Your Uber has Arrived … In Court:

The Liability and Legal Personhood of Fully Autonomous Vehicles

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A Thesis

Presented to

the Faculty and Administration of

Providence Classical School

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In Partial Fulfillment

of the Requirements of

Graduation

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By

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April 2025

Accepted by the Faculty of Providence Classical School in

Partial fulfillment of the requirements of graduation

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ABSTRACT

YOUR UBER HAS ARRIVED … IN COURT:

THE LIABILITY AND LEGAL PERSONHOOD OF FULLY AUTONOMOUS VEHICLES

Steven Wimberly

Fully autonomous vehicles should be assigned legal liability and recognized as independent entities. Given the vehicles' real-time decision-making independent from human control, the current legal frameworks are not sufficient. Therefore, new liability frameworks and insurance incentives need to be developed to promote safer technology while also ensuring victims are compensated.

YOUR UBER HAS ARRIVED … IN COURT:

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Imagine a bustling city in the year 2040, where fully autonomous vehicles glide silently down luminescent streets. In this futuristic society, human drivers have been replaced with intelligent machines programmed to navigate the busiest urban areas. Suddenly, in the midst of the city, a chaotic scene unfolds: a pedestrian, lost in their own thoughts, abruptly steps onto the crosswalk just as one of the autonomous vehicles approaches at an explosive speed.

In milliseconds, the fully autonomous vehicle's algorithms begin to work. It assesses its surroundings, calculating the consequences of every possible solution. It determines that braking quickly will cause a catastrophic chain event where a pileup of vehicles trail behind that could endanger countless civilian lives. With no time to hesitate, the car makes the split-second decision to swerve directly left and collide with a parked car on the side of the curb.

The collision leaves both vehicles severely damaged, while the passenger of the hit vehicle sustains grave injuries. The accident results in a substantial financial burden that runs into hundreds of thousands of dollars.

This dramatic accident forces society to consider the future and confront a profound question: In a world where intelligent machines make split-second decisions that have life-altering consequences, who is liable for the accident? Was it the pedestrian stepping onto the crosswalk unexpectedly? Was it the programmer for coding the vehicle to prioritize certain outcomes over others, such as minimizing harm to passengers versus pedestrians? Was it the

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passenger inside the vehicle, even though they had no control over its actions? Or was it the fully autonomous vehicle itself.

At first, it might sound crazy to suggest that the vehicle itself should or even could be held liable. How can a machine made of metal and circuits be put on the same legal ground as a living, breathing human? However, this question needs to be carefully considered. No human controlled it at the moment of the accident. Its software assessed the scenarios and made the best decision possible. If fully autonomous vehicles can make decisions for themselves, operate independently, and take the place of human drivers, then why should they not be the ones who are assigned legal liability?

Narratio

When people think about autonomous vehicles (AV), they often picture the autopilot feature in electric vehicles such as Tesla or Waymo. However, the topic of AV technology travels beyond autopilot. Autonomous vehicles are categorized into six different Levels: No Driving Automation (Level 0), Driver Assistance (Level 1), Partial Driving Automation (Level 2), Conditional Driving Automation (Level 3), High Driving Automation (Level 4), and Full Driving Automation (Level 5).[1] A fully autonomous vehicle is a vehicle with an automated driving system (ADS), and it is capable of operating the vehicle throughout complete trips on public roadways, regardless of the starting point, end point, intervening traffic, or weather conditions. Drivers do not need to supervise fully autonomous vehicles; if an error occurs, the

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[1] SAE International, *"Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles,"* SAE J3016, Society of Automotive Engineers, 2014.

vehicle will perform a minimal-risk maneuver.[2] In contrast, all other levels require some form of human intervention, whether that be steering the vehicle or staying vigilant.[3]

Throughout history, technological advances have continuously made driving safer. As early as the 1950s, engineer Ralph Teetor created cruise control, a device that automates vehicle speed. From there, increasingly advanced technology such as lane centering, automatic braking systems, and autopilot has blossomed.[4] High Driving Automation vehicles (Level 4) gained popularity in 2020, and experts predict that Full Driving Automation vehicles (Level 5) will be in production by 2030, according to the accounting firm KPMG.[5] However, the leap from Level 4 to Level 5 is more drastic than most realize. Fully autonomous vehicles will rely on numerous sensors and cameras to make real-time decisions using a complex machine-learning algorithm without human intervention. Still, this technological advancement raises concerns about liability in AV accidents: who is responsible when a fully autonomous vehicle causes an accident?

