Semi-Annual Progress Report No. 2 – Center for Equitable Transit Oriented Communities

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	University of New Orleans (Lead Institution) *Florida Atlantic University* *University of Colorado, Denver* *University of Florida* *University of Utah*
Center Director:	Guang Tian, PhD gtian@uno.edu Phone: 504-280-6520
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1. ACCOMPLISHMENTS

1.1 What are the major goals of the program?

CETOC's Mission is to cultivate transit-centered, equitable, and resilient communities that support residents' multimodal travel needs and preserve the environment.

Goals:

Research: Advance scientific knowledge and identify innovations that can inform the planning and development of equitable transit-oriented communities.

Leadership: Cultivate a diverse group of visionary transportation leaders who will dedicate their careers and inspire others to advance public transportation and build equitable and resilient communities.

Education and Workforce Development: Train a new generation of transportation professionals with the knowledge and techniques needed to meet the challenges of the present and be prepared for the future.

Tech Transfer: Develop transformative products (e.g., tools, databases, methods, and strategies) to be widely adopted and implemented by the transportation profession for building equitable transit-oriented communities.

1.2 What was accomplished under these goals?

In this reporting period, substantial progress has been made on the majority of our first-year research projects (see below), after a slow start in the prior reporting period due to delays finalizing subcontracts and other administrative details. Many of the ongoing projects have begun to produce outputs such as papers, public discussions, and other forms of technology transfer. Furthermore, over a dozen events have been held both in person and virtually by various consortium members which directly or indirectly served to disseminate relevant research or engage communities in discussion about equitable transit, transit-oriented communities, and other CETOC-related topics. Students have been funded by CETOC at every consortium member university, contributing to research, education, and workforce development. Administratively the Center has developed and strengthened itself to promote an increased ability to succeed in the above goals through the onboarding of a full-time Project Manager, selection of an Advisory Board consisting of thought leaders and practitioners from academic, public, and private sectors and the development of partnerships with local transit providers, planning agencies, and others to promote ongoing and future technology transfer.

1.2.1 Research

Research on the following CETOC-funded first year projects is underway:

Lead University	Project Name	PI(s)
UNO	Longitudinal Analysis of Transit's Land Use Multiplier in Three Regions	Guang Tian
	Status Update: -After some delays due to data issues, data processing is nearing completion -Final analysis of completed data is underway -A literature review and some sections of a research paper have been completed	
UNO	Quantifying the Influences of Telecommuting on VMT and Transit Usage	Guang Tian
	Status Update: -Data processing and analysis are complete -A first draft of the final paper has been completed -Final editing and search for appropriate journal are underway -Study findings were discussed at the CETOC x APA Webinar/Lunch & Learn April 19th.	
UC-D	Examining the Role of Transit Investments on Opportunity Outcomes	Aditi Misra, Manish Shirgaokar, Wesley Marshal
	Status Update: -Literature Review and all data related tasks (securing, cleaning, integrating) have been completed. -Model and visualization tool development will be done over summer with the TRB paper submission deadline as target completion date	
UC-D	Understanding Transit User Experience and Expectations in Under-served Communities	Manish Shirgaokar, Aditi Misra, Wesley Marshall
	Status Update: -Completed tasks: team building, IRB approval, identifying experts, designing instruments -Tasks ongoing: interviewing, setting up interactions with local communities, data cleaning, geocoding -Tasks not started: designing choice experiments and hosting survey on Qualtrics, documenting findings in papers and public-facing report	
FAU	Using machine learning to understand the built environment’s influence on 15-minute transit-oriented communities	Louis Merlin
	Status Update:	

	-Literature review 80% complete -Data collection 10% complete	
FAU	50 Years of Trends in Station Areas across the United States	John L. Renne
	Status Update: -Literature review 40% complete -Data collection 20% complete	
UF	Shared micromobility as a last-mile complement to public transit	Xiang Yan
	Status Update: Completed Milestones: -Established a new data pipeline for integrating public transit and micromobility data across Washington DC and Los Angeles. Conducted research using web and post-usage surveys, revealing shared e-scooters' barriers as a last-mile solution, with demographic insights on adoption rates. -Developed and implemented a novel post-ride survey method for evaluating transit-micromobility multimodal trips. Identified discrepancies in the accuracy of buffer-zone methods for inferring first-mile/last-mile trips, suggesting alternatives for more accurate assessments. -Published two manuscripts in the Journal of Transport Geography and Travel Behavior and Society, sharing findings from the project's research. Ongoing Work: -Finalizing the final paper on the demographic factors influencing the transit-connecting micromobility trips. -Compilation of a final technical report to summarize findings is in progress.	
UF	Analyzing transit-based evacuation demand in hurricanes	Xilei Zhang
	Status Update: Completed Milestones: -Development and implementation of algorithms to infer home locations, activities, and evacuation behaviors of individuals based on mobile phone GPS data. -Collection and analysis of a large-scale, high-resolution GPS dataset from Gravy Analytics, covering 150 million mobile devices with 13 billion records from September 1 to October 15, 2022, in Florida. -Categorization of users into six groups (Non-evacuees, Shadow evacuees, Self-evacuees, Voluntary evacuees,	

