

APPENDIX



Testimony on Autonomous Vehicles

Monday, October 20, 2018

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Thank you very much for inviting me to testify about Autonomous Vehicles or what I call SmartDrivingCars (trucks & buses too).

Just a little bit of background about me. I have been teaching and researching issues about automated transportation since 1971, more than 45 years. Beginning with something called Personal Rapid Transit, which was going to save cities by providing on-demand 24/7 automated mobility for everyone. With my students, we contemplated and designed systems composing of 10,000 stations using 10,000 miles of guideway that could serve essentially everyone in New Jersey. Only problem: to build the slim overhead guideways that interconnected those stations would cost a quarter trillion dollars or so. I also participated in Automated Highway studies in the 70s, 80s and 90s. Those efforts were focused on building new roadways that would exclusively serve automated cars and trucks. However, it eventually became obvious that those concepts weren't going anywhere because NJ DoT would never build an Automated Highway until General Motors built and sold many automated cars. And GM would never build or have a chance of selling automated cars until NJ DoT built the automated roads that would unlock the benefits of the automated cars. Again, getting started was impossible.

I then had the great pleasure of leading the Princeton University entries in the 2005 DARPA Grand Challenge and 2007 DARPA Urban Challenge² that focused on the development and demonstration of automated driving technology; driverless cars using roads just like anybody else without needing anything special nor disrupting anyone. The success of those Challenges almost 15 years ago made it clear to many of us that the way to use automation to deliver safe, affordable, environmentally respectful, on-demand, ubiquitous, 24/7, mobility for all, was to focus on putting sufficient intelligence in each car, truck or bus such that it could drive safely and use the roads that we already have on a shared basis without disrupting the existing users of those roads. This allowed us to focus our attention, ingenuity and money on creating that intelligence in just a single, or a handful, of vehicles. Once working on those few vehicles, we could simply replicate what works. That intelligence involves software, whose replication costs are essentially zero, and hardware (processors and sensors) that scale really well so that in-volume replication costs become very inexpensive. Viral adoption would surely follow. And one of the reasons why we are here today is that it is happening. Consider the

¹ <http://www.advancedtransit.org/>

² https://en.wikipedia.org/wiki/DARPA_Grand_Challenge

evolution of Waymo, the division of Alphabet/Google who many consider the leading innovator of driverless car technology.

Waymo began in 2009³ by assembling some of the talent from the DARPA Challenges and began developing and evolving their automated driving technology to work on just a couple of Priuses that they purchased from the local Lexus dealer. Then a couple of years later went back to the Lexus dealer and got about 20 Lexies in order to continue to improve its automated driving technology stack. Then a couple of years later built about 200 Fireflies, two seat cars without any pedals, nor a steering wheel, to further improve and extend the scope of their evolving driverless technology. Then a couple of years later ordered 2,000 Chrysler Pacificas to get serious about really improving their technology to the point that it can actually deliver on-demand ride-hailing mobility (Uber/Lyft-like services) to normal people in an "early rider program"⁴ in Chandler Arizona, a suburb of Phoenix. Then on March 27 of this year obtained an option to purchase 20,000 Jaguars⁵ and the at the end of May placed an option to buy another 62,000 Chrysler Pacificas⁶, apparently in a move to provide safe, affordable, environmentally respectful, on-demand, ubiquitous, 24/7, mobility in many test markets around the country, my conjecture.

This history of converting normal road vehicles to safe automated road vehicles by Waymo has been growing at an exponential rate of 10x every 2 years since their inception in 2009. At this growth rate, it implies that in 2020 Waymo will order 200,000 and in 2022, 2 million new cars to make driverless. Given that these vehicles have been designed to deliver safe, affordable mobility on demand, their fundamental business case necessitates that they be used as extensively as possible, each and every day. Consequently, these vehicles will be managed and operated as a fleet to serve as many as possible trip makers throughout the 24 hour day. A rule of thumb is that each car could serve about 50 person trips per day at a cost of about 25 cents per passenger mile or about half of AAA's estimated costs⁷ of using your own car.

