

Safe at Any *Speed*

Photos courtesy of Virginia Department of Transportation

Technology may be taking a toll on Wall Street and killing stock portfolios across the country, but it's proving to be a life-saver on the streets of our communities. From coast to coast, government agencies, private companies, educational institutions, and others are joining forces and using technology to save lives and make roads safer.

According to the U.S. Department of Transportation, driver error is the primary cause in about 90 percent of all police-reported crashes. To help drivers navigate the streets more safely, research studies and pilot projects are being tested throughout the country to provide drivers with as many safeguards and tools as possible to reduce crashes. Some projects are even trying to transfer the driving responsibility from the driver to the driving machine. How does this affect you? Take a look at some of the key technologies and initiatives designed to make our roads safer.

Speed Smart Ideas

The intelligent vehicle initiative (IVI) is at the forefront of testing and implementing new vehicle technologies, such as adaptive cruise control, rear-collision avoidance technology, and technology to prevent truck rollovers.

IVI is a cooperative effort between the motor-vehicle industry and four agencies housed under the U.S. Department of Transportation: the Federal Highway Administration, the National Highway Traffic Safety Adminis-



All-weather testing is just one capability of Smart Road technologies. At the touch of a button in the control room (*see inset*) overlooking the road, more than 70 towers can produce elements such as snow, rain and fog-like mist.

tration, the Federal Transit Administration, and the Federal Motor Carrier Safety Administration.

“IVI’s goal is to facilitate accelerated deployment, through development and testing,

of advanced technology products designed to prevent crashes,” said Jeff Paniati, program manager, ITS Joint Program Office, U.S. Department of Transportation. “IVI also tests newly developed driver assistance products, such as navigational aids, for their safety impacts, including driver distraction.”

One of IVI’s most current projects is being tested in the Greater Yellowstone National Park area. Because of the location’s vulnerability to harsh weather, such as avalanches and heavy fog, a system is being developed to integrate traveler information and road-weather information systems. In essence, wireless communications are being used to provide travelers with real-time and forecasted weather information for 60 miles so they can make responsible decisions as to which route to take. IVI is sponsoring similar projects around the country to help drivers reach their destinations safely.

Smart Roads

You can’t drive on this road or even see it on a map, but the Smart Road in southwestern Virginia is one of the most novel applications of technology to the field of transportation. When completed, the Smart Road will be a 5.7-mile, limited-access highway, linking Interstate 81 with Blacksburg, Va. While the road was designed to be a direct route between these two areas, it has another very important purpose: It offers researchers and product developers a state-of-the-art research lab for testing new transportation technologies.

The Smart Road is the first facility of its kind to be built from the ground up with its infrastructure incorporated into the roadway. It is currently a 2-mile, two-lane road, with a banked turnaround at one end and a slower speed turnaround at the other end, and it includes a 2,000-foot bridge. Construction is projected to be finished as early as 2008, at which time the public will be able to use the road.

With the total cost estimated at \$108 million, the Smart Road exists due to a coopera-

tive effort of several federal and state organizations, including Virginia’s Center for Innovative Technology (CIT), the Virginia Depart-



This 2,000-foot Smart Road bridge is located near Blacksburg, Va.

ment of Transportation (VDOT), the Virginia Transportation Research Council, the Federal Highway Administration, and Virginia Tech University.

“Our goal is to make transportation safer and more efficient,” said Cindy Wilkinson, operations director for Virginia Tech’s Transportation Institute. “It’s wonderful to have a tool like Smart Road to turn our goal into a reality.” Smart Road technologies include:

- All-weather testing capabilities, using more than 70 towers that can produce elements such as snow, rain and fog-like mist.
- Embedded sensors in the roadway that can measure how well different types of pavement react to different loads and weather conditions.
- Equipment that can simulate almost 90 percent of highway-lighting conditions.
- Advanced communications systems, including a local-area wireless network interfaced with a fiber-optic backbone.

Using these capabilities, research projects being conducted currently include:

- Testing what combination of factors

(e.g., spacing, intensity) create the best lighting conditions for night driving.

