Collision Avoidance Technology and its Role as the Next Frontier in Motor Vehicle Products Liability

by Robert Langdon & Justin Watkins

Collision Avoidance Technology, also known as CAT, is the next fronter in automotive and heavy truck safety technology. The technology represents the first step on the path to a new era of roadway safety: full automation, when cars will drive people, and not the other way around. According to some, once full automation arrives, severe injuries and fatalities on our roads and highways will be a thing of the past.[1] Full automation is, however, decades away, and for the foreseeable future, severe injuries and fatalities remain an unfortunate part of everyday motor vehicle transportation. But even today, many of those injuries and fatalities are avoidable, and CAT is emerging as a key and increasingly central component to the determination of whether an injury or fatality could have been avoided.

I. A Brief History of Motor Vehicle Safety: The Path From Seat Belts to Full Automation

The role of motor vehicles in the life of the average United States citizen has vastly transformed over the last century. In 1913 only 1.3 million vehicles were registered. By 2019, that number grew to 277 million registered vehicles.[2] Motor vehicles are the primary mode of travel for the average citizen and integral to commercial transportation. Motor vehicles are necessary for activities ranging from driving a child to soccer practice to transporting commercial goods across the country. But as motor vehicle usage has increased, so too have the risks associated with that usage. We therefore rely heavily upon safety features developed over the years to mitigate and avoid those risks, from the seatbelts and airbags that are expected and required by law, to the CAT systems that are now becoming common place. As vehicles become bigger and faster, safety technology cannot remain static. Advancement is necessary to keep the motoring public reasonably safe as they travel upon our roads and highways.

Advancement in motor vehicle safety is driven by technology, and, maybe even more importantly, by the regulations, the laws, and by those who enforce the laws that require the motor vehicle industry to advance and incorporate available lifesaving technology. According to the National Highway Safety Traffic Administration (NHTSA), there are five distinct eras of motor vehicle safety:[3]

The first era spans from 1950 to 2000 and is characterized by the introduction of basic safety features into motor vehicles for the first time, including cruise control, seat belts, frontal airbags, and antilock brakes. Of course, these features are now standard, and mandated by law in new vehicles.

The second era, the period from 2000-2010, marked the first introduction of advanced technologies. Electronic stability control was introduced, along with the first CAT systems such as blind-spot detection, forward collision warning, and lane departure warning.

The period of 2010 to 2016 marks the third era of motor vehicle safety innovation. The era is characterized by the emergence of autonomous safety and driver assistance features including rearview video systems, automatic emergency braking (AEB), rear cross-traffic alert, and lane centering assist. But, although these systems were widely available to manufactures, integration into new vehicles was slow. By 2016, forward collision warning systems were available in only 13.10 percent of vehicles, AEB in only 6.6 percent, brake assist in only 7.6 percent, lane departure warning in only 10.2 percent, lane-keeping assist in only 4.10 percent, blind spot monitoring in only 17.0 percent, and pedestrian automatic braking in only 13.4 percent.[4] Indeed, integration of these technologies into motor vehicles was a slow process despite NHTSA estimates that incorporation of the full panel of available technologies could have mitigated or prevented 62.0 percent of crashes from 2011 to 2015 and could have *prevented* 62.2 percent of fatalities.[5]

Currently, we are in the fourth era of motor vehicle safety, which is predicted to span from 2016 to 2025. Existing safety technologies are becoming more common and available to consumers. As of 2018, the availability of CAT has increased significantly: forward collision warning was available on 38.3 percent of vehicles, AEB on 42.0 percent, brake assist on 35.0 percent, lane departure warning on 30.1 percent, lane-keeping assist on 23.8 percent, blind spot monitor on 30.7 percent, and pedestrian automatic braking on 25.6 percent percent.[6] The implementation of CAT systems was clearly increasing as of 2018, but there was still room for improvement as more than 50 percent of vehicles manufactured in 2018 lacked some or all CAT systems. The full benefits of these technologies simply cannot be realized until they are standard on all vehicles.

We are, however, quickly

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approaching a future when CAT systems available on the market will be standard in new vehicles. That future will usher in the fifth and potentially final era of motor vehicle safety, when fully autonomous vehicles capable of performing all driver functions under all conditions will emerge—autopilot for cars.[7] But that era remains decades away, and the promise of eliminating injuries and fatalities when it arrives is only as good as the technology employed to achieve that goal.