	Mandatory evacuees, and Partial evacuees) to analyze evacuation rates and patterns. -Conducted descriptive analyses to reveal spatial patterns of evacuation rates across different counties in Florida, highlighting disparities in evacuation behaviors. Updates: -Preliminary results indicate a heterogeneous spatial pattern of evacuation rates, with significant variations across counties. Lee County, despite being the hardest hit, showed a notably low evacuation rate. -The project incorporates sensitivity analysis and validation using household survey data from Lee County to ensure the reliability of the evacuation behavior inference algorithm.	
UU	Gentrification, displacement, and GHG emissions at Transit-Oriented Communities	Andy Hong
	Status Update: Literature review has been completed; VMT data collection is being delayed due to complications with data sharing; Environmental data collection is under way; VMT modeling and estimation are under way	
UU	Is transit-oriented development affordable for low- and moderate-income households (in terms of H+T)	Reid Ewing
	Status Update: For the current phase of the study, we are estimating the T (transportation) cost component. During the first quarter of 2024 we: (1) examined various data options and settled on two: (a) travel data (including VMT) collected by StreetLight and (b) mode share and vehicle ownership data collected for seven TODs (2) determined that StreetLight Data can provide VMT data for all 107 TODs which can be used to calculate transportation costs for each TOD. (3) completed price negotiations with StreetLight Data. (4) sent a list and locations of the 107 TODs to StreetLight Data	

Furthermore, progress is underway in selecting second-year projects for funding. 27 pre-proposals were submitted resulting in 25 formal proposal submissions which are currently under peer review by members of the CETOC Advisory Board as well as additional external reviewers.

1.2.2 Leadership

Leadership Effectiveness Metrics	Progress
# of national and regional leadership positions held by CETOC PIs	12 (up from 10)
# of conference planning positions held by CETOC PIs	12 (up from 5)
# of leadership and research awards received by CETOC PIs during reporting period	2

1.2.3 Education and Workforce Development

Education and Workforce Development Effectiveness Metrics	Progress
# of transportation-related master's degree programs offered	14
# of transportation-related PhD degree programs offered	8
# of transportation-related certificate programs offered	8

Across the five consortium member universities, CETOC research is currently funding 4 undergraduate students, 13 master's students, and 6 doctoral students. Over half of all CETOC-funded students are female, non-binary, and/or minority students.

1.2.4 Technology Transfer

Technology Transfer Effectiveness Metrics	Progress
# of related editorial Journal positions held by CETOC PIs	13 (up from 12)

1.3 How have the results been disseminated?

Over a dozen events have been held both in person and virtually by various consortium members which directly or indirectly served to disseminate relevant research or engage communities in discussion about equitable transit, transit-oriented communities, and other CETOC-related topics. CETOC PIs and CETOC-funded students attended TRBAM in Washington D.C. to present and discuss research, network with fellow transportation professionals, and spread awareness of the Center and its research. See also (3.1) Publications.

1.4 Plans for next reporting period

In the next reporting period, we hope to have most year one projects complete or nearing completion, year two projects selected and funded with research (and education, tech transfer, etc.) underway. CETOC representatives with attend the CUTC Summer Meeting in June and attend and present at the Future of Transportation Seminar in August. Many year one projects will be submitted for presentation at TRBAM 2025 by the summer deadline, and many should have produced papers which will be under journal review. We plan to continue hosting events to disseminate research and engage with community members, as well as continued development of education and tech transfer activities. We have already completed the first CETOC webinar episode, which falls into the next reporting period, and hope to produce at least one additional episode within the coming reporting period. We plan to increase collaboration between consortium members as well as with community partners, and to work to expand the ways in which we disseminate research outputs and enagage in tech transfer activity.