The question of liability for AVs resonates with philosophical and legal debates about which entities should be responsible for these vehicles' actions. Many might assume that the driver is liable. However, since fully autonomous vehicles lack steering wheels or any other control system, drivers have no influence over the vehicle's decision making. Therefore, holding the driver liable would be unfitting. Because of this, discussions in legal scholarship and legal

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[2] SAE International, "Taxonomy for Driving Automation."

[3] SAE International, "Taxonomy for Driving Automation."
[4] Sears, David, "The Sightless Visionary Who Invented Cruise Control," Smithsonian, March 8, 2024, https://www.smithsonianmag.com/innovation/sightless-visionary-who-invented-cruise-control-180968418/.

[5] Charlie Simpson, Edward Ataii, Edwin Kemp, and Yuan Zhang, "Mobility 2030: Transforming the Mobility Landscape," KPMG, February 2019, https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2019/02/mobility-2030-transforming-the-mobility-landscape.pdf.

policy have increasingly shifted liability from the driver to three potential candidates: the manufacturer, the programmer, and the AV itself.[6]

Traditionally, manufacturers have been held liable based on legal frameworks such as product liability, strict liability, and traditional negligence.[7] Product liability law generally holds manufacturers liable for damage caused by defects in their products. Programmers who create the complex algorithm which governs the AV's decision-making are also potential candidates for liability.[8]

Another possibility is to hold the autonomous vehicle itself liable for its actions. This perspective does not claim that AVs are human but rather argues they should have legal personhood.[9] Assigning legal personhood to AVs suggests that these vehicles could bear liability for their actions. To understand this point better, a parallel can be drawn from the landmark case *Santa Clara County v. Southern Pacific Railroad Co.* (1886). In this case, the Supreme Court found that corporations should be treated as legal persons.[10] This decision effectively "implied that equal protection laws provided by the Fourteenth Amendment applied to corporations."[11]

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[6] Jeffrey Gurney, "Sue My Car Not Me: Products Liability and Accidents Involving Autonomous Vehicles," SSRN, October 6, 2015, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2352108.

[7] Lubomira Kubica, "Autonomous Vehicles and Liability Law," Oxford Academy, August 4, 2024, https://academic.oup.com/ajcl/article/70/Supplement_1/i39/6655619?login=false.

[8] Katherine Miller, "Designing Ethical Self- Driving Cars," HAI Stanford University, https://hai.stanford.edu/news/designing-ethical-self-driving-cars.

[9] Tetiana Luzan, "Legal Personhood of Artificial Intelligence," University of Helsinki, December 2020, https://helda.helsinki.fi/server/api/core/bitstreams/dc58ef4d-2b51-446f-87a9-6f74724a10c3/content.

[10] "Santa Clara County v. Southern Pacific Railroad Co., 118 U.S. 394 (1886)," Justia, Accessed December 4, 2024, https://supreme.justia.com/cases/federal/us/118/394/. The Court stated that it did "not wish to hear argument on the question whether the provision in the Fourteenth Amendment to the Constitution which forbids a state to deny to any person within its jurisdiction the equal protection of the laws applies to these corporations. We are all of opinion that it does."

[11] "Santa Clara County v. Southern Pacific Railroad Company," *Oyez,* Accessed 4 Dec. 2024, www.oyez.org/cases/1850-1900/118us394.

From that point on, corporations were seen as *legal* entities although they were *non-human* entities. Similarly, autonomous vehicles, though they are non-human, could be recognized as legal entities who are capable of bearing liability for their actions.[12]

However, unlike corporations, AVs lack independent financial means. This raises significant questions about the practicality of holding non-human technology liable. In practice, if an AV were liable for an accident, the compensation would need to originate from an external source, as the vehicle itself would not be able to provide restitution. This scenario suggests that another party would bear financial responsibility. This framework will be addressed later in the thesis.

