



February 12, 2019

Councilmember Mary M. Cheh, Chairperson  
Committee on Transportation and the Environment  
Council of the District of Columbia  
1350 Pennsylvania Avenue, NW  
Washington, DC 20004

Dear Chairperson Cheh,

The Center for Auto Safety (the Center), the nation's premier independent, non-profit consumer advocacy organization dedicated to improving vehicle safety, quality, and fuel economy, thanks you for the opportunity to testify before your committee on January 31, 2019 regarding The Integration of Automated Vehicles in the District.

During the roundtable discussion following our testimony, you requested additional information on claims regarding the potential safety benefits of automated vehicles as well as recommendations for safety standards compliance before licensing automated vehicles (AVs) for operations on the District's streets. Please find our response below, including references for additional information if needed. Our testimony and the round table discussion also addressed AV operational liability, which we discuss in more detail below.

In summary, while the potential safety benefits of automated vehicles may at some point in the distant future be significant, data and reason would suggest they will likely have much less of an immediate safety impact than the reductions in deaths and injuries often touted by AV proponents. This is especially true considering the lack of a federal framework for AV safety. The gated certification licensing program we propose is a manageable, reasonable process for assessing AV safety by local jurisdictions until a federal regulatory structure is established. Further, full access to the civil justice system by any victims of an AV crash is an essential mechanism for incentivizing safety for those companies who wish to use the DC public streets as a proving ground for their technology.

***Claims of Safety Improvements Resulting from Introduction of Autonomous Vehicles***

Proponents of AV technology often suggest that their cars will eliminate all crashes, with statements such as: "Imagine a world with no car crashes. Our self-driving vehicles aim to eliminate human driver error — the primary cause of 94 percent of crashes — leading to fewer injuries and fatalities."<sup>1</sup> This

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<sup>1</sup> General Motors 2018 SELF-DRIVING SAFETY REPORT, at:

conjecture, is based on a misreading and prejudicial interpretation of a 2008 study on the causes of a subset of reported crashes conducted on behalf of the National Highway Traffic Safety Administration (NHTSA).<sup>2</sup> That study states:

The critical reason is the immediate reason for the critical pre-crash event and is often the last failure in the causal chain of events leading up to the crash. Although the critical reason is an important part of the description of events leading up to the crash, it is not intended to be interpreted as the cause of the crash nor as the assignment of the fault to the driver, vehicle, or environment.<sup>3</sup>

In other words, assertions that cite this study for evidence that AVs could eliminate 94% of crashes are simply wrong and inconsistent with the study's design and conclusions because the NHTSA study does not equate 'critical reason' and crash cause. Therefore, there is no basis to state that addressing the "critical reasons" as defined in the study necessarily equates to eliminating crashes. For example, poor road conditions could lead to the same crash whether the computer in an AV is operating a vehicle, or the vehicle is being driven by a person.

Also note also that for purposes of the study, each incident was assigned to a single factor. In fact, many accidents have multiple factors, but interactions of multiple factors are not considered in this study. There is no evidence that AVs, even when implementing artificial intelligence, are necessarily superior to humans in processing critical situations with multiple factors, and considerable evidence that humans are superior when confronted with novel situations such as when multiple factors are involved in a critical traffic situation.<sup>4</sup> Also note that there is currently no evidence that AVs are superior to humans with regard to recognition errors, (and in fact studies have shown that AVs are not nearly as perceptive as humans in many commonly encountered traffic situations<sup>5</sup>) that AVs do not necessarily exclude decision errors such as false assumptions of others' actions, illegal maneuvers or misjudgment of gaps or others' speeds, nor that AVs necessarily eliminate crashes due to overcompensation, poor directional control, etc. Similar conclusions were reached by an actuarial analysis of the source data.<sup>6</sup>

Of all the 'human error' factors cited in the NHTSA study, only falling asleep (7% of crashes)<sup>7</sup> is intrinsically avoidable by AV use, and even then, such avoidance would only be possible in a "level 5" AV

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<https://www.gm.com/content/dam/company/docs/us/en/gmcom/gmsafetyreport.pdf>

<sup>2</sup> National Motor Vehicle Crash Causation Survey, DOT HS 811 059 , <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811059> ; Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey, DOT HS 812 115, <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115>.

