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| **Research Project Name**: Agent-Based Modeling for Assessment of Coastal Transportation Network Resiliency and Environmental Justice (TAMU) |
| Improving the Durability and Extending the Life of Transportation Infrastructure |
| **Principal Investigator:** <br> Amirali Najafi, PhD, anajafi@tamu.edu, 0000-0002-7845-0859, 979-458-5387, Texas A&M University |
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| **Research Project Funding**: <br> Federal: $40,000.00            Match: $20,061.00 (TAMU) |
| **Project Start Date**: 09/01/2024      **Project End Date:** 08/31/2025 |
| **Project Description**: This research focuses on the vulnerability of socially vulnerable communities to climate change impacts, particularly in coastal areas. It explores how infrastructure resilience planning can inadvertently worsen disparities in community vulnerability. The objective is to develop an agent-based model (ABM) framework that integrates infrastructure resilience, community vulnerability, agency decision-making, and climatic hazards, with a focus on transportation networks. The ABM aims to advance understanding of complex social-environmental-infrastructure interactions and inform engineering and decision-making policies. The broader impact involves promoting climate change equity in Houston through civil infrastructure solutions. |
| **US DOT Priorities:** This research proposal aims to align with the US DOT's strategic goals in equity, climate sustainability, and transformation by focusing on environmental justice in coastal resilience. The project seeks to address disparities in how climatic hazards affect different communities, ensuring that strategies are both effective and equitable. It also supports US DOT's commitment to addressing the climate crisis and transforming transportation systems for future readiness. The proposed ABM framework will facilitate advanced scenario planning and policy testing to improve the resilience of coastal transportation infrastructure, aligning with CREATE goals for enhancing safety, efficiency, and equity in transportation systems facing coastal hazards. <br><br> **Outputs**: This project is expected to produce several key outputs that will advance the field of coastal resilience. This includes the development of an innovative agent-based modeling framework for assessing coastal resilience and climatic disaster equity, integrating multiple agents representing community, climatic hazards, physical infrastructure, and government/agency aspects. This framework will provide a holistic understanding of coastal dynamics and interactions, contributing to more effective resilience strategies. Additionally, the project will establish partnerships with leading experts in coastal engineering and geospatial modeling, such as Dr. Joseph Louis and Dr. Haizhong Wang from Oregon State University, enhancing collaboration and knowledge exchange beyond the UTC consortium. |
| **Outcomes/Impacts**: The outcomes of this project are expected to have an impact on transportation systems, particularly in terms of safety, reliability, and cost-effectiveness. By developing a comprehensive agent-based modeling framework, the project aims to improve |

the resilience of coastal transportation infrastructure to climatic hazards. This will lead to more robust infrastructure designs and improved emergency response strategies, ultimately enhancing the safety and reliability of transportation systems in coastal areas. Additionally, the project's focus on environmental justice and equitable distribution of resilience benefits will ensure that vulnerable communities are better protected from the impacts of climatic disasters, leading to more equitable transportation systems overall.

**Final Research Report**: URL to final Report will be provided upon completion.