These driverless cars can be productive throughout each day serving the general public. It will be a long time before any of these driverless cars will be sold into private hands where they'd end up sitting around unused in driveways and parking lots rather than providing quality-of-life enhancing mobility to everyone, especially the most mobility disadvantaged.

Let me make sure that we are all clear about what I have been talking about. That is Driverless Cars (which could also be moving goods or moving groups of people in buses where and when the demand warranted.). To date, Waymo is the ONLY company in the world that has operated a car on any normal public roadway without a driver or attendant in the car, much as we currently use elevators, They did it for the first time in 2015, giving a short ride in a Driverless Firefly in Austin Texas to Steve Mahan⁸, who is legally blind. It wasn't until November of 2017⁹ that they did it again to members of their early rider program in Chandler, AZ¹⁰. Waymo has announced that they will launch commercial driverless ride-hailing services in Chandler by the end of this year¹¹.

Driverless is the ultimate opportunity in the use of automated driving technology to improve mobility. It has the opportunity to provide "safe, affordable, environmentally respectful, on-demand, ubiquitous,

³ <https://techcrunch.com/2010/10/09/google-automated-cars/>

⁴ <http://fortune.com/2018/03/13/waymo-driverless-minivans-phoenix/>

⁵ <http://www.latimes.com/business/autos/la-fi-hy-waymo-jaguar-20180327-story.html>

⁶ <https://www.theverge.com/2018/5/31/17412908/waymo-chrysler-pacifica-minivan-self-driving-fleet>

⁷ <https://newsroom.aaa.com/auto/your-driving-costs/>

⁸ https://www.youtube.com/watch?v=X_d3MCklvg8

⁹ <http://fortune.com/2017/11/07/google-waymo-phoenix-self-driving-car/>

¹⁰ <https://youtu.be/aaOB-ErYq6Y>

¹¹ <https://www.theverge.com/2018/8/21/17762326/waymo-self-driving-ride-hail-fleet-management>

24/7, mobility for "all" as part of a centrally managed fleet. Less capable levels of automation what I term "Safe-Driving Cars" and "Self-Driving Cars" can deliver valuable, but more limited, public benefits.

Safe-driving Cars, as the name clearly implies, uses sensors and intelligence to keep a car from crashing and staying in its lane of travel. These technologies are focused on going beyond crash mitigation, focused on having drivers and passengers survive crashes using seat belts, air bags and crash attenuating designs, to actually intervening at the right time to automatically apply brakes and/or control the steering wheel so as to **not** crash into something ahead or drift out of the lane. This continuous monitoring and automatic intervention in the driving environment is focused on correcting driver errors or mis-behavior that all too often lead to crashes. These technologies such as Automated Emergency Braking are really extensions of technologies that already exist, such as anti-lock brakes, or are mandated, such as electronic stability control, in all new cars.

Automated Emergency Braking is intended not let cars crash into objects in the lane ahead. Even though there is a large variation in the performance of these systems that are currently on the market they can and are helping reduce some collisions. I contend that they would become even better and more new car customers would buy them if the insurance industry was able to properly reward its customers that could most benefit from these technologies. If the heavily regulated insurance industry was given the freedom to appropriately discount premiums and the ability to educate and steer its insurance customers to acquire the crash avoiding technologies and reduce their insurance claims. Insurance companies could really promote crash avoidance thus reducing their LOSS, improving their profitability and reducing insurance expenses to the Safe-driving car owner.

Self-driving Cars. As the name clearly implies these cars are able to drive themselves, but can't do it well enough to drive without a driver or attendant in the car; else they'd be called Driverless. So, while you may be able to take your hands off the steering wheel or feet off the pedals, a normal licensed and capable driver needs to be paying attention to the road ahead and be prepared to take over whenever the automated system encounters a driving situation that it can't handle. Self-driving cars having Tesla's AutoPilot¹² or GM's SuperCruise¹³ or Volvo's Pilot Assist¹⁴ or Mercede's Distronic Plus¹⁵, or Subaru's EyeSight¹⁶ are available today. These systems focus on providing comfort and convenience to the driver by letting the driver take his/her hands off the wheel and feet off the pedals, but **absolutely** require that the driver remain aware of what is happening and prepared to take over and avoid a crash. Unfortunately, car makers, in their enthusiasm to sell these features, aren't necessarily clear that the technology that they're selling you may not be good enough for you to really relax and certainly is NOT good enough to enable you to even think about having another adult beverage or allowing you to really text and certainly NOT enabling you to doze off while it drives.

