



**BUREAU OF RESEARCH**

New Jersey Department of Transportation  
**25th Annual NJDOT Research Showcase**

*Commitment to Safety*

NEW JERSEY DEPARTMENT OF TRANSPORTATION

25TH ANNUAL NJDOT

**RESEARCH  
SHOWCASE**

OCTOBER 25, 2023

Conference Center at Mercer  
1200 Old Trenton Road  
West Windsor, NJ 08550

# 25TH ANNUAL NJDOT RESEARCH SHOWCASE

The Annual New Jersey Department of Transportation (NJDOT) Research Showcase is an opportunity for New Jersey’s transportation community to experience the broad scope of ongoing academic research initiatives and share technology transfer activities being conducted by institutions of higher education (IHE) partners and their associates. It also serves to highlight the benefits of transportation research, including NJDOT’s own program. As part of the event, the annual implementation award and recognition of outstanding university students studying in a transportation-related field will be presented.

This program is organized by the NJDOT Bureau of Research in partnership with the New Jersey Local Technical Assistance Program (NJ LTAP) at Rutgers Center for Advanced Infrastructure and Transportation (CAIT) and meets requirements for up to 2 professional development hours (PDHs) for continuing professional competency for licensed professional engineers. \*\*

---

## AGENDA

|            |  |
|------------|--|
| 9:00 a.m.  | <p><b>Introduction and Housekeeping</b></p> <p>David Maruca, Program Development Administrator, Rutgers Center for Advanced Infrastructure and Transportation</p>  |
| 9:10 a.m.  | <p><b>Welcoming Remarks</b></p> <p>Andrew Swords, Director, New Jersey Department of Transportation Division of Statewide Planning</p>   |
| 9:15 a.m.  | <p><b>Opening Remarks</b></p> <p>Diane Gutierrez-Scaccetti, Commissioner, New Jersey Department of Transportation</p>  |
| 9:40 a.m.  | <p><b>Opening Remarks</b></p> <p>Robert Clark, Division Administrator, Federal Highway Administration New Jersey Division</p>  |
| 9:45 a.m.  | <p><b>Keynote Address</b></p> <p>New Jersey Safety and Health Outcomes (NJ-SHO) Data Warehouse<br/>Dr. Allison E. Curry, PhD, MPH, Associate Professor of Pediatrics, Children’s Hospital of Philadelphia</p>  |
| 10:30 a.m. | <p><b>Break</b></p>  |
| 10:40 a.m. | <p><b>Panel Discussion: How is New Jersey Department of Transportation Addressing Safety?</b></p> <p>Andrew Swords, Director, New Jersey Department of Transportation Division of Statewide Planning<br/>Syed Kazmi, Section Chief, New Jersey Department of Transportation Division of Traffic Engineering<br/>Kurt McCoy, Supervising Engineer, New Jersey Department of Transportation Division of Operations Support<br/>Sangaran Vijayakumar, Project Management Specialist 3, New Jersey Department of Transportation Division of Project Management<br/>Hirenkumar Patel, Principal Engineer, New Jersey Department of Transportation Division of Transportation Mobility</p> |
| 11:45 a.m. | <p><b>Presentation of 2023 Awards</b></p> <p>Presented by Dr. Giri Venkiteela, Research Scientist, Bureau of Research, New Jersey Department of Transportation</p> <p>2023 Outstanding University Student in Transportation Research Award<br/>2023 NJDOT Research Implementation Award<br/>2023 Best Poster Award<br/>2023 Research Champion Excellence Award<br/>2023 NJDOT Build a Better Mousetrap Award</p>   |
| 12:00 p.m. | <p><b>Buffet Lunch/Break</b></p>   |

# CONCURRENT BREAKOUT SESSIONS

Presenters selected from abstract solicitation by NJDOT

---

1:00 p.m.

## Concurrent Breakout Sessions

Infrastructure  
Equity/Mobility  
Safety  
Poster Session

1:10-1:35 p.m.

