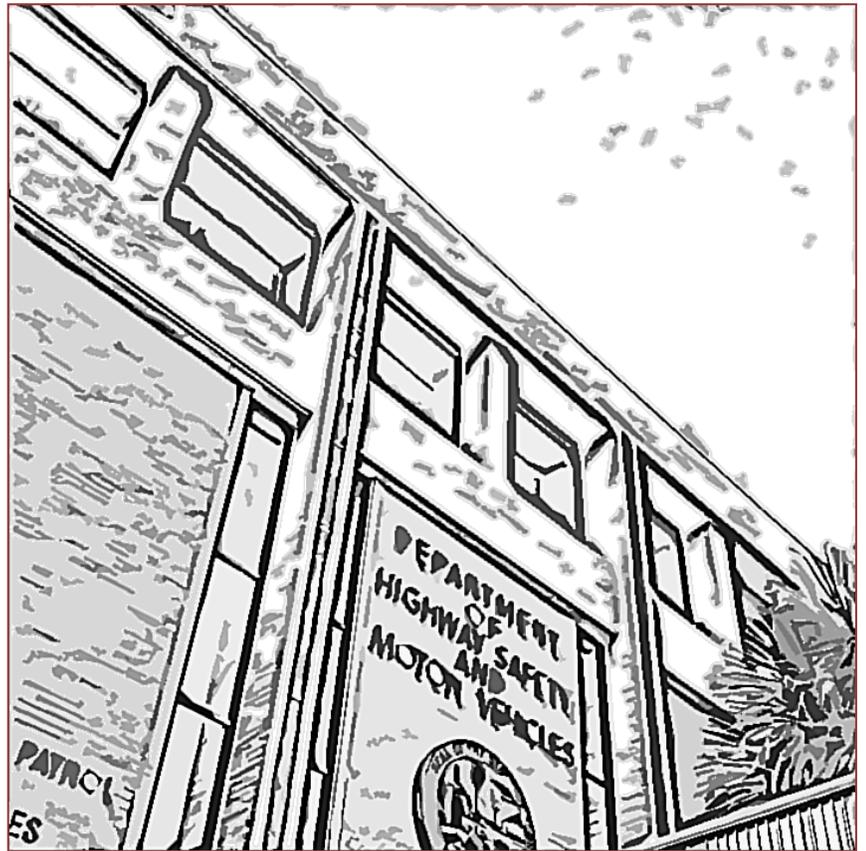


Autonomous Vehicle Report



Julie L. Jones
Executive Director

February 10, 2014

Introduction

[Section 316.86](#), Florida Statutes, requires the Department to submit a report to the President of the Senate and the Speaker of the House of Representatives recommending additional legislative or regulatory action that may be required for the safe testing and operation of motor vehicles equipped with autonomous technology. As defined in [section 316.003\(90\)](#), Florida Statutes, an autonomous vehicle is a motor vehicle equipped with technology that *“has the capability to drive the motor vehicle on which the technology is installed without active control or monitoring by a human operator.”*

Present Situation

[Effective July 1, 2012](#), the Florida Legislature authorized the testing of autonomous vehicles in Florida. The current Florida laws are brief, requiring a licensed driver, unless on a closed course¹, to monitor the autonomous mode and intervene, when necessary; limiting such drivers to employees, contractors and other persons designated by the manufacturer of the technology; and specifying that the testing entity provide \$5 million in insurance. The person who engages the autonomous technology is deemed the operator.

The autonomous technology must allow the licensed driver to disengage from autonomous mode, must provide a visual indicator inside the vehicle when it is in autonomous mode, and must alert the operator if there is a technology failure. In addition, the autonomous vehicle must comply with applicable traffic and motor vehicle laws.

The original manufacturer of a vehicle converted by a third-party into an autonomous vehicle is not liable for defects in the autonomous technology unless the defects were present in the vehicle as originally manufactured.

Nevada, California, the District of Columbia, and Michigan have also enacted laws related to autonomous vehicles. Nevada was the first to pass [legislation](#) and has previously licensed Google, Audi and Continental to test autonomous vehicles on public roads. California’s laws are very similar to Florida’s. California’s Department of Motor Vehicles has drafted more specific [regulations](#) and is conducting public workshops to promulgate rules prior to January 1, 2015. In December 2013, Michigan’s Governor signed [legislation](#) allowing the testing of autonomous vehicles. The government of Ontario, Canada has [published](#) its intent to initiate a five-year pilot program for autonomous vehicle testing.