Other potential parties, such as component suppliers, software developers, or mapping services, may also bear liability. However, this thesis will focus specifically on the primary liability holders including programmers, manufacturers, drivers, and the fully autonomous vehicle itself.

By concentrating on these primary parties, this thesis aims to propose a potential solution for effectively assigning liability when fully autonomous vehicles become part of the everyday world. This focus is intended to offer a direction for policymakers to act as they navigate the complexity of Level 5 AV-related incidents.

<div align="center">Partitio</div>

Having explored the nature of autonomous vehicles and the potentially liable candidates when accidents happen, it is necessary to define key terms to understand these vehicles further. Liability occurs "when a party is held legally responsible for their actions. A party can be held

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[12] Visa Kurki, "The Legal Personhood of Artificial Intelligences," Oxford Academy, August 2019, https://academic.oup.com/book/35026/chapter/298856312?login=false.

liable for their actions or inactions or the actions of others for which they are legally responsible."[13] A legal person is "a human or non-human entity that is treated as a person for legal purposes. They can engage in legal business such as being sued, owning property, and entering contracts."[14] Risk assessment is "the process of identifying, analyzing, and evaluating risks associated with a particular activity or project."[15] Product liability "refers to the liability of the parties of any product for damage caused by the product. Product liability is derived mostly from Tort law."[16] Tort law "refers to law concerning an act that gives rise to injury or harm to another and amounts to a civil wrong for which courts impose liability."[17] Moral responsibility concerns making "judgements about whether a person is morally responsible for their behavior and holding others responsible for actions and the consequences of their actions."[18] Strict liability is "a type of liability that does not depend on actual negligence or intent to harm, but that is based on the breach of an absolute duty to make something safe."[19] Agency law is "the common law doctrine controlling relationships between agents and principles."[20]

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[13] "Liability," Legal Information Institute, Accessed December 3, 2024, https://www.law.cornell.edu/wex/liability.

[14] "Legal Person," Legal Information Institute, Accessed December 3, 2024, https://www.law.cornell.edu/wex/legal_person.

[15] "Risk Assessment: An Overview," Thomson Reuters, June 3, 2024, https://legal.thomsonreuters.com/blog/what-is-a-risk-assessment/.

[16] "Products Liability," Legal Information Institute, Accessed December 3, 2024, https://www.law.cornell.edu/wex/products_liability.

[17] "Tort," Legal Information Institute, Accessed December 3, 2024, https://www.law.cornell.edu/wex/tort.

[18] "Moral Responsibility," Stanford Encyclopedia of Philosophy, October 16, 2019, https://plato.stanford.edu/entries/moral-responsibility/.

[19] *Black's law dictionary* 7th Ed., s.v. "Strict Liability" (Minesota: West Group, 1999)

[20] "Agency," Legal Information Institute, Accessed December 3, 2024, https://www.law.cornell.edu/wex/agency.

After setting forth the thesis statement with its foundational arguments, this paper will offer 4 supporting arguments in favor of the thesis statement. Then, two common counterarguments will be addressed. Finally, a call to action will be presented.

Propositio

The legal liability for the accidents of fully autonomous vehicles should rest on the vehicles themselves. Level 5 AVs should be treated as independent legal beings. Fully autonomous vehicles will have passengers but will operate without a driver playing any role in determining how the vehicle will operate, beyond requesting a particular destination. Likewise, manufacturers and programmers will not know the vehicle's decision-making due to its artificial intelligence. Fully autonomous vehicles make decisions in real-time scenarios that go beyond that of the driver, programmer, and manufacturer. Because of this, the vehicle should be seen as a legal entity. Since drivers lack control over the vehicle, and programmers and manufacturers cannot foresee or control how the vehicles will handle real-world scenarios, legal liability should be assigned to the AV itself.