As I've mentioned, these systems are already on the market and are being used on New Jersey roads as we speak. That barn door is open; however, there are a couple of ways the legislature could be helpful.

1. One is by incentivizing NJ DoT to improve the stripping on all New Jersey roads and improving the readability of all signs. Since all of the automated lane keeping systems on the market today use computer vision to determine the location of the lane edges, having easy to see lane edges on all streets, especially those most heavily traveled, as well as good stop lines, pedestrian crossings and turn lane markings would help every one of us to better see these makings, and enable each of these self-driving systems work better. I don't want to suggest that

¹² <https://www.tesla.com/autopilot>

¹³ <https://www.cadillac.com/world-of-cadillac/innovation/super-cruise>

¹⁴ <https://www.youtube.com/watch?v=EClvk7SgPDK>

¹⁵ <http://www.silverstarny.com/blog/what-is-mercedes-benz-distronic-plus-with-steering-assist/>

¹⁶ <https://www.cars.com/articles/subaru-expands-eyesight-as-new-study-shows-effectiveness-1420700145788/>

good lane markings and good readable signs haven't been a high priority of New Jersey's road maintenance program, but maybe not so much. Thank goodness that these Self-driving systems don't need nor have they been designed to use fancy electronic gizmos. They just need good paint and good signs, just like each of us need to drive more safely.

2. A 2nd system that would substantially improve the throughput of what is the world's most efficient bus transit corridor, exclusive bus lane, the XBL, leading from the NJ Turnpike to the Lincoln Tunnel and the PABT (Port Authority Bus Terminal). That would be to retrofit "off-the-shelf" intelligent cruise control, as exists in all of the aforementioned Self-driving car systems, into each of the transit buses that are authorized to use the XBL each morning. This a fleet of approximately 3,000 buses. As operated today, the XBL has a maximum practical throughput of approximately 700 buses per hour. What limits the throughput is the large disparity in the separation between buses as they traverse the XBL. Any of the intelligent cruise control systems in any of the self driving cars on the market today could safely deliver a 50% increase in capacity of that facility. This amounts to an increase of almost 20,000 one-seat rides in the peak hour into mid-town Manhattan from NJ's Park & Ride lots. This capacity increase is essentially equivalent to the number of seats that the new rail tunnels would provide. I first proposed this to NJ Transit and the Port Authority more than 20 years ago¹⁷. Given that the automated technology is off-the-shelf, cost of such a retrofit couldn't possibly be greater than \$20k/bus, or \$60 Million to do the 3,000 buses. The Port Authority might finally be taking a close look at this. Help from the NJ Legislature might actually push this over the top and make it a reality.

Let's get back to the 3rd kind of SmartDrivingCars, **Driverless**, which is really the focus of much of the proposed legislation. Driverless is the technology that has the biggest opportunity to improve the quality of life of many New Jersians, create jobs and substantially improve New Jersey's economy. The 9 million New¹⁸ Jersians take more than 30 million vehicle trips on a typical day, more than 90% of which are taken in automobiles or light duty trucks. New Jersey's public road system affords those having access to an automobile a superior quality of life being able to go anywhere at any time at essentially zero marginal costs. However, the Census claims that in Mercer County alone, there are over 15,000 households¹⁹ representing about 27,000 residents²⁰ that don't have access to one of these vehicles. Most are very poor, many are seniors. Their lack of mobility to get to jobs, health care, training and recreation greatly restricts their quality of life. For example, in 2014, Amazon opened a fulfillment center in Matrix Business Park in Robbinsville New Jersey, a high tech warehouse that currently employs over 2,500 people. While the facility is located at the nexus of major interstate roads, it is not located within walking distance of housing and is not served by NJ Transit. To help out, the Greater Mercer Transportation Management Association²¹ (TMA), established a shuttle, the "Z line" to take employees from the Hamilton Market Place (HMP), served by three (3) bus lines²². However, except for those folks living within walking distance of HMP, this is not a one-seat ride to work. In fact if one lives in Ewing, one needs to catch an NJT bus at about 5:30 am to arrive at the Amazon facility just in time to start on the 7am shift, while by car or by Uber or Lyft, one can do it in about 30 minutes. If, instead, one had Waymo-styled driverless service available, 30 minute ride could be offered affordably and with enhanced vehicle management, pairing those who can share rides, thus making each person trip more affordable, more energy efficient and more environmentally responsible while proving a personal auto-like level-of-service. These vehicles, would then be available to affordably serve on-demand mobility

