

Regulating the Future: Autonomous Vehicles and the Role of Government

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ABSTRACT: Within the next decade, society will be revolutionized by the presence of almost completely autonomous vehicles on our roadways. The amount of traffic fatalities will decrease, road congestion will disappear, and people will be able to watch their favorite Netflix show while on the way to work. This Note critically analyzes the current regulatory gap in autonomous vehicle technology, with a focus on problems arising from a patchwork of state laws and the lack of federal regulation. At this critical juncture in time, consumers are distrustful and hesitant of the technology. This Note argues that the National Highway Traffic Safety Administration should pass new manufacturing and safety standards to fill the regulatory gap and assure consumers that autonomous vehicles are both viable and safe. Failure to create national regulation will see the dream of robotic cars filling the roads go up into smoke.

I.	INTRODUCTION.....	1412
II.	AVS: THE HISTORY, THE FUTURE, AND HOW THEY RELATE TO STANDARD VEHICLES	1414
	A. WHAT DOES “SELF-DRIVING” MEAN?	1415
	B. THE HISTORY AND FUTURE OF AUTONOMOUS VEHICLE TECHNOLOGY	1418
	C. REGULATION OF STANDARD AUTOMOBILES.....	1420
	1. Federal Oversight of Vehicle Safety and Manufacturing.....	1420
	2. Regulatory Role of the States	1423
III.	THE CURRENT GAP IN AV REGULATION AND PUBLIC PERCEPTION	1425
	A. THE PATCHWORK OF STATE AV LAWS.....	1426
	1. State Traffic Law Exemptions for AVs	1426

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2.	State-Level Preemption of Municipal AV Regulation.....	1427
3.	AV Maintenance and Liability.....	1427
4.	Differing Legal Definitions of AVs.....	1428
B.	<i>THE LACK OF COMPREHENSIVE FEDERAL REGULATION</i>	1429
1.	The NHTSA's Yearly Non-Regulatory Reports on AVs.....	1430
2.	Inaction in Congress and the White House.....	1433
C.	<i>CONSUMER CONFIDENCE IN AV TECHNOLOGY</i>	1434
1.	Deaths Caused by AV Technology.....	1435
2.	Measuring Consumer Skepticism in AVs.....	1436
IV.	TURNING VOLUNTARY NHTSA GUIDELINES INTO ROBUST FEDERAL REGULATION.....	1438
A.	<i>AVOIDING A PATCHWORK OF STATE LAWS THROUGH NHTSA REGULATION</i>	1438
B.	<i>MANDATORY REGULATIONS, NOT VOLUNTARY GUIDELINES</i>	1440
1.	Issuing New Federal Regulations for AVs.....	1440
i.	<i>AVs: A New Category of Automobiles</i>	1441
ii.	<i>Preempting State Regulation of AVs</i>	1442
iii.	<i>Expanding Testable Unit Amounts and Easing Exemption Requirements</i>	1443
2.	Improving Consumer Confidence Through Education and Pre-Market Approval.....	1444
i.	<i>Creating an AV Advisory Council</i>	1445
ii.	<i>Adopting a Pre-Approval Regime for AV Components</i>	1446
V.	CONCLUSION.....	1446

I. INTRODUCTION

“Every once in a while a new technology, an old problem and a big idea turn into an innovation.” -*Dean Kamen*¹

1. Chloe Sorvino, *One of America's Most Successful Inventors Dean Kamen Talks Segway, Clean Water and Robotics*, FORBES (June 9, 2016, 10:11 AM), <https://www.forbes.com/sites/chloe-sorvino/2016/06/09/dean-kamen-inventor-success-segway-water-purification-toyota> [https://perma.cc/M4MT-FEH8]. Dean Kamen, known by many for inventing the Segway, is an entrepreneur that has helped pioneer technologies in other industries. See Chris Morris, *Legendary Inventor Dean Kamen Jumpstarts Human Organ Manufacturing in the US*, CNBC (Apr. 19, 2018, 9:16 AM), <https://www.cnbc.com/2018/04/19/legendary-inventor-dean-kamen-jumpstarts-human-organ-manufacturing-in-the-us.html> [https://perma.cc/R2UU-4LAX] (noting how Dean Kamen recently founded a new company to mass produce biofabricated human organs for transplants and previously had developed a “drug infusion pump for

In the next few years, the introduction of fully autonomous vehicles (“AVs”) onto American roadways will revolutionize how people drive, will hopefully reduce traffic fatalities, and will trigger a litany of legal questions. For example, how should they be regulated? In 2017, over 37,100 people were killed in driving-related accidents in the United States.² The U.S. Department of Transportation (“DOT”) estimates that human error while driving caused 94 percent of those fatal accidents.³ At least one study has indicated that introducing an early form of autonomous vehicle technology onto American roadways could reduce traffic deaths by ten percent.⁴ However, once truly autonomous vehicles hit the roads, traffic deaths could be reduced by as much as 90 percent.⁵ But given the nascency of the AV industry, it is difficult to precisely determine to what extent driverless vehicles will reduce the amount of yearly fatalities.⁶ Nonetheless, industry experts and the federal government both agree that AVs will still save lives.⁷ The lifesaving potential of AV technology increases as the dependency on human decision making while driving decreases.⁸ “[I]mpaired driving, distraction, . . . speeding or illegal maneuvers[,] . . . [and] drinking and driving” caused an estimated 25,000 of the traffic deaths in 2017.⁹ Computer programming does not succumb to these factors affecting human decision making.¹⁰

diabetics”); *see also* Sorvino, *supra* (noting how Dean runs a nonprofit foundation “focused on exciting students ages 6 to 18 around the globe about robotics, engineering and math”).

2. U.S. DEP’T OF TRANSP., PREPARING FOR THE FUTURE OF TRANSPORTATION: AUTOMATED VEHICLES 3.0, at 1 (2018) [hereinafter REPORT 3.0].

3. Aarian Marshall, *To Save the Most Lives, Deploy (Imperfect) Self-Driving Cars ASAP*, WIRED (Nov. 7, 2017, 12:01 AM), <https://www.wired.com/story/self-driving-cars-rand-report> [<https://perma.cc/X7J3-YU9T>].

4. *Id.* The researchers found that current AVs are “about 10 percent safer” as compared to the average human driver. *Id.*

5. Adrienne LaFrance, *Self-Driving Cars Could Save 300,000 Lives Per Decade in America*, ATLANTIC (Sept. 29, 2015), <https://www.theatlantic.com/technology/archive/2015/09/self-driving-cars-could-save-300000-lives-per-decade-in-america/407956> [<https://perma.cc/CQ43-Y4TR>].

6. AV technology is largely still in the testing phase. *See infra* notes 41–44 and accompanying text (explaining that current AVs are between the 1–2 Level, with Level 3s about to roll out into commercial markets). Once fully autonomous driving systems are developed, testing may provide a more accurate measure of how many lives can be saved. Marshall, *supra* note 3.

7. Marshall, *supra* note 3; REPORT 3.0, *supra* note 2, at 41.

8. REPORT 3.0, *supra* note 2, at 3.

9. *Id.*

10. *See* Marshall, *supra* note 3 (noting how AVs will not “drink or text or yell at their kids in the backseat”). However, traffic deaths involving AVs are inevitable. *See infra* notes 179–88 and accompanying text (detailing the three AV-related deaths so far). Computer programming is not perfect, and AVs will need programming dictating how the vehicle responds to an unavoidable collision. *See* Bryant Walker Smith, *The Trolley and the Pinto: Cost-Benefit Analysis in Automated Driving and Other Cyber-Physical Systems*, 4 TEX. A&M L. REV. 197, 200–01 (2017) (describing the ethical thought experiment of the Trolley Problem as applied to AVs). The Trolley Problem involves an ethical dilemma where a trolley is destined to hit several pedestrians standing on the

Thus, applying Dean Kamen's adage to the present issue, the new technology is sophisticated driving systems that can respond to their environment, the old problem is human error causing thousands of accidents yearly, and the innovative solution is reducing deaths through AVs. Nonetheless, the use of AV technology to save lives raises the question of how this technology should be regulated.

The federal government—aware of the tide of change that AV technology will usher in—has yet to craft any regulations or pass any legislation affecting AVs. In this regulatory wake, the states have taken the initiative to pass similar and conflicting AV laws. This Note argues that the lack of legal uniformity will hurt consumer receptiveness to the technology. Specifically, problems arise when it comes to how AVs are legally defined, the requirements to possess and operate them, and who bears the responsibility to fix and maintain AVs. If the federal government continues to treat AVs as being of the same legal species as standard automobiles, the potential life-saving benefits of the technology may suffer. Rather, the federal government—through the National Highway Traffic Safety Administration (“NHTSA”)—should pass regulations to address these legal issues. Much like how NHTSA currently only regulates certain aspects of standard automobiles, AVs should be regulated just the same, but as a distinctive legal creature.

Part II of this Note provides an overview of AV technology, detailing the different levels of automation, exploring the past and future of the industry, and noting how the federal government currently regulates standard automobiles. Part III investigates the problems of the current regulatory gap of AVs and the federal government's insufficient attempts to address it. In response to this issue, Part IV argues NHTSA should pass new safety regulations to quell consumer fears in AV technology. Specifically, this Note advances three essential regulations NHTSA must promulgate before autonomous vehicles hit the roadway. If AVs are truly going to solve the old problem of traffic fatalities, the technology's inevitable rollout needs sensible governmental oversight.

II. AVS: THE HISTORY, THE FUTURE, AND HOW THEY RELATE TO STANDARD VEHICLES

The full implementation of AV technology on public roadways will revolutionize the transportation industry. The major benefits include a dramatic reduction in driving-related fatalities, more free time while riding in

current track unless the trolley is diverted to another track where it will only kill one individual. *Id.* at 198. The moral choice of who to kill is left to the switch worker. *Id.* In the context of AVs, the choice is left to the computer programming if the AV will impact another vehicle—killing those other people—or divert and kill the AV's own occupants. *Id.* at 199.

an autonomous vehicle, and highway systems with less congestion.¹¹ These advantages are promising but the concept of AVs is limited by the current state of the technology and uncertainty in the commercial future of AVs. AV technology exists on a spectrum differentiated by the degree of autonomy of the driving system.¹² Section II.A establishes what “self-driving” means and details the different tiers of autonomy. Section II.B continues by providing a brief historical overview of AV technology and what the commercial future looks like. Lastly, Section II.C analyzes how standard automobiles are regulated under a state and federal framework. It is important to understand how normal vehicles are treated under the law to determine at which points AV technology may require similar or different regulatory treatment.

A. WHAT DOES “SELF-DRIVING” MEAN?

The word “automotive”—derived from Latin roots—means self-moving.¹³ From the word’s etymological meaning, it would seem that the concept of autonomous vehicles is almost inevitable. When someone thinks of a self-driving vehicle, instinctually he or she may imagine reclining back into a comfortable leather seat, watching a movie or reading a book while an advanced computer driving system safely escorts them from point A to B—with no human intervention. While this level of sophistication of AV technology is in the works,¹⁴ the above definition fails to capture the dynamics of AV technology. Autonomous vehicles exist as a taxonomy, from no automation at the base (level 0) to full automation at the top (level 5).¹⁵ This categorical scheme, promulgated by an industry leader in mobility engineering, the Society of Automotive Engineers International (“SAE”),¹⁶ has formally been adopted by NHTSA as the system to distinguish between different levels of AV technology.¹⁷ The need for this scheme arose out of the

11. See Cadie Thompson, *The 3 Biggest Ways Self-Driving Cars Will Improve Our Lives*, BUS. INSIDER (Jun. 10, 2016, 4:04 PM), <https://www.businessinsider.com/advantages-of-driverless-cars-2016-6> [<https://perma.cc/V8Q5-NHTQ>].

12. See NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP’T OF TRANSP., *AUTOMATED DRIVING SYSTEMS 2.0: A VISION FOR SAFETY 4* (2017) [hereinafter *REPORT 2.0*] (listing the six different levels of automation from no automation to fully automated).

13. *About SAE International*, SAE INT’L, <https://www.sae.org/about/history> [<https://perma.cc/NL4X-PZRB>].

14. See *infra* notes 40–44 and accompanying text.

15. Sam Abuelsamid, *SAE International Ready to Tackle Automated Vehicle Safety Testing Standards*, FORBES (Aug. 1, 2018, 7:27 AM), <https://www.forbes.com/sites/samabuelsamid/2018/08/01/sae-international-ready-to-tackle-automated-vehicle-safety-testing-standards> [<https://perma.cc/S3QL-M6WH>].

16. *Id.* SAE was formed in 1905 with the mission of collaboration—especially within the automotive industry—and has served as a generator of best practices and standards to be followed in the industries it operates within. See *About SAE International*, *supra* note 13 (detailing the founding of SAE and its involvements with the automotive industry).

17. *REPORT 2.0*, *supra* note 12, at 4.

problem of evaluation.¹⁸ “[T]here [we]re . . . no commonly accepted methods of even evaluating this [AV] technology” until SAE presented this framework.¹⁹ As the SAE scheme is catching traction as the standard for the industry, it shall be the language for AV discussion in this Note. Figure 1 details SAE’s categorical scheme.

