WHERE TECH MEETS TORT: A SURVEY OF GEISTFELD'S APPROACH TO AUTONOMOUS VEHICLES AND THE CIVIL LIABILITY REGIME

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This paper explores how advanced driver assistance systems (ADAS) and autonomous vehicles (AVs) interact with the current civil liability regime. Section I discusses different driving technologies, from least to most advanced (ADAS to AVs), while highlighting the legal issues posed by each system. These driving technologies have shortcomings that can be demonstrated by examples of collisions involving both advanced driver assistance systems and autonomous vehicles. After explicating how the existing civil liability regime would likely manage motor vehicle accidents involving ADAS technologies, this paper turns to the faults of AVs, then introduces the three-part solution proposed by Mark Geistfeld—Sheila Lubetsky Birnbaum Professor of Civil Litigation at New York University School of Law. Section I concludes, in general agreement with Geistfeld, that problems raised by ADAS can largely be resolved within the civil liability regime through a traditional negligence analysis. Consequently, this paper narrows its focus to fully autonomous vehicles. In Section II, Geistfeld's proposed resolutions to the central issues arising from the interaction between autonomous vehicles and the civil liability regime are analyzed. Ultimately, Geistfeld believes the lack of interjurisdictional consistency regarding products liability laws creates uncertainty for manufacturers when assessing their liability exposure for the production and sale of AVs—his primary reason for proposing federal safety regulations. This paper concludes that Geistfeld's proposed federal regulations, in conjunction with state tort law, create a comprehensive solution to the primary issues posed by AVs. However, due to the status of

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National Highway of Transportation Safety Administration standards surrounding automated driving technologies, it unclear whether the sweeping reform Geistfeld advocates for will be realized any time soon.

INTRODUCTION

There are currently over 275 million motor vehicles in the United States.[1] By May of 2018, almost 93 percent of all new vehicles offered at least one advanced driver assistance system (ADAS).[2] These technologies range from collision alerts, such as blind spot warnings, to automated driving tasks, like lane keeping assistance.[3] As the sophistication of these technologies has rapidly increased, so too has their accessibility to consumers.

According to the National Highway Traffic Safety Administration (NHTSA), an estimated 38,680 people died in the United States due to motor vehicle accidents in 2020[4]—an increase of 7.2 percent from 2019.[5] The National Motor Vehicle Crash Causation Survey revealed driver error was the central cause of 94 percent (plus or

1. *Number of U.S. Aircraft, Vehicles, Vessels, and Other Conveyances*, U.S. DEP'T OF TRANSP., https://www.bts.gov/content/number-us-aircraft-vehicles-vessels-and-other-conveyances [https://perma.cc/5NQB-HVWM].

2. AAA, ADVANCED DRIVER ASSISTANCE TECHNOLOGY NAMES 1 (Jan. 2019), https://www.aaa.com/AAA/common/AAR/files/ADAS-Technology-Names-Research-Report.pdf [https://perma.cc/QMH4-2SYD].

3. *Id.*

4. Press Release, NHTSA, 2020 Fatality Data Show Increased Traffic Fatalities During Pandemic (June 3, 2021), https://www.nhtsa.gov/press-releases/2020-fatality-data-show-increased-traffic-fatalities-during-pandemic [https://perma.cc/6A2E-RQ9F].

5. *Driver Assistance Technologies*, NHTSA, https://www.nhtsa.gov/equipment/driver-assistance-technologies [https://perma.cc/MD9D-RUXF] [hereinafter *Driver Assistance Technologies*] (stating 36,096 people died in motor vehicle accidents in 2019).

minus two percent) of vehicle collisions from the years 2005 to 2007.[6] While critics warn this figure "should not merely be used in a vacuum,"[7] many cite the elimination of human error as a primary reason to advocate for the further deployment of autonomous vehicles and related technologies.[8] Though predictions regarding the adoption and safety impacts of autonomous vehicles (AVs) vary,[9] there is a general consensus that AV sales will steadily increase, reducing motor vehicle accident related injuries and deaths substantially.[10] While these technologies are potentially "life-saving,"[11] they pose novel issues regarding liability. For example: Who should be held liable when a driverless vehicle causes an accident that results in injury? Although advanced driver assistance systems do not raise questions that cannot be resolved within the existing civil liability regime, the same cannot be said for autonomous vehicles.[12] Due to variability in tort law among jurisdictions, specifically surrounding manufacturing defects, determining how AV liability should be managed is a murky analysis.[13] Mark Geistfeld, Sheila Lubetsky Birnbaum Professor of Civil Litigation at New York University School of Law, argues that federal regulations should be promulgated to provide manufacturers with clear answers to these questions. However, the current state of NHTSA regulations surrounding automated vehicle technologies is far from the comprehensive regime offered by Geistfeld.[14] Potential issues of

6. NHTSA, TRAFFIC SAFETY FACTS: CRITICAL REASONS FOR CRASHES INVESTIGATED IN THE NATIONAL MOTOR VEHICLE CRASH CAUSATION SURVEY, 1 (Feb. 2015), https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115 [https://perma.cc/4GCT-6BZX]; *but see*, Don Kostelec, *The 94% Error: We Need to Understand the True Cause of Crashes*, STREETS BLOG USA (Oct. 14, 2020), https://usa.streetsblog.org/2020/10/14/the-94-solution-we-need-to-understand-the-causes-of-crashes/ [https://perma.cc/77VS-UUBC] (suggesting claims that 94 percent of motor vehicle accidents result from human error are misleading).