**INFRASTRUCTURE** Room: Auditorium | Moderator: Shane Mott, Rutgers CAIT

Asphalt Pavement Pothole Repair with Recycled Material and Preheating

Presenters: Xiao Chen and Hao Wang, Rutgers University

**EQUITY/MOBILITY** Room: 213 | Moderator: Omid Sarmad, Rutgers CAIT

A Vehicle Trajectory Stitching and Reconstruction Method for Digital Twin Applications with High-Resolution Roadside LiDAR Data

Presenter: Anjiang Chen, Rutgers University

**SAFETY** Room: 214/215 | Moderator: Ryan Stiesi, Rutgers CAIT

Determining Key Factors Linked to Injury Severity in Intersection-Related Crashes in NJ

Presenter: Deep Patel, Rowan University

**POSTER SESSION** Room: 116/117

1:45-2:10 p.m.

**INFRASTRUCTURE** Room: Auditorium | Moderator: Shane Mott, Rutgers CAIT

Development and Analysis of Low Embodied Carbon Concrete Mixtures for Use in Transportation Applications

Presenter: Matthew P. Adams, The New Jersey Institute of Technology

**EQUITY/MOBILITY** Room: 213 | Moderator: Omid Sarmad, Rutgers CAIT

Comparative Analysis of Arterial Characteristics to Evaluate Road Diet Lane Reduction Potential

Presenter: Thomas Brennan, The College of New Jersey

**SAFETY** Room: 214/215 | Moderator: Ryan Stiesi, Rutgers CAIT

Unveiling Perceived Travel Safety for Micromobility Users: A Rider-Centered Exploration

Presenter: Wenwen Zhang, Rutgers University

**POSTER SESSION** Room: 116/117

2:20-2:45 p.m.

**INFRASTRUCTURE** Room: Auditorium | Moderator: Shane Mott, Rutgers CAIT

Rapid Assessment of Infrastructure Using NDT Methods

Presenter: Manuel Celaya, Advanced Infrastructure Design

**EQUITY/MOBILITY** Room: 213 | Moderator: Omid Sarmad, Rutgers CAIT

Developing Indicators for Comprehensive Evaluation of Equity in Transportation System

Presenter: Catherine Abacan and Ruqaya Alfaris, Rowan University

**SAFETY** Room: 214/215 | Moderator: Ryan Stiesi, Rutgers CAIT

Understanding Crash Factors in Disadvantaged Communities: An Examination of Socioeconomic Disparities and Road Safety

Presenter: Ruqaya Alfaris, Rutgers University

**POSTER SESSION** Room: 116/117

## **POSTER SESSION — Posters on Display**

*Room: 116/117*

- Optimizing Road Infrastructure: A Conceptual Simulation-based Study of Dynamic Transit Lanes for Connected Private Vehicles
- Connected Vehicles Data: A New Horizon for Estimating Traffic Counts
- Developing Indicators for Comprehensive Evaluation of Equity in Transportation System
- Materials and Structures Laboratory at NJIT: Resilient and Sustainable Construction Materials Research
- Properties of Cementitious Materials with Reclaimed Cement
- Investigating Performance of Cold In-Place Recycled Asphalt Sections in Accelerated Pavement Testing Using Finite Element Modeling
- Seatbelt Compliance Observation Using Moving Vehicle: A Case Study in New Jersey
- Understanding Travel Behavior Pattern of Commuters with Economic Downturn and Inflation in Dhaka, Bangladesh
- Investigating the Severity of Curve-Related Roadway Departure Crashes: The Role of Driver Distraction, Automation Levels, and Environmental Conditions
- Development of High-Frequency Electromagnetic Induction Technology for Nonintrusive Geophysical Ground Investigation in Cold Regions
- Study of the Failure Mechanisms for Inducing Rockfall Hazard in New Jersey Area
- Machine Learning Based Structural Health Monitoring of Rocking Bridge System under Seismic Excitation
- Truck Parking Availability Prediction Model for Harding Truck Rest Area
- Equity & Safety: Hand in Hand on the Road to Success
- Prediction of Critical Strains of Flexible Pavement from Traffic Speed Deflectometer Measurements
- Design Study and Potential Implementation of Photovoltaic Noise Barrier for Sustainable Highway
- Resiliency Analysis for Work Zone Scheduling on Two-Lane Highways
- Development of an Integrated Model for Friction Estimation with Embedded Flexible Pressure Sensors
- Towards Democratized Flood Risk Management: An Advanced AI Assistant Enabled by GPT-4 for Enhanced Interpretability and Public Engagement
- Computer Vision-based Near Miss Detection among Mixed Traffic Flows within Intersections
- Segment Anything Model for Pedestrian Infrastructure Inventory: Assess Zero-Shot Segmentation on Multi-Mode Geospatial Data
- How Distracted Driving Awareness Month Help Reduce Cellphone Use: A Comparative Analysis Using Moving Observational Data

