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INTELLIGENT TRANSPORTATION SYSTEMS
SAFETY SOLUTIONS
Preventing Crashes and Saving Lives

Roadway safety is a serious public health issue in the United States. Even with a 1.9-percent decline in traffic fatalities in 2011, more than 32,300 people were killed on U.S. roads and over 2 million people were injured.

Intelligent transportation systems (ITS) offer significant opportunities to save lives. Many of these technologies are available today, and pioneering States, cities, and private industry leaders across the country are already investing in 21st century solutions to make vehicles and roadways safer. Both in-vehicle technologies and infrastructure-based safety systems can help prevent crashes before they happen, with technologies like automatic crash notification, emergency vehicle preemption at intersections, and real-time data sharing all helping to speed recovery after an incident occurs.

The following are current examples of ITS.

Vehicle Safety Systems

In-vehicle technologies not only improve the driver experience, but play a large role in improving traffic safety. Some of the technologies available today include:

- **Collision avoidance systems** use radar, sonar, or other sensors to detect nearby vehicles and potential roadway hazards and alert drivers so they can take corrective action. Some systems also take proactive measures to avoid or mitigate the severity of a collision, including providing automated braking assistance and engaging vehicle stability control systems.

- **Lane departure warning systems** use cameras to detect lane markings and alert the driver when the vehicle begins to drift from its lane without use of the turnsignal.

  — Example: The City of Minneapolis has pioneered the use of lane departure warnings and high-tech guidance systems on its bus fleet, allowing transit buses to operate safely in the narrow shoulder lane on the interstate.

- **Drowsy driver warning systems** use video technology to monitor eye movements and detect when a driver is showing signs of fatigue, providing alerts when necessary to help reduce dangerous driving situations.

A connected vehicle network could dramatically improve transportation safety, according to a recent report by the National Highway Traffic Safety Administration (NHTSA).

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U.S. Department of Transportation

Research and Innovative Technology Administration

Roadway Safety Systems

Technology embedded in or adjacent to roadways also plays a key role in improving driver, passenger, and pedestrian safety. Sensors or cameras can be embedded in roads, traffic signals, and other strategic locations to collect and transmit real-time information about vehicles, driving conditions, and potential hazards. These technologies work together to make our roads "smarter" and safer. Examples include:

- **Intersection collision avoidance systems** use sensors to monitor traffic approaching dangerous intersections and warn vehicles of approaching cross traffic via roadside signage. Intersection collisions account for approximately one-third of all crashes in the United States, and test deployments have indicated that these systems are effective in both reducing the speed of approaching vehicles and reducing the number of collisions at dangerous intersections.

- **Dynamic curve warning systems** use radar to measure the speed of vehicles approaching a curve, display the speed at which the curve can be safely negotiated on electronic signs, and warn drivers to slow down based on real-world conditions.

- **Wildlife detection systems** use infrared or other detection technologies to identify large animals approaching the roadway. When animals are detected, drivers are alerted through flashing signs. These systems are particularly important in rural areas where fatal crashes are almost five times more likely to be associated with animals than in metropolitan areas.

- **Road weather sensors** can deliver information to travelers in real-time about icy bridges, water on the road, rain or fog ahead, and other potentially hazardous conditions through dynamic message signs, highway advisory radio, and in-vehicle navigation systems.

Incident and Emergency Response

Technology exists today to help identify and respond quickly to crashes, which can be especially critical in rural areas. Receiving appropriate care within the first hour after traumatic injury can greatly increase a crash victim's chance of survival. Examples include:

- **Automatic crash notification systems** use on-board sensors to detect evidence of a collision. When the vehicle's sensors detect a crash, the vehicle automatically communicates with a call center and transmits information on the vehicle's location.

- **Emergency vehicle preemption** technology provides the right-of-way to emergency vehicles at traffic lights so they can respond more quickly to traffic incidents.

- **Real-time data sharing** between emergency responders, police, and traffic managers is now possible through coordinated traffic management and emergency operation centers equipped with cameras, sensors, and other technology.

The Future of Intelligent Transportation – Preventing Crashes Before They Happen

What if there was a way to integrate all of these safety features by allowing vehicles to communicate with other vehicles as well as the surrounding infrastructure using wireless technology? The U.S. Department of Transportation's (USDOT's) Connected Vehicle research initiative aims to make this a reality. The initiative is a partnership between the Federal Government, vehicle manufacturers, public and private sector technology leaders, and transportation stakeholders that will enable real-time communication between vehicles, the infrastructure, and even wireless devices to help prevent crashes before they happen.

The United States has invested billions of dollars in working to reduce traffic fatalities and injuries through occupant protection measures designed to safeguard drivers and passengers after a crash. The next great leap in traffic safety is to enlist smart technology to help prevent crashes from happening in the first place.

The U.S. Government's Role

The USDOT's Research and Innovative Technology Administration's Intelligent Transportation Systems (ITS) Joint Program Office fosters the development and future deployment of connected vehicle technologies. But connected vehicle research involves all agencies within the USDOT including NHTSA, the Federal Highway Administration, the Federal Motor Carrier Safety Administration, the Federal Transit Administration, and the Federal Railroad Administration. The USDOT and its public and private partners are working to address the technical, safety, and policy challenges and are helping to create the standards and the wireless architecture that will be the backbone of the system. Connected vehicle research will leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter, and greener. If successful, connected vehicles will ultimately enhance the mobility and quality of life of all Americans, while helping to reduce the environmental impact of surface transportation.