proceedings. In 2007, one of his papers won the best paper award by Transportation Research Board (TRB) Committee on Operational Effects of Geometrics. He currently serves as Associate Editor of the Transportation Research – Part C journal, Regional Editor for the Internal Journal of Transportation, and Editorial Board Member of the Journal of Intelligent Transportation Systems.

Xuegang (Jeff) Ban, PhD, Associate Professor, RPI



Dr. Xuegang (Jeff) Ban is an Associate Professor of the Department of Civil and Environmental Engineering at the Rensselaer Polytechnic Institute. He received his B.S. and M.S. in Automobile Engineering from Tsinghua University, and his M.S. in Computer Sciences and Ph.D. in Transportation Engineering from the University of Wisconsin at Madison. His research focuses on Transportation Network Modeling and Simulation, Urban Traffic System Modeling, Connected and Automated Vehicles, Transportation Big Data Analytics, and Intelligent Transportation Systems (ITS).

Dr. Ban has published over 50 papers in refereed journals or as book chapters, and 40 papers in conference proceedings. Dr. Ban is a member of the Network Modeling Committee (ADB30) and the Vehicle-Highway Automation Committee (AHB30) of the Transportation Research Board, and the Elected Vice Chair (2010-2011) and Chair (2012-2013) of the ITS SIG under the Transportation Science and Logistics Society of INFORMS. He also serves on the Board of ITS-NY. Dr. Ban is an Associate Editor of the Journal of Intelligent Transportation Systems, Networks and Spatial Economics, and Transpormetrica - B. He also serves on the editorial board of Transportation Research, Part B, Part C. He received the CAREER Award from the National Science Foundation in 2011, the New Faculty Award from the Council of University Transportation Centers (CUTC) and the American Road & Transportation Builders Association (ARTBA) in 2012, and the Research Excellence Award from the School of Engineering of RPI.

Shanjiang Zhu, Assistant Professor, George Mason University

Dr. Shanjiang Zhu is an Assistant Professor of Transportation Planning and Engineering at George Mason University (GMU). He graduated from Tsinghua University with a B.S degree in 2003 and a M.S in 2005. During 2001-2003, he studied at the Ecole Centrale de Nantes, in France, as a dual-degree student. He obtained his Ph.D. degree at the University of Minnesota, Twin Cities, in 2010 and worked two years as a Research Scientist at the University of Maryland before joining GMU. Dr. Zhu is experienced in travel demand modeling, travel behavior analysis, GPS-based travel survey method, integrated transportation planning and simulation models, traffic incident management, and transportation economics. Dr. Zhu is a Co-PI of the newly founded TransInfo UTC that focuses on Big Data studies in transportation. His research work has also been funded by VDOT and Virginia OPT3 office. He is Virginia Governor's appointee on the Technical Advisory Board of Northern Virginia Transportation Authority and is a fellow of GMU P3 policy center. Dr. Zhu is a champion of multi-disciplinary research approach. He holds three Master's degrees in Civil Engineering, Automatics, and Applied Economics, respectively. Dr. Zhu is the recipient of International Transport Forum's 2014 Young Research of the Year Award.

William E. Geary, Jr, Deputy Commissioner, DPW Highways, Erie County

William E. Geary, Jr. was appointed Deputy Commissioner in the Department of Public Works – Division of Highways for Erie County, New York in October 2012 after serving as Senior Highway Maintenance Engineer for four years.

As Deputy Commissioner, William is responsible for 1,179 centerline miles of road, 278 large bridges, 466 small bridges and 17 parks bridges. His responsibilities also include managing Five Maintenance Districts and Fleet Operations.

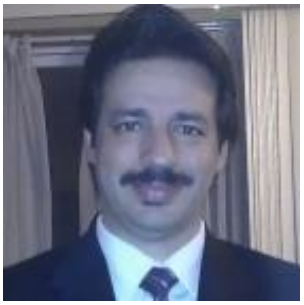
William holds two degrees obtained through the Air Force as well as a yellow belt in Six Sigma. He also serves on the WNY APWA Board of Directors, and he is on the WNY Incident Management Team for eight WNY Counties.

William is currently a flight engineer in the Air Force Reserves with 24 years of service and six deployments since 2003 for Operation Enduring Freedom and the Global War on Terrorism. He has been awarded 15 medals to include four Air Medals for achievements in combat.

William Smith, Director of Access and Safety, BNMC

Bill joined the Buffalo Niagara Medical Campus, Inc. team in 2008 as Project Associate, initially brought on to assist in updating the BNMC Master Plan and Implementation Strategy. From 2012 to present, Bill has served as the organization's Director of Access and Safety, responsible for the ongoing planning, implementation and day-to-day management of the BNMC's parking and transportation systems, as well as facilitating collaborative public safety initiatives on and surrounding the Campus. Bill's additional responsibilities at the BNMC include creating a robust system of sustainable and efficient transportation and parking options, developing Transportation Demand Management (TDM) strategies to promote smarter commuting choices among workers, database management and analysis utilizing Geographic Information Systems (GIS) applications, and managing various projects to develop innovative solutions to transportation and parking issues on and around the BNMC.

Faroog Ibrahim, Executive Director, Savari Networks



Dr. Faroog Ibrahim, a doctorate of engineering from UDM with a major in EE has a total of around 27 years of experience. He is a US expert to ISO/TC204/WG14 and the global work item leader for ISO 15623 FVCWS and Cooperative ACC. Dr. Ibrahim has around 45 granted and published patents and trade secrets, and around 45 publications. In addition of being in Executive director position, Dr. Ibrahim has led successfully the V2X applications development. Different Safety applications were developed, demonstrated and validated successfully. In addition, he filed 5 patents in the connected vehicle technology. Before Joining Sa vari in 2012, he spent 15 years of experience in the automotive industry at Takata's active safety systems, Visteon's ADAS-algorithm and controls technical fellow and ford's research engineer. His main areas of expertise are in radar, vision, connected vehicles and map based active safety/ADAS algorithms, fusion and control. He also had developed first demonstrable PAFS and CSW systems. Dr. Ibrahim has an additional 10 years of research experience mostly at universities.

