THE FOURTH AMENDMENT IN THE AGE OF AUTONOMOUS VEHICLES

Tracy Hresko Pearl*

Autonomous vehicles exist at the intersection of two extremely turbulent areas of Fourth Amendment jurisprudence—traffic stops and emerging technologies—and have implications for virtually every major search and seizure doctrine developed over the last century. Complicating matters even further is the fact that car manufacturers are developing these vehicles at varying rates, meaning that vehicles with differing levels of automation are being introduced onto the consumer market at different (and often unpredictable) times. Each level of vehicle automation, in turn, poses unique issues for law enforcement. Semi-autonomous (Levels 2 and 3) vehicles make it extremely difficult for police to distinguish between dangerous distracted driving and safe use of a vehicle's autonomous capabilities. Fully autonomous (Level 4 and 5) vehicles solve this problem but create another one: the ability of criminals to use these vehicles to break the law with an extremely low risk of detection. How and whether we solve these legal and law enforcement issues depends on our willingness to adapt or abandon a number of significant Fourth Amendment doctrines. Six possible solutions (in order from least to most extreme) reveal why. These solutions include (1) restrictions on visibility obstructions, (2) restrictions on the use and purchase of fully autonomous vehicles, (3) requirements that users of these cars provide implied consent for suspicion-less traffic stops and searches, (4) creation of government checkpoints or pull-offs requiring autonomous vehicles to submit to brief stops and dog sniffs, and (5) exploitation of the third-party doctrine to surveil the data generated by these vehicles. They also include abandonment of the century-old "automobile exception" in favor of rebalancing Fourth Amendment jurisprudence for the benefit of motorists who, for far too long, have seen a gradual but persistent erosion of some of their most significant constitutional rights.

---

* Professor of Law, University of Oklahoma College of Law. I am grateful to my assistant, Michele Thaetig, and also to Professor M. Alexander Pearl, Professor Eric Carpenter, Professor Stephen Henderson, Professor Stacey Tovino, and Associate Dean Joseph Thai. This article was made possible by a generous grant from the University of Oklahoma College of Law and workshopped at the Governance of Emerging Technologies and Science conference at Arizona State University Sandra Day O'Connor College of Law.

A remarkable amount of constitutional jurisprudence arises from encounters at the side of the road. For nearly a century, a steady stream of cases has come to us from transient no man's lands that exist between "here" and "there": shoulders of busy highways, curbs of suburban streets, and lonely dirt patches just off rural roads. The parties—citizen drivers (and sometimes passengers) and police—both find themselves in uncomfortable settings during these encounters: forced to negotiate a sudden mash-up of law, public and personal safety, and the uncertainty inherent in encounters with strangers in strange places. Even the briefest and most banal of these stops—the friendly warnings about broken taillights and concerned cautions about driving too fast—can be fraught with risk and concern for all involved.

The jurisprudence that has risen up around traffic stops is, therefore, complex and in near constant flux, puzzling and frustrating law students, law enforcement, and legal scholars alike.[1] Indeed, an entire body of Fourth Amendment law marked by subtle distinctions, countless exceptions, stutter steps, and restarts has developed around these seemingly common encounters between citizens and the state.[2] As courts have tried to keep up with developments in policing, sometimes even simple stops have yielded significant changes in the law.[3] And with well over 15 *million* traffic stops occurring each year on U.S. roads, there have been ample opportunities for courts to make those changes.[4]

Our understanding of the Fourth Amendment has always been vulnerable to the vagaries of social and technological change.[5] The Supreme Court had struggled in recent years, for instance, to adapt existing jurisprudence to the privacy issues inherent in searching and seizing smart phones,[6] attaching GPS tracking devices to the automobiles of suspects,[7] and utilizing thermal-imaging scanners.[8] Each new form of

---

[1] *See* Orin S. Kerr, *An Equilibrium-Adjustment Theory of the Fourth Amendment*, 125 HARV. L. REV. 476, 502 (2011).
[2] *See* Jeff Daniel Clark, *Driverless Cars and Criminal Justice Resource Allocation*, 22 SMU SCI & TECH L. REV. 195, 201 (2019).
[3] *See* Elizabeth E. Joh, *Automated Seizures: Police Stops of Self-Driving Cars*, 94 NYU L.R. Online 113, 118 (2019) ("Indeed, many of the Supreme Court's most significant Fourth Amendment cases have begun with the enforcement of minor traffic offenses.").
[4] COURT STATISTICS PROJECT, TRIAL COURT CASELOAD OVERVIEW: CASELOAD DETAIL – TOTAL TRAFFIC (2020), https://www.courtstatistics.org/csp-stat-nav-cards-second-row/csp-stat-traffic.
[5] *See, e.g.*, *Carpenter v. U.S.*, 138 S. Ct. 2206, 2216-17 (2018); *Kyllo v. United States*, 533 U.S. 27, 33-34 (2001) ("It would be foolish to contend that the degree of privacy secured to citizens by the Fourth Amendment has been entirely unaffected by the advance of technology."); *Florida v. Riley*, 488 U.S. 445, 451-52 (1989); *Dow Chem. Co. v. United States*, 476 U.S. 227, 239 (1986).
[6] *Carpenter*, 138 S.Ct. at 2216-17; *Riley*, 573 U.S. at 393-94.
[7] *United States v. Jones*, 565 U.S. 400, 404-11 (2012).
[8] *Kyllo*, 533 U.S. at 34-40.

emerging technology requires courts to evaluate claims of privacy, trespass, and governmental overreach anew, forcing existing doctrines into strained new positions or requiring the development of entirely new frameworks of analysis.

What we have not seen in recent years is the intersection of these two volatile areas of Fourth Amendment analysis: traffic stop jurisprudence and emerging technology law. With the arrival of both semi-autonomous and fully autonomous vehicles on U.S. roads, however, those cases are soon coming, and they will pose thorny constitutional questions when they do.[9] These vehicles will not only drastically change the nature of automobile travel and the transportation sector more generally, they will also challenge existing jurisprudence of all kinds.[10] Most critically, they will change the nature of traffic stops—for both better and worse—and almost certainly create confusions for law enforcement, attorneys, and courts.[11]

While many legal scholars have written about important dimensions of the coming changes, including police searches of autonomous vehicle data,[12] the privacy implications of self-contained versus interconnected autonomous vehicles,[13] automated seizures of driverless vehicles,[14] and the legal implications of reduced risk in traffic stops involving such vehicles,[15] there has not yet been a comprehensive assessment of the ways in which both crime detection and the Fourth Amendment will be implicated by the most likely categories of traffic stops involving autonomous vehicles. These categories include stops of semi-autonomous vehicles, stops of occupied fully autonomous vehicles, and stops of unoccupied fully autonomous vehicles. Each permutation is likely to implicate the Fourth Amendment in different ways and pose unique challenges for law enforcement on the scene.

The Article seeks to fill this existing gap in the literature and set out the parameters and major considerations of Fourth Amendment analysis in each of the categories identified, while also offering suggestions for future lines of analysis. In Section I, I offer background information about

---

[9] *See* Rachael Roseman, *When Autonomous Vehicles Take Over the Road: Rethinking the Expansion of the Fourth Amendment in a Technology-Driven World*, 20 RICH. J.L. & TECH. 3, 26 (2014).
[10] *See generally* Tracy Hresko Pearl, *Hands Off the Wheel: The Role of Law in the Coming Extinction of Human-Driven Vehicles*, 33 HARV. J. L. & TECH. 427 (2020).
[11] *See infra* notes 94-185.
[12] Adam M. Gershowitz, *The Tesla Meets the Fourth Amendment* (William & Mary Law School Research Paper No. 09-444) (October 29, 2021), https://ssrn.com/abstract=3958465.
[13] Dorothy J. Glancy, *Privacy in Autonomous Vehicles*, 52 SANTA CLARA L. REV. 1171, 1174 (2012).
[14] Joh, *supra* note 3, at 131.
[15] Jordan Blair Woods, *Autonomous Vehicles and Police De-Escalation*, 114 NW. U.L. REV. ONLINE 74, 76 (2019).

both autonomous vehicles and traffic stops in the United States. In Section II, I provide an overview of Fourth Amendment traffic stop jurisprudence. In Section III, I set forth the four major categories of autonomous vehicle stops, and provide an overview of the Fourth Amendment issues inherent in each. In Section IV, I consider a series of solutions to the difficulties associated with stopping fully autonomous vehicles. I conclude by identifying other potential issues in this area of law and making broad recommendations for future analysis.

I. BACKGROUND

Autonomous vehicles, also known as driverless cars, "are those in which at least some aspects of safety-critical control function (*e.g.*, steering, throttle, or braking) occur without direct driver input."[16] Put more simply, autonomous vehicles take control out of the hands of human drivers and place it instead in complex onboard computer software, external sensors, and GPS.[17] Working together, these systems allow the vehicle to change speed, direction, and route, and navigate the road environment with minimal input from their human occupants.[18]

A. Autonomous Vehicle Development

The list of companies actively developing autonomous vehicles is growing, and includes both technology companies like Waymo and Lyft, and automobile manufacturers like Tesla, Ford, and Volvo.[19] These companies are doing so, moreover, with broad support from the U.S. government which, in January 2020, announced its commitment "to fostering surface transportation innovations to ensure that the United States leads the world in automated vehicle technology and integration."[20] Progress, however, is coming in fits and starts, making it difficult to predict

---

[16] NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, PRELIMINARY STATEMENT OF POLICY CONCERNING AUTOMATED VEHICLES (2013) [hereinafter NHTSA PRELIMINARY STATEMENT].
[17] *See* Kyle L. Barringer, *Code Bound and Down . . . A Long Way to Go and A Short Time to Get There: Autonomous Vehicle Legislation in Illinois,* 38 S. ILL. U. L.J. 121, 123 (2013).
[18] *See* Sophia H. Duffy & Jamie Patrick Hopkins, *Sit, Stay, Drive: The Future of Autonomous Car Liability*, 16 SMU SCI & TECH. L. REV. 453, 455–56 (2013).
[19] SEAN E. GOODISON, ET AL., AUTONOMOUS ROAD VEHICLES AND LAW ENFORCEMENT: IDENTIFYING HIGH-PRIORITY NEEDS FOR LAW ENFORCEMENT INTERACTIONS WITH AUTONOMOUS VEHICLES WITHIN THE NEXT FIVE YEARS (RAND Corp. 2020), https://www.rand.org/pubs/research_reports/RRA108-4.html. Other companies developing autonomous vehicles include Uber, General Motors, BMW, Toyota, and Audi. *Id.*
[20] NATIONAL SCIENCE & TECHNOLOGY COUNCIL & U.S. DEPT. OF TRANSPORTATION, ENSURING AMERICAN LEADERSHIP IN AUTOMATED VEHICLE TECHNOLOGIES (Jan. 2020), at 1.

rollout with any accuracy.[21] Additionally, companies are approaching the development and market release of autonomous vehicles differently, meaning that industry players are at differing stages of development. As I have described in earlier work, most automobiles manufacturers are taking a "gradualist" approach, slowly introducing greater levels of autonomy into their vehicles over time, whereas most tech companies do not intend to enter the consumer market until they have fully autonomous models of their vehicle ready for public roads.[22]

The major implication of these varying approaches to autonomous vehicle development is that, for some period of years (if not decades), vehicles with differing levels of automation will populate U.S. roads.[23] The National Highway Traffic Safety Administration (NHTSA), in an attempt to describe the significant benchmarks in vehicle autonomy, adopted a six-level taxonomy of autonomous vehicles.[24] Those levels are:

- Level 0: Vehicles with no automation whatsoever.[25] A Level 0 vehicle is a conventional automobile without cruise control.

- Level 1: Vehicles with "function-specific automation" like basic cruise control.[26] The driver can hand over one and only one driving function (like acceleration) to the vehicle, but must maintain control over all other driving tasks.[27] Most vehicles currently on U.S. roads are Level 1 vehicles.

- Level 2: Vehicles with "combined functioned automation" like cruise control with lane-centering.[28] The driver can hand over more than one driving function (like acceleration and basic steering) to the vehicle, but must continuously monitor the vehicle and be ready to retake control quickly.[29] A Tesla with Autopilot functionality is an example of a Level 2 Car.

---

[21] Christopher Mimms, *Self-Driving Cars Could Be Decades Away, No Matter What Elon Musk Said*, WALL ST. J., Jun. 5, 2021, https://www.wsj.com/articles/self-driving-cars-could-be-decades-away-no-matter-what-elon-musk-said-11622865615.
[22] Tracy Hresko Pearl, *Compensation at the Crossroads: Autonomous Vehicles & Alternative Victim Compensation Schemes*, 60 WM. & MARY L. REV. 1827, 1840 (2019).
[23] *See* Glancy, *Privacy in Autonomous Vehicles*, *supra* note 13, at 1172–73.
[24] NATIONAL HIGHWAY TRAFFIC SAFETY ADMIN., FEDERAL AUTOMATED VEHICLES POLICY 9 (2016), https://www.transportation.gov/sites/dot.gov/files/docs/ AV%20policy%20guidance%20PDF.pdf [https://perma.cc/5SWR-N34E] [hereinafter NHTSA FAVP].
[25] NHTSA PRELIMINARY STATEMENT, supra note 16, at 4.
[26] *Id.*
[27] *Id.*
[28] *Id.* at 5.
[29] *Id.*

- Level 3: Vehicles with "limited self-driving automation."[30] The driver can hand over all driving functions to the vehicle and need not supervise, but must be ready to resume driving on fairly short notice.[31] As of early 2022, Level 3 vehicles are in development, but are not yet available to consumers.

- Level 4: Vehicles that can drive completely autonomously, but "only in certain environments and under certain conditions."[32] Human drivers need not be ready to retake control, but the vehicle may not be able to be used safely under certain conditions. Level 4 vehicles are in development.

- Level 5: Fully autonomous vehicles that "can perform all driving tasks, under all conditions that a human driver could perform them."[33] Human drivers need not ever supervise or retake control of these vehicles and may lack the ability to do so even if they wished. Level 5 vehicles are in development.

