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CALTRANS DIVISION OF RESEARCH, INNOVATION AND SYSTEM INFORMATION

TRANSFORMING IDEAS INTO SOLUTIONS

Research Notes

Modal

Measurement and Prediction of Transit System Performance Using Probe Data Generated through DSRC and non-DSRC Technologies

Develops a suite of data protocols to readily transform dedicated short-range communications (DSRC) data from city buses into measurements of transit performance.

MAY 2023

Project Title:
Measurement and Prediction of Transit System Performance Using Probe Data Generated through DSRC and non-DSRC Technologies

Task Number: 3514

Start Date: September 1, 2020

Completion Date: August 31, 2022

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WHAT IS THE NEED?

The California Department of Transportation (Caltrans) Strategic Management Plan targets a doubling of transit, reduction of statewide per capita vehicle miles travelled and reduction of greenhouse gasses and particulate matter emissions. Rapidly emerging information and communication technologies present effective means to measure current transit system performances against expected objectives.

There is a need to develop software and protocols to collect and analyze the transit data generated by these new technologies to ensure the benefits of these infrastructure investments are realized for the public.

WHAT ARE WE DOING?

This project will create a standardized set of procedures that transit agencies can readily implement to collect, analyze, and display the data generated by on-vehicle communication technologies. Specifically, this project will:

1. Identify the probe data to be transmitted
2. Specify the transmission protocols
3. Structure the collection of those data
4. Integrate those data with relevant GTFS data
5. Determine the fundamental metrics to be calculated to analyze:
   a. Dwell time at stops
   b. Transit time between stops

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6. Determine the application of these metrics to report performance at:
   a. The route level
   b. The run level
   c. The segment level
7. Create the code to generate an easy to use "dashboard" to readily assess transit performance through these metrics
8. Incorporate sufficient detail to understand the impact of:
   a. Boarding/Alighting flows including ramp deployment
   b. Traffic conditions including signal prioritization
   c. Weather conditions based on vehicle sensors
   d. Bus driver behaviors

WHAT IS OUR GOAL?

This task order develops a suite of data protocols to readily transform DSRC data from city buses into measurements of transit performance.

WHAT IS THE BENEFIT?

The proposed project carried out via this task order aligns with two Caltrans priorities:

- Modality – this research will leverage transit by measuring their performance.
- Innovation – this research is embracing the dedicated short-range communications data and other real-time data to help Caltrans solve major planning issues.

WHAT IS THE PROGRESS TO DATE?

The researcher continued to work on troubleshooting the method to impute stop arrival and departure times from the General Transit Feed Specification (GTFS) Vehicle Position feeds. The researchers have tested these estimates against the more limited data provided in the GTFS Trip Update feeds. While the research team have solved the largest problems, they are still refining the method for Caltrans. The final products have been delayed while the research team completes additional troubleshooting on the stop time estimation algorithm that drives the core metrics.