II. Collision Avoidance Technologies Defined

Collision avoidance technology is exactly what it sounds like: technology designed to avoid collisions involving motor vehicles. A CAT system consists of sensors, cameras, radar, and computers that, like other existing safety systems in vehicles, such as airbag systems, collect and interpret data, and then either activate a safety feature or not based on a set of predetermined rules in the system programming. CAT systems may be categorized into two sub-categories: (1) systems designed to warn the driver of a risk, and (2) systems designed to act autonomously to avoid a risk.

Notably, CAT systems are often designed to only react to certain collision risks. Less advanced CAT systems respond only to vehicles or vehicle-sized objects, but not pedestrians. Other systems may not function at very high speeds. Appreciating technology functions and limitations is essential to evaluating whether a collision, and any resulting injury or fatality, could have been avoided.

III. Warning Systems

A. Lane Departure Systems

Lane Departure Systems focus on detecting collision risks on each side of the vehicle. These systems utilize sensors and cameras to monitor lane markings and notify the driver when he or she is drifting out of the lane. These systems can eliminate multiple types of collisions including vehicles sideswiping others traveling in the same direction, crossing center lines into oncoming traffic, and colliding with objects on the side of the road.

Lane Departure Systems are not autonomous. This type of system merely provides drivers with a warning, and the driver must take action to avoid a potential collision.

B. Forward Collision Warning

Unlike Lane Departure Systems, Forward Collision Warning (FCW) systems detect collision risks in front of a vehicle. These systems monitor vehicle speed and the distance between and speed of a vehicle ahead to determine if there is a risk of a collision. If a collision is deemed imminent the FCW system provides an auditory and visual warning to the driver. Like a Lane Departure System, an FCW system is not autonomous, and the driver must react to a warning to avoid a collision with a vehicle or object ahead.

C. Blind Spot Warning

Blind Spot Warning systems provide drivers with a warning when another vehicle is in their blind spot. These warnings are primarily visual, and a common form is a simple signal on the side mirror. Auditory warnings will generally be employed, however, when the turn signal is on and a vehicle is in a blind spot.

D. Rear Cross-Traffic Warning

This system acts only when a vehicle is in reverse. The system monitors the space behind the vehicle for cross traffic and alerts when there is a collision risk, such as a vehicle or pedestrian to the rear of the vehicle. These systems are especially important when risks are outside the range of a backup camera.

IV. Autonomous Systems

A. Lane Keep Assist/Lane Centering Assist

Lane Keep Assist systems are designed to keep vehicles in their lane by preventing drift. The systems use sensors and cameras to determine if a vehicle is inadvertently (*i.e.*, not as a result of the driver moving the vehicle from one lane to another) drifting outside of its lane of travel. The system can accelerate one or more wheels, autonomously correct the steering, or combine both to ensure the vehicle remains in its lane.

Lane Centering Assist systems are very similar and aim to maintain a vehicle inside its designated lane of travel. They do so through the use cameras to monitor positioning of the vehicle within its lane of travel and automatically apply the steering necessary to keep the vehicle centered.

B. Automatic Emergency Braking

Automatic Emergency Braking (AEB) systems apply a vehicle's brakes automatically when a crash is deemed imminent. They can reduce or avoid forward collisions. According to NHTSA, "[e]xtensive research on this technology and on relevant performance measures showed that a number of AEB systems currently available in the marketplace are capable of avoiding or reducing the severity of rear-end crashes in certain situations."[8]

There are two versions of AEB systems that often work in tandem. If a driver is not braking to avoid a collision, crash imminent braking (CIB) systems apply the brakes to slow the vehicle. If a driver is braking, but not hard enough to avoid a collision, dynamic brake support (DBS) systems kick in to supplement the driver's braking and further slow the vehicle.

Despite significant progress on AEB systems, the systems have room for improvement. More advanced AEB systems that can detect pedestrians and brake accordingly are still being refined, including rear AEB systems that detect objects behind the vehicle and brake while the vehicle is in reverse.

C. Blind Spot Intervention

Blind-spot intervention systems, like the other autonomous systems discussed above, act as a backup to blind-spot warning systems. These systems intervene when drivers ignore blind-spot warnings and transition

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into a lane with a detected vehicle. The system prevents transition into the occupied lane by lightly braking or steering the vehicle into its original lane.