One of the challenges that law enforcement may face as vehicles of these varying levels appear on public roads, therefore, is knowing what level of autonomous vehicle (if any) a vehicle of interest is, and whether the human occupant is currently exerting any control.[34] If a police officer spots a human in a driver's seat, for instance, it may be unclear whether the human is currently driving (as is possible in a Level 0, 1, 2, or 3 vehicle), whether the human is merely supervising the vehicle (as may be the case in a Level 2 or Level 3 vehicle driving semi-autonomously), or whether the human is a completely passive occupant (as is likely the case in a Level 4 or 5 vehicle). Knowing the make, model, and year of the vehicle, moreover, may not be enough to resolve any uncertainty, as manufacturers like Tesla push greater levels of autonomy to existing vehicles via over-the-air updates over time, meaning that a vehicle that was Level 2 at purchase may evolve into a Level 3 or perhaps even Level 4 vehicle at some point in the future.[35]

---

[30] *Id.*
[31] NHTSA FAVP, supra note 24, at 9.
[32] *Id.*
[33] *Id.*
[34] Dr. James Hedlund, *Autonomous Vehicles Meet Human Drivers: Traffic Safety Issues for States*, GOVERNOR'S HIGHWAY SAFETY ASSOCIATION (2017), https://www.ghsa.org/sites/default/files/2017-01/AV%202017%20-%20FINAL.pdf.
[35] Sean O'Kane, *Tesla Can Change So Much With Over-The-Air Updates That It's Messing With Some Owners' Heads*, THE VERGE, Jun. 2, 2018, https://www.theverge.com/2018/6/2/17413732/tesla-over-the-air-software-updates-brakes.

Despite these complexities, autonomous vehicles are expected to have a number of major societal benefits. These benefits include "improved safety and a reduction in roadway fatalities; improved quality of life; access, and mobility for all citizens; lower energy usage; and improved supply chain management."[36] Additionally, wide adoption of these vehicles may yield other important gains such as "increased economic productivity and efficiency, reduced commuting time, and even the potential reduction of the environmental impact of conventional surface vehicles while increasing overall system energy efficiency."[37] However, the U.S. may never realize these benefits if our existing laws do not adapt thoughtfully and carefully to this new technology, or if courts and legislatures adopt either too lax or too draconian of a stance on its regulation.[38] This is particularly true with respect to traffic stops of autonomous vehicles, and what Fourth Amendment rights drivers and occupants may or may not have in that context.

B. Traffic Stops in the United States

Traffic stops are, by far, the most common form of police-initiated contact with citizens in the United States.[39] Indeed, studies by the Bureau of Justice Statistics show that traffic stops account for over 40% of all police contacts with people over the age of 16, a percentage that increases to over 50% when police responses to traffic accidents are added into the mix.[40] In 2020, for instance, a study of caseloads in just 26 states revealed 16,691,792 incoming non-criminal traffic violation cases, down from 24,687,672 such cases in 2016.[41]

Traffic stops are so common, in part, because police have a legitimate interest in keeping public roads safe.[42] Motor vehicle crashes are a leading cause of death among multiple age groups in the United States, and the

---

[36] NATIONAL SCIENCE & TECHNOLOGY COUNCIL, *supra* note 20, at 1.
[37] *Id.*
[38] *See* Tracy Hresko Pearl, *Hands on the Wheel: A Call for Greater Regulation of Semi-Autonomous Cars*, 93 IND. L.J. 713, 756 (2018); Lindsey Barrett, *Herbie Fully Downloaded: Data-Driven Vehicles and the Automobile Exception*, 106 GEO. L.J. 181, 183 (2017).
[39] Erika Harrell & Elizabeth Davis, *Contacts Between Police and the Public, 2018 – Statistical Tables*, U.S. DEPARTMENT OF JUSTICE, BUREAU OF JUSTICE STATISTICS (Dec. 2020), https://bjs.ojp.gov/content/pub/pdf/cbpp18st.pdf.
[40] Lynn Langton & Matthew Durose, *Police Behavior During Traffic and Street Stops, 2011*, U.S. DEPARTMENT OF JUSTICE, BUREAU OF JUSTICE STATISTICS (Oct. 27, 2017), https://bjs.ojp.gov/content/pub/pdf/pbtss11.pdf.
[41] COURT STATISTICS PROJECT, *supra* note 4.
[42] Orin Kerr, *How Self-Driving Cars Could Determine the Future of Policing*, WASH. POST, Jun. 16, 2017, https://www.washingtonpost.com/news/volokh-conspiracy/wp/2017/06/16/how-self-driving-cars-could-determine-the-future-of-policing/.

economic cost of these crashes exceeds well over $200 billion per year.[43] As one scholar has observed, "[c]ars can be very dangerous, so the state has a strong interest in ensuring that drivers are alert, trained, licensed and driving cars safely. The Supreme Court has recognized that interest by giving the police significant powers to enforce the traffic laws."[44]

However, police use some traffic stops to investigate or enforce violations of other laws.[45] Indeed, "routine traffic violations have uncovered drugs and weapons and revealed people with outstanding warrants. One of the most famous traffic stops was when a state trooper stopped and arrested Oklahoma City bomber Timothy McVeigh in 1995 for not having a license plate."[46] The Supreme Court has confirmed that police can use traffic violations as mere pretexts for stopping a vehicle, and it is not difficult for police to find reasons to do so.[47] Another scholar notes:

> Officers can easily find a technical or trivial traffic offense because state and local traffic codes are chock-full of them. The Texas Transportation Code title concerning "Vehicles and Traffic" is almost 800 pages long. Chapter 28 from the Dallas City Code, "Motor Vehicles and Traffic," is over 200 pages long. Of course, all of these pages do not define offenses. But buried within the byzantine bailiwicks of these codes are literally hundreds of varied traffic offenses available to ensnare all but the most exacting of drivers.[48]

There may also be broader reasons police may want to conduct traffic stops: they provide visual reminders to the public that law enforcement is present and watching in their community, and, in so doing, perhaps serve as a deterrent to criminal behavior.[49]

C. Likely Impacts of Autonomous Vehicles on Traffic Stops

The growing number of semi-autonomous vehicles, and the eventual arrival of fully autonomous vehicles, on U.S. roads will have far-reaching

---

[43] *Summary of Motor Vehicle Crashes*, TRAFFIC SAFETY FACTS: 2014 DATA 1 (May 2016), http://www-nrd.nhtsa.dot.gov/Pubs/812263.pdf; *Summary of Motor Vehicle Crashes*, TRAFFIC SAFETY FACTS: 2014 DATA 3 (May 2016), http://www-nrd.nhtsa.dot.gov/Pubs/812263.pdf.
[44] Kerr, *Self-Driving Cars, supra* note 42.
[45] *Id.*
[46] Jay Zagorsky, *Cops May Feel Biggest Impact From Driverless Car Revolution*, THE CONVERSATION, Mar. 16, 2015, https://theconversation.com/cops-may-feel-biggest-impact-from-driverless-car-revolution-38767.
[47] *Whren v. United States*, 517 U.S. 806, 815–16 (1996).
[48] Clark, *supra* note 2, at 200.
[49] Zagorsky, *supra* note 46.

implications for traffic stops, some positive and some negative. A brief overview of the most significant of these can provide helpful context for the legal discussion that follows.

First, fully autonomous vehicles will likely drastically decrease the number of traffic violations and thus traffic stops each year.[50] Because these vehicles will be programmed to obey all traffic laws and obey them perfectly, police will be less able to establish justifications for traffic stops, whether prextextual or not.[51] Even just a 30% reduction in traffic stops could mean a reduction of more than 5 million traffic cases each year,[52] significantly reducing the caseloads of misdemeanor courts and the costs associated with them.[53]

The proverbial flip side of this coin is that fewer traffic violations mean lower ticket revenue for cities, towns, and counties, some of which rely very heavily on this money. A 2019 study by *Governing* magazine, for example, showed that traffic fines accounted for at least 10% of general fund revenues in 583 cities and towns across the country, and that 80 of those relied on traffic fines for over half of their revenue.[54] The consequences of significant drops in this revenue are thus potentially severe. Kevin Davis, a captain in the California Highway Patrol, writes:

> According to one report, about 41 million people receive speeding tickets in the United States every year, paying more than $6.2 billion per year in fines and forfeitures. This translates to an estimated $300,000 in speeding ticket revenue per U.S. police officer every year. Absent this revenue, many cities and counties will have to make adjustments to their resource deployment. This, in turn, could also impact staffing levels; even if there are fewer budgetary impacts than anticipated from a drop in citation revenue, there may be pressure to reduce staffing levels as traffic collision rates decline and the apparent need for traditional traffic enforcement efforts decreases.[55]

---

[50] *See* Clark, *supra* note 2, at 205; Olivia Phillips, *The Robot-Transporter: Sex Trafficking, Autonomous Vehicles, and Criminal Liability for Manufacturers*, 123 DICK. L. REV. 215, 216 (2018); Dorothy J. Glancy, *Autonomous and Automated and Connected Cars-Oh My! First Generation Autonomous Cars in the Legal Ecosystem*, 16 MINN. J.L. SCI. & TECH. 619, 662 (2015).
[51] Dorothy J. Glancy, *Autonomous and Automated, supra* note 50, at 663.
[52] COURT STATISTICS PROJECT, *supra* note 4.
[53] Clark, *supra* note 2, at 205.
[54] Mike Maciag, *Addicted to Fines*, GOVERNING, Aug. 19, 2019, https://www.governing.com/archive/gov-addicted-to-fines.html.
[55] Kevin Davis, *Preparing for a Future with Autonomous Vehicles*, THE POLICE CHIEF 83 (July 2016), https://www.policechiefmagazine.org/preparing-for-a-future-with-autonomous-vehicles/.

For similar reasons, fewer traffic violations could mean cuts to law enforcement agencies and diminished employment opportunities for highway troopers and other police officers.[56]

Second, fully autonomous vehicles will likely reduce opportunities for police to racially profile. Studies have repeatedly shown that police stop Black and Latinx drivers at significantly higher rates than White drivers.[57] Without traffic violations to rely on as pretexts for traffic stops, police officers will have less opportunity to introduce subjectivity (or outright racial animus) into their decisions about which cars to stop, reducing the burden of overpricing on minority communities and achieving and perhaps even beginning to rebuild public trust in law enforcement.[58] While at least one scholar worries that "autonomous vehicles may actually exacerbate uneven enforcement on the roads in the short-term,"[59] and they are likely to be adopted by upper- and middle-income individuals first, that problem should abate relatively quickly over time as autonomous vehicles replace human-driven vehicles as the preferred mode of transportation.[60]

Third, traffic stops of autonomous vehicles may be safer for both police and vehicle occupants alike. In fully autonomous vehicles, occupants may lack the ability to use the car to suddenly flee, a situation dangerous to both law enforcement and nearby civilians.[61] Similarly, if autonomous vehicles are able to connect virtually to smart infrastructure (as many industry observers predict they eventually will), police may be able to gather a significant amount of information from a distance, reducing the likelihood of unjustified police shootings of drivers and passengers and reducing the risk to police inherent in close encounters with vehicle occupants who may turn out to be dangerous.[62] While at least one law enforcement agent has publicly worried about the possibility that autonomous vehicles may free up occupants—who might otherwise have

---

[56] *Id.; see also* Zagorsky, *supra* note 46.
[57] L. Song Richardson, *Implicit Racial Bias and the Perpetrator Perspective: A Response to Reasonable but Unconstitutional*, 83 GEO. WASH. L. REV. 1008, 1015 (2015) ("Copious evidence demonstrates that police disproportionately stop Black and Latino drivers despite the fact that those populations do not commit traffic offenses at significantly higher rates than Whites. Often the assumption is that this results from conscious and intentional racial profiling, and it is certainly true that officers engage in this conduct. Individuals of color, however, will continue to bear the brunt of pretextual policing even in the absence of conscious bias because of the effect of implicit racial biases on officer judgments of criminality and suspicion."); *see also* Joh, *supra* note 3, at 129.
[58] Melissa L. Griffin, *Steering (or Not) Through the Social and Legal Implications of Autonomous Vehicles*, 11 J. BUS. ENTREPRENEURSHIP & L. 81, 95 (2018).
[59] Joh, *supra* note 3 at 129.
[60] Pearl, *Hands Off the Wheel*, *supra* note 10, at 475-78.
[61] Joh, *supra* note 3, at 120.
[62] *Id.* at 124-25.

their hands on the steering wheel—to wield weapons against police bystanders, the risk during traffic stops, which are necessarily stationary, does not seem to be heightened in this manner.[63]

Fourth and finally, knowing that autonomous vehicles are significantly less likely to be stopped at all, criminals may use them to transport illegal contraband, victims of human trafficking, or worse.[64] They may be able to do so, moreover, in vehicles with no human occupants at all, nearly eliminating the risk that a member of the criminal enterprise may be detained or apprehended.[65] Such vehicles, when filled with explosives, could be turned into mobile bombs that could be driven into any publicly accessible location of choice.[66] Law enforcement is already immensely concerned about these possibilities and their ability to respond effectively.[67] Unfortunately, the federal government has almost entirely excluded police from conversations and planning in and around autonomous vehicles.[68] In 2017, for example, the U.S. Department of Transportation established a 25-person advisory committee on autonomous vehicles that included members from industry, academia, labor, and local governments, but did not include a single person from law enforcement, a seemingly significant oversight.[69] Subsequently, in 2020, the RAND Corporation convened a workshop on autonomous vehicles for law enforcement officials specifically that demonstrated that both consider themselves stakeholders on the issues raised by these vehicles and have numerous concerns and questions about their rollout that government has thus far largely overlooked.[70]

II. TRAFFIC STOPS & THE FOURTH AMENDMENT

The Fourth Amendment to the U.S. Constitution guarantees "[t]he right of the people to be secure in their persons, houses, papers, and effects,