2. PARTICIPANTS & COLLABORATING ORGANIZATIONS

2.1 What organizations have been involved as partners?

- City of Gainesville: Dan Zhu, collaboration with Xilei Zhao, UF
- Jacksonville Transportation Authority: Alexander Traversa, collaboration with Xiang Yan, UF
- Miami-Dade Transit: Linda Morris, collaboration with Xiang Yan, UF
- Regional Transportation District, Denver, CO: Jonathan Wade, data expert and domain expert on transit, collaboration with Manish Shirgaokar, UCD
- City Planning Commission, New Orleans, LA, collaboration with UNO (cost-share, tech transfer)
- APA Metro New Orleans, collaboration with UNO (event production)
- WSP New Orleans, collaboration with UNO (event production)

Many other partnerships are in formative stages for research, cost-share, tech transfer, event production, education, and outreach. Once these agreements have been finalized, they will be included in the next reporting cycle.

2.2 Have other collaborators or contacts been involved?

Collaboration is ongoing between all consortium member PIs and other researchers within consortium universities on current projects, planned future projects, planned events and webinars, education projects, outreach projects, data sharing, and more. Non-organizational (academic) collaborators outside the consortium include:

- Thomas Vanoutrive, University of Antwerp (Belgium), collaboration with Louis Merlin, FAU
- Nacima Baron, Gustave Eiffel University (Paris, France), collaboration with John Renne, FAU
- Thomas Sanchez, Texas A&M University, collaboration with Xiang Yan, UF

3. OUTPUTS

3.1 Publications

Publications and presentations marked with an asterisk acknowledge(d) federal CETOC funding. All other articles should be considered CETOC-related or CETOC-associated, but not CETOC-funded.*

3.1.1 Journal Publications

Forrister, A., Kuligowski, E. D., Sun, Y., Yan, X., Lovreglio, R., Cova, T. J., & Zhao, X. (2024). Analyzing risk perception, evacuation decision and delay time: A case study of the 2021 Marshall Fire in Colorado. *Travel Behaviour and Society, 35*, 100729.

*Huang, E., Yin, Z., Broaddus, A., & Yan, X. (2024). Shared e-scooters as a last-mile transit solution? Travel behavior insights from Los Angeles and Washington D.C. *Travel Behaviour and Society, 34*, 100663.

Kaniewska, J., Ewing, R., Sabouri, S., & Ameli, H. (2024). Is transit-oriented development affordable for low-and moderate-income households? *Cities, 147*, 104772.

Renne, J. L., Chava, J., Appleyard, B., & Tolford, T. (2024). Rent Growth Near Rail Stations after the Great Recession. *Journal of Sustainable Real Estate, 16*(1), 2300556. doi:https://doi.org/10.1080/19498276.2023.2300556

*Su, L., Yan, X., & Zhao, X. (2024). Spatial equity of micromobility systems: A comparison of shared E-scooters and docked bikeshare in Washington DC. *Transport Policy, 145*, 25-36.

Sun, Y., Huang, S. K., & Zhao, X. (2024). Predicting hurricane evacuation decisions with interpretable machine learning methods. *International Journal of Disaster Risk Science, 15*, 134-148.

Yang, W., Tian, G., & Ewing, R. (2023). Impact of corridor highway system on communities: Built environment and travel mode choices. *Cities, 141*, 104467.

*Yin, Z., Rybarczyk, G., Zheng, A., Su, L., Sun, B., & Yan, X. (2024). Shared micromobility as a first-and last-mile transit solution? Spatiotemporal insights from a novel dataset. *Journal of Transport Geography, 114*, 103778.

*Zhang, X., Zhou, Z., Xu, Y., & Zhao, X. (2024). Analyzing spatial heterogeneity of ridesourcing demand determinants using explainable machine learning. *Journal of Transport Geography, 114*, 103782.

3.1.2 Books and other non-periodical, one-time publications

Lovreglio, R., Paes, D., Feng, Z., & Zhao, X. (2024). Digital Technologies for Fire Evacuations. In X. Huang, & W. C. Tam (Eds.), *Intelligent Building Fire Safety and Smart Firefighting* (pp. 439-454). Springer Nature Switzerland.

Renne, J. (2023). Chapter 15: Urban Interventions: Formulating a Strategy for Walkable and Transit- Oriented Development. In J. de Abreu e Silva, K. Currans, R. Schneider, & V. Van Acker (Eds.), *Handbook on Transportation and Land Use: Human-Centered Communities in an Age of Rapid Technological Change.* UK: Edward Elgar.

Sun, Y., Zhao, X., Lovreglio, R., & Kuligowski, E. (2024). AI for Large-Scale Evacuation Modeling: Promises and Challenges. In M. Z. Naser (Ed.), *Interpretable Machine Learning for the Analysis, Design, Assessment, and Informed Decision Making for Civil Infrastructure* (pp. 184-204). Elsevier.