Confirmatio

To establish that fully autonomous vehicles (AVs) should be assigned legal liability for accidents, this thesis presents four central arguments. First, Level 5 autonomous vehicles will operate independently of human control, making traditional liability frameworks inadequate. Second, manufacturers and programmers neither fully predict nor control the AI's decision-making within the Level 5 AV. Third, legal precedents and analogies exist for assigning liability to non-human entities. Finally, risk assessment, fairness, and justice support holding Level 5 AVs liable for accidents, ensuring the correct party is liable. Together, these arguments justify assigning liability to AVs.

The key to these arguments is the concept of legal personhood, which must be expanded to include autonomous vehicles. Historically, legal personhood refers only to humans or corporate entities (such as corporations). However, this term should also refer to non-human entities which can make decisions independently. By granting AVs legal personhood, society has a way to hold AVs accountable for the significant risks they pose.[21]

Traditional liability frameworks assume drivers are held liable for the actions of their vehicle. If the driver makes judgments while driving and causes a wreck, they should be liable for their mistake. However, this framework falls apart when discussing AVs. This principle leads to the first argument: drivers cannot logically or ethically bear liability for accidents involving Level 5 AVs.[22]

Traditional liability frameworks assume that human drivers are in control of their vehicles. However, in the context of Level 5 autonomous vehicles, this assumption collapses completely. The Society of Automotive Engineers (SAE) defines Level 5 vehicles as vehicles that do not need any form of human input to make decisions and can drive under any conditions. They do not have steering wheels, gas pedals, or brakes.[23] This type of vehicle relies on advanced technology including cameras and software. For example, Level 5 vehicles use LiDAR (Light Detection and Ranging) [24], a sensor-based technology that eliminates collision risk while

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[21] Noah Goodall, "Ethical Decision Making During Automated Vehicle Crashes," Cornell University arXiv, January 1, 2014, https://arxiv.org/pdf/2010.16309.

[22] Philipp Hacker and Jan-Hendrik Passoth, "Varieties of AI Explanations under the Law: From the GDPR to the AIA, and Beyond," SSRN, Last Revised May 10, 2022, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3911324.

[23] "SAE Levels of Driving Automation," SAE Blogs, May 3, 2021, https://www.sae.org/blog/sae- j3016-update.

[24] "Autonomous Vehicles Driving into the Future with LiDAR Sensors," Infosys BPM, Accessed December 7, 2024, https://www.infosysbpm.com/blogs/annotation-services/lidar-technology-for-autonomous-

driving by making AVs aware of their surroundings. [25] Since these vehicles operate without any human interaction, it is both illogical and unjust to hold the so-called "driver" (who is essentially a passenger in Level 5 AVs) liable, rather than the vehicle itself. This issue becomes more apparent in cases where no passenger is present in the vehicle. For example, consider a fully autonomous taxi en route to pick up a passenger. In this scenario, there is no human occupant that can oversee the vehicle, reinforcing the argument that liability should shift away from individuals and move towards manufacturers, programmers, or the vehicle itself.[26]

Level 5 vehicles were designed to eliminate the need for a driver or any human intervention. This is what separates them from other levels of autonomous vehicles. While a driver is expected to intervene in emergencies in Level 4 AVs, fully autonomous vehicles will have fully developed systems that help them navigate and sense their environment. For example, Tesla's autopilot function would be classified as a Level 4 AV. This is because it still needs the driver's oversight as evidenced by the steering wheel in their cars. However, Level 5 goes a step further. Instead of no human intervention being needed, no human intervention is possible.[27]

This distinction is critical for understanding Level 5 AVs. In other automated levels, it makes sense to follow liability frameworks where the driver has a "duty to intervene."[28] In this

vehicles.html#:~:text=LiDAR%20(Light%20Detection%20and%20Ranging,eliminates%20collision%20risk%20while%20driving.

[25] Noah Goodall, "Machine Ethics and Automated Vehicles," Cornell University Computers and Society, https://arxiv.org/abs/2010.15665.

[26] Jan Gogoll and Julian F. Müller, "Responsibility for Crashes of Autonomous Vehicles: An Ethical Analysis," Science and Engineering Ethics, vol. 21, no. 3, 2015, pp. 619–630, https://link.springer.com/article/10.1007/s11948-014-9565-5.