Figure 1. Levels of Autonomy for Self-Driving Vehicles²⁰

Level of Automation	Defining AV Technology	Examples
0- No Automation	The driver performs most tasks	Features like cruise control and crash assistance are still a part of the vehicle system
1- Driver Assistance	Steering or braking assistance, but not both	Advanced cruise control that will brake when possible collision detected
2- Partial Automation	Steering and braking assistance	Maintaining driving position while on the highway
3- Conditional Automation	Complete automation of a simple driving task, Automated Driving System-L ₃	AV likely able to drive from a simple point A to B
4- High Automation	Full automation in pre-planned driving scenarios, Automated Driving System-L ₄	AV can accomplish all driving tasks, including parking
5- Full Automation	Automated Driving System-L ₅	A driver is no longer needed

Most vehicles on American roadways today fall within Level 0, with many newer models featuring some basic assistance features, like lane-centering assist, adaptive cruise control, and blind-spot warnings, placing these models more appropriately in Level 1 or sometimes even Level 2.²¹ A major distinction between the lower and upper levels is the requirement of occupant

18. Abuelsamid, *supra* note 15.

19. *Id.*

20. *See id.*; *see also* REPORT 2.0, *supra* note 12, at 4 (adopting the SAE scheme but altering the language used to describe each level).

21. *See Cars with Advanced Safety Systems*, CONSUMER REPORTS, <https://www.consumerreports.org/car-safety/cars-with-advanced-safety-systems> [<https://perma.cc/Q472-N5ZB>] (last updated Aug. 12, 2019) (listing the many new safety features released with commercial vehicles).

supervision of the driving environment.²² Beginning with Level 3, a human occupant only needs to take control if there is an emergency or an unexpected issue with the driving system.²³ At Level 4, the role of the human occupant is even further reduced to driving only when the driving system is not active.²⁴ At Level 5, theoretically the only time the human occupant—if there even is one—would have to drive is when he or she wants to.²⁵

As noted in Figure 1, the defining AV technology for Levels 3–5 is the designated Automated Driving System (“ADS”) level:

[This] computer system[] that drive[s] cars consist[s] of three modules. The first is the perception module, which takes information from the car’s sensors and identifies relevant objects nearby. . . . The readings from these sensors are combined to build a model of the world, and machine-learning systems then identify nearby cars, bicycles, pedestrians and so on. The second module is the prediction module, which forecasts how each of those objects will behave in the next few seconds. Will that car change lane? . . . Finally, the third module uses these predictions to determine how the vehicle should respond . . . : speed up, slow down, or steer left or right.²⁶

The successful programing and implementation of these three modules separates the Level 0–2s on the roads today from the 3s, 4s, and 5s of tomorrow.²⁷ When AV industry leaders talk about getting AVs onto the American roadway, they mean the Level 3–5s that “[are] capable of sensing [their] environment and navigating without human input.”²⁸ Likewise, when this Note references AVs in Parts III and IV, it means the higher level of AVs that are near perfecting their ADSs.

22. Robert J. Szczerba, *Rise of the Machines: Understanding the Autonomy Levels of Self-Driving Cars*, FORBES (July 19, 2018, 11:43 AM), <https://www.forbes.com/sites/robertszczerba/2018/07/19/rise-of-the-machines-understanding-the-autonomy-levels-of-self-driving-cars/#30774aabb9593> [https://perma.cc/AA75-SV36].

23. *Id.*

24. A Level 4 AV “can drive itself full-time under the right circumstances. The car is expected to have backup systems so that if one technology fails, it will still be operational[, and] [i]f the car encounters something it can’t handle it will ask for driver assistance.” *Id.*

25. Abuelsamid, *supra* note 15.

26. T.S., *Why Uber’s Self-Driving Car Killed a Pedestrian*, ECONOMIST (May 29, 2018), <https://www.economist.com/the-economist-explains/2018/05/29/why-ubers-self-driving-car-killed-a-pedestrian> [https://perma.cc/KM2K-ZLZ2].

27. *Id.* The most difficult module to perfect is the perception module, because current computer programs are unable to consistently identify “rarely-seen items such as debris on the road, or plastic bags blowing across a highway.” *Id.*

28. Shima Rayej, *How Do Self-Driving Cars Work?*, ROBOHUB (June 3, 2014), <https://robohub.org/how-do-self-driving-cars-work> [https://perma.cc/CYJ9-AE3U].

B. *THE HISTORY AND FUTURE OF AUTONOMOUS VEHICLE TECHNOLOGY*

The concept of a self-driving vehicle has entertained the thoughts of engineers and entrepreneurs for almost a century.²⁹ This fantasy car came closer to reality in the 1980s with various institutes conducting driving tests with semi-autonomous vehicles.³⁰ In the 1990s, the industry saw the achievement of several milestones: a 2,800 mile cross-country trip of a semi-autonomous vehicle,³¹ a test on European roads of a semi-autonomous vehicle reaching speeds of up to 80 miles per hour “with an onboard computer . . . controlling the steering wheel, the gas pedal and the brakes,”³² and the introduction of the first commercial driver-less vehicle in the world.³³ The 2000s brought with it an increased collaboration between governmental funding and market development.³⁴ For example, “[i]n 2002, DARPA³⁵ [the Defense Advanced Research Projects Agency] announce[d] its Grand Challenge, offering researchers from top research institutions a \$1 million prize if they [could] build an autonomous vehicle able to navigate 142 miles through the Mojave Desert.”³⁶ When the challenge occurred in 2004, all 15

29. Alanis King, *The Fascination with Self-Driving Cars Started Nearly 100 Years Ago*, JALOPNIK (June 26, 2016, 4:20 PM), <https://jalopnik.com/the-fascination-with-self-driving-cars-started-nearly-1-1782241743> [<https://perma.cc/R6V3-ZXNH>] (describing the testing of a vehicle that “will start its own motor, throw . . . its [own] clutch, twist its [own] steering wheel, [and] toot its [own] horn” being controlled by a machine behind it using radio waves).

30. See generally Richard Wallace et al., *First Results in Robot Road-Following*, CARNEGIE MELLON U.: ROBOTICS INST. 1089 (1985), available at <https://www.ijcai.org/Proceedings/85-2/Papers/o86.pdf> [<https://perma.cc/VYF5-7TD4>] (describing the first demonstrations of semi-autonomous vehicles using visual signals to maintain stable driving on the road); *Navlab: The Carnegie Mellon University Navigation Laboratory*, CARNEGIE MELLON U.: ROBOTICS INST., <http://www.cs.cmu.edu/afs/cs/project/alv/www/index.html> [<https://perma.cc/TSA4-C7K6>] (detailing how the lab has conducted testing on AVs since 1984); Janosch Delcker, *The Man Who Invented the Self-Driving Car (in 1986)*, POLITICO (Apr. 19, 2019, 1:49 AM), <https://www.politico.eu/article/delf-driving-car-born-1986-ernst-dickmanns-mercedes> [<https://perma.cc/6LYV-CCHZ>] (noting the first vehicle to drive autonomously was tested in 1986).

31. Mike Freeman, *The Long Road to Autonomous Vehicles*, PHYS.ORG (Apr. 9, 2017), <https://phys.org/news/2017-04-road-autonomous-vehicles.html> [<https://perma.cc/5CX8-RH65>]. The trip began in Pittsburgh and ended in San Diego, with “[t]he vehicle navigat[ing] itself, without intervention from a human driver, for 98 percent of the . . . journey.” *Id.*

32. Delcker, *supra* note 30.

33. See Dick van Sluis, *Operations Contract of Driverless Parkshuttle Extended with 2 Years*, 2GETTHERE, <https://www.2getthere.eu/driverless-parkshuttle> [<https://perma.cc/67AD-ZSQK>] (describing the use of a driverless public transit system in the Netherlands).

34. Luke Dormehl & Stephen Edelstein, *Sit Back, Relax, and Enjoy a Ride Through the History of Self-Driving Cars*, DIGITAL TRENDS (Feb. 3, 2019, 9:00 PM), <https://www.digitaltrends.com/cars/history-of-self-driving-cars-milestones> [<https://perma.cc/7ALR-7DJD>].

35. “DARPA [is] the central research and development organization of the Department of Defense.” Annie Jacobsen, *Engineering Humans for War*, ATLANTIC (Sept. 23, 2015), <https://www.theatlantic.com/international/archive/2015/09/military-technology-pentagon-robots/406786> [<https://perma.cc/62MJ-TCQU>]. While DARPA’s funding interests have expanded to include AVs, its original mandate “focused on developing vast weapons systems.” *Id.*

36. Dormehl & Edelstein, *supra* note 34.

participants failed to reach the 142-mile mark, with the winner achieving fewer than eight miles before starting on fire.³⁷ This “damaging blow to the goal of building real self-driving cars” proved to be non-fatal.³⁸

The current buzz over AV technology began in 2009, when massive tech giants like Google began announcing that they were investing research and development into self-driving cars.³⁹ Dubbed “Waymo,” Google’s AV project unveiled an AV design in 2014 that lacked “any steering wheel, gas pedal or brake pedal, thereby being 100 percent autonomous.”⁴⁰ In the years to follow, “General Motors, Ford, Mercedes Benz, BMW, and other[.]” companies announced their efforts to develop AV technology.⁴¹ Projects like Waymo and Tesla are on the threshold of Level 2 to 3 at their commercial state.⁴² While prototypes have been pitched that may appear to be a Level 5, the actual ADSs may still be years from reaching commercial application.⁴³ In fact, only one car to date has officially achieved the rank of Level 3. The 2018 Audi A8 was unveiled to allow autonomous driving up to 37 miles per hour, allowing the driver to “zone out” and not requiring the driver maintain contact with the steering wheel.⁴⁴

37. *Id.*

38. *Id.* Congress, for instance, has continued to fund the research, development, and testing of AV technology indirectly through funds allocated to NHTSA and direct funding attempts that have thus far stalled in the legislature. *See infra* notes 165–70 and accompanying text. *See also* David Shepardson, *U.S. Spending Plan Include \$100 Million for Autonomous Cars Research, Testing*, REUTERS (Mar. 21, 2018, 9:01 PM), <https://www.reuters.com/article/us-autos-selfdriving-congress/u-s-spending-plan-include-100-million-for-autonomous-cars-research-testing-idUSKBN1GY074> [<https://perma.cc/HUE4JAGX>] (detailing how the distribution of funds would allocate \$60 million to test safety and \$38 million towards research into issues like cyber-security). Nonetheless, this spending bill, like other omnibus AV bills, failed to pass through Congress. *See infra* notes 165–70.

39. Dormehl & Edelstein, *supra* note 34.

40. *Id.* This article notes that “[b]y the end of [2017], more than 2 million miles had been driven by Google’s autonomous car.” *Id.*

41. *Id.*

42. *See* Sean O’Kane, *How Tesla and Waymo Are Tackling a Major Problem for Self-Driving Cars: Data*, VERGE (Apr. 19, 2018, 8:00 AM), <https://www.theverge.com/transportation/2018/4/19/17204044/tesla-waymo-self-driving-car-data-simulation> [<https://perma.cc/QP4G-7ZZG>] (describing Tesla’s autopilot mode as “still only a semi-autonomous feature” and noting Waymo’s self-driving vehicles are currently designed for testing, not commercial application).

43. *See* Fred Lambert, *Tesla’s Software Timeline for ‘Enhanced Autopilot’ Transition Means ‘Full Self-Driving Capability’ as Early as Next Year*, ELECTREK (Oct. 20, 2016, 4:31 PM), <https://electrek.co/2016/10/20/tesla-enhanced-autopilot-full-self-driving-capability> [<https://perma.cc/Q7AL-46Z4>] (stating Tesla claims to have the hardware required to reach Levels 3–5 but “the technology is now a software problem”). Tesla expected to have this software update out to Tesla vehicles within 2–3 months back in 2016 but has yet to complete this goal. *Id.*

44. Philip E. Ross, *The Audi A8: The World’s First Production Car to Achieve Level 3 Autonomy*, IEEE SPECTRUM (July 11, 2017, 5:00 PM), <https://spectrum.ieee.org/cars-that-think/transportation/self-driving/the-audi-a8-the-worlds-first-production-car-to-achieve-level-3-autonomy>. Other Level 1–2 brands like Tesla require contact with the steering wheel and will sound an alarm if the driver fails to do so. Fred Lambert, *Tesla Is Updating Autopilot’s ‘Hold Steering Wheel’ Alert After Complaints*,

Nearing almost 100 years of engineering, many industry experts think developers are on the cusp of finally realizing the dream of Level 4–5 AVs populating our roadways within a few years. Many companies have posited 2020 (or sometime in this decade) as the hopeful timeframe where at least Level 4s will emerge into commercial markets.⁴⁵ Level 4s are currently in the testing phase,⁴⁶ but this optimism of hitting rubber to the market has fizzled in the past. Radio-controlled cars were predicted to dominate our interstate systems by 1960⁴⁷ and smart roads were to be constructed by 1975 to send electrical signals to vehicles to guide their steering.⁴⁸ Neither of these ambitious projects were realized. Nonetheless, the future of the AV industry has never looked more promising. Major AV industry participants have invested billions in either research and development or acquisitions.⁴⁹ Even absent government funding of AV technology, the momentum from private market forces alone likely ensures the ambitious goal of Level 4 commercialization by 2020 or at least that the early 2020s will not fall victim to the same failure of the 1960 and 1975 fantasies.

C. REGULATION OF STANDARD AUTOMOBILES

1. Federal Oversight of Vehicle Safety and Manufacturing

The regulation of automobiles is directed by the federal government through NHTSA in setting safety and manufacturing standards applicable to all commercial vehicles,⁵⁰ with the remainder left to the police power of the

Says Elon Musk, ELECTREK (June 13, 2018, 6:12 AM), <https://electrek.co/2018/06/13/tesla-autopilot-hold-steering-wheel-alerts-complaints> [<https://perma.cc/4Q45-R6LV>].