# About Our Presenters

---

**Robert Clark**, Division Administrator, Federal Highway Administration New Jersey Division

In September 2013, Robert became the FHWA New Jersey Division Administrator. As the Division Administrator, Robert is the principal representative of the Federal Highway Administration (FHWA) in New Jersey and is responsible for administering the Federal-aid highway program in the State.

Robert has been with FHWA for 19 years, prior to that he worked for the North Carolina Department of Transportation in a variety of positions. Robert holds a Bachelor's Degree in Finance from Georgia Southern University and a Master's Degree in Public Administration from North Carolina State University.

**Dr. Allison E. Curry**, PhD, MPH, Associate Professor of Pediatrics, Children's Hospital of Philadelphia

Allison E. Curry, PhD, MPH is an Associate Professor of Pediatrics at the University of Pennsylvania Perelman School of Medicine and a Senior Scientist and Director of Epidemiology and Biostatistics at the Center for Injury Research and Prevention at the Children's Hospital of Philadelphia (CHOP). She is an injury epidemiologist by training and her research focuses on the prevention of motor vehicle crashes and support of safe transport across the lifespan.

Dr. Curry and her team have spent the last decade developing the New Jersey Safety and Health Outcomes (NJ-SHO) Data Warehouse—a statewide data source of traffic safety and health data that includes 24 million NJ residents—and have published nearly 50 research papers using these data. With the generous support of the NJ Division of Highway Traffic Safety, her team is now working to establish the NJ-SHO Center for Integrated Data, whose vision is to reimagine how we collect, integrate, and disseminate traffic safety data.

Dr. Curry is also the principal investigator of a large research program to support driving safety for teens with attention-deficit hyperactivity disorder and autism spectrum disorder, their families, and groups that support them during the learning-to-drive process.



**Diane Gutierrez-Scaccetti**, Commissioner, New Jersey Department of Transportation

Diane Gutierrez-Scaccetti was confirmed as the 19th Commissioner of the New Jersey Department of Transportation on June 7, 2018. She was nominated on December 19, 2017 and began serving as Acting Commissioner on January 16, 2018.

A native New Jerseyan, Ms. Gutierrez-Scaccetti is a transportation professional with more than 33 years in the industry, and 41 years in government service. She possesses extensive executive, operational, and planning knowledge.

Prior to her nomination, the Commissioner served as the Executive Director and CEO at Florida's Turnpike Enterprise, a part of the Florida Department of Transportation. Under her leadership, Florida's Turnpike Enterprise managed more than 460 centerline miles and a 5-year capital program in excess of \$6 billion, supported by \$1 billion in revenues.

This capital program included the construction of SunTrax, a 2.25 mile test track and research facility for the development of transportation technology, including automated and connected vehicle applications. She was instrumental in implementing Regional Toll Interoperability of SunPass in the Southeastern United States. SunPass, Florida's statewide electronic toll collection system, was under her charge.

As Executive Director and CEO, Gutierrez-Scaccetti was a member of the Executive Committee of the Florida Department of Transportation, a policy setting body that reports to the Secretary of Transportation.

Prior to the Commissioner's Florida experience, she spent 21 years at the New Jersey Turnpike Authority, working her way up from a Contract Administrator to the post of Executive Director, a position she held from 2008 to 2010. During her tenure, she managed the day-to-day administrative operations and was chief negotiator for the agency's several collective bargaining units.

As NJDOT Commissioner, she oversaw the largest capital program in the Department's history with \$1.23 billion in construction contracts and \$359 million in consultant design/inspection agreements awarded in Fiscal Year 2021.