V. CAT in the Court Room

Even with the significant advancement of safety technologies over the last 70 years, and the introduction of advanced technologies over the past two decades, injuries and fatalities continue to plague our roads and highways. According to the National Safety Council, in 2019, more than 4.5 million people experienced medically consulted injuries in motor vehicle accidents, and more than 39,000 died. This marked a 10.6 percent *increase* in deaths since 2013.[9] Shockingly, these numbers increased in 2020 despite reduced vehicle usage due to the pandemic, when 4.8 million people experienced medically consulted injuries, and 42,000 people died, an 8 percent *increase* over 2019.[10]

Clearly, road safety remains a significant concern, and CAT systems are increasingly at the forefront of liability determinations for injuries and fatalities that could have been avoided. Following are just four scenarios that could give rise to claims involving CAT failures:

A. Scenario 1: Failure to Retrofit

Vehicle 1, a semi-truck with Forward Collision Warning (FCW) technology hauling a trailer, is traveling at 80 mph on Interstate 55 in the right lane. About 500 feet ahead, Vehicle 2, a minivan, has merged onto Interstate 55 traveling 60 mph. Both vehicles are headed east. The driver of Vehicle 1 is distracted by a hands-free device and does not notice the FCW alerting her of Vehicle 2 ahead.

Too late, the driver of Vehicle 1 finally notices she is approaching Vehicle 2 at a dangerous speed. She applies the brakes of the semi-truck and trailer but collides with Vehicle 2. Vehicle 2 is much smaller and is forced off the road. The family in the minivan survives the collision, but the driver and passengers are severely injured.

This scenario illustrates the increased difficulty posed in liability determinations when CAT technology is used in commercial vehicles. Semi-trucks are crisscrossing the nation constantly and utilize the same roads as the much smaller vehicles used by the average citizen. While heavy trucks account for a smaller number of motor vehicle injuries than other vehicles at just 182,000 of the 2.8 million injuries recorded by NHTSA, heavy truck accidents account for fatalities at a much higher rate. In 2019, heavy trucks accounted for 5,244 of the 36,096 fatalities in motor vehicle accidents.[11] Collisions involving heavy trucks are far more likely to be fatal, making CAT in heavy trucks even more important.

In this Scenario 1, the CAT system worked properly. The system sounded a warning but the driver failed to respond. On the surface, this may not appear to be a CAT liability case, but it is upon closer inspection. CAT manufacturers for the heavy-trucking industry, including Mobileeye, Bendix, and WABCO are manufacturing advanced CAT systems specifically for heavy trucks. These CAT manufacturers market retrofit kits to heavy trucks that include advanced CAT systems, including AEB. One advanced system, the OnGuardACTIVE™ system, is marketed as capable of detecting vehicles up to 650 feet ahead and autonomously applying the brakes to avoid a forward collision. The system also has adaptive cruise control and will maintain a safe 3.6-second following distance between the truck and a vehicle ahead.[12] In our Scenario 1, if Vehicle 1 had been equipped with these systems, the collision with Vehicle 2 would have been mitigated or avoided completely. This raises a failure to equip theory of liability that extends potential liability to the trucking company responsible for the truck for failing to equip their truck with a retrofit CAT kit.

B. Scenario 2: Defective CAT System

Vehicle 1, a luxury sedan, is speeding, traveling 60 mph on Lake

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Shore Drive headed northbound. Vehicle 2, a compact car, is traveling 40 mph about 150 feet ahead of Vehicle 1 in the same lane. Vehicle 1 is quickly approaching Vehicle 2, but the driver is distracted and fails to notice. Vehicle 1 is equipped with FCW and AEB, but the systems fail to identify Vehicle 2 and the vehicles collide with a Delta-V of 20 mph. The driver of Vehicle 2 is severely injured by the rear-end collision.

In this scenario, Vehicle 1 was equipped with FCW and AEB, but the technologies failed. The FCW and AEB systems should have warned the driver, giving him time to brake or steer to avoid Vehicle 2. Even if the driver had not reacted, the AEB system should have braked to reduce the speed of Vehicle 1. As with any safety feature, these systems are imperfect. As they become more widely used, failures like this are bound to occur more frequently. The failure of the systems gives rise to potential negligence and product liability of the system designer and manufacturer, as well as the vehicle manufacturer.

C. Scenario 3: Failure to Equip

Vehicle 1, an SUV, is driving eastbound on I-74 in the left lane approaching Champaign. Vehicle 2, a hatchback, is also driving eastbound on I-74 but in the right lane. Both vehicles are approaching exit 181 just outside of Champaign, Illinois, and are driving at the posted speed limit of 60 mph. Vehicle 2's front wheels are just ahead of Vehicle 1's rear wheels. As the vehicles approach exit 181, Vehicle 1 checks his passenger-side mirror for any cars. Seeing no one, he turns his right blinker on and begins to move into the right lane to exit. Not seeing Vehicle 2, the driver of Vehicle 1 sideswipes Vehicle 2 sitting in Vehicle 1's blind spot. Both drivers are severely injured.

