Photo Source: USDOT

AUTOMATED VEHICLE RESEARCH AT THE U.S. DEPARTMENT OF TRANSPORTATION (USDOT)

LIMIT 35
SAFETY

MOBILITY

ENVIRONMENT

The Potential of Automation

Automated vehicles have the potential to bring about transformative safety, mobility, energy, and environmental benefits to our nation's surface transportation system. These benefits could include crash avoidance, reduced energy consumption and vehicle emissions, reduced travel times, improved travel time reliability and multi-modal connectivity, and improved transportation system efficiency and accessibility, particularly for persons with disabilities and the growing aging population. The pace of research, development, and commercialization of automation technologies has increased rapidly in recent years. While technologies available today require a human driver to monitor the roadway and be prepared to take control, research into the development of fully self-driving vehicles is underway.

Automation Research at the USDOT

The USDOT's Intelligent Transportation Systems Joint Program Office (ITS JPO) has established an automation research program within the overall ITS program. Automation is also a key component of the ITS JPO's *ITS Strategic Plan 2015-2019*. The section below outlines the program's goal, objectives, and organization.

Goal

The program's goal is to enable safe, efficient, and equitable integration of automation into the transportation system. To achieve this goal, the USDOT will conduct research; assess impacts; communicate results; convene and coordinate with stakeholders; provide guidance, education, and assistance; develop or encourage appropriate standards and policies; and continue to provide oversight and enforcement.

Program Objectives

1. Facilitate development and deployment of connected automated transportation systems that enhance safety, mobility, and sustainability

2. Assess implications of emerging enabling technologies

3. Research transportation system-level operational impacts of automation applications

4. Assess the need for new vehicle performance guidelines and requirements

5. Develop stakeholder guidance for automated vehicle operations

Connected and Automated Vehicles

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. While some automation technologies could be implemented without connectivity, higher levels of automation will likely need connected vehicle technology to achieve their full potential.

Research Highlight

Evaluating Driver Transitions

There are critical research questions regarding driver transitions between automated and manual driving modes, such as how drivers perform over time when using these systems. This initial research study, Human Factors Evaluation of Level 2 and Level 3 Automated Driving Concepts, funded by the National Highway Traffic Safety Administration and the ITS JPO, addresses human factors research questions focused on drivers transitioning into and out of automated driving states. The results could lead to the development of initial human factors driver-vehicle interface principles. Project partners include the Virginia Tech Transportation Institute, Battelle, Bishop Consulting, General Motors, Google, and the Southwest Research Institute.

U.S. Department of Transportation

6. Develop appropriate testing methods and objective test procedures

7. Estimate the potential safety, mobility, energy, and environmental benefits of automation technologies

8. Identify and address policy, institutional, and regulatory challenges to safe automated vehicle operations.

Program Organization

The Automation Program is organized into five parallel research tracks, as seen below.

Enabling Technologies		
Digital Infrastructure	Communications	Technology Research

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

Transportation System Performance		
Cooperative Adaptive Cruise Control, 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

Current USDOT Research

USDOT research aims to enable and accelerate the development and deployment of automated vehicles; ensure safe and efficient operations of emerging technologies and systems; and maximize public benefits by leveraging connected vehicle technologies, infrastructure-based solutions, and other approaches.

Current research includes:

Enabling Technologies

- Enabling Technologies: Future Forecast
- Assessment and Guidance for Digital Infrastructure

Safety Assurance

- Functional Safety of Automated Lane Centering Controls
- Cybersecurity Requirements for Automated Vehicles
- Driver Acceptance of Automated Vehicle Systems
- Human Factors Evaluation of Combined Function Automation Concepts

### Transportation System Performance

- Automated Speed Harmonization Prototyping and Testing
- Simulation for Research on Automated Longitudinal Vehicle Control
- High Performance Vehicle Streams Simulation
- Partial Automation for Truck Platooning
- Lane Changing/Merge Foundational Research

Testing and Evaluation

- Development of Functional Descriptions, Safety Principles, and Test Methods for emerging system concepts in automated vehicles
- Transportation System Benefit Study of Highly Automated Vehicles

Policy and Planning

- Standards Program Planning for Automated Vehicles
- Automation Policy Foundational Research
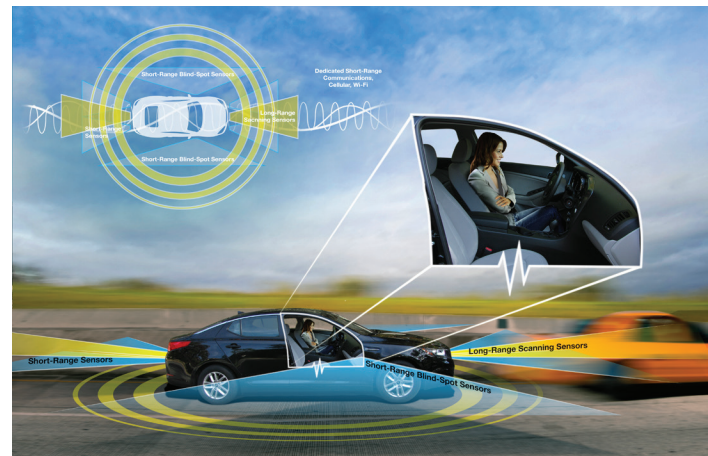
Automated vehicles use on-board sensors, cameras, global positioning, and telecommunications to help perform safety-critical driving functions such as steering, acceleration, and/or braking. To ensure full awareness of their surroundings, automated vehicles can leverage connected technology to communicate wirelessly with other vehicles and roadside infrastructure to improve safety, performance, and reliability.