

Semi-Annual Progress Report No. 1 – The SMARTER Center

Submitted to: U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Grant Number: 69A3552348303

Project Title: Sustainable Mobility and Accessibility Regional Transportation
Equity Research Center

Morgan State University (Lead Institution)
Virginia Polytechnic Institute and State University
University of Maryland, College Park
Howard University
University of Virginia
West Virginia University
University of Pittsburg

Program Director: Dr. Mansoureh Jeihani
443-885-1873

Submitting Official: Same as above

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Recipient Organization: Morgan State University
1700 E. Cold Spring Lane
Baltimore, MD 21251

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Signature:



1. ACCOMPLISHMENTS.

1.1 What are the major goals and objectives of the program?

As a USDOT Regional UTC, the SMARTER Center has been tasked with addressing the myriad transportation challenges faced by travelers in the mid-Atlantic. These include the equitable distribution of transportation related assets, network resilience in the face of climate change, accessibility concerns, network efficiency and mobility, freight and shipping bottlenecks, and the implementation of emerging technologies like electric vehicles and connected vehicles.

These challenges will predominantly be addressed through a robust research program with immediate and near-immediate implementation capabilities for policy makers, industry, and the public at large. Many of these research endeavors consist of technology programs or the development of best practices for transportation administrators. The Center will also work to ensure that its findings are shared with civil society through a wide-ranging program of technology transfer, community engagement, education, and workforce development.

1.2 What was accomplished under these goals?

The SMARTER Center has approved and launched 20 core projects since the beginning of the grant period and is now finalizing the administrative and financial requirements necessary to allow our principal investigators to begin working. Many of our researchers have started engaging in preliminary research into their respective topics and are actively seeking to hire additional personnel to aid in these endeavors. This cohort of new hires will consist almost entirely of graduate students who will gain vital research experience during this process.

Finally, we have begun planning a series of events designed to foster greater collaboration both within and outside of SMARTER. Our SMARTER Collaboration Forum, slated for December 2023, will allow researcher from across our constituent universities to identify potential areas of collaboration in preparation for our upcoming round of collaborative research RfPs. We have likewise conducted several meetings and demonstrations with local media outlets like the Baltimore Banner, allowing us to expand our notoriety with the public and highlight the ways in which our research and expertise can generate meaningful improvements for travelers in the Mid-Atlantic. Future events will seek to engage the multitude of community-based transit organizations centered in the region's major cities to better understand the needs of residents and facilitate collaboration across various civil institutions, from government and academia to the private sector, developers, and non-profits.

Listed below are the 20 projects that have been approved for launch at the SMARTER Center:

Project Type/ University	Project Name	PIs
Core (MSU)	A Novel Driver Warning System with Hedging to Promote Defensive Driving	Di Yang
Core (MSU)	Smart, Green, Equitable, Safe, Complete Streets for All - Phase I: Providing a smart campus using a CAV testbed around Morgan State University	Mansoureh Jeihani, Di Yang, Anam Ardeshiri
Core (MSU)	The Mass Transit Dilemma: Streamlining regulatory regimes to address climate change and poverty	Joseph Niehaus
Core (UD)	Crime Prevention through Environmental Design (CPTED) for Public Transit Stations	Jennie Saxe
Core (UD)	Understanding the Role of Equity in Delaware Department of Transportation Expenditures	Philip Barnes, Andrea Pierce
Core (UD)	The Impacts of Climate Change and Urbanization on Non-Motorized Transportation Facilities and Negative Consequences on Lower Income Neighborhoods	Ardeshir Faghri
Core (VT)	Energy consumption modeling of ships: towards a Door-to-Door (D2D) freight optimization	Hesham A. Rakha, Ahmed Aredah
Core (VT)	Enabling GLOSA through Domain Knowledge Aware SPAT Prediction and Queue Length Aware Trajectory Optimization	Hesham A. Rakha, Amr Shafik, Seifeldeen Eteifa
Core (Pitt)	Ensuring Equity in Pavement Rehabilitation Strategies	Lev Khazanovich, Julie Vandenbossche