Qing He, Stephen Still Assistant Professor, State University of New York at Buffalo

Dr. Qing He is currently the Stephen Still Assistant Professor in Transportation Engineering and Logistics, affiliated with both Civil Engineering and Industrial Engineering at University at Buffalo, The State University of New York. He obtained his PhD degree from University of Arizona in 2010. Prior to joining faculty, he worked as a postdoctoral researcher in IBM T J Watson Research Center, where he has been working on Smarter Transportation projects from 2010 to 2012. His research vision is to develop a multimodal, multidimensional transportation and logistics systems with Big Data and information technology, using a broad range of techniques, including optimization, control, simulation, and statistics. Specifically his research addresses problems in transportation modeling and operations using mobile sensors, incident management, and Intelligent Transportation Systems (ITS).

Dr. He possesses 7 U.S. patents in transportation analytics. He also won 2nd place in TomTom Traffic Prediction Contest of IEEE ICDM (International Conference on Data Mining) in 2010, and won IBM Faculty Partnership Award in 2012 and 2014, respectively.

Didier Valdés, Professor, University of Puerto Rico Mayaguez

Dr. Didier Valdés has a bachelor's degree in Civil Engineering from La Gran Colombia University, a master's degree in Traffic and Transportation Engineering from El Cauca University, Colombia, and completed his Ph.D. at The University of Texas at Austin. His dissertation thesis, titled "Integrated Information and Traffic Control Strategies for Congested Urban Freeway Corridors", was related to the integration of information and traffic control strategies to manage incident situations.

Dr. Valdés More joined the University of Puerto Rico in 1999, and since then he has been involved in high quality research. Dr. Valdés' research interests include the application of operations research tools, simulation and systems engineering, and system dynamics to the analysis, modeling, and control of transportation systems; highway safety; information and traffic control strategies on urban networks; urban rail transportation systems; information supply strategies during incident situations; Intelligent Transportation Systems; optimal control and fuzzy logic and their applications to traffic control; graduate and undergraduate engineering education; research ethics and ethics across the curriculum; professional development programs and pre-college outreach programs. He has been involved in high quality research projects for several agencies including NSF, FHWA, UTRC, the PR Department of Transportation and Public Works (DTOP), PR Highway and Transportation Authority (ACT), PR Authority for Public-Private Partnerships (AAPP), and the PR Infrastructure Financing Authority (AFI). Dr. Valdés has served on various TRB committees and NSF peer review panels and for over 10 years he has been the director of the PR Summer Transportation Institute (STI) where he encourages high school students to pursue careers related to the transportation industry.

John Handley, Transportation Analytics, PARC, A Xerox Company

Dr. John Handley leads research projects in transportation analytics at PARC, Inc., A Xerox Company based in Webster, NY. One of his projects deals with developing a visualization and analysis platform for transportation data. He leads a team that is creating novel quality of service analytics for public transit. He also leads a project in connected vehicle analytics with the Mobility Transformation Center at University of Michigan. The work of his teams appears in transportation services offered by Xerox Corporation. He has a basic research agenda where he collaborates with Cornell University on developing statistical methods for urban informatics.

Dr. Handley holds a B.S. and M.S. in mathematics from Ohio State University. He obtained a Ph.D. in imaging science from Rochester Institute of Technology. A mathematical statistician at heart, he transitioned from image processing to data science in 2003 and to transportation analytics in 2010. He has 20 journal publications in applied statistics, image processing and quantitative paleoecology, several book chapters and numerous conference papers and presentations. His recent work appears in the Transportation Research Board annual meetings and the IEEE ITS Conference. He holds 60 US patents.

Hal Morse, Executive Director, Greater Buffalo Niagara Regional Transportation Council

As Executive Director of the GBNRTC since 2000, Hal is responsible for guiding a metropolitan planning process (MPO) in the Buffalo-Niagara Region of New York State. Primary focus is development of integrated multimodal plans for transportation and development in the region including the recently completed *One Region Forward*, regional plan for sustainable development. The MPO also develops near term priorities for transportation projects funding to deliver on the Plan. As a border region, GBNRTC is actively involved in issues and planning between the United States and Canada.

Hal also worked for 15 years with Westinghouse Corporation as Project Integration Manager, in strategic planning and project management with the business focused on environmental remediation. Other experience includes County Planning Director in New York State, as well as multicounty regional and metropolitan (MPO) transportation planning in the State of Michigan. Educational background is in urban transportation planning, with Bachelors and Masters Degrees from the State University of New York at Buffalo. Hal is professionally certified in Project Management (PMP).

Thomas George, Director of Public Transportation, Niagara Frontier Transportation Authority

Tom George is the Director of Public Transit for the Niagara Frontier Transportation Authority (NFTA) where he provides overall direction for NFTA Metro business group including public transportation administration, operations, maintenance and financial planning and administration. Responsible for providing over 30 million rides annually, Metros light rail, bus and paratransit services serve Western New York including the cities of Buffalo and Niagara Falls.

Mr. George was previously the Executive Director of the Niagara International Transportation Technology Coalition (NITTEC) providing overall leadership and management responsibilities for the multi-agency international coalition of transportation entities in Western New York and Southern Ontario. Mr. George's professional career includes over thirty years of working in all modes of transportation. Tom's previous experience includes over twenty years of private sector consulting in public transportation, intelligent transportation systems, and many aspects of transportation including highway, airports, facility and traffic systems.

He currently serves on the Board of Directors of New York Public Transit Association (NYPTA) and is an active member of many professional affiliations including the American Public Transit association (APTA), Transportation Research Board (TRB) and the Institute of Transportation Engineers (ITE).

Mr. George is a Licensed New York State Professional Engineer with a Bachelor of Science degree from Michigan Technological University.

Alberto Figueroa, Executive Director, Integrated Transit Authority of Puerto Rico and Professor, University of Puerto Rico Mayaguez

Dr. Alberto M. Figueroa is Professor at the Department of Civil Engineering and Surveying in the University of Puerto Rico at Mayaguez (UPRM) and a Registered Civil Engineering in Puerto Rico. He has BSCE and MSCE degrees in Civil Engineering from UPRM and a PhD degree from Purdue University. His PhD dissertation was related to the development and calibration of statistical and econometrical models for the evaluation of traffic operations, safety, driver behavior, and risk perception. Dr. Figueroa has been exposed to advanced traffic operations and controls, vehicle detection technologies, and ITS applications since his work at the Traffic Operations and Controls Laboratory and the Mobile Traffic Laboratory at Purdue University. He has served as the Deputy Director of the Puerto Rico Transportation Technology Transfer Center at the UPRM and the Coordinator of the FHWA Dwight D. Eisenhower Transportation Fellowship Program and he is a member of the College of Engineers and Surveyors of Puerto Rico, the Institute of Transportation Engineers, and the Transportation Research Board.

