Research explores privacy, legal implications of emerging ITS technologies

Frank Douma and graduate student Jordan Deekenbach are among the researchers exploring the legal issues surrounding new ITS technologies.

By Frank Douma, Hubert Humphrey Institute of Public Affairs, University of Minnesota

Intelligent transportation systems (ITS) technologies can provide planners and engineers with new tools that produce a safer and more efficient transportation system. However, because many of these technologies rely on the ability to track and record the movements of individual citizens, scholars and legal advocates have begun to raise privacy concerns. Under the auspices of the TechPlan Program, a research program at the Humphrey Institute of Public Affairs funded by the ITS Institute, State and Local Policy Program Assistant Director Frank Douma is investigating the implications of privacy law in regards to emerging ITS technologies. The research thus far has shown that while privacy protections for citizens on the open road are quite sparse, the rapid development of these technologies may require a reconsideration of parts of the legal framework for privacy in America.

A key finding has been that privacy protections, to date, largely do not extend to the transportation system. As Chief Justice Rehnquist stated in his majority opinion in United States v. Knotts, “A person traveling in an automobile on public thoroughfares has no reasonable expectation of privacy in his movements from one place to another.” However, as this decision was handed down more than 25 years ago, new technologies have emerged that make surveillance easier, cheaper and more pervasive, to the point that one may logically ask whether the Supreme Court would still arrive at the same decision if one of these technologies were challenged.

The US currently does not have a comprehensive legal framework for privacy, but instead relies on a nebulous web of state and federal constitutional provisions and statutes. The major issue in examining ITS is whether the ability of surveillance technologies to track and record where a specific vehicle has been in the past, as well as project where it may go in the future, begins to impinge upon some of these protections.

Most broadly, the United States Supreme Court has declared that a right to privacy exists when there is an expectation of privacy and when society is ready to accept that expectation of privacy as reasonable. Though current jurisprudence and statutory regulations do not directly attempt to regulate ITS technology designs, a number of state legislatures and courts have begun to write and interpret laws concerning data practices, vicarious criminal liability, and privacy tort actions in ways that may affect the use of ITS. As it is unlikely that these legal issues are going to subside, a consideration by ITS engineers and planners of the legal implications of ITS design and use is helpful. The following is a sampling of some ITS technologies and potential legal implications they face.

Who is watching you?

Automated enforcement of traffic laws is emerging as a popular utilization of ITS surveillance technologies. Red-light intersection cameras, license plate recognition systems, and photo-radar technologies have begun to be tested and used in a number of jurisdictions around the United States. Proponents of these technologies cite increased road safety and needed relief in law enforcement agencies that are

Interactive course modules enhance learning

Gaining an understanding of the complex dynamics that underlie traffic flows and intelligent vehicle guidance systems is a challenge that many transportation engineering students grapple with every semester. Adding to the difficulty is the fact that simulation and modeling rely on expensive dedicated software and powerful computer servers, so students rarely have the opportunity to experiment and explore outside of course labs.

Now, University of Minnesota students are benefiting from greater access to simulation tools both in and out of the classroom, thanks to the work of Chen-Fu Liao, the Minnesota Traffic Observatory’s senior educational systems engineer. Liao has developed several interactive course modules to help students understand complex ITS topics like intersection signal control and vehicle guidance.

Liao developed the Online Application for Signal Intersection Simulation (OASIS)

Part of an interactive traffic simulation game developed by Chen-Fu Liao

--- www.its.umn.edu ---
Future of vehicle safety lies in crash prevention

Seat belts and other safety technologies have saved hundreds of thousands of lives on U.S. roadways since 1960. Tomorrow’s safety systems, particularly those that prevent crashes, will save many more, said Ronald Medford at the CTS Winter Luncheon. Their widespread deployment, however, hinges on a key question: What level of reliability will convince consumers the systems work and are worth the money—and persuade manufacturers to install them?

