AUTONOMOUS VEHICLES & RURAL DRIVING: A REVIEW OF OTHER STATES' APPROACHES

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OVERVIEW

PURPOSE

Rural states face unique issues when it comes to autonomous vehicles, such as severe weather, connectivity, slower traffic such as farm equipment, gravel roads, and possible animal-vehicle collisions. This report will look at four areas where other more rural states have started taking steps to prepare for this new technology, including: testing and pilot programs; state laws; connectivity; and workforce training.

Note that during the 2021-2022 interim, the Transportation Interim Committee conducted a study of autonomous vehicles, including a review of model legislation, liability, and federal regulations.¹

TECHNOLOGY OVERVIEW

There are various degrees of vehicle automation; the graphic below from the Society of Automotive Engineers (SAE) describes the six primary levels. Many newer vehicles come equipped with lower levels of automation, including lane keeping assistance, adaptive cruise control, and blind spot warnings. These forms of automation are

	SAE J3016 [™] LEVELS OF DRIVING AUTOMATION					
	S4E LEVEL 0	SÆ LEVEL 1	SÆ LEVEL 2	SÆ LEVEL 3	SÆ LEVEL 4	SÆ LEVEL 5
What does the human in the driver's seat have to do?	You are driving whenever these driver support features are engaged - even if your feet are off the pedals and you are not steering			You are not driving when these automated driving features are engaged - even if you are seated in "the driver's seat"		
	You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests you must drive	These automated driving features will not require you to take over driving	
THESE ARE DRIVER SUPPORT FEATURES				THESE ARE AUTOMATED DRIVING FEATURES		
What do these features do?	These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/ acceleration support to the driver	These features provide steering AND brake/ acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met		This feature can drive the vehicle under all conditions
Example Features	 Automatic emergency breaking Blind spot warning Lane departure warning 	Lane centering OR Adaptive cruise control	Lane centering AND Adaptive cruise control at the same time	• Traffic jam chauffeur	 Local driverless taxi Pedals/steering wheel may or may not be installed 	• Same as level 4, but feature can drive everywhere in all conditions.

¹ https://leg.mt.gov/committees/interim/past-interim-committees/2021-2022/2021tic/hj-10/



meant to help but not replace drivers. Level 5 is the highest level of automation, where the vehicle can perform all driving functions under all conditions.

In terms of the driving systems, particularly for higher levels of automation, the following graphic shows how the systems function as broken out into three primary modules: sensing, computing, and actuation. The sensing component is how the automated driving systems take in the surrounding environment. LiDAR stands for light detection and ranging; it's a remote sensing method that can used to measure and sense objects and other vehicles. The data from the camera, the GPS mapping, and the LiDAR take in the data, and the platform computes it. Following that, in the last module, the system will act based on the computation of the data received.



Source: Autoware³

Figure 1. Diagram. Automated driving vehicle platform (Autoware).

Source: https://ops.fhwa.dot.gov/publications/fhwahop20013/fhwahop20013.pdf

RURAL STATE APPROACHES TO AUTONOMOUS VEHICLES

The following sections will provide examples of how rural states are preparing for autonomous vehicle technology in four primary areas listed in the purpose section on page 1.



TESTING & PILOT PROGRAMS

In June of 2020, the National Highway Traffic Safety Administration (NHTSA) launched an automated vehicle test initiative to provide the public with information about on-road testing of vehicles equipped with automated driving systems. NHTSA has an interactive map available to show reported testing locations, as shown below.²



Data is also provided on testing sites by road type and by vehicle type. The majority of testing reported has been done with automated shuttles. The test site closest to Montana was in Yellowstone National Park and was for an automated shuttle.

² <u>https://www.nhtsa.gov/automated-vehicle-test-tracking-tool</u>



MARCH 2024 AUTONOMOUS VEHICLES & RURAL DRIVING

In Iowa, a research project is underway for testing automated driving systems on high-speed rural roadways.³ A partially automated shuttle bus was driven along a 47-mile route, driven by a trained safety driver and co-pilot to see how the vehicle responded to various road conditions. The vehicle was equipped with a GPS antenna, cameras, LiDAR, and mobile detectors. Research was conducted in six phases, and the final report has not yet been published. There are summary reports for each phase, however. Each of these reports provides an overview of the routes taken, any incidents where the driver had to take over for the system, an overview of how the system performed with different types of roads and intersections, and



feedback from the drivers. There are also updates on how the system handles different situations such as dust blowing from farm equipment, a turkey crossing the road, water from sprinkling systems, and gravel roads.