<sup>3</sup> Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey, DOT HS 812 115, <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115>

<sup>4</sup> Artificial Intelligence and Human Intelligence are very different., <https://bdtechtalks.com/2018/08/21/artificial-intelligence-vs-human-mind-brain/>

<sup>5</sup> Bikes May Have To Talk To Self-Driving Cars For Safety's Sake, <https://www.npr.org/sections/alltechconsidered/2017/07/24/537746346/bikes-may-have-to-talk-to-self-driving-cars-for-safety-sake> ; Here's how scientists convinced self-driving cars that stop signs were speed limit signs, <https://globalnews.ca/news/3654164/alterd-stop-signs-fool-self-driving-cars/>

<sup>6</sup> Casualty Actuarial Society Automated Vehicles Task Force, "Restating the National Highway Transportation Safety Administration's National Motor Vehicle Crash Causation Survey for Automated Vehicles", [https://www.casact.org/pubs/forum/14fforum/CAS%20AVTF\\_Restated\\_NMVCCS.pdf?utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=newsletter\\_axiosautonomousvehicles&stream=autonomous-vehicles](https://www.casact.org/pubs/forum/14fforum/CAS%20AVTF_Restated_NMVCCS.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosautonomousvehicles&stream=autonomous-vehicles)

<sup>7</sup> Id.

where the vehicle is 100% in control in all circumstances. Significantly, even AV proponents will regularly admit that “level 5” may be more of an ideal than an attainable level of sophistication.<sup>8</sup>

Even while AVs have potential for remediating some crash causes, AVs introduce many new factors that could lead to other crashes and skew safety comparisons towards less favorable results. AVs are susceptible to potentially lethal cybersecurity, communication, and algorithmic errors that are not a factor for conventional cars. AV sensors are complex and may be degraded by age, inattention to needed calibration, contaminants, impacts, or malicious actions, any of which could degrade sensor capability and safety, but might not affect comparably equipped human-driven cars. It’s also evident that many safety technologies that could benefit AVs, such as automatic emergency braking, lane change assist, lane keeping assistance, rear cross traffic alert, automatic stability control, dynamic cruise control, blind spot crash avoidance, etc., provide at least equal benefits for conventionally driven vehicles. A fair comparison of AV safety with human-driven car safety should include the safety benefits of comparably equipped conventional vehicles and the detrimental safety impact of compromised sensors, communication dropouts, data processing errors, etc. that are unique features of AVs. This fair comparison has not been done.

In summary, proponents of testing AV technology on public streets seem to simultaneously posit that the value of the test is to prove that the technology will provide a level of safety that the tests have not yet demonstrated. Put differently, Ford is asking to have its cake and eat it too.

### ***Licensing AVs for District of Columbia Public Road Testing***

The Center recommends a gated certification process for District of Columbia AV demonstration based on objective safety standards applied with compliance verification at critical development stages. (For additional details please see the Center’s response to the NHTSA’s proposal for an AV Pilot Program.<sup>9</sup>) The need for a certification process prior to public road deployment is in part because supervised driving is inadequate to establish high confidence in their safety in predictable traffic situations.<sup>10</sup> Deaths and crashes involving not just the AVs themselves but pedestrians and other motorists, when operators were behind the wheel of both test vehicles and passenger cars with advanced driver assist systems (ADAS) demonstrate the existing safety record of AV technology is not yet where it needs to be to assure safety on public roads.<sup>11</sup>

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<sup>8</sup> “Waymo CEO: Autonomous cars won't ever be able to drive in all conditions,” CNET, Nov. 13, 2018, at: <https://www.cnet.com/news/alphabet-google-waymo-ceo-john-krafcik-autonomous-cars-wont-ever-be-able-to-drive-in-all-conditions/>

<sup>9</sup> Center for Auto Safety comments on NHTSA proposal for AV Pilot Program, <https://www.regulations.gov/contentStreamer?documentId=NHTSA-2018-0092-0040&attachmentNumber=1&contentType=pdf>. See also NYC Comment\_NHTSA-2018-0092, <https://www.regulations.gov/contentStreamer?documentId=NHTSA-2018-0092-0068&attachmentNumber=1&contentType=pdf>

