April 1, 2021

Dr. Steven Cliff, Acting Administrator
National Highway Traffic Safety Administration
U.S. Department of Transportation
1200 New Jersey Avenue SE
West Building Ground Floor, Room W12-140
Washington, DC 20590-0001

Re: Advance Notice of Proposed Rulemaking on a Framework for Automated Driving System Safety, Docket No. NHTSA-2020-0106, 85 Fed. Reg. 78058

Dear Acting Administrator Cliff,

On behalf of Velodyne Lidar, Inc., I am pleased to submit these comments regarding the National Highway Traffic Safety Administration's ("NHTSA") Advance Notice of Proposed Rulemaking ("ANPRM") on the Framework for Automated Driving System ("ADS") Safety ("Framework") published in the Federal Register on December 3, 2020.[1] We note that Velodyne actively participated in, and is supportive of, the comments submitted by the Intelligent Transportation Society of America ("ITSA") and the comments submitted by the Automotive Safety Council. Our brief comments here are submitted to supplement those provided by ITSA and the Automotive Safety Council.

By way of background, Velodyne Lidar is a California-founded and headquartered company that provides smart, powerful lidar solutions for autonomous vehicles, driver assistance, navigation, mapping, and more. Velodyne ushered in a new era of autonomous technology with the invention of real-time surround view lidar sensors and is known globally for its broad portfolio of breakthrough lidar technologies. Lidar is central to the sensor suite for ADS, as it provides high-resolution, real-time 3D information needed to support safe autonomy and our revolutionary sensor and software solutions provide performance, quality, and flexibility to enhance the safety of vehicles equipped with ADS. Through continuous innovation, Velodyne strives to transform lives and communities by advancing safer mobility for all.

Velodyne shares NHTSA's belief that ADS technology has the potential to support NHTSA's mission to save lives by preventing and reducing injuries and fatalities for road users

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[1] U.S. Dep't of Transp., Nat'l Highway Traffic Safety Admin., Framework for Automated Driving System Safety, Advance Notice of Proposed Rulemaking, Docket No. NHTSA-2020-0106 (Dec. 3, 2020), https://www.federalregister.gov/documents/2020/12/03/2020-25930/framework-for-automated-driving-system-safety [hereinafter *ADS ANPRM*].

inside and outside of vehicles.[2] We strongly believe that ADS technology presents a great opportunity to increase driving safety and reduce the number of roadway deaths and injuries by mitigating crashes involving human error. Accordingly, we support NHTSA's efforts to develop a framework to assess the performance of ADS while enabling further innovation.

In the context of flexible and adaptive framework, Velodyne encourages NHTSA to continue to explore ways to collect data associated with near-misses. We understand that much of NHTSA's data collection focuses on events that result in a reportable incident, but we also appreciate that NHTSA recognizes the importance of collecting near-miss data to better predict the potential for crashes and, in doing so, increase crash prevention.[3] Further deployment of vehicles equipped with ADS can increase the Agency's ability to obtain near-miss data, as lidar provides critical means for systems to detect, avoid, and register near-misses. Therefore, we support efforts by NHTSA to encourage the deployment of vehicles equipped with ADS and to collect data associated with near-misses.

Additionally, Velodyne would support efforts by NHTSA to increase nighttime testing of ADS equipped vehicles and require low false negative rates for sensing features of ADS to ensure that ADS technologies are safe and reliable at all times of day. We understand that the Framework developed by NHTSA will strive to ensure that ADS technologies are consistently reliable and improve safety for all road users.[4] We support this goal and believe that requiring sensing features of ADS to maintain low false negative rates can help to achieve this goal. For instance, as cameras provide images in two dimensions without depth measurements, sensing and perception features based exclusively on cameras can produce considerable false negative rates, particularly in low light conditions. These false negative ratings can cause significant detrimental effects on safety, as a false negative could result in a vulnerable road user not being sensed by a camera and the ADS not being able to respond accordingly. Alternatively, sensing features that produce low false negative rates are more reliable and better equipped to improve safety for all road users. In the specific context of lidar, lidar provides a safety benefit beyond cameras and radar because it serves as its own light source, enabling nighttime and related applications that are inaccessible to or suboptimal for the other sensors. As a result, ADS technologies that rely on lidar provide far fewer false negatives than systems equipped exclusively with camera and/or radar, particularly in low light scenarios. Understanding that the vast majority of pedestrian and cyclist fatalities happen at night, use of lidar would reduce the potential for such tragedies to occur and help to achieve NHTSA's goals. To ensure that ADS equipped vehicles are able to effectively sense and react to their scenarios in all surroundings,

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[2] *See ADS ANPRM* at 78061.
[3] See U.S. Dep't of Transp., Nat'l Highway Traffic Safety Admin., Evaluating the Relationship Between Near-Crashes and Crashes: Can Near-Crashes Serve as a Surrogate Safety Metric for Crashes? (Oct. 2010), https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/documents/dot_hs_811_382.pdf.
[4] *See ADS ANPRM* at 78073.

Velodyne encourages NHTSA to evaluate the performance of ADS equipped vehicles in nighttime or low light conditions through the New Car Assessment Program ("NCAP") testing protocols. Finally, we encourage NHTSA to require low false negative rates in both daytime and nighttime for sensing features of ADS whenever evaluating ADS equipped vehicles.

We appreciate the opportunity to provide comments on NHTSA's ANPRM on the Framework for Automated Driving System Safety. These comments represent Velodyne's continued engagement with NHTSA and other stakeholders on these important issues affecting the automotive industry and consumers around the world. Should you have any questions regarding any of the comments above, please contact me at asokoll@velodyne.com.

Sincerely,

/s/

Aaron Sokoll
Director of Policy and Regulation, Velodyne Lidar, Inc.