7. Kostelec, *supra note* 6.

8. Mark A. Geistfeld, *A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation*, 105 CALIF. L. REV. 1611, 1611, 1615 (2017); *Driver Assistance Technologies*, *supra* note 5.

9. Neil Winton, *Computer Driven Autos Still Years Away Despite Massive Investment*, FORBES (Feb. 27, 2022, 9:18 AM), https://www.forbes.com/sites/neilwinton/2022/02/27/computer-driven-autos-still-years-away-despite-massive-investment/?sh=3c2368be18cc [https://perma.cc/M9KE-2YLW].

10. Geistfeld, *supra* note 8, at 1615–16 (predicting motor vehicle accident fatalities will decrease by 21,700 in the United States when 90 percent of vehicles are autonomous); Matthew Wansley, *The End of Accidents*, 55 U.C. DAVIS L. REV. 269, 271 (2021); *see* AAA, *supra* note 2, at 7.

11. Geistfeld, *supra* note 8, at 1613.

12. *See* discussion *infra* Section III.

13. Geistfeld, *supra* note 8, at 1634–36.

14. *See* discussion *infra* Section III.

privity between parties, contractual clauses precluding lawsuits, effects on bystanders, and crashes resulting from third-party hacking lie outside the scope of this paper.

I. AUTOMATED DRIVING TECHNOLOGIES AND THEIR RESPECTIVE FAULTS

Section I explicates the difference between advanced driver assistance systems and autonomous vehicles, while dispelling the myth that Teslas are self-driving. As discussed in the sections ahead, the civil liability regime treats each technology differently. While motor vehicle accidents involving vehicles with ADAS likely fall squarely within a traditional negligence analysis, AV collisions do not. Consequently, there is a need for greater uniformity, which Geistfeld proposes in the form of federal safety regulations.[15]

A. Advanced Driver Assistance Systems

The earliest forms of ADAS were adopted in the mainstream market in the late 1970s with anti-lock braking and traction control systems.[16] Nearly two decades later, in the late 1990s, adaptive cruise control (ACC) was introduced.[17] Much like traditional cruise control, ACC allows the driver to select and set their vehicle's speed.[18] However, when a vehicle with ACC engaged comes up behind another vehicle, its speed adjusts automatically to maintain a safe distance from the vehicle ahead.[19] Traditional cruise control, by contrast, relies on the driver to manually adjust their speed or disengage cruise control to avoid a collision. As the name suggests, ADAS features are meant to *assist* a driver who is otherwise in control of the vehicle. Included in the plethora of advanced driver assistance systems are features such as adaptive cruise control, lane keeping assistance, blind spot warning, lane departure warning, pedestrian detection, automatic emergency braking and steering, driver monitoring, and automated parking assistance.[20]

15. *See infra* Section II(B); Geistfeld, *supra* note 8, at 1678.

16. *See* Sven A. Beiker, *Legal Aspects of Autonomous Driving*, 52 SANTA CLARA L. REV. 1145, 1148 (2012).

17. *Id.*

18. Keith Barry, *Guide to Adaptive Cruise* Control, CONSUMER REPS. (May 9, 2022), https://www.consumerreports.org/car-safety/guide-to-adaptive-cruise-control-a9154580873/ [https://perma.cc/3LSY-Z9QM].

19. *Id.*; *Driver Assistance Technologies*, *supra* note 5.

20. AAA, *supra* note 2, at 4–5.

Yet, none of these systems describe the "self-driving" Tesla technology media outlets are buzzing about.[21] Tesla offers Autopilot, Enhanced Autopilot, and "Full Self-Driving Capability" for its vehicles.[22] Autopilot is the combination of adaptive cruise control (Tesla calls it "Traffic-Aware Cruise Control") and "Autosteer," which assists the driver with steering to keep the vehicle in its lane.[23] According to Tesla's website, "Enhanced Autopilot" includes the addition of the following features to basic Autopilot:

> Auto Lane Change: Assists in moving to an adjacent lane of the motorway when the indicator is engaged by driver.
> Autopark: Helps parallel or perpendicular park your car, with a single touch.
> Summon: Moves your car in and out of a tight [parking] space using the mobile app.
> Smart Summon: Your car will navigate more complex environments and parking spaces, [maneuvering] around objects as necessary to come find you in a [parking lot] within your direct vicinity.[24]

Lastly, "Full Self-Driving Capability" includes all the features of both basic and Enhanced Autopilot.[25] A feature within a feature—Navigate on Autopilot—is the setting most are describing when touting, "Teslas drive themselves."[26] According to Tesla, these technologies are "intended for use with a fully attentive driver, who has their hands on the wheel and is prepared to take over at any moment."[27] In turn, a majority of these Tesla features can be classified as advanced driver assistance systems. On the other hand, the Summon and Smart Summon technologies are used without a human driver behind wheel[28]—moving out of the ADAS

