INNOVATION / TECHNOLOGY DEPLOYMENT SUMMARY

Adaptive Signal Operations Using Crowdsourced Speed Data

CHALLENGE

Signalized intersections along freeway frontage roads contribute to congestion when traffic signal timing does not account for unexpected fluctuations in traffic flow. This is especially prevalent during periods of inclement weather and freeway incidents when traffic diverts from the congested freeway mainlanes to the adjacent frontage roads.

SOLUTION

In response to changing conditions, this innovation project leverages cloud-based INRIX traffic speed data (Figure 1) to dynamically adjust traffic signal timing patterns on an urban freeway frontage road (Figure 2). Additionally, the Texas A&M Transportation Institute (TTI) developed a web-based tool to facilitate real-time monitoring.

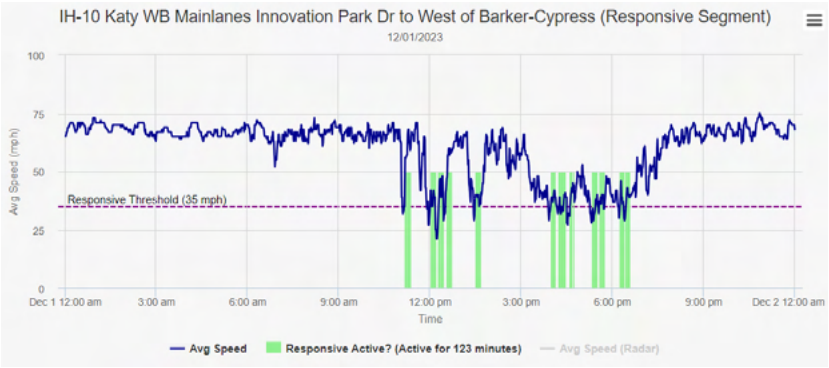

Figure 1. Historical data chart.

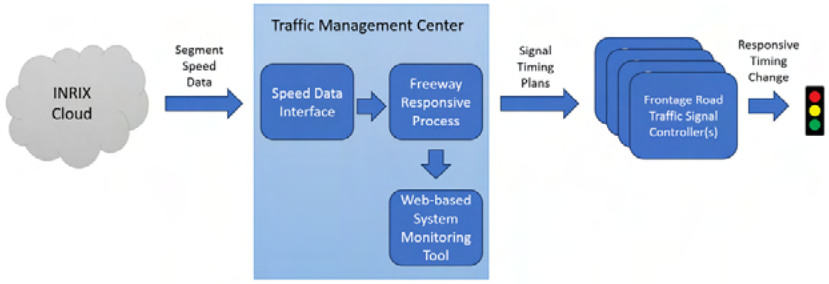

Figure 2. Data flow.

TxDOT GOALS

- Deliver the right projects
- Focus on the customer
- Foster stewardship
- Optimize system performance
- Preserve our assets
- Promote safety
- Value our employees

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PROACTIVE APPROACH

This innovation enhances an existing pilot project that uses a roadside radar installation to provide speed data to the software. The enhancement approach offered a cost-efficient way for the Houston District to test deployment, as well as a framework to more accurately estimate system deployment benefits.

BENEFITS

The software framework for this project automatically changes signal timing along freeway frontage roads based on speed data received from INRIX in real time. This innovation better facilitates traffic flow when frontage road traffic volumes increase due to unexpected congestion on freeway mainlanes. Overall transportation system benefits include reductions in congestion and traffic delays, as well as a reduction in pollution. The use of cloud-based data analysis reduces operating and maintenance costs for the agency.

KEY TASKS

- Develop location selection criteria based on system performance (Figure 3) and safety considerations.
- Monitor the system in real time to identify priority pilot location(s).
- Deploy the system at the selected locations.
- Incorporate the system into shared traffic management center (Houston TranStar) for multi-agency monitoring.

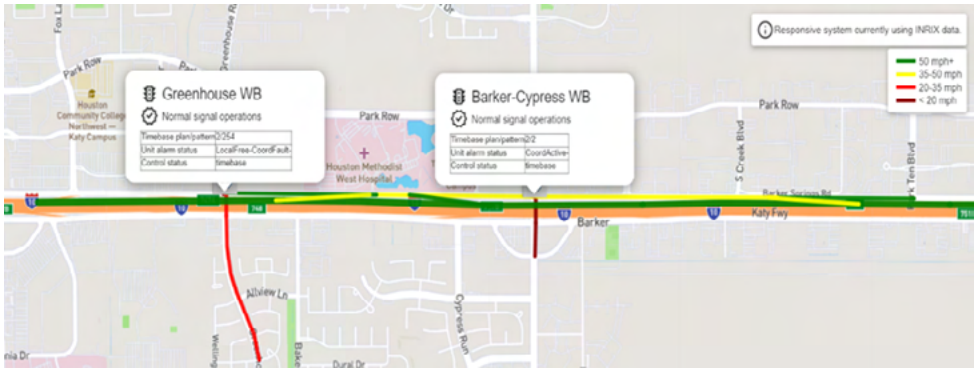

Figure 3. System status map.

DATA SOURCES

The project software uses INRIX cloud-based speed data. Existing traffic signal timing plan templates are used to specify changes to the traffic signal controller.

Resources

Houston District (txdot.gov)

Greater Houston Transportation and Emergency Management Center (houstontranstar.org)

Crowdsourcing for Advancing Operations (dot.gov)

A Comparison of Crowdsourcing Approaches for Road Weather Information (bts.gov)

Crowdsourcing: Case Studies and Fact Sheets (dot.gov)

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