45. See, e.g., Philip E. Ross, *CES 2017: Nvidia and Audi Say They'll Field a Level 4 Autonomous Car in Three Years*, IEEE SPECTRUM (Jan. 5, 2017, 2:30 PM), <https://spectrum.ieee.org/cars-that-think/transportation/self-driving/nvidia-ceo-announces> (announcing plans by Nvidia and Audi to have Level 4s out by 2020); Jon Walker, *The Self-Driving Car Timeline—Predictions from the Top 11 Global Automakers*, EMERJ, <https://emerj.com/ai-adoption-timelines/self-driving-car-timeline-themselves-top-11-automakers> [<https://perma.cc/8UZE-VELK>] (last updated May 14, 2019) (listing Honda, Toyota, Hyundai, and Renault–Nissan as companies planning to roll out Level 4s by 2020); David Welch & Elisabeth Behrmann, *Who's Winning the Self-Driving Car Race?*, BLOOMBERG (Oct. 4, 2018, 8:49 AM), <https://www.bloomberg.com/news/features/2018-05-07/who-s-winning-the-self-driving-car-race> [<https://perma.cc/568U-B5W6>] (predicting that developer Zoox Inc. will have its AVs ready by 2020).

46. Welch & Behrmann, *supra* note 45 (noting how companies like Waymo—a Google subsidiary—and others are testing Level 4 AVs with non-company passengers).

47. NORMAN BEL GEDDES, *MAGIC MOTORWAYS* 56 (1940).

48. Joseph C. Ingraham, *Electronic Roads Called Practical*, N.Y. TIMES (June 6, 1960), <https://www.nytimes.com/1960/06/06/archives/electronic-roads-called-practical-new-system-of-guiding-cars-safely.html> [<https://perma.cc/7RZY-SC3K>].

49. See Walker, *supra* note 45 (describing how 11 major automakers are aggressively pursuing AV technology).

50. See 49 C.F.R. § 1.94 (2012) (stating in section 1.94(b) that the NHTSA has the responsibility of “establishing and enforcing safety standards and regulations for the manufacture . . . of motor vehicles”).

states.⁵¹ NHTSA has been granted broad authority to “set[] uniform guidelines for a coordinated national highway safety formula grant program carried out by the States.”⁵² This federal agency (subsumed within the larger DOT) was founded in 1970 to actualize the safety program goals of laws enacted by Congress in the 1960s.⁵³ It achieved these goals in part “by promoting vehicle safety innovations, . . . setting safety standards for cars and trucks, and educating Americans to help them make safer choices when driving.”⁵⁴ NHTSA sets manufacturing regulations that motor vehicle producers must follow but it works in conjunction with states to “deliver congressionally allocated funds” to solve individual traffic safety concerns.⁵⁵

Federal law dictates strict guidelines for what federal grant funding can be used for and when grant funding can be used.⁵⁶ The “costs must be necessary, reasonable, and allocable and Federal funds must be used in accordance with the appropriate statute and implementing grant regulations or guidance.”⁵⁷ Programs already in place include funding for occupant protection laws to reduce traffic deaths, programs aimed at reducing crashes caused by intoxicated drivers, laws related to using a cell phone while driving, increasing seat belt usage, and encouraging the adoption of graduated driver license laws.⁵⁸ The funds can be awarded directly to the State, universities or another private institution consulting on behalf of the state, but may not be granted for the basic “construction, maintenance, or design . . . of highways.”⁵⁹

For a private manufacturer to sell a motor vehicle, the vehicle must comply with all Federal Motor Vehicle Safety Standards (“FMVSS”) issued by NHTSA.⁶⁰ The first rule was FMVSS No. 209 for Seat Belt Assemblies.⁶¹ The range of rules has grown expansively to include braking systems, power-operated windows, windshields, transmissions, general controls and displays,

51. See U.S. CONST. amend. X (“The powers not delegated to the United States . . . are reserved to the States respectively . . .”).

52. 49 C.F.R. § 1.94(a).

53. *Understanding the National Highway Traffic Safety Administration (NHTSA)*, U.S. DEP’T TRANSP., <https://www.transportation.gov/transition/understanding-national-highway-traffic-safety-administration-nhtsa> [https://perma.cc/ZU56-YL75].

54. *Id.*

55. *Id.*

56. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., HIGHWAY SAFETY GRANT FUNDING GUIDANCE 1 (2013), available at https://www.nhtsa.gov/staticfiles/administration/programs-grants/Highway_Safety_Grant_Funding_Guidance.docx [https://perma.cc/U7SH-X4NF].

57. *Id.*

58. *Id.* at 2–4.

59. *Id.* at 10–11.

60. NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., QUICK REFERENCE GUIDE (2010 VERSION) TO FEDERAL MOTOR VEHICLE SAFETY STANDARDS AND REGULATIONS ii (2011), <https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/fmvss-quickrefguide-hs811439.pdf> [https://perma.cc/28XT-ZTXH].

61. *Id.*

and a litany of other automobile components.⁶² These regulations are “written in terms of minimum safety performance requirements for motor vehicles or items of motor vehicle equipment.”⁶³ The underlying safety goal in implementing these standards is to protect society from an “unreasonable risk of crashes occurring as a result of the design, construction, or performance of motor vehicles and” against serious injury or death if such crashes occur.⁶⁴ Setting Federal Motor Vehicle Safety Standards operates as the formal and lengthy rule-making process for NHTSA.⁶⁵

In conjunction with the power to set new federal standards, NHTSA can exempt safety and manufacturing requirements.⁶⁶ Congress granted the exemption power to the Secretary of Transportation,⁶⁷ but through an agency rule the power was delegated to NHTSA.⁶⁸ A manufacturer may seek a temporary exemption from a safety standard “on terms the Secretary [of the NHTSA] considers appropriate.”⁶⁹ A basis for granting an exemption includes promoting the public interest and the development of vehicle safety features.⁷⁰ The manufacturer must submit an initial application and subsequent applications for each renewal, as exemptions only last two to three years.⁷¹ An applicant must include “a record of the research, development, and testing establishing the innovative nature of the safety feature and a detailed analysis establishing . . . the safety level of the feature” for every sought exemption.⁷² A further restriction is placed on how many vehicles may be exempted.⁷³

62. *See id.* at 1–6.

63. *Id.* at ii.

64. *Id.*

65. 49 C.F.R. § 553.1 (2018).

66. 49 U.S.C. § 30113 (2012).

67. *Id.* (“The Secretary of Transportation may exempt, on a temporary basis, motor vehicles from a” FMVSS).

68. 49 C.F.R. § 1.94 (2012); *see also* Temporary Exemption from Motor Vehicle Safety and Bumper Standards, 83 Fed. Reg. 66,158 (Dec. 26, 2018) (to be codified at 49 C.F.R. pt. 555) (“The Secretary has delegated the authority for implementing [FMVSS exemptions] . . . to NHTSA”).

69. 49 U.S.C. § 30113(b).

70. *Id.* § 30113(b)(3). Other bases include: Enforcing a FMVSS would cause “substantial economic hardship” and compliance with a certain FMVSS would make the vehicle less safe overall. *Id.*

71. *Id.* § 30113(e).

72. *Id.* § 30113(c)(2).

73. *Id.* § 30113(d). An exemption based on economic hardships permits sales of no more than 2,500 vehicles in the United States every twelve months, while the safety exemptions only allow production of up to 10,000 vehicles. *Id.* A recent example of a temporary and non-AV related exemption is in 2014 when NHTSA approved for Aston Martin to continue exporting luxury vehicles to the United States despite not complying with a new safety rule (testing how the vehicle would impact a pole). Karla Sanchez, *Aston Martin Gets Temporary Exemption from New NHTSA Safety Rules*, MOTORTREND (Oct. 31, 2014), <https://www.motortrend.com/news/aston-martin-gets-temporary-exemption-from-new-nhtsa-safety-rules> [<https://perma.cc/58Q5-U547>].

Aside from setting safety standards, NHTSA can also exercise authority through its self-certification program⁷⁴ or through its defects and recall power.⁷⁵ Under the current legal framework, NHTSA is not responsible for testing every new automobile before it enters the market. Rather, every manufacturer is individually liable to ensure that its product meets all applicable FMVSS standards.⁷⁶ Under this regime, NHTSA can shift the onus of inspection costs to the manufacturer and issue appropriate penalties for a failure to achieve full compliance.⁷⁷ Alternatively, if NHTSA identifies a flaw within the vehicle design or the vehicle is found to not comply with federal safety standards, it cannot be sold.⁷⁸ If that defective or non-complying automobile reaches the market, the manufacturer may have to recall it.⁷⁹ Another means the agency has to incentivize the auto industry to carefully follow federal safety standards and other NHTSA guidelines is NHTSA's power to invoke and enforce a burdensomely expensive recall for manufacturers.⁸⁰

2. Regulatory Role of the States

Aside from NHTSA rulemaking and the corporate grant programs, the remainder of legislative power is left to the states, if they are not preempted by federal regulation.⁸¹ The National Traffic and Motor Vehicle Safety Act of 1966 provided an express pre-emption for federal agency regulative authority within the auto industry:

Whenever a Federal motor vehicle safety standard established under this subchapter is in effect, no State or political subdivision of a State shall have any authority either to establish, or to continue in effect, with respect to any motor vehicle or item of motor vehicle equipment any safety standard applicable to the same aspect of

The NHTSA accepted Aston Martin's economic hardship argument, reasoning enforcement of the safety rule on Aston Martin would cause significant financial strain on the foreign car manufacturer. *Id.*

74. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP'T OF TRANSP., FEDERAL AUTOMATED VEHICLES POLICY: ACCELERATING THE NEXT REVOLUTION IN ROADWAY SAFETY 11 (2016) [hereinafter REPORT 1.0].

75. See 49 U.S.C. §§ 30102(a)(8), 30116(a), 30120(a) (2012).

76. REPORT 1.0, *supra* note 74, at 11.

77. Consequences for violating a FMVSS can include a recall of the unit(s) or hefty civil fine. 49 U.S.C. §§ 30116, 30165.

78. *Id.* § 30116.

79. *Id.*

80. NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP'T OF TRANSP., MOTOR VEHICLE SAFETY DEFECTS AND RECALLS: WHAT EVERY VEHICLE OWNER SHOULD KNOW 1, 8–10 (2016) (explaining the recall process).

81. See Caleb Nelson, *Preemption*, 86 VA. L. REV. 225, 225–26 (2000).

performance of such vehicle or item of equipment which is not identical to the Federal standard.⁸²

Nonetheless, in interpreting this Act the Supreme Court held “that the absence of regulation itself” does not necessarily “constitute[] regulation.”⁸³ In *Freightliner Corp. v. Myrick*, the plaintiffs brought a common law design defect suit against truck manufacturers that had failed to install antilock braking systems (“ABS”) in their vehicles.⁸⁴ The defendants argued that the express pre-emption clause of the 1966 Act precluded the plaintiffs from being able to raise a common law suit.⁸⁵ The Court reasoned that because “no express federal [safety] standard[s] addressing stopping distances or vehicle stability for trucks or trailers” were in effect “with respect to ‘the same aspect of performance’ regulated by a state standard,” there was no federal regulation to trump the state action.⁸⁶ In the absence of a direct FMVSS regulation, the 1966 Act permits states “to ‘establish, or to continue in effect,’ their own safety standards.”⁸⁷

States can regulate many aspects of automobiles, aside from FMVSS regulations. There is near uniformity in the aspects of automobiles that states will regulate—like vehicle registration requirements—but there is some variety in what those regulations look like. In Alaska, vehicles are registered for a two-year period and the owner must hold a liability insurance policy of 50/100/25.⁸⁸ In Maine, the registration must be renewed every year,⁸⁹ but the insurance minimums are like that of Alaska—50/100/25.⁹⁰ Wisconsin also requires yearly renewal of the registration,⁹¹ yet the insurance minimums are a smaller 25/50/25 scheme.⁹² NHTSA, while not specifying registration

82. 15 U.S.C. § 1392(d) (1988).

83. *Freightliner Corp. v. Myrick*, 514 U.S. 280, 286 (1995).

84. *Id.* at 282.

85. *Id.* at 283.

86. *Id.* at 286 (citing 15 U.S.C. § 1392(d)).

87. *Id.*

88. *General Vehicle Registration*, ALA. DIV. MOTOR VEHICLES, <http://doa.alaska.gov/dmv/reg/require.htm> [<https://perma.cc/82VY-9F79>]. The 50/100/25 figures are a shorthand way of saying that liability minimum must be \$50,000 for injury or death of one person, \$100,000 for injury or death resulting from a single accident, and \$25,000 for property damage. *Understanding Minimum Car Insurance Requirements*, INSURANCE.COM (May 16, 2018), <https://www.insurance.com/auto-insurance/coverage/understanding-minimum-car-insurance-requirements.html> [<https://perma.cc/UC7S-Z2SZ>]. Almost all states have insurance minimums in the 50/100/25 format, with the exact figures being different. *Id.*

89. *How to Register a Passenger Vehicle*, ME. BUREAU MOTOR VEHICLES, <https://www.maine.gov/sos/bmv/registration/passenger.html> [<https://perma.cc/P5XE-XUPA>].