Dr. Figueroa has published and presented his research results in recognized journals and professional meetings in areas related to highway geometric design, user behavior of transportation systems, development of statistical and econometrical models for the prediction of vehicle speeds and highway crashes, analysis of motorcycle-related crashes in Puerto Rico, evaluation of transit technologies for the expansion of the Tren Urbano System, and the evaluation of the service quality of pedestrian facilities and bus services in San Juan. He served as the President of the Metropolitan Bus Authority of Puerto Rico from 2013 to 2015 and, since February 2015, he is the Executive Director of the Integrated Transit Authority of Puerto Rico.

Eric Wood, Research Engineer, National Renewable Energy Laboratory

Eric Wood is a research engineer at the National Renewable Energy Laboratory (NREL) in Golden, Colorado. Working in NREL's Transportation and Hydrogen Systems Center, Eric focuses on integrating real-world travel data into the analysis of vehicle, infrastructure, and energy storage systems. Interfacing closely with NREL's Transportation Secure Data Center (TSDC), Eric routinely works with large geographic-enabled databases linking time series measurements to underlying road network and elevation/grade layers in a variety of database and geographic information system (GIS) programs. Eric employs quality control, statistical analysis, and data visualization to turn "big data" into quantifiable trends and actionable analysis.

Kevin Majka, Senior Scientist, CUBRC

Dr. Kevin Majka is a senior scientist at CUBRC in Buffalo, NY and a key contributor to projects at in the Public Safety and Transportation Group. He has a Ph.D. in geography from the State University of New York at Buffalo with specializations in transportation modeling and geographic information systems. Dr. Majka is experienced in spatial analysis, including statistical pattern recognition, demographic analysis, interpreting quantitative and qualitative environmental data, the use of global positioning and remote sensing technologies, and the development and management of complex geographic databases. He is primarily focused on transportation modeling and safety, motor vehicle crash analysis, and driver behavior.

Ivette Cruzado, Associate Professor, University of Puerto Rico Mayaguez

Dr. Cruzado has a Ph.D. in Civil Engineering from Penn State University, a Master in Science in Civil Engineering from Michigan State University and a Bachelor in Science degree in Civil Engineering from the University of Puerto Rico at Mayaguez (UPRM). Dr. Cruzado has been a faculty member in the UPRM since the year 2009. The PI serves as member of the Transportation Research Board (TRB) Geometric Design Committee (AFB10).

During her doctoral studies, Dr. Cruzado contributed in several research projects related to the influence of highway geometric features on operating speeds, as well as vehicle lateral placement. Also, she has participated in research projects related to drivers' response due to roadway signs and pavement markings. Her Ph.D. dissertation *Factors Affecting Driver Speed Choice along Two-Lane Rural Highway Transition Zones* compared various speed prediction models for rural high-speed to urban low-speed transition zones; these were panel data, multilevel models, and generalized estimating equations (GEE).

Since being a member of UPRM's faculty, Dr. Cruzado has participated in various research studies across several engineering areas, such as the evaluation of the Luis Muñoz Marin International Airport located in Carolina, Puerto Rico, a study in the performance of students when applying the inverted classroom in a transportation engineering course, and a research focused on developing speed prediction models along horizontal curves that include the influence of changes in vertical alignment. Currently, Dr. Cruzado is involved in two projects which are part of the Transportation Informatics (TransInfo) University Transportation Center. One project, along with Dr. Manuel Rodriguez from Electrical Engineering, is focused in developing mobile applications that will substitute the written forms for both vehicle accident and traffic violations reports. The second project, along with Dr. Didier Valdes from Civil Engineering, aims to develop performance measures for the public transportation system of the Metropolitan Bus Authority, which serves the San Juan Metropolitan Area in Puerto Rico, based on data collected by the buses' GPS equipment.

Richard McDonough, Director (Acting), Planning and Development Bureau, Office of Modal Safety and Security of NYSDOT

Rick is currently Director of NYSDOT's Connected Vehicle program, and is the Acting Director of technology development and infrastructure projects in support of NYS' commercial vehicle safety programs. His office currently includes NYSDOT's Oversize/Overweight Permitting Program, which issues approximately 160,000 permits annually in support of billions of dollars of freight movement. He manages all IT projects within the Office of Safety and Security, and also serves as the liaison and coordinator of IT projects within the Operations and Asset Management Division under Assistant Commissioner Rod Sechrist.

Rick is currently the co-chair of the I-95 Corridor Coalition's Intermodal Freight and Passenger Movement Committee, the former chair of the ITSA Commercial Vehicle & Freight Mobility Forum, and he presently represents NYSDOT on the NYS Motor Truck Multi-Agency Task Force and the AASHTO & Pooled Fund Study Connected Vehicle Working Groups, as well as the newly created AASHTO Deployment Coalition for V2I.

He also has been Director of the NYSDOT Grade Crossing Safety Program, Freight Assistance Program, and the Passenger and High Speed Rail Programs. He has been directly responsible for managing and delivering over 900 capital and IT projects throughout his career. He received his B.S. in Civil & Environmental Engineering from Clarkson University and did his graduate studies at the Rockefeller College of Public Policy and Administration.

Larry Brinker, Executive Director of NUAIR Alliance

Lawrence H. Brinker, Esq. is an experienced pilot and aviation attorney currently serving as the Executive Director & General Counsel of the NUAIR Alliance, a Not-for-Profit corporation with over 70 public, private, and academic partners, managing the Griffiss International Airport, FAA authorized, Unmanned Aircraft Systems Test Site in New York, Massachusetts, and Michigan.

He is retired from the US Air Force with 25 years total active and reserve service. During his military career he attained the rank of Lt. Colonel and held various positions including Command Pilot, Intelligence Officer, Operations Officer, Ethics Counsel, Congressional Liaison and Squadron Commander.

