



## **Semi-Annual Progress Report for University Transportation Centers #3**

**April 1, 2024 – September 30, 2024**

Federal Agency: U.S. Department of Transportation, Office of the Assistant Secretary for Research and Technology

Federal Grant #: 69A3552348331

Project Title: Maritime Transportation Research and Education Center (MarTREC)

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Submission Date: October 30, 2024

DUNS: 1914297450000

EIN: 71-6003252

Recipient Organization: University of Arkansas  
800 W. Dickson St.  
Fayetteville, AR 72701

Project/Grant Period: Start Date: June 1, 2023  
End Date: May 31, 2029

Reporting Period End Date: September 30, 2024

Report Term or Frequency: Semi-annual

Signature:

## INTRODUCTION

MarTREC, the Maritime Transportation Research and Education Center, is a U.S. Department of Transportation Tier 1 University Transportation Center funded through the Office of the Assistant Secretary for Research and Technology. MarTREC was competitively awarded under MAP-21 and the FAST Act. Now through funding of the Bipartisan Infrastructure Law, MarTREC's theme is *Preserving the Nation's Transportation System through Sustainable and Resilient Maritime and Multimodal Supply Chains and Infrastructure*.

MarTREC's vision is *to be recognized as the nation's premier source for expertise on maritime and multimodal transportation research and education*. Made up of renowned maritime transportation researchers dedicated to transferrable research and inclusive education and workforce development, the MarTREC consortium includes the University of Arkansas, Jackson State University; Louisiana State University, University of New Orleans, Texas A&M University/Texas Transportation Institute, and Vanderbilt University.

This semi-annual progress report is submitted as per our UTC grant reporting requirements.

### 1. ACCOMPLISHMENTS

#### What are the major goals of the program?

MarTREC will contribute primarily to four United States (U.S.) Department of Transportation (DOT) strategic goals: 1) Economic Strength and Global Competitiveness by addressing resilient supply chains and system reliability and connectivity; 2) Climate and Sustainability by increasing the safety, effectiveness, equity, and sustainability of our nation's transportation infrastructure and the communities it serves; 3) Safety by supporting system response and recovery plans and protocols to minimize the effects of system disruptions and hasten system recovery; and 4) Equity by expanding transportation options in underserved rural and urban communities.

The following performance metrics are used to evaluate the effectiveness of our research, leadership, education and workforce development, and technology transfer and collaboration and assess our progress towards meeting our semi-annual goals.

Research Performance Metric	Semi-Annual Goal	Semi-Annual Progress
# of peer-reviewed journal articles (published, accepted, submitted)	10 / 6 month	6
# of conference presentations given	10 / 6 month	8
# of students participating in transportation research projects funded by UTC	10 / 6 month	18

Leadership Performance Metric	Semi-Annual Goal	Semi-Annual Progress
# of national and regional leadership positions held	5 / 6 month	41
# of invited talks given	5 / 6 month	4
# of leadership and research awards received	1-2 / 6 month	2

Education and Workforce Development Performance Metric	Semi-Annual Goal	Semi-Annual Progress
# of transportation-related degrees conferred to supported students	7/ 6 month	4
# of technician certification programs offered	4 / 6 month	8
# K-12 outreach programs offered	2-3 / 6 month	4

Technology Transfer and Collaboration Performance Metric	Semi-Annual Goal	Semi-Annual Progress
# of existing collaborative partnerships	10 / 6 month	27
# of new collaborative partnerships formed	2-3 / 6 month	14
# of project deliverables submitted	2-3 / 6 month	0
# of collaborative research/tech transfer agreements	1-2 / 6 month	0

**What was accomplished under these goals?**

- MarTREC’s progress towards our semi-annual goals is presented above.
- Four new research projects were started during this reporting cycle as presented below.
- Seven ongoing research projects continued during this reporting cycle as presented below.