[27] Tesla, "Autopilot and Full Self-Driving (Supervised)," Tesla Support, https://www.tesla.com/support/autopilot.

[28] "Duty to Intervene Definition," Law Insider, Accessed January 16, 2025, https://www.lawinsider.com/dictionary/duty-to-intervene.

case, the driver would be responsible if he could have prevented an accident but did not. In Level 5 AVs, this is illogical. It is physically impossible for the driver to intervene without a steering wheel, brakes, and a gas pedal. In the same way, why would passengers on a plane be responsible if there is an error with the aircraft?[29]

A recent accident in Tempe, Arizona illustrates some of the difficulties and limitations at issue here. The accident involved a partially automated Uber with a driver behind the wheel and a pedestrian. This is one example of the limitations of autonomous vehicles. In this accident, the vehicle's automated driving system (ADS) saw the pedestrian more than five seconds before they collided. However, the human driver failed to intervene in time.[30]

This accident highlights two key points: first, that even in a partially autonomous vehicle, human intervention did not prevent the accident. In Level 5 AVs, holding the driver responsible becomes contradictory. Second, the question of liability was unclear in this case. Was Uber, the maker of the car's automated driving system, liable? Was it the driver for not responding? Or the vehicle itself? This accident shows the problems with applying old liability frameworks to autonomous vehicles or other advanced technology.[31]

Because of this, a new framework is needed to replace the traditional framework to align with advanced technology. Since the driver cannot be liable, this raises the question of who else can be? The first parties that come to mind would be the manufacturer and programmer since

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[29] M. L. Cummings, Heather M. Roff, Kenneth Cukier, Jacob Parakilas, and Hannah Bryce, "Artificial Intelligence and International Affairs," Chatham House Report, December 11, 2020, https://www.chathamhouse.org/2018/06/artificial-intelligence-and-international-affairs.

[30] National Transportation Safety Board, "Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian, Tempe, Arizona, March 18, 2018," NTSB, November 19, 2019, https://www.ntsb.gov/investigations/AccidentReports/Reports/HAR1903.pdf.

[31] Patrick Lin, "Why Ethics Matters for Autonomous Cars," Springer pp. 69-85: 2016, https://link.springer.com/chapter/10.1007/978-3-662-48847-8_4.

they are the ones who designed, built, and programmed the vehicles. However, is this the right approach in light of the complexity of AI's decision-making and unpredictability? [32]

While manufacturers and programmers play an essential role in the creation and development of fully autonomous vehicles, they should not be held liable for accidents involving Level 5 autonomous vehicles. Because of the nature of AI decision-making, real-world complexities and ethical considerations show that having the manufacturers and programmers be held liable is not only impractical but unjust.

Fully AVs will operate using an AI system. This is done autonomously, meaning that the vehicle's decision-making is beyond human supervision while the vehicle is in use. Although programmers create AI systems, they cannot control nor predict the AV's decision-making on the roads in real-world situations. [33]

AI in Level 5 autonomous vehicles is designed to function independently. These are no longer simple learning models but advanced, complex systems that enable the vehicle to adapt to any road conditions without human intervention from the programmer. The vehicle responds dynamically to the algorithms set in place, but driving involves far too many variables for any programmer to predict them all. There are countless unpredictable scenarios, such as flooding that causes road obstructions, erratic human drivers, or completely bizarre situations—like the viral incident in San Diego where a sea lion was found crossing lanes of a freeway. Even with

[32] Megha Nautiyal, "The Blame Game: Who Takes the Heat When AI Messes Up?" Legal Cheek, August 8, 2023. https://www.legalcheek.com/lc-journal-posts/the-blame-game-who-takes-the-heat-when-ai-messes-up/.