Many public and private organizations are involved in researching and testing autonomous vehicles both domestically and abroad, including: technology companies like Google; automobile manufacturers like General Motors, Nissan, Volvo, Audi, and Tesla; and research institutions like Carnegie Mellon University and the University of Oxford. Most recently, Nissan Motor Corporation tested autonomous technology in the Nissan LEAF electric vehicle on the Sagami Expressway in Japan and Mercedes-Benz demonstrated its prototype self-driving car on the public roadway in Germany.

¹ Florida law does not define “closed course.”

Discussion

The anticipation and excitement of autonomous vehicles has been around for decades. As a society, we are finally amassing technological advancements sufficient to support autonomous technology, with changes occurring exponentially. Vehicle manufacturers, software developers, and researchers are actively engaged in the development of autonomous technology, with drastically different approaches and solutions.

The automobile manufacturers, like General Motors, are researching ways to change the roadway infrastructure to support the technology. [Carnegie Mellon University](#) explains it as having the vehicles communicate with street lights and other vehicles. On the other hand, [Google](#) is developing technology that would act independently, solely using Google maps, GPS, and sensors on the vehicles. Each entity currently involved in the development and testing of autonomous technology has much at stake, including significant financial investment, future sales, liability, and their credibility.

The Department, like other motor vehicle agencies, relies on vehicle safety standards established by the National Highway Traffic Safety Administration (NHTSA). Currently, NHTSA has not established safety standards for autonomous vehicles. However, NHTSA is in the midst of an extensive research project related to safety standards and software security of autonomous vehicles. The research is expected to lead to new rules and regulations. For the time being, NHTSA has deferred to the states to determine how to address safety issues such as licensing, driver training, and operating autonomous vehicles during the testing phase. NHTSA [recommends](#) that states:

- Ensure that the driver understands how to operate a self-driving vehicle safely
- Ensure that on-road testing of self-driving vehicles minimizes risks to other road users
- Limit testing operations to roadway, traffic and environmental conditions suitable for the capabilities of the tested self-driving vehicles
- Establish reporting requirements to monitor the performance of self-driving technology during testing
- Ensure that the process for transitioning from self-driving mode to driver control is safe, simple, and timely
- Self-driving test vehicles should have the capability of detecting, recording, and informing the driver that the system of automated technologies has malfunctioned
- Ensure that installation and operation of any self-driving vehicle technologies does not disable any federally required safety features or systems
- Ensure that self-driving test vehicles record information about the status of the automated control technologies in the event of a crash or loss of vehicle control

NHTSA outlines five levels of vehicle automation ranging from the human driver being in complete control of all vehicle functions (Level 0) to the vehicle operating without a human driver (Level 4). Cruise control, parking assistance, collision avoidance systems, and lane departure warnings are semi-autonomous features available today. The general belief is that semi-autonomous technologies improve traffic safety, as the vast majority of traffic crashes are caused by human error.

The rapidly changing technology and varying approaches to the development of autonomous technology create enormous challenges in setting safety standards. However, vehicle safety standards are a national issue and should be addressed by NHTSA prior to the public availability of self-driving vehicles.

Absent NHTSA standards, the Department reviewed NHTSA’s recommendations and practices in other states to determine if Florida’s current laws are satisfactory.

NHTSA recommends that drivers understand how to operate a self-driving vehicle safely and that on-road testing minimizes risk to other road users. Florida law does not specifically address driver training, although it does limit operators to licensed drivers affiliated with the manufacturer of the autonomous technology. California’s proposed regulations include similar provisions, but also establish driver qualifications based on driver history (e.g., point offenses, at-fault crashes, and driving under the influence convictions) and require the manufacturer to maintain a test driver training program.

Nevada’s testing guidelines require two licensed drivers to be in the autonomous vehicle while testing and that the state issue red license plates to test vehicles. Michigan also requires a special license plate. A license plate provides a clear visual indicator to other drivers that a vehicle may be operating in autonomous mode. Whether this knowledge reduces risk to other road users is debatable. Florida has over 200 specialty license plates, so identification by license plate may not be effective.



