Method uses 'Bluetooth' to track travel time for vehicles, pedestrians

May 27 2008

Engineers have created a method that uses pervasive Bluetooth signals from cell phones and other wireless devices to constantly update how long it takes vehicles and pedestrians to travel from one point to another.

The method envisioned by engineers at the Indiana Department of Transportation represents a potentially low-cost leap in technology to provide information for everything from the speed of the morning commute to the sluggishness of airport security lines.

"This is incredibly valuable information that could be used for many purposes, including better traffic signal timing and management of construction work zones to reduce congestion, as well as real-time traffic information for motorists," said Darcy Bullock, a professor of civil engineering at Purdue University. "Now we have a way to measure how slow traffic is on a given stretch of road or how long it's taking people to get through airport security at a given concourse and time of day."

Bullock is developing the method with Jason S. Wasson and James R. Sturdevant, engineers from the Indiana Department of Transportation.

"We came up with the idea at INDOT and developed the prototype this year from off-the-shelf hardware," Wasson said.

The method picks up the identifying "addresses" from Bluetooth devices in consumer electronics. Because each device has its own distinct digital signature, its travel time can be tracked by detectors installed at

intersections or along highways and other locations.

Travelers could access the travel-time information using the same portable electronic devices that make the system possible.

"Information is a commodity people are aggressively seeking, and this method promises to cost effectively provide information that has never been widely available to travelers," Bullock said.

Research findings will be detailed in a paper appearing in the June issue of the ITE Journal, published by the Institute of Transportation Engineers. The paper was written by Wasson, Sturdevant and Bullock.

Bluetooth technology connects and exchanges information for cell phone hands-free headsets, wireless keyboards, Internet access for personal digital assistants, and wireless networks for laptops and personal computers. The new travel-time estimation procedures detect and record "media access control," or MAC identification signals, every time a Bluetooth device passes a detector.

"It gives you quantitative 24-hour feedback on traffic flow, information we can use for design and operation decisions," Wasson said. "Agencies need quantitative data so they can make informed decisions about how to allocate resources and how well design changes are working."

Data from such a system would provide not only information about short-term factors such as congestion from construction work zones, but also long-term trends requiring design changes, Sturdevant said.

The researchers tested the method on sections of Interstate 65, Interstate 465 and roads in and around Indianapolis, tracking 1.2 percent of the average daily traffic on specific routes.

"That's important because it means basically every hundredth vehicle is tracked, so the travel-time information is accurate and updated," Bullock said. "With improved antenna mounting we expect to do even better."

Pedestrian walking speeds also could be tracked to learn how long it takes people to negotiate airports and other facilities.

Future work may involve expanding the research to additional sections of roadways. The researchers have filed a patent on the method, and the basic technology is available commercially to create the tracking system, Bullock said.

Source: Purdue University