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18 <http://worldpopulationreview.com/states/new-jersey-population/>

19 <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>

20 <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=bkmk>

21 <http://gmtma.org/contact-us/>

22 NJT 601,606, 613

needs to healthcare, learning, shopping, dining, and recreation to the young, the old, the poor and anyone else throughout the entire day. Even more efficient shuttle services between more concentrated locations such as between remote parking and the passenger terminal at Trenton-Mercer airport or between remote athletic facilities, classrooms and dormitories at Princeton University. These concentrated driverless shuttle services could readily be expanded to the West Trenton train station or even the Amtrak/NJ Transit station in the airport scenario and to low income and senior housing locations in Princeton.

What is needed to deliver these services is the creation of what I would like to term as a "win-win welcoming environment" between the private sector fleet management companies that would provide the driverless mobility services and the public sector entities that represent those that would use the services as well as those residents that live along the public roads that these vehicles would use to deliver the services. In return for the welcoming to use the so designated network of public roadways, by the fleet operator(s), a "common carrier obligation" would be embraced by the fleet operator. That obligation might/should include the commitment to offer safe on-demand high-quality shared ride services on a **priority basis** to the most mobility disadvantaged household living and needing to travel within the defined network of public roadways within a defined geo-fenced area. Instead of remaining idle, the fleet could then serve anyone else needing to travel within the defined area. Such a service could start with but a few vehicles, say 10, operating within a limited geo-graphic area, that might reach across Mercer County but authorized to use only streets for which the neighbors would welcome these vehicles on their streets and gaining the opportunity to be a customer of the afforded mobility. If successful the system could readily grow to 100, then 1,000 and so on as deemed appropriate.

The legislation creating the public-private partnership relationship that would create both the "welcoming environment" and the "common carrier obligation" go well beyond the current proposed legislation. It may well require the creation of the mechanisms that would ensure the delivery of the rights and responsibilities of the neighborhood and community associations as well as the reporting requirements that ensure safety and the diligent delivery of the priority services by the fleet operator

All of this presupposes that Driverless vehicles are operated and managed by substantive entities that have demonstrated an ability to deliver on the "common carriage obligation" and have demonstrated the ability to maintain the safety of the driverless technology. Until driverless vehicles become common place, it would be prudent for New Jersey to prohibit driverless operation without an attendant ready to take over unless the entity that tells that vehicle where to go and what roads to use to get there has agreed to the "common carriage obligation". Else the vehicle is a Self-driving vehicle that NJ legislation should require that a licensed driver be in the driver's seat, alert and ready to take over the driving function should that become necessary.

I've said little about the movement of goods, but, of course, there is a substantial opportunity to move goods locally using driverless vehicles, especially if those vehicles perform those deliveries in the wee hours of the morning when our streets are essentially totally unused and no children are chasing balls into any of them. Between the hours of 1am and 5 am, deliveries of packages, mail etc. could readily be accomplished efficiently and safely. Creating legislation that would encourage such operation is, of course, very desirable.

Again, thank you for your attention to my comments. I fully encourage you to do whatever you can to have New Jersey play a leading role in the evolution and deployment of these most valuable technologies. I'd be pleased to answer any of your questions.

October 22, 2018

The Honorable Andrew Zwicker
New Jersey Assembly Science, Innovation and Technology Committee
P.O. Box 068
Trenton, NJ 08625-0068

The Honorable Daniel R. Benson
New Jersey Assembly Transportation and Independent Authorities Committee
P.O. Box 068
Trenton, NJ 08625-0068

Re: Honda's testimony concerning autonomous vehicles and support of AJR 164 if amended.

