AMERICAN BAR ASSOCIATION
Tort Trial and Insurance Practice Section

Fall 2020

COMMITTEE NEWS

Automobile Litigation

Safety and Regulatory Considerations of Advanced Driver Assistance Systems (ADAS)

Iiona D. Scully, Ph.D., *Exponent, Inc.*

Sean Scally, *Exponent, Inc.*

Ryan Clark, Esq., *Lewis, Thomason, King, Krieg & Waldrop, P.C.*

Michael R. Carey, Esq., *Dykema Gossett PLLC*

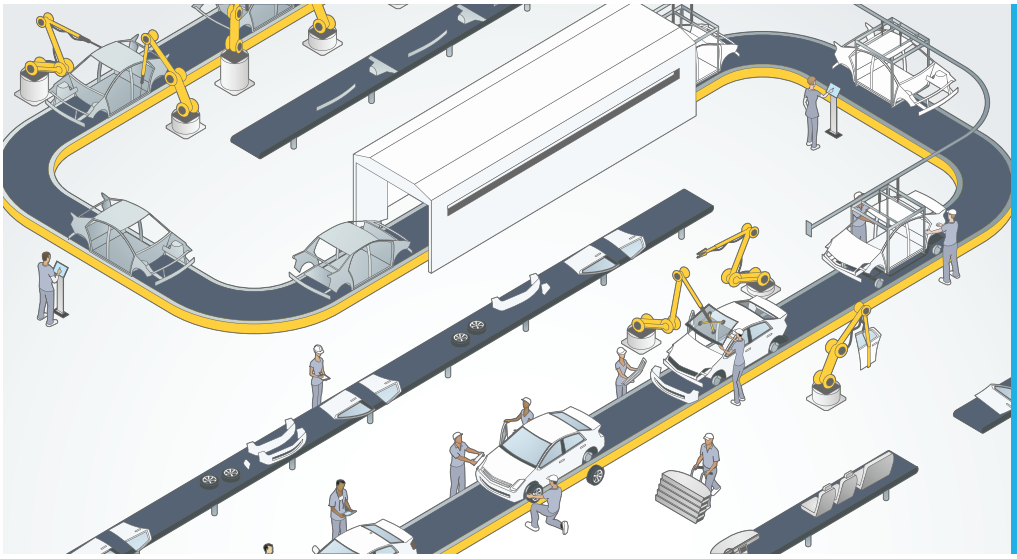
David M. Cades, Ph.D., *Exponent, Inc.*

Ryan J. Harrington, M.E., *Exponent, Inc.*

Advanced driver assistance systems (ADAS) technologies are becoming increasingly available on new vehicles. These systems, such as forward collision warning (FCW) and automatic emergency braking (AEB), are designed to provide warnings and/or features that assist the driver with the driving task. One estimate in the U.S. market suggests that as of May 2018, at least one ADAS feature was available on approximately 92% of all new vehicles.[1] These ADAS features are designed to enhance the safety and/or convenience of driving, but are not meant to be a replacement for the driver. With the growing rate of adoption of these technologies, there will be an increased need to investigate and understand ADAS technologies. It is important, in that context, to additionally consider the evolving safety and regulatory impact of and on these technologies more broadly.

In 2018, motor vehicle crashes accounted for over 1.8 million injuries and 33,000 fatalities in the U.S. alone.[2] Recent research suggests that ADAS technologies have the potential to reduce these numbers. For example, in a study of crash records