---

[63] Davis, *supra* note 55.
[64] *Id.*; Phillips, *supra* note 50, at 216.
[65] *Id.*
[66] Davis, *supra* note 55.
[67] *Id.* ("As with many new technologies, although designed to positively impact quality of life, there will likely be some people looking to utilize the technology for criminal gain or illicit purposes. Although the exact path has yet to be set, the law enforcement community must carefully plan for the development and implementation of autonomous vehicles in order to remain relevant and be properly prepared for the litany of potential outcomes associated with this technology.").
[68] Woods, *supra* note 15, at 76 ("Most law enforcement agencies are not seriously considering or preparing for the new technology, and the few police chiefs and sheriffs that have considered the issue are largely claiming that law enforcement is being left out of major strategic and policy discussions on autonomous vehicles.").
[69] Press Release, *USDOT Announces New Federal Committee on Automation*, U.S. Department of Transportation (Jan. 11, 2017), https://www.transportation.gov/briefing-room/dot0717.
[70] *See generally* GOODISON, *supra* note 19.

against unreasonable search and seizures," and says that "no [w]arrants shall issue, but upon probable cause[71] . . . ." The Founders drafted this amendment with the intention of protecting individual privacy and the sanctity of one's home and possessions from government scrutiny unless and until the government had a sufficiently good reason to interfere.[72] This sort of government intrusion into private life was of immense concern to citizens of the young republic who had suffered widespread abuses of this nature at the hands of King George III and his occupying forces.[73]

As noted above, however, our understanding of the Fourth Amendment has had to evolve and stretch fairly significantly over time as society has moved into the modern era.[74] For more than the first 150 years of its existence, the Fourth Amendment was understood to forbid the government from physically interfering with the tangible property of a citizen without a warrant or recognized exception to the warrant requirement.[75] In 1967, however, in a case called *Katz v. United States*, the Court called this so-called "trespass doctrine" into question, holding that "the Fourth Amendment protects people, not places," and that while what someone "knowingly exposes to the public" is not protected by the Fourth Amendment, what they hold back as private is.[76] In so doing, the Court made privacy—or at least the expectation of privacy—rather than trespass the new hallmark of this area of constitutional jurisprudence.[77] More recently, the Court has struggled to apply *Katz* and its progeny cases to new forms of technologies, and seems to be on the verge of either returning to the trespass doctrine of yore or creating an entirely new theory of Fourth Amendment protection altogether.[78]

While the history of Fourth Amendment jurisprudence has always been tumultuous, vehicles and the Fourth Amendment have always had a particularly fraught relationship. Over the last 100 years, as automobiles have become a dominant feature of American life, courts have struggled to

---

[71] U.S. CONST. amend. IV.
[72] William J. Stuntz, *The Distribution of Fourth Amendment Privacy*, 67 GEO. WASH. L. REV. 1265, 1265 (1999).
[73] Orin S. Kerr, *The Curious History of Fourth Amendment Searches*, 2012 SUP. CT. REV. 67, 70-71 (2012).
[74] *See, e.g.*, *Carpenter v. U.S.*, 138 S.C t. 2206, 2216-17 (2018); *Kyllo*, 533 U.S. at 33-34 ("It would be foolish to contend that the degree of privacy secured to citizens by the Fourth Amendment has been entirely unaffected by the advance of technology."); *Florida v. Riley*, 488 U.S. 445, 451-52 (1989); *Dow Chem. Co. v. United States*, 476 U.S. 227, 239 (1986).
[75] *Katz v. United States*, 389 U.S. 347, 352 (1967) *citing Olmstead v. United States*, 277 U.S. 438, 457 (1928); *Goldman v. United States*, 316 U.S. 129, 134 (1942).
[76] *Id.* at 351.
[77] *See id.*
[78] *Carpenter v. U.S.*, 138 S. Ct. 2206, 2216-17 (2018); *Riley v. California*, 573 U.S. 373, 393-94 (2014); *United States v. Jones*, 565 U.S. 400, 404-11 (2012).

balance the government's interest in maintaining the safety of public roads with the interests of citizens in maintaining their privacy and freedom from government scrutiny while commuting and traveling.[79] This tension has existed since virtually the arrival of motor vehicles on U.S. roads at the turn of the 20th Century. Just around the time they had been adopted en masse by citizens in urban areas, they also started being used to smuggle liquor in violation of the Prohibition laws at the time.[80]

It was from these Prohibition era cases that the first major development in Fourth Amendment traffic stop jurisprudence arose. In *Carroll v. United States*, the U.S. Supreme Court created what has come to be known as the "automobile exception" by upholding a warrantless stop and search of vehicles suspected of transporting liquor as long as the police had probable cause to believe that the vehicles in question were doing so.[81] The Court also recognized, however, that occupants of motor vehicles still retained some privacy rights, and said that police searches of all motor vehicles would be "intolerable and unreasonable."[82]

The primary reason for the automobile exception was clearly articulated in *Carroll*:

> [T]he guaranty of freedom from unreasonable searches and seizures by the Fourth Amendment has been construed, practically since the beginning of Government, as recognizing a necessary difference between a search of a store, dwelling house or other structure in respect of which a proper official warrant readily may be obtained, and a search of a ship, motor boat, wagon or automobile, for contraband goods, where it is not practicable to secure a warrant because the vehicle can be quickly moved out of the locality or jurisdiction in which the warrant must be sought.[83]

---

[79] Glancy, *Privacy in Autonomous Vehicles*, *supra* note 13, at 1219 ("Societal interests in managing transportation and roadways so that public roads are not used for nefarious purposes have had enduring importance. At the same time, concerns about surveillance privacy interests and excessive government power in this setting also were recognized early in the history of the automobile.").
[80] *Id.* at 1219-20.
[81] *Carroll v. United States*, 267 U.S. 132, 153-54 (1925).
[82] *Id.* at 153.
[83] *Id.*

The Court has reaffirmed and expanded that reasoning over time.[84] In *United States v. Ross*, for instance, the Court noted that warrantless searches are justified in the context of automobile searches because "the nature of an automobile in transit" is such that "an immediate intrusion is necessary,"[85] and observed in *South Dakota v. Opperman* that the easy mobility of vehicles "creates circumstances of such exigency that, as a practical necessity, rigorous enforcement of the warrant requirement is impossible."[86]

As straightforward as the automobile exception may appear at first glance, the implications for drivers and passengers are profound:

> The police can force drivers to pull over if the police have probable cause to believe any traffic law has been violated. No crime needs to be suspected: every civil traffic violation suffices, including driving just one mile an hour over the speed limit. After a car has been stopped, the police do not need a warrant to search it. Probable cause to believe a car has evidence or contraband inside permits an extraordinarily invasive warrantless search of the car.[87]

The amount of discretion police officers have during traffic stops based on such little evidence of wrongdoing has thus led many legal scholars to observe that, at this point, Fourth Amendment protections in automobiles are "weak,"[88] "languorous,"[89] or have "all but [been] eviscerated."[90]

The tepidness of Fourth Amendment protections during traffic stops is particularly apparent in the long line of traffic stop cases handed down after *Carroll*. In *Arizona v. Gant*, the Court held that police can conduct a warrantless search of the entire passenger compartment of a vehicle incident to the arrest of an occupant if either the arrestee is within reaching distance of that compartment or the police have reason to believe the vehicle contains evidence of the offense of arrest.[91] In *United States v. Ross*, the Court clarified that, if police have a valid basis to search the

---

[84] *See, e.g.*, *California v. Carney*, 471 U.S. 386, 390 (1985); United States v. Ross, 456 U.S. 798, 806 (1982); *Cooper v. California*, 386 U.S. 58, 59, (1967); *Chambers v. Maroney*, 399 U.S. 42, 52 (1970); *Cady v. Dombrowski*, 413 U.S. 433, 442 (1973).
[85] *Ross*, 456 U.S. at 806.
[86] *South Dakota v. Opperman*, 428 U.S. 364, 367 (1976).
[87] Kerr, *Equilibrium-Adjustment Theory*, *supra* note 1, at 502.
[88] *Id.* at 502–03.
[89] Clark, *supra* note 2, at 201.
[90] *Id.*
[91] *Arizona v. Gant*, 556 U.S. 332, 351 (2009).

interior of a car, they can also search any sealed containers therein.[92] And the Court confirmed in *Whren v. United States* that police can use minor traffic violations as a mere pretext for initiating a stop if they have a mere hunch the driver or passengers may be up to no good.[93]

III. AUTONOMOUS VEHICLES & THE FOURTH AMENDMENT

The major question confronting the legal system now is how all of this precedent will apply in the encroaching brave new world of autonomous vehicles, vehicles that may only be partially driven by a human—or not driven by one at all—and in which the concepts of "driver" and "passenger" no longer mean what they used to. This challenge, moreover, is immensely complicated by the uneven pace of development and adoption of these vehicles, meaning that automobiles on U.S. roads may vary quite significantly in their levels of automation for quite some time before fully autonomous, Level 5 vehicles attain supremacy.[94] What this array of automation means, most importantly, is that it would be a mistake for both courts and law enforcement to adopt a single approach to traffic stops of autonomous vehicles. As one group of scholars astutely observes:

> Each [configuration of autonomous vehicles] includes different conceptions of and roles for "drivers," "passengers," "users," and "occupants"; different systems for communications and control; different systems of spatial organization; different commercial and political arrangements; and different consequences for societal and human values. Each imagination of autonomous automotive transport involves an entire world of reorganization for politics and values--each presenting different challenges for regulators and the public. Reckoning with the implications of these reconfigurations means . . . focusing on how each autonomous transport vision, promoted by various parties, moves toward a different future with particular political and ethical implications.[95]

Courts would be wise, therefore, to approach each level of autonomous vehicles as a distinct category unto itself, deserving of its own tailored

---

[92] *United States v. Ross*, 456 U.S. 798, 825 (1982); *see also California v. Acevedo*, 500 U.S. 565, 580 (1991).
[93] *Whren*, 517 U.S. at 815-16 (1996).
[94] *See supra* notes 21-22.
[95] Jake Goldenfein et. al., *Through the Handoff Lens: Competing Visions of Autonomous Futures*, 35 BERKELEY TECH. L.J. 835, 838 (2020).

application of Fourth Amendment precedent responsive to the unique aspects and challenges of each particular level. As discussed at greater length below, moreover, industry, law enforcement, and private citizens are all important stakeholders in the development of this new line of jurisprudence, and any new legal approach that overlooks the concerns of one of them it as risk to fail.[96]

The following sections are an attempt to identify the most significant Fourth Amendment issues presented by each unique level of automation and explore how existing precedent might apply. Each discussion seeks as its ultimate goal attainment of what the Court sought long ago in *Carroll*: ensuring the safety of public roads (and society more generally) while also protecting the constitutional rights of vehicle occupants.[97] These discussions are not intended to be exhaustive descriptions of the issues presented by each type of vehicle, but endeavor instead to providing a starting point for future development of law in this area.

A. Level 2 (Semi-Autonomous) Vehicles

Level 2 vehicles, those in which the driver can both remove their hands from the wheel and their feet from the pedals but must continuously monitor the vehicle while doing so, arguably place the least amount of stress on existing Fourth Amendment jurisprudence. If anything, in fact, these vehicles may provide police with *more* reasons to initiate a traffic stop than Level 1 vehicles. As I have written about at length previously, Level 2 vehicles present unique risks on public roads because their drivers often (a) don't fully understand the limitations of the semi-autonomous systems within them, and/or (b) do not take their obligation to constantly monitor the vehicle seriously, leading them to make reckless choices dangerous to everyone on the road.[98]

The tragic case of Joshua Brown perhaps best illustrates why semi-autonomous vehicles may warrant additional police scrutiny. On a sunny day in May 2016, Mr. Brown, a 40-year-old licensed driver, was seated in the driver's seat of his 2015 Tesla Model S.[99] At some point, he engaged the "Autopilot" function of the car, Tesla's semi-autonomous driving system that allows the vehicle to steer, accelerate, and brake itself under certain

[96] *See infra* notes 186-230.
[97] *Carroll*, 267 U.S. at 153-54.
[98] Pearl, *Hands on the Wheel, supra* note 38, at 731-38.
[99] Mike Spector & Ianthe Jeanne Dugan, *Tesla Draws Scrutiny After Autopilot Feature Linked to a Death*, WALL ST. J., June 30, 2016, http://www.wsj.com/articles/tesla-draws-scrutiny-from-regulators-after-autopilot-feature-is-linked-to-a-death-1467319355.

conditions.[100] Tesla had stated on a number of occasions that use of its Autopilot feature was "not reliable enough for a driver to stop paying attention [to the road] while in use."[101] Mr. Brown seemingly understood this limitation given that he was known in the online Tesla community for "testing the limits of the Autopilot function" and assessing its strengths and weaknesses under various driving conditions.[102] On the day in question, however, Mr. Brown did not heed Tesla's warnings. Instead, evidence suggests that, at some point after engaging the Autopilot, Mr. Brown picked up a portable DVD player and began watching a Harry Potter film.[103] The consequences of this choice were deadly: Mr. Brown's vehicle drove straight into the trailer of an 18-wheel truck that had turned left in front of the vehicle moments before.[104] The impact sheared the roof off the Tesla and killed Mr. Brown.[105] After the crash, Tesla hypothesized that, given the bright conditions that day, the Autopilot system could not distinguish between the side of the white tractor trailer and the sky behind it, and Mr. Brown did not react in time to avoid a collision.[106]

Thus, Level 2 vehicles place obligations on human drivers in addition to the normal obligations associated with Level 1 vehicles: obligations to use the semi-autonomous systems in their vehicles safely by carefully and continuously monitoring the situation when that system in engaged.[107] This, in turn, means that police may have at least one additional reason to initiate traffic stop of these vehicles, one that did not exist before these vehicles arrived on the consumer market: failure to adequately monitor a vehicle operating at a Level 2 measure of autonomy. Alternatively, this may merely be a new version of a very old problem on public roads: distracted driving. Either way, a police officer who witnesses the driver of a Level 2 vehicle doing something other than watching the road would certainly have probable cause to execute a standard traffic stop given that there are no scenarios in which distracted driving in a Level 2 vehicle would be justifiable. And, in fact, police have already begun making such

---

[100] Tom Krisher & Joan Lowy, *Tesla Driver Killed in Crash While Using Car's 'Autopilot'*, ASSOCIATED PRESS, Jun. 30, 2016, http://bigstory.ap.org/article/ee71bd075fb948308727b4bbff7b3ad8/self-driving-car-driver-died-after-crash-florida-first.