[33] Hauptman, O'Brien, Wolf & Lathrop, "Liability in Self-Driving Car Accidents: Who Pays?" Hauptman, O'Brien Personal Injury Lawyers, https://www.hauptman-obrien.net/blog/liability-in-self-driving-car-accidents/.

hours and hours of testing, not every situation can be accounted for. This makes it unreasonable for the programmer to be held liable for road situations that they could not foresee.[34]

To clarify, if the programmers fail to take the necessary precautions, they should be held liable for the resulting accident. The best solution is to establish a clear performance benchmark and rigorous testing standard for Level 5 AVs which will ensure that they can handle all reasonably foreseeable situations. If an AV does not know how to handle a reasonably foreseeable situation due to programming or faulty decision-making algorithms, then liability should rest on the programmer who designed and implemented the flawed vehicle. However, if the AV is functioning as designed and encounters an unforeseeable situation, then holding the programmer liable would be unjustified.

If an AV consistently makes errors, fails to observe traffic laws, or repeatedly struggles with common driving scenarios, then it should be taken off public roads and should not be allowed to operate until it is reprogrammed. Just as human drivers lose their licenses for reckless driving, fully autonomous vehicles must be held to a similar standard. The ultimate goal of AV technology is to increase road safety. Allowing a flawed AV system to remain in operation would undercut that goal. This action must be in place to prevent AVs from endangering human lives.

Shifting the focus to the manufacturer, a critical question arises: should they be held liable for accidents involving autonomous vehicles? Product liability generally dictates that a manufacturer is responsible for defects in their products. However, this principle does not directly apply to autonomous vehicles since their decision-making processes are dynamic. Unlike

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[34] Bill Feather and Dennis Romero, "Like a true Californian, Sea Lion takes the 94 to the 805 before Freeway Rescue," NBC News, Updated January 8, 2022, https://www.nbcnews.com/news/us-news/true-californian-sea-lion-takes-94-805-freeway-rescue-rcna11428.

other products with static decision-making, AV decisions continuously adapt to real-time data. In the cases discussed, there is no inherent defect in the product itself; the AV systems are functioning as designed. Rather, it is the unpredictability of the external environment that leads to accidents.

Almost all AV accidents are caused not by errors in the manufacturing of the vehicle but by the decisions the vehicle makes. Unlike traditional vehicles, autonomous vehicles rely on software that interprets and causes the car to react to real-time data. Product liability assumes that all products function in a predictable manner. Holding the manufacturer liable for the vehicle's decisions would be fundamentally unjust, as it does not acknowledge the AV's independent decision-making. Therefore, a more appropriate approach is to hold the AV liable, since it is the entity that caused the accidents.[35]

That said, manufacturers should be held accountable for defects in the physical construction of the vehicle—just as the programmer needs to be held accountable for faulty programming in the AV. For instance, if an AV's wheel suddenly detaches while driving, leading to an accident, that is a manufacturing defect. Manufacturers must adhere to safety standards in assembling the fully autonomous vehicles. If the failure is mechanical rather than computational, then liability should rest on the manufacturer.

Additionally, placing liability on either the manufacturer or programmer could stunt innovation and slow technological progression. Manufacturers should be responsible for creating a safe product. If they do create a safe product, why hold them to extra requirements that they cannot control? Holding them accountable for every decision an AV makes is an unreasonable

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[35] Megha Nautiyal, "The Blame Game: Who Takes the Heat When AI Messes Up?" Legal Cheek, August 8, 2023, https://www.legalcheek.com/lc-journal-posts/the-blame-game-who-takes-the-heat-when-ai-messes-up/.

extension of the manufacturer's responsibility. Essentially, they would need to predict the unpredictable. The AV did not make a mistake—it made the best possible decision based on its programming. However, when that decision leads to harm, liability cannot simply vanish.[36]

If extra liability is placed on manufacturers and programmers, this could prevent companies from making autonomous vehicles. The potential for lawsuits skyrockets if this were the case even when the manufacturer and programmer could not predict AV's actions. The lawsuits would outweigh economic incentives to innovate which slows the technological and production process. In terms of ethical responsibility, liability should align with the party that is in control. In the case of AVs, manufacturers and programmers do not have the control to make the vehicle decide in real time. This makes it unacceptable for the manufacturers and programmers to be held liable.

