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Research Goals

- To employ advanced V2I wireless technologies to reduce, mitigate, or prevent an additional 12% of crash scenarios not addressed by the V2V program.
- To develop signal warnings that support active safety.

Research Outcomes

- Understand and plan for the minimum level of infrastructure needed to support V2V and V2I safety and operational efficiency applications.
- Document the stakeholder needs and impacts associated with developing policy guidance or recommendations, in support of deployment.
- Enable additional safety and mobility applications through the use of traffic Signal Phase and Timing (SPaT) data exchange.
- Enable and facilitate interoperable, cost-effective infrastructure deployment.



AZTECH

Vehicle-to-Infrastructure (V2I) Communications for Safety

INTRODUCTION

Vehicle-to-Infrastructure (V2I) Communications for Safety is the wireless exchange of critical safety and operational data between vehicles and roadway infrastructure, intended primarily to avoid motor vehicle crashes.

V2I communications for safety is a key research program of the Intelligent Transportation Systems Joint Program Office (ITS JPO) program within the U.S. Department of Transportation's (U.S. DOT) Research and Innovative Technology Administration (RITA).

VISION

The vision for V2I research is to enable safety applications designed to avoid or mitigate vehicle crashes, particularly for crash scenarios not addressed by V2V communications alone. Another important objective of the V2I research is national interoperability to support infrastructure and vehicle deployments.

RESEARCH PLAN

The four major objectives of the technical V2I safety research program are:

1. Develop V2I active safety applications that address some of the most critical crash scenarios, including applications using the traffic signal phase and timing (SPaT) information that is sent to vehicles via a wireless network.
2. Develop a rigorous estimation of safety benefits that will contribute to the assessment of possible safety recommendations and/or guidelines for practitioners.
3. Provide objective data and information that will support decision making among practitioners regarding nationwide infrastructure deployment.
4. Ensure appropriate strategies are implemented for privacy, security and system certification, interoperability, scalability, governance structures, public acceptance, and a sustainable marketplace to effectively propel and sustain deployment of infrastructure components.

MULTIMODAL

The V2I communications for safety program research involves multiple transportation agencies and modes. It focuses on key Research and Innovative Technology Administration (RITA), Federal Transit Administration (FTA), Federal Motor Carrier Safety Administration (FMCSA), and Federal Highway Administration (FHWA) application areas of interest, including intersection safety, speed management, pedestrian safety, transit and commercial vehicle operations.



STANDARDS IN USE

Due to the great variety of vehicle and infrastructure safety systems currently installed and forthcoming, the program also emphasizes the need for consistent, widely applicable standards and protocols. Data and communications standards have been developed through this research effort which includes the SAE J2735 Basic Safety Message; and a standard communications architecture/ platform communicating in the 5.9 GHz band of radio spectrum.

The key to success in the V2I communications for safety research area is the definition of minimum infrastructure needed to ensure maximum benefit from the applications.

RESEARCH PROGRAM

Track 1 - Identify and analyze critical crash scenarios for V2I applications. Preliminary studies show that an additional 12 percent of potential crash scenarios could be addressed by V2I safety applications.

Track 2 - Develop prototype applications, which include the identification and refinement of requirements and countermeasures. An additional effort under this track will be the cooperative research and development of one safety application with partners in the European Union.

Track 3 - Address infrastructure communications and interoperability elements that enables multiple systems or components to exchange useful information including mapping, positioning, standards, security, and wireless communication, among other areas.

Track 4 - Through controlled demonstrations and field operational testing, conduct benefits assessments by collecting and analyzing real world data, while assessing engineering architecture and design. These analyses will result in a better understanding of the market potential, infrastructure requirements, and level of market penetration needed to enable future V2I safety applications.

Track 5 - Conduct deployment planning by developing tools and guidelines that give practitioners the information required to make sound decisions on how eventually to deploy and maintain V2I systems.

Ultimately, the results of the V2I safety research program will develop safety applications capable of supporting infrastructure and vehicle communication.

WORK IN PROGRESS

STAKEHOLDER INVOLVEMENT

U.S. DOT recognizes they cannot do this work alone and is working, through collaborative research efforts, with stakeholder groups in a multi-track approach that addresses the breadth of technical and non-technical V2I research needs. Feedback helps to refine the research program, assure a broader oversight of interim results, and better define effective technology transfer opportunities.

Exploratory Research on V2I safety is also underway for commuter, freight, and heavy rail. This research will investigate data interoperability and communication to support a variety of applications, including at-grade rail crossing operations, track surveillance, and right-of-way detection.



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Potential V2I Safety Applications crash scenario mitigation opportunities.

- intersection safety
- roadway departure prevention
- speed management
- transit safety and operations
- commercial vehicle enforcement and operations
- at-grade rail crossing operations
- priority assignment for emergency vehicles



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V2I applications can be designed to help improve critical safety situations.

To learn more about the V2I Safety program, contact:

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