[101] Mahita Gajanan, *Tesla Driver May Have Been Watching Harry Potter Before Fatal Crash*, VANITY FAIR, Jul. 2, 2016, http://www.vanityfair.com/news/2016/07/tesla-driver-may-have-been-watching-harry-potter-before-fatal-crash.

[102] Rachel Abrams & Annalen Kurtz, *Joshua Brown, Who Died in Self-Driving Accident, Tested Limits of His Tesla*, N.Y. TIMES, July 1, 2016, http://www.nytimes.com/2016/07/02/business/joshua-brown-technology-enthusiast-tested-the-limits-of-his-tesla.html.

[103] Gajanan, *supra* note 101.

[104] Spector & Dugan, *supra* note 99.

[105] Krisher & Lowy, *supra* note 100.

[106] Tesla, *A Tragic Loss*, Tesla.com (Jun. 30, 2016), https://www.tesla.com/blog/tragic-loss.

[107] NHTSA PRELIMINARY STATEMENT, supra note 16, at 5.

stops. In May 2021, for example, police officers in Wisconsin pulled over a driver who appeared to be asleep behind the wheel of his Tesla after following him for over two miles at over 80 mile per hour of speed.[108] They cited the driver for inattentive driving.[109]

Where Level 2 vehicles could theoretically complicate matters are situations in which a Level 2 system either malfunctions or otherwise responds poorly to a sudden driving condition, leaving even a very attentive driver with no time to respond. In those scenarios, a nearby police officer might witness a car swerve, depart from a lane without signaling, run off the road, or even hit another car, but lack the ability to determine whether this traffic violation was the fault of the car's semi-autonomous system or the human driver. Again, I would argue that, based upon what he or she has witnessed, a police officer would absolutely have probable cause to execute a traffic stop under such circumstances despite this uncertainty.[110] Drivers in *many* scenarios may not be at fault for traffic violations (*e.g.*, when those violations are caused by sudden brake failures, tire malfunctions, etc.) or may have good reasons for violating traffic laws (*e.g.*, speeding to get a person in heavy labor to the hospital), but Courts have never found that such factors, discovered after the fact, make a traffic stop unconstitutional. Instead, the Supreme Court recognized in *Heien v. North Carolina*, that "[t]o be reasonable is not to be perfect, and so the Fourth Amendment allows for some mistakes on the part of government officials, giving them 'fair leeway for enforcing the law in the community's protection'" and that "searches and seizures based on mistakes of fact can be reasonable."[111]

B. Level 3 (Semi-Autonomous) Vehicles

While Level 2 vehicles may not challenge policing or Fourth Amendment jurisprudence much, the coming arrival of Level 3 vehicles on U.S. roads will likely mark the start of much greater uncertainty, both legally and for traffic patrol officers. As discussed above, Level 3 vehicles can drive themselves in some conditions, but may require a human to

[108] Kate Duffy, *Watch Police Pull Over a Tesla Driver They Say was Asleep at the Wheel Going 82 mph with Autopilot Switched On*, BUSINESS INSIDER, May 20, 2021, https://www.businessinsider.com/watch-police-stop-tesla-driver-asleep-driving-82-mph-autopilot-2021-5.

[109] *Id.*

[110] While Level 2 vehicles may raise difficult questions about who should be held liable in the event that malfunction of the autonomous system injures someone, those questions do not implicate the Fourth Amendment and are thus outside the scope of this paper.

[111] *Heien v. North Carolina*, 574 U.S. 54, 60–61 (2014) *quoting Brinegar v. United States*, 338 U.S. 160, 176 (1949).

retake control when signaled to do so by the vehicle itself.[112] While drivers of Level 2 vehicles must monitor their car constantly while using its autonomous features, drivers of Level 3 vehicles have greater leeway to engage in other tasks assuming they can do so while remaining ready to retake control of the vehicle when alerted. Thus, while distraction is never justified in a Level 2 vehicle, distraction may not only be safe in a Level 3 vehicle, it is likely to be one of the major appeals of using this kind of vehicle.[113]

But, Level 3 vehicles will likely present law enforcement with the same kind of challenge posed by Level 2 vehicles: not knowing whether a given car is being piloted autonomously or driven by a human driver at any given moment.[114] The difference is that, in a Level 2 vehicle, distracted driving arguably *always* provide probable cause for a traffic stop since it is never justified, whereas in a Level 3 vehicle, distracted driving should not. Indeed, someone sitting in the driver's seat of a Level 3 vehicle texting, reading a book, or watching a movie may be doing so completely safely, and thus may not be violating any traffic laws at that moment. The problem, of course, is that a police officer may not know what level of autonomous vehicle it is, whether the autonomous system has been activated, and whether, if activated, the driver has been signaled to retake control at that moment. In short, when Level 3 vehicles become available to consumers, coexist with Level 0, 1, and 2 vehicles on U.S. roads, and an officer witnesses a distracted driver, one of four scenarios is possible:[115]

1. The distracted driver is driving a Level 0, 1, or 2 vehicle and is violating existing traffic laws;

2. The distracted driver is driving a Level 3 vehicle, has not activated the autonomous system, and is violating existing traffic laws;

3. The distracted driver is using a Level 3 vehicle, *has*

---

[112] SAE INT'L, AUTOMATED DRIVING: LEVELS OF DRIVING AUTOMATION ARE DEFINED IN NEW SAE INTERNATIONAL STANDARD J3016, at 1 (2014), https://cdn.oemoffhighway.com/files/base/acbm/ooh/document/2016/03/automated_driving.pdf [https://perma.cc/YWX2-UF3N].

[113] Alex Davies, *Ford's Skipping the Trickiest Thing About Self-Driving Cars,* WIRED, Nov. 10, 2015, 7:00 AM), https://www.wired.com/2015/11/ford-self-driving-car-plan-google; Glancy, *supra* note 13, at 125-26 ("Without appropriate legal protections for privacy, autonomous vehicles could well meet 'market resistance' from potential users who perceive autonomous vehicles as threats to their privacy. Similarly, assuring respect for user privacy is one of the best ways to foster trust and confidence in new technologies such as autonomous vehicles.")

[114] GOODISON, *supra* note 19.

[115] This analysis proceeds under the assumption that the relevant jurisdiction lacks statutory law banning distracted driving in vehicles of all levels of automation.

activated the autonomous system, and is *not* violating existing traffic laws;

4. The distracted driver is using a Level 3 vehicle, has activated the autonomous system, but has been signaled to retake control of the vehicle, not done so, and is violating existing traffic laws.

This identification problem will be compounded by the fact that, discussed above, manufacturers are releasing different levels of autonomy in their vehicles at different rates and even pushing new levels of automation to vehicles post-purchase via over-air-updates.[116] Law enforcement, moreover, has already signaled that they anticipate this identification issue being a major problem. Proceedings of the 2020 Rand Conference reported that "[law enforcement] needs methods to determine whether and when an AV is operating without human control. This is critical from a legal standpoint because how a vehicle is operating could factor into officers' reasonable suspicion and probable cause determinations."[117]

One potential solution would be to rule that the burden of identifying whether a distracted driver falls into Scenario 1, 2, 3, or 4 should not fall on law enforcement, and that witnessing a distracted person in a driver's seat is always sufficient to give police reasonable suspicion or even probable cause to initiate a traffic stop, regardless of the level of autonomy of the driver's vehicle and whether the autonomous system has been engaged. In fact, without meaningful changes in how these cars are manufactured, police may entirely lack the ability to determine what kind of vehicle someone is driving, particularly in the quickly moving world of traffic enforcement.[118] The problem, of course, is that this kind of blanket approach could greatly undermine what will arguably be major appeal and utility of Level 3 vehicles: being able to engage in other tasks while the car is driving itself. If using the autonomous system of a Level 3 vehicle exposes drivers to a greater threat of traffic stops, some (if not many) consumers may opt not to purchase them at all, impeding the adoption and development of this technology.[119] This might be particularly true for

[116] *See supra* notes, 33-35.
[117] GOODISON, *supra* note 19
[118] *Id.* ("Participants described a variety of needs related to actively and retroactively communicating with AVs. In particular, participants thought that [law enforcement] needs to have . . . some way of determining when a vehicle is operating autonomously. Vehicles with differing levels of autonomy are going to be on the road, and establishing the participation of a human driver will affect several important issues, such as [that] for initiating a traffic stop and culpability for driving behavior.").
[119] While some might argue that the threat of traffic stops is *de minimus* if a citation is unlikely to result from that stop, studies consistently show that even non-citation yielding stops are highly stressful for drivers and passengers alike. In short, no one likes getting stopped by the police.

consumers from communities of color for whom traffic stops carry much greater risk.[120] Surely this would be an unacceptable outcome for consumers, industry, and arguably society, as studies consistently show that high levels of motor vehicle automation on U.S. roads will significantly improve highway safety.[121]

Another possible solution would be to use market share of Level 3 vehicles (as measured by percentage of vehicles on public roads with this level of automation) to determine whether police have probable cause to make stops for distracted driving more generally. Indeed, once the market share of Level 3 vehicles is high enough, police will arguably no longer have probable cause or reasonable suspicion to suspect that a distracted driver is violating the law. With respect to satisfying probable cause in these case, in *Carroll*, the Court said that probable cause only exists where police have "a reasonable ground for belief of guilt."[122] This means that the "facts and circumstances" of the situation are such as to warrant a police officer "of prudence and caution in believing that [an] offense has been committed."[123] Moreover, the Court has also observed that an assessment of probable cause necessarily "deal[s] with probabilities."[124] While these are "not technical; they are the factual and practical considerations of everyday life on which reasonable and prudent men, not legal technicians, act."[125] Presumably, once Level 3 vehicles make up a majority of vehicles on the road in a given area, the statistical chances that a distracted driver falls into the third scenario above is significant. This, in turn, would suggest that police would no longer have a reasonable ground for belief of guilt if they see someone, say, texting while sitting in the driver's seat of a moving vehicle.

But, police can justify brief traffic stops on the basis of mere reasonable suspicion, too, so a market share approach, to be viable, would need to yield a similar result under this standard, as well.[126] In determining whether police had reasonable suspicion to make a stop, courts "look at the totality of the circumstances of each case to see whether

---

[120] Sharon LaFraniere & Andrew W. Lehren, *The Disproportionate Risks of Driving While Black*, N.Y. TIMES, Oct. 24, 2015, https://www.nytimes.com/2015/10/25/us/racial-disparity-traffic-stops-driving-black.html.

[121] Bryant Walker Smith, *Automated Driving and Product Liability*, 2017 MICH. ST. L. REV. 1, 19-20 (2017) ("[A]utomating every motor vehicle trip could reduce total crash magnitude. In short: Automated driving systems may crash less frequently and less severely, and those who are involved in these crashes may be better protected.")

[122] *Carroll*, 267 U.S. at 161, *quoting McCarthy v. De Armit*, 99 Pa. 63, 69 (1881).

[123] *Id.*, *quoting Stacey v. Emery*, 97 U.S. 642, 645 (1878).

[124] *Brinegar v. United States*, 338 U.S. 160, 175 (1949).

[125] *Id.*

[126] *Navarette v. California*, 572 U.S. 393, 396–97 (2014) *citing United States v. Cortez*, 449 U.S. 411, 417-18 (1981).

the detaining officer ha[d] a particularized and objective basis for suspecting legal wrongdoing."[127] This, in turn, means allowing officers "to make inferences from and deductions about the cumulative information."[128] Although more than a mere hunch is required, "the likelihood of criminal activity need not rise to the level required for probable cause, and it falls considerably short of satisfying a preponderance of the evidence standard."[129] Seemingly, the totality of the circumstances would require an officer to consider the likelihood that someone who appears to be a distracted driver is, at that moment, merely riding in a Level 3 vehicle driving autonomously, particularly if a significant number of the vehicles on the road in that area are semi-autonomous. This may mean that, for some period of time, police officers in rural areas not known for early adoption of new technologies (*e.g.*, Lancaster, Pennsylvania) may have an easier time establishing reasonable suspicion for traffic stops for distracted driving than officers in urban areas with a high number of early adopters (*e.g.*, San Francisco, California). Thus, while a reasonable suspicion standard gives police more leeway in all situations, the percentage of Level 3 vehicles on the road would still seemingly be a relevant factor for consideration.