Brinker is also a FAA rated Airline Transport Pilot with multiple type ratings and over 8000 international and domestic flying hours. He is an FAA rated Flight Engineer in turbo-jet aircraft. He also served as an FAA Aviation Safety Inspector (Air Carrier). He has served as legal and public policy advisor to private and public sector clients from around the world.

He attended the US Naval Academy and graduated from The Citadel with a BA in Political Science. He earned an MBA from Southern Illinois University and a JD degree from Atlanta Law School. Mr. Brinker is a member of the Federal Bar Association, Georgia Bar Association, the NTSB bar Association, the Air Force Association, Lawyer Pilots Bar Association and serves as a panel attorney on the AOPA Legal Services Plan panel.

Michael Brown, Senior Engineer, Southwest Research Institute

Mike Brown is a Staff Engineer with Southwest Research Institute and has been a leader in the research and development of intelligent systems for over eighteen years. He has served various federal, state, and commercial clients in projects spanning the areas of Advanced Traffic Management and Traveler Information Systems, Connected Vehicle Systems, and Vehicle Automation. He also serves as a subject matter expert on a number of standards development committees including IEEE 1609, SAE J2735, and NTCIP Center-to-Center (Chair).

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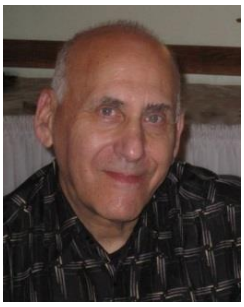
Alan Blatt, Director, Public Safety and Transportation, CUBRC



Alan Blatt is currently is Director of the Public Safety and Transportation Group at CUBRC. He has been the Program Manager for a number of transportation safety programs including the recently completed Erie County Data Collection Test Site of the Strategic Highway Research Program 2 Naturalistic Driving Study and the Center for Transportation Injury Research. His current interests are in the development of advanced technologies to improve emergency response services and research to reduce the number and severity of motor vehicle crashes. Mr. Blatt has more than 50 transportation safety-related publications and has received his B.S. and M.S. in Engineering from SUNY at Buffalo.

Eric Nagler, Software Engineer, CUBRC

Eric Nagler is currently a software engineer at CUBRC in Buffalo, NY with a strong background in data intensive computing frameworks. Mr. Nagler has in-depth knowledge with the latest big data processing trends on Hadoop; streaming data platforms; and data storage and query services to ensure actionable insights for data consumers. Mr. Nagler's current responsibility in the transportation domain is the development of a Transportation Research Informatics Platform (TRIP) for the FHWA. This system's primary responsibility is to be a scalable research platform allowing for the integration of multiple disparate data sources into one easy-to-use information system. The TRIP platform will leverage the latest big data and data alignment tools allowing for researchers and data scientists to integrate new data and tools into the system quickly and easily. Currently Mr. Nagler is focused on applying his big data expertise to algorithm development to create advanced predictive analytics for clients use.

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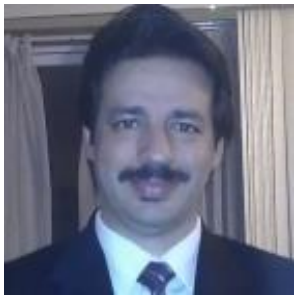

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Joyoung Lee, Assistant Professor, New Jersey Institute of Technology

Dr. Joyoung Lee is an assistant professor with the John A. Reif Department of Civil and Environmental Engineering at the New Jersey Institute of Technology (NJIT). He has Master's and doctoral degrees in civil engineering from the University of Virginia with a focus on Intelligent Transportation Systems, Traffic Operations, and Connected Vehicles. Before joining NJIT in 2013, he was a laboratory manager of the Saxton Transportation Operations Laboratory (STOL) at the Federal Highway Administration (FHWA) Turner-Fairbank Highway Research Center. Dr. Lee's research experiences overarch Connected Vehicle (CV) and its applications covering 1) i) traffic management (i.e. CV-based route guidance system), ii) traffic signal controls (i.e., V2I real-time intersection control), iii) cooperative vehicle infrastructure system (CVIS) for intersection controls, and iv) Dynamic Mobility Applications (DMA)-INFLO Bundle including cooperative adaptive cruise control(CACC), speed harmonization(SPD HARM), and Queue Warning(Q-WARN). Dr. Lee has authored and co-authored more than 40 journal papers and conference proceedings and approximately 100 times of professional presentations at prestigious conferences.

Applications in Simulation-based Transportation Research, such as the Integrated Traffic-Driving-Networking Simulator (ITDNS) at the University at Buffalo

Kevin Hulme, Research Scientist, Center for Engineering Design and Applied Simulation, State University of New York at Buffalo

Dr. Kevin Hulme received his Ph.D. from the Department of Mechanical and Aerospace Engineering at the University at Buffalo in 2000 with a concentration in multidisciplinary analysis and optimization of complex systems. For the past decade, he has served as the technical lead of the Motion Simulation Laboratory at the Center for Engineering Design and Applied Simulation. He and his research team focus on the custom design and development of ground vehicle simulations for applications in: clinical research, education and training, and next-generation transportation studies. Recent areas of focus include: Modeling and Simulation (M&S) in transportation research, standardization of simulators in teen driver safety, fidelity requirements in simulation system specification, multi-participant civilian driving simulators, and serious gaming in simulation-based training.