Core (Pitt)	Socially responsible road charging for online retailers to support disadvantaged urban communities	Aleksandar Stevanovic, Lev Khazanovich
Core (UMD)	Design and evaluation of an Arterial-Friendly Local Ramp Metering System	Gang-Len Chang
Core (UMD)	A Comprehensive Analysis of EV Charging Demand Prediction, Infrastructure Planning, and Power Network Resilience in the Era of Electric Mobility	Xianfeng Yang
Core (UV)	Connected Vehicle Identification System for Cooperative Control of Connected Automated Vehicles	B. Brian Park
Core (UV)	Measuring Pedestrian Psycho-Physiological Well-Being in the Built Environment	T. Donna Chen, Andrew Mondschein
Core (UV)	Smart Rideshare Matching – Feasibility of Utilizing Personalized Preferences	B. Brian Park, Afsaneh Doryab, T. Donna Chen, Andrew Mondschein
Core (MSU)	Deriving Transit Performance Metrics from GTFS Data	Gregory Newmark
Core (WVU)	Automated vehicle-supported mobility services for rural areas	Kakan Dey, David Martinelli
Core (WVU)	Advancing Equity through Regional Multimodal Planning in Small Urban and Rural Communities	V. Dimitra Pyrialakou
Core (HU)	Near-Real-time Health Monitoring and Assessment of a Railway Track system	Dr. Stephen Arhin

1.3 What opportunities for training and professional development has the program provided?

Graduate students have been recruited to assist in the completion of SMARTER core projects. This will provide students with valuable experience that they can carry into future careers in academia, industry, or the public sector.

Early planning has also begun on the 2024 National Summer Transportation Institute. New staff are currently being recruited to administer the program, and curricula that incorporates emerging technologies in connected vehicles, railways, cybersecurity, and more are being developed.

1.4 How have the results been disseminated? If so, in what way(s)?

- Opportunities for the dissemination of research findings have been limited since SMARTER research projects have just launched over the past several weeks; however, We have had several opportunities to share our researchers' expertise with the public through media spots and participation in various panels and webinars:
- Our director, Dr. Masnoureh Jeihani, gave a presentation on "5 Resources Everyone Needs When Applying for Federal Grants" at the Maryland Department of Transportation.
- SMARTER researchers were part of the team that received the US Department of Energy's 'Digitizing Utilities Prize.' This work provided valuable insight into the trends and challenges related to electric vehicle adoption in the United States.
- SMARTER director Mansoureh Jeihani participated at the HBCU Week Conference at the University of Michigan in Minneapolis in September of 2023.
- SMARTER Researcher Jennie Saxe spoke to UDaily and Delaware Public Media about University of Delaware's planned contributions to the SMARTER Center in May and June of 2023, respectively. <https://www.udel.edu/udaily/2023/april/federal-us-transportation-department-research-solutions-equity-policy-engineering/>

1.5 What do you plan to do in the next reporting period to accomplish these goals?

The Center will continue to provide administrative support to its principal investigators as they begin their research projects. We will also provide opportunities for dialogue and collaboration between SMARTER's constituent universities, such as the aforementioned collaboration forum. Finally, we will continue to foster our relationships with media outlets and community organizations to better understand travelers' needs and share our relevant findings with the public.

2. PARTICIPANTS AND COLLABORATING ORGANIZATIONS. Who has been involved?

2.1 What organizations have been involved as partners?

- SMARTER is working with several firms to implement its Mixed Traffic CAV Testbed. Ouster is working with our research team to install LIDAR units at intersections around campus while Iteris is installing on-board units inside of Morgan State University's shuttles. The Center has also worked closely with Baltimore City to safely implement this technology on public roadways and collect data on near-collisions.
- The Maryland Aviation administration has collaborated with the National Transportation Center to implement the Autonomous Wheelchair being developed by researchers at

Morgan State University at the Baltimore-Washington Thurgood Marshall Airport, which makes use of SMARTER funding.