Medford, senior associate administrator with the National Highway Transportation Safety Administration (NHTSA), spoke at the Center for Transportation Studies’ Winter Luncheon on February 13. The ITS Institute sponsors the annual event, which features a presentation on an ITS-related topic by a national policy or technology leader.

Ninety percent of crashes in this country are related to driver behavior, with just two percent related to vehicles and eight percent to road surface. Vehicle safety systems that compensate for driver behavior—either by warning drivers of an impending crash or assuming control of the vehicle—are becoming more fea-

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Minnesota Traffic Observatory launches new Web site

The Minnesota Traffic Observatory (MTO) has launched a new Web site to provide information about research capabilities and projects, located at www.mto.umn.edu.

“Researchers and other potential partners who are interested in working with us will be able to see what we have to offer and what we have already accomplished. We have a lot of unique capabilities, and we’re eager to let people know about them,” said MTO director John Hourdos.

The MTO is the ITS Institute’s dedicated traffic management laboratory, and offers a range of capabilities in the areas of traffic data collection, simulation and modeling, and visualization. In addition to supporting University of Minnesota researchers, the facility partners with other universities and corporations to carry out traffic research.

Young learners explore engineering with Narrow Commuter Vehicle prototype

A prototype narrow commuter vehicle being developed by Minnesota researchers with ITS Institute funding proved a popular attraction at The Works, a “hands-on, minds-on” learning center for children and teens. The vehicle was featured at TechFest, an annual event held in conjunction with National Engineers Week.

Lee Alexander, a member of the team of engineers developing the vehicle, accompanied the prototype and explained the vehicle’s cutting-edge features to children—and their commute-savvy parents.

The design features two wheels in front and a single wheel in the rear, and tilts automatically when turning. Tilting is necessary to achieve stability and safety with a relatively tall and narrow chassis. The driver never has to worry about how to tilt—a sophisticated computerized steering system handles all the necessary wheel and suspension adjustments to keep the vehicle safely upright in corners.

While the narrow commuter vehicle may be years away from appearing on city streets, some of the young learners who visited TechFest might find themselves at the controls of a similar set of wheels when they are old enough to drive—or they might be inspired to go on and design their own innovative vehicles.

Human factors research motivates 2007 Student of the Year

Michael Rakauskas, a doctoral student in the University of Minnesota’s Cognitive and Biological Psychology program, was presented with the ITS Institute’s 2007 Outstanding Student of the Year Award at the Transportation Research Board’s annual meeting in Washington, DC, January 12, 2008.

The award is sponsored by the USDOT Research and Innovative Technology Administration (RITA). Honorees receive a $2,000 award as well as funding to travel to the TRB annual meeting.

Rakauskas’ current research focuses on designing, managing, and analyzing research initiatives from both test tracks and simulated environments. One recent project involved his design and implementation on a driving simulator study that examined the effects of interacting with the 511 public traveler information system, involving exploration of alternative menu structures that may improve the user’s interaction and potentially reduce search times and increase driving safety.

Rakauskas’ graduate advisor noted that “his hard work has made some of our more difficult challenges appear straightforward.” In addition to maintaining a 4.0 GPA, Rakauskas has received several awards during his graduate studies. Before commencing his doctoral research at Minnesota, Rakauskas earned a Master of Science degree in applied psychology from Clemson University and a Bachelor of Arts degree in psychology from Miami University.

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undermanned in enforcing traffic laws due to the constantly increasing number of drivers on the road. While these technologies have not been found to violate any stated privacy regulation, legal challenges centered on the issue of vicarious criminal liability have succeeded. In a 2006 challenge to Minneapolis red-light enforcement cameras, the Minnesota Supreme Court found that a Minneapolis ordinance, which held owners of vehicles caught on camera running red lights responsible for the offense, was invalid as it conflicted with state statutes that made the driver the liable party for the running of a red light. The fact that the law held owners responsible for infractions committed in their vehicles deprived them of due process through the automatic assignment of guilt. Proponents of automated enforcement technologies have countered that the issue of due process under criminal procedure requirements need not apply, as only civil penalties are levied on owners of a vehicle for red light violations. Though this rationale has been accepted in Ohio and Washington, DC, district court, the Minnesota Supreme Court rejected that argument, claiming petty misdemeanors, though not crimes, still fall under the rules of criminal procedure that demand a presumption of innocence. The court also implicitly suggested a solution, noting that since state laws regulating traffic require uniform enforcement, local municipalities did not have the authority to assign liability to owners of vehicles without statewide legislation. In other words, if a state law extended liability for running red lights to the owner of the offending vehicle, it might survive a subsequent legal challenge.