3.1.3 Other publications, conference papers and presentations

-Serena Hoermann. “Climate Gentrification and Resilience: A Critical Discourse Analysis” at the Southeast Conference for Public Administration (SECoPA 2023) in Atlanta, GA, September 28, 2023 (doctoral student)

-Justyna Kaniewska. “Is Transit-Oriented Development Affordable for Low- and Moderate-Income Households?” TRBAM 2024 Lectern Presentation 1/1/24.

-Aditi Misra, Anna Henderson, Manish Shirgaokar, and Wesley Marshall. “Un-driving climate change: The benefits of an e-bike rebate program,” 103rd Annual Meeting of the Transportation Research Board, Washington, D.C., January 9, 2024

-Aditi Misra, Wesley Marshall, Lucy O’Sullivan, Molly Wagner, and Manish Shirgaokar. “Estimating uncertainty and misery (index) of the paratransit experience,” 103rd Annual Meeting of the Transportation Research Board, Washington, D.C., January 8, 2024

- Aditi Misra, Manish Shirgaokar, Wesley Marshall; 'Infrastructure, Transit Investments and Population Displacement'; submitted to the Annual Conference for American Collegiate Schools of Planning (ACSP) 2024.

-Aditi Misra, Manish Shirgaokar, Wesley Marshall; 'Role of Population Displacement Infrastructure & Transit Investments on in Denver'; submitted to TRB Conference on Advancing Transportation Equity, 2024.

-John Renne. “Adaptation Urbanism: Rethinking Streets to Address Climate Change,” University of Oxford, Transport Studies Unit, School of Geography and the Environment, October 5, 2023 (Invited Lecture)

- John Renne. “Disasters, Older Adults, Vulnerable Populations, and Resilience,” National Hartford Center for Gerontological Nursing Excellence, National Conference, October 26, 2023 (Plenary Speaker)

-John Renne. “From Garden Cities to 15-Minute Cities: The Importance of Transit, Walking, and Attainable Housing in TODs,” Oxford Brookes University, October 12, 2023 (Invited Lecture)

- John Renne, Louis Merlin, Serena Hoermann. “Leveraging Virtual Reality for Community Engagement in Urban Planning,” February 16, 2024, West Palm Beach.

-Guang Tian. “Impact of Corridor Highway System on Communities: Built Environment and Travel Mode Choices,” TRBAM 2024 Economic Development and Land Use Committee; 1/8/24

*-Guang Tian, Bob Danton, Reid Ewing, et al. “Varying Influences of the Built Environment on Household Travel in the United States: An Update with 36 Diverse Regions and Machine Learning,” TRBAM 2024 Poster Session 3106; 1/9/24

*-Guang Tian, Bob Danton, et. al. “Predicting Vehicle Miles Traveled: Traditional Statistical Models Versus Machine Learning Approaches” TRBAM 2024 Poster Session 3215; 1/9/24.

-Guang Tian, Hongwei Dong, Minyu Situ, Alex Karner, & Kate Ko, “Residential Location and H+T Cost,” 3/27/24, Virtual Presentation for TRB Committee AMS50 Webinar Series.

*-Guang Tian, Reid Ewing, et. al. “Exploring the Influences of Ride hailing Services on Vehicle Miles Traveled and Transit Usage: Evidence from California,” TRBAM 2024 Poster Session 3216; 1/9/24.

-Guang Tian & Gregory Harris. “At-Grade Rail Crossings,” 11/7/23, Entergy Centre New Orleans.

-Molly Wagner, Manish Shirgaokar, Aditi Misra, and Wesley Marshall. “What can organizations and practitioners do to improve ADA implementation for infrastructure design and supply?,” 103rd Annual Meeting of the Transportation Research Board, Washington, D.C., January 8, 2024

-Xiang Yan. “Leveraging Data Science and AI for Smart and Equitable Public Transportation Systems”, Federal Transit Administration, January 11, 2024. (Invited talk)

-Xiang Yan. “Integrating Big and Small Data to Understand Transit and Micromobility Interactions and Promote Their Integration”, Next-Gen Transportation Department of Civil, University of Michigan, January 18, 2024. (Invited talk)

-Xiang Yan. “Applying AI Methods to Mobility” (Moderated by Renee Autumn Ray, other panelists include Nicole Dupuis, Robert Sheehan, Philip Pugliese). Workshop on Accelerating Mobility Innovation: Overcoming Challenges and Re-envisioning Opportunities. Transportation Research Board 2024 Meeting, January 7, 2024.