Data Warehouse Development and Real-Time Incident Detection

Andrew Bartlett, State University of New York at Buffalo

In the traffic engineering field, study and analysis often requires the use of multiple datasets. The nature of these data often makes them difficult to work with, especially in conjunction with one another. The overall goal of this study was to not only design a solution to this problem for the Buffalo-Niagara Region of western New York, but to demonstrate its usefulness through a specific application. To achieve this, three objectives were designed: (1) outline the structure of a data warehouse for the Buffalo-Niagara region, (2) use the combined data in the prototype warehouse to examine its usefulness in the construction of a real-time incident detection system which not only detects incidents but also tries to predict incident characteristics, and (3) show the importance of the data warehouse by comparing the results of incident detection strategies which require different combinations of data. To meet these objectives a prototype data warehouse was first created, and then used in the creation and validation of three incident detection strategies: a speed threshold detection system, a binary probit model which uses only speed data, and a binary probit model which uses a combination of speed and volume data. The prototype data warehouse showed it was possible to construct a fully fleshed-out version for transportation data in the Buffalo-Niagara region with useful results. The speed threshold model which used a 10 minute speed drop of 10 mph to detect incidents had a 62.5% detection rate, as well as favorable false alarm and classification rates. The more complex binary outcome model which used only speed data detected incidents with a success rate of 70.4%, an improvement over the speed threshold model despite worse false alarm and classification rates. It was also able to predict incident type, number of blocked lanes, and incident severity with 75.9%, 70.4%, and 75.9% accuracy, respectively. The binary outcome model which used both speed and volume data had a more impressive detection rate of 75.5% with similar false alarm and classification rates and was slightly better at predicting incident type and severity (both with 77.6% accuracy) but slightly worse at predicting the number of blocked lanes (with 69.4% accuracy). Overall, the combined data model is the best strategy for both detecting incidents and predicting their characteristics, which emphasizes the importance of a transportation data warehouse.

Analysis of the factors that affect accident frequencies on highway segments with different traffic volumes and traffic compositions

Ugur Eker, State University of New York at Buffalo

Accident frequencies can be influenced by the level some motorists are alert, or by how some motorists perceive risk, under different traffic conditions. For example, under low traffic volume (overall, or truck) conditions, some motorists may be less alert while driving, which can possibly make them more accident prone. At the same time, some motorists may compensate for the same low traffic volume conditions, and drive faster, which can also make them more accident prone. And the contrary also stands; high traffic volume (overall, or truck) conditions can keep some motorists more alert, or can make them drive slower to compensate for the high-risk conditions, which in both cases make the motorists less accident prone. This paper, seeks to investigate the possibility that different factors can affect accident frequencies, when the latter are observed on highway segments under different traffic volumes and traffic compositions. Random parameters negative binomial models are estimated, and through the use of likelihood ratio tests, the results reveal that different sets of factors affect the accident frequencies for different traffic conditions.

Car Accident Report System (CARS): A Mobile application for Vehicle Accident Report Submission

Omar Gerardo Soto Fortuno, University of Puerto Rico, Mayaguez

There are approximately 29,589 vehicle crashes daily in the United States (US) (National Highway Traffic Safety Administration, 2012). Information from these crashes can be used by researchers to recommend improvements to the highway's infrastructure that could lead to an increase in roadway safety. However, in the Commonwealth of Puerto Rico and the majority of US localities, police officers are required to collect this information manually on the scene using a paper based vehicle accident report which often leads to legibility issues when transcribing this information to computer information systems. Important information can be missed that will later be useful for several applications, such as identification of exact location of the crash, request of emergency services, and data analysis for research studies, among others. Improving the process of having this information available for a transportation engineer is important in order to take safety measures in a timely manner. These improvements can reduce vehicle crashes that actually cause approximately 35,900 fatalities each year in the US (National Safety Council, 2012). Another significant issue is the difference between vehicle accident reports within different US localities. This issue does not help interested parties to get critical information in the same matter for all the states. To handle this deficiency, the Model Minimum Uniform Crash Criteria Guideline (MMUCC) has been developed, which offers a standardized data set for describing motor vehicle crashes and the vehicles, persons and environment involved. This project seeks to mitigate these issues by developing the Car Accident Report System (CARS), an electronic accident report system. The CARS is an Objective-C based iPad application that will be accompanied by the development of a web service utilizing

Java Play Framework and MariaDB. The web service will interact with the iPad application as an Application Programming Interface (API) using the Representational State Transfer (REST) standard. The iPad application will also include tools to improve the data entry process, such as: Google Maps API, Google Reverse Geocoding API, Edmunds VIN Decoder, and pdf417 Barcode Scanner (for driver licenses), among others. The MMUCC will be important in order to define which data needs to be gathered at the scene by the police officer using the iPad application. Having this information entered directly into the system will significantly reduce the time to have this information available to interested parties.

Development of an Accurate and Time Efficient Electronic Crash Report Application Based on Police Feedback

Jose R. Gonzales, University of Puerto Rico, Mayaguez

The written Police Traffic Accident Report (PTAR) forms from Puerto Rico (PR) has not been updated since 1989. Literature review has shown that data obtained from the written PTARs have several inconsistencies regarding missing information, legibility issues, and errors of crash locations. In 1996 a study compared the efficiency of electronic reporting with written reports; the results indicate that, using only 47 cases, an increase in efficiency is obtained by the use of an electronic report. Since January 2015, a new (paper) PTAR has been developed but it still has not been provided to the Police of PR as is awaiting approval from the Superintendent of the Police of PR. The purpose of this research is to develop an accurate and time efficient electronic version of the PTAR using Apple IPads. The objective is to determine the application's reporting efficiency and accuracy with the participation and feedback from the police officers of PR. Individual interviews with Police Officers will be conducted. These officers will have a trial run of both versions of the report and will be given 3 hypothetical cases so they can fill out each case in random selection in either the paper or the electronic version. The time of filling the reports will be taken for each case to determine time efficiency and data from the sample will be compared with the corrected report to determine accuracy. Two-sample t-tests will be performed to determine time efficiency, if any, of the electronic version whereas two-proportion Z-tests will determine if there is an increase in accuracy.

Impacts of Policy-Induced Freight Modal Shifts

Lokesh Kalahasthi, Rensselaer Polytechnic Institute

Freight system is a crucial component of a country's economic competitiveness and also a major part of traffic in the network. Freight transportation produces negative impacts on society such as pollution, emission of Green House Gases (GHG), noise, congestion and also a major consumer of natural resources. Freight is a complex system involving interactions among many players: shippers, carriers, receivers, freight-forwarders, warehouse operators, third party logistics providers, etc. Freight can be moved by several modes: road, rail, water, air, pipeline, etc. In addition, each mode has various types of vehicles with different characteristics. Each type of vehicle in a given mode has its own merits and de-merits in terms of travel time, service, accessibility, and fuel consumption. Policies should aim at utilizing various modes of transportation effectively that minimizes the energy consumption, externalities while fostering the economic growth.