Dear Chairman Benson and Chairman Zwicker:

Thank you for the opportunity to share Honda's vision for the future of Highly Automated Vehicles (HAV) and to provide comments on the various bills under consideration by the committee today. Honda is passionate about the safety of everyone who gets into our vehicles, as well as those who share the road with our products, such as other drivers, bicyclists, and pedestrians. Our ultimate goal is to help create a collision-free society with the joy of freedom and mobility for everyone. In our view, HAV technology is the key to achieving this goal, and we look forward to working with policy makers in New Jersey to ensure that this technology is developed and deployed in a safe and responsible manner.

Earlier this month, The National Highway Traffic Safety Administration (NHTSA) reported that over 37,000 people died in traffic crashes in 2017.¹ In a 2015 study, NHTSA estimated that over 94% of all traffic crashes were the result of driver distraction, driver impairment or some other form of human error.² In addition to potentially saving tens of thousands of lives a year, HAV technology has the potential to significantly improve fuel efficiency, traffic congestion and personal mobility.

While HAV technology will have a profound impact on the way consumers own and use motor vehicles, it should not have such a profound impact on the way government regulates motor vehicles. As HAV technology develops, there may be a need for new laws and regulations, but for decades states and the federal government have successfully shared oversight of motor vehicle transportation issues. The federal government sets and enforces motor vehicle safety standards (MVSS) for vehicles and vehicle equipment as well as investigate and manage the recall and remedy of non-compliances and defects. States also play an important role by licensing human drivers, registering motor vehicles, setting motor vehicle insurance laws and enacting and enforcing traffic laws.

Automakers, NHTSA and other stakeholders are in agreement that the emergence of HAV technology is not a reason to change these existing roles and responsibilities. The federal government needs to retain exclusive control of setting and enforcing MVSS so that automakers can continue to design and build vehicles that can be

¹ <https://www.usatoday.com/story/money/cars/2018/10/03/nhtsa-2017-crash-deaths-fatalities/1509341002/>

² <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115>

sold and operate in all 50 states. That becomes an impossible task for automakers if states and localities enact their own legislative and regulatory policies. The creation of this type of patchwork regulatory framework poses the greatest challenge to automakers as we look to develop this technology and bring it to market. In a recent report the Governor's Highway Safety Association unequivocally endorsed this view, stating, "...states should not attempt to regulate ADS vehicles and software design and performance, and indeed they lack the resources and technical expertise to do so even if they wanted to. That's NHTSA's role. In particular states cannot and should not attempt to guarantee that each ADS on the road is performing satisfactorily."³

While Honda believes that the legislation under consideration today is a well-intentioned attempt to help facilitate HAV technology, there is no need for New Jersey to break new ground when states like Ohio have already laid out a successfully proven model. Ohio is allowing this technology to evolve before looking to regulate it, while taking an active role in ensuring that companies like Honda have the infrastructure needed to develop this technology. This policy has allowed us to work with the state on projects like the Columbus Smart City, US-33 Smart Corridor, and the Marysville Smart Community projects. These programs, explained in more detail [here](#)⁴, are critical to the pre-deployment testing that is necessary before automate driving systems can be trusted to transport people without the need for intervention by a licensed driver.

Honda's partnership with Ohio was facilitated by the creation of a task force similar to the one proposed by AJR 164. Ohio brought together stakeholders from across various state and local government agencies to share their ideas and concerns. In addition to ensuring that the respective government agencies were on the same page, this task force provided automakers with a single point of contact with the state, which was incredibly helpful in facilitating communication with the government. While Honda is in strong support of New Jersey establishing a task force on HAV technology, we do believe that AJR 164 does need to be amended. We would like to see the task force expanded to include more stakeholders, including representatives from the auto industry to ensure that future HAV policy is shaped by feedback from all interested parties. We are also concerned by the language in section (6)(d) that allows the commission to determine whether the state should enact stricter safety standards than NHTSA. As previously discussed we strongly believe that NHSTA should retain exclusive control of establishing motor vehicle safety standards and that this language should be stricken from the bill.