New Project Title	Lead Institution
Deploying Smart Watch Technology to Measure and Mitigate Heat Stress Among Maritime Transportation Workers	Vanderbilt University
An Automated Training Model for Selecting Maritime Traffic Monitoring and Tracking Model Types using AIS Data with Missing Information	Jackson State University
Pathways for a Future-Ready Maritime Transportation Workforce	Jackson State University
AI-Driven Preventive Maintenance for Coastal Bridges in Marine Environments	Jackson State University

Ongoing Project Title	Lead Institution
Evaluation of Employment Options in the Inland Waterways Sector	Texas A&M Transportation Institute (TTI)
Analyzing the Economic Development Impacts of Truck Parking in Louisiana	University of New Orleans
Economic Impact Analysis of Artificial Draft Restriction on the Lower Mississippi River Port Complex	University of New Orleans
Climate Financing for Marine Transport: Analyzing the Impact of Climate Adaptation Investments in Inland Waterways (Part II)	Vanderbilt University
Modeling Drivers’ En-route Diversion Behavior During Congestion: A Pilot Study	Louisiana State University
Continuous Decision Plan for Optimizing Budget Allocation for Dredging Projects Considering Shoaling Effect within a Multi-year Horizon	Texas A&M University
Strategies for Potential Emissions Reductions for Commercial Maritime Vessels at Ports	Texas A&M Transportation University (TTI)

**The MarTREC consortium leadership team is as follows:**

Center Personnel	Title	Organization
Heather Nachtmann	Center Director	University of Arkansas
Michelle Barry	Center Associate Director	University of Arkansas
Stacy Williams	Center Associate Director	University of Arkansas
Amy Shell	Center Manager	University of Arkansas
Peggy Anderson	Research Advancement Specialist	University of Arkansas
Hiba Baroud	Site Director	Vanderbilt University
Jim Kruse	Site Director	Texas A&M Transportation Institute
Bethany Stich	Site Director	University of New Orleans
Bruce Wang	Site Director	Texas A&M University
Robert Whalin	Site Director	Jackson State University
Brian Wolshon	Site Director	Louisiana State University

**How have the results been disseminated?**

- Six journal articles, four conference papers, eight presentations, and one book were submitted, accepted or published.

**What do you plan to do during the next reporting period to accomplish the goals?**

- Finalize preparations and host our annual Professional Advisory Board meeting at the University of Arkansas on October 22 and 23, 2024
- Submitting a 2024 CUTC Student of the Year for the 2025 TRB Winter meeting in January 2025
- Continue preparations to host 2025 Summer CUTC meeting on June 24-26, 2025
- Work on contributions to 2025 TRB Annual Meeting in January 2025
- Begin early preparations to host 2025 Professional Advisory Board meeting at the University of Arkansas in Fall 2025
- Work on contributions to Smart Rivers Conference in Memphis TN in September 2025
- Continue work on ongoing research projects and begin new research projects
- Continue building collaborations to ensure MarTREC contributes use-inspired research serving USDOT and its associated constituents.

**2. PARTICIPANTS & COLLABORATING ORGANIZATIONS**

**What organizations have been involved as partners?**

Advisory Board Member	Title	Organization
Harold Beaver	District Engineer, (Retired)	Arkansas Department of Transportation
Scott Bennett	VP Transportation Marketing Director	Volkert Inc.
Reese Brewer	Director	Frontier Metropolitan Planning Organization
Jack Buffington	Director, (Retired)	Mack Blackwell Transportation Center
Cassandra Caldwell	Executive Director	Arkansas Waterways Commission
Bryan Day	Executive Director	Port of Little Rock
Dan Flowers	Director, (Retired)	Arkansas Department of Transportation

Ann Gilbert	Executive Director	Arkansas Transit Association
Gary Hunt	Vice President, (Retired)	ABF Freight System, Inc.
Mike Johnson	Associate Vice Chancellor, Facilities (Retired)	University of Arkansas
Caren Kraska	President/Chairman	Arkansas & Missouri Railroad
Glenn Moore	Advisor, Cyber Security and Infrastructure Security Agency	U.S. Dept. of Homeland Security
Ned Mitchell	Research Civil Engineer	U.S. Army Corps of Engineers
Shannon Newton	President	Arkansas Trucking Association
Craig Philip	Professor, Civil Engineering	Vanderbilt University
Matthew Smith	Technical Director, Water Resources Infrastructure	U.S. Army Corps of Engineers
Melissa Tooley	Director, External Initiatives	Texas A&M Transportation Institute
Lorie Tudor	Director	Arkansas Department of Transportation

**Have other collaborators or contacts been involved?**

Existing Collaborators:

1. Bill Anderson, Transportation Research Board, research
2. Brenda Dix, ICF Inc., research
3. Charles Doktycz, Argonne National Laboratory, research
4. Christine Titus, Greater New Orleans Port Safety Council, outreach
5. Connie Porter Betts, Louisiana Department of Transportation, board service
6. Daniel Capparella, Greater Nashville Regional Council, outreach
7. David Lee and Andrea Noel, Tennessee Department of Transportation, research
8. David Scoggin, Global Logistics Expert, board service
9. Dawn Lopez, Turn Services, outreach
10. Douglas Grubbs, Crescent Port Pilots Association (retired), board service and outreach
11. Dwight Norton, Chief of Planning and Infrastructure, New Orleans Regional Transit Authority, board service
12. Greg Harris, New Orleans Public Belt Railroad, board service and outreach
13. Harrison Crabtree, Director, World Trade Center Greater New Orleans, board service
14. Jeff Roesel, New Orleans Regional Planning Commission, board service and adjunct instructor
15. Joel Whitehead, Retired Admiral, Propeller Club of New Orleans, board service
16. Kristi App, International Freight Forwarders & Customs Brokers Association of New Orleans, research
17. Laura Bryan, Principal Planner, City of New Orleans, board service
18. Magdalena Asborno, USACE, research
19. Paul Matthews, Port of South LA, research, outreach, board service
20. Randy Guillot, President, Triple G. Express, Inc., research and board service
21. Renee Amar, Executive Director, Louisiana Motor Transport Association, board service
22. Robin Barnes, Resilience Solutions, board service
23. Sarah Porteous, Port of New Orleans, research and board service
24. Scott Parr, Embry-Riddle Aeronautical University, research
25. Sharon Leader, S.W. Leader, Inc., research and board service
26. Steve Olmsted, Arizona Department of Transportation, research
27. William App, President, J. W. Allen & Co., Inc., board service

New Collaborators:

1. Aaron Brantly, Virginia Tech, Blacksburg, VA, research collaboration
2. Amy Hopper Swan, Arkansas Research Alliance, Little Rock, AR, research collaboration
3. Charles Colen, University of Arkansas at Pine Bluff, Pine Bluff, AR, research collaboration
4. Cheryl Keymer, North Arkansas College, Harrison, AR, research collaboration
5. Craig Woolsey, Virginia Tech, Blacksburg, VA, research collaboration
6. Donghoon Kim, Arkansas State University, Jonesboro, AR, research collaboration
7. Eric Jacques, Virginia Tech, Blacksburg, VA, research collaboration
8. Jack Mays, Virginia Tech, Blacksburg, VA, research collaboration
9. James Davis, US Army Corps of Engineers, Vicksburg, MS, research collaboration
10. Joannis Koutromanos, Virginia Tech, Blacksburg, VA, research collaboration
11. Laura Berry, North Arkansas College, Harrison, AR, research collaboration
12. Max Baker, Greater Nashville Regional Council, outreach
13. Michael Roth, US Army Corps of Engineers, Vicksburg, MS, research collaboration
14. Tom Wall, Argonne National Laboratory, research collaboration

### 3. OUTPUTS

**Publications, conference papers, and presentations:**

Journal publications

1. Bu, Fan, and Heather Nachtmann, "Value-Focused Thinking Assessment of Container on Barge Maritime Transportation Readiness," *Engineering Management Journal*, accepted, September 2024.
2. Mallum, Faisal and Bethany Stich, "Analyzing the Impact of International Trade Policies, Global Pandemic, and Geopolitical Conflicts on the Lower Mississippi River Port Systems," *Transportation Journal*, Wiley Publication, under review.
3. Mallum, Faisal and Bethany Stich, "Assessing the Impacts of Evolving Trade Policies on the Productivity of Key Maritime Hubs," *Journal of Maritime Economics & Logistics*, under review.
4. Monsreal, Mario, Jim Kruse, Don H. Kang, and Rafael B. Carmona, "A Predictive Methodology for Vessel Travel Times: An Application on the Gulf Intracoastal Waterway (GIWW)," *Journal of Applied Research and Technology*, published, August 2024.
5. Stich, Bethany, Faisal Mallum, and Brittany Waggener, "Examining U.S. Transportation and Trade Policy Dynamics through the Advocacy Coalition Framework: A Case Study," *Science Direct*, under review.
6. Stich, Bethany, Faisal Mallum, Janey Camp, Craig Philip, Brittany Waggener, Bailey Bullock, and Miguel Morave, "Chassis: The Bottleneck to Trade and Transportation," *Journal of Critical Infrastructure Policy*, Wiley Publication, published, September 2024.

