U.S. DOT Automation Program

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The ITS JPO has Department-wide authority in coordinating the ITS program and initiatives among the following DOT Offices:

- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Transit Administration (FTA)
- Federal Railroad Administration (FRA)
- National Highway Traffic Safety Administration (NHTSA)
- Maritime Administration (MARAD).
Context: ITS Strategic Plan Framework

- **Performance Management**
- **Technology Tracking**

**Two Program Priorities:**
- Realizing Connected Vehicle Implementation and Advancing Automation

**Five Strategic Themes**

**Six Program Categories**

- **Research**
- **Development**
- **Adoption**

Goals

U.S. Department of Transportation
ITS Joint Program Office
What is an Automated Vehicle?
What is an Automated Vehicle?

- **Automated vehicles** are those in which at least some aspect of a safety-critical control function (e.g., steering, throttle, or braking) occurs without direct driver input.
- **Connected vehicles** are those which use wireless technology to communicate between vehicles, roadside infrastructure, and other road users.
On-Vehicle Sensors

Source: Texas Instruments ADAS Solutions Guide
Automation Can Be a Tool for Solving Transportation Problems

- Improving safety
  - Reduce and mitigate crashes

- Increasing mobility and accessibility
  - Expand capacity of roadway infrastructure
  - Enhance traffic flow dynamics
  - More personal mobility options for disabled and aging population

- Reducing energy use and emissions
  - Aerodynamic “drafting”
  - Improve traffic flow dynamics

…but connectivity is critical to achieving the greatest benefits
Connected Automation for Greatest Benefits

Autonomous Vehicle
Operates in isolation from other vehicles using internal sensors

Connected Vehicle
Communicates with nearby vehicles and infrastructure

Connected Automated Vehicle
Leverages autonomous and connected vehicle capabilities
# U.S. DOT Automation Program

**Goal:** Enable safe, efficient, and equitable integration of automation into the transportation system

<table>
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<tr>
<th>Area</th>
<th>Example Applications</th>
<th>Research Emphasis</th>
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<tr>
<td><strong>Connected Driving Assistance</strong></td>
<td>Platooning, merge/weave assist, speed harmonization, and eco-approach and departure</td>
<td><strong>Benefits</strong> (safety, mobility, sustainability) and <strong>Application Development</strong></td>
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<td><em>Level 1-2</em></td>
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<td><strong>Conditional Automation</strong></td>
<td>Highway autopilot, traffic jam assist, etc.</td>
<td><strong>Safety Assurance</strong> (human factors, control system reliability, testing procedures, and cybersecurity)</td>
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<td><em>Level 2-3</em></td>
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<td><strong>Limited Driverless Vehicle Operations</strong></td>
<td>Low-speed automated shuttles, first-last mile transportation</td>
<td><strong>Feasibility</strong> (concept development, testing, evaluation)</td>
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<td><em>Level 4</em></td>
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## Research Tracks

### Enabling Technologies
- Digital Infrastructure
- Communications
- Technology Research

### Safety Assurance
- Electronic Control Systems
- Functional Safety and Electronics Reliability
- Cybersecurity
- Human Factors

### Transportation System Performance
- CACC, Speed Harmonization, and Platooning
- Lateral Control
- First/Last Mile and Transit Operations

### Testing and Evaluation
- Interoperability
- Testing Methods
- Benefits Assessment

### Policy and Planning
- Standards
- Federal Policy Analysis
- Stakeholder Engagement
- Transportation Planning
Automation and Road Weather Overview

- **Today**
  - Poor sensor performance under degraded environmental conditions
    - Snow, fog, dust, direct sunlight, etc.
    - Wide range of capabilities: entry-level to high-end
    - Rapid evolution
  - Driver reengagement under challenging conditions

- **Looking ahead**
  - Road-weather information critical for operating condition assessment
  - Potential for new opportunities for real-time road surface condition information collection
  - Potential reduction in certain weather-related crash types as sensors improve
Discussion Questions

- **Working Together**
  - What does the weather community want to know about automation?
  - What are effective communication tools?

- **Scoping Future Research**
  - How do you see the weather-related research needs for automation?
  - What would help you do your job?
For More Information

www.its.dot.gov

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Enabling Technologies

POSITION, NAV & TIMING

MAPPING

SENSORS

COMMUNICATIONS

HUMAN FACTORS
Safety Assurance Example: Human Factors Research

- Addresses human factors research questions focused on drivers transitioning into and out of automated driving states enabled by Level 2 (2010 Cadillac SRX) and Level 3 (Google-modified 2012 Lexus RX450h) automated driving concepts.

- Producing Driver-Vehicle Interface Design Principles
Transportation System Performance
Example: Eco-Signal Operations

1. SPaT Data
2. I2V Communications: SPaT and GID Messages
3. V2V Communications: Basic Safety Messages
4. Vehicle Equipped with the Eco-Approach and Departure at Signalized Intersections Application (CACC capabilities optional)
Evaluation and Testing Example: Benefits Evaluation Framework
Policy and Planning Example: Review of Federal Motor Vehicle Safety Standards

How could highly automated vehicles impact or change the nature of existing Federal Motor Vehicle Safety Standards (FMVSS)?

• Identifying where current FMVSS pose challenges to introduction of AVs – particularly as they move into concepts of ‘human out of the loop’ or ‘driverless’

• Ensuring that existing Federal regulations do not stifle innovation and that AVs are performing their functions safely

• NHTSA and ITS JPO coordinated research