Read more on page 11



In This Issue

Safety... Continued from page 1

supported by the Insurance Institute for Highway Safety (IIHS), it is estimated that ADAS technologies such as FCW, lane departure warning (LDW), adaptive headlights, and blind spot warning (BSW) have a combined potential to prevent or at least reduce the severity of up to approximately 1.8 million crashes per year, including 149,000 moderate to serious injury crashes, and approximately 10,000 fatal injury crashes.[3] An analysis of police-reported incidents, focusing solely on FCW, suggests that it has the potential to prevent or mitigate 20%, or approximately 1.2 million crashes per year.[4] These numbers are consistent with a more recent National Highway Traffic Safety Administration (NHTSA) study, which estimates that FCW, lane keeping assist (LKA), BSW, forward pedestrian impact mitigation, and backing collision mitigation systems have the potential to prevent or mitigate approximately 3.6 million crashes, 20,800 fatalities, 1.7 million injuries and 4.6 million instances of vehicle property damage.[5] In addition to the potential safety impact of ADAS technologies, research conducted by the Highway Loss Data Institute (HLDI) suggests that the equipping of ADAS technologies may reduce the number of collision and property damage liability insurance claims.[6] More specifically, HLDI found that FCW, AEB, and BSW all reduced the frequency of claims related to collision and property damage liability.[7] Overall, it is reasonable to suggest that, as ADAS technologies become more prevalent, there will be a decrease in the rate of collisions, injuries, fatalities, insurance claims and the losses associated with these claims.

While the estimated safety benefits of ADAS technologies are an oft touted incentive for continued investment in their development and deployment, a better understanding of the specific capabilities and limitations of the various technologies will support both users and those involved in investigating claims related to ADAS. Firstly, there is not yet a partially or fully autonomous vehicle that can avoid, or even necessarily mitigate, all possible crashes. ADAS features are typically designed to operate within an Operational Design Domain (ODD) and are sensitive to operating and environmental conditions. These features often have sensor or processing limitations that restrict their use based on several factors. For example, researchers who reviewed vehicle owner's manuals examined the listed limitations of various ADAS technologies including LKA and adaptive cruise control (ACC). They found that the majority of the limitations of ADAS technologies fell into six categories: environmental conditions, external human factors, road characteristics, lane markings and surface quality, static or mobile obstacles, and alteration of the vehicle's original state. Of these, the most frequently cited limitations include road characteristics, presence of environmental conditions (e.g., snow, ice, or fog), static or mobile obstacles in the roadway, and lane markings and road surface quality.[8]

As indicated above, despite limitations, many ADAS technologies have the potential to mitigate collisions and enhance driver safety. In order to realize and optimize

Author Bios

Iiona D. Scully, Ph.D.
Dr. Scully received her Ph.D. in Psychology from Lehigh University where her research and training focused of various aspects of human cognition including human behavior, memory, attention, and perception. She applies this expertise to the investigation of human factors in transportation accidents, slips and falls, product warnings, and safety information.

Sean Scally
Sean Scally is a vehicle engineering consultant with Exponent in the greater Boston area. Mr. Scally is a recent addition to the firm, with past R&D experience at Volvo Group Trucks Technology and Nissan Motor Corporation. His expertise includes the areas of advanced driver assistance systems (ADAS) and automated vehicles.

Ryan Clark, Esq.
Ryan Clark is a shareholder with Lewis Thomason in Nashville, Tennessee. Mr. Clark has a broad commercial litigation practice with a particular emphasis on representing manufacturers in product liability and warranty cases.

Michael R. Carey, Esq.
Michael Carey is a trial attorney in the Minneapolis office of Dykema Gossett PLLC . He maintains a national automotive products liability defense practice.

David M. Cades, Ph.D.
Dr. Cades specializes in human factors investigations of vehicle and aircraft operator behavior, including perception response time, visual perception, nighttime visibility, and distractions and has investigated

the safety benefits of these technologies, it is important to create a strategy to appropriately inform the consumer of their capabilities and limitations, as well as to educate users on how to interact with these technologies. The results of many investigations involving ADAS technologies have shown confusion between the expectations of the driver and the capabilities of the technology. In fact, recent data indicates that consumers do not have a clear picture of what ADAS technologies can and cannot do.[9] Furthermore, depending on the vehicle make and included ADAS technologies, consumers report differing levels of trust in the technologies.[10] As trust in automation and technology can be a predictor of use,[11] it is important to properly inform consumers about these technologies so that they can learn about the limitations and capabilities. This will increase understanding, use, and compliance. As an example, human factors evaluation can help manufacturers and regulators understand how best to take advantage of learned behavior and implant necessary driver tendencies to enhance the transition to ADAS-equipped vehicles.