-Xiang Yan. “Exploring Micromobility: Research on Safety, Equity, Transit Integration, and Testbeds,” pre-organized RiM session (Moderated by Wenwen Zhang, other panelists include Hannah Younes, Ralph Buehler, Janille Smith-Colin, and Greg Griffin). Association of Collegiate Schools of Planning (ACSP) 2023 Chicago Annual Conference, October 19-21, 2023.

- Zhao, X. (2024). Advancing Understanding and Modeling of Human Behavior in Wildfires. NIST’s Fire Research Seminar Series. (Invited Talk)

*-Zhao, X., Jiang, S., Liu, L., Huang, S-K, Lindell, M., Zhang, X. (2024). Fusing Small and Big Data to Advance Understanding of Hurricane Evacuation. Gulf of Mexico Conference, Tampa, FL.

-Zhao, X. (2023). Should we stay or leave now? Improving understanding of wildfire evacuation with large-scale GPS data. TRB Webinar: Understanding Evacuation Behavior and Regional Resilience. (Invited Talk)

*-Jiang, S., Xu, Y., Wong, W., & Zhao, X. Real-time urban traffic monitoring using transit buses as probes. Transportation Research Board 103rd Annual Meeting.

*-Zhang, X., Zhao, X., & Yan, X. (2024). Are mobile device location data biased for human mobility analysis?. Transportation Research Board 103rd Annual Meeting.

-Sun, Y., Forrister, A., Kuligowski, E. Lovreglio, R., Cova, T. J., & Zhao, X. (2024). Social vulnerabilities and wildfire evacuations: A case study of the 2019 Kincade Fire. Transportation Research Board 103rd Annual Meeting.

3.2 Websites and Other Internet Sites

3.2.1 CETOC Homepage

https://www.uno.edu/cetoc

3.2.2 CETOC Social Media:

Instagram: https://www.instagram.com/cetocofficial/
LinkedIn: https://www.linkedin.com/company/cetoc/
X/Twitter: https://twitter.com/CETOCOfficial
YouTube: https://www.youtube.com/@CETOCOfficial

3.3 Technologies & Techniques

Nothing to report.

3.4 Inventions, Patents, & Licenses

Nothing to report.

3.5 Other Products

Nothing to report.

4. OUTCOMES

4.1 Increased Understanding and Awareness of Transportation Issues

See 3.1.1-3.1.3

4.2 Passage of new policies, regulation, rulemaking, or legislation

Nothing to report.

4.3 Increases in body of knowledge

See 3.1

4.4 Improved processes, technologies, techniques, and skills

Nothing to report.

4.5 Enlargement of the pool of trained transportation professionals

Students at consortium universities completed a wide range of transportation-related courses; on-site tours with the UNOTI Fall 2023 and Spring 2024 Speakers Series introduced students to a wide variety of transportation-related professional opportunities. One CETOC-funded student graduated with an MS degree and is now employed in the transportation field. CETOC is currently funding 4 undergraduate students, 13 master's students, and 6 doctoral students.

4.6 Adoption of new technologies, techniques, or practices

Nothing to report.

5. IMPACTS

5.1 Effectiveness of the Transportation System

Nothing to report.

5.2 Technology Transfer

Nothing to report.

5.3 Increase in the Body of Scientific Knowledge

13 editorial Journal positions held by CETOC PIs.

5.4 Transportation Workforce Development

See 1.2.3; 4.1; 4.5.

5.5 Transfer of Results

Nothing to report.

5.6 Commercialization of Technology

Nothing to report.

5.7 Adoption of new practices

Nothing to report.

5.8 Opportunities in research and training

See 1.2.3; 4.1.

5.9 Underrepresented Groups

Over half of all currently funded CETOC students represent underrepresented groups, including minorities, people of color, women, and those identifying as non-binary.

5.10 Development and Dissemination of New Educational Materials

Nothing to report.

6. CHANGES/PROBLEMS

The primary challenge facing CETOC in this reporting period has been streamlining processes for internal reporting and invoicing, and development of processes and procedures for selection and review of the second-year projects. These hurdles have all been handled with grace and cooperation and we believe we are set for things to run considerably more smoothly in the next reporting period and in years to come. Other hurdles have come from individual consortium members' need to secure cost match, an issue which also seems to have been largely resolved at this time. As mentioned in the prior report, year one projects were delayed initially by issues of subcontract finalization which have since been resolved, and while some projects are still somewhat behind their planned schedules, all are now fully underway albeit in varying stages of completion.

7. SPECIAL REPORTING REQUIREMENTS

Nothing to report.