Conference Papers

1. Cole, Grace, Brian Wolshon, and Jeffery Schmidt, "Route Decisions in Congestion: A Comparison of Choice Influencers in Urban and Non-Urban Networks," *Journal of Urban Planning and Development*, under review, 2024.
2. Cole, Grace, Brian Wolshon, and Jeffery Schmidt, "Travel Diversion During Disruption and Uncertainty: Motivators and Influencers of Driver Choice," *Journal of Transportation Safety & Security*, under review, 2024.
3. Fuller, James, Grace Cole, Rebecca Bian, and Brian Wolshon, "Utilizing International Travel Survey Data to Develop a More Comprehensive Understanding of the Diversion Behavior of

Commuting Drivers," 13th International Conference on Transport Survey Methods, accepted, 2024.

4. Shapouri, Mohammad, James Fuller, Jason Harman and Brian Wolshon, "Understanding and Modeling Drivers' Diversion Behavior During Congestion," Journal of Transportation Engineering Part A: Systems, under review, 2024.

#### Presentations, lectures, and workshops

1. Abkowitz, Mark, "Artificial Intelligence, Risk and Resilience," Nashville, TN, September 2024. Lecture presentation
2. Allison, J., Z. Li, C. Ma, Y. Zhang, and X. Wang, "Performance Evaluation of Reinforcement Learning-Based Adaptive Signal Control Deployment in Urban Network," 17th IFAC Symposium Control in Transportation Systems, Ayia Napa, Cyprus, July 2024. Lecture presentation
3. Baroud, Hiba, "IMAGINED: Intermodal Analytics for Green Infrastructure Network Energy Decarbonization," Macroeconomic Implications of Decarbonization Policies and Actions workshop, National Academy of Sciences, Washington, DC. September 2024. Invited poster presentation
4. Baroud, Hiba, "Evaluating Uncertain Infrastructure Interdependencies: A Case Study on Transportation Systems," Rutgers University, Newark, New Jersey, April 2024. Invited presentation
5. Barry, Michelle, AR-DATA Program, "Utilizing Data Analytics and New Technologies in Geotechnical Engineering," waterways data for high school teacher lesson plan development, July 2024. Workshop
6. Nachtmann, Heather, "Regional Economic Impact Study of the McClellan-Kerr Arkansas River Navigation System (MKARNS)," Oklahoma Port Showcase, Muskogee, Oklahoma, June 2024. Invited presentation
7. Stich, Bethany and Faisal Mallum, "Examining Transportation and International Trade Policy Dynamics Through the Advocacy Coalition Framework: A Case Study of the Lower Mississippi River Ports," TRB Transportation Symposium on Environment, Energy, and Livable Economies, Denver, CO, August 2024. Invited presentation
8. Wang, X., F. Wang, V. Fang, and L. Sun, "Using Trip Trajectory Data to Estimate Local Road and Rural Collector Road Vehicle-Miles-Traveled Respectively," 17th IFAC Symposium on Control in Transportation Systems, Ayia Napa, Cyprus, July 2024. Lecture presentation

#### Books or other non-periodical, one-time publications

1. Mark Abkowitz, Vanderbilt University, "The World According to Humpty Dumpty - The New Normal of Managing Risk," book, published.

#### Website(s) or other Internet site(s)

<https://martrec.uark.edu/>  
<https://www.uno.edu/academics/colaehd/la/centers-institutes-affiliates/transportation>  
<https://tti.tamu.edu/>  
<https://www.vanderbilt.edu/vector/>

#### Technologies or techniques

- Vanderbilt is using computer vision for traffic safety analysis and smart watches to identify stressful mobility locations.
- Vanderbilt hosted an educational session for senior executives on AI risk and resilience, to then return and share the knowledge and lessons learned with their organizations.

