

JOINT TRANSPORTATION RESEARCH PROGRAM

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SPR-3410

2012

Application of Travel Time Information for Traffic Management

Introduction

Using conventional methods, it is extremely costly to measure detailed traffic characteristics in high quality spatial or temporal resolution. For analyzing travel characteristics on roadways, the floating car method, developed in the 1920s, has historically been the most used assessment tool. Measuring traffic patterns, such as estimating origin-destination (O-D) matrices, has traditionally required the establishment of cordons with many observers recording license plate numbers which are later cross-referenced. Both applications are very labor intensive because of the need to employ human observers over many hours, meaning that the cost per data point is prohibitive for collecting data for anything besides limited studies.

This report documents techniques developed in Indiana to use Bluetooth MAC address matching for obtaining probe vehicle data. The term "probe vehicle" means the direct measurement of individual vehicle travel times by matching vehicle identifiers between two locations in a traffic network. However, the data reduction techniques are applicable to other probe vehicle technologies such as vehicle re-identification techniques (e.g., matching detector response patterns), real-time tracking of vehicle trajectories using GPS units or cell phones and connected vehicle technology, currently under development by USDOT.

Findings

Throughout this study, the following findings were implemented by the Indiana Department of Transportation.

1. An eight-foot vertical height was recommended when deploying Bluetooth sensors.
2. Real-time monitoring of the Bluetooth probe data first developed in conjunction with the 2008 Brickyard 400 race was subsequently used during several special events by the INDOT TMC.
3. Real-time monitoring of the 2009 I-65 Lake County construction work zone and subsequent after action reviews have been used for several subsequent reviews of work zone traffic conditions.
4. A 2010 study of the traffic patterns and network impact associated with closing the Cline Avenue Bridge in Northern Indiana was used by INDOT decision makers in identifying traffic mitigation measures.
5. Statistical processing techniques were developed that used probe data to assess the impact of traffic signal retiming efforts to develop business cases for retiming signalized corridors. In one example, the impact of re-timing eight signals on Saturday had a positive economic impact of approximately \$500,000 in estimated user savings over a one-year period.

Implementation Recommendations

Perhaps the most important contribution of SPR-3410 is that outcome assessment, based upon observed changes in corridor probe data, has become a widely accepted, day-to-day practice by INDOT operations engineers. There remain opportunities to expand these techniques to other applications such as assessing winter operations and using commercial data sources to characterize statewide congestion and mobility for prioritizing future capital program investments.

Recommended Citation

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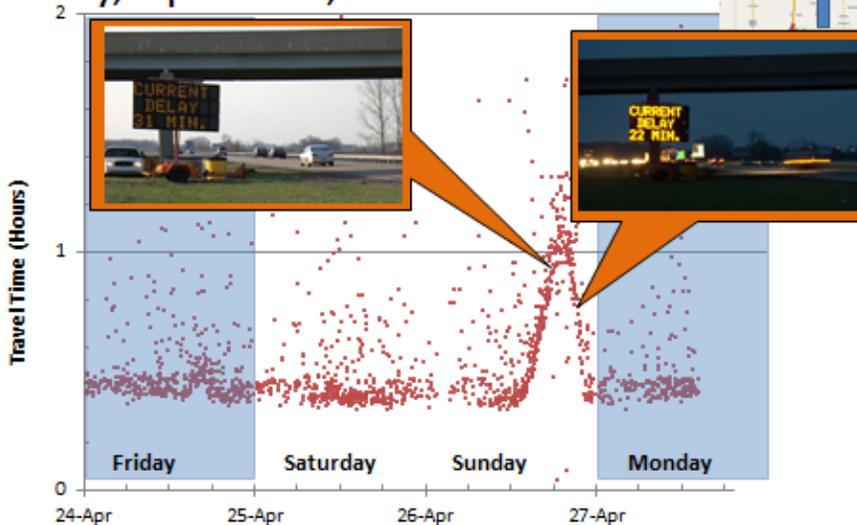
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Bluetooth monitoring temporary “tie wrap” station.

Travel Delay Notification Field Test Sunday, April 26th, 2009



Travel delay notification field test.



Bluetooth monitoring equipment field installation.