TOYOTA

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March 20, 2017

The Honorable Robert E. Latta
Chairman
Subcommittee on Digital Commerce and Consumer Protection
2125 Rayburn House Office Building
Washington, DC 20515-6115

Dear Chairman Latta:

I am writing in response to your letter dated March 6, 2017, regarding Gill Pratt's testimony before the Subcommittee on Digital Commerce and Consumer Protection at the hearing entitled "Self-Driving Cars: Road to Deployment." Please find responses to the additional questions enclosed for the hearing record. In responding to these questions, Toyota has used its best efforts to be as accurate and responsive as possible based on our understanding of the terms used in the questions and the limited time available to respond as requested. The representations herein are based on reasonably available information and current information and belief.

The Honorable Jan Schakowsky

1. **You stated that the Toyota Research Institute is working on systems that could detect a heartbeat and changes in skin temperature in the occupants of a car. Do you have a timeline for when this technology will be available? Is Toyota is [sic] working on any other technologies to prevent child heat deaths?**

   Toyota has not conducted research to directly address the "hot car" issue. Toyota is conducting general research on driver monitoring systems. Currently, there is no timetable for introduction of this technology, as it is still in its research phase. As this future technology is being developed and as it becomes reliable, it is possible that it could be adapted for other occupant monitoring uses.

2. **In your testimony, you stated that automatic emergency braking (AEB) will be standard in almost every Toyota model sold this year. How soon will Toyota get to 100 percent?**

By the end of the 2017 calendar year, consistent with the Commitment to Advancing Automatic Emergency Braking Technology, Toyota will have automatic emergency braking on approximately 95% of Toyota and Lexus vehicles sold in the United States. There are only 2 models for which the technology will not be available in the foreseeable future. Currently, there are technological issues related to vehicles with a very low stance (e.g., sports cars). In such cases, current technology is unable to ensure accurate detection of obstacles in the path of the vehicle. In the future, when the technology evolves to ensure accurate detection, Toyota will develop a plan to install the technology on such vehicles. Further, there is a model that is nearing the end of its life cycle, and thus, there are no plans to update this vehicle at this time.

3. **I think the best way to keep defective vehicles off our roads is to prevent the sale of used cars under recall until the recall is repaired. Has Toyota committed to not selling used vehicles as "safe," "repaired for safety," passed a "rigorous inspection," and/or qualified to be sold as "certified" pre-owned cars when they have open recalls?**

   Toyota Certified Used Vehicles (TCUV) policy and L/Certified policy for Lexus models prohibits the certification of any vehicle with an outstanding recall. In addition, Toyota is looking into measures to reinforce the importance of the policy with dealers.

4. **What assurances will Toyota provide before putting AVs on the roads that they are protected from cybersecurity attacks?**

   Cybersecurity remains a priority for the auto industry, including Toyota, and considerable time and effort is currently focused on minimizing potential hazards caused by cybersecurity attacks. We are incorporating measures into vehicles for this purpose. In addition to our own efforts, a little more than a year ago, the auto industry formed an Automotive Information Sharing and Analysis Center, Auto-ISAC where companies can share cybersecurity threat and vulnerability information. The Auto-ISAC is also currently engaged in a robust effort to develop cybersecurity best practices for the industry.

5. **There is a lot of interest in expanding NHTSA's authority to grant exemptions from FMVSSs. Does Toyota support public notice and a comment period when automakers request an exemption or should NHTSA be allowed to make these determinations without public input? If Toyota does not support notice and comment, why?**

   Toyota believes the process currently in 49 CFR Part 555 is adequate. This process provides for an exemption following a public comment period, which allows the industry and other stakeholders to consider the potential impacts of such an exemption.

6. **It has been widely reported that autonomous commercial motor vehicles could precede autonomous cars in widespread distribution. Will Toyota be selling AV trucks? If yes, when will this begin? What assurances will Toyota provide to the motoring public that AV trucks are safe?**

There is a possibility that vehicle sensors and systems for automated driving may be shared with commercial trucks, but we do not currently have any plans to sell automated commercial trucks.

7. **There has been a lot of discussion about the importance of data sharing among the companies, with NHTSA, and with the public. I understand the sensitivity around sharing certain company data, and I know that no company wants proprietary information revealed to its competitors.**

   a. **Assuming confidential business information is adequately protected and that only relevant safety information is shared, does Toyota agree that more data sharing would help improve self-driving cars and lead to quicker deployment? Does Toyota agree that the public needs more information to know self-driving cars are safe?**

      Toyota agrees that, if properly implemented, data sharing during testing could help to improve self-driving cars and lead to quicker deployment. Toyota supports the various goals of data sharing, including sharing with the government to improve understanding of highly autonomous vehicle technology, sharing with the government or public for evaluation of the safety of a particular system, and sharing among developers to help improve the performance of systems. We note that a significant amount of work needs to be done to ensure that such sharing does not unintentionally delay innovation or worsen safety. For example, the sharing of miles-tested and disengagement statistics – without more - may create a perverse incentive for developers to only test "easy" miles, potentially impairing the quality of research and lowering safety outcomes. In addition, appropriate means must be considered to preserve a company's confidential and propriety intellectual property. Toyota looks forward to working with stakeholders to determine how to share relevant data in the most practical and effective manner.

   b. **Please list the types of information that Toyota is willing to share and types of information Toyota is not willing to share? And detail with whom Toyota is prepared to share that information, such as other companies, NHTSA, or the public.**

      As noted above, Toyota supports the goals of data sharing and looks forward to working with relevant stakeholders to develop an approach that improves safety outcomes while protecting companies' proprietary innovations. Because the types of data that should be shared depend on the goal of data sharing, it is not possible for us at this time to list out the specific types of information that should be shared and with whom. We recognize that some of these decisions may be specific to the level or function of the automated driving system being developed and may not be amenable to a one-size-fits-all data sharing solution. In addition, there are important details that need to be worked out by the industry, including identifying what data should be shared to maximize comparability across different systems, ensuring that the source of the data is anonymized, deciding where the data will be compiled, and determining who should have access to the data and for what purposes.

