

RESEARCH SUMMARY

OFF-LINE AND REAL-TIME EVALUATIONS OF EASTERN-SHORE SENSORS WITH A GENERALIZED DETECTION PERFORMANCE MONITORING SYSTEM

WHAT WAS THE NEED?

MDOT SHA has installed six Wavetronix sensors on the Eastern Shore, with plans to deploy an additional 14 sensors on scheduled dates. A rigorous quality evaluation with respect to the six existing sensors is essential to ensure the best application of their real-time data, and also for the review of the deployment plan for the remaining 14 sensors. The system for detector performance evaluation can address some critical data issues such as stability, availability, and the variance of time-series sensor data, and consistency of data accuracy under different congestion levels and various traffic compositions

WHAT WAS THE GOAL?

The primary objectives of this study are to develop a detector performance monitoring system for both off-line and on-line applications, and to implement such a system for the Eastern Shore region's current and proposed sensors, including: evaluate the data quality and reliability of the six sensors deployed in the Eastern Shore region; assess the applicability of the six sensors in the Eastern Shore region for supporting various traffic monitoring and congestion-control strategies; and analyze the data applicability and effectiveness of the proposed 14 more sensors for the Eastern Shore region for traffic monitoring, congestion control, or emergency evaluation, based on their proposed deployment locations.

WHAT DID THE RESEARCH TEAM DO?

The research team has conducted the following tasks for this study: (1) developing the drone-based data collection method for calibration of typical radar-based detectors; (2) review of literature for detector quality evaluation and design of a customized algorithm for detector data quality assessment; (3) performing the assessment for 20 proposed locations for deploying traffic sensors on the Eastern Shore, and (4) converting the developed algorithm into a user-friendly software.

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WHAT WAS THE OUTCOME?

This study has addressed three major tasks and offered results for field deployments. The first is to design a set of guidelines for selecting the deployment locations for traffic sensors in the Easter Shore region for different purposes. The second accomplishment of this study is to design an innovative, multi-stage control model for traffic professionals to efficiently assess the quality of massive speed and flow rate data produced from a deployed detector. For convenience of using the detector quality assessment model, this study has further converted its embedded, multi-stage screening process into an interactive and user-friendly computer program for either on-line or off-line execution.

HOW WILL MDOT SHA USE THE RESULTS?

Anticipated benefits on this research include, having knowledge of a data driven, ideal locations for installation of sensors using the guidelines from this research. These guidelines and recommendations serve as a backup to the preliminary engineering process that MPED conducts before installing a field device. Similarly, using the data quality tool developed by this research will serve a great QA/QC measure for the RITIS data. Since RITIS data is heavily used statewide by multiple agencies for tasks such as signal warrant analysis, traffic impact analysis and safety analysis, it is imperative that good quality data be used.

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