Keeping an eye on data

Other legal issues with ITS technologies center on questions of the kind of data that are collected and who has access to that information. As much as ITS can be used to create safer and more efficient transitways, law enforcement agencies could also utilize ITS in fighting crime and advancing homeland security. It is not too hard to imagine that some day soon, ITS technologies might allow law enforcement officials to backtrack the activities of a suspect’s vehicle or discover what vehicles were in a particular location at a certain time. Though at first consideration these uses seem beneficial to society, without proper legal limitations these technologies can potentially be used to invade the private lives of innocent parties. In The Company v. United States, the US Court of Appeals for the 9th Circuit found that the FBI’s tapping of an on-board navigational system with a built-in cell phone in order to listen in on the private conversation of the vehicle’s occupants was inappropriate. However, the court stated that the problem was not due to a potential privacy invasion, but because the tapping disabled the services of the system, most notably, the ability of the system to be continually available to contact emergency services at any moment. Consequently, it appeared that should this technical problem be resolved, the knowledge that in-vehicle conversations can be legally tapped may deter people from using or buying this type of ITS technology, despite the opportunity to otherwise obtain significant safety benefits from them.

There is also concern that data collected by ITS technologies will be highly valuable to private litigants in non-transportation settings. Civil suits, such as divorce and insurance fraud cases, are beginning to use subpoenas to obtain information on individuals’ travel routines as recorded by ITS technologies. Making ITS collected data anonymous as part of the technology design, coupled with strict data privacy laws, can curtail some of these concerns; however, the desire of researchers and planners for vehicle-specific data will have to be balanced into the equation. While the current privacy regulations do not pose a direct challenge to successful development and implementation of new ITS technologies, the current legal landscape still contains barriers that must be considered. Consequently, as ITS planners and engineers continue to develop new technologies, they may also find it useful to advocate for continued development of privacy and related protections, such that they facilitate and support efforts to produce safer and more efficient transportation systems while also respecting the expectations of the users. — Douma would like to acknowledge the contributions of Professor Stephen Simon, as project advisor, as well as of research assistants Steve Frooman and Jordan Deckenbach.
and Roadway Online Application for Design (ROAD), both of which have been incorporated into the curriculum of the civil engineering department’s Introduction to Transportation Design course. OASIS allows students to examine the effects of different signal timing strategies on a simulated intersection; ROAD is used to teach geometric design techniques for planning road alignments.

In the vehicle realm, Liao’s Simulation Visualizer for Vehicle Guidance Control is being used in the mechanical engineering department’s Introduction to Robotics course in spring semester 2008. The modules have been well received by instructors, and Liao is continuing to improve them and develop new tools that support interactive learning. He is already at work on a second-generation OASIS, which will incorporate hardware-in-loop interaction with the same signal controller hardware used by many traffic management agencies. Pre-college students are also being exposed to transportation engineering issues through an online intersection control game aimed at high school science classrooms. Liao says he is eager to do more to increase K-12 students’ familiarity with transportation issues.

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  Chen-Fu Liao – CTS 08-01 (January 2008)

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- Using Archived ITS Data to Improve Transit Performance and Management
  Ahmed M. El-Geneidy, Jessica Horning, Kevin Krizek – Mn/DOT 2007-44 (October 2007)

Upcoming Events

For event details, see www.its.umn.edu/events/

May 20–21 19th Annual CTS Transportation Research Conference, St. Paul RiverCentre, Minnesota.

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