<sup>10</sup> Driving to Safety, RAND Corporation, [https://www.rand.org/content/dam/rand/pubs/research\\_reports/RR1400/RR1478/RAND\\_RR1478.pdf](https://www.rand.org/content/dam/rand/pubs/research_reports/RR1400/RR1478/RAND_RR1478.pdf)

<sup>11</sup> “Self-driving Uber vehicle strikes and kills pedestrian,” Washington Post, Mar. 19, 2018, [https://www.washingtonpost.com/news/dr-gridlock/wp/2018/03/19/uber-halts-autonomous-vehicle-testing-after-a-pedestrian-is-struck/?utm\\_term=.a7e5ef39b926](https://www.washingtonpost.com/news/dr-gridlock/wp/2018/03/19/uber-halts-autonomous-vehicle-testing-after-a-pedestrian-is-struck/?utm_term=.a7e5ef39b926); NTSB Docket HWY16FH018 - May 07, 2016 - Williston, FL, United States, <https://dms.nts.gov/pubdms/search/hitlist.cfm?docketID=59989&StartRow=16&EndRow=30&CurrentPage=2&or>

Both AV developers and licensing authorities, such as the DC government, would be advantaged by a defined pathway to full licensing such as the gated certification we propose since it would reduce uncertainty and allow for rational planning. For example, a qualified review panel empaneled by the District government including public safety officials, safety advocates, technical experts, and representatives of the public, could be empowered to license initial AV operations in defined areas and conditions with supervisory human drivers before initial tests, analogous to a learner's permit. A similar review panel could review a license application to continue AV operation with any reduction in numbers of supervisory drivers per vehicle, operational design domain (ODD), or condition (such as excluding operation as a school bus, etc.). Another review could be required for initial operations with no human driver under reduced human supervision, ODD expansion, or conditional passenger expansion, analogous to a provisional driver's license. A final license application could then be reviewed by the panel after a sufficient amount of accumulated experience of fleet driverless operation before application for and potential issuance of a full driver's license for specified ODD and conditions.

At each step, an examination would include compliance<sup>12</sup> with safety standards in light of the applicant's requested ODD and accumulated safety experience. The proposed reviews are comparable to those any human driver is required to complete before issuance of a driver's license.

The recommended objective AV safety requirements below were developed based on the Center's extensive experience in automotive safety. We believe they are a reasonable set of requirements of safety that do not impose an undue burden on developers and are no more than any resident of a municipality would reasonably expect had been done to assure the safety of both the occupants of the AV as well as the safety of those sharing the public roads with the technology.<sup>13</sup>

- AVs shall do no harm.
- AVs shall provide built-in-test (BIT)/built-in-diagnostics (BID) to verify safe operational capability prior to embarkation and during operations.
- AVs shall always defer to commands by a designated occupant.
- AVs shall respond promptly and appropriately to emergency and public safety vehicles, to emergency situations as directed by emergency personnel, and to police instructions in all traffic situations.
- AVs shall safely transition to occupant control.
- AVs shall assure occupant situational awareness and safe egress.
- AVs shall provide cybersecurity.
- AVs shall respect their mechanically limited and logically limited geographic operational limits.
- AVs shall respect naturally occurring inclement weather and hazardous environmental conditions.
- AVs shall appropriately respond to compromising, unusual or undocumented artificial road conditions.

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[der=1&sort=0&TXTSEARCHT=;](#) Preliminary Report Issued for Investigation of Fatal, Mountain View, California, Tesla Crash, <https://www.nts.gov/news/press-releases/Pages/nr20180607.aspx>

<sup>12</sup> Such compliance would be intended to be proven statistically, based on the previously described panels' recommended levels of success. For example: 99.9% probability of success with 90% confidence, established by combined validated simulation and test.

<sup>13</sup> Id. at footnote 9.

- AVs shall protect occupants from uncontrolled or malicious drivers in other vehicles.
- AVs shall implement data recorders that provide public safety officers and government officials necessary access to operational history and vehicle state necessary to understand the cause of a crash.
- AVs shall detect and respond appropriately to collisions.
- AV developers shall prove that they have the financial resources to cover the risks that AV development, test, and operations on public roads entail.
- AV manufacturers shall provide conspicuous visual and audible warning of automatic vehicle operation to other users of public roads prior to completion of operator licensing.