Depending on the model year of Vehicle 1, there may be claims for negligence or product liability based on a failure to equip blind spot warning/intervention systems. If Vehicle 1 is one of the many model year 2020 vehicles for which blind-spot warning technology was optional, the vehicle is potentially defective and unreasonably dangerous. This is because feasible safety features were available and could have been incorporated in Vehicle 1 to warn the driver of Vehicle 2 and prevent or mitigate the collision.[13] Indeed, while many manufacturers offer blind-spot warning (BSW) systems as part of an optional and expensive luxury package rather than implementing them as standard features, and the BSW features cannot be selected *a la carte*.[14] This practice places profit over safety and simply cannot be tolerated.

This failure to equip theory of liability can be applied to other CAT systems in appropriate fact patterns where injury or fatality could have been avoided or mitigated if not for the failure to equip CAT safety features, thus giving rise to potential negligence and products liability claims.

D. Scenario 4: Design Defect

Vehicle 1, a compact car is driving northbound on Interstate 94 approaching downtown Chicago at 65 mph. Vehicle 2, an SUV, is 250 feet ahead of Vehicle 1, travelling in the same lane of traffic, also driving northbound on Interstate 94 toward downtown Chicago at 65 mph. As Vehicle 2 approaches the intersection of Interstate 94 and Interstate 57, traffic significantly slows, and is bumper to bumper through the intersection. Vehicle 2 slows to 10 mph. The driver of Vehicle 1 is distracted and does not recognize the slowed traffic ahead until it is too late and the driver attempts to slam on the breaks. Vehicle 1 does not sound any warning and does not apply any autonomous safety features. Vehicle 1 crashes into Vehicle 2 with a Delta-V of 35 mph. Both drivers are severely injured.

The driver of Vehicle 1 had become familiar with and often dependent upon his 2022 vehicle's CAT systems, which included all the bells and whistles: FCW and AEB, lane keep assist, BSW, everything that is commercially available on today's market. So, what happened? The systems were installed but did not activate. Well, even when vehicles are equipped with these life-saving systems, some vehicles provide the operator the option of turning the systems off. More concerning, the on/off switch is, at least in certain vehicles, placed on the wheel with other controls such as cruise control and radio volume controls. In other words, at a location where the systems can very easily be deactivated, even inadvertently.

In this Scenario 4, our driver of Vehicle 1 believed his CAT systems were active, and in his time operating the vehicle our driver had grown comfortable with relying upon those systems to keep him in his lane, and to maintain a safe distance from vehicles ahead. Unfortunately, prior to the collision, our driver of Vehicle 1 had inadvertently turned off his CAT systems when trying to adjust his cruise control. With the systems completely deactivated there was no chance to mitigate the collision that occurred.

Two potential theories of liability arise from this scenario. First, should these life-saving CAT systems even be able to be deactivated at the option of the vehicle operator? Second, even if there is good cause to permit the vehicle operator to deactivate a CAT system, should the controls for doing so be accessible on the wheel where the control can inadvertently be triggered? These questions will be decided in the courtroom, of course, but your authors would suggest that the answer to either question is a resounding NO.

E. Federal Preemption

The above theories of liability, among other CAT liability theories, are already being tested in courtrooms across the county. On a parallel track, auto manufacturers are testing a variety of defenses. One of those defenses is federal preemption. In our federal system, the Supremacy

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Clause establishes that when a state law conflicts with a properly enacted federal law, the state law is preempted. Preemption can be express, when a federal law explicitly states that related state law is preempted, or implied. Implied preemption can occur in one of three ways: (1) field preemption, which occurs when the scope of a federal law indicates an intention that federal law is meant to occupy the field exclusively; (2) impossibility, which occurs in situations where it is not possible to comply with both state and federal law or regulation; and (3) obstacle preemption, which occurs when state law would prevent objectives of Congress from being accomplished.[15]

As the argument goes, manufacturers contend that NHTSA has established a clear policy objective concerning a CAT system that preempts state tort law claims concerning that system. Illustrative is *Varela v. FCA US LLC*, involving claims by the plaintiff that a collision and resulting injuries would not have occurred if the subject vehicle, a Jeep Grand Cherokee, had been equipped with AEB. Chrysler argued the claim was preempted pursuant to implied obstacle preemption due to objectives established by NHTSA regarding the development and deployment of AEB technology, which do not mandate AEB installation. The Arizona Supreme Court, after meticulously reviewing the administrative record from NHTSA, found there was no implied preemption and that plaintiff's claims were not in conflict with any NHTSA objectives or policies, overruling *Dashi v. Nissan North America, Inc.*, a Court of Appeals of Arizona opinion finding preemption.[16] While the defense bar was unsuccessful in establishing preemption in *Varela*, the issue will certainly be one that plaintiffs attorneys will have to continually navigate in CAT liability cases.