21. *See* Matt McFarland, *We Tried Tesla's 'Full Self-Driving.' Here's What Happened*, CNN (Nov. 18, 2021), https://www.cnn.com/2021/11/18/cars/tesla-full-self-driving-brooklyn/index.html [https://perma.cc/4Z6Z-AK8C]; *see also* Camila Domonoske, *Cars Are Getting Better at Driving Themselves, but You Still Can't Sit Back and Nap*, NPR (Dec. 22, 2021), https://www.npr.org/2021/12/22/1064598337/cars-are-getting-better-at-driving-themselves-but-you-still-cant-sit-back-and-na [https://perma.cc/XEY7-ET9X].

22. *Autopilot and Full Self-Driving Capability*, TESLA, https://www.tesla.com/en_AE/support/autopilot-and-full-self-driving-capability [perma.cc/SMV3-84JL].

23. *Id.*

24. *Id.*

25. *Id.*

26. *Id.*; Domonoske, *supra* note 21.

27. TESLA, *supra* note 22.

28. *Id.*

classification *temporarily* into the autonomous vehicle category while engaged.

Although Tesla states its features, aside from Summon and Smart Summon, are supposed to be operated by a fully attentive motorist with both hands on the wheel,[29] there are multiple reports of Tesla drivers sleeping behind the wheel. For example, in May of 2021, a Wisconsin police officer attempted to pull over a Tesla for speeding.[30] When the car failed to stop, the officer pulled alongside the Tesla, which was going over 80 mph, only to realize the driver was asleep.[31] One viral Tweet showed a Tesla driver and passenger both asleep while traveling on the Massachusetts Turnpike.[32] Tesla responded to the video by dismissing it as a "[prank or hoax]" because "drivers typically receive warnings every 30 seconds or less if their hands aren't detected on the wheel" when traveling at highway speeds, as depicted in the video.[33]

Aside from these reports of drivers sleeping at the wheel—pranks or not—the first fatality linked to Tesla's Autopilot feature occurred in May of 2016, when a tractor-trailer made a left hand turn in front of 40-year-old Joshua Brown's Tesla Model S.[34] Brown's Tesla did not detect the vehicle and collided directly with the trailer, killing Brown.[35] The National Transportation Safety Board (NTSB) investigated the accident, finding Brown was driving with his hands off the wheel for extended periods of time and had received multiple warnings from his vehicle for doing so.[36] According to the NTSB report, Brown's hands were only on the wheel for

29. *Id.*

30. Tim Fitzsimons, *Tesla Driver Slept as Car Was Going Over 80 mph on Autopilot, Wisconsin Officials Say*, NBC NEWS (May 18, 2021, 3:35 PM), https://www.nbcnews.com/news/us-news/tesla-driver-slept-car-was-going-over-80-mph-autopilot-n1267805 [https://perma.cc/75VL-2VTL].

31. *Id.*

32. Dakota Randall (@DakRandallNESN), TWITTER (Sept. 8, 2019, 1:13 PM), https://twitter.com/DakRandallNESN/status/1170777292768985089 [https://perma.cc/5AYW-THSN].

33. Christopher Brito, *Disturbing Video Shows Driver Apparently Asleep in Moving Tesla on Highway*, CBS NEWS (Sept. 10, 2019, 7:27 AM), https://www.cbsnews.com/news/tesla-driver-asleep-at-the-wheel-disturbing-video-shows-driver-apparently-asleep-in-moving-tesla-on-highway/ [https://perma.cc/C5KK-38BM].

34. *Id.*; NAT'L TRANSP. SAFETY BD., COLLISION BETWEEN A CAR OPERATING WITH AUTOMATED VEHICLE CONTROL SYSTEMS AND A TRACTOR-SEMITRAILER TRUCK NEAR WILLISTON, FLORIDA (2017) [hereinafter NTSB REPORT I] https://www.ntsb.gov/investigations/accidentreports/reports/har1702.pdf [https://perma.cc/DQR7-GTWL].

35. David Shepardson, *Tesla Driver in Fatal 'Autopilot' Crash Got Numerous Warnings: U.S. Government*, REUTERS (June 19, 2017, 3:36 PM), https://www.reuters.com/article/us-tesla-crash/tesla-driver-in-fatal-autopilot-crash-got-numerous-warnings-u-s-government-idUSKBN19A2XC [https://perma.cc/UP8Y-5WPU].