In addition, NJDOT has supported communities during the pandemic with staff logging more than 1,000 hours driving mobile vaccination trucks and continuing her tradition of encouraging community involvement by holding charitable drives.



As NJDOT Commissioner, she serves as Chair of NJ TRANSIT, the New Jersey Turnpike Authority, the South Jersey Transportation Authority, the NJ Transportation Trust Fund Authority, and Vice Chair of the New Jersey Motor Vehicle Commission.

The Commissioner's accomplishments and leadership have been recognized by the Executive Women of New Jersey, WTS Central Florida Woman of the Year, and Orlando Business Journal's 2015 CEO of the Year for the Public Sector. She received the 2019 Service to the People Award presented by the American Society of Civil Engineers Central New Jersey Branch and the 2020 Women of Achievement Award presented by the New Jersey Chapter of Professional Women in Construction.

She is the recipient of the 2021 American Council of Engineering Companies of New Jersey Distinguished Service Award and was recognized with the Richard M. Hale Chairman's Award at the 2021 47th Annual New Jersey Alliance for Action Eagle Awards ceremony. She was also the Women in Transportation New Jersey (WTSNJ) "Woman of the Year" honoree in 2021.

Ms. Gutierrez-Scaccetti is a member of the Board of Directors of the American Association of State Highway and Transportation Officials (AASHTO) and the Northeast Association of State Transportation Officials (NASTO) and is currently serving as the Chair of the AASHTO Committee on Transportation Communications (TransComm). She served as the 2022 President of the International Bridge, Tunnel and Turnpike Association (IBTTA) and is currently serving as the Immediate Past President on the IBTTA Executive Committee and Chair of the IBTTA Nominating Committee. She is currently serving as chair of the Executive Committee of the Transportation Research Board (TRB), and Chair of The Eastern Transportation Coalition (formerly I-95 Corridor Coalition).



Photo: 2019 Research Showcase, ©Steve Goodman/Rutgers CAIT

**Syed Kazmi**, Section Chief, New Jersey Department of Transportation Division of Traffic Engineering

Syed A. Kazmi is Section Chief for the New Jersey Department of Transportation's Division of Traffic Engineering. Syed has 24 years of core traffic engineering experience in managing projects within the most highly congested areas of New Jersey state.

Syed brings an in-depth understanding of traffic signal and timing system and design, Congestion Management, Emergency and train preemption, complex traffic signal staging, creative signing and striping in compliance with FHWA guidelines, and daily coordination with local stakeholders.

**David Maruca**, Program Development Administrator, Rutgers Center for Advanced Infrastructure and Transportation

David Maruca is a Program Developer for Rutgers Center for Advance Infrastructure and Transportation (CAIT) since 2013. Dave is responsible for developing, coordinating and administering several CAIT transportation safety programs.

Prior to joining CAIT, he was an enlisted member of the New Jersey State Police where he served in many different capacities to include an Academy Instructor and Unit Head of both Construction and the Motor Coach Compliance Safety Audit Review Unit. Dave ultimately achieved the rank of Lieutenant before retiring from the Transportation Safety Bureau after 27 years of service. Mr. Maruca holds a master's degree in education from Seton Hall University.

**Kurt McCoy**, Supervising Engineer, New Jersey Department of Transportation Division of Operations Support

Kurt McCoy is a Supervising Engineer, Construction and Maintenance for the Division of Operations Support at the New Jersey Department of Transportation. His primary duties include being the Project Manager of 10-20 active design and construction resurfacing projects. Projects are limited in scope that can be designed typically within one year. The resurfacing program typically completes \$85-95 million in resurfacing contracts per year. Other duties include completion of Maintenance Work Orders that can focus on single intersection or striping upgrades.

**Hirenkumar Patel**, Principal Engineer, New Jersey Department of Transportation Division of Transportation Mobility

Mr. Hirenkumar Patel is a Principal Electrical Engineer in Mobility Engineering and started with the Department just over Five years ago. He is a graduate from Rutgers University with a B.S. in Electrical Engineering.

He has worked on various projects focused on the deployment of Intelligent Transportation System devices statewide. He was also involved in Mobility Engineering Wrong Way Driving & Connected Vehicle initiatives. He has a passion for the various communication systems used for the ITS devices, along with future technologies.