90. Mila Araujo, *Understanding Minimum Car Insurance Requirements*, BALANCE, <https://www.thebalance.com/understanding-minimum-car-insurance-requirements-2645473> [<https://perma.cc/ML5D-UYZP>] (last updated Apr. 10, 2019).

91. *Vehicle Registration*, WIS. DEP'T TRANSP., <https://wisconsin.gov/Pages/dmv/vehicles/title-plates/registration.aspx> [<https://perma.cc/77RR-P5YN>].

92. Araujo, *supra* note 90.

requirements that states *must* follow, has still released recommended guidelines for states to adopt.⁹³ A model registration program requires that: all vehicles are registered, relevant information of the vehicle and the owner should be compiled into a records system, and the program should be regularly evaluated with reports provided to NHTSA.⁹⁴

III. THE CURRENT GAP IN AV REGULATION AND PUBLIC PERCEPTION

The regulatory framework for AVs is a nascent area of law that has yet to fully emerge.⁹⁵ The legal landscape—encompassing everything from copyrights of driving program software, questions of liability in an AV-related accident, or how AVs may change police enforcement and search and seizure doctrines—is largely undefined.⁹⁶ Several states have passed a litany of statutes and executive orders, shaping the future of the technology in different ways.⁹⁷ NHTSA on top of these state regulations, has thus far only issued recommended policies for the states to adopt, not mandatory administrative rules.⁹⁸ Many of the more nuanced issues arising from AV technology cannot be addressed until higher amounts of AVs hit the road, problems arise, and a body of common law emerges, but governmental regulation could anticipate and resolve some of these issues. Nonetheless, Section III.A critically analyzes the patchwork of states' laws to see the potential danger in a lack of uniform regulation. Section III.B continues by deeply exploring the recommendations

93. See *Uniform Guidelines for State Highway Safety Programs*, NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., <https://one.nhtsa.gov/nhtsa/whatsup/tea21/tea21programs/index.htm> [<https://perma.cc/JWK4-B3VK>].

94. *Id.*

95. See Brian Fung, *The Big Question About Driverless Cars No One Seems Able to Answer*, WASH. POST (Feb. 17, 2016), <https://www.washingtonpost.com/news/the-switch/wp/2016/02/17/the-big-question-about-driverless-cars-no-one-seems-to-have-an-answer-to> [<https://perma.cc/8AK9-W2VT>] (listing liability for an accident involving an AV as an unsettled area of law).

96. See, e.g., Frank Douma & Sarah Aue Palodichuk, *Criminal Liability Issues Created by Autonomous Vehicles*, 52 SANTA CLARA L. REV. 1157, 1158 (2012) (stating “the criminal liability regime will have to significantly change in order to accommodate [AV] technology”); Mark A. Geistfeld, *A Roadmap for Autonomous Vehicles: State Tort Liability, Automobile Insurance, and Federal Safety Regulation*, 105 CALIF. L. REV. 1611, 1616–17 (2017) (discussing who to hold responsible for AV-related accidents—a manufacturer or driver—is still a contested legal point); Paul J. Pearah, *Opening the Door to Self-Driving Cars: How Will This Change the Rules of the Road?*, 18 J. HIGH TECH. L. 38, 48 (2017) (suggesting that the intellectual property of “software algorithms and sensor systems that will replace human judgment, perception and attention” may not automatically be patentable as trade secrets); Bryant Walker Smith, *Automated Driving and Product Liability*, 2017 MICH. ST. L. REV. 1, 71 (concluding “that [AVs] and product liability can coexist”); Lindsey Barrett, Note, *Herbie Fully Downloaded: Data-Driven Vehicles and the Automobile Exception*, 106 GEO. L.J. 181, 184 (2017) (arguing “the privacy interests implicated by data-driven vehicles should mandate that a warrant is required” whereas one is not required for the automobile exception).

97. *Autonomous Vehicles: Self-Driving Vehicles Enacted Legislation*, NAT'L CONFERENCE STATE LEGISLATURES (Sept. 9, 2019), <http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx> [<https://perma.cc/7U4Z-BADP>].

98. See REPORT 3.o, *supra* note 2, at ii (stating NHTSA offers only a non-regulatory approach to AV technology).

thus far issued by the NTHSA and how they fall short of adequately providing the direction and uniformity that the industry needs, and how the gap in regulation is a serious obstacle towards accomplishing the social goal of eliminating as many traffic deaths as possible. Section III.C explores the tentative trust and interest the public currently has in AVs.

A. THE PATCHWORK OF STATE AV LAWS

By the end of 2017, almost 33 state governments had enacted some form of regulation or issued an executive order relating to AVs.⁹⁹ Nevada was the first state to act, statutorily permitting the testing of AVs in 2011.¹⁰⁰ What is striking, aside from the amount of states taking regulatory action since 2011, is the sheer divergence of law. This is in regards especially to (1) the special exemptions AVs are being granted from normal traffic laws, (2) whether a state preempts local municipalities from regulating AVs, (3) how altering or performing maintenance on an AV affects liability, and (4) the difference in how AV technology is statutorily defined by states.

1. State Traffic Law Exemptions for AVs

These statutory exemptions beg the question of how future AVs will be treated under the law. Will AVs receive relevant exemptions from normal motor vehicles laws, like in the above instances, or will they eventually become viewed as a distinct species under the law?¹⁰¹ For example, Alabama has granted an exemption for duck platoons¹⁰² that are “engaged in electronic brake coordination” for receiving traffic citations from following each other too closely on a highway.¹⁰³ Georgia recently passed a law exempting the necessity to hold a driver’s license when occupying a Level 5 or when “the automated driving system [is] engaged.”¹⁰⁴

99. *Autonomous Vehicles: Self-Driving Vehicles Enacted Legislation*, *supra* note 97.

100. See NEV. ADMIN. CODE § 482A.110 (2017).

101. In the arena of tort liability of AVs, legal scholarship has already put forward new ways of thinking to conceptualize how automated driving systems should not be held liable as a “standard vehicle,” but under a new standard of negligence. See Ryan Abbott, *The Reasonable Computer: Disrupting the Paradigm of Tort Liability*, 86 GEO. WASH. L. REV. 1, 7 (2018) (arguing the computer programming in an AV should “occupy[] the position of a reasonable person in the traditional negligence paradigm”); John W. Zipp, Note, *The Road Will Never be the Same: A Reexamination of Tort Liability for Autonomous Vehicles*, 43 TRANSP. L.J. 137, 141 (2016) (suggesting that AV software be conceptualized as a legal fiction of an actual driver, requiring tort victims “to file a claim against the [AV] itself”).

102. A “duck platoon” is a group of self-driving trucks that move together “like a mother duck and her ducklings,” hence the nickname. Lauren Barack, *Tesla’s Autonomous Semi Trucks Reportedly Move in “Platoons,”* GEARBRAIN (Aug. 10, 2017), <https://www.gearbrain.com/tesla-talks-autonomous-semi-trucks-2471182093.html> [<https://perma.cc/PgKS-EKDR>].

103. ALA. CODE § 32-5A-89(d)(1) (2018).

104. GA. CODE ANN. § 40-5-21(a)(13) (West 2018).

2. State-Level Preemption of Municipal AV Regulation

At least four states (Illinois,¹⁰⁵ Texas,¹⁰⁶ Tennessee,¹⁰⁷ and North Carolina¹⁰⁸) have preempted local governments from taking certain actions regarding AVs. These states have recognized that AV technology is best regulated by a central state government. Even among this group, there is variety in the degree of preemption. North Carolina dictates “[n]o local government shall enact any local law or ordinance related to the regulation or operation of fully autonomous vehicles”¹⁰⁹ whereas Illinois forbids “[a] unit of local government . . . [to] enact an ordinance prohibiting the use of [AVs]” but still allows for local regulation of “[AVs] for traffic control purposes.”¹¹⁰ If the dichotomy between North Carolina and Illinois were enlarged to include every state—assuming every state addresses the issue—the consequence would be a patchwork of law. A manufacturer, when rolling out commercial Level 4s, could look at a state like North Carolina, see what the state code and regulations are and push forward. Yet, this same company would incur increased transaction and compliance costs when encountering the divergent local rules in Illinois and of the other 48 states.¹¹¹ From the vantage point of the manufacturer, the source of where to look for governing law is further complicated by states that have voluntarily relinquished regulatory authority to the federal government.¹¹²

3. AV Maintenance and Liability

Additionally, like the Level 0s on the road today, future Level 4s and 5s will still require vehicle maintenance. The question becomes who is responsible for maintaining upkeep of the AV and if there will be different maintenance requirements for the software of the vehicle versus physical

105. 625 ILL. COMP. STAT. ANN. 5/11-208(e-10) (West 2019).

106. TEX. TRANSP. CODE ANN. § 545.452(b) (West Supp. 2018).

107. TENN. CODE ANN. § 55-30-105 (2017).

108. N.C. GEN. STAT. ANN. § 20-401(i) (West 2018).

109. *Id.*

110. 625 ILL. COMP. STAT. ANN. 5/11-208(e-10).

111. See JAMES M. ANDERSON ET AL., RAND CORP., AUTONOMOUS VEHICLE TECHNOLOGY: A GUIDE FOR POLICYMAKERS 53 (2016) [hereinafter RAND STUDY] (“Inconsistent state laws might increase costs and hinder the use of [AV] technology . . .”).

112. See CAL. VEH. CODE § 38750(g) (West 2019) (stating any “[f]ederal regulations promulgated by the [NHTSA] shall supersede the provisions of this division when found to be in conflict with any other state law or regulation”); FLA. STAT. ANN. § 319.145 (West 2018) (requiring that AVs registered in the state must continue to meet applicable federal standards and regulations). This statute is unclear by what “federal standards” are meant. FLA. STAT. ANN. § 319.145. To infer federal law would make the “and regulations” part of the statute redundant. *Id.* Thus, it could be interpreted to mean recommended federal standards, like those pitched by NHTSA. See REPORT 3.0, *supra* note 2, at ii.

components (tires, alignment, etc.).¹¹³ Two states have already attempted to answer these questions statutorily. In Florida, if a third party converts a vehicle “into an autonomous vehicle,” then the original manufacturer “is not liable . . . [for] any legal action” arising from harm caused by that modified vehicle.¹¹⁴ A plain reading of the statute is straightforward, but ambiguity emerges when a mechanic works on a Level 3 or 4. Florida defines an AV as “[a]ny vehicle equipped with an automated driving system.”¹¹⁵ The statute goes further to define “automated driving system” as “the hardware and software that are collectively capable of performing the entire dynamic driving task of an autonomous vehicle on a sustained basis.”¹¹⁶ Say a situation arises where the hardware required to run the software of the AV driving system needs to be replaced. A mechanic in Florida determines that the hardware piece needs to be replaced and installs a new hardware part that is of a different brand than what the manufacturer originally built into the car. Has this mechanic “converted” the Level 3 or 4 AV under Florida law? Michigan addresses this problem by making the mechanic liable if he or she modifies the AV “without the manufacturer’s consent,”¹¹⁷ unless the fix is made “according to [the] specifications from the manufacturer.”¹¹⁸ From the consumer perspective, the statutory gap creates a daunting challenge to determine where to take an AV to get fixed. Under the current, disjunctive scheme a customer must ask if their AV has to be sent to a repair facility run by the manufacturing company or if the local auto mechanic can look under the hood.

4. Differing Legal Definitions of AVs

How AVs are defined can determine if and how AV laws apply. Illinois defines AVs’ driving systems as “hardware and software that are collectively capable of performing the entire dynamic driving task on a sustained basis.”¹¹⁹

113. See Sasha Kucharczyk, *How Will Maintenance Change with the Autonomous Vehicle?*, READWRITE (Apr. 18, 2017), <https://readwrite.com/2017/04/18/maintenance-and-the-autonomous-vehicle-tl1> [<https://perma.cc/Y5TN-ML5V>] (describing how some tech start-ups are researching ways “to allow [AVs to] self-diagnose future and upcoming issues”); Lewis Diuguid, *With Race to Build Driverless Cars, Where Will We Go for Repairs?*, GOVERNMENT TECHNOLOGY (May 27, 2016), <http://www.govtech.com/fs/perspectives/With-Race-to-Build-Driverless-Cars-Where-Will-We-Go-for-Repairs.html> [<https://perma.cc/9XPX-FZXT>] (noting how the introduction of commercial AVs is “creating an entirely new industry in the auto repair market”).

114. FLA. STAT. ANN. § 316.86 (West 2019).

115. *Id.* § 316.003.

116. *Id.*

117. MICH. COMP. LAWS ANN. § 257.665a (West 2019).

118. *Id.* § 600.2949b(3).

119. 625 ILL. COMP. STAT. ANN. 5/11-208(e-10) (West 2019).

Other states have adopted similar language.¹²⁰ The transient occupant of an AV need not fear how states have thus far defined the technology that allows the car to drive autonomously, but there is contrast in how *autonomous vehicles* themselves are defined. In Florida, an AV is any vehicle capable of driving without human control,¹²¹ in Nevada AVs are any vehicle equipped with “an automated driving system” that is also a Level 3–5,¹²² in Colorado and Connecticut an autonomous vehicle is only in reference to Level 4s and 5s,¹²³ and in Texas an AV is considered any “motor vehicle on which an automated driving system is installed.”¹²⁴ A major issue with these definitions, aside from the variety itself, is the incorporation of the SAE’s categorial language when the utilization of that scheme is entirely voluntary. The AV laws of Colorado may not apply to the driver of a Level 3 who is passing through the state, despite the Level 3 still possessing semi-autonomous features.¹²⁵

Lack of uniformity underlies all of these issues: legal exemptions for AVs, preemption of regulation, maintenance of AVs, and even the technology’s legal definition. As a 2016 study by Rand Corporation on AV technology noted, the complication of a patchwork of laws by the 50 states may “hinder the use of this technology in a way that harms [the] social [benefits].”¹²⁶ To better achieve the social goals of reducing traffic fatalities and eliminating barriers created by inconsistent state laws that may hinder AV market growth and application, AV technology standards, much like normal vehicle production standards, are best left to the federal government.