36. *Id.*

25 seconds of his 37-minute trip.[37] The Tesla issued seven separate warnings, with the visual message "Hands Required Not Detected" appearing on the vehicle's display; six of these warnings were accompanied by chimes.[38] Although, if he was paying attention, the tractor-trailer would have been visible to Brown for at least seven seconds before the impact, "he took no braking, steering or other actions to avoid the collision."[39] In other words, the evidence suggests that Brown was not exercising reasonable care while operating his motor vehicle.[40]

In Brown's case, there were clear errors made by the Tesla technologies and driver alike, both for failing to detect and avoid obstacles in the roadway. Ultimately, this type of motor vehicle accident can be managed by the existing civil liability regime through a traditional negligence claim, as it is a clear case of failure to exercise reasonable care on the part of the driver.[41]

A negligence analysis is comprised of four main components: injury, duty, breach, and causation.[42] In the Brown's case, but for the driver's failure to exercise reasonable care, the injury to persons and property would not have occurred. Additionally, it is reasonably foreseeable that the carelessness exhibited by the driver, i.e. not paying attention to the road, could cause a collision. If a plaintiff can prove these statements by a preponderance of the evidence, then they have established a *prima facie* negligence case.[43] Geistfeld concurs with this conclusion, stating, "[h]umans are still behind the wheel, so vehicles equipped with [ADAS] have not created liability issues fundamentally different from those posed by conventional vehicles not equipped with this technology."[44] Because advanced driver assistance systems do not pose a novel liability issue, this paper's focus now shifts to a more complicated analysis: how fully autonomous vehicles interact with the civil liability regime.

37. NTSB REPORT I, *supra* note 34, at 14.
38. *Id.* at 14–15; Shepardson, *supra* note 35.
39. Shepardson, *supra* note 35.
40. *See id.*
41. *See* Geistfeld, *supra* note 8, at 1677.
42. RESTATEMENT (SECOND) OF TORTS § 281 (AM. L. INST. 1965).
43. *Id.* at §§ 496G, 433(b).
44. Geistfeld, *supra* note 8, at 1625.

B. Fully Autonomous Vehicles

While advanced driver assistance systems are designed to help a fully attentive driver operate their motor vehicle, autonomous vehicles do not require a human driver.[45] In 2015, Uber began recruiting talent to create its self-driving unit.[46] Three years later, while testing its self-driving program in Arizona, an autonomous Uber struck and killed a pedestrian, Elaine Herzberg.[47] According to the National Transportation Safety Board report, the safety driver (a person who acts as a "back-up" driver if the self-driving technologies fail)[48] was not paying attention to the road.[49] Instead, she was allegedly streaming a television show to her phone when the collision occurred.[50] Of note, the pedestrian was crossing the street in the dark illegally and had methamphetamine in her system.[51] Additionally, the Uber vehicle's automated driving system "precluded emergency braking for crash mitigation alone."[52] In other words, the vehicle was fully dependent on the safety driver to brake to avoid the collision. The NTSB determined the probable cause of the accident to be the "failure of the vehicle operator to monitor the driving environment and the operation of the automated driving system because she was visually distracted throughout the trip by her personal cell phone."[53] The safety driver was charged with negligent homicide, though a disposition has yet to be reached on the case.[54] In December 2020, Uber announced it would be selling its

45. *See The Path to Autonomous Driving*, BMW, https://www.bmw.com/en/automotive-life/autonomous-driving.html [https://perma.cc/D4MX-GBLA].

46. Aarian Marshall, *Uber Gives Up on the Self-Driving Dream*, WIRED (Dec. 7, 2020, 4:06 PM), https://www.wired.com/story/uber-gives-up-self-driving-dream/ [https://perma.cc/W7DG-55U6].

47. *See e.g.*, NAT'L TRANSP. SAFETY BD., HIGHWAY ACCIDENT REPORT: COLLISION BETWEEN VEHICLE CONTROLLED BY DEVELOPMENTAL AUTOMATED DRIVING SYSTEM AND PEDESTRIAN 1 (Nov. 19, 2019) [hereinafter NTSB REPORT II]; David Shepardson, *Safety Driver in Fatal Arizona Uber Self-Driving Car Crash Charged with Homicide*, REUTERS (Sept. 15, 2020, 8:19 PM), https://www.reuters.com/article/uber-selfdriving/safety-driver-in-fatal-arizona-uber-self-driving-car-crash-charged-with-homicide-idUSKBN26708P [https://perma.cc/VU3W-WWC3].

48. *See* Shepardson *supra* note 47.

49. NTSB REPORT II, *supra* note 47, at v; Ray Stern, *Was the Backup Driver in an Uber Autonomous Car Crash Wrongfully Charged?*, PHOENIX NEW TIMES (July 9, 2021, 10:41 AM), https://www.phoenixnewtimes.com/news/uber-self-driving-crash-arizona-vasquez-wrongfully-charged-motion-11583771 [https://perma.cc/S3T4-ZD9T].

50. NTSB REPORT II, *supra* note 47, at v, 24.

51. *Id.* at 36, 57; Stern, *supra* note 49.

52. NTSB REPORT II, *supra* note 47, at 1.

53. *Id.* at 59.