Going back to Uber's Tempe accident, it was already mentioned that the AV detected the pedestrian but did not react. In this case, assigning liability to Uber, as the manufacturer and programmer, overlooks the fact that the decisions were made independent of what the programmer had coded. This highlights why the programmer should not be accountable for the decisions that the vehicle made autonomously.[37]

Instead of making the manufacturer and programmer liable, the logical solution is to treat the AV as a legal entity that is accountable for its actions. By assigning legal personhood to AVs, a new framework can be made to effectively reflect their autonomy.

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[36] Alexis Madrigal, "If a Self-Driving Car Gets in an Accident, Who- or What- Is Liable?" The Atlantic, August 13, 2014, https://www.theatlantic.com/technology/archive/2014/08/if-a-self-driving-car-gets-in-an-accident-who-is-legally-liable/375569/.

[37] National Transportation Safety Board, "Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian, Tempe, Arizona, March 18, 2018," NTSB, November 19, 2019, https://www.ntsb.gov/investigations/AccidentReports/Reports/HAR1903.pdf.

Given the limitations of holding the manufacturer and programmer liable for autonomous vehicle accidents, it is necessary to understand how AVs can be liable for their actions. This can be seen through existing legal precedents and analogies for non-human entities (for example corporations) which ensure a suitable approach to liability. Corporations are treated as legal entities since they act through a combination of non-human and human processes.[38]

A foundational case that established legal personhood for non-human entities is *Santa Clara County v. Southern Pacific Railroad Co.*, where the U.S. Supreme Court recognized that corporations have certain protections under the Fourteenth Amendment. In the case, the Court stated, "The defendant Corporations are persons within the intent of the clause in section 1 of the Fourteenth Amendment to the Constitution of the United States, which forbids a State to deny to any person within its jurisdiction the equal protection of the laws."[39] Additionally, the Court stated that they did "not wish to hear argument on the question whether the provision in the Fourteenth Amendment to the Constitution, which forbids a State to deny to any person within its jurisdiction the equal protection of the laws, applies to these corporations."[40] Along with this, the Court *unanimously* agreed that it applies to corporations. These quotes establish that corporations, as non-human entities, are considered legal persons under the law. This reinforces the idea that legal personhood can extend to artificial entities that function within legal and

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[38] Carla Reyes, "Autonomous Corporate Personhood," Washington Law Review, Vol 96 No. 4 (2021), https://digitalcommons.law.uw.edu/wlr/vol96/iss4/7/.

[39] "Santa Clara County v. Southern Pacific Railroad Co., 118 U.S. 394 (1886)," Justia, Accessed December 4, 2024, https://supreme.justia.com/cases/federal/us/118/394/.

[40] "Santa Clara County v. Southern Pacific Railroad Co., 118 U.S. 394 (1886)," Justia, Accessed December 4, 2024, https://supreme.justia.com/cases/federal/us/118/394/.

economic frameworks. Just like corporations, autonomous vehicles could similarly be assigned a legal status that allows them to be held liable for accidents and pay damages through insurance.[41]

The actions of AVs can be understood more clearly through a distinct analogy. Think of a vending machine. A vending machine requires an input and produces an output. In this case, the user of the vending machine is held responsible for their actions because the machine lacks autonomous judgment. In contrast, think about newborns growing up to become adults. As children grow up, they eventually become liable for their actions after being trained by their parents for many years. This can be likened to autonomous vehicles. Much like these newborns becoming adults, after years of training, autonomous vehicles can reach a level of training that separates them from the responsibility of their programmer.

Similarly, there are legal frameworks that already exist that distinguish between a party being held *liable* and the same party being held *responsible*. For instance, a disabled adult may not be responsible for their actions due to their cognitive or physical limitations. While this is the case, they can still be held *liable* for damages to property or injury. A similar distinction can be found in vicarious and strict liability, where a party may be legally obligated to compensate for harm even when they are not at fault. As Peter Cane explains, "A person may be under a moral obligation to repair a bad outcome of their conduct even if they were not at fault in causing it. Thus…if a child breaks a neighbour's window while playing ball, the parents are under a moral obligation to pay for the repair of the window even if they were in no way at fault."[42] Applying this principle to autonomous vehicles, while AVs cannot be held morally responsible as a human

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[41] "Santa Clara County