Project Summary

Texas Department of Transportation

0-5217: Vehicle/License Plate Identification for Toll Collection Applications

Background

Vehicles on public roads in the U.S. are required to display a license plate as identification. State departments of transportation (DOTs) maintain records of vehicles and their owners to ensure financial responsibility. Most DOTs also require a registration sticker, which may contain data readable only by public safety officers for database checks. TxDOT is considering 'smart' registration tags with features such as radio frequency identification (RFID).

Electronic vehicle identification (EVI) would give a more complete picture of where and when vehicles are moving. RFID tags are already serving this role in toll collection systems. Universal EVI would allow transportation agencies to introduce additional Intelligent Transportation Systems (ITS) features, including vehicle-roadside communications.

What the Researchers Did

In this project three areas were researched: (1) technology: current and promising technologies for vehicle identification, especially those already deployed for toll collection, (2) organization: incorporation of national and state standards, legislative initiatives, and public response into TxDOT planning, and (3) implementation: costs, benefits, and implementation requirements for EVI.

What They Found

Tolling technology: Tolling technologies are the leading wave of ITS implementation. Tolling is evolving from corridor and cordon systems to area-wide systems, i.e., drivers pay for mileage driven. Several technologies including global positioning systems (GPS) have the potential for mileage tolling, but RFID tags are likely to dominate tolling in the U.S. for some time.

EVI technologies: The feasibility of five EVI technologies was evaluated. On a scale of 16, their scores were loop detectors – 6.71, video – 6.72, RFID tags – 6.90, GPS – 3.79, and cell phones – 6.78. All except GPS can be considered equal, but tags and GPS have the most potential. Because full GPS capabilities are still in the future, tags are currently the most feasible technology for EVI.

Benefits of EVI: EVI would provide better data for managing operations through monitoring of travel times and congestion, and better information for travelers, resulting in traffic redistribution and better utilization of existing assets.

Research Performed by:

Center for Transportation Research (CTR), The University of Texas at Austin

Research Supervisor:
Michael Walton, CTR

Researchers:
Shahriyar Hussain, CTR
Khali Persad, CTR
Chris Robertson, CTR
Zhong Wang, CTR

Project Completed:
8-31-07

Commercial vehicle operations would benefit from pre-clearance at interdiction points and asset tracking services. The public would also see benefits, including lower pollution, better compliance with regulations, and improved safety.

Cost-benefit analysis: An estimate of costs and benefits of EVI was developed for two cases: (1) statewide in Texas, and (2) a selected 6.4 mile segment of IH 35 in Austin. Statewide, annualized costs were estimated at $150 to $240 million. For the selected Austin segment, annualized costs would be $450,000-$600,000. Not all the benefits were quantified. The statewide case has a benefit/cost (B/C) ratio in the range of 0.94 to 0.38. For the Austin segment, the B/C ratio is in the range of 2.33 to 1.27. The largest costs would be incurred initially.

Implementation scenarios: At least three scenarios for EVI deployment could be considered: (1) phased in by date, e.g., mandatory on all new vehicles from a certain date on, and retrofitting of existing vehicles over time, (2) phased in by vehicle class, e.g., start with commercial vehicles, then public vehicles, etc., and (3) phased in by jurisdiction, e.g., start with urban counties.

The third scenario holds the most promise for allowing the benefits of EVI to 'sell' the program.

Privacy concerns: EVI simplifies the task of linking a vehicle to its owner, so care is needed in preserving data privacy. Before implementation, privacy concerns will need to be addressed. In addition, legislative changes may be required to define what information can be read off a vehicle and who will have access to data.

EVI data policy: TxDOT's EVI data policy should include, as a minimum, the following six elements: (1) TxDOT principles, (2) compliance with federal and state laws on privacy, (3) data subjects, (4) scope of information collection, (5) data recipients, and (6) limitations on information sharing.

What This Means

1. Legislation to codify EVI authority is desirable. The program should be limited to TxDOT's mission.
2. EVI will make violators more easily identifiable. Public concerns over privacy make it necessary for TxDOT to develop a public relations campaign to explain the benefits before initiating EVI.
3. TxDOT should develop a comprehensive EVI data policy. A firewall must be maintained between the vehicle ID reader system and the vehicle owner database.
4. The benefits of improved traffic management are large enough to justify urban deployments. Because the major urban areas of Texas already have electronic toll systems, deployment can begin by installing readers on urban non-toll roads, and equipping the traffic management centers to process the data.
5. Willingness of the private sector to partner should dictate the scope of EVI deployment. For travel information services, a contracted operations business model is suitable. Developments in GPS will make contracted fusion with asset management a viable model for EVI within 10-15 years.

For More Information:
Research Engineer - Duncan Stewart, TxDOT, 512-465-7403
Project Director - David Powell, TxDOT, 512-936-0961
Research Supervisor - Michael Walton, CTR, 512-471-1414

Technical reports when published are available at:
http://library.ctr.utexas.edu/index.html

www.txdot.gov
keyword: research

Texas Department of Transportation
Research and Technology Implementation Office
P.O. Box 5080
Austin, Texas 78763-5080
512-465-7403

This research was performed in cooperation with the Texas Department of Transportation and the Federal Highway Administration. The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. Trade names were used solely for information and not for product endorsement.