Modal split is one of the four steps in the transportation planning process: trip generation, distribution, mode split, and traffic assignment. There is very limited research in the field of freight mode choice. The target of this study is to study the current modal pattern, analyze the factors influencing the mode choice of different freight agents and to develop analytical methods to assess various policy implications on modal patterns. The methodology adopted in this research comprises of a thorough literature review, case studies pertaining to policy implications on mode, In-Depth-Interviews (IDI) with various freight agents, and analyzing the Commodity Flow Survey (CFS)-2007 data.

CFS is carried out by the Census Bureau and the Bureau of Transportation Statistics (BTS) every five years. It is a domestic shipper-based mandatory survey that covers mining, manufacturing, wholesale trade, and selected retail and services sectors. Transportation, construction, farms, fisheries, foreign establishments, most shippers in retail, services, government sectors and imports till it reaches the domestic shipper are not covered by the CFS. These data have the information on origin, destination, date, mode, commodity type, industry sector, value, distance, shipment size, foreign destination (exports only), hazardous material, temperature control sent by nearly 100,000 shippers at 123 CFS geographic areas spread across the US, except Puerto Rico, U.S. possessions and territories. These information is collected for four weeks, an entire week in each quarter. CFS is the only publicly available data for the highway mode to analyze the movement of goods and forecast the flows. Disadvantages include it covers only the freight production for shippers, but not carriers and receivers. Freight attraction (goods received) by the firms is not included in the CFS. CFS micro data (establishment level) may not provide freight details between all origin and destination due to sample limitations; require more time to process and is difficult to obtain access due to confidentiality restrictions.

This poster presents the overview of the project, current freight modal pattern, a thorough literature review, factors influencing the mode choice – a brief review of IDIs and a detailed description of the CFS data. This also includes the advantages, challenges, and limitations in using the CFS data. The poster concludes with the future work, additional data that could be used for the analysis.

Measuring Demand Elasticity for U.S. Toll Roads: An Aggregate Analysis of Panel Toll Data Collected from a Large Sample of U.S. Tolled Roads

Jeong Kweun, George Mason University

This paper estimates the aggregate price elasticity for travel demand with distance based toll rates using the dynamic panel data model. The paper is of interest in part because it uses an aggregate approach which is an alternative to the current literature in the U.S. that uses individual survey data to make these estimates. While static demand models have been used frequently in the literature, studies are few using a dynamic demand model for the aggregate level analysis in the U.S. This paper uses a large number of panel data sets collected from nearly one hundred toll road facilities between 1984 and 2013. This paper finds that the toll price elasticity of demand is -0.1028 in the short-run and -0.1817 in the long-run.

Dynamic Traffic Signal Timing Optimization Strategy Incorporating Various Vehicle Fuel Consumption Characteristics

Wan Li, Rensselaer Polytechnic Institute

This paper proposes a dynamic traffic signal timing optimization strategy (DTSTOS) based on various vehicle fuel consumption and dynamic characteristics to minimize the combined total energy consumption and traffic delay for vehicles passing through an intersection. With the increasing penetrations of new vehicle types and configurations, vehicle fuel consumption characteristics become rather diversified and dynamic, and need to be explicitly incorporated in the traffic light timing control in order to improve the reduce the total energy consumption and traffic delay. Through the vehicle-to-infrastructure (V2I) communications, information and states of individual vehicles around an intersection can be made available to the traffic light controller for producing the optimal traffic light timing. Unified and control-oriented speed-type fuel consumption models for various types of vehicles in conjunction with a simplified traffic model are employed to conduct real-time traffic light timing control optimization using an iterative grid search method. The effectiveness of the DTSTOS was evaluated and demonstrated with a traffic simulator in VISSIM under various traffic flows and vehicle types. The proposed plan was compared with Synchro and the consistent results were obtained.

TransInfo's Electronic Ticket Platform: Towards an Improved Traffic Violations Data Collection System Dynamic Traffic Signal Timing

Christopher Torres Lugo, University of Puerto Rico, Mayaguez

Issuing citations for law and regulation violations is one of the most common tasks that police and other state officers are required to perform. Currently, this task is mostly performed manually, thus making it costly, error prone, and slow. This lack of efficiency brings consequences which can range from invalidated tickets to non-compliance with federal and state governments due to outdated statistics. In the case of the Government of the Commonwealth of Puerto Rico, the Department of Transportation and Public Works (DTPW) estimated that, for the fiscal years 2011 and 2012, 28% of all issued traffic tickets were not registered and 1% of these were cancelled due to errors, while revenues for only 14% of them were collected. This project seeks to correct these inefficiencies by developing TransInfo's Electronic Ticket Platform, a client-server system that will streamline the whole ticketing process, from issuance and collection to making data accessible and consistent for analysis and statistics. In order to achieve these goals, a Swift-based iPad application that provides a uniform interface for its users is being developed. It is expected that this application will serve the ticketing needs of Puerto Rico's officers and other stakeholders, ranging from the state and municipal police departments to the departments of Natural and Environmental Resources and DTPW.

Transit Performance Measures Using Big Data

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Performance measurement and peer comparison are valuable tools that can be used to evaluate actual performance, identify areas that need improvements, and establish feasible goals for a near future. With the most recently advances on technology, we had entered the Big Data world, where it is possible to acquire a great deal of information with relatively low cost or efforts. In the past, the industry relied heavily in the use of relatively small samples, which findings had to be extrapolated to the whole phenomenon. But with the development of technology now is possible to measure the performance of a transit system using data from the entire system. The San Juan Metropolitan Area (SJMA) is the urbanized area surrounding Puerto Rico's capital. It includes over 10 municipalities and its population is over a million. The Metropolitan Bus Authority (AMA, for its name in Spanish) is the government transit agency that serves SJMA. Real-time GPS data is available for the buses; the exact location of all the buses in service is registered in 10-second intervals. In addition, passenger counters are installed in buses

high demand corridors; this information is registered and sent to the AMA Control Center. Several new real-time performance metrics will be established that will assist AMA to improve the efficiency of the routes. Passenger counts and load diagrams will be used to establish new strategies in order to improve the quality of service and increase the attractiveness of the public transit system.