In December of 2023, the U.S. Department of Transportation issued a notice of funding opportunity for a new Rural Autonomous Vehicle Program.⁴ Total funding available for this program is \$25.0 million; funds will be used to conduct research and to work with rural and tribal communities on the unique challenges related to integration of automated vehicles.

STATE LAWS

The National Conference of State Legislatures (NCSL) provides a database of all state legislation related to autonomous vehicles from 2017 to present.⁵ In focusing on rural states such as North Dakota, South Dakota, Wyoming, and Montana, some legislation has passed pertaining to autonomous vehicles. This legislation focuses on various topics including requiring authorization for autonomous vehicle operation, revising laws relating to vehicles following too closely to one another (applicable primarily for truck platooning), authorizing rulemaking, and providing for study of autonomous vehicles.

The most recent legislation was passed in South Dakota in February of 2024⁶; HB 1095 provides definitions, allows for fully autonomous vehicle operation on public roads with certain conditions, requires proof of financial responsibility, outlines actions in the event of accident, requires registration, and provides for rulemaking.

⁶ https://mylrc.sdlegislature.gov/api/Documents/264493.pdf



³ <u>https://adsforruralamerica.uiowa.edu/</u>

⁴ <u>https://grants.gov/search-results-detail/351434</u>

⁵ <u>https://www.ncsl.org/transportation/autonomous-vehicles-legislation-database</u>

CONNECTIVITY

Connectivity is the term used to describe the communication technology which allows autonomous vehicles to access services through a wireless connection. This connection allows the vehicle to access real-time information, traffic updates, and navigation services.

In 2018, Wyoming Department of Transportation undertook a pilot project, funded by the U.S. Department of Transportation, to look at connected vehicle technology along I-80. The project installed connected vehicle technology in various types of vehicles including snowplows, maintenance vehicles, and private trucks. These vehicles then sent road condition data to Wyoming DOT's transportation management centers. The data was also broadcast to the public via the Wyoming 511 app and the WYDOT commercial vehicle operator portal. The project was conducted from 2017-2019 and concluded in 2021. This project provided a demonstration of connectivity in a more rural setting; the Wyoming DOT presented an update on their project in 2020 to the Wyoming Legislature: https://wyoleg.gov/InterimCommittee/2020/S19-202012162-02CVProject.pdf

WORKFORCE TRAINING

In the case of truck platooning, where two or more trucks are linked using connectivity technology and automated driving



Source: MSU-WTI

support systems, specialized workforce training will likely be needed for truck operators to safely conduct these platoons.

In Maryland, truck platooning is allowed; truck platoons are limited to two trucks.⁷ Each truck is required to have a driver who has a valid commercial driver license with appropriate endorsements, has been trained on that specific vehicle's platooning system, and is responsible for the care and control of their vehicle. Entities interested in truck platooning in the state must submit and application and an operational plan.

SUMMARY & ADDITIONAL RESOURCES

SUMMARY

In summary, there are a number of various considerations for autonomous vehicles. Rural states may present unique challenges for deployment, and it will be important to make sure those are addressed in order for the vehicles to operate safely on the roads. Research is underway to look at these issues more closely.

ADDITIONAL RESOURCES

• Transportation Interim Committee, 2023-2024: <u>https://leg.mt.gov/committees/interim/tic/</u>

⁷ https://cav.mdot.maryland.gov/wp-content/uploads/2023/02/PlatooninginMarylandFlyer.pdf

- HJ 10: Study of Autonomous Vehicle Use, Transportation Interim Committee, 2021-2022 Interim: https://leg.mt.gov/committees/interim/past-interim-committees/2021-2022/2021tic/hj-10/
- Detailed Analysis of ADS-Deployment Readiness of the Existing Traffic Laws and Regulations, October 2020, Federal Highway Administration:

https://ops.fhwa.dot.gov/publications/fhwahop20013/fhwahop20013.pdf

- ADS for Rural America, Iowa Driving Safety Research Institute: <u>https://adsforruralamerica.uiowa.edu/</u>
- Autonomous Vehicles Legislation Database, National Conference of State Legislatures: https://www.ncsl.org/transportation/autonomous-vehicles-legislation-database
- AV TEST Initiative, National Highway Traffic Safety Administration: <u>https://www.nhtsa.gov/automated-vehicle-test-tracking-tool</u>
- Maryland's Connected and Automated Vehicle Program, Maryland Department of Transportation: https://cav.mdot.maryland.gov/