Thank you very much for your time and consideration of our position. Customer safety has always been at the core of Honda's philosophy, which is why nine Honda and Acura models earned the Insurance Institute for Highway Safety's Top Safety Pick rating for model year 2017, and why Honda is considered a safety leader in the industry. In our pursuit of a collision-free society, Honda is steadily building its automated and connected car technology portfolio, while bringing industry-leading capabilities to current generation vehicles.

Honda is proud of our relationship with New Jersey, which is home to 253 authorized Honda and Acura dealerships that employ over 5,150 residents and provide New Jersey consumers with a wide range of products that utilize the latest environmental and safety technologies. In addition to our dealer presence, Mount Laurel is home of Honda's North-Eastern parts center and zone offices which provides key support to our dealers and customers throughout the region. For more information on Honda's presence in New Jersey please visit our website www.hondainamerica.com or follow us on twitter @hondainamerica.

³ https://www.ghsa.org/sites/default/files/2018-08/Final_AVs2018.pdf

⁴ http://hondanews.com/releases/honda-demonstrates-new-smart-intersection-technology-that-enables-vehicles-to-virtually-see-through-and-around-buildings/videos/honda-smart-intersection-technology-for-vehicle-to-everything-v2x-communication-is-designed-to-reduce-traffic-collisions-at-roadway-intersections-2?scope_filter=cGFnZT0z

If you have any questions, or if Honda can otherwise be a resource for you please don't hesitate to contact me or our New Jersey lobbyist Lynn Nowak of Porzio Governmental Affairs at (609) 396-6100.

Sincerely,



Craig Orlan
Sr. State Relations Specialist
Honda North America, Inc.

TESTIMONY
OF
JAMES B. APPLETON, PRESIDENT
NEW JERSEY COALITION OF AUTOMOTIVE RETAILERS
BEFORE A JOINT HEARING OF THE
ASSEMBLY SCIENCE, INNOVATION AND TECHNOLOGY
COMMITTEE
AND
ASSEMBLY TRANSPORTATION AND INDEPENDENT AUTHORITIES
COMMITTEE
OCTOBER 22, 2018

Chairman Zwicker, Chairman Benson. Members of the Assembly Science, Innovation and Technology and Transportation and Independent Authorities Committees. Thank you for the invitation to testify, today, about autonomous vehicles and the impact of emerging personal mobility trends on the new car business and the role of the neighborhood new car dealer.

My name is Jim Appleton, and I am President of the New Jersey Coalition of Automotive Retailers -- NJCAR. We are the state wide trade association that represents New Jersey's 500+ franchised new car and truck retailers. Auto retail is a \$35 billion per year business in New Jersey, which directly employees more than 38,000 men and women all across the Garden State. These are good, local jobs with great pay and benefits; jobs that can't be outsourced to the Sunbelt or shipped overseas.

Auto retailers are part of a dynamic, ever – evolving industry. Since the first Model T rolled off the assembly line in Detroit, auto retailers have operated in an environment of constant change and technological innovation. Indeed, the only constant in the car business is change.

Auto retailers embrace change and have adapted their business to meet consumer demand and accommodate all kinds of new technologies, disruptive business models and an ever – changing legal and regulatory environment. Dealers are nothing, if not adaptable and it's why, after more than 100 years selling and servicing cars, auto retailers remain the economic engine on Main Street in just about every town and every community across the great State of New Jersey.

In this new era of advanced technology vehicles and new mobility choices, many have questioned the role of auto retailers. Some, like Tesla, have even attempted to go to market without dealers, demanding special treatment under the law and an exemption from the requirement to operate through locally owned and operated franchisees. They say the

franchise model won't work for them, but they ignore the fact that the franchise system works well for automakers whose products account for 98.8% of the new car market and, more importantly, the franchise system works for new car consumers, because it promotes important public policy goals, like competition, consumer protection and highway safety.

We hear that the growing trend toward ride sharing and new autonomous vehicle technologies will put an end to personal vehicle ownership and, therefore, the neighborhood new car dealer. But a recent National Automobile Dealers Association survey of 1200 consumers found that 81% of all millennial's and 93% of drivers age 35 and older want to keep a personal vehicle. We have been told by ridesharing enthusiasts that it is cheaper than owning a car and, over time, this would cause fewer people to purchase a new car or truck. But a study by the AAA Foundation for Traffic Safety found it cost half as much to own your own vehicle as it does to rely solely on a ride sharing service.