2.2 Have other collaborators or contacts been involved?

Nothing to report.

3. OUTPUTS: What new research, technology or process has the program produced?

3.1 Conference papers and presentations

- SMARTER researchers Alirezza Ansariyar and Dr. Mansoureh Jeihani won the “Best Presentation Award” at the International Conference of Transportation and Traffic Engineering in New York City for their presentation, “Investigating the Vehicle-Bicyclists Conflicts using LIDAR Sensor Technology at Signalized Intersections.”

3.2 Journal publications

- Ansariyar, A., Jeihani, M., (2023), Investigating the Vehicle-Bicyclists Conflicts using LIDAR Sensor Technology at Signalized Intersections, International Journal of Transport and Vehicle Engineering, Vol 17, No 07, July 2023, New York City,

3.3 Books or other Non-Periodical, one-time publications

- SMARTER researchers have published a book in partnership with Eliva Press titled, “Will Connected Vehicles Affect Equity and Mobility?,” ISBN: 978-9994987634

3.4 Websites or other Internet sites

- [The SMARTER Center's](#) website hosts all of the institution's ongoing research projects with detailed descriptions related to the relevant investigators' aims and findings. The site also contains a wide array of information about the Center's staff, facilities, and workforce development initiatives.
- [LinkedIn](#)
- [Twitter](#)
- [Facebook](#)
- [YouTube](#)

3.5 Technologies or techniques

Nothing to report.

3.6 Inventions, patent applications and/or licenses

Nothing to report.

4 OUTCOMES. What outcomes has the program produced? How are the research outputs described in section 3 above being used to create outcomes? (Outcomes are the application of outputs; any changes made to the transportation system, or its regulatory, legislative, or policy framework, resulting from research and development outputs.)

Several SMARTER projects, including “Crime Prevention through Environmental Design (CPTED) for Public Transit Stations,” “The Mass Transit Dilemma: Streamlining regulatory regimes to address climate change and poverty,” and Advancing Equity through Regional Multimodal Planning in Small Urban and Rural Communities,” are designed to provide guidance to policymakers and transportation planners in the form of best practices and design frameworks.

5. IMPACTS. What is the impact of the programs/ How has it contributed to improve the transportation system: safety, reliability, durability, etc.; transportation education; and the workforce?

5.1 What is the impact on the effectiveness of the transportation system?

The Mixed Traffic Connected and Autonomous Vehicle Testbed at Morgan State is actively collecting data on traffic conflicts on the roadways near Morgan State University. Moreover, this technology is preparing to accommodate connected vehicles by providing them with static warning messages and traffic signal timing information as they approach specific intersections on the testbed.

5.2 What is the impact on the adoption of new practices, or instances where research outcomes have led to the initiation of a start-up company?

Nothing to report.

5.3 What is the impact on the scientific body of knowledge?

Nothing to report.

5.4 What is the impact on transportation workforce development?

Many of our projects have begun to recruit and train graduate students. These students will serve diverse roles within their respective projects, gaining valuable hands-on experience in data analysis, engineering, writing, transportation planning and many other disciplines.

6 CHANGES/PROBLEMS.

6.1 Changes in approach and reasons for change.

Nothing to report.

6.2 Actual or anticipated problems or delays and actions or plans to resolve them.

Nothing to report.

6.3 Changes that have a significant impact on expenditures.

Nothing to report.

6.4 Significant changes in use or care of human subjects, vertebrate animals, and/or biohazards.

Nothing to report.

6.5 Change of primary performance site location from that originally proposed.

Nothing to report.

7. SPECIAL REPORTING REQUIREMENTS

All of our completed research projects have been submitted to the following databases: research.hub@dot.gov, NTLDigitalSubmissions@dot.gov, TRIS-TRB@nas.edu, and the Transportation Library at Northwestern University, The Volpe National Transportation Systems Center, the Federal Highway Administration Research Library and the National Technical Information Service.

Research projects conducted in Maryland are also submitted to MD-SOAR, a statewide repository.