A third possible solution to the quandary posed by Level 3 vehicles could come from industry rather than from courts. One legal scholar, has suggested that manufacturers outfit all autonomous vehicles with exterior indicator lights which, when illuminated, would indicate to any observer that the vehicle is being driven by its autonomous system rather than by a human driver.[130] While at least one state has passed a law requiring autonomous vehicles to have "a visual indicator *inside* the cabin to indicate when the autonomous technology is engaged," no jurisdiction has yet demanded that these vehicles have exterior lights indicating the same, even though such lights would be tremendously helpful to law enforcement.[131] Another, perhaps simpler possibility would be to require Level 3 vehicle owners to identify their vehicle's level of autonomy upon registration and place a sticker on a designated section of the exterior of their vehicle to signal its level of autonomy. Both the sticker and the car's registration itself could, in turn, inform law enforcement that a "distracted" driver therein is unlikely to be driving at all. A third possibility would be to enable Level 3 cars "to emit an electronic signal that could be

---

[127] *United States v. Arvizu*, 534 U.S. 266, 273–74 (2002) (internal quotations and citations omitted).
[128] *Id.*
[129] *Id.* at 274.
[130] Alyssa Vallar, *Robots on the Road: Fourth Amendment Implications of Stopping and Searching an Autonomous Vehicle*, 26 GEO. MASON L. REV. 587, 587-88 (2018).
[131] CAL. VEH. CODE § 38750(c)(1)(B) (West) (emphasis added).

read by [law enforcement] to determine whether a vehicle is operating autonomously.[132]

C. Level 4 & 5 (Fully Autonomous) Vehicles

Fully autonomous vehicles will likely eliminate the problem of distracted driving—and the appearance of districted driving—entirely. Early mockups of the interiors of these vehicles often show them without a driver's seat or even a steering wheel, so police should be able to determine fairly easily via simple observation that a vehicle is fully autonomous.[133] However, fully autonomous vehicles may pose a different—and potentially very serious—problem for law enforcement. Since manufacturers plan to program fully autonomous vehicles to drive in near perfect compliance with traffic laws, the ability of police officers to establish either reasonable suspicion or probable cause to initiate a traffic stop could be significantly curtailed.[134] This limitation, in turn, could create huge incentives for criminals to use these vehicles for nefarious purposes such as transporting drugs, other forms of contraband, and even victims of human trafficking or kidnapping:

> Removal of the pretextual traffic stop, one of the most valuable tools of policing, may foster more crime inside of driverless cars. Crime within driverless cars may be further fostered by 360-degree blacked-out window tinting. Laws regulating window tinting are aimed at ensuring driver visibility, but those laws would be unnecessary for driverless cars. For smugglers, driverless cars would make ideal couriers. Driverless cars could be loaded with drugs

---

[132] GOODISON, *supra* note 19.

[133] *See* Justin Pritchard, *How Can People Safely Take Control From a Self-Driving Car?*, ASSOCIATED PRESS, Nov. 30, 2015, http://bigstory.ap.org/article/84c6f179beb24f758a40acac1340ce78/how-can-people-safely-take-control-self-driving-car; Alex Davies, *Google's Self-Driving Car Hits Roads Next Month-- Without a Wheel or Pedals*, WIRED, Dec. 23, 2014, http:// www.wired.com/2014/12/google-self-driving-car-prototype-2/.

[134] Clark, *supra* note 2, at 205; Glancy, *Autonomous and Automated*, *supra* note 50, at 663. Note that the analysis in this section proceeds from the assumption that manufacturers will ultimately be successful in programming autonomous vehicles to operate perfectly. However, it is possible (if not likely) that this will take time to achieve and that there may some intermediate period in which fully autonomous vehicles still break the law. *See* Vallar, *supra* note 130, at 610 ("For example, a human driver understands that she must drive more cautiously on certain residential roads on Halloween night, and even distinguishes between young trick-or-treaters and mischievous teenagers to adjust her predictions and thus her behavior accordingly. Human drivers also often make split-second ethical decisions, such as choosing between striking a child who dashes unexpectedly into the street or veering off the road and thereby putting the occupants' safety at risk. Unless and until autonomous technology is able to grapple with such subjective evaluations, AVs will drive recklessly at times.").

> or other contraband and, if interdicted, would not "flip" and cooperate with law enforcement like human couriers might.[135]

In more extreme scenarios, moreover, fully autonomous vehicles could be filled with explosives or biological weapons and used as lethal weapons.[136] These possibilities should obviously be of concern to citizens and law enforcement alike.

Additionally, while there may be many benefits to an overall reduction in traffic stops resulting from the use of fully autonomous vehicles, these benefits are likely to come at the expense of detecting and stopping crime more generally.[137] Indeed, "[c]onducting traffic stops has been a cornerstone of policing for decades, often leading to the identification of crimes unrelated to the act of driving."[138] Police often use their ability to initiate traffic stops to conduct broader investigations of suspicious activity as traffic stops can—for better or worse—evolve into more significant stops involving searches of the interior of the vehicle, dog sniffs of the exterior of the vehicle, and/or extensive questioning of the occupants, all of which can result in evidence of non-traffic-related crimes.[139] Stymieing law enforcement's ability to conduct these traffic stops could thus change the nature of policing in this country and make it more difficult for police to ferret out crime of all types. Moreover, if, as predicted, these vehicles become a preferred choice for criminals, the availability of fully autonomous vehicles on the consumer market might actually result in an overall *increase* in crime.[140]

At some point, this tradeoff would presumably become unacceptable to most citizens, as the many benefits of these kinds of vehicles become overshadowed by their use to commit "perfect" or at least highly undetectable crimes. This situation would place fully autonomous vehicles in the same category as consumer goods such as Sudafed,[141] gun

---

[135] Clark, *supra* note 2, at 207-08.
[136] Clark, *supra* note 2, at 207-08; Federal Bureau of Investigation, *Autonomous Cars Present Game Changing Opportunities and Threats for Law Enforcement*, FBI, May 20, 2014, https://info.publicintelligence.net/FBI-AutonomousVehicles.pdf.
[137] *See* Zagorsky, *supra* note 46.
[138] Davis, *supra* note 55.; *see also* Zagorsky, *supra* note 46.
[139] Wayne R. LaFave, *The "Routine Traffic Stop" from Start to Finish: Too Much "Routine," Not Enough Fourth Amendment*, 102 MICH. L. REV. 1843, 1844-45 (2004).
[140] *See* Glancy, *Autonomous and Automated*, *supra* note 50, at 663.
[141] Raphael S. Nemes*, Shake and Bake: The Meth Threat and the Need to Rethink 21 U.S.C. S 841(c)(2),* 88 WASH. U.L. REV. 993, 999 (2011) ("Due to a new method of methamphetamine production commonly called "shake and bake" meth or "one pot" meth, small, legal quantities of pseudoephedrine are now enough to produce methamphetamine on a small scale. Using pseudoephedrine purchased at stores in legal amounts by so-called "smurfs," methamphetamine

silencers,[142] and, more recently, cryptocurrencies:[143] products with high levels of utility that have been compromised by frequent use in crime, resulting in regulation (or calls for regulation) placing much greater restrictions on sale, ownership, possession, and/or use.

The relevant question, therefore, is the extent to which existing Fourth Amendment jurisprudence truly impedes the ability of police to stop a fully autonomous vehicle. Are scholars and commentators right that police will have little to no ability to stop these vehicles, eventually rendering traffic stops mostly obsolete?[144] Or, is the vast jurisprudence around traffic stops and the Fourth Amendment permissive enough to provide law enforcement with more opportunities than one might initially think to develop reasonable suspicion or probable cause to stop a fully autonomous vehicle? The answer is likely dependent on a number of factors, including "the presence or absence of the car's owner, the mobility of the vehicle, and the extent to which it is regulated."[145] The most significant factor, however, is likely to be whether the vehicle is occupied or unoccupied by passengers.[146]

1. Occupied Level 4 & 5 Vehicles

With respect to fully autonomous vehicles that are occupied, police could form reasonable suspicion to stop the vehicle in several ways. First and foremost, police could develop reasonable suspicion based on mere observation of the occupants. The Supreme Court has said on repeated occasions that suspicious behavior on the part of car passengers can form the basis of both reasonable suspicion and even probable cause.[147] In

users are able to create their addictive product on their own at nearly any location.") (internal quotations and citations omitted).

[142] Robert J. Spitzer, *Gun Accessories and the Second Amendment: Assault Weapons, Magazines, and Silencers*, 83 J. LAW & CONTEMP. PROBS. 231, 246-49 (2020) ("Engineer Hiram Maxim invented the gun silencer in the early 1900s and patented it in 1908, Maxim immediately sought to sell his invention to the American military, as well as to those of European nations. Objections to civilian use of silencers appeared almost immediately. In 1909, *Scientific American* reported on a direct demonstration of the device, discussing in detail its technological traits and value for military use. But the piece also noted "the menace" of silencers because they 'greatly enlarged the opportunities for the commission of undetected crime.'") (internal citations omitted).

[143] *See* Gabrielle Chasin Velkes, *International Anti-Money Laundering Regulation of Virtual Currencies and Assets*, 52 N.Y.U. J. INT'L L. & POL. 875, 844 (2020) ("Because there is not an internationally uniform understanding of what constitutes a virtual asset and a virtual asset service provider, money launderers will likely be able to find and exploit potential regulatory gaps. Differences between national schemes present opportunities for criminals to take advantage of open or non-regulated virtual assets to continue to launder profits.").

[144] *See* Clark, *supra* note 2, at 205; Glancy, *Autonomous and Automated*, *supra* note 50, at 663.

[145] Barrett, *supra* note 38, at 184.

[146] *See infra* notes 147-85.

[147] *See infra notes* 148-54.

United States v. Brignoni-Ponce, for instance, the Court said that, in establishing reasonable suspicion for a traffic stop, officers may consider the number of passengers, the behavior of those passengers (*e.g.*, are they "trying to hide"), and even their "mode of dress and haircut."[148] Similarly, in *United States v. Arvizu*, the Court said that a police officer had reasonable suspicion to stop a vehicle after witnessing the driver appearing "rigid," the knees of children in his back seat being "unusually high, as if their feet were propped up on some cargo on the floor," and the children waving at him in an "odd" and "abnormal" way.[149] Lower courts also frequently find that passenger behavior can form the basis of reasonable cause and that even very vague factors such as "stiff" behavior,[150] appearing nervous,[151] staring straight ahead while a police officer passes,[152] or being "dirty" and unbathed can suffice.[153] There is seemingly no reason why police could not make similar observations about the occupants of fully autonomous vehicles and then execute traffic stops accordingly. Even something as simple as occupant failure to use seatbelts would, if observed by officers, be enough to execute a traffic stop.[154]

Second, police could develop reasonable suspicion to stop a fully autonomous vehicle based on the type of vehicle (*e.g.*, truck vs. car), its location, and whether it appears to be carrying a significant amount of weight ("riding low").[155] In *United States v. Cortez*, the Court held that officers had reasonable suspicion to initiate a traffic stop to investigate suspected smuggling of undocumented immigrants based upon, among other factors, the number of passengers the vehicle could hold, its location near a known area of border crossing, and the time of night it was observed.[156] In *United States v Brignoni-Ponce*, the Court noted that other features of a vehicle, like the availability of "large compartments for fold-down seats or spare tires" could also be relevant in establishing reasonable suspicion.[157] Even factors like out-of-state license plates and "travel

[148] *United States v. Brignoni-Ponce*, 422 U.S. 873, 885 (1975).
[149] United States v. Arvizu, 534 U.S. 266, 270-71 (2002).
[150] *United States v. Westhoven*, 562 F. App'x 726, 731 (10th Cir. 2014).
[151] *United States v. Bautista-Silva*, 567 F.3d 1266, 1270 (11th Cir. 2009).
[152] *Id.*; *see also United States v. Garcia*, 118 F. App'x 690, 692 (4th Cir. 2004).
[153] *United States v. Cervantes*, 797 F.3d 326, 335 (5th Cir. 2015). One factor that will become irrelevant in the context of fully autonomous vehicles is "the officer's ability to consider erratic or unusual driving patterns" since a human occupant is unlikely to have the ability to change how the vehicle drives in response to nearby police officers. Roseman, *supra* note 9, at 27.
[154] *See* Clark, *supra* note 2, at 203.
[155] *United States v. Pacheco-Espinosa*, 121 F. App'x 352, 355 (10th Cir. 2005); *see also Brignoni-Ponce*, 422 U.S. at 884-85.
[156] *Cortez*, 449 U.S. at 415-20.
[157] *Brignoni-Ponce*, 422 U.S. at 885.

patterns" might suffice.[158] Again, there are no reasons to think this would no longer be true in the context of fully autonomous vehicles.

Third, police could form reasonable suspicion to stop a fully autonomous vehicle based on a credible tip. The Court in both *Adams v Williams and Alabama v. White* found that an informant's tip can form the basis of reasonable suspicion if it has an "indicia of reliability."[159] In making this assessment, police must consider the informant's veracity, previous reliability, and basis of knowledge under a totality of the circumstances approach.[160] So, assuming a police officer receives reliable information than an occupied autonomous vehicle is being used for criminal purposes, they would certainly have reasonable suspicion to execute a traffic stop.[161] For example:

> Suppose . . . that an officer receives an anonymous tip that an individual has been employing [autonomous vehicles (AVs)] to deliver drugs from his home, and that the suspect planned one such delivery for the next day. The tipster informs the officer that the suspect will summon an Uber AV, place a large brown suitcase in the back of the vehicle, and then send it to a local motel. Suppose further that the officer decides to investigate this tip and does in fact observe a man emerge from the described house, approach the Uber AV idling at the curb, and place a brown suitcase in the back seat. The officer then follows the vehicle for a few blocks and decides to pull the AV over once it turns onto the street where the motel is located. At that point, the facts known to the officer would certainly amount to enough reasonable suspicion to stop the vehicle, regardless of whether anyone was occupying the AV at the time. The tip and the corroborating circumstances would give the officer reason to suspect that "criminal activity may be afoot."[162]

As this hypothetical scenario makes clear, while autonomous vehicles may use utilize new and novel technologies, community members will still be able to use their eyes, ears, and life experience to identify suspicious or even outright criminal behavior and notify law enforcement. A strange vehicle with strange occupants slowly casing houses in the middle of the

---

[158] *United States v. Westhoven*, 562 F. App'x 726, 732-33 (10th Cir. 2014).
[159] *Alabama v. White*, 496 U.S. 325, 328 (1990); *see also Adams v. Williams*, 407 U.S. 143 (1972).
[160] *Illinois v. Gates*, 462 U.S. 213, 214 (1983).
[161] Roseman, *supra* note 9, at 29.
[162] Vallar, *supra* note 130, at 611, *quoting Terry v. Ohio*, 392 U.S. 1, 30 (1968).

night will seem suspicious regardless of whether the vehicle is autonomous or not.