54. State v. Vasquez, No. CR2020-001853 (AZ Maricopa Super. Ct. filed Aug. 27, 2020); Stern, *supra* note 49.

1,200-person autonomous vehicle department to Aurora, a self-driving technology company.[55] It is speculated that Uber chose to do so in response to a mixture of financial losses, negative public perception, and overall risk tolerance.[56]

Though Uber chose to step away from the autonomous vehicle space, Alphabet, Google's parent company, has not shied away from developing AVs. In 2016, Alphabet established Waymo—an autonomous driving technology company.[57] Only five years later, Waymo began testing its autonomous vehicle ride-hailing service, Waymo One.[58] Currently, Waymo One is operating fully autonomous passenger vehicles in San Francisco and the Phoenix metropolitan area.[59] In addition, Waymo is testing autonomous "Class 8 Heavy duty trucks," better known as semi-trucks, for the transportation of goods.[60]

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In sum, potential claims arising from motor vehicle accidents involving advanced driver assistance systems can be managed within the existing framework of the civil liability regime, i.e., a traditional negligence analysis. Geistfeld argues that "the existing regime poses no apparent obstacle to the ongoing development of [ADAS,] largely limiting the regulatory problem to the new safety issues posed by driverless vehicles."[61] Collisions involving autonomous vehicles pose problems that cannot be resolved so easily by the existing civil liability regime, largely due to states' differing legal approaches to claims of this nature.[62] This paper will now examine Geistfeld's solution to the problems posed specifically by AVs.

II. GEISTFELD'S APPROACH TO AUTONOMOUS VEHICLES

Legal scholars assert the existing avenue for recovery—the civil liability regime—alone does not adequately protect consumers

55. Marshall, *supra* note 46.

56. *See id.*

57. *Waymo's Story*, WAYMO, https://waymo.com/company/ [https://perma.cc/WB2M-6L3R].

58. *Id.*; Paresh Dave & Hyunjoo Jin, *Google Self-Driving Spinoff Waymo Begins Testing with Public in San Francisco*, REUTERS (Aug. 24, 2021, 6:09 PM), https://www.reuters.com/technology/google-self-driving-spinoff-waymo-begins-testing-with-public-san-francisco-2021-08-24/ [https://perma.cc/3WF5-7VWW].

59. *Frequently Asked Questions*, WAYMO, https://waymo.com/faq/ [https://perma.cc/N2QK-DZNB].

60. *Id.*

61. Geistfeld, *supra* note 8, at 1677.

62. *See infra* Section II(A).

from technology utilized by autonomous vehicles manufacturers.[63] One of Geistfeld's central motivations is to significantly decrease the uncertainty surrounding liability, which he believes is inhibiting manufacturers from developing AVs more rapidly, therefore slowing the adoption of this "life-saving technology."[64] The primary question in his analysis: Who is liable when an autonomous vehicle crashes? Luckily, the answer is simple: the manufacturer. Scholars have generally concluded that because "one can incur tort liability only through the exercise of autonomous agency,"[65] manufacturers will be legally responsible for the driving behavior of their AVs.[66] In an effort to show consumers their technologies are reliable, leading manufacturers have stepped forward and accepted liability for accidents caused by their autonomous vehicles.[67] Although there are a lot of questions surrounding autonomous vehicles and the potential issues they pose regarding liability, Geistfeld asserts they can be answered "with a sufficiently high degree of certainty."[68] Geistfeld states that manufacturers can satisfy their tort obligations through pre-market testing and consumer warnings in conjunction with federal safety regulations requiring: (1) pre-marking testing; (2) post-sale updates of the operating systems; and (3) product warnings.[69] Ultimately, he concludes the proposed federal regulations coupled with the current civil liability regime:

> would subject the manufacturer to tort liability only for crashes caused by malfunctioning physical hardware (strict products liability); malfunctions of the operating system due to either programming error (same) or third-party hacking (strict liability again, with an important caveat); the manufacturer's failure to adopt a reasonably safe design or to provide adequate warnings for ensuring safe deployment of the vehicle (an ordinary products liability claim); or the manufacturer's failure to treat consumers and bystanders equally

63. *See* Rebecca Crootof, *The Internet of Torts: Expanding Civil Liability Standards to Address Corporate Remote Interference*, 69 DUKE L. J. 583 (2019) (proposing solutions to the constraints of civil liability by limiting corporate exculpatory clauses, broadening relational duties, extending causation, etc.); Geistfeld, *supra* note 8, at 1611.

64. Geistfeld, *supra* note 8, at 1613.

65. *Id.* at 1629.

66. *Id.* at 1619.

67. *Id.* at 1629–30, n.52; Sean Tucker, *Mercedes: We'll Be Liable for Self-Driving Cars*, KELLEY BLUE BOOK (Mar. 21, 2022, 9:06 AM), https://www.kbb.com/car-news/mercedes-well-be-liable-for-self-driving-cars/ [https://perma.cc/K46J-B5PU].

68. Geistfeld, *supra* note 8, at 1622.

69. *Id.* at 1678.

> when designing the vehicle and its operating system (an ordinary negligence claim).[70]

Hence, according to Geistfeld, federal regulations could resolve interjurisdictional issues and fill in the gaps left when analyzing how autonomous vehicles interact with the civil liability regime.