B. THE LACK OF COMPREHENSIVE FEDERAL REGULATION

NHTSA and the federal government have yet to enact any regulations specific to AV technology.¹²⁷ Instead, NHTSA has used its FMVSS exemption power for companies like Waymo and Tesla for limited AV testing.¹²⁸ NHTSA has issued over 70 federal safety regulations and “[m]any innovative AV designs [will] not comply with” all of them.¹²⁹ This forces any AV

120. See CONN. GEN. STAT. ANN. § 13a-260(a)(2) (West 2019); COLO. REV. STAT. § 42-1-102(7.7) (2018) (specifying this definition only applies to SAE’s 2016 categories of Level 4s and 5s only, not Level 3s); GA. CODE ANN. § 40-1-1 (5.1) (West 2018).

121. FLA. STAT. ANN. § 316.003(3).

122. NEV. ADMIN. CODE § 482A.015 (2019).

123. COLO. REV. STAT. § 42-1-102(7.7); CONN. GEN. STAT. ANN. § 13a-260(a)(2).

124. TEX. TRANSP. CODE ANN. § 545.451(2) (West 2018).

125. See *supra* Figure 1 (displaying how Level 3 AVs are the first tier to have an automated driving system).

126. RAND STUDY, *supra* note 111, at 53.

127. See *infra* notes 165–70 and accompanying text.

128. See LAURA FRAUDE-BLANAR & NIDHI KALRA, RAND CORP., AUTONOMOUS VEHICLES AND FEDERAL SAFETY STANDARDS: AN EXEMPTION TO THE RULE? 1 (2017), available at https://www.rand.org/content/dam/rand/pubs/perspectives/PE200/PE258/RAND_PE258.pdf [<https://perma.cc/8GYZ-TZSQ>].

129. *Id.*

manufacturer, tester, or researcher to complete the onerous process of applying for an exemption.¹³⁰ Currently, a manufacturer “can exempt [only] up to 2,500 vehicles in a 12-month period.”¹³¹ As mentioned previously, these exemptions are temporary and a manufacturer must repeat the *entire* application process anew for renewal of the exemption.¹³² The cap on how many vehicles a manufacturer can exempt significantly hinders AV testing.¹³³ The purpose of testing AV prototypes on private and public roads is for data collection.¹³⁴ The more vehicles amassing data, theoretically the better the driving programs—like the perception module¹³⁵—should become.¹³⁶ Waymo has logged several million miles with its driverless AV prototypes¹³⁷ and Tesla has logged an alleged one billion miles with its Autopilot feature,¹³⁸ but millions of miles of testing are still required to vet the safety of AVs and the 2,500 cap will slow this effort.¹³⁹

1. The NHTSA’s Yearly Non-Regulatory Reports on AVs

NHTSA has also released three reports each of which details policy on AV technology, the role of governmental regulation, and priorities for the future.¹⁴⁰ The first report (“Report 1.0”) was released in 2016 after extensive consultation with industry leaders, experts in the field, governments, and

130. See David Shepardson, *GM, Toyota Says U.S. Rules Limiting Self-Driving Cars Need to Be Eased*, REUTERS (Feb. 13, 2017, 11:44 AM), https://www.reuters.com/article/us-autos-selfdriving/gm-toyota-says-u-s-rules-limiting-self-driving-cars-need-to-be-eased-idUSKBN15S23F?feedType=RSS&feedName=businessNews&utm_source=Twitter&utm_medium=Social&utm_campaign=Feed%253A+reuters%252FbusinessNews+%2528Business+News%2529 [https://perma.cc/V7DW-NWZ9].

131. Andrew J. Hawkins, *Automakers Are Seeking Broad Exemptions from Safety Rules for Self-Driving Cars*, VERGE (Feb. 13, 2017, 3:31 PM), <https://www.theverge.com/2017/2/13/14601118/self-driving-car-congress-nhtsa-gm-toyota-lyft-volvo> [https://perma.cc/Z9LK-ASUX].

132. See *supra* notes 66–73 and accompanying text.

133. Hawkins, *supra* note 131.

134. Dana Hull, *Tesla Customers Rack Up 1 Billion Miles Driven on Autopilot*, BLOOMBERG (Nov. 28, 2018, 1:01 PM), <https://www.bloomberg.com/news/articles/2018-11-28/tesla-customers-rack-up-1-billion-miles-driven-on-autopilot> [https://perma.cc/W6EN-USZD].

135. T.S., *supra* note 26.

136. Hull, *supra* note 134.

137. Welch & Behrmann, *supra* note 45.

138. Hull, *supra* note 134.

139. See Welch & Behrmann, *supra* note 45 (detailing the current state of the self-driving car race). NHTSA has not set a minimum goal for how many AV-testing hours should be logged. See NIDHI KALRA & SUSAN M. PADDOCK, DRIVING TO SAFETY: HOW MANY MILES OF DRIVING WOULD IT TAKE TO DEMONSTRATE AUTONOMOUS VEHICLE RELIABILITY? 10 (2016), available at https://www.rand.org/content/dam/rand/pubs/research_reports/RR1400/RR1478/RAND_RR1478.pdf [https://perma.cc/SZX9-24G2] (concluding from a statistical study “that [AVs] would have to be driven hundreds of millions of miles and sometimes hundreds of billions of miles to demonstrate their reliability in terms of fatalities and injuries”).

140. See REPORT 1.0, *supra* note 74, at 7; REPORT 2.0, *supra* note 12, at ii–iii; REPORT 3.0, *supra* note 2, at viii.

various public safety advocates.¹⁴¹ The intent with the reports moving forward was to seek public comment, implement feedback, and release a revised edition each year.¹⁴² Report 1.0 noted that NHTSA's current regulatory "tools may not be sufficient to ensure that [AVs] are introduced safely."¹⁴³ Despite this, NHTSA has still expressed optimism that its current toolkit of "interpretations, exemptions, notice-and-comment rulemaking, and defects and enforcement authority" would still be able to keep pace with how rapidly the AV market has been evolving.¹⁴⁴

Instead of introducing new federal safety standards with Report 1.0, NHTSA offered a "Model State Policy" that it encouraged states to follow.¹⁴⁵ The Model State Policy offered administrative suggestions like having the state identify a point agency or committee to head AV issues, establishing a favorable legal environment for testing of the technology, and internally addressing regulatory gaps within each state.¹⁴⁶ Report 1.0 also paralleled how it may respond to AV technology the same way the Federal Aviation Administration ("FAA") did to autopilot features being added to commercial airplanes.¹⁴⁷ Following such a route would require NHTSA to utilize a regulatory tool it does not expressly possess through Congressional action—pre-market approval authority.¹⁴⁸ The important takeaways are that the Model State Policy and the suggestion of switching to pre-market approval scheme are merely guidelines a state could wholly disregard, if it so chose.

In September of 2017, NHTSA released its second report ("Report 2.0")—it was remarkably shorter than the first.¹⁴⁹ Again, NHTSA adopted a non-regulatory approach in this policy update, providing only a voluntary guideline for states to follow.¹⁵⁰ NHTSA even noted the importance of regulating "in a proactive—rather than a reactive—manner."¹⁵¹ In conjunction with the voluntary guidelines for states to follow, Report 2.0

141. REPORT 1.0, *supra* note 74, at 3.

142. *Id.*

143. *Id.* at 7.

144. *Id.*

145. *Id.* at 37.

146. *Id.* at 40–47.

147. *Id.* at 71.

148. *Id.* at 71–72. Under pre-approval market authority plan, instead of an AV manufacturer self-certifying that it meets all the FMVSS, NHTSA itself would test the vehicle or technology before allowing it on the road. *Id.* The Vehicle Safety Act only provided for authorization for a self-certification system. *Id.* It is unclear if a congressional amendment to the Act would be required for NHTSA to legitimately implement a pre-market approval system. *See id.* at 73 ("Substitution of pre-market approval for all standards for which manufacturers currently self-certify . . . would require both fundamental statutory changes and a large increase in Agency resources.").

149. Compare REPORT 1.0, *supra* note 74, at 1 (containing 110 pages), with REPORT 2.0, *supra* note 12, at iv (containing only 27 pages).

150. REPORT 2.0, *supra* note 12, at ii.

151. *Id.* at 19.

mentioned that NHTSA has also entered into partnerships with various organizations¹⁵² with the goals of “promot[ing] uniformity amongst jurisdictions and provid[ing] a baseline safety approach.”¹⁵³

Report 2.0 continued by delineating the regulatory roles between the states and the federal government. NHTSA made it clear the agency itself was tasked with setting and enforcing safety standards, while states were best left to regulate vehicle registration, enforcing local traffic laws, and regulating automobile insurance and liability.¹⁵⁴ Report 2.0 concluded by remarking how “[p]ublic trust and confidence” in AV technology will be a great factor in deciding the future of the technology.¹⁵⁵ Nonetheless, the agency’s own acknowledgement of the importance of consumer confidence matters little when the regulatory floor of federal safety standards for AVs has yet to be set.

On October 4, 2018, Report 3.0 was released for public input.¹⁵⁶ The only significant changes to Report 3.0 included, inter alia, more detailed guidance to states in terms of licensing test drivers and creating a local legal framework favorable to the testing of AVs.¹⁵⁷ Nonetheless, there was also a policy clarification that moving forward, the self-certification system would be retained versus adopting a pre-approval scheme because the former “more appropriately balances and promotes safety and innovation.”¹⁵⁸ And like in the 2016 and 2017 reports, the 2018 edition was a non-regulatory set of optional guidelines.¹⁵⁹ Report 3.0 concluded with the same remarks as Report 2.0 regarding a focus on consumer perspectives of booming AV technology and how that sentiment is such a determinative force for the success of AVs.¹⁶⁰ The concern with the current NHTSA approach stems from a combination of the lack of any federal regulation directed specifically at AVs and Report 3.0’s

152. Such organizations include the American Association of Motor Vehicle Administrators, the National Conference of State Legislatures, and the Governors Highway Safety Association. *Id.*

153. *Id.*

154. *Id.* at 20.

155. *Id.* at 25.

156. *Automated Driving Systems*, NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., <https://www.nhtsa.gov/vehicle-manufacturers/automated-driving-systems#automated-driving-systems-av-30> [<https://perma.cc/92UZ-UBYD>].

157. See REPORT 3.0, *supra* note 2, at viii–x (detailing changes in the Executive Summary of the 2018 version).

158. *Id.* at 7. Report 1.0 raised the switching to a pre-approval system as a possibility and devoted several pages of discussion to detailing what that switch may look like, even proposing a potential hybrid between a self-certification and pre-approval regime. REPORT 1.0, *supra* note 74, at 70–75. Report 2.0, likely because of its brevity, skipped any significant discussion of whether pre-approval of AV technology would be adopted. See generally REPORT 2.0, *supra* note 12 (foregoing any mention of a possible NHTSA shift to testing AV technology before it hits the road). Given that the NHTSA always seeks public input, there is a possibility a negative industry or consumer backlash to this policy clarification could cause them to reconsider it in 2019’s version.

159. REPORT 3.0, *supra* note 2, at 32.

160. See *id.* at 41–42.

decline to adopt at the very least a hybrid pre-approval system.¹⁶¹ These two aspects are concerning because they present no solution to the problems arising out of the patchwork AV laws. All three reports adopted and advocated for utilization of the SAE's definitional taxonomy,¹⁶² but NHTSA has not required such language uniformity for the states.¹⁶³ While no state has adopted a scheme different than the SAE, the possibility remains since many states have yet to pass any AV-related laws.¹⁶⁴ In the wake of federal safety standards issued from NHTSA, the states may also pass differing maintenance laws and requirements. The lack of legal certainty when it comes to basic definitional standards and the duty of maintenance of an AV can strike directly at consumer confidence. Because NHTSA has decided for the time being to retain a self-certification system, the federal government's response can only be responding to problems, not preventing them. The current federal framework fails to regulate these necessary areas, and the tools of choice by NHTSA will only bandage problems with AV technology, not wholly prevent them.

2. Inaction in Congress and the White House

Congress has also attempted to pass new federal laws promoting the safe implementation of AVs onto the American market, but both a bill passed in the House in 2017 and a similar bill passed in the Senate in 2017 have failed to become law.¹⁶⁵ The House version—dubbed the SELF DRIVE Act—granted express preemption of federal safety regulation over the “design, construction, or performance of [AVs], automated driving systems, or components [thereof].”¹⁶⁶ The bill also aimed for NHTSA to create a new national advisory council tasked with addressing many of the pressing issues presented by the incorporation of AVs onto public roadways.¹⁶⁷

161. See REPORT 3.0, *supra* note 2, at 7 (declining to abandon the “self-certification approach” or adopt a “type approval” approach).

162. REPORT 1.0, *supra* note 74, at 9; REPORT 2.0, *supra* note 12, at 4; REPORT 3.0, *supra* note 2, at vi.

163. See REPORT 3.0, *supra* note 2, at ii (declaring the report to only be *voluntary* and not requiring the states to adopt any guidance therein).