Regulatory Considerations

Amidst the roll-out of ADAS technologies, differences have emerged between standards in the U.S. and abroad, particularly the E.U. While differences exist with respect to the timing and existence of mandates for equipage in different parts of the world, what is common is that ADAS technology is proliferating. Furthermore, it is not clear to what extent, if any, these differences in requirements for ADAS lead to overall safety differences. When evaluating regulatory differences, one must contextualize them in the different approaches to regulation. In the E.U., pre-market approval is required for all vehicles sold. A vehicle is granted type approval if it satisfies a defined set of technical criteria which is independently determined by the regulatory authority. In contrast, regulations in the U.S. market are based on mandatory self-certification. That is, manufacturers are given flexibility in determining how technologies are implemented. Thus far, the U.S. government's guidance on these matters has generally been flexible and technology neutral, evolving as technology does.[12]

To date, Federal Motor Vehicle Safety Standards (FMVSS) have not mandated, or regulated, any particular ADAS technology. Thus, at lower levels of automation (e.g., SAE Levels 1 and 2),[13] manufacturers and developers are not constrained by current FMVSS when it comes to developing new ADAS technology. At higher levels of automation (e.g., SAE Levels 4 and 5),[14] the vehicle begins to depart from conventional designs, meaning manufacturers may run into compliance issues with current FMVSS (e.g., SAE Level 5 vehicles may not need a steering wheel or pedals). It is apparent that the rate at which innovation occurs in this segment has

the effects of advanced driver assistance systems (ADAS) and highly automated vehicles (HAVs) on driver behavior. He received his Ph.D. in Human Factors and Applied Cognition from George Mason University in 2011.

Ryan J. Harrington, M.E.
Ryan Harrington is a principal in the Vehicle Engineering Practice at Exponent. Leveraging his experience working in the automotive industry and the federal government, he specializes in the analysis of complex technical and policy issues related to the development, testing, and deployment of automotive emerging technologies, including advanced driver assistance systems (ADAS) and automated vehicles.

outpaced regulators' ability to update safety standards. With federal regulations and policy in transition, vehicle regulations pertaining to ADAS in the U.S. may vary from state to state. The SELF DRIVE Act, a bill proposed in 2017 which has not yet been enacted into law, would preempt states from making any laws related to partially and fully automated vehicles, as well as provide uniform standards to manufacturers. Notwithstanding that the government has not yet implemented legislation, the U.S. Department of Transportation (DOT) and NHTSA have issued guidance documents to reaffirm the federal government's authority on rulemaking in this area and establish the certification of automated vehicles.[15]

While the current regulatory environment is conducive to facilitating innovation, many industry outsiders may perceive a lack of top-down management from the federal government. This understanding of the regulatory landscape can assist in the evaluation of claims with respect to the inclusion and/or performance of ADAS technology. It is important to consider that the safety case of certain technologies is not fully established and is on an evolving continuum.

Litigation Considerations

The absence of regulatory guidance over ADAS technology presents challenges and opportunities for litigators. Without any applicable FMVSS, evidence of FMVSS compliance or non-compliance likely will not be available to litigants. That means that plaintiffs cannot argue that FMVSS non-compliance is evidence of defect, while on the other hand, potential non-defect presumptions available under certain states' product liability laws for FMVSS compliance may not apply to claims concerning ADAS technology. Likewise, manufacturers may be less likely to assert federal preemption defenses to state-law tort claims based on lack of, or alleged malfunctioning of, ADAS technology. Because the adoption of ADAS technology has been largely voluntary and industry-driven, plaintiffs alleging that lack of ADAS technology is a defect can potentially offer defect, negligence, and punitive damages arguments that focus on noncompliance with the state-of-the-art. From the defense perspective, manufacturers who install industry-standard ADAS technology should benefit from state-of-the-art defenses.

ADAS technology also raises novel causation questions. For technologies like BSW or FCW that are intended to alert drivers of the presence of potential hazards or impending crashes, but do not control the operation of the vehicle, an allegation of an absence or malfunction of the technology causing a crash would be unable to establish causation unless it is proved that the ADAS technology would have caused the driver to behave differently. Additionally, assertions of defect with ADAS

technology must prove that the ADAS would have activated in the particular crash scenario at issue. As discussed above, this inquiry can be quite complex.