A. Manufacturers' Tort Obligations

While autonomous vehicles can be involved in a collision for any number of reasons, manufacturers' liability is limited to incidents proximately caused by their vehicles under the current civil liability framework.[71] In turn, manufacturers' primary liability exposure is for collisions which could have been reasonably foreseen by the autonomous vehicle's programmed driving behavior.[72] Further, it is well established tort doctrine that products must perform in a reasonably safe manner.[73] Consequently, product manufacturers and distributors are exposed to strict liability for injuries actually and proximately caused by a defective product.[74]

There are three types of defective product claims: manufacturing, design, and failure to warn.[75] Geistfeld argues only two of them raise issues car manufacturers are not accustomed to facing when producing conventional motor vehicles—design and warning defects.[76] Essentially, a manufacturing defect occurs when a product is not produced in accordance with its design.[77] Car manufacturers already have measures in place, like quality control, to mitigate this specific issue.[78] As such, Geistfeld focuses his analysis on collisions caused by AVs without any manufacturing flaws, which give rise to claims for defective design and failure to warn.[79]

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70. *Id.* at 1613.
71. *Id.* at 1632.
72. *Id.*
73. *See* RESTATEMENT (THIRD) OF TORTS: PRODUCTS LIABILITY § 2 (AM. LAW INST. 1998).
74. *Id.*
75. *Id.*
76. Geistfeld, *supra* note 8, at 1632–33.
77. *Id.* at 1633; RESTATEMENT (THIRD) OF TORTS, *supra* note 73, at § 2.
78. Geistfeld, *supra* note 8, at 1633; VOLVO GROUP, SUPPLIER QUALITY ASSURANCE MANUAL 18 (5th ed. 2019), https://www.volvogroup.com/content/dam/volvo-group/markets/master/suppliers/our-supplier-requirements/SQAM-2019.pdf [https://perma.cc/MS3M-ZP76]; NISSAN MOTOR CORP., SUSTAINABILITY REPORT 2021 149 (2021), https://www.nissan-global.com/EN/SUSTAINABILITY/LIBRARY/SR/2021/ASSETS/PDF/SR21_E_All.pdf [https://perma.cc/3VAN-E9N7].
79. Geistfeld, *supra* note 8, at 1635.

Defective design cases can be complex due to the differing legal tests among jurisdictions, namely the consumer expectations test and risk-utility test.[80] A majority of jurisdictions use the risk-utility test or some variation thereof.[81] Further, the *Restatement (Third) of Torts* has adopted the risk-utility test.[82] However, some states continue to consider the consumer expectations test in products liability cases.[83] Geistfeld believes the lack of interjurisdictional consistency between products liability laws creates uncertainty for manufacturers when assessing their liability exposure for the production and sale of AVs—his primary motivation for proposing federal safety regulations.[84]

Geistfeld believes manufacturers can pass muster for both tests with pre-market testing, post-sale operating system updates, and consumer warnings.[85] "Adequate testing will satisfy the manufacturer's obligation to ensure that the operating system is reasonably safe and not defectively designed."[86] Proper consumer warnings will not only satisfy the manufacturer's duty to warn, he argues, but also function to "defeat claims of product malfunction."[87] Yet, Geistfeld does not want to leave the standards for these measures up to the courts.[88] Instead, he believes NHTSA should create rules establishing these standards.[89]

B. Proposed Federal Regulations

To further reduce the uncertainty manufacturers will face regarding liability and mend the so-called "patchwork" of state tort laws, Geistfeld proposes three federal safety regulations to be promulgated by NHTSA.[90] These regulations are intended to work in conjunction with well-established tort principles while addressing issues that manufacturers could face due to the inconsistency between laws from state to state.[91] Keep in mind, regulations provided by NHTSA establish *minimum* performance standards for

80. *Id.*
81. *Id.*; Aaron D. Twerski & James A. Henderson Jr., *Manufacturers' Liability for Defective Product Designs: The Triumph of Risk-Utility*, 74 BROOK. L. REV. 1061, 1062 (2009).
82. RESTATEMENT (THIRD) OF TORTS, *supra* note 73, at § 2(b).
83. Geistfeld, *supra* note 8, at 1635.
84. *Id.* at 1674.
85. *Id.* at 1641, 1646.
86. *Id.* at 1650.
87. *Id.*
88. *Id.* at 1674, 1677.
89. Geistfeld, *supra* note 8, at 1677–78; 23 U.S.C. § 402 (2021).
90. Geistfeld, *supra* note 8, at 1678, 1680–81.
91. *Id.* at 1635.

manufacturers.[92] It is manufacturers' responsibility to ensure their products are compliant with NHTSA standards.[93]

First, Geistfeld posits that federal safety regulations setting forth standards for pre-market testing are necessary.[94] He demonstrates that, when assessing their tort obligations, manufacturers are unable to find clear answers about exactly how much pre-market testing is needed to limit their exposure.[95] NHSTA providing manufacturers with pre-market testing standards solves this issue effectively, according to Geistfeld.[96] Consequently, questions surrounding manufacturer's obligations for pre-market testing—such as, "What are the necessary road conditions? How many miles should be driven on freeways and in urban conditions? How many total miles must be logged by an operating system to generate sufficiently reliable crash data? What other metrics are required for adequately measuring safe performance?"—will be answered unambiguously.[97]