I mention Tesla and ride sharing as examples of the overblown predictions about the massive disruption forecast for the automobile sector. And I caution you about accepting similar bold predictions about AV's. The integration of new technology and consumer acceptance is a gradual process; not the big bang AV enthusiasts and Wall Street investors are hoping for. Automatic braking, collision avoidance, and lane centering are just a few of the autonomous safety systems that have already become standard equipment in many vehicles. These technologies are saving lives and are becoming part of more and more vehicles every year. And there is no doubt that these technologies and others yet to be introduced are only going to get better and more sophisticated over time.

But, does that mean consumers will be willing to give up their steering wheels, brake pedals and human decision making and rely solely on a fully autonomous vehicle? In that NADA study I referred to earlier, only 45% of millennial's have a favorable view of AVs versus 19% unfavorable. And, for drivers 35 and older, only 29% had a favorable view of AVs and 30% had an unfavorable opinion.

So, if consumers are getting the autonomy they want in cars, today, and they are not clamoring for full autonomy, what is driving the AV discussion? We know what's driving the push for AVs on Wall Street. But what's driving the discussion here on State Street? It is -- or at least should be -- a discussion about public and highway safety. And so it falls to public policy makers, like you, to examine these safety claims carefully.

Autonomous vehicle advocates assert that deployment of this emerging technology will eliminate traffic fatalities. Right now, there is not nearly enough data to support this claim. And, in fact, there is plenty of anecdotal evidence that undermines this assertion. In an August 2018 article about self driving cars, Bloomberg quoted a machine learning expert who said "the problem isn't that self driving cars don't work, it's that people act unpredictably." His point, of course, was that if people acted less erratically, the safety record of AVs would improve. Ah, yea. You think? If humans acted less erratically, there would be no highway safety issue in the first place.

Last year, approximately 37,000 people died in auto related accidents in the US. Every one of those deaths is a tragedy, and we should do everything we can to lower that number. But it is important to consider how many vehicles are on the road and how many miles are driven in order to put that number in perspective and to understand the true potential of AV technology to reduce traffic fatalities.

For example, Americas drove more than 32 Trillion miles last year alone -- that's a "3" and a "2" followed by 11 zeros. That means there was one auto related death for every 90 million miles driven. Let's compare that to the 54,589 traffic deaths which occurred in 1972, the highest number of fatalities recorded in any single year over the last 100 years, according to data published by the National Highway Transportation and Safety Administration. Americans drove approximately 1.3 Trillion miles in that year, which equates to one auto related death for every 24 million miles driven. So, you can see that driving is becoming safer and safer every year; a three-fold decrease in highway fatalities over the past few decades.

If the safety promise of autonomous vehicles is dependent upon reprogramming the behavior of people, why don't we just reprogram drivers to always wear seatbelts, not to speed, not to drive drunk, not to text or get distracted? It is inconceivable that AV technology will eliminate every traffic death; not when the external human element is still present, even if it is removed entirely from the vehicle cabin itself.

I don't think there is any question but that AVs will play a role in the future of personal mobility choices available to consumers. And I have no doubt that new car dealers can and will add value to the system for deploying AV's, servicing AVs and remarketing AVs. But I don't see AV's as a dominant force in the marketplace or even a major disruptor of the personal motor vehicle market. Autonomous vehicles may disrupt the mass transit system in the U.S. and will, most likely, find their way to the market through fleet operators, rather than privately owned personal motor vehicles. And, that is probably a good thing. Fleet deployment of AVs will allow the State to put in place rigorous safety inspection and maintenance protocols and substantial property and casualty insurance requirements that will mitigate the risk that AV technology will present on the highway. These requirements will, likely, be out of reach for many individuals, which is why fleet operators and mass transit providers are likely to see a much higher deployment rate of autonomous vehicles compared to individual consumers.