Conclusions

Despite some limitations and the maturing of ADAS technology, the integration of ADAS technology has the potential to reduce the rate of collisions, injuries, fatalities, insurance claims and the losses. These benefits can be further realized as the capabilities and limitations of ADAS are better understood by the users.

Thus far the regulatory environment in the U.S. has fostered innovation and growth in the field of partially and fully autonomous vehicles. As the safety case of certain ADAS technology becomes better established and understood, it is imperative that safety standards continue to move forward and incorporate performance-based outcome evaluation. It is also important that safety standards remain flexible in order to accommodate continued growth in this domain to foster the further deployment of ADAS technologies to allow them to reach an even greater potential.

Endnotes

1 e.g., American Automobile Association [AAA], 2019
2 National Highway and Traffic Administration [NHTSA], 2020
3 Jermakian, 2011
4 Jermakian, 2011
5 Wang, 2019
6 Highway Loss Data Institute [HLDI], 2018
7 HLDI, 2018
8 Capallera et al., 2019
9 Hoyos et al., 2018
10 Kidd et al., 2017
11 e.g., Parasuraman & Riley, 1997
12 National Science & Technology Counsel [NSTC] & United States Department of Transportation [DOT], 2020
13 Society of Automotive Engineers International [SAE], 2018
14 SAE, 2018
15 e.g., Blanco et al., 2020

References

American Automobile Association (2019). *Advanced Driver Assistance Technology Names.* https://www.aaa.com/AAA/common/AAR/files/ADAS-Technology-Names-Research-Report.pdf.

Blanco, M., Chaka, M., Stowe L., Gabler, H.C., Weinstein, K., Gibbons, R.B., Neurauter, L., McNeil, J., Fitzgerald, K.E., Tatem, W., & Fitchett, V.L. (2020). *FMVSS Considerations for Vehicles With Automated Driving Systems: Volume 1.* (No. DOT HS 812 796).

Capallera, M., Meteier, Q., de Salis, E., Angelini, L., Carrino, S., Khaled, O.A., & Mugellini, E. (2019). Owner manuals review and taxonomy of ADAS limitations in partially automated vehicles. In *Proceedings of the 11th International Conference on Automotive User Interfaces and Interactive Vehicular Applications*: 156-164.

Highway Loss Data Institute (2018). Compendium of HLDI collision avoidance research. *HLDI Bulletin, 35(34),* 1-25.

Hoyos C., Lester B.D., Crump C., Cades D.M., Young, D. (2018). Consumer perceptions, understanding, and expectations of Advanced Driver Assistance Systems (ADAS) and vehicle automation. In P*roceedings of the Human Factors and Ergonomics Society Annual Meeting 2018 Sept; 62(1)*:1888-1892, Sage CA: Los Angeles, CA: SAGE Publications.

Jermakian, J.S. (2011). Crash avoidance potential of four passenger vehicle technologies. *Accident Analysis & Prevention*, *43(3)*, 732-740.

Kidd, D.G., Cicchino, J.B., Reagan, I.J., & Kerfoot, L.B. (2017). Driver trust in five driver assistance technologies following real-world use in four production vehicles. *Traffic Injury Prevention, 18(1),* S44-S50.

National Highway and Traffic Administration (2020). *National Statistics*. Traffic Safety Facts Annual Report. https://cdan.dot.gov/tsftables/National%20Statistics.pdf.

National Science & Technology Counsel & United States Department of Transportation (2020). *Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0.* https://www.transportation.gov/sites/dot.gov/files/2020-02/EnsuringAmericanLeadershipAVTech4.pdf.

Parasuraman, R., & Riley, V. (1997). Humans and automation: Use, misuse, disuse, abuse. *Human Factors, 39(2)*, 230-253.

Society of Automotive Engineers International (2018). *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles* (SAE Standard J3016).

Wang, J. S. (2019). *Target Crash Population for Crash Avoidance Technologies in Passenger Vehicles* (No. DOT HS 812 653).