164. See *Autonomous Vehicles*, *supra* note 97 (stating that least only 29 states have passed AV-related laws as of 2017).

165. Chris Teale, *Federal AV Legislation to Go No Further in Congress*, SMART CITIES DIVE (Dec. 21, 2018), <https://www.smartcitiesdive.com/news/AV-START-Act-autonomous-vehicle-legislation/544907> [<https://perma.cc/GW2R-8RZ5>]. At least one cause for failure is the clashing of various stakeholders over bill provisions. See Catherine Chase et al., *Congress Is Trying to Pass Legislation to Make Self-Driving Cars Safer. It Doesn't Go Far Enough*, CNBC (June 12, 2018, 1:20 PM), <https://www.cnbc.com/2018/06/12/self-driving-car-legislation-in-congress-doesnt-go-far-enough.html> [<https://perma.cc/HVF3-DM4C>]. Over “40 major safety, consumer, public health, bicyclist, pedestrian, environmental, law enforcement and disability rights” groups have identified flaws with the twin bills. *Id.*

166. SELF DRIVE Act, H.R. 3388, 115th Cong. § 3 (2017).

167. *Id.* § 9.

The bill passed through the House but stalled in the Senate's docket in September 2017.¹⁶⁸ The sister bill originating in the Senate—nicknamed the AV START Act—was introduced to the Senate floor but never passed.¹⁶⁹ The Senate bill contained a similar preemption provision, created an advisory committee, focused on consumer education and public safety, and even went as far as adopting the SAE definitional hierarchy.¹⁷⁰

The most recent activity on the federal level, aside from Report 3.0's release, was a March 1, 2018 conference—hosted by the executive branch—consisting of “[a]uto manufacturers, technology companies, road safety advocates and policy makers.”¹⁷¹ Following this summit, the Trump Administration was posed to release new AV guidelines with the intent of “rewrit[ing] regulations that pose legal barriers to robot vehicles.”¹⁷² Yet, Report 3.0 failed to re-write and add mandatory regulations. As it stands, the federal government—as expressed by the executive and legislative branches—is keen on filling the AV regulatory gap but has thus far failed to do so,¹⁷³ allowing the problems arising from the patchwork of state laws to persist.

C. CONSUMER CONFIDENCE IN AV TECHNOLOGY

An important factor to consider in regulatory determinations of AV technology is how the public perceives its viability and safety. Reaching a high point of consumer confidence may pose as a daunting challenge for both AV manufacturers and the federal government.¹⁷⁴ This is because many individuals have an inherent distrust towards robotics—especially when it involves relinquishing a sense of control.¹⁷⁵ The testing of AVs has yielded

168. *Id.*

169. AV START Act, S. 1885, 115th Cong. (2017).

170. *Id.*

171. David Shepardson, *Trump Administration Plans Autonomous Vehicles Regulatory Summit*, INS. J. (Feb. 12, 2018), <https://www.insurancejournal.com/news/national/2018/02/12/480210.htm> [<https://perma.cc/FTR9-W8MN>].

172. *Id.*

173. David Shepardson, *U.S. Congress Will Not Pass Self-Driving Car Bill in 2018: Senators*, REUTERS (Dec. 19, 2018, 1:15 PM), <https://www.reuters.com/article/us-autos-selfdriving/u-s-congress-will-not-pass-self-driving-car-bill-in-2018-senators-idUSKCN1OI2CV> [<https://perma.cc/AT7X-RQ4J>]. “Automaker lobbyists say the [AV bills] will face tougher odds in 2019 when Democrats and Republicans will share control of Congress.” *Id.* Until 2020, the only potential wellspring of regulation will likely be NHTSA. *Id.*

174. Numerous studies have demonstrated “an increased wariness of self-driving cars[] ha[s] reflected a disconnect between industry enthusiasm and the public’s attitudes toward a driverless future.” Eric D. Lawrence, *Concerned About Self-Driving Cars? You’re Not Alone*, TRANSP. TOPICS (Jan. 26, 2018, 1:00 PM), <https://www.ttnews.com/articles/concerned-about-self-driving-cars-youre-not-alone> [<https://perma.cc/7NSM-HWPV>]. These studies are discussed later in this Section. *See infra* notes 189–201 and accompanying text.

175. *See, e.g.*, Lauren A. Leotti et al., *Born to Choose: The Origins and Value of the Need for Control*, 14 TRENDS COGNITIVE SCI. 457, 461 (2010) (stating there is a biological need for people to feel in control, even if it is just an illusion); Jim Everett et al., *Why Are We Reluctant to Trust Robots?*, GUARDIAN (Apr. 24, 2017, 12:51 PM), <https://www.theguardian.com/science/head-quarters/>

promising results,¹⁷⁶ but more testing will need to be performed before an actual safety potential of AVs can be determined with any degree of certainty.¹⁷⁷ Nonetheless, until a point is reached where enough data is compiled to render such a determination, consumers will be left to make decisions on AVs based off, inter alia, how the media reports on AV-related accidents.¹⁷⁸

1. Deaths Caused by AV Technology

Three heavily reported deaths relating to an AV accident have occurred so far. A fatal crash occurred in 2016 when the driver, busy watching Harry Potter, put his Tesla's Model S into its autopilot self-driving mode and then crashed into a semitruck.¹⁷⁹ The vehicle's visual sensor system failed to identify the semitruck against the backdrop of a bright sky.¹⁸⁰ Tesla was involved in a second fatality earlier in 2018 when the autopilot feature of Tesla's Model X SUV rammed into a concrete wall on the highway, causing the vehicle to burst into flames and kill the occupant.¹⁸¹ Data collected from the vehicle's computer showed that the driver should have had five seconds of unobstructed view before hitting the concrete wall, but the driver did not have his hands on the steering wheel to supervise the autopilot program for six

2017/apr/24/why-are-we-reluctant-to-trust-robots [https://perma.cc/4LNQ-WQBM] (citing a psychological study revealing people mistrust those who make moral decisions through a cost/benefit calculation—like the programming of AVs when deciding where they will crash); Vyacheslav Polonski, *Would You Let an Algorithm Choose the Next U.S. President?*, TECHCRUNCH (Nov. 6, 2016, 4:00 PM), https://techcrunch.com/2016/11/06/would-you-let-an-algorithm-choose-the-next-us-president [https://perma.cc/9QFF-GDU2] (mentioning research showing “that people hesitate to put their personal lives in the hands of an AI assistant, especially when that assistant makes decisions without providing a transparent reasoning for choosing one solution over a set of alternatives”).

176. Testing results by companies operating in California in 2016 featured no accidents. Peter Els, *How Much Testing Will Prove Automated Cars Are Safe?*, AUTOMOTIVE IQ (Mar. 7, 2018), https://www.automotive-iq.com/autonomous-drive/articles/how-much-testing-will-prove-automated-cars-are-safe [https://perma.cc/A9RM-g2VC]. The AVs being tested drove collectively almost 636,000 miles with only 2,578 disengagements (when a driver had to take control because of a hardware or software issue). *Id.*

177. See *supra* notes 3–10 and accompanying text.

178. See Paul J. Pearah, *Opening the Door to Self-Driving Cars: How Will This Change the Rules of the Road?*, 18 J. HIGH TECH. L. 38, 41 (2017) (predicting that the media may “sensationalize anomalous occurrences” of AV-related deaths, which “will likely exacerbate public fear and skepticism”).

179. Sam Levin & Nicky Woolf, *Tesla Driver Killed While Using Autopilot Was Watching Harry Potter, Witness Says*, GUARDIAN (July 1, 2016, 1:43 PM), https://www.theguardian.com/technology/2016/jul/01/tesla-driver-killed-autopilot-self-driving-car-harry-potter [https://perma.cc/4ZVZ-ARG6].

180. *Id.*

181. Jack Stewart, *Tesla's Autopilot Was Involved in Another Deadly Car Crash*, WIRED (Mar. 30, 2018, 10:34 PM), https://www.wired.com/story/tesla-autopilot-self-driving-crash-california [https://perma.cc/KB77-5C2P].

seconds.¹⁸² Tesla attributed the accident to the driver's lull in maintaining hand placement on the steering wheel and reminded consumers "that Autopilot is a driver assistance tool, not a replacement, and that [the human driver] retain[s] responsibility for driving safely."¹⁸³

The third death—the first incident of a self-driving car striking a pedestrian—occurred when an experimental Uber AV hit and killed a bicyclist.¹⁸⁴ The National Transportation Safety Board ("NTSB")¹⁸⁵ investigated and found that the vehicle's detection system failed to properly identify the pedestrian.¹⁸⁶ There was a human occupant in the test vehicle at the time of the crash, but he had been looking at the display screen at the time of impact.¹⁸⁷ What underlies these tragic accidents is how the AV in each case failed in some regard, resulting in a death. And the amount of deaths will only climb as the presence of AVs increases.¹⁸⁸

2. Measuring Consumer Skepticism in AVs

The public's exposure to these statistically anomalous accidents will cause heightened skepticism towards AV safety. In a 2016 consumer survey,¹⁸⁹ Kelley Blue Book found that 64 percent of drivers preferred to retain some degree of control over the vehicle—meaning they would be opposed to owning a Level 5 that had no brakes or steering wheel for manual operation.¹⁹⁰ About 30 percent said they would never buy a Level 5, with only 16 percent

182. *Id.*

183. *Id.*

184. T.S., *supra* note 26.

185. The NTSB is the independent investigatory arm of the Department of Transportation that will conduct a thorough assessment of aviation, vehicle, or other transportation-related accidents and report its findings. *History of the National Transportation Safety Board*, NAT'L TRANSP. SAFETY BD., <https://www.nts.gov/about/history/Pages/default.aspx> [<https://perma.cc/6PZN-MCUN>].

186. T.S., *supra* note 26.

187. *Id.*

188. See Alexandra Ossola, *If a Self-Driving Car Gets into an Accident, Who Is to Blame?*, WEEK (July 6, 2016), <https://theweek.com/articles/633406/selfdriving-car-gets-into-accident-who-blame> [<https://perma.cc/QH6J-6YFJ>] (mentioning that AVs have programming limitations because "bad weather . . . clouds [their] sensors [and] [t]heir GPS and mapping algorithms aren't 100 percent accurate"). Thus, even if a high volume of AVs on the road reduces the overall amount of traffic deaths, the imperfect nature of computer programming and its responses to complex weather systems means some deaths are still likely. See *id.*

189. Kelley Blue Book is recognized as an industry expert in providing new and used "vehicle valuation and information for consumers and the automotive industry." *Company Overview of Kelley Blue Book Co., Inc.*, BLOOMBERG (MAR. 7, 2016, 2:00 PM), <https://web.archive.org/web/20160307190023/https://www.bloomberg.com/research/stocks/private/snapshot.asp?privcapId=4843555> [<https://perma.cc/WGJ6-4TLY>]; see also Gina Chon, *Autotrader.com Buys Kelley Blue Book*, WALL ST. J. (Oct. 26, 2010, 12:01 AM), <https://www.wsj.com/articles/SB10001424052702304248704575574683608871098> [<https://perma.cc/S2H3-L9gW>] ("Kelley Blue Book Co. [is] the best-known provider of information about the value of new and used cars.").

190. COX AUTOMOTIVE, FUTURE AUTONOMOUS VEHICLE DRIVER STUDY 8 (2016).

indicating immediate interest to buy a fully autonomous vehicle once it becomes commercially feasible.¹⁹¹ Overall, this study, which was conducted in May of 2016, noted that 51 percent of drivers wanted to have complete control, leaving little room for an automated driving system.¹⁹²

The first AV-related death (where the occupant was watching Harry Potter) occurred on May 7, 2016;¹⁹³ at this point, consumer confidence began to shift. A 2017 MIT study—asking respondents “about their interest in self-driving cars”—found a steep drop in the number of people ages 25–34 interested in AVs: from 40 percent in 2016 to 20 percent in 2017.¹⁹⁴ An additional 48 percent also said they would never purchase a Level 5: 60 percent higher than the results from the 2016 study conducted by Kelley Blue Book.¹⁹⁵ Reasons for this response ranged from drivers not liking the loss of control, not trusting the technology, and wholly regarding AVs as unsafe.¹⁹⁶ In March 2018, both Tesla’s second AV-related death¹⁹⁷ and the first pedestrian death occurred.¹⁹⁸ Following the “hype and controversy” over these accidents, public sentiment has continued to decline.¹⁹⁹ A May 2018 American Automobile Association (“AAA”) study measuring consumer trust found that 73 percent of American drivers were reportedly fearful of riding in an AV.²⁰⁰ This statistic was “up . . . from 63 percent in late 2017.”²⁰¹ “[The] results [of the AAA study] show that *any* incident involving an autonomous vehicle is likely to shake consumer trust”²⁰² Fortunately, no deaths have occurred since March of 2018, but the timeline of AV accidents causing death and the decline of consumer confidence should alert the AV industry and—most importantly—the federal government that something must be done.

191. *Id.* at 9.

192. *Id.* at 6.

193. Levin & Woolf, *supra* note 179.

194. Zeninjon Enwemeka, *Consumers Don't Really Want Self-Driving Cars, MIT Study Finds*, WBUR (May 25, 2017), <http://www.wbur.org/bostonomix/2017/05/25/mit-study-self-driving-cars> [<https://perma.cc/6XgX-YNN6>].

195. *Compare id.* (finding that 48 percent of consumers would never purchase a Level 5), with COX AUTOMOTIVE, *supra* note 190, at 9 (finding that 30 percent would never purchase one).