Inventions, patent applications, and/or licenses

- Nothing to report

Other products

- Educational Aids:
  1. Mark Abkowitz, civil engineering professor, Vanderbilt University, "The World According to Humpty Dumpty - The New Normal of Managing Risk," book, published.
  2. Gary Prinz, civil engineering professor, University of Arkansas created a video for K-8 students. The video is part of his MarTREC project "K8 MEMES: K-8 Maritime Education Modules to Engage Students."  
<https://www.dropbox.com/scl/fi/6iqp9zjxamyetnlqfnest/SpringSpring.mp4?rlkey=awrmh0ogqk7aw4ag0u5zzf6mq&e=1&dl=0>

#### 4. OUTCOMES

MarTREC faculty have increased the body of knowledge through courses they teach at their universities:

Undergraduate

1. Active Transportation Planning, Policy and Design
2. Advanced Coastal Engineering Design
3. Car Culture & Suburbs
4. Case Studies in Risk and Reliability
5. Coastal Structures
6. Data Analytics for Engineers
7. Enterprise Risk Management
8. Geometric Design of Highways and Airports
9. Globalization & Mobility
10. Introduction to Ordinary Differential Equations
11. Introduction to Transportation Engineering
12. Introduction to Transportation Planning
13. Risk, Reliability, Resilience Engineering
14. Soil Mechanics

Graduate

1. Active Transportation Planning, Policy and Design
2. Advanced Highway Design and Traffic Safety
3. Applied Techniques for Transportation Professionals
4. Capstone I
5. Capstone II
6. Case Studies in Risk and Reliability
7. Computational Data Enabled Science and Engineering
8. Decision Models
9. Enterprise Risk Management
10. Environment & Energy
11. Innovative Transportation Funding and Finance
12. Intermodal Freight Transportation
13. Quantitative Exploration of Data
14. Traffic Operations and Control



15. Transportation Policy and Administration
16. Transportation Seminar

## 5. IMPACTS

### **What is the impact on the effectiveness of the transportation system?**

MarTREC faculty have impacted the transportation system by holding leadership positions that engage with external transportation organizations and individuals:

1. Advisor, Grant application for Columbia Port Commission
2. Advisor, Grant application for National Coalition on Truck Parking
3. Advisory Board Member, Transportation Research Board (TRB) Part E: Logistics Review
4. Appointee, Complete Streets Advisory Council, Louisiana Department of Transportation and Development (DOTD)
5. Appointee, New Orleans Complete Streets Working Group, City of New Orleans
6. Board Chair, Marine, National Academy of Science
7. Board Member, National Waterways Foundation
8. Board Member, Ride New Orleans
9. Chair, American Society of Engineers (ASCE), Geo-Institute Soil Properties and Modeling Technical Committee
10. Chair, TRB Consensus Committee on Chassis Provisioning, Federal Maritime Commission
11. Chair, TRB Standing Committee, Extreme Weather and Climate Adaptation
12. Co-chair, ASCE Risk and Resilience Measurement Committee
13. Co-chair, New Orleans Regional Traffic Safety Coalition, Vulnerable User Emphasis Area
14. Committee Member on Planning, Freight Planning Task Force, American Association of State Highway and Transportation Officials (AASHTO)
15. Committee Member, Louisiana Energy Addition Network (CLEAN)
16. Executive Committee Member, Global Young Academy
17. Executive Committee Member, TRB
18. Foundation President, Baton Rouge Rotary
19. Member, Advisory Council for Transportation Research, Arkansas Department of Transportation
20. Member, American Society for Public Administration: Section on Transportation Policy & Administration and Section of Public Administration Research
21. Member, ASCE Infrastructure Resilience Division
22. Member, Board of Directors, Blue Sky Maritime Coalition
23. Member, Engineering Research Visioning Alliance (ERVA) Standing Council, National Science Foundation
24. Member, Federal Demonstration Partnership, National Academy of Science
25. Member, International Trade Working Group and Interconnectivity Task Force
26. Member, Ports Association of Louisiana
27. Member, Smart Rivers 2025 PIANC Conference Planning Committee
28. Member, Southeastern Conference of Public Administration
29. Member, TRB Committee, Critical Infrastructure Protection
30. Member, TRB, Standing Committee on Economic Development and Land Use
31. Member, TRB, Intermodal Freight Transport Committee
32. Member, TRB, Logistics of Disaster Response and Business Continuity
33. Member, TRB, Standing Committee on Freight Rail Transportation
34. Member, TRB, Standing Committee on Freight Transportation Economics and Regulation
35. Member, TRB, Standing Committee on Inland Waterway Transportation