NHTSA also recommends limiting testing operations to roadway, traffic, and environmental conditions suitable for the capabilities of the tested self-driving vehicles. California’s proposed regulations require a licensed driver in the driver’s seat of an autonomous vehicle if it is being tested on public roadways, but do not include any limitations as to what public roadways or geographical locations the technology is tested on, nor does it include that specific permissions of geographical locations are required.

In Nevada, testers are only allowed to test the autonomous technology on predetermined highways in specific geographic regions.

Many of Florida’s roadways are in densely populated areas. However, Florida has a number of limited access roads that could potentially be used for testing. Testing entities wishing to use these limited access roads would likely seek permission and guidance from the Florida Department of Transportation and the Department.

Another NHTSA recommendation is to require that self-driving test vehicles record information about the status of the automated control technologies in the event of a crash or loss of vehicle control. Nevada requires that the technology have a way to capture data 30 seconds before a collision occurs and that such data is preserved for three years after the date of the collision. Both Nevada and California require the testing entities or manufacturers to report crashes involving autonomous vehicles to the state within 10 days.

Florida’s crash reporting laws already require law enforcement agencies to report crashes involving property damage, bodily injury or death within 10 days of the crash. Florida intends to brand the vehicle title as “autonomous.” Any autonomous-branded vehicle could be identified through the existing crash

report process. This, though, does not satisfy NHTSA's recommendation, which is really about data collection by the autonomous technology.

Data collection raises many questions related to public records, data retention, privacy, and trade secrets/proprietary information. How would data be maintained, who would need it, and would it be subject to a public records requests? Could autonomous vehicle data be used to track individuals? Would data from technology owned by a single testing entity or manufacturer constitute trade secrets?

While NHTSA recommends establishing reporting requirements to monitor the performance of self-driving technology during testing, Department staff does not have the expertise to interpret or apply the results. This is a function normally provided by the federal government (NHTSA).

The final NHTSA recommendations include ensuring that the transition from self-driving mode to driver control is safe, simple and timely; requiring the vehicle to detect, record, and inform the driver of system malfunctions; and ensuring that no federally required safety features are disabled. Florida law requires that the human operator have a means to easily engage and disengage the autonomous technology, that the vehicle have the means to visually indicate when the vehicle is in autonomous mode, and that the vehicle alert the operator of technology failure and allow the operator to take control. Additionally, the vehicle must comply with applicable laws. Florida laws are consistent with the laws in the other states.

Florida law briefly addresses liability by establishing two facts: 1) the person who engages the autonomous technology is the operator and 2) the original vehicle manufacturer is not liable for a defect in the autonomous technology unless the defect was present when the vehicle was manufactured. Michigan's and Nevada's laws are similar, while California requires the manufacturer to sign a document binding them to the autonomous vehicle.

To protect the state and the motoring public, Florida law requires the testing entity to provide \$5 million in insurance, in the form of an instrument of insurance, a surety bond, or self-insurance; Florida motor vehicle insurance laws still apply to the driver. California and Nevada also require \$5 million in insurance. California's proposed regulations require the manufacturer to carry proof of insurance in the autonomous vehicle at all times. The proposal details specific requirements for the insurance instrument, surety bond, or self-insurance, many of which are covered in Florida's existing Financial Responsibility Laws. Michigan laws requires a "*proof satisfactory to the secretary of state that the vehicle is insured*" under Michigan's insurance code.

In Florida, when a testing entity presents insurance to the Department and pays the title fees, the Department will brand the vehicle title "autonomous". "Autonomous Vehicle" will print on the registration certificate. California is also proposing to identify the autonomous vehicle as such on the face of the registration card and vehicle certificate of ownership (title).

The Department does not require an application or otherwise regulate the testing entity. Conversely, both California and Nevada require the testing entity to submit an application. The application fee is \$100 annually in Nevada and \$150 annually in California, with additional charges based on the number of vehicles and drivers involved. California's proposed regulations require the testing entity to obtain a Manufacturer's Testing Permit, which is valid for one year and may be renewed. Testing entities applying in Nevada must present proof that the vehicle has been driven in autonomous mode for at

least 10,000 miles and demonstrate the technology to the state, as well other requirements noted above. The application is valid for one year, after which the tester must reapply.