Identification of traffic flow state from a single vehicle trajectory

Choudhury Siddique, Rensselaer Polytechnic Institute

Today GPS-enables smartphones can be used as an accurate and extensive source of traffic information and current situation demands an even better efficiency and improved performance from the system. This study has developed and validated a methodology that uses Support Vector Machine, a machine learning technique to identify the traffic flow state (free flow/congested) from the GPS data of a single vehicle trajectory. The identification of traffic state in real time will provide multiple benefits such as significant reduction in the amount of GPS data to handle and reduced battery uses and cellular data uses.

Multinomial Logistic Regression for Land Use Classification with Remote Sensing

Louis Tang, State University of New York at Buffalo

In the era of big data, harnessing remote sensing data for transportation decision making has become an achievable task. This paper focuses on land use classification on the finest parcel scale by using remote sensing data as input. Different from other relevant researches, we utilized the multinomial logistic regression, or called multinomial logit (MNL) models, for land use classification, whose great potentials have been overlooked in field of land use classification. In addition to using spectral features collected by remote sensing, we also suggest using transportation related attributes, such as the distance from a parcel of land to the nearest road or intersection, as ancillary input to improve overall classification performance. The MNL models were tested on the land use data collected in the City of Buffalo, New York. The best model achieves an average prediction accuracy of 83.7%. For the residential and commercial parcels, the prediction accuracy reaches up to 94.5%. As expected, the suggested transportation related attributes were found significant in discriminating land use classes. Two main conclusions were raised from the research, including remote sensing as a reliable data source for timely updating land use and land cover, and the applicability of the MNL models for land use classification with remote sensing.

Effect of Turns, Signals and Other Network Variables on Route Choice

Mohan Venigalla, George Mason University

The route-choice problem may also be stated in the form of a rhetorical question, "What is the most practical path from point A to point B?" It is widely accepted that there is no single answer to this question because path choice on a trip is dependent on trip characteristics, network attributes, and traveler's personal characteristics. The best-known network variables that influence route-choice are travel distance and travel time. This research attempts to study the influence of other network variables, namely signals, turns and roadway classification on route choice. Real world trip data from GPS-tracked path trajectories in an urban area are used to isolate nearly 5700 unique real paths. Procedures to compute theoretical shortest-time path (STP) and shortest-distance path (SDP) based on travel time and distance as impedance variables, respectively, are developed. Street network data is augmented with data on signalized intersections. Procedures to identify turns and road classes along the real and theoretical paths are developed. The real paths are compared to their STP and SDP counterparts to identify discernible relationships between the network variables and the path choice. The number of traffic signals along the path is found not to be a statistically significant factor during the path selection process. On the contrary, for trips shorter than 10 miles drivers embraced more signals along their chosen travel paths than the number of signals that are present along the SDP or STP. It is observed that drivers are willing to spend longer time or travel longer distances on paths that have fewer turning movements. Furthermore, there is statistical evidence to indicate that real paths have fewer turns per mile than both STP and SDP. When they must make a turn to complete their trips, drivers seem more prone to making the turn at a signal controlled intersection, while at the same time trying to minimize the number of turns occurring at unsignalized intersections. Most notably, for trips shorter than 5 miles in length, real paths have a statistically significant fewer left-turns per mile than right-turns per mile. This leads to the conclusion that drivers tend to minimize left turns while selecting a path. Exceptions to these observations are very few and they all happen with paths longer than 10 miles. It is anticipated that the findings from this research will be influential and make it easier to find paths that are more consistent with drivers' real choices and consequently provide more sound solutions to modeling transportation networks.

A Bounding Box Approach to Network Pruning for Efficient Path Search Through Large Networks

Mohan Venigalla, George Mason University

In this research, the term "network pruning" is used to describe the process of extracting an appropriate sub-network for efficient path search. There is sparse literature on network pruning methods, potentially due to the rapid improvement of computing resources and the proprietary nature of such problems for service providers. However, this issue reemerges due to applications on small devices and to travel behavior studies that require repeated running of route search routines. To insure the soundness of travel behavior studies and route guidance applications that rely on such routines, different methods need to be evaluated based on real route chosen by travelers, which represents a gap in literature. A bounding-box method is proposed for efficient pruning of large networks and expediting search for the shortest path. The method is evaluated using real world trips tracked by global positioning system (GPS). It is observed that an appropriate sub-network can greatly improve the efficiency of path finding algorithms without losing much accuracy. Through the investigations on real paths, the study found the orientation of the straight line connecting the O-D locations is relevant to the relationship of x and y deviations of the real path. Two types of buffers were investigated in this study - uniform and proportional. The results indicated that the proportional buffer is superior to the usually used uniform buffer considering the balance between efficiency and accuracy. The proportional buffer methodology is expected to be useful in developing such innovative solutions as route guidance applications for drivers of connected vehicles where small devices perform bulk of the computing task.

Mixed Equilibria with Common Link Constraints on Transportation Networks

Xia Yang, Rensselaer Polytechnic Institute

This study concerns about modeling mixed equilibrium (ME), including user equilibrium, system optimum, and Cournot-Nash players, with common link constraints (CLCs) on transportation networks. The CLCs capture the interactions of the decisions variables of different players in ME, which could be internal such as road link capacity constraints or external such as emission or congestion control policies. It is shown that ME with CLCs can be modeled as a generalized Nash equilibrium problem (GNEP). The study proves that, under certain assumptions, the GNEP-based ME is jointly convex, which can be reformulated as a variational inequality (VI). Numerical tests are conducted on a simple two-node, three-link network first and then on the Nguyen Dupus Network. The results show that modeling users' route choice behaviors with CLCs is more general in evaluating system performance, planning link capacities, and making congestion or emission control related policies.

Impact of the Washington Metro Silver Line: One Year Experience

Zhuo Yang, George Mason University

This study documented and analyzed transit ridership data, including those of both the metro system and the regional bus services, in the Metropolitan Washington D.C. area before and after Phase 1 of the Silver Line entered service on July 26th 2014. Most riders of the five new Silver Line stations went to downtown Washington D.C., showing patterns of a monocentric city, although there were also signs for an emerging regional business and commercial center in the Tysons Corner area. Riders at the five new Silver Line stations include both demand shifted from the Orange Line, and new demand. Riders of different stations exhibit different travel patterns. The availability of transfer modes, parking lots, and land use patterns can explain these differences in ridership patterns, and shed lights on travel characteristics such as purposes. Regional bus services complement the metro network and help to shape its demand. This study provides a valuable empirical evidence for researchers, policy makers, and transit system operators. It will also help to inform planners and operators in the region as Phase II of the project is on the horizon.