**Andrew Swords**, Director, New Jersey Department of Transportation Division of Statewide Planning

Andy Swords serves as the Director of the Division of Statewide Planning at the New Jersey Department of Transportation (NJDOT). In that role, Andy leads several teams responsible for a variety of transportation planning functions, including long range, performance based and asset management planning, safety programs, bicycle and pedestrian planning and Complete Streets, traffic congestion analysis, air quality planning, the Transit Village Initiative and State Planning Commission coordination.

The Division also manages the Department's research and innovation program, the State Planning and Research (SPR) program, and the work programs of the state's three Metropolitan Planning Organizations (MPOs). Andy has 34 years of experience with NJDOT and is a licensed Professional Planner in the State of New Jersey.

**Giri Venkateela**, Research Scientist, Bureau of Research, New Jersey Department of Transportation

Dr. Giri Venkateela works as a Research Scientist with the NJDOT Bureau of Research. He is responsible for managing various research projects, developing research ideas, and serving as a subject matter expert for research projects. He earned his Bachelor's, Master's, and Doctoral degrees in Civil Engineering. He has over 12 years of hands-on experience in transportation research and administration.

Giri is serving as AASHTO-RAC Region 1 vice chair and the TRB-RIIM-Emerging topics subcommittee cochair. He is also serving as a chair and member for various NCHRP research projects and TRB committees. His innovative research work on infrastructure materials and advanced AI modeling is well received by various organizations across the nation including NSF, AASHTO and TRB. He serves as a reviewer and judge for various research proposals and journals from NJDOT, FHWA, USDOT, NCHRP, ASCE and TRB. Giri has had various journal articles published and has provided numerous invited talks at national and international conferences related to transportation research.

**Sangaran Vijayakumar**, Project Management Specialist 3, New Jersey Department of Transportation Division of Project Management

Sangaran Vijayakumar, Ph.D., P.E., PTOE is a Project Management Specialist with the Division of Project Management (Team B), managing over 15 transportation infrastructure improvement projects in various phases, including concept development, preliminary engineering, final design, and construction. He has been with the Division of Project Management for over 12 years.

Sangaran is currently managing several complex transportation projects, including the Route 66 Project which is in the final design phase. The Route 66, Jumping Brook Road to Bowne Road/Wayside Road Project, in Neptune Township, Monmouth County will address traffic operations, safety and pavement conditions. The proposed key improvements include widening of Route 66 from a 2-lane section to a 4-lane section with a grass/paved median separation, and a 2-lane roundabout to replace two closely signalized intersections. Sangaran is also managing the Route 440 Pavement reconstruction between Milepost 0.05 and 4.0 in Middlesex County. The purpose of the project is to improve the existing pavement conditions. The proposed key improvements include pavement reconstruction, drainage improvements and several safety improvements.





## 25TH ANNUAL NJDOT RESEARCH SHOWCASE PARTNERS

Cambridge Systematics, Inc.

Lehigh University

New Jersey Institute of Technology

Thomas Edison State University

Stockton University

Rowan University

Rutgers, The State University of New Jersey \*

The College of New Jersey

\* Official USDOT University Transportation Center

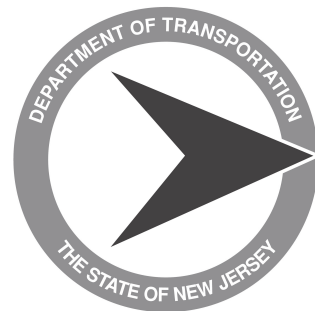
Please visit the NJDOT Technology Transfer website and the New Jersey State Transportation Innovation Council page.

<https://www.njdottechtransfer.net/>

<https://www.njdottechtransfer.net/nj-stic/>



The 25th Annual NJDOT Research Showcase is organized and sponsored by the NJDOT Bureau of Research in partnership with the New Jersey Local Technical Assistance Program (NJ LTAP) at Rutgers Center for Advanced Infrastructure and Transportation (CAIT) and co-sponsored by the Federal Highway Administration.



\*\* To confirm the acceptance of these PDHs for continuing professional competency for licensed professional engineers, please consult the licensure board of that state.