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U.S. DOT-ITS JPO

SAFETY PILOT DEVICES

Vehicle Awareness Device – This is an aftermarket electronic device, installed in a vehicle without connection to vehicle systems, that is capable of only sending the basic safety message (BSM) over a DSRC wireless communications link. Vehicle awareness devices do not generate warnings. They may be used in any type of vehicle.

Aftermarket Safety Device (ASD) – This is an aftermarket electronic device, installed in a vehicle, and capable of sending and receiving the safety messages over a DSRC wireless communications link. The device has a driver interface, runs V2V and V2I safety applications, and issues audible or visual warnings and/or alerts to the driver of the vehicle.

Retrofit Safety Device – This is an electronic device installed in vehicles by an authorized service provider, at a service facility after the vehicle has completed the manufacturing process (retrofit). This type of device is connected to a vehicle databus and can provide highly accurate information from in-vehicle sensors. The integrated device has a working driver interface, both broadcasts and receives BSMs, and can process the content of received messages to provide warnings and/or alerts to the driver of the vehicle in which it is installed. These are being developed for transit vehicles and trucks.

Integrated Safety System – This is an electronic device inserted into vehicles during vehicle production. This type of device is connected to proprietary data buses and can provide highly accurate information using in-vehicle sensors. The integrated system both broadcasts and receives BSMs and can process the content of received messages to provide warnings and/or alerts to the driver of the vehicle in which it is installed. These are being developed for light vehicles, trucks, and transit vehicles.

A connected vehicle network can vastly improve system-wide safety. Potential V2V safety applications include driver safety warnings such as:

- Emergency brake-light warning
- Forward-collision warning
- Intersection movement assist
- Blind-spot and lane-change warning
- Do-not-pass warning
- Control-loss warning
- Vehicle stabilization activation on roadways alerting transit operators to weather-related information.

Connected Vehicle Safety Pilot Program

INTRODUCTION

The Connected Vehicle Safety Pilot Program is part of a major scientific research program run jointly by the U.S. Department of Transportation (DOT) and its research and development partners in private industry. The Connected Vehicle Safety Research Program supports the development of safety applications based on vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications systems, using dedicated short-range communications (DSRC) technology. The Safety Pilot is designed to determine the effectiveness of these safety applications at reducing crashes and to show how real-world drivers will respond to these safety applications in their vehicles. The test will include many vehicles with vehicle awareness devices, others with integrated safety systems, and others that use aftermarket safety devices to communicate with surrounding vehicles. All of these technologies are based on DSRC technology. The Safety Pilot will include multiple vehicle types—cars, trucks, and transit vehicles.



While the Intelligent Transportation Systems (ITS) Joint Program Office within the Research and Innovative Technology Administration is leading this research initiative, several agencies within the U.S. DOT are supporting the Safety Pilot, including the National Highway Transportation Safety Administration (NHTSA), Federal Highway Administration, Federal Motor Carrier Safety Administration, and Federal Transit Administration.



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Safety Pilot researchers will study how ordinary drivers respond to in vehicle safety messages.

NHTSA will use the research data collected through the Safety Pilot to support a major decision milestone in 2013 on the future of connected vehicle technology. NHTSA's agency decision could include several options, such as mandatory deployment of the technology, voluntary installation of wireless devices in new cars, or additional research and development.

Research from NHTSA found that connected vehicle technology has the potential to address vehicle crashes by unimpaired drivers, but more research needs to be done to understand the true effectiveness of the technology. Since safety is the U.S. DOT's top priority, the potential safety benefits of this technology cannot be ignored. However, more research is necessary to determine the actual effectiveness of the applications and to understand the best ways to communicate safety messages to motorists without causing unnecessary distraction.

RESEARCH VISION

The vision of the Safety Pilot is to test connected vehicle safety applications in real-world driving scenarios to determine their effectiveness at reducing crashes and to ensure that the devices are safe and do not unnecessarily distract motorists or cause unintended consequences. The Safety Pilot will evaluate everyday drivers' reactions both in a controlled environment through driver clinics and on actual roadways with other vehicles through the real-world model deployment. In all, approximately 3,000 vehicles will be included in the combined model deployment and driver clinics. Driver reactions will be evaluated as they use the latest wireless vehicle safety applications and receive in-vehicle warning messages if they approach potentially dangerous traffic situations. Testing will be performed on passenger cars as well as commercial trucks and transit vehicles.

The driver clinics began in August 2011 and will continue through early 2012; the model deployment will run from the fall of 2012 to the fall of 2013.