Thus, while fully autonomous vehicles are likely to drive while causing few, if any, traffic violations, they will not be unstoppable if they are occupied. Police will be able to use observations about the passengers and the vehicle itself in addition to credible tips to establish reasonable suspicion to execute a traffic stop. Police *are*, however, likely to largely lose their ability to conduct pretextual stops: stops "where officers stop a motorist for a minor violation in order to investigate a potentially more serious crime."[163] From a law enforcement perspective, this may be a serious blow, as one scholar has estimated that pretextual stops may account for fully half of all police encounters with the public, and remain an easy way for police to detect and stop crime.[164] From a societal perspective, however, a significant reduction in pretextual stops would almost certainly represent a positive change in policing, as officers have overly relied on these kind of stops in recent years and undermined the privacy of citizens in the process:

> While police are sworn to uphold the Constitution, they are, after all, "engaged in the often competitive enterprise of ferreting out crime." It is thus perhaps not too surprising that, in the course of their attempts to stem the drug traffic, the police have been so relentless in pushing their claimed authority relating to traffic stops to the absolute limits. But it is sad, to say the least, that so many judges have served as ready and willing accomplices in these excesses, thereby treating the Fourth Amendment as largely an irrelevancy in the context of "routine traffic stops." Surely the one hundred ninety million licensed drivers in this country, subjected to the millions upon millions of traffic stops made annually, are entitled to more than this.[165]

Additionally, as discussed above, since people of color "bear the brunt of intrusive police conduct and its attendant harms during pretextual traffic stops," minimizing the opportunity to conduct such stops could go a long

[163] Robin Washington, *Autonomous Vehicles Will Mean the End of Traffic Stops*, WIRED, Sept. 30, 2016, https://www.wired.com/2016/09/autonomous-vehicles-will-mean-end-traffic-stops/.
[164] *Id.*
[165] LaFave, *supra* note 139, at 1905, *quoting Johnson v. United States*, 333 U.S. 10, 14 (1948).

way in reducing racial disparities in policing,[166] and "restoring public trust in police departments and government that has faded tremendously."[167]

2. Unoccupied Level 4 & 5 Vehicles

Establishing reasonable suspicion or probable cause to stop *unoccupied* fully autonomous vehicles will undoubtedly be more difficult.[168] Without occupants, police officers will have less to observe and fewer indicia of potential criminal activity.[169] While police will certainly retain the ability to use tips and observable characteristics of the vehicle itself to establish reasonable suspicion, even these factors are likely to be less meaningful in the context of unoccupied autonomous vehicles. For example, as discussed above, courts have held that police can use the location and/or route of a vehicle to establish reasonable suspicion.[170] A car that seems out of place in a given neighborhood or to be taking an unusual route may be grounds for suspicion. However, in the context of unoccupied, fully autonomous vehicles:

> [I]mmediate observations like the route taken or even the neighborhood where the vehicle is being operated may be less indicative of criminal activity. When the AV takes control of the navigation of the vehicle and the route taken, these factors may simply be indicative of the programming of the vehicle, rather than an indication that criminal activity may be afoot. That is not to say that the location of the vehicle and route taken will become completely irrelevant, but the weight given to those factors should be reduced in many instances.[171]

In short, what may, in fact, be suspicious activity in a conventional, semi-autonomous, or even fully autonomous but occupied vehicle may be the result of an algorithm in an unoccupied vehicle. Additionally, as with occupied fully autonomous vehicles, police will not have the ability to make pretextual stops because these cars will likely operate in total compliance with all relevant traffic laws.[172]

---

[166] Woods, *supra* note 15, at 83.
[167] Griffin, *supra* note 58, at 95.
[168] *See infra* notes 169-74. Note that this section presumes that manufacturers of fully autonomous vehicles will program them to pull to the side of the road and stop when signaled to do so by the police, although it is still uncertain how precisely they will do so. *See* GOODISON, *supra* note 19.
[169] Roseman, *supra* note 9, at 28.
[170] *Cortez*, 449 U.S. at 415-20; *United States v. Westhoven*, 562 F. App'x 726, 732-33 (10th Cir. 2014).
[171] Roseman, *supra* note 9, at 28.
[172] *See supra* notes 134-36.

With so little to go on, moreover, even observable characteristics of the vehicle that may, in fact, be suspicious may not be enough to rise to the level of reasonable suspicion if they exist in isolation, given that courts apply a totality of the circumstances analysis to these determinations.[173] For instance, if police witness an unoccupied, fully autonomous vehicle "riding low" in the back, a factor that courts have said may suggest the vehicle is carrying contraband, it is highly doubtful that factor alone, without something more, would be enough to establish reasonable suspicion.[174] Viewed in isolation, there are a vast number of innocent explanations for a weighed-down car: perhaps the vehicle is moving a significant number of household goods from a former home to a new home; perhaps the vehicle is transporting suitcases filled with items intended for donation at the destination; or perhaps the vehicle is carrying books from the office of a professor to their home in preparation for a summer's worth of research and writing. Without any other factors to consider, the situation could be described as something like "Schrodinger's Trunk;" police have no more reason to believe that the trunk is filled with contraband than they do to believe it is filled with lawful goods, and continued observation of the exterior of the car is unlikely to yield more clues. In a situation like that, a traffic stop would surely run afoul of the Fourth Amendment.

Troublingly, this analysis suggests that the concerns of industry observers are correct: criminals will be able to use unoccupied Level 4 and 5 vehicles to commit crimes successfully and with little risk of detection.[175] If criminals take basic precautions to ensure that illegal goods (or victims) are not observable from the exterior of the car, program the vehicle to use well-traveled roads during normal hours, and otherwise make the vehicle inconspicuous, police will likely struggle mightily to establish reasonable suspicion to stop that vehicle in the absence of a credible tip.[176] This situation begs the questions: (1) How big of a problem is this likely to become; (2) Is a solution needed?; and (3) If so, what are the potential options?

With respect to the first question—how big of a problem use of unoccupied autonomous vehicle for criminal purposes is likely to become—

---

[173] *See Illinois v. Gates*, 462 U.S. at 214.

[174] *United States v. Pacheco-Espinosa*, 121 F. App'x 352, 355 (10th Cir. 2005); *see also Brignoni-Ponce*, 422 U.S. at 884-85.

[175] *See* Davis, *supra* note 55; Phillips, *supra* note 50, at 216.

[176] For an example of a vehicle that violates these principles, consider the car that has recently taken Lubbock, Texas by storm: a black Lincoln with a large decal reading "Cocaine & Hookers" on the back window, and that is falling into greater disrepair over time. *See* Lance Balance, *It's Time for Lubbock to Step Up and Show Our Love of Cocaine and Hookers*, AWESOME98, Jan. 7, 2022, https://awesome98.com/its-time-for-lubbock-to-step-up-and-show-our-love-of-cocaine-and-hookers/.

no data currently exists because fully autonomous vehicles are not yet available to consumers. However, we can use what we know about the risks associated with crime more generally to speculate.[177] Currently, there are several significant risk factors associated with using occupied vehicles in the course of committing a crime:

- Human drivers frequently make mistakes and break traffic laws, making human-driven vehicles exponentially more likely than autonomous vehicles to be stopped by the police, pretextually or otherwise.[178]

- Once a vehicle is stopped, police have a much better opportunity to see, smell, and hear the vehicle up close, increasing the risk police will develop probable cause to search the vehicle and find illegal contraband.[179]

- Even if police lack probable cause for a search, they are entitled to conduct a dog-sniff of the exterior of the car if they can do so in a reasonable amount of time. This, too, can reveal the presence of contraband.[180]

- In situations in which police lack probable cause to search a vehicle, the occupants of the vehicle may (and often do) to consent to a search at the request of officers on the scene, which could also lead to the discovery of contraband.[181]

- If police find contraband or even merely have evidence that a traffic violation has occurred, they are entitled to arrest the driver and/or the passengers of the vehicle, creating the risk that the relevant gang or criminal organization could lose a valuable member or, worse, find themselves confronted with a member who "flips" and cooperates with law enforcement.[182]

---

[177] *See* Glancy, *Privacy in Autonomous Vehicles*, *supra* note 10, at 1216-17.
[178] *See* Smith, *supra* note 121, at 1844-45.
[179] Roseman, *supra* note 9, at 30.
[180] *Illinois v. Caballes*, 543 U.S. 405, 409 (2005).
[181] *Schneckloth v. Bustamonte*, 412 U.S. 218, 222 (1973); *see also* Alafair S. Burke, *Consent Searches and Fourth Amendment Reasonableness*, 67 FLA. L. REV. 509, 511 (2016) ("[M]ultiple scholars have estimated that consent searches comprise more than 90% of all warrantless searches by police, and that they are "unquestionably" the largest source of searches conducted without suspicion.")
[182] Clark, *supra* note 2, at 207-08.

Unoccupied fully autonomous vehicles not only have none of these risks associated with them, they are likely to be faster and more efficient than human-driven vehicles.[183] The relevant question, therefore, is not "Will criminals use unoccupied, fully autonomous vehicles to commit crime," it is "Why would they not?" Other than the possibility that, for some period of time, fully autonomous vehicles may be more expensive than their less autonomous counterparts, there appear to be no downsides to using such vehicles to commit crime, and significant upsides to doing so.

A more difficult question to answer is whether this is a problem in need of a solution. On the one hand, surely no reasonable person (or government) is unconcerned by the prospect of criminals acquiring the ability to commit crimes more successfully and with less detection. On the other, if the solution to this problem requires stretching Fourth Amendment jurisprudence even further than it has already been stretched in order to give police the ability to stop vehicles with something less than reasonable suspicion (or with a watered down reformulation of reasonable suspicion), the price may simply be too high. As one scholar has argued, "Though the police may be slightly more restricted in stopping AVs, any increase in the government's power to stop automobiles could be devastating to our privacy, and courts should refrain from increasing the government's power in this area."[184] Remember that while police may lack the ability to readily stop unoccupied autonomous vehicles, they still retain the ability to detect and prevent crime in another way: through standard police work. In this view, diminished ability to stop fully autonomous vehicles merely amounts to the elimination of a convenient investigatory shortcut for law enforcement rather than a fatal blow to their ability to perform their duties successfully.

How—or whether—we solve the problem of traffic stops and unoccupied fully autonomous vehicles is ultimately likely to turn on how politically, legally, and perhaps even culturally palatable the solutions are. Identifying those potential solutions is thus a critical component of this analysis, and the component to which we now turn.

---

[183] *See id.*; NATIONAL SCIENCE & TECHNOLOGY COUNCIL, *supra* note 20, at 1 ("The potential economic and societal benefits of AVs could also be substantial, including increased economic productivity and efficiency, reduced commuting time, and even the potential reduction of the environmental impact of conventional surface vehicles while increasing overall system energy efficiency. In addition, adoption of AVs may provide mobility to citizens who currently face transportation challenges, increasing their access to jobs and services and their ability to live independently.").

[184] Roseman, *supra* note 9, at 2.

IV. POTENTIAL SOLUTIONS

The potential solutions to the problem of unoccupied, fully autonomous vehicles being mostly "unstoppable" by police range from promulgating fairly minor new traffic regulations to significantly increasing government surveillance initiatives. In this section, I consider six possible solutions in order from least to most extreme. Note that this is neither an exhaustive list nor a full analysis of each of these possibilities (all of which could be given a full-length article treatment), but is instead intended as an overview of the major legal implications of each.

A. Restrictions on Visibility Obstructions

First, state and local governments could ban efforts to obscure visibility of the interior passenger compartment of fully autonomous vehicles. Prohibitions on the use of dark window tinting and other forms of window coverings, restrictions on the size and number of interior compartments such as glove boxes, bans on the use of large interior partitions or privacy screens, and other restrictions on modifications to the interior of the car that are designed to reduce visibility could increase the likelihood of police observing suspicious behavior and items in these vehicles (and thus developing reasonable suspicion to execute a traffic stop) and make it more difficult for criminals to use fully autonomous vehicles for nefarious purposes.[185] Such regulations, moreover, would be consistent with many similar regulations that already exist, and would not mark a radical new form of vehicle regulation.[186]

While ardent privacy activists might complain that such regulations unfairly encroach upon the privacy and autonomy of the owners and passengers of fully autonomous vehicles, the Supreme Court has repeatedly held that individuals have a lesser expectation of privacy in their vehicles than they do in their homes.[187] As the Court in *Cadwell v. Lewis* explained:

> One has a lesser expectation of privacy in a motor vehicle because its function is transportation and it seldom serves as one's residence or as the repository of personal effects. A car has little capacity for escaping public scrutiny. It

[185] *See* Clark, *supra* note 2, at 207-08.
[186] *See id.*
[187] *See United States v. Knotts*, 460 U.S. 276, 281 (1983); *Rakas v. Illinois*, 439 U.S. 128, 148 (1978); *United States v. Martinez-Fuerte*, 428 U.S. 543, 561 (1976); *S. Dakota v. Opperman*, 428 U.S. at 367–68 (1976); *Cardwell v. Lewis*, 471 U.S. 583, 590 (1974).

> travels public thoroughfares where its occupants and its contents are in plain view.[188]

Furthermore, since automobile owners are already subject to restrictions of these types, it is unlikely that the Supreme Court would find that similar restrictions on fully autonomous vehicles violate the Fourth Amendment, particularly when the government has a strong interest in ensuring that these vehicles are not being used to transport contraband.

