

BATIVE

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# **Connected** and Automated Vehicles



NCHRP SUPPORT FOR TRANSPORTATION AGENCY LEADERS

The National Academies of SCIENCES · ENGINEERING · MEDICINE

> IRB TRANSPORTATION RESEARCH BOARD

# NCHRP: YOUR RESEARCH PROGRAM

AASHTO members commit State Planning and Research Program funding to support and oversee NCHRP, which pools the states' research dollars to find solutions to transportation challenges identified as critical by the states.

Established as a part of the Transportation Research Board (TRB) in 1962, NCHRP is part of the independent and interdisciplinary National Academies of Sciences, Engineering, and Medicine (NASEM). NCHRP's connection to TRB and NASEM provides trusted objectivity across the full range of transportation areas.

Learn more at <u>trb.org/nchrp</u>.

"Connected and automated vehicles have the potential to radically transform how the world works, plays, and lives. It could be the biggest transformation in transportation since the automobile, and, like the automobile, the consequences could be positive or negative.

"It's our mission at NCHRP, the Transportation Research Board, and the National Academies to do the research that decision makers need to facilitate this transformation in a manner and time frame that yield positive outcomes: increased safety, reduced congestion, environmental benefits, economic growth, and user equity."

**Neil Pedersen** Executive Director, Transportation Research Board

#### SELF-DRIVING CARS: THE FUTURE IS NOW

Or if not now, likely tomorrow or the day after.

Connected and automated vehicles (CAVs) are poised to change the landscape of transportation, but the possible future paths for CAVs diverge dramatically.

A best-case scenario for CAVs could be a major reduction in personal vehicle ownership, with sharedride CAVs effectively serving as an alternative public transportation system without fixed routes. The flipside scenario for CAVs could be the acceptance of longer commutes for CAV owners, with increased traffic congestion, and even the prospect of empty cars that roam city streets when parking spots



This or that? The promises and perils of CAVs.



The National Renewable Energy Laboratory estimates that potential emissions impacts of CAVs could swing from a 60 percent drop to a 200 percent increase. It is little wonder. then, that interest is high in undertaking national research to inform short- and lona-term decisions about CAVs.

are scarce.

NCHRP is in its sixth decade of administering highpriority research

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for state DOTs on the full range of transportation challenges that they face. Just as state DOTs have led in long-established research areas like bridges, pavements, safety, and operations, they are once again in the vanguard of research through NCHRP.

NCHRP is addressing the myriad issues DOTs are facing with respect to CAVs, including technology, infrastructure, human-machine interaction, licensing, liability, and legalities. Through a coordinated research effort, NCHRP is developing products that will support DOT executives in realizing the best possible future with CAVs.

#### **KEEPING PACE** WITH LEGAL ISSUES

"How soon and how smoothly driverless vehicles merge onto U.S. roads and highways will depend, in part, on how the legal system resolves the many legal issues implicated by these vehicles," according to <u>NCHRP Legal</u> <u>Digest 69</u>: A Look at the Legal Environment for Driverless Vehicles. The report, available on TRB's website, provides extensive citations for DOT policymakers and state lawmakers about the evolving legal landscape for CAVs. Topics include:

- Civil liability for personal injury
- Criminal law and procedure
- Automobile insurance structures
- Privacy and security laws
- Legislative and regulatory issues
- Land use, environmental, and infrastructure issues



Image courtesy of Zandr Milewski

The report notes that CAVs appear to be transforming much more rapidly than the traditionally cautious and slow-to-change legal system: "The legal response to driverless vehicles has already begun with basic measures, such as laws that simply authorize the use of these vehicles in some states. ... As driverless vehicles grow more sophisticated and common, they will assuredly generate many [new legal issues]."

While laws affecting CAVs will likely be shaped by analogies to conventional vehicles, over time, "policymakers will come to better appreciate, and begin to focus on, the unique capacities of, and challenges presented by, driverless vehicles and the system that supports them," according to the report.