- Testing rear-signaling systems, since rear-end crashes are so common.
- Developing better methods of snow and ice control.
- Improving visibility of traffic markings and signs.
- Using magnetic warning tape hidden below the surface of a road to trigger an in-vehicle sensor and alarm to awaken drowsy or inattentive drivers.

The Smart Road is only one component of VDOT's "Smart Travel" plan. Smart Traffic Centers located in Hampton Roads and Northern Virginia, for example, monitor traffic with video cameras and pavement sensors and inform motorists of traffic conditions via electronic-message signs and radio. These initiatives and others are helping to keep Virginia roads as safe as possible.

Smart Simulators

We must have smart vehicles and smart roads, but how do we identify drivers that aren't too smart about driving? Driving simulators just might provide the solution. While simulators have been used for years in the mili-



Driving simulators are a common tool in many Florida school districts. The fully interactive simulators are being used for driver education, screening and testing.

tary for training, they're now being used for driver education, screening and testing.

After witnessing a high-profile automobile accident that took the lives of five teenagers in its community, the Raydon Corp. saw an opportunity to share its simulation-training expertise with student drivers. Having created PC-based training systems for the military, Raydon used this knowledge and partnered with several Florida school districts, the Central Florida Technology Development Center at the University of Central Florida, AAA and others. They continued the advanced development of fully interactive driving simulators for secondary school driver's education classes and a fully integrated system for driver's license testing and screening.

The Raydon Virtual Driver looks like a car, complete with items such as an accelerator, brake, gearshift, seat belts, and turn signals. The difference is that the windshield is actually a computer monitor. The simulator can issue commands, such as "turn right at the intersection" in multiple languages.

Some of the Florida schools have been so impressed with the simulators, because drivers are totally immersed in the driving environment, that they have suspended training on the driving ranges. They solely train on the simulators.

"Simulator training is safer for the novice driver and instructor," said Deborah Quackenbush, Raydon's vice president of commercial products. "The simulator also can provide individuals with a variety of driving situations, such as night driving and driving in inclement weather, which people don't always get to experience in their training."

DMVs around the country also have expressed a strong interest in using the simulator for driver's license testing, screening and renewal. Quackenbush says this application would, like the school setting, mean greater safety for the driver and examiner, plus prospective drivers would be given a more accurate and objective score.

"On a typical road test, you can't always test someone's driving abilities at night or how

someone will react if a pedestrian starts to walk out on the street,” said Quackenbush. “With a fully interactive simulator, you can make the test exactly what you want it to be, and you can make sure the difficulty is equal for each driver. Thus, the score is fair and consistently applied.”

Along with testing new drivers, the simulator could serve as a means to test those who need to renew their licenses or those who have special licensing needs.

“It all boils down to safety,” said Quackenbush. “Whether someone is 16 or 60, the goal is to teach and test drivers as thoroughly as possible so our roads are as safe as they can be.”

Smart Anklets

While some safety products function to keep drivers on the road, one safety product’s goal is to keep dangerous drivers off the road. On Oct. 1, 1999, Michigan’s “repeat offender law” mandated that individuals with multiple convictions for driving under the influence of alcohol or drugs, or certain other infractions, would face significant punishments. These punishments would include but not be limited to having their car impounded, booted or clubbed, or having themselves immobilized. While serving to punish the convicted driver, the law often deprived families of needed transportation.

During his tenure as a Genessee County, Mich., circuit court judge, Val Washington had seen countless repeat offenders come back to the court, seeking restricted-driving privileges to go back and forth to work. He always was bothered by the fact that, despite his ruling, most convicted drivers would leave his courtroom and drive anyway. Knowing that fact and knowing that some families were being punished by not having transportation because of one family member’s convictions, Washington and a partner decided to do something about it when he retired from the bench.

Washington’s frustration led to his co-

founding Driver-ID, Inc., which developed an electronic tether system to prevent a convicted driver from using a vehicle but allowing others to use it. The XD-1 is a two-part system based on advanced micro-electronic technology. In short, the driver wears an ankle bracelet transmitter, similar in size to a pager, and the car is outfitted with a receiver. The system prevents the restricted person from starting the car or operating it after it has started.