B. Restrictions on Purchase & Use

Second, the government could require all would-be purchasers of fully autonomous vehicles to undergo criminal background checks, and forbid citizens with felony records from owning them and/or using them, putting these vehicles in the same category as guns and explosives.[189] Given that purchases of automobiles already require a significant amount of paperwork in addition to compliance with state licensure, registration, and insurance laws (and, if financing the vehicle, a credit check and proof of employment), it is difficult to imagine that imposing a background check requirement would meaningfully increase the administrative burden or invasiveness of this process.[190]

While such a restriction would seemingly be the first law banning ownership or use of a particular *type* of vehicle for some individuals, it is neither uncommon nor impermissible for state and local governments to curtail someone's motor vehicle privileges.[191] Courts throughout the United States have consistently held that "[t]he operation of a motor vehicle upon the public highways is not a fundamental right, but only a privilege,"[192] meaning that states need only show a legitimate, rather than compelling, interest to regulate that right.[193] For example, state courts may suspend or revoke someone's driver's license for driving while under the influence, reckless driving, or for habitual violation of traffic laws.[194]

---

[188] *Cardwell*, 471 U.S. at 590.
[189] FBI, *National Instant Criminal Background Check System (NICS)*, https://www.fbi.gov/services/cjis/nics.
[190] Hearst Autos Research, *What to Bring When Buying a Car*, CAR & DRIVER, https://www.caranddriver.com/research/a31514698/what-to-bring-when-buying-a-car/.
[191] *See infra* notes 192-96.
[192] 7A AM. JUR. 2D AUTOMOBILES § 11 *citing State v. Folda*, 885 P.2d 426 (Mont. 1994); *Brandmiller v. Arreola*, N.W.2d 353 (Wis. Ct. App. 1994); *People v. Peterson*, 734 P.2d 118 (Colo. 1987); *Satterlee v. State*, 289 Ark. 450 (1986); *City of Spokane v. Port*, 16 P.2d 945 (Wash. App. 1986).
[193] *Id. citing People v. Peterson,* 734 P.2d 118 (Colo. 1987); *Heying v. State,* 515 N.E.2d 1125 (Ind. Ct. App. 1987).
[194] 7A AM. JUR. 2D AUTOMOBILES § 139 ("A number of motor vehicle statutes have provisions for the suspension or revocation of a drivers' license where the licensee is convicted of certain offenses relating to motor vehicles,1 such as where a licensee is convicted of—leaving the scene of an accident

States may also limit the driving privileges of, for instance, young drivers, new drivers, or drivers with vision difficulties at night.[195] Finally, states are permitted to require special driving endorsements for unique kinds of vehicular use, like the operation of heavy trucks or motorcycles.[196] So, a law restricting ownership of a fully autonomous vehicle would not be unprecedented and would likely be upheld upon challenge if it were intended to reduce the likelihood that fully autonomous vehicles will be used for criminal purposes.

This solution may not be particularly effective, however, if, as some have predicted, fully autonomous vehicles change the nature of automobile use and ownership in the United States.[197] One possibility:

> The arrival of autonomous vehicles to the consumer market may . . . incentivize the formation of ride-share fleets in urban areas that individuals can summon much like they would an Uber or a Lyft. Assuming that it is both efficient and cheap to do so, consumers may then opt out of personal vehicle ownership—which is expensive and inefficient—and into fleet membership, which will require no maintenance costs, time for fuel stops, and burdens associated with securing parking.[198]

A recent study found that vehicle arrangements like these "could reduce average [vehicle] ownership rates by 43%, from 2.1 to 1.2 vehicles per household."[199] If fleet membership rather than personal automobile ownership becomes the norm, restrictions on fully autonomous vehicle purchase and use are likely to be far less effective at reducing the access of criminals to these vehicles. In fact, criminals would have a strong incentive

---

without reporting, driving with a suspended license, reckless driving, negligent driving, speeding, driving while intoxicated.").

[195] *See* 7A AM. JUR. 2D AUTOMOBILES § 102 ("The state has the power to require the procurement of a license before one may operate a motor vehicle on the public highways. This power to license carries with it the power to prescribe reasonable conditions precedent to the issuance of such licenses, and to classify drivers for special regulation, provided such classifications are not unreasonable or arbitrary.").

[196] *See Stanley v. Pub. Utilities Comm'n of Maine*, 295 U.S. 76, 78 (1935) ("In safeguarding the use of its highways for intrastate transportation, carriers for hire may be required to obtain certificates of convenience and necessity.").

[197] *See* James Motavalli, *Who Will Own the Cars That Drive Themselves*, N.Y. TIMES, May 29, 2020, https://www.nytimes.com/2020/05/29/business/ownership-autonomous-cars-coronavirus.html.

[198] Tracy Hresko Pearl, *Racing to Defeat Climate Change on Reluctant Roads: Autonomous Vehicles, Climate Resilience, and Legal Reform* in URBAN CLIMATE RESILIENCE: THE ROLE OF LAW (2021).

[199] Brandon Schoettle and Michael Sivak, *Potential Impact of Self-Driving Vehicles on Household Vehicle Demand and Usage* (Feb. 2015) (University of Michigan, Transportation Research Institute, Report No. UMTRI-2015-3).

to use such fleets as doing so would make it even more difficult for police to trace the origins of contraband if discovered. Even an outright ban on felons using *any* fully autonomous vehicle might not be effective, as enforcement would be extremely difficult.

In sum, while restrictions on purchase and use would almost certainly be constitutional and might make it difficult for criminals to obtain fully autonomous vehicles, changing norms in vehicle ownership might limit the effectiveness of this solution.

C. Implied Consent

Third, the government could make ownership and use of autonomous vehicles conditional on providing law enforcement with implied (or express) consent to execute a traffic stop. Consent gives officers the right to execute a stop, search, or seizure (depending on the scope of the consent) without reasonable suspicion or probable cause.[200] This consent, however, must be "freely and voluntarily given" rather than simple "acquiescence to a claim of lawful authority."[201] In the context of automobiles, consent can also be implied by statute.[202] Many states, for example, have laws providing that all motorists on public roads have impliedly consented to breathalyzer tests when police officers have reason to believe the driver may be under the influence of drugs or alcohol, or that make licensure conditional on signing a form providing such consent. California's law requires all applicants for a driver's license or license renewal to sign the following statement: "I agree to submit to a chemical test of my blood, breath, or urine for the purpose of determining the alcohol or drug content of my blood when testing is requested by a peace officer. . . ."[203] Missouri's law states: "Any person who operates a vehicle upon the public highways of this state . . . shall be deemed to have given consent . . . to a chemical test or tests of the person's breath, blood, saliva, or urine for the purpose of determining the alcohol or drug content of the person's blood . . . ."[204] Kansas has an even more draconian law that says that a person can have their commercial driver's license suspended for "not less than one year upon a first occurrence" of refusal to consent to a test of their level of intoxication.[205]

---

[200] *Schneckloth*, 412 U.S. at 222.
[201] *Bumper v. North Carolina*, 391 U.S. 543, 548–49 (1968).
[202] *Birchfield v. North Dakota*, 579 U.S. 438 (2016) ("Our prior opinions have referred approvingly to the general concept of implied-consent laws that impose civil penalties and evidentiary consequences on motorists who refuse to comply.").
[203] CAL. VEH. CODE § 13384 (West).
[204] MO. ANN. STAT. § 577.020 (West).
[205] KAN. STAT. ANN. § 8-2,142 (West).

Law enforcement or courts could thus find "that [autonomous vehicle] owners, by virtue of their ownership and licensing of the vehicles, provide implied consent to police searches following a lawful stop when operating their vehicles in autonomous mode on state roads."[206] Alternatively, legislatures could pass statutes requiring owners of fully autonomous vehicles "who intend to operate the vehicle without a physically present operator to give implied consent to all [stops and] searches."[207] Such laws would seemingly solve the problem of "unstoppable" fully autonomous vehicles and give law enforcement significantly more leeway to surveil their use.

The constitutionality of such laws, however, would be questionable if they require owners of fully autonomous vehicles to consent to any and all searches rather than, as with the intoxication testing statutes discussed above, a narrow category of searches.[208] Courts might view their extremely broad applicability as an unreasonable infringement on the Fourth Amendment rights of autonomous vehicle owners. While an individual's Fourth Amendment protections may be weaker in an automobile than they are in a home, they are certainly not nullified.[209] States seeking to pass such laws, therefore, would be wise to try to limit their scope by, for instance, only requiring owners to consent to brief traffic stops and/or dog sniffs of the exterior of the vehicle (something that the Supreme Court has held does not constitute a search), rather than to a search of the interior.[210]

A more technologically complex, but less legally problematic approach might come in the form of a communication device:

> The best option is for the AV manufacturers to include a mechanism for obtaining consent and for legislatures to require AVs operators who are not physically present to be available to consent via the mechanism created by the AV manufacturers. This would ensure the officer has the opportunity to obtain consent, thereby ensuring the government retains its ability to conduct consent searches

[206] Roseman, *supra* note 9, at 32.
[207] *Id.*
[208] *See id.*
[209] *Carroll*, 267 U.S. at 153-54 ("It would be intolerable and unreasonable if a prohibition agent were authorized to stop every automobile on the chance of finding liquor, and thus subject all persons lawfully using the highways to the inconvenience and indignity of such a search.").
[210] *See Caballes*, 543 U.S. at 409 ("Accordingly, the use of a well-trained narcotics-detection dog—one that does not expose noncontraband items that otherwise would remain hidden from public view, during a lawful traffic stop, generally does not implicate legitimate privacy interests.") (internal quotation and citation omitted).

> when a drug dog is not readily available. Similarly, this would guarantee the individuals' privacy and ability to refuse a search is protected. The interests of both parties would be protected and balanced similar to the way they are currently balanced.[211]

If technologically feasible, this solution could be a strong one. However, it is unclear how many owners of fully autonomous vehicles would provide consent in such a situation. Saying "no" to a police officer's request is likely to be significantly easier and less intimidating when one is communicating with law enforcement from afar than when one is stopped on the side of a highway and separated from the officer by a car door alone, particularly if one knows that unsavory goods are likely to be discovered in the vehicle in the course of a search.

D. Highway Checkpoints

Fourth, law enforcement could set up highway checkpoints or designated pull-offs (much like truck weigh stations) at which all fully autonomous vehicles are subject to a brief screening involving perhaps a dog sniff of the exterior of the car and a quick look into the windows. The Court has upheld checkpoints in several cases. In *Michigan Dept. of State Police v. Sitz*, the Court upheld a sobriety checkpoint set up by the Michigan State Police at which all vehicles passing through were briefly stopped in order to examine drivers for signs of intoxication.[212] The Court said that, although checkpoints do involve a seizure for Fourth Amendment purposes, the government's interest in stopping drunk driving outweighed the minimal intrusion involved in stopping drivers for a small number of seconds.[213] The Court upheld a permanent immigration checkpoint located 66 miles north of the U.S.-Mexico border in *United States v. Martinez-Fuerte*.[214] At that checkpoint, all vehicles traveling northbound on the highway were visually screened for several seconds for undocumented immigrants.[215] The Court again said that the public interest in having such checkpoints outweighed the minimal intrusion on individual rights.[216]

However, since those cases were handed down, the Court has signaled an unwillingness to extend their reasoning beyond sobriety and immigration checkpoints. Most notably, in *Indianapolis v. Edmond*, the

[211] Roseman, *supra* note 9, at 33.
[212] *Michigan Dep't of State Police v. Sitz*, 496 U.S. 444, 447 (1990).
[213] *Id.* at 455.
[214] *United States v. Martinez-Fuerte*, 428 U.S. 543, 566-67 (1976).
[215] *Id.* at 546-47.
[216] *Id.* at 566-67.

Court held that four checkpoints established to detect drug trafficking were unconstitutional even though they stopped vehicles in a predetermined and random manner and only briefly detained motorists.[217] The Court said that it could not "sanction stops justified only by the generalized and ever-present possibility that interrogation and inspection may reveal that any given motorist has committed some crime."[218] The Court opined that "Without drawing the line at roadblocks designed primarily to serve the general interest in crime control, the Fourth Amendment would do little to prevent such intrusions from becoming a routine part of American life."[219]

Edmond suggests that courts would look at autonomous vehicle checkpoints with a highly skeptical eye given that, like drug interdiction checkpoints, such checkpoints would exist "to serve the general interest in crime control."[220] Without a showing that autonomous vehicles were being utilized in large numbers to conduct extremely dangerous crimes such as transporting kidnapping victims or carrying bombs into crowded areas, it is highly unlikely based on current precedent that a court would find that the government interest in these checkpoints outweighs the nature of the intrusion.

E. Government Surveillance of Autonomous Vehicle Data

Fifth, if autonomous vehicles connect remotely with other vehicles or "smart infrastructure" in their environment, the government could surveil (either passively or actively) data shared between these entities. Doing so would almost certainly be a massive boon to law enforcement and a serious blow to the privacy of the owners and users of fully autonomous vehicles:

> Unless personal information from autonomous vehicle is encrypted and rendered anonymous, interconnected autonomous vehicles communicating location and other data back and forth over a wireless network could be very useful tools for invisible targeted surveillance. Absent data encryption and anonymity, access to an autonomous vehicle network would enable immediate remote access to the real time location of an autonomous vehicle and its user. Such access would also enable collection of longitudinal records of past locations. As a result, access to the interconnected autonomous vehicle network would

[217] *City of Indianapolis v. Edmond*, 531 U.S. 32, 34-36, 48 (2000).
[218] *Id.* at 44.
[219] *Id.* at 42.
[220] *Id.*

> enable law enforcement, national security, and other types of public and private agencies to conduct remote surveillance of the vehicle's user.[221]

Furthermore, "personal information from autonomous vehicle can be correlated with other information."[222] By observing a vehicle user's daily and monthly travel routines, law enforcement could be used predict future behavior, deduce user's hobbies and political affiliations, and identify their friends, colleagues, and relatives.[223]

More troubling still is the fact that such data would be collected by a third party—the smart infrastructure network, for example—rendering the level Fourth Amendment protection for that data unclear.[224] The status of what has come to be known as the "third-party doctrine" is currently unclear. In the mid-twentieth century, the Court consistently held that an individual "has no legitimate expectation of privacy in information he voluntarily turns over to third parties, such as the numbers dialed on a telephone and conveyed to the telephone company."[225] More recently, however, as smart phones have become ubiquitous in American society, the Court has cast the viability of the third-party doctrine into doubt. In the 2018 case, *Carpenter v. United States*, the Court declined to grant the state unrestricted access to a wireless carrier's cell-site location information (CSLI).[226] The Court ruled that, "[i]n light of the deeply revealing nature of CSLI, its depth, breadth, and comprehensive reach, and the inescapable and automatic nature of its collection, that such information is gathered by a third party does not make it any less deserving of Fourth Amendment protection."[227] Similarly, in *Riley v. California*, the Court applied the same logic in ruling that police must obtain a warrant before searching the data contained on a cellphone, even though that data is being shared with third parties.[228]

The question is whether the Court is (a) on the verge of abandoning the third-party doctrine altogether, indicating that, to obtain autonomous vehicle data police will need to obtain a warrant, or (b) willing to preserve

---

[221] Glancy, *supra* note 13, at 1210.
[222] *Id.* at 1196.
[223] *See id.*
[224] *See id.* at 1210.
[225] *Smith v. Maryland*, 442 U.S. 735, 743-44 (1979) *citing United States v. Miller*, 425 U.S. 435, 442-44 (1976); *Couch v. United States*, 409 U.S. 322, 335-336 (1973); *United States v. White*, 401 U.S., 745, 752 (1971); *Hoffa v. United State*s, 385 U.S. 293, 302 (1966); *Lopez v. United States*, 373 U.S. 427 (1963).
[226] *Carpenter*, 138 S. Ct. at 2223.
[227] *Id.*
[228] *Riley v. California*, 573 U.S. 373, 401 (2014).

the third-party doctrine for more limited kinds of information, but restrict its use in the context searches of cellphones, personal computers, etc. If it takes this second, bifurcated approach, courts are likely to view the data generated by fully autonomous vehicles as more akin to the data generated by a cellphone than by a pen register due to its "depth, breadth, and comprehensive reach."[229] Unlike the vehicles in the days of *Carroll*, today's vehicles "are driven by data," collect a vast amount of information, and may even have "some ability to record, send, or receive information."[230]

This information, moreover, can include specific details about the day-to-day habits and locations of the vehicle's owners and occupants.[231] This would again suggest that courts will require law enforcement to get a warrant to gather this data.