Conclusion

Collision avoidance technology and semi-autonomous vehicles are a reality, and fully autonomous vehicles are coming. There have already been missteps that result in serious injuries and fatalities for those involved. It is unclear if CAT and fully autonomous vehicles will eliminate injuries and fatalities, and it is incumbent on the plaintiffs' bar to ensure that reasonable safety features are incorporated into all vehicles. They must operate without defect and when defects do arise, corrective action must be taken. Holding the motor vehicle industry accountable for its failures is necessary to help our clients recover from them.

Endnotes

1 National Highway Traffic Safety Administration (NHTSA), Automated Vehicles for Safety, https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#the-topic-safety-timeline ("Fully automated cars and trucks that drive us, instead of us driving them, will become a reality.")

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2 NSC, NSC Injury Facts, https://injuryfacts.nsc.org/motor-vehicle/overview/introduction/

3 NHTSA, *supra* note 1.

4 Wang, J.-S, NHTSA, *Target Crash Population for Crash Avoidance Technologies in Passenger Vehicles* (March 2019).

5 *Id.*

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8 NHTSA, Driver Assistance Technologies, https://www.nhtsa.gov/equipment/driver-assistance-technologies (last visited July 11, 2022).

9 NSC, NSC Injury Facts, https://injuryfacts.nsc.org/motor-vehicle/overview/introduction/; NSC, NSC Injury Facts, https://injuryfacts.nsc.org/motor-vehicle/historical-fatality-trends/deaths-and-rates/ (last visited Nov. 28, 2021).

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11 NHTSA, Traffic Safety Facts Annual Report Tables, https://cdan.nhtsa.gov/tsftables/tsfar.htm# (last visited Nov. 28, 2021); Federal Motor Carrier Safety Administration, Large Truck and Bus Crash Facts 2019 (October 2021); NHTSA and NSC count motor vehicle injuries and fatalities using somewhat different criteria, with NSC including injuries and fatalities not included in NHTSA numbers. *See* NSC, NSC Injury Facts, https://injuryfacts.nsc.org/motor-vehicle/overview/introduction/.

12 Mobileye, Mobile 8 Connect, https://www.mobileye.com/us/fleets/products/mobileye-8-connect/ (last visited Nov. 28, 2021); Bendix, Bendix Retrofit Upgrades, https://www.bendixcvsupgrade.com/#/ (last visited Nov. 28, 2021); WABCO, https://www.wabco-auto.com/americas_en/Our-Solutions/Truck-solutions/Truck-Safety/Advanced-Driver-Assistance-Systems/OnGuard-CMS-Truck (last visited Nov. 28, 2021).

13 The failure by manufacturers to equip a product with available or optional safety equipment is a theory of liability recognized by courts across the country. *See, e.g.*, *Cincinnati v. Beretta U.S.A. Corp.*, 768 N.E.2d 1136 (Ohio 2002); *Jiminez v. Dreis & Krump Mfg. Co.*, 736 F.2d 51 (2d Cir. 1984); *Duke v. Gulf & W. Mfg. Co.*, 660 S.W.2d 404 (Mo. Ct. App. 1983); *Foster v. Ford Motor Co.*, 616 F.2d 1304 (5th Cir. 1980); *Pike v. Frank G. Hough Co.*, 467 P.2d 229 (Cal. 1970); *Richey v. Sumoge*, 273 F. Supp. 904 (D. Or. 1967).

14 Ethan Douglas, Consumer Reports, A Higher Price on Safety: How Automakers Require Consumers to Pay a Premium for Proven Vehicle Safety Features (June 1, 2020), *available at* https://advocacy.consumerreports.org/wp-content/uploads/2020/06/CR-A-High-Price-on-Safety-June-2020.pdf.

15 *See generally Varela v. FCA US LLC*, 505 P.3d 244, 251 (Ariz. 2022).

16 *Id.* at 262.

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