Second, Geistfeld argues for a supplement to the pre-market testing requirements in the form of mandatory post-sale updates of the operating systems when complications with safety or cybersecurity occur.[98] If and when AVs are launched into the mainstream market, they will inevitably encounter novel situations from which the vehicle's operating system must "learn."[99] In turn, such post-sale updates of AVs' operating systems would ensure the continued safety of consumers.[100] For example, imagine a scenario where a Lexus autonomous vehicle never encounters a black cat on black pavement running in front of it in premarket testing. However, months after hitting consumer markets, an AV manufactured by Lexus hits a black cat walking on a black road. The data from this AV's encounter is, then, sent to Lexus. Consequently, Lexus updates its operating system to detect and avoid striking black cats on black pavement. A NHTSA regulation mandating that manufacturers send over-the-air (wireless) updates to their AVs would, in

92. *Id.* at 1678; *Importation and Certification FAQs*, NHTSA, https://www.nhtsa.gov/importing-vehicle/importation-and-certification-faqs-8 [https://perma.cc/2U46-L8M9].

93. Geistfeld, *supra* note 8, at 1678.

94. *Id.* at 1674.

95. *Id.* at 1654.

96. *Id.* at 1679.

97. *Id.* at 1678–79.

98. *Id.* at 1680.

99. Ali Osman Örs, *The Role of Machine Learning in Autonomous Vehicles*, ELECTRONIC DESIGN (Dec. 2, 2020), https://www.electronicdesign.com/markets/automotive/article/21147200/nxp-semiconductors-the-role-of-machine-learning-in-autonomous-vehicles [https://perma.cc/SZ5X-6K2T]; *id.*

100. Geistfeld, *supra* note 8, at 1679.

this instance, allow all Lexus AVs on the road to benefit from the new information coded into the operating system—enhancing the overall safety of Lexus' fleet of AVs.[101]

The final federal regulation for which Geistfeld advocates is mandatory product warnings.[102] The purpose of these warnings would be to ensure the vehicle operator understands the capabilities of the AV as well as its limitations.[103] To satisfy this obligation, "the product warning must include an adequate disclosure about the inherent risk that the fully functioning operating system will cause the vehicle to crash."[104] In their early stages of development, as seen with Waymo, AVs will most likely only be able to operate within certain geographical limits, like major highways and within cities.[105] Further, inclement weather conditions, such as snowstorms can negatively impact autonomous vehicles' performance, due to dense snowfall inhibiting the vehicle's sensors and cameras.[106] Consequently, these product warnings would advise users to avoid attempting to route the vehicle to travel on gravel backroads or in weather that causes poor visibility. In essence, consumers need to know what their AVs can and cannot do to keep themselves and other motorists safe.[107]

One rationale for federally mandated product warnings is promoting informed consumer decision-making.[108] When shopping for an AV, safety ratings will likely be the metric consumers look to first, as it is a central concern surrounding AVs.[109] In turn, Geistfeld states manufacturers should also be required "to disclose the annual, risk-adjusted premium for insuring their autonomous vehicles" within this product warning.[110] Geistfeld foresees that, because the driving behavior of an AV fleet is systematized and therefore predictable, insurance premiums will be imputed for the fleet as a whole.[111] As such, the price of the insurance premium would

101. *See* Geistfeld, *supra* note 8, at 1680–81.
102. *Id.* at 1681.
103. *Id.*
104. *Id.* at 1677.
105. WAYMO, *supra* note 57.
106. SUDHARSON SUNDARARAJAN & ISMAIL ZOHDY, U.S. DEP'T OF TRANSP., *VEHICLE AUTOMATION AND WEATHER: CHALLENGES AND OPPORTUNITIES* 5 (Dec. 2016).
107. Geistfeld, *supra* note 8, at 1681.
108. *See id.* at 1682.
109. *See* DELOITTE, 2020 GLOBAL AUTOMOTIVE CONSUMER SURVEY 4, 9 (2020), https://www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-2020-global-automotive-consumer-study-global-focus-countries.pdf [https://perma.cc/3G8Z-4EY3].
110. Geistfeld, *supra* note 8, at 1682.
111. *Id.* at 1660.

be disclosed to the consumer before making the purchase.[112] This figure serves as an additional safety metric Geistfeld believes consumers should be able to consider when deciding what type of AV to buy.[113]

III. DISCUSSION

Geistfeild's central aim to quell manufacturers' concerns surrounding liability exposure in the AV market is commendable, as he believes doing so can speed up the development of life-saving technology. But just how the civil liability regime will deal with the unique challenges presented by autonomous vehicles remains unclear. That is not to say the civil liability regime will leave certain questions with unambiguous answers. Geistfeld's proposed federal safety regulations requiring (1) pre-marking testing; (2) post-sale updates of the operating systems; and (3) product warnings would do an excellent job filling in gaps that courts may encounter in autonomous vehicle liability cases.