In short, as appealing as this solution might be for law enforcement, barring a drastic change in Fourth Amendment jurisprudence, courts are unlikely to approve of it.

F. Abandonment of the "Automobile Exception"

Finally, another extreme solution—this one favorable to citizens rather that police—would be to reject the need to combat crime facilitated by fully autonomous vehicles, abandon the "automobile exception" entirely with respect to that kind of vehicle, and require police to obtain a warrant for each and every traffic stop or vehicle search for which another warrant exception would not apply. Remember that the automobile exception was created to address the inherently mobile nature of vehicles and concerns that, if police could not search them immediately on site, they could be "quickly moved out of the locality or jurisdiction."[232] Fully autonomous vehicles challenge this reasoning.

Every car on the road in 1925 when *Carroll* was handed down was a Level 0 vehicle, wholly controlled by a human driver.[233] When police executed a traffic stop, there was always a possibility that a driver would drive off (and out of the jurisdiction) before law enforcement had an opportunity to conduct an investigation. The success of a traffic stop, in short, was dependent on human compliance with law enforcement requests. But, human compliance is always a questionable factor on which to rely, and so, as noted above, the Court deemed traffic stops

[229] *Carpenter*, 138 S. Ct. at 2223.
[230] Barrett, *supra* note 38, at 184.
[231] *Id.*
[232] *Carroll*, 267 U.S. at 153-54.
[233] *See* NHTSA PRELIMINARY STATEMENT, supra note 16, at 4.

"circumstances of such exigency that, as practical necessity, rigorous enforcement of the warrant requirement is impossible."[234]

However, fully autonomous vehicles, because they are *not* controlled by a human driver, arguably change that calculus:

> An autonomous vehicle's mobility no longer necessarily depends on the choices of the individual occupying it. This seems to demand a radically different application of the Fourth Amendment's automobile exception, which is partially predicated on the likelihood that a vehicle could exit the scene or pose a risk to officer safety.[235]

Beyond inputting a destination and perhaps selecting among different potential routes, human occupants are unlikely to wield much control over the vehicle at all.[236] This might be particularly true, moreover, in the context of traffic stops, as manufacturers will almost certainly have to program these vehicles to pull over when signaled to do so by a patrol car.[237] If manufacturers fail to program these vehicles to do so, in fact, unoccupied fully autonomous vehicles would be functionally unstoppable by police, a result states and counties are unlikely to tolerate.

If traffic stop programming is a standard feature of these vehicles, and if this programming cannot be overridden by a vehicle's occupants, the automobile exception would no longer appear necessary or constitutionally justifiable. The government would lack a compelling reason to demand an exception to the warrant requirement, at least with respect to the inherent mobility of the vehicle.[238]

If the mobility justification for the automobile exception is no longer viable, suggesting that law enforcement obtain a warrant before searching a fully autonomous vehicle, the major remaining concern would be the length of time police would need to obtain a warrant in these circumstances, and whether the wait would be overly burdensome on law enforcement or private citizens (who have an interest in quick and efficient conclusions to traffic stops). But just as vehicles change with technology over time, so do warrant applications, and as early as 1977 the Federal Rules of Criminal Procedure were amended to allow warrants to be

---

[234] *Opperman*, 428 U.S. at 367.
[235] Barrett, *supra* note 38, at 194.
[236] Pritchard, *supra* note 133.
[237] *See generally* GOODISON, *supra* note 19; Joh, *supra* note 3, at 124.
[238] Barrett, *supra* note 38, at 195.

obtained over the phone in addition to in person.[239] The rules were amended again in 1993 and 2006 to allow for the use of fax machines and "other reliable electronic means."[240] A significant number of states have adopted similar laws.[241] The legal implications of these new forms of warrant applications are profound:

> Technology is rapidly approaching the point where electronic communication between the law enforcement officers in the field and the magistrate issuing the warrant is continuously available, thereby narrowing the situations in which the exigent circumstances exception should be applied. In this modern age of high-powered laptops equipped with cellular access to the Internet, police (like the general public) have ready access to communication methods such as email, instant messaging, and even face-to-face video conferencing wherever they go. These new methods of reliable communication make it possible for law enforcement officers to quickly obtain a warrant from a judge without leaving the area they are investigating.[242]

If police can quickly obtain a warrant from on the road or from the side of the road, the justification for application of the automobile exception to fully autonomous vehicles is even weaker.[243]

Fully autonomous vehicles may thus offer U.S. courts an opportunity to reexamine the viability of automobile exception in modern times and to rebalance the interests of law enforcement and citizens in the context of traffic stops. In the words of one scholar, "The advent of AMVs offers a unique opportunity for government to 'get it right' by enacting a comprehensive scheme recognizing that personal transportation is becoming an increasingly fundamental need, and that in order to protect the right to access to such transportation, privacy rights must be defined and adequately enforced."[244]

---

[239] FED. R. CRIM. P. 41(d)(3) ("[A] a magistrate judge may issue a warrant based on information communicated by telephone or other reliable electronic means.").
[240] *See id*.
[241] *See, e.g.*, TENN. CODE ANN. § 40-6-109 (West 2014); N.H. REV. STAT. ANN. § 595-A:4-a (2014); FLA. STAT. ANN. § 901.02 (West 2013); COLO. REV. STAT. ANN. § 16-1-106 (West 2012); MO. ANN. STAT. § 542.276 (West 2010); MICH. COMP. LAWS ANN. § 780.651 (West 2009).
[242] Andrew H. Bean, *Swearing by New Technology: Strengthening the Fourth Amendment by Utilizing Modern Warrant Technology While Satisfying the Oath or Affirmation Clause*, 2014 B.Y.U. L. Rev. 927, 935 (2014).
[243] *Id.* at 927-28.
[244] Matthew Gillespie, *Shifting Automotive Landscapes: Privacy and the Right to Travel in the Era of Autonomous Motor Vehicles*, 50 WASH. U. J.L. & POL'Y 147, 169 (2016).

V. CONCLUSION

Fourth Amendment jurisprudence has been in constant flux for well over a century. Courts have struggled to keep up with the fast pace of societal change and the effects those changes have had on issues of privacy, public safety, and government power. This difficulty has been particularly apparent in the Fourth Amendment jurisprudence surrounding automobiles and traffic stops, in which courts attempt to balance the government's interest in keeping public roads safe in quickly changing environments with the right of citizens to retain some level of privacy in their daily travels.

Fourth Amendment jurisprudence has also been challenged by emerging technologies in recent years. Products like cellphones, enhanced surveillance devices, and GPS trackers have forced courts to grapple with whether and how old doctrines should apply to new issues. There are, as of yet, no easy answers, as the Court seems mired in uncertainty with whether to adapt existing principles to the modern era or abandon them entirely in favor of a novel approach to search and seizure law.

Autonomous vehicles exist at the intersection of these two extremely turbulent areas of Fourth Amendment law and have implications for virtually every major search and seizure doctrine that has emerged over the last century. Complicating matters even further are the facts that (a) car manufacturers are developing these vehicles at varying rates of speed and success, (b) these vehicles can have differing levels of automation, and (c) there will likely be some significant period of time when U.S. roads are shared by vehicles with a fairly vast variety of autonomous driving capabilities.

More challenging yet, each level of vehicle automation poses unique issues for law enforcement. Level 2 and 3 semi-autonomous vehicles make it extremely difficult for police to distinguish between dangerous distracted driving and safe use of a vehicle's autonomous capabilities. Without some sort of exterior signal indicating the vehicle's current level of automation, a police officer who witnesses a person texting on their phone while sitting in the driver's seat of a moving vehicle may not be able to tell whether the vehicle is being driven autonomously or whether the person is seriously (and dangerously) neglecting their obligations as a driver. For the foreseeable future in which Level 2 vehicles have the highest level of automation available to consumers, police almost certainly have probable cause to stop any distracted driver they see since Level 2 vehicles require constant human monitoring. As Level 3 vehicles arrive on the market, however, and grow in market share, there will presumably be a point at

which law enforcement can no longer assume that a "distracted" person in a driver's seat is doing something illegal. At that point, police will have a significant need to identify a vehicle's level of automation in order to patrol roadways successfully.

Level 4 and 5 fully autonomous vehicles solve this problem (as humans will likely lack the ability to "drive" these vehicles) but create another one: the ability of criminals to use these vehicles to commit crime with an extremely low risk of detection. Indeed, because fully autonomous vehicles will be programmed to operate in compliance with all traffic laws, police officers will not have many opportunities to develop reasonable suspicion to stop these vehicles unless observations of the passengers or exterior characteristics of the vehicle give police reason to believe suspicious activity is afoot. Unoccupied fully autonomous vehicles will make this particularly difficult.

How and whether we solve the legal and law enforcement issues posed by autonomous vehicles depends on our willingness or reluctance to adapt or abandon a number of significant Fourth Amendment doctrines. Six possible solutions, in order from least to most extreme, reveals how. First, state governments could pass restrictions on visibility obstructions in fully autonomous vehicles to give police a greater opportunity to detect contraband and perhaps even crime victims in the interiors of these vehicles. Such restrictions would almost certainly be reasonable extensions of existing window tinting laws and other such regulations although requiring a different justification: crime detection rather than driver visibility.

Second, states could place restrictions on purchase and use of fully autonomous vehicles and prohibit their use by, for example, registered felons. Such laws would be a new application of previous jurisprudence holding that operation of a motor vehicle is not a fundamental right in the United States, and, by extension, laws that permit states to suspend or revoke driver's licenses for various driving offenses. Where they would be novel is in banning mere ownership of a particular category of vehicle, a restriction that arguably makes sense in the context of fully autonomous vehicles that can be dispatched by owners for nefarious purposes without any occupants. The success of this solution, however, is likely to be dependent on whether autonomous vehicles change the nature of vehicle ownership lead to fewer purchases of personal vehicles in favor of buying memberships in ride-share fleets.

Third, state governments could require owners or users of fully autonomous vehicle to consent in advance to traffic stops and other forms

of police scrutiny. While many states already require drivers to provide implied consent to blood and breath alcohol testing as a condition of licensure, this solution would be a fairly dramatic extension of such laws since drivers would be asked to consent in advance to a wide range of potential police investigations. A better option might be to outfit fully autonomous vehicles with communication devices that would permit police officers to communicate remotely with owners.

Fourth, state governments could establish checkpoints or pull-offs and require all fully autonomous vehicles to submit to brief stops and dog sniffs to determine if the vehicle is being used to carry contraband. This solution would almost certainly be struck down by courts if current precedent is applied. The Supreme Court has indicated in multiple cases that it is likely to view such checkpoints as unconstitutional outside of very limited DUI and immigration contexts.

Fifth, the government could exploit existing third-party doctrine to surveil data generated by autonomous vehicles. This doctrine holds that data shared with a third party is no longer entitled to Fourth Amendment protection and has been used by law enforcement to justify the use of pen registers and wired informants, among other surveillance techniques. Gathering this data from autonomous vehicles would greatly assist law enforcement in determining how, when, and where these vehicles are being used. However, in recent years, the Court has repeatedly indicated that it is unwilling to extend the third-party doctrine to surveillance practices that would purport to gather data from technologies that gather a deep and wide variety of personal information. Autonomous vehicles, which gather a significant amount of data, would seemingly fall under this recent precedent.

Finally, courts or the government could opt to do nothing about the problems created by autonomous vehicles, or even use these emerging issues as an opportunity to abandon the century-old automobile exception. While autonomous vehicles may eliminate (or at least drastically restrict) the use of pretextual traffic stops as a key method of law enforcement, police will still be able to use more conventional investigatory techniques to detect and stop the use of autonomous vehicles in crime. Such investigatory techniques, moreover, are less likely to result in the racial profiling and violence that have historically plagued pretextual traffic stops. Autonomous vehicles, therefore, for as much as they may challenge an already fraught area of law, may create a valuable opportunity to rebalance both policing and Fourth Amendment jurisprudence in greater favor of motorists who, for far too long, have seen a gradual but persistent erosion of some of their most significant constitutional rights.