RESEARCH PLAN

The two components of the Safety Pilot are:

- **Safety Pilot Driver Clinics:** Small-scale driver clinics are being conducted at six different sites in the United States to assess user acceptance of the connected vehicle technology. At each driver clinic, approximately 100 drivers will test in-vehicle wireless technology in a controlled environment, such as a race track. The goal is to determine how motorists respond to and benefit from in-vehicle alerts and warnings. The data generated from the driver clinics will be critical to supporting the 2013 NHTSA agency decision regarding connected vehicle technology.
- **Safety Pilot Model Deployment:** Approximately 3,000 vehicles will be equipped with wireless connected vehicle devices to test safety applications using DSRC between vehicles, while operating on public streets in an area highly concentrated with equipped vehicles. The model deployment is designed to determine the effectiveness of the technology at reducing crashes. Vehicles will be able to tell when another vehicle with connected vehicle technology has moved into the immediate driving area. The model deployment will include a mix of cars, trucks, and transit vehicles; it will be the first test of this magnitude of connected vehicle technology in a real-world, multimodal operating environment. The University of Michigan Transportation Research Institute (UMTRI) will lead a diverse team of industry, public agencies, and academia in supporting this effort.



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Safety Pilot will include several transportation modes including, cars, trucks and transit vehicles as well as traffic signals

RESEARCH GOALS

The goals of the Safety Pilot are to:

- Support the 2013 NHTSA agency decision by obtaining empirical data on user acceptance and system effectiveness
- Demonstrate real-world connected vehicle applications in a data-rich environment
- Establish a real-world operating environment for additional safety, mobility, and environmental applications development
- Archive data for additional research purposes.

RESEARCH OUTCOMES

The planned outcomes of this research are:

- Documentation and determination of the potential benefits of connected vehicle technologies and evaluation of driver acceptance of vehicle-based safety systems

- Identification of any research gaps and the steps to address them
- Factual evidence needed to support the 2013 NHTSA agency decision.

RESEARCH TRACKS

Track 1 – Vehicle Builds and Driver Clinics: This track features the building of integrated light vehicles and trucks for driver clinics and model deployment activities. This track also includes specific driver clinics/performance testing in a variety of geographically diverse environments using a variety of enabled connected vehicles.

Track 2 – Device Development and Certification: This track will determine specifications for devices and integrated safety systems so that they work on all types of vehicles and adhere to communication standards to ensure security and message integrity. Developed devices will have met U.S. DOT-defined specifications for placement on the Qualified Product Lists and will be available to conduct driver clinics/performance testing and “critical mass” environment testing in the model deployment. Devices will include vehicle awareness, aftermarket, and roadside equipment.

Track 3 – Real-World Testing: This track will provide real-world performance data to assess DSRC operating characteristics and exposure data to determine potential benefits. Through a one-year model deployment, the track will test the effectiveness of the V2V and V2I safety applications by creating a highly concentrated connected vehicle communications environment with approximately 3,000 vehicles “talking to each other.” In addition to the safety applications, the model deployment will also showcase non-safety applications such as:

- Signal priority for transit and emergency vehicles
- Roadway maintenance application
- Density of pedestrian traffic
- Traffic signal timing.

During the model deployment, the U.S. DOT will open this data-rich environment to the industry for use in testing their own devices and applications.

Track 4 – Independent Evaluation: This track will analyze data from testing and provide assessments of performance and benefits.

To learn more about the Connected Vehicle Safety Pilot Program, contact:

Mike Schagrin

Program Manager, Connected Vehicle Safety Programs
ITS Joint Program Office
Research and Innovative Technology Administration
1200 New Jersey Ave. SE Washington, DC 20590
(202) 366-2180
mike.schagrin@dot.gov

The U.S. Government's Role

The U.S. DOT's Research and Innovative Technology Administration's (RITA) Intelligent Transportation Systems (ITS) Joint Program Office fosters the development and future deployment of these connected vehicle technologies. But Connected Vehicle research involves all agencies within U.S. DOT including NHTSA, the Federal Highway Administration (FHWA), the Federal Motor Carrier Safety Administration (FMCSA), Federal Transit Administration and the Federal Railroad Administration.

U.S. DOT 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.

For more information about this initiative, please contact

Mike Pina
Program Manager
Communications and Outreach
Research and Innovative Technology
Administration
ITS Joint Program Office
(202) 366-3700
mike.pina@dot.gov