None of the states appear to consider testing history or records from other states in the application process. Florida does not have authority to deny a testing entity for any other reason than that lack of compliance with insurance and titling requirements. The concern becomes whether a testing entity with a poor safety record from other states could conduct testing in Florida without resolution of the safety issues.

Florida, Nevada, California and Michigan each require that the operator of the autonomous vehicle being tested is an employee, contractor, or other person authorized by the manufacturer. Florida, Nevada and Michigan do not require a driver license endorsement or specific permit to operate an autonomous vehicle. California's proposed regulations would require the driver to hold a test vehicle operator permit.

The national decline in traffic fatalities is partly due to vehicle safety improvements. Some researchers estimate that driver error is the cause of 90 percent of traffic crashes. [Google](#) estimates that autonomous vehicles could reduce the annual 30,000 road fatalities and 2 million injuries nationally up to 90 percent. To reach Florida's goal of zero traffic fatalities, and to reduce overall traffic crashes, state regulations need to support the development of technology that will reduce human error.

NHTSA does not recommend that states attempt to establish safety standards for autonomous vehicle technologies (for public use). There are a number of technological issues as well as human performance issues that must be addressed for autonomous vehicles. In light of the rapid evolution and wide variations in autonomous technologies, detailed policies and regulations may not be feasible at this time at the federal or state level, beyond the scope of testing guidelines and regulations.

The Department is part of an autonomous vehicle information sharing workgroup facilitated by the American Association of Motor Vehicle Administrators, which includes representatives from Nevada, California, Washington, Maine, Maryland, New York, Missouri, and South Carolina, among others. In addition, the Department participated in the Autonomous Vehicle Summit hosted by the Florida Department of Transportation and the Florida Engineering Society. The University of South Florida's Center for Urban Transportation Research has launched the Automated Vehicle Institute to help bring Florida to the forefront of technology exploration and policy implementation. The Florida Department of Transportation is also involved extensively in autonomous vehicle research, planning, and outreach.

Rapid technology developments, the lack of a single blueprint for autonomous solutions, and the lack of national safety standards make regulation of autonomous technology and autonomous vehicles much more challenging than regulation of motor vehicles in the past. Finding a balance between ensuring public safety and creating a positive environment for manufacturers to innovate is critical in maintaining the momentum toward self-driving vehicles.

Fiscal Impact

A. Taxes and Fees

N/A

B. Private Sector

This could potentially attract businesses to the state of Florida.

C. Government Sector

There may be costs for training for Department staff and law enforcement officers responsible for the application, licensing, and safe operation of autonomous vehicles.

Infrastructure-related expenses incurred by the Florida Department of Transportation could lead to long-term cost savings, e.g., more efficient vehicle operations could lessen the need for highway expansion. However, infrastructure expenditures and/or savings are indeterminable at this time.

Conclusion

Autonomous technology offers business and economic opportunities for Florida, including technology and policy research, and testing, monitoring, and evaluating the technology. The Department recommends that the State of Florida establish working relationships with motor vehicle manufacturers and technology developers to encourage these business opportunities, much like the State of California has done.

Current Florida laws allow manufacturers of autonomous technology to test on Florida's public roadways. Oversight is limited; for example, Florida laws do not provide a mechanism for the Department to deny a manufacturer's request to test in the event of a poor safety record in another state. However, each testing entity is required to comply with existing federal and state safety and traffic regulations. To date, the Department has received no requests from manufacturers of autonomous technology to conduct testing on Florida's roadways.

Technology is rapidly advancing and multiple industries are involved with many different approaches to technology development. In addition, there are no national safety standards and many unknowns. Policy-making at this juncture is difficult, at best. Autonomous technology has potential to significantly improve highway safety by reducing crashes and saving lives. In order to encourage innovation and foster a positive business environment toward that end, the Department proposes no changes to existing Florida laws and rules at this time.

The Department will continue to participate in national, state and local discussions to monitor developments, identify best practices, address safety issues, and craft proposed legislation for the safe testing and operation of autonomous vehicles.