AV technology is here and now and it's saving lives on New Jersey roads every single day. And more and better AV technology is on the way and making driving safer by the mile. How much safer can complete autonomy make our highways is a big question, especially since the overwhelming majority of drivers don't really appear ready to give up their cars or driving for an autonomous future.

My advice to you, as public policy makers, is to go slow. Question the hype. Demand proof. Ask for information to back up bold claims about the safety and reliability of A/V systems. Separate the investor frenzy and myth from the true technological advancement, innovation and safety

benefits of autonomous vehicles.

I would be happy to answer any questions you may have about autonomous vehicles and the role of the neighborhood new car dealer in an autonomous vehicle future.

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**Testimony before the Assembly Science, Innovation and Technology Committee and the Assembly
Transportation and Independent Authorities Committee on Autonomous Vehicles**

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Thank you Chairman Zwicker and Chairman Benson and members of the committee for facilitating this important discussion. My name is Tracy Noble and I am the spokesperson for the AAA Clubs of New Jersey. Collectively, AAA represents almost two million New Jersey motorists.

As the advocacy organization for all motorists, AAA representatives have been actively engaged with automakers and traffic safety stakeholders at the national level, **in an effort to promote progress without compromising safety.**

Autonomous vehicle (AV) technology has the potential to improve safety, mobility and convenience for motorists. AAA supports the continued advancement of technologies leading to the development, testing and use of AV systems.

With more than 90% of all fatal crashes attributed to driver behavior, there is good reason to be excited about the possibility of eliminating drivers from the risk equation but, without question, there is a whole new set of risks to be considered with 'driverless' vehicles as well.

The terms "autonomous vehicles" and highly automated vehicles refer to not only fully self-driving cars but also a range of different technologies, some of which are already on the road in New Jersey. Vehicles equipped with adaptive cruise control, automatic emergency braking or lane keeping technologies are building bricks toward more advanced systems.

The evolution of AVs will be gradual. Fully self-driving vehicles, operating without human interactions, are years away from being a common sight on our roadways. The process will take time, for a number of reasons, including: the development of the technology, the long turnover as consumers buy new cars (the average vehicle age is 11.5 years old); technical and human factors challenges; and the need to set insurance liability and appropriate laws. We will likely see a mix of vehicles with differing levels of automation on our roads for decades.

Consumer acceptance will be crucial to the successful deployment of AVs. A recent AAA survey found that three out of four U.S. drivers reported feeling "afraid" to ride in a fully self-driving car. Despite this significant fear, drivers who own vehicles equipped with semi-autonomous

features were 75 percent more likely to trust the technology than those without it, suggesting that gradual experience with these advanced features may ease consumer fears.

Among drivers who want AV technology in their vehicles, AAA found the primary motivation to be *safety* (84 percent), followed by *convenience* (64 percent), *reducing stress* (46 percent) and *wanting the latest technology* (30 percent).

Businesses and government will play an integral role in the acceptance and interest in AV's by maximizing transparency and helping consumers better understand how they operate, their benefits and limitations and the various impacts on society.

As autonomous technology becomes more prevalent, AAA anticipates a number of long-term challenges to the automotive, legal and business environments, reparability, liability and ownership models.

Recognizing that self-driving and autonomous vehicles have the potential to change our lives dramatically, AAA wants to ensure that the safety of motorists receives the highest priority as research moves forward and as laws passed to regulate this technology are considered.

Current motor vehicle laws never envisioned a vehicle that can drive itself. If a vehicle causes a crash in autonomous mode who is liable – the “operator”, the vehicle owner, their insurance company, the automaker that built the vehicle or the company that developed the AV software?

Current driver training and education programs need to continue to keep pace with vehicle technology and include instruction on the operation and use of autonomous features. Looking forward, driver training providers will need to further educate in the skills necessary to operate AVs and interact with the specific vehicle's operation as they become more common.

Time and transparency will lead to trust and acceptance of autonomous vehicles and now is the time to be having these important discussions.

The AAA Clubs of New Jersey welcome the opportunity to play an active role in this process, representing the motoring public as part of an AV task force or a working group where our research and resources could be of benefit.

With that in mind, AAA fully supports the study of autonomous vehicles in New Jersey.