196. Enwemeka, *supra* note 194.

197. Stewart, *supra* note 181.

198. T.S., *supra* note 26.

199. Christian Wardlaw, *Self-Driving Cars Are Inevitable, You're Going to Pay for Them, and You Only Have Yourself to Blame*, N.Y. DAILY NEWS (May 24, 2018, 9:00 AM), <http://www.nydailynews.com/autos/street-smarts/consumer-confidence-autonomous-cars-article-1.4006105?cid=msn> [<https://perma.cc/83CL-PXFC>].

200. *American Trust in Autonomous Vehicles Slips*, AAA NEWSROOM (May 22, 2018), <https://newsroom.aaa.com/2018/05/aaa-american-trust-autonomous-vehicles-slips> [<https://perma.cc/2LRU-BVUH>].

201. *Id.*

202. *Id.* (emphasis added) (quoting Greg Brannon, AAA’s director of Automotive Engineering and Industry Relations).

IV. TURNING VOLUNTARY NHTSA GUIDELINES INTO ROBUST FEDERAL REGULATION

The lifesaving potential of AVs, “reduc[ing] traffic fatalities by up to 90 percent,”²⁰³ is premised on the condition that *all* consumers eventually purchase or regularly utilize a Level 4 or 5.²⁰⁴ If, for example, only twenty percent of Americans use an AV, the heralded “[30,000] lives [saved] a year” promise becomes only 6,000.²⁰⁵ Consumers are hesitant and skeptical of the technology. The question becomes if the regulatory framework can juggle the interests of AV manufacturers with promoting AV desirability and safety. The current federal approach of non-voluntary guidelines falls short of the uniformity the nascent AV industry needs. It must be the responsibility of NHTSA, not the individual states, to create a regulatory framework where AV development and consumer confidence can harmonize. Section IV.A analyzes why NHTSA is currently the best situated governmental authority to regulate AVs. Section IV.B argues for targeted steps NHTSA can take to achieve sensible regulation.

A. AVOIDING A PATCHWORK OF STATE LAWS THROUGH NHTSA REGULATION

NHTSA has recognized that it likely already “has authority to establish [new] [f]ederal safety standards” related to AVs.²⁰⁶ It has teased updating its regulative toolbox in the yearly reports,²⁰⁷ but the crucial period to adopt new FMVSS or work collaboratively with states to approach uniform laws in key areas is during the introduction of Level 3s to the commercial market. This is because the capabilities of Level 3 vehicles, while not fully autonomous, introduce many new features the typical driver may have never experienced before—like having the vehicle perform the steering controls.²⁰⁸ And because the first commercial batch of Level 3s are set to enter the market soon,²⁰⁹ what moves NHTSA takes in the next few years in terms of regulation of AVs will dictate in part how consumers respond to AV arrival.

Aside from NHTSA, regulation could also spring from Congress or simply be left to the states. However, Congress has stalled passing comprehensive reform for the past two years and into the foreseeable

203. LaFrance, *supra* note 5.

204. *See id.* (noting that “all this relies on widespread adoption of driverless cars”).

205. This statistic is based on the number of traffic crash fatalities in 2013. In all fairness, 6,000 thousand lives saved is still a substantial improvement in public health, but policymakers should aim to prevent as many deaths as possible by encouraging consumers to trust AVs. *Id.*

206. REPORT 3.0, *supra* note 2, at 6–7 (commenting that NHTSA is seeking public input on what FMVSS should include).

207. These are the reports mentioned previously. *See* REPORT 1.0, *supra* note 74; *see* REPORT 2.0, *supra* note 12; *see* REPORT 3.0, *supra* note 2.

208. *See supra* Figure 1.

209. *See supra* note 44 and accompanying text.

future.²¹⁰ Yet, the earlier analysis of current AV-related state laws²¹¹ and AV manufacturers makes clear that AV regulation should not be simply left to the states.²¹² For an AV consumer driving across state lines, non-uniformity of AV-related laws may create a host of problems. An interstate driver must ask themselves how the state he or she is entering legally defines AVs compared to their home state, if the AV requires maintenance whether the driver can take the AV to a local auto shop or must search for a manufacturer, or if there are any special exemptions for driving an AV in the state. Additionally, the driver does not even know whether to look to local or state-level regulation of AVs for answers to these questions. The tangle of conflicting state laws may be daunting to the average consumer, discouraging them from purchasing an AV.²¹³ To combat the discontinuity of state laws and reverse the tide of negative perception resulting from AV-related deaths, strong NHTSA regulation is needed.²¹⁴

AV manufacturers agree with this assessment.²¹⁵ Toyota, Lyft, and Volvo have all testified before Congressional committees asking for, at the very least,

210. See *supra* notes 165–70 and accompanying text. The overhauling legislation would address many of the issues identified by this Note, but passage of the law is unlikely for the foreseeable future. Shepardson, *supra* note 173.

211. See *supra* Section III.A.

212. See generally *Self-Driving Cars: Road to Deployment: Hearing Before the Subcomm. on Dig. Commerce & Consumer Prot. of the H. Comm. on Energy & Commerce*, 115th Cong. 7 (2017) (statement of Anders Karrberg, Vice President of Government Affairs, Volvo Car Corporation), available at <https://docs.house.gov/meetings/IF/IF17/20170214/105548/HHRG-115-IF17-Wstate-KarrbergA-20170214.pdf> [<https://perma.cc/RLJ2-C7YL>] (asking “Congress and NHTSA . . . [to] set the laws and regulations with respect to vehicle technology”); *Self-Driving Cars: Road to Deployment: Hearing Before the Subcomm. on Dig. Commerce & Consumer Prot. of the H. Comm. on Energy & Commerce*, 115th Cong. 14 (2017) (statement of Gill Pratt, CEO, Toyota Research Institute), available at <https://docs.house.gov/meetings/IF/IF17/20170214/105548/HHRG-115-IF17-Wstate-PrattG-20170214.pdf> [<https://perma.cc/4EgH-ME2G>] (suggesting the federal government “updat[e] the federal motor vehicle safety standards to address the handful of standards that are inconsistent with or incompatible with autonomous vehicle technology”); *Testimony of Joseph Okpaku: Hearing Before the Subcomm. on Dig. Commerce & Consumer Prot. of the H. Comm. on Energy & Commerce*, 115th Cong. 5 (2017), available at <https://docs.house.gov/meetings/IF/IF17/20170214/105548/HHRG-115-IF17-Wstate-OkpakuJ-20170214.pdf> [<https://perma.cc/3BMP-E2MU>] (recommending for “NHTSA to begin a rulemaking to update current FMVSS standards to accommodate the development, deployment, and introduction into commerce of AVs at [a] commercial scale”); Ma Jie & David Welch, *Nations with National Regulatory Policies Outpacing U.S. on Driverless Cars*, *INS. J.* (May 15, 2018), <https://www.insurancejournal.com/news/national/2018/05/15/489307.htm> [<https://perma.cc/NF5F-FVV8>] (commenting how foreign states with strong national regulations on the testing and safety standards of AVs are outpacing U.S.-based companies despite U.S. companies pouring billions of dollars into research and development).

213. Enwemeka, *supra* note 194.

214. See Chase et al., *supra* note 165 (stating the United States Government “should take the time to develop tests and minimum standards to ensure [AV’s] reliability and lifesaving potential”).

215. Eliza Fawcett, *Driverless-Car Makers Want Congress to Free Them from State Safety Standards*, *L.A. TIMES* (July 11, 2018, 7:32 AM), <http://www.latimes.com/politics/la-na-pol-driverless-vehicle-legislation-20180711-story.html> [<https://perma.cc/8UMH-93DP>].

updated FMVSS.²¹⁶ Uber and Waymo advised the Senate to pass the AV START Act when it was being considered in 2017 to “protect against a patchwork of [state] regulations that could only delay or complicate the deployment of this important technology.”²¹⁷ Aside from how non-uniform state AV laws may stifle consumer interest, these manufacturers are also affected. Regulations for if and how a manufacturer can test an AV also “vary from state to state.”²¹⁸ A nationwide policy or regulation on the conditions for AV testing means the manufacturer can focus on AV development instead of navigating differing state laws on “safety and performance standards.”²¹⁹ Other lobbyist groups have voiced a desire for direct federal regulation.²²⁰ Groups such as the American Trucking Association want to “ensure [that] federal officials are solely responsible for the [AV] regulations.”²²¹ As the drivers of AV development, the consensus of manufacturers for a national regulatory framework reveals the need for prompt NHTSA action.

B. MANDATORY REGULATIONS, NOT VOLUNTARY GUIDELINES

The status quo non-regulatory approach of NHTSA fails to appreciate the problems caused by the patchwork of state laws and the media’s hyperbolic coverage of AV-related deaths. In the absence of robust NHTSA action, consumer confidence in AVs will wane and the lifesaving potential of the technology will not be fully realized. NHTSA should take a two-prong approach moving forward. Section IV.B.1 explores how NHTSA can convert its voluntary guidelines into calculated regulations. On the other front, Section IV.B.2 discusses the dire need of increasing consumer awareness and preparedness for AVs.

1. Issuing New Federal Regulations for AVs

Of several regulatory options in the NHTSA toolkit, the FMVSS rulemaking power is best suited for regulating AVs.²²² The FMVSS exemption power strictly limits AV testing because of statutory requirements and is therefore untenable for robust change.²²³ Switching from the current self-certification regime for manufacturers to a pre-approval process where

216. See *supra* note 212 and accompanying text.

217. Fawcett, *supra* note 215.

218. Mary Barra, *Why Self-Driving Cars Need Federal Regulations*, AXIOS (Oct. 5, 2018), <https://www.axios.com/mary-barra-gm-why-self-driving-cars-need-federal-regulations-4e9d4337-3b74-41a5-a9a2-c7fae034dae3.html> [<https://perma.cc/3SUU-RCVL>].

219. Fawcett, *supra* note 215.

220. Eugene Mulero, *Federal Standard on Autonomous Vehicle Technology Is Needed*, Rep. Latta Says, TRANSP. TOPICS (Sept. 13, 2018, 4:00 PM), <https://www.ttnews.com/articles/federal-standard-autonomous-vehicle-technology-needed-rep-latta-says> [<https://perma.cc/NYD9-VH8R>].

221. *Id.*

222. See *supra* Section II.C.

223. See *supra* notes 66–73 and accompanying text.

NHTSA tests an AV is a step in the right direction,²²⁴ but this tool alone cannot fully address non-uniform state laws or increase consumer confidence. Likewise, NHTSA's recall power²²⁵ and grant-funding program²²⁶ can assist with the federal regulation of AVs, but they require a series of new federal safety standards to be operational.²²⁷ NHTSA should issue a new series of safety regulations that do several things: (a) the regulations should establish AVs as a distinct legal creature categorically different than standard automobiles; (b) the federal regulations should preempt state regulation in enumerated AV-related areas; and finally (c) the regulations should expand the number of testable AV prototypes and ease the requirements of the application and renewal process.

i. AVs: A New Category of Automobiles

A first necessary regulatory step is treating AVs as their own distinct legal species, separate from regular automobiles.²²⁸ There are still practical overlaps of regulation in how the vehicle is manufactured—the requirement of seatbelts, for example—where AVs and the standard automobile should be treated as equivalent, but the presence of the ADS is a point of divergence.²²⁹ Thus, an attempt to fully regulate AVs by forcing them under a FMVSS scheme intended for vehicles that always have occupant drivers will ultimately fail. The technological reality of AVs requires a new legal scheme that is in some matters distinct from federal regulation of normal automobiles.

This objective of distinguishing AV technology can be achieved through a new FMVSS that creates a uniform definition of AVs. The SAE taxonomy, which has already been adopted by many states and the NHTSA, is the perfect candidate.²³⁰ Such uniformity means both consumers and manufacturers spend no time navigating how the states have developed different definitions for AVs. Rather, consumers can be aware of applicable AV laws when driving or riding in an AV crossing over state lines and manufacturers can devote less

224. See *supra* notes 74–76, 158–60 and accompanying text.

225. See *supra* notes 75–79 and accompanying text. For example, if a FMVSS for AVs is not followed by a manufacturer, NHTSA can use its recall authority. However, this presumes there is new FMVSS crafted for AVs in the first place.

226. See *supra* notes 55–65 and accompanying text.

227. The recall power enforces new AV-related FMVSS while grant funding could be used to help implement the rollout of federal regulation.

228. Such a regulative need arises from the fact that states are granting exemptions to AVs for laws that apply to typical automobiles. *Supra* notes 70–72 and accompanying text. As AV technology continues to evolve and Level 4s and 5s become a commercial reality, the technological difference between an AV and a regular automobile may likely require more exemptions under local state traffic laws. Such a legal distinction may even become the norm for the states as AV laws evolve from statutes mostly regulating testing to statutes regulating personal usage. See *supra* note 97 (describing many of the listed state AV laws as pertaining to testing).

229. *Supra* notes 21–28 and accompanying text.