Generally, litigation is time, cost, and labor intensive. A case can spend years in the pre-trial phase, then be determined in a ten-day jury trial—only to spend more years in the appeals process.[114] Consequently, the civil liability regime often leaves litigants without answers to their legal questions or remedies to their injuries for years on end. Further, judges are legal generalists.[115] They determine the merits of the cases based on the facts presented by each side, whereas NHTSA is the specialist on motor vehicle safety research and development.[116] Geistfeld states that NHTSA "would use its specialized expertise to comprehensively address these matters through the administrative rule-making process, giving it a comparative institutional advantage for determining the appropriate testing criteria for evaluating the safety performance of an autonomous vehicle."[117]

One of the greatest strengths of Geistfeld's solution is the process through which NHTSA goes when promulgating new regulations, i.e., notice and comment rulemaking.[118] Before Geistfeld's recommended rules could hypothetically go into effect, NHTSA

112. *Id.* at 1657.
113. *Id.* at 1682.
114. *See* Robert E. Litan, *Speeding Up Civil Justice*, 73 JUDICATURE 162 (1989).
115. *See* Allison Orr Larsen, *Judicial Factfinding in an Age of Rapid Change*, 130 HARV. L. REV. F. 316 (2017).
116. *See* Geistfeld, *supra* note 8, at 1679; *see also* Exec. Order No. 11357, 32 Fed. Reg. 8225 (1967), *reprinted in* 49 U.S.C. § 30101 (2012).
117. Geistfeld, *supra* note 8, at 1679.
118. *Id.*

would publish a "Notice of Proposed Rulemaking" in the Federal Register.[119] Then, the public could review the proposed rules and make comments for NHTSA to review. Through notice and comment rulemaking, the public is given the opportunity to share its thoughts on the agency's proposed rule.[120] Additionally, the agency could take this feedback into consideration before publishing a Final Rule in the Federal Register.

Over the span of 2016 to January of 2022, NHTSA sent personnel to investigate 26 incidents and 11 deaths involving Tesla's Autopilot function.[121] On March 10, 2022, the NHTSA "issued a first-of-its-kind final rule to ensure safety of occupants in automated vehicles."[122] The rule simply updates existing safety standards to include vehicles without steering wheels or other driver controls.[123] The rule, for instance, clarifies that children are not supposed to sit in the driver's seat when a vehicle is driving itself.[124] It appears the agency is moving slowly, implying more radical change, like Geistfeld's proposed comprehensive federal safety regulations, is unlikely to happen soon. However, according to NHTSA's website, the agency foresees fully autonomous vehicles will be available for consumer purchase in 2025 at the earliest.[125] Perhaps NHTSA plans on using the years leading up to its predicted launch of AVs into consumer markets to promulgate more robust regulations surrounding this technology.

CONCLUSION

While the development of automated driving technology is promising, it does not seem to be developing as rapidly as many, including Geistfeld, have hoped. Though Geistfeld primarily attributes this delay to manufacturers' uncertainty regarding tort liability, there are likely other factors, like cost, risk-tolerance, and negative public perception, at play. As demonstrated by Geistfeld,

119. Rulemaking Process, FCC, https://www.fcc.gov/about-fcc/rulemaking-process [https://perma.cc/3RAR-P335].

120. *Id.*

121. Faiz Siddiqui, *Tesla Driver Faces Felony Charges in Fatal Crash Involving Autopilot*, WASH. POST (Jan. 20, 2022, 7:26 PM), https://www.washingtonpost.com/technology/2022/01/20/tesla-autopilot-charges/ [https://perma.cc/44TK-EE29].

122. Press Release, NHTSA, NHTSA Finalizes First Occupant Protection Safety Standards for Vehicles Without Driving Controls (Mar. 10, 2022), https://www.nhtsa.gov/press-releases/nhtsa-finalizes-first-occupant-protection-safety-standards-vehicles-without-driving [https://perma.cc/L7D5-6E68].

123. *See* 49 C.F.R. § 571 (2022).

124. *Id.*

125. *Automated Vehicle Safety*, NHTSA, https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety [https://perma.cc/7PA6-EK99].

advanced driver assistance programs generally do not raise issues that cannot be addressed by the existing civil liability regime. However, autonomous vehicles do. A combination of pre-market testing, post-sale software updates, and consumer warnings have the potential to protect manufacturers in liability claims. However, the existing civil liability regime does not provide manufacturers with clear standards for these measures. Consequently, NHTSA should promulgate rules to provide these standards for AV manufacturers. While federal regulations have their pros and cons, coupled with the existing civil liability regime, Geistfeld's proposed standards would create a comprehensive solution to issues surrounding AV liability. According to Geistfeld, these standards would dissipate the uncertainty manufacturers face surrounding the development of autonomous vehicles—the primary barrier to the wide-spread employment of these life-saving technologies. However, based on the current state of NHTSA standards regarding automated driving technologies, it is unclear whether the agency plans on making sweeping reform of this nature within the next few years.