“The XD-1 is helping keep our roads safer because the convicted driver simply cannot drive,” said Washington. “Previously, a police officer would have to pull over a vehicle to catch the repeat offender, but this way, the repeat offender cannot even start the car.”

XD-1 currently is available only in Michigan, but Washington is working with other jurisdictions that are proposing repeat-offender laws to educate them about this impoundment alternative.

Smart Cameras

Mention red-light cameras to almost anyone, and you’re likely to get a strong reaction. These cameras, approved in only a select number of states, have received positive and negative receptions from drivers, but they’re receiving high marks from safety experts.

Essentially, these cameras are installed in traffic lights at key intersections. They photograph vehicles whose drivers run red lights and provide the information to motor-vehicle agencies. Offenders receive a ticket by mail. Until recently, there was little research regarding the cameras’ effectiveness at curbing red-light runners and accidents.

However, an Insurance Institute for Highway Safety study conducted at Oxnard, Calif., indicated that front-into-side collisions most commonly associated with red-light running decreased by 32 percent. Front-into-side collisions with injuries decreased 68 percent after the cameras had been installed. What is significant to note is that the crashes declined throughout the city, even though only 11 of the

city's 125 intersections were equipped with the cameras.

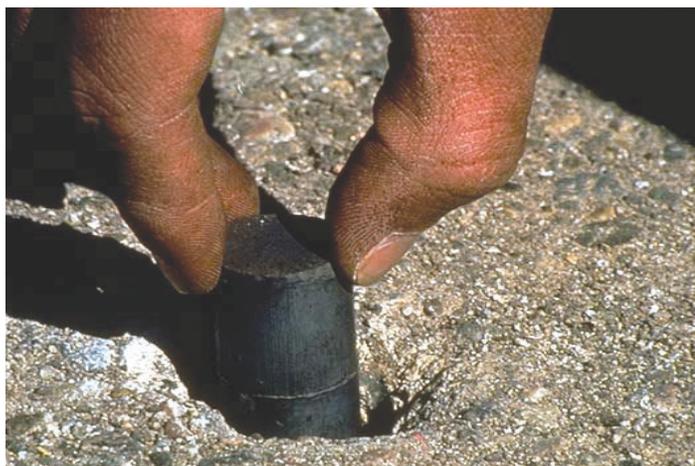
Most recently, the District of Columbia added speed cameras to its enforcement arsenal. The cameras are operated by officers and generate a printed photo of the speeding vehicle, along with the owner's address, violation date, speed, and fine. Tickets, which are sent to the vehicle owner, carry a fine of \$30 to \$200, depending on speed.

Whether you love them or hate them, enforcement cameras—and their associated technology—likely are here to stay.

Smart Highway Systems

While traffic-light cameras and adaptive cruise control are being implemented today, there are safety measures being investigated and tested that we won't see for years. One example is the automated highway system (AHS) project. The National Automated Highway System Consortium, composed of universities, electronics companies, government agencies, and automakers, is trying to create a system that enables motor vehicles to drive themselves.

In essence, magnets are embedded in the roadway to guide vehicles along the desired path, or the vehicles are equipped with camera-



With the AHS project, magnets are embedded in the roadway to guide vehicles along the desired path.



A convoy of vehicles with ultraviolet headlights travels Smart Road at night.

imaging sensors that allow the car to follow the white lines of the road. The driver keys in the desired cruising speed and the desired highway exit, then lets the car lead the way. A small stretch of highway in California and several equipped vehicles are part of the AHS project, but due to the extensive time and resource infrastructure needs, the general public probably won't benefit from the project for years.

Smart Technology = A Safer Future

Whether you're a fan or phobic about technology, it's hard not to applaud its role in creating a safer driving environment. Everywhere you look, groups are using or planning to use technology to prevent crashes and identify unsafe drivers. The life that technology saves could be your own. **A**

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