A simple way to help cities monitor traffic more accurately

August 7 2012, by Pam Frost Gorder

Cities count the number of cars on the road in order to plan everything from the timing of stoplights to road repairs. But the in-road metal detectors that do the counting can make errors – most often by registering that a car is present when one isn't.

One common error is called "splashover" because it usually involves an over-sensitive detector picking up the presence a vehicle in the next lane over – as if the signal from the car "splashed over" into the adjacent lane.

Now Ohio State University researchers have developed software to help city managers easily identify detectors that are prone to splashover and reprogram them to get more accurate numbers.

Benjamin Coifman, associate professor of Civil, Environmental and Geodetic Engineering at Ohio State, and doctoral student Ho Lee describe the software in the October 2012 issue of the journal *Transportation Research Part C: Emerging Technologies*.

For the study, Coifman and Lee monitored 68 in-road detectors in Columbus, Ohio. They found six detectors that were prone to erroneously detecting cars in adjacent lanes. Error rates ranged from less than 1 percent to 52 percent.

"A host of city services rely on these data. We've known about splashover for decades, but up until now, nobody had an effective

automatic test for finding it," said Coifman. "With this software, we can help transportation departments know which detectors to trust when deciding how they should put their limited dollars to work."

People may not be familiar with the commonly used loop detectors, which are often present at intersections to activate a stoplight. When the detectors are visible, they look like rectangular cutouts in the road surface, where underground wiring connects the detector to a traffic box at the side of the road. The same detectors are often present at freeway onramps and exits, to help cities monitor congestion.

To see how often splashover occurred in the 68 detectors in the study, the researchers went to the sites, and noted whether a car was truly present each time a detector counted a car. Then they used those data to construct computer algorithms that would automatically identify the patterns of error.

In tests, the software correctly identified four of the six detectors that exhibited splashover. The two it missed were sites with error rates less than 1 percent – specifically 0.6 percent and 0.9 percent.

"We might not catch detectors in which one in 100 or one in 1,000 vehicles trigger splashover," Coifman said, "but for the detectors where the rate is one in 20, we'll catch it."

The discovery comes just as many American cities are moving toward the use of different technologies, such as roadside radar detectors, to monitor traffic.

"The world is moving away from loop detectors," Coifman added. "And the radar sensors that are replacing loop detectors are actually more prone to splashover-like errors."

These radar detectors bounce a signal off a car and measure the time it takes for the signal to return. Because the detectors are on the side of the road, small measurement errors often cause a single vehicle to be counted in two separate lanes by the radar.

The same algorithms they developed for loop detectors should work for radar detectors, Coifman said. The makers of radar detectors keep their software proprietary, so he can't readily test that hypothesis, though he points out that all of the details of the Ohio State algorithms are fully explained in the article, should radar makers wish to incorporate it into their products.

Provided by Ohio State University