230. See *supra* notes 16–28 and accompanying text.

time and energy to maneuvering through legal hurdles. A secondary effect of incorporating the SAE taxonomy into a type of federal regulation may permit many of the current federal regulations for standard automobiles to no longer apply to AVs.²³¹ Where there is a practical safety overlap between standard vehicles and AVs (i.e., requiring seatbelts) the new regulations should still require compliance. However, creating categorical exemptions for others (i.e., a regulation requiring a steering wheel when a Level 5 AV may not have one) reconciles what should be deemed a new category of automobiles with the current rigid system.

ii. *Preempting State Regulation of AVs*

A second regulatory step should address the topic of preemption. As Level 4s and 5s begin to populate roadways, major cities will have a heightened interest in local regulation.²³² This is not to suggest a vigorous rollout of federal regulation that preempts all local aspects of AVs,²³³ but rather carefully curtailed areas of law that deal with the safety and manufacturing of AVs. Under the 1966 Act, NHTSA already has the congressional grant of authority to create federal safety standards that explicitly preempt state safety standards.²³⁴ Crafting an exhaustive list of all areas requiring preemption is beyond the scope of this Note, but at the very least NHTSA should preempt state regulations on AV testing.²³⁵ And even if

231. As it stands, AVs likely fall within the general definition Congress has used to define motor vehicles. *See* 49 U.S.C. § 30102 (2012) (defining “motor vehicle” as “a vehicle driven or drawn by mechanical power and manufactured primarily for use on public streets, roads, and highways”); *see also id.* § 32901(a)(3) (defining “automobile” as “a 4-wheeled vehicle that is propelled by fuel, or by alternative fuel, manufactured primarily for use on public streets, roads, and highways and rated at less than 10,000 pounds gross vehicle weight”). Nonetheless, it is unclear if when Congress wrote these statutes, it assumed the vehicle would also include an occupant driver. When Level 4s and 5s—with no driver present—that operate as taxis or Ubers hit the road, these statutes may no longer apply if the courts were to determine that was congressional intent.

232. Large urban areas like New York City have expressed concern about whether AVs will be computationally able to process the “dense and chaotic” driving environments. Eric Phillips, *The Future of Autonomous Vehicles in American Cities*, 21 N.Y.U. J. LEGIS. & PUB. POL’Y 287, 315 (2018). There is another potential downside of increased traffic because of what has been coined “ghost vehicles.” *Id.* These are AVs that aimlessly drive around while their owner or occupant is busy attending to a task, like shopping, to avoid the high parking costs in major cities. *Id.*

233. A 1966 law likely prevents complete preemption of the AV field anyway. *Supra* notes 81–87 and accompanying text. The 1966 Act has an express preemption provision and a savings clause for state tort actions. *See Geier v. Am. Honda Motor Co.*, 529 U.S. 861, 867–68 (2000). In *Geier*, the Court held that if a state tort suit interferes with a FMVSS, the suit is preempted. *Id.* at 869–74. Under ordinary preemption principles, NHTSA would prevail if a state tort action conflicted with an AV FMVSS, but because of the savings clause, NHTSA cannot create a FMVSS determining what law—negligence or product liability—courts should apply in an AV tort case. *See id.* at 868–71.

234. *Supra* notes 81–87 and accompanying text.

235. *See* Catherine M. Sharkey, *Inside Agency Preemption*, 110 MICH. L. REV. 521, 523–25 (2012) (noting how preemption interpretations have largely shifted from a Congress-based to an

NHTSA were hesitant to rapidly preempt without cautious calculation, it could still use preemption as a tool to block conflicting state AV laws via issuing broad regulatory language.²³⁶ Given that the state of AV technology is still in the testing phase, local laws that would restrict testing or outright use of AVs on public roadways may hinder the growth of AV technology and damage its public perception.

Another area that requires preemption through a federal regulatory scheme is AV maintenance. If the 50 states have as many different laws regulating who is to fix an AV's broken axle, who is to patch glitched driving software, or restricting who can maintain the vehicle to only its manufacturer, consumers will be discouraged to buy the technology.²³⁷ Some auto market experts think repair shops for AV technology will likely evolve as an extension to current repair garages, with "[n]etwork engineers . . . work[ing] alongside lower-skilled techs who do oil changes and rotate tires."²³⁸ Regardless of how the shops arise, uniform, federal regulation abates legal hurdles the consumer would otherwise face if his or her AV were to break down in a different state.

iii. Expanding Testable Unit Amounts and Easing Exemption Requirements

A third step for new federal safety regulation should be to improve the current statutory exemption process.²³⁹ As a start, NHTSA has already "eliminat[ed] [a] provision calling for the Agency to determine that a petition is complete before the Agency publishes a notice summarizing the petition and soliciting public comments on it."²⁴⁰ This singular FMVSS rule change will speed up the current temporary exemption process, but it fails to address the amount of testable units and the need for onerous renewals.²⁴¹ Congress

agency-based focus). An amicus brief submitted to the Supreme Court in 2010 by the Solicitor General posited the view that "NHTSA safety standards should generally be read as minimum standards unless the regulatory history demonstrates the [NHTSA's] contrary affirmative policy." *Id.* at 532. To avoid such an argument that NHTSA rulemaking is only setting a floor, any FMVSS or rulemaking procedures should make clear that a certain area of AV regulation is being preempted.

236. A simple announcement by NHTSA that it intends to solely occupy certain regulatory areas of AV technology would not pass preemption muster. *See Geier*, 529 U.S. at 884 (holding that conflict preemption requires "the identification of 'actual conflict,' and not . . . an express statement of pre-emptive intent").

237. For standard automobiles, many consumers are well-equipped to handle basic auto repairs and even more complex work (like replacing an engine, transmission, etc.). With AV technology, that population size of consumers who could perform a patch of a driving software glitch is likely quite statistically small. The need for software maintenance further distinguishes AVs from standard automobiles and necessitates an easy system for consumers to seek that software patch, whatever state they may be in.

238. Alan L. Adler, *The Hurdles of Fixing Automated Vehicles*, AUTOMOTIVE NEWS (Feb. 19, 2018, 12:00 AM), <http://www.autonews.com/article/20180219/RETAIL05/180219994/self-driving-car-repair> [<https://perma.cc/J458-6YHJ>].

239. *See supra* notes 66–73 and accompanying text.

240. Temporary Exemption from Motor Vehicle Safety and Bumper Standards, 83 Fed. Reg. 66,158 (December 26, 2018) (to be codified at 49 C.F.R. pt. 555).

241. *Id.*

has already recognized the need for change. The SELF DRIVE Act, the bill that died in the House in 2017, contained a provision increasing the amount of exemptions “through a phased approach that would begin with 25,000 exemptions in the first year and increase to 100,000 by the third year.”²⁴²

To what exact amount the limit (if there need be one) should be increased is a technical point beyond the scope of this Note, but Congress obviously thought 2,500 was far too low and drafted a new ceiling at 40 times the current amount.²⁴³ Allowing more testable units increases data collection from miles driven. Increasing the current amount by even tenfold would speed up the testing phase for AVs exponentially. In conjunction with increasing the exemption limit, easing the renewal process means companies could spend less time on bureaucratic niceties, like lengthy applications, and more time on developing AVs. In lieu of a burdensome, complete application for each renewal, NHTSA could instead require that companies submit their plan for the next exemption period and share any updates or new relevant information not included in the initial exemption application.

2. Improving Consumer Confidence Through Education and Pre-Market Approval

Consumers’ ambivalence and distrust towards AVs may stem in part or wholly from a lack of appreciating the technology’s reliability and safety.²⁴⁴ This problem is reflected in the drop of consumer interest following media-reported deaths²⁴⁵ and by manufacturers adding more advanced intelligence to their AVs.²⁴⁶ “[A]s cars get smarter and smarter consumers struggle to understand the latest innovations.”²⁴⁷ Consumers misunderstanding the autonomy difference in a Level 3 versus a Level 4 is encouraging some manufacturers “to skip [Level 3] entirely and move directly to Level 4.”²⁴⁸

To bridge this knowledge gap—and consequently increase consumer confidence—NHTSA should take several actionable steps. In addition to ending the non-voluntary guidance, two other steps will further educate

242. Fawcett, *supra* note 215.

243. *Id.*

244. See Els, *supra* note 176. In Arizona, there have been almost two dozen cases of people attacking Waymo’s prototype AVs. Simon Romero, *Wielding Rocks and Knives, Arizonans Attack Self-Driving Cars*, N.Y. TIMES (Dec. 31, 2018), <https://www.nytimes.com/2018/12/31/us/waymo-self-driving-cars-arizona-attacks.html> [<https://perma.cc/C4XL-QHJP>]. One researcher riding in an AV during a test reported being threatened with a gun. *Id.* The local police department has viewed the cases not as random acts of vandalism but resentment toward AVs. See *id.*

245. See *supra* Section III.C.1.

246. Szczerba, *supra* note 22.

247. *Id.*

248. *Id.* Consumers misunderstanding the difference between full autonomy and mere driver assistance technologies (i.e., Tesla’s autopilot) has been attributed as a cause of the first AV-related death in 2016. Theo Leggett, *Who Is to Blame for ‘Self-Driving Car’ Deaths?*, BBC (May 22, 2018), <https://www.bbc.com/news/business-44159581> [<https://perma.cc/79HU-ATBJ>].

consumers and promote confidence. These include (1) creating an advisory council and (2) adopting a pre-approval standard for AV parts.

i. Creating an AV Advisory Council

NHTSA should work collaboratively with other interested stakeholders in AVs to publicize the safety results and reliability of AVs thus far.²⁴⁹ NHTSA noted it is already establishing partnerships with relevant organizations,²⁵⁰ and the White House hosted a summit of AV stakeholders in March of 2018.²⁵¹ These practices should continue, along with the establishment of a working group on AVs—as contemplated in the AV START Act²⁵² and in the SELF DRIVE Act.²⁵³ The AV START Act had an entire section dedicated to consumer education, requiring the creation of an advisory group tasked with creating “responsible education efforts” to teach consumers about AVs.²⁵⁴ Membership included AV manufacturers and dealers, consumer advisory groups, public health officials, organizations with expertise in consumer education, marketing professionals, and more.²⁵⁵ The House’s SELF DRIVE Act provided for the creation of a similar advisory council, which included even members of academia.²⁵⁶ Duties for the council—under the House version—included, *inter alia*, consumer education and to create “independent verification and validation procedures for [AVs] that may be useful to safeguard motor vehicle safety.”²⁵⁷ While these bills gave a Congressional mandate for the creation of an advisory council, NHTSA need not wait to form one on its own. Through its grant funding power, or another administrative means, NHTSA should form an advisory committee on AVs tasked with the objective of promoting consumer education. NHTSA is, after all, a federal regulatory agency and not a public relations firm. Collaboration is essential to give consumers a reason to trust AVs.

249. Collaboration between AV manufacturers and non-profit organizations to improve consumer awareness is happening already, absent governmental involvement. *See* Pete Bigelow, *New Coalition Wants to Educate Consumers on Self-Driving Tech*, AUTOMOTIVE NEWS (Jan. 7, 2019, 2:00 PM), <https://www.autonews.com/ces/new-coalition-wants-educate-consumers-self-driving-tech> [<https://perma.cc/85RG-2S5G>] (describing how AV manufacturers like Waymo are working with the National Safety Council to host national exhibitions showcasing the safety of AVs to consumers).

250. REPORT 2.0, *supra* note 12, at 19.

251. Shepardson, *supra* note 173.

252. AV START Act, S. 1885, 115th Cong. (2017).

253. SELF DRIVE Act, H.R. 3388, 115th Cong. (2017).

254. S. 1885 § 12.

255. *Id.*

256. H.R. 3388 § 9(a)–(b).

257. *Id.* § 9(e)(10).

ii. *Adopting a Pre-Approval Regime for AV Components*

A third step is to adopt a pre-approval standard for AV-related components. While NHTSA may require Congressional approval to make such a change,²⁵⁸ even adopting a hybrid system between pre-approval and self-certification interjects governmental safety inspections into AV technology.²⁵⁹ Companies like Waymo and Tesla test AV components before attempting to commercialize the technology, but adding another round of testing, specifically by the federal government, may offer assurances to wary consumers. If a potential buyer walks into an AV dealership and sees a sticker from Tesla, their trust in the AV's safety rests on Tesla's reputation and record for safety. However, knowing that an AV was vetted and approved by the federal government may provide the final nudge the consumer needs to purchase the vehicle.

V. CONCLUSION

If statistics on yearly driving fatalities are anything like in previous years, tens of thousands of people will die in auto-related accidents this year, and thousands more the next.²⁶⁰ Since the inception of the automobile over 100 years ago, society has strived to make it safer—all in an attempt to save lives. In the twenty-first century, automobile manufacturers are now at the precipice of advancing technology so far, with Level 5s, that human drivers are no longer needed. Yet, if society shuns the safety potential of AVs, the lofty social goal of significantly reducing driving fatalities will disappear. Regulation left solely to the states has produced a patchwork of laws that has hurt consumer confidence. Therefore, in the year(s) to come, NHTSA must implement calculated regulations to rein in AV's exploding growth; otherwise, the jury will be out on public sentiment. Without federal regulation of AVs, consumer confidence will wane, and lives will not be saved.

258. Report 1.0 stated "NHTSA does not presently have authority to pre-approve new motor vehicles or new motor vehicle technologies." REPORT 1.0, *supra* note 74, at 48. Report 1.0 did not indicate whether that authority derives from the Secretary of Transportation or Congress. *Id.*

259. *Id.* at 73–75.

260. Ryan Beene, *Traffic Deaths in U.S. Exceed 40,000 for Third Straight Year*, BLOOMBERG (Feb. 12, 2019), <https://www.bloomberg.com/news/articles/2019-02-13/traffic-deaths-in-u-s-exceed-40-000-for-third-straight-year> [<https://perma.cc/4MFN-6ASZ>].