8. **Some have expressed concern that testing through miles of driving may not adequately represent all real driving conditions, e.g., that such testing is occurring on open highways and**

not necessarily in city conditions. Please list how many miles Toyota autonomous vehicles have been tested and under what conditions such testing has occurred.

Toyota is testing its autonomous vehicle technologies on closed courses and on some public roads in Japan and the U.S. Test vehicles supporting the development of the Chauffeur system are currently being tested on closed courses in Massachusetts, California, and Michigan. We are also testing on public roads in Michigan. A trained safety driver is always present in the driver's seat and able to intervene during this testing. For proprietary reasons, we prefer not to disclose publicly how many miles and under what conditions our autonomous test vehicles have been tested.

We believe that developing a truly reliable autonomous vehicle technology will require extensive testing. The complexities involved in the development, testing, and deployment of autonomous vehicle technology requires a significant amount of public road testing. This testing would not only address the thousands of traffic scenarios that human drivers would encounter on a regular basis, but also would identify as many "edge cases" or "corner cases" as possible. Millions of test-drive miles are necessary, but probably not sufficient, to achieve the reliability that we need for autonomous vehicle technology, particularly if those test-driven miles are through "easy" or predictable routes. The truth is that all testing miles are not created equal, and developers should be focused on testing scenarios while driving is challenging or even exceedingly difficult. Computer simulation can accelerate and expand the range of testing of these systems, and should – with adequate evidence of validity – be an acceptable equivalent to real-world testing to achieve the billions of test-driven miles that will likely be needed to accomplish this.

9. **There has been discussion of level 4 AVs being rolled out as ridesharing fleets before being sold to individuals. How does Toyota plan to educate ridesharing passengers on what to do should a problem occur with those vehicles?**

   We agree that it would be important for Level 4 ridesharing customers to be educated about how to handle a problem with the vehicle should one occur. The customer training or education that would be most effective for those who ride in Level 4 ridesharing fleet vehicles is an important area of discussion.

   Toyota is still exploring the full range of potential business models for this technology. Educating our customers on the safe use of our products is, as always, a part of the development and marketing process.

10. **Some automakers have committed to accepting liability for accidents involving self-driving vehicles. Is Toyota considering this model and if so, would Toyota accept liability for level 4 vehicles and above?**

    To the extent that a crash is the result solely of a defect in the product itself, Toyota believes that strict liability would apply under current law. However, there are factors that may contribute to a

crash having nothing to do with the vehicle itself, so generalizing about potential liability is not appropriate.

The Honorable Tony Cardenas

1. **California has been a pioneer and leader in technology for many years. More recently, Southern California and Los Angeles have been home to rapid growth in an exciting technology industry. Of course, as policymakers, part of our jobs is to make sure that our laws don't fall too far behind. It's definitely easier said than done. Given that, I am encouraged by the conversation, and hope that we can continue to explore this in a bipartisan way, with the collaboration of industry.**

   a. **We know you're concerned with a situation in which 50 states develop 50 different ways of addressing autonomous vehicles. When exploring the development of a federal standard, what within the California standards developed over the past few years has worked well? How has California being at the forefront contributed to AV development?**

   We believe that California's pioneer spirit contributed to the current proliferation of research and development of automated driving systems. We understand that many of the laws and regulations put forward by states, including California, are well-intended and actions are being taken to assure public safety while keeping doors open to innovation. We appreciate California being transparent and receptive to industry input as the state updates its testing regulations and finalizes its deployment regulations. This process has opened up an important dialogue among Federal and State governments and developers. This has allowed us to work towards a solution that can work for all stakeholders and, most importantly, assures public safety. We agree that the public should be kept safe and have reasonable assurance that developers are testing responsibly, but firmly believe that a single, national framework is the best way to do this.

2. **As technologies evolve, our workforce also evolves. I've heard some really interesting ideas from companies about how they're thinking about addressing this issue when it comes to our workers.**

   a. Has Toyota studied the possible effects of mass deployment of autonomous vehicles on transportation jobs? If so, are there any initiatives that are being developed to ensure our workforce doesn't get left behind?

   The potential for autonomous vehicle technology to result in job displacement, particularly for those who make a living driving, is something that needs to be studied. All of the stakeholders need to have a better understanding about the extent of the potential impact, what can be done to address those impacts in a meaningful and effective manner, and whether automation may create new economic and employment opportunities. It is likely going to be a number of years before the technology is deployed in a way that could potentially displace drivers, so there is an opportunity to address some of these challenges before any displacement occurs.

At the same time, we should recognize that there is not a one-size-fits-all approach to autonomous vehicle technology. For example, we are working on two types of autonomy – Chauffeur and Guardian. Under Guardian, there is still a driver and the system is designed to provide driver assist. The deployment of these types of technologies would not lead to any job displacement, but is designed to help increase the safety of our roads and the safety of those who are employed as drivers.

If you have any questions, or need additional information, please let me know.

Sincerely,

Stephen Ciccone
Group Vice President
Government Affairs
Toyota Motor North America, Inc.