- 36. Member, TRB, Standing Committee on Ports & Channels
- 37. Member-At-Large, Council of University Transportation Centers, Executive Committee
- 38. Secretary Designee, Louisiana DOTD, Truck Parking Availability System (TPAS)
- 39. Section Lead, OMC/OTD Connected and Autonomous Vehicles Working Group
- 40. US Representative, World Association for Waterborne Transport Infrastructure (PIANC) Task 193
- 41. Voting Panel Member, Local Truck Parking Regulations Committee

Awards bestowed upon MarTREC faculty as a result of their contributions to the understanding and awareness of transportation issues:

- Michelle Barry, University of Arkansas, United States Universities Council on Geotechnical Education and Research (USUCGER) Early Career Researcher Award
- Bruce Wang, Texas A&M University, Genesis Award, College of Engineering for research

#### **What is the impact on the body of scientific knowledge?**

MarTREC researchers currently hold six editorial journal positions:

- Editor-In-Chief, The Engineering Economist
- Associate Editor, Natural Hazards Review
- Editorial Board Member, ASCE Journal of Risk and Uncertainty
- Editorial Board Member, Environment Systems and Decisions
- Editorial Board Member, Maritime Economics and Logistics
- Review Editor, Frontiers in Water, Water and Built Environment

#### **What is the impact on transportation workforce development?**

MarTREC's workforce development is accomplished through several avenues:

- MarTREC graduated four students into the transportation workforce.
- The Center for Training Transportation Professionals at the University of Arkansas executed workforce development training programs through 27 classes, certifying 571 participants in seven areas: asphalt, aggregates, concrete, pavement, soils, stormwater management, and unpaved roads.
- The University of New Orleans had their first graduate of their Geographic Information System certificate.
- The University of Arkansas hosted its annual GirlTREC, one-week transportation engineering summer day camp for rising sixth- and seventh-grade girls, 15 attendees. The camp included five civil and industrial engineering faculty programs, one industry speaker, and four field trips; train ride, driving simulation, drone demonstration, and airport visit. Please watch the provided video: <https://www.youtube.com/watch?v=OaS1gmd2mA4>
- The University of New Orleans teamed up with TRIO Upward Bound Summer Program 2024 and introduced 25 high school students to transportation planning and globalization and international trade.
- Texas A&M University civil engineering department hosted Summer 2024 Camp Build for high school seniors.
- Jackson State University and its Mississippi Transportation Institute (MSTI) Program introduced ten high school students to the transportation industry. The MSTI Summer Camp was held in July, spanning two weeks of intensive learning and hands-on experiences. The camp consisted of a blend of competition projects, engineering lectures, lab experiments and field trips. The field trips included the Mississippi Department of Transportation Materials lab, Nissan Factory, and Lower Mississippi River Museum.

- Justin Chimka, associate professor of industrial engineering, University of Arkansas, was named director of the J.B. Hunt Innovation Center of Excellence, which seeks to develop innovative solutions to address emerging challenges and opportunities facing the transportation and logistics industry.
- The University of Arkansas College of Engineering Community and Engagement hosted Dominique Pittenger, director of the University of Oklahoma Women in Engineering Program, as guest lecturer. Pittenger serves as the technical director for the USDOT Southern Plains Transportation Center.
- The University of New Orleans hosted the National Academies 2024 Marine Board Spring Meeting.

## **6. CHANGES/PROBLEMS**

Peggy Anderson joined the MarTREC team at the University of Arkansas as a Research Advancement Specialist. She has more than twelve years of experience in research administration and advancement. Anderson will provide direct research support to MarTREC and the Department of Industrial Engineering in the areas of proposal development support, grant writing, and research advancement.

### **Changes in approach and reasons for change**

- Nothing to Report

### **Actual or anticipated problems or delays and actions or plans to resolve them**

- Nothing to Report

### **Changes that have a significant impact on expenditures**

- Nothing to Report

### **Significant changes in use or care of animals, human subjects, and/or biohazards**

- Nothing to Report

## **7. SPECIAL REPORTING REQUIREMENTS**

- Nothing to Report