### A COORDINATED RESPONSE TO PRESSING QUESTIONS

NCHRP is administering research on a wide range of technical, operational, and policy challenges related to CAVs primarily through <u>NCHRP Project 20-102</u>, Impacts of Connected Vehicles and Automated Vehicles on State and Local Transportation Agencies.

Some research topics are completed and others are ongoing, following a CAV research roadmap directed by top-level practitioners, leaders, and experts. Beyond the work highlighted below, more is on the way. For example, states wrestling with infrastructure funding questions will find value in an upcoming synthesis of practice to forecast vehicle miles traveled by CAVs.

**NCHRP 20-102(01)** Policy and Planning Actions to Internalize **Societal Impacts** of CV and AV Systems into **Market Decisions** 

**NCHRP 20-102(02)** Impacts of Regulations and Policies on CV and AV Technology Introduction in **Transit Operations** 

NCHRP 20-102(03) Challenges to CV and AV Application in Truck Freight Operations

NCHRP 20-102(05) Strategic Communications Plan for NCHRP Project 20-102

NCHRP 20-102(06) Road Markings for Machine Vision

NCHRP 20-102(07) Implications of Automation for Motor Vehicle Codes

Implicit in traditional motor vehicle codes are assumptions about drivers maintaining attention to and control over their vehicles. With this project, NCHRP is coordinating with the American Association of Motor Vehicle Administrators to develop CAV guidance and resources for DOTs and DMVs.



NCHRP 20-102(08) Dedicating Lanes for Priority or Exclusive Use by CVs and AVs

This project addresses a near-term issue as CAVs mix with traditional vehicles: What is the formula for getting maximum benefit, and how is that achieved? More lanes? Repurposing of existing lanes? The research will also examine the negative impacts on non-CAV users and projected market changes over time.



Image courtesy of U.S. DOT Intelligent Transportation Systems Joint Program Office

**NCHRP 20-102(09)** Providing Support to the Introduction of CV/AV Impacts into **Regional Transportation Planning and Modeling** Tools

**NCHRP 20-102(10)** Cybersecurity Implications of CV/AV Technologies on State and Local Transportation Agencies

Opinions vary about the risks associated with the possible hacking of today's intelligent vehicles (and tomorrow's CAVs). Even so, cybersecurity remains an issue of keen interest and concern. This research will provide a primer on CAV cybersecurity based on experience from other areas (such as financial services) where security and privacy issues are well managed today.

**NCHRP 20-102(11)** Summary of Existing Studies on the Effects of CV/AV on **Travel Demand** 

NCHRP 20-102(12) Business Models to Facilitate Deployment of CV Infrastructure to Support AV Operations

NCHRP 20-102(13) Planning Data Needs and Collection Techniques for CV/AV Applications

NCHRP 20-102(14) Data Management Strategies for CV/AV Applications for Operations

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## **CONVENING TOP-LEVEL LEADERS**

CAVs are both a national topic and a day-to-day issue for state DOTs. Information sharing and strategic partnering across state lines and across the nation are paramount. TRB continues to create opportunities for DOT executives and decision makers to dialogue on the most pressing—and constantly shifting—issues related to CAVs.

NCHRP's triennial **State DOT CEO Leadership Forum** will zero in on CAV and transportation infrastructure readiness in 2017. To be held in conjunction with the October 2017 <u>ITS World Congress</u> in Montreal, the forum will be an opportunity for DOT directors to share concerns, lessons learned, and successful strategies related to CAV infrastructure.



The July 2017 **<u>Automated Vehicles Symposium</u>**, cosponsored by TRB and the Association for Unmanned Vehicle Systems International, marks the seventh year of this growing event. Interest is tremendous—the symposium has become TRB's second largest event after its annual meeting. The symposium in San Francisco will bring together industry, academia, and government to expedite the future of CAVs.

With CAVs such a fast-moving area, NCHRP's research roadmap needs to be flexible too. TRB is organizing a national public-private-university **Forum on Preparing for Automated Vehicles and Shared Mobility Systems**. An outgrowth of NCHRP Project 20-113, Research Roadmap–Transformational Technologies, the forum will meet twice a year to update NCHRP's research roadmap.

#### **CONTACT US**

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