Photo Source: USDOT

CONNECTED VEHICLE SAFETY PILOT PROGRAM

Research Overview

U.S. Department of Transportation
SAFETYPILOT
CONNECTED VEHICLE TECHNOLOGY

The Connected Vehicle Safety Pilot Program is part of a major scientific research program run jointly by the U.S. Department of Transportation (USDOT) 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 includes 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 also includes multiple vehicle types—cars, trucks, and transit vehicles.

While the Intelligent Transportation Systems Joint Program Office (ITS JPO) within the Research and Innovative Technology Administration is leading this research initiative, several agencies within the USDOT 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.


Photo Source: USDOT

Research from NHTSA shows that connected vehicle technology has the potential to address a very significant number of light vehicle crashes and heavy truck crashes by unimpaired drivers. Since safety is the USDOT'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.

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.

*The Connected Vehicle Safety Pilot is now known as the Ann Arbor Connected Vehicle Test Environment.

The Connected Vehicle Safety Pilot will involve up to 3,000 vehicles equipped with a range of options such as:

- **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

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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 is evaluating everyday drivers' reactions both in a controlled environment through driver clinics and on actual roadways with other vehicles through the real-world model deployment.

Research Plan

The two components of the Safety Pilot are:

Safety Pilot Driver Clinics: Small-scale driver clinics were conducted at six different sites in the United States to assess user acceptance of the connected vehicle technology. Conducted from August 2011 to January 2012, each driver clinic had over 100 drivers testing in-vehicle wireless technology in controlled environments, such as race tracks. The goal was to determine how motorists respond to and benefit from in-vehicle alerts and warnings.

Safety Pilot Model Deployment: Using approximately 3,000 cars, trucks, and transit vehicles (and some infrastructure) equipped with wireless connected vehicle devices, this model deployment has created a highly concentrated environment of equipped vehicles operating on public streets to test safety applications using DSRC. 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. Launched in August 2012, the one-year model deployment , held in Ann Arbor, MI, is the first test of this magnitude of connected vehicle technology in a real-world, multimodal operating environment. The University of Michigan Transportation Research Institute leads a diverse team of industry, public agencies, and academia in supporting this effort.

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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 busses 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.

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 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 determines 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 have met USDOT-defined specifications for placement on the Qualified Product Lists and are 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 provides real-world performance data to assess DSRC operating characteristics and exposure data to determine potential benefits. Through the model deployment, the track tests the effectiveness of the V2V and V2I safety applications by creating a highly concentrated connected vehicle communications environment of vehicles "talking to each other." In addition to the safety applications, the model deployment also showcases 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 USDOT 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.

For more information about this initiative, please contact:
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