NEW ENGLAND TRANSPORTATION CONSORTIUM
QUARTERLY PROJECT PROGRESS REPORT

A. PROJECT NUMBER AND TITLE:
NETC 20-2 Current Status of Transportation Data Analytics and A Pilot Case Study Using Artificial Intelligence (AI)

B. PRINCIPAL INVESTIGATOR(s) & UNIVERSITY(s):
Yuanchang Xie, PhD, PE, University of Massachusetts Lowell

C. WEB SITE ADDRESS (*If one exists*):
None

D. START DATE (*Per NETC Agreement*):
5/5/2021

E. END DATE (*Per NETC Agreement*):
12/31/2023

F. ANTICIPATED COMPLETION DATE:
12/31/2023

G. PROJECT OBJECTIVES:
(1) Provide clear and comprehensive picture to the six New England state DOTs regarding their data assets, data needs and emerging data sources, modeling and workforce needs, and data collection, analysis, utilization, storage, and sharing practices related to traffic operations;
(2) Provide strategic and practical recommendations to prepare New England DOTs for future data-driven transportation system analytics; and
(3) Conduct a pilot case study of using AI techniques to analyze existing multi-source data for improving traffic operations and safety.

H. REPORT PERIOD:
1st Quarter, 2023

I. ACCOMPLISHMENTS THIS PERIOD:

- Conducted additional tests of the radar and camera systems on UMass Lowell campus. Fixed some issues with the camera data logger. Upgraded the radar data logger firmware. Both the radar and camera data loggers now can handle data collection for more than 5 days. We also practiced how to adjust the position of the radar sensor using a trailer provided by NHDOT so that it can be quickly set up in the field.
- Both radar and thermal sensors were tested using the trailer provided by NHDOT at their headquarters for about 5 days at the end of March. Both sensors and their data loggers worked well.
- After consulting with NHDOT, we added one high-risk site in Nashua NH and one in Tilton NH. Also, we dropped two sites that are not on interstate highways.

- Have been working on incorporating Task 1 report into the final report. We are adding tables and figures to summarize the discussion in Task 1 report. Figures and tables will make our results easier to understand.
- Have been investigating different artificial intelligence (AI) models to analyze the data to be collected in New Hampshire (NH). Once we have the data collected from NH highways, we can jump start the data analysis. The data currently being used was collected from a local arterial near UMass Lowell campus and in an NHDOT yard.
- Have been exploring potential applications of the data to be collected (e.g., setting curve advisory speed, validating TomTom data, understanding driver behavior before entering curve, how vehicles from on-ramp merge).
- We received the trajectory data for the Naturalistic Driving Study program. The dataset only covers a few rural highways in the state of Washington and does not include interstate highways. The sampling rate is 1 Hz (1 data point per second), which is not detailed enough. Given its limited sample size, we later shifted our focus to analyzing the sample data collected on UMass Lowell campus and at the NHDOT headquarters.

J. PROBLEMS ENCOUNTERED (If any):

We initially planned to complete the data collection in March. However, there were some issues with the camera data logger. The vendor developed another solution based on Raspberry Pi, which consumes less power and can handle a larger volume of video data than the initial solution. The new data logger has been thoroughly tested and it works well.

Another reason for the delay was the weather. Snow and rain resulted in wet and muddy site conditions, and we had to cancel one trip due to this. The low temperature and short daytime made it difficult to charge trailer batteries using solar panels. These problems no longer exist in April.

All problems have been resolved. We have rescheduled our first field data collection to April 11, 2023 and should be able to complete the remaining sites soon without any other issues.

K. TECHNOLOGY TRANSFER ACTIVITIES:

None

L. STATUS BY TASK:

Task	Description	% Complete
Task 1	Review of Current Data Collection and Utilization Practices	100%
Task 2	Assessment of Data Needs, Emerging Data Sources, and Data Processing and Analytics	100%
Task 3	Recommendations	100%
Task 4	Case Study	25%
Task 5	Draft Final Report	10%
Task 6	Final Report	Not started

M. PERCENT COMPLETION OF TOTAL PROJECT:

60%

N. ACTIVITIES PLANNED FOR NEXT QUARTER:
The team will finish the field data collection.

O. FINANCIAL STATUS:
As of: *April 09, 2023*
Total Project Budget: $200,000.00
Total Expenditures: $103,071.29

Note: This report should not require more than 2-3 pages & should be e-mailed to the NETC Coordinator so as to arrive no later than three (3) working days after the end of each calendar quarter.