RESEARCH
PROJECT CAPSULE [13-2SS]
October 2013
TECHNOLOGY TRANSFER PROGRAM

DOTD Support for UTC Project: Travel Time Estimation Using Bluetooth

JUST THE FACTS:

Start Date:
July 1, 2013

Duration:
24 months

End Date:
June 30, 2015

Funding:
SPR: TT-Fed/TT-Reg

Principal Investigator:
Chester Wilmot, Ph.D., P.E.
Professor Civil & Environmental Engineering Dept.
Louisiana State University

Administrative Contact:
Mark Morvant, P.E.
Associate Director, Research
225-767-9124

Technical Contact:
Kirk Zeringue, P.E.
Senior Research Engineer, Special Studies
225-7679169

Louisiana Transportation Research Center
4101 Gourrier Ave
Baton Rouge, LA 70808

Sponsored jointly by the Louisiana Department of Transportation and Development and Louisiana State University

POINTS OF INTEREST:

Problem Addressed / Objective of Research / Methodology Used Implementation Potential

This project is associated with the Louisiana Transportation Research Center (LTRC) partnership with the National Center for Intermodal Transportation for Economic Competiveness (NCITEC). The NCITEC is a university transportation center housed at Mississippi State University funded by the Research and Innovative Technology Administration (RITA) of the U.S. Department of Transportation (DOT).

PROBLEM

Travel time estimates are useful tools for measuring congestion in an urban area. Current practice involves using probe vehicles or video cameras to measure travel time, but this is a labor-intensive and expensive means of obtaining the information. A potentially more efficient and less expensive way of measuring travel time is to use Bluetooth technology to track vehicle movement in a network.

When conducting research into the use of Bluetooth technology to obtain travel time observations, it is necessary to consider whether there are other means of obtaining the information quicker and cheaper. Some possibilities are time-related travel speeds on major networks from sources such as Google's traffic maps and information on overall congestion in major U.S. cities published in Texas Transportation Institute's annual Urban Mobility Report (http://mobility.tamu.edu/ums). From the initial assessment, the researchers believe that the type of travel time information sought above can be effectively answered using TTI's annual Urban Mobility Report and consecutive annual Urban Mobility Reports, respectively. Identification of the location of individual "hotspots" can possibly be identified using Google's traffic map information. However, part of the research will be to verify the initial assessment that using secondary data sources is quicker and cheaper than Bluetooth technology when identifying overall congestion, the trend in congestion, and individual hotspots.

OBJECTIVE

The main objective of this study is to use probe detection systems capable of detecting Bluetooth devices to measure travel time on freeways and major arterials in the Baton Rouge area. More specifically, the kind of information the researchers are looking to obtain from the measurement of travel time is overall congestion in an urban area, the trend in overall congestion in an urban area, individual locations where congestion is high (i.e., identification of so-called "hotspots"), the level of congestion at the hotspots, and the difference in congestion following introduction of a policy change in an urban area.

METHODOLOGY

The study will include a literature review, identification of the current state-of-the-practice in the US regarding the measurement of travel time, a review of secondary sources of travel time in urban areas, determination of the instruments needed to collect data, purchase of the hardware, formulation of a deployment strategy of instruments to measure congestion at hotspots, actual deployment of instruments at a sample of sites, collection of travel time data using the deployed instruments, estimation of travel time using the collected data, and expression of the results in terms of measures or indices.

IMPLEMENTATION POTENTIAL

A potential benefit of the research is the opportunity to obtain an ongoing indication of the location, level, duration, and trend of congestion in an urban area like Baton Rouge. If the measurement of travel time with Bluetooth detection proves to be more economical, then the execution of this research will result in a number of long-term benefits to both DOTD and users of the highway and road system. The system will provide low-cost, widely available travel time data useful for traveler information and system operations. A major benefit from the perspective of the users is better travel and route planning, which results in less time and fuel wasted due to congestion. For DOTD and regional transportation agencies that maintain, upgrade, and manage the road and highway system, data from the system will permit a more efficient and effective use of limited resources for upgrades, expansions, and maintenance. The result of better utilization of resources for maintaining and upgrading the road system is safer and more efficient travel as measured by shorter travel times and less delay.

Implementation at select locations will provide more data than previously available, and will reduce the cost needed to estimate travel times. Wide-scale implementation will provide data on a scale that was not previously accessible. There will also be a tremendous reduction in the amount and cost of infrastructure needed to estimate travel times.

Additionally, this technology could easily be applied to evaluate the impact of different types of road improvement projects on travel time. For example, delays through construction zones could be estimated more accurately, thus providing DOTD with the ability to enforce contractual agreements with service providers as well as important traveler information.