As an added benefit, developing AV requirements prior to deployment will minimize risk, cost, and schedule of AV development, benefiting AV developers and District regulators alike.<sup>14</sup>

Summarizing this section, the Center believes that a gated certification AV licensing program is the best approach to licensing AV operation on the District's roads. We further believe that gated certification is reasonable, economical, and amenable to District legislation, rulemaking, and implementation.

### ***Liability***

There is no question that cars, be they AV test vehicles or otherwise, crash. Over 37,000 Americans,<sup>15</sup> and 1.2 million people worldwide<sup>16</sup> die every year from crashes involving motor vehicles. Although the type of technology at issue in the proposed program here in DC is relatively new, incidents involving cars with either "driverless" or "assisted" technology have been involved in both fatal and non-fatal incidents.<sup>17</sup> While the purported goal of AV technology is to reduce crashes and the related deaths and injuries, it is up to public safety officials to incentivize maximum safety for all drivers, passengers, and pedestrians. One of the most successful tools available for such a task is the American civil justice system.

In the absence of federal regulations mandating proof of the safety of this technology, or required performance standards on issues ranging from cybersecurity to the ability to perform in weather conditions, the corporate entity putting vehicles on the road must be responsible for risks consumers will be subject to from their products. At a minimum, this will mean the company needs to be considered the "operator" or "driver" for liability purposes. Further, law enforcement and private crash investigators must be able to access the information needed to determine what happened in a crash to allow both for determining fault (as one would when non-AVs are involved) as well as working to prevent a repeat crash. Absent such information and legal structure, municipalities may continue to be held responsible for AV related liabilities.<sup>18</sup> The Center believes that AV operators need to be insured

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<sup>14</sup> Systems Engineering for Intelligent Transportation Systems, Section 3.2.1, Project Development Challenges, <https://ops.fhwa.dot.gov/publications/seitsguide/section3.htm#s3.1>

<sup>15</sup> NHTSA 2017 Fatal Motor Vehicle Crashes: Overview, <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812603>

<sup>16</sup> 1.2 million die on roads each year: WHO, <https://www.cbc.ca/news/technology/1-2-million-die-on-roads-each-year-who-1.909878>

<sup>17</sup> Supra at footnote 11; Report of Traffic Collision Involving an Autonomous Vehicle (OL 316), State of California, [https://www.dmv.ca.gov/portal/dmv/detail/vr/autonomous/autonomousveh\\_ol316+](https://www.dmv.ca.gov/portal/dmv/detail/vr/autonomous/autonomousveh_ol316+)

<sup>18</sup> Tempe faces \$10 million claim in Uber self-driving vehicle fatality, <https://www.usatoday.com/story/tech/2019/02/03/tempe-faces-10-million-claim-uber-self-driving-vehicle-fatality/2761875002/>

appropriately so that all legitimate claims against AV developer/operators can be expeditiously settled as would be the case for similar incidents involving conventional vehicles.

Finally, the long-term viability of AV technology will require public trust in this technology as well as its purveyors. In order to encourage this trust, and provide a safety backstop against rogue operators, AV companies engaged in experiments in DC should be prohibited from using binding arbitration clauses in the context of ride-sharing programs. Similarly, vital safety data should not be allowed to be hidden behind closed doors via protective orders shrouded in exaggerated claims of “proprietary business information,” when transparency regarding the success and failures of this experiment will be key to encouraging safe deployment of AV technology.

**Conclusion**

Licensing for operations of AV technology in the District should begin with a balance of the potential benefits against the potential hazards with due regard for vehicular, pedestrian, bicyclist, and other road user’s safety. While the Center remains concerned with testing of AV technology on public roads, if it is going to be undertaken, a licensing program using gated certification and with objective safety measures is the best approach available. This approach assures public input, objective assessment of safety, and a rational basis for actuarial assessment of risk and appropriate AV operations insurance. Lastly, maintaining the ability of injured parties to hold those responsible accountable will also encourage a safer approach to public testing of experimental technology.

We thank you for the opportunity to contribute to the discussion. Please let us know if we can provide additional assistance to you on behalf of the District of Columbia Council.

Very Truly Yours,

A handwritten signature in black ink, appearing to read "Jason Levine". The signature is fluid and cursive, with a long, sweeping underline that extends to the left.

Jason Levine  
Executive Director, Center for Auto Safety