Collecting Travel Information Using a Smartphone App for Parking Information

Zhuo Yang, George Mason University

This study developed a smartphone app to collect data to advance on campus travel behavior. To motivate participation, this app provides users with on campus parking information collected from different resources, including sensors from gated parking garage, inputs from users, and potentially, a camera-based parking information system. Users can report the latest parking space availability through the app and share information with others. In addition, the app can also provide real-time navigation guidance once users choose which parking lot to use. Users can opt to share their travel information by uploading

their travel trajectory voluntarily, which would inform campus transportation planning and advance our understanding of on campus travel behavior in general.

Spatial-Temporal Traffic Pattern Identification and Anomaly Detection in a Large-Scale Urban Network

Zhenhua Zhang, State University of New York at Buffalo

Regional traffic pattern identification help traffic operators evaluate the performance of traffic operations and put forward corresponding strategies. In this paper, dictionary-based compression method is employed to analyze the ever-growing multi-dimensional traffic-related data and an anomaly index is derived to quantify the performance of traffic operations over a certain period. Then, we further explore the characteristics of traffic patterns in two different perspectives: the spatial and temporal traffic pattern identification which show the concurrent and non-concurrent features of the traffic patterns respectively. Both pattern identification are conducted in three different geographic levels: detector, intersection and sub-region. From different geographic, several important features are revealed including the geographic distribution, pattern shift over different time of day, pattern fluctuations in different days. Both the spatial and temporal traffic patterns defined in our study can jointly characterize pattern changes and provide good reference for traffic operations and management. The method is further validated by a case study on the impact of a newly constructed subway line on its surrounding road traffic.

U.S Department of Transportation Office of the Assistant Secretary for Research and Technology (OST-R)

OST-R is part of the USDOT's Office of the Secretary of Transportation (OST) and comprises all of the program offices, statistics and research activities previously administered by the Research and Innovative Technology Administration (RITA). OST-R is a dynamic, world-class transportation resource with broad technical and institutional expertise not replicated elsewhere - with a mission to transform transportation by expanding the base of knowledge to make America's transportation system safer, more competitive and sustainable.

University Transportation Research Center

The Region 2 University Transportation Research Center (UTRC) is one of ten original University Transportation Centers established in 1987 by the U.S. Congress. The Center, through its consortium, an Agency-Industry Council and its Director and Staff, supports research, education, and technology transfer in the field of transportation under its theme "Planning and Managing Regional Transportation Systems in a Changing World." Presently, under the direction of Dr. Camille Kamga, the UTRC represents USDOT Region II, including New York, New Jersey, Puerto Rico and the U.S. Virgin Islands. Functioning as a consortium of nineteen (19) major universities throughout the region, UTRC is located at the CUNY Institute for Transportation Systems at The City College of New York, the lead institution of the consortium.

The Institute for Sustainable Transportation and Logistics

The Institute for Sustainable Transportation and Logistics (ISTL) serves as an umbrella which brings together faculty and students from all across the University at Buffalo interested in transportation and logistics research. ISTL is jointly led by the School of Engineering and Applied Sciences (SEAS) and the School of Management (SOM), and houses research programs focused on transportation, logistics and Supply-Chain Management (SCM), will offer a new interdisciplinary master's degree (along with a certificate) in Sustainable Transportation and Logistics, and engages in outreach for community engagement and fostering partnerships with governmental agencies, industry, and other academic institutions (both domestic as well as international).

Transportation Informatics Tier I University Transportation Center

Transportation Informatics (TransInfo) Tier I University Transportation Center leverages its partnership with top-tier transportation research universities to collaborate with government, industry, academia, and policy makers around the globe in search of transportation solutions by mining the wealth of big data available and employing a wide variety of methods, tools and models, including artificial intelligence (AI), machine learning, statistics, and database systems.

State University of New York at Buffalo

UB is a premier, research-intensive public university and a member of the Association of American Universities. As the largest, most comprehensive institution in the 64-campus State University of New York system, our research, creative activity and people positively impact the world.

George Mason University

George Mason University is the largest public research university in the Commonwealth of Virginia. The university was founded as a branch of the University of Virginia in 1957 and became an independent institution in 1972. Today, Mason is recognized for its strong programs in economics, law, creative writing, computer science, and business. In recent years, George Mason faculty have twice won the Nobel Prize in Economics. The university enrolls 33,917 students, making it the largest university by head count in the Commonwealth of Virginia.

Rensselaer Polytechnic Institute (RPI)

Founded in 1824, Rensselaer Polytechnic Institute is the nation's oldest technological research university. The university offers degrees from five schools: Engineering; Science; Architecture; Humanities, Arts, and Social Sciences; and the Lally School of Management; as well as an interdisciplinary degree in Information Technology and Web Science.

University of Puerto, Mayagüez

The University of Puerto Rico, Mayagüez is the second-largest university campus of the University of Puerto Rico system. It is a co-educational, bilingual, and non-sectarian school comprising the Colleges of Engineering, Arts and Sciences, Business Administration, and Agricultural Studies with over 12,000 students.

CUBRC

The Center for Transportation Injury Research (CenTIR) was established in 1998 at CUBRC, an independent, not-for-profit, research corporation in Buffalo, NY. The Center's mission is to 1) Perform research which will lead to a reduction in the human and financial costs associated with motor vehicle crashes and 2) Perform advanced research to develop the 'next generation' of emergency response technologies. Technical staffing for the CenTIR is provided by CUBRC's in-house scientists and engineers, as well as by faculty and graduate students from the University at Buffalo. This alliance has enabled the CenTIR to continue the rich 50 year heritage of Buffalo-based research and innovation in automotive crash safety, injury prevention and analysis. Technical oversight of the CenTIR is provided by Federal Highway Administration's (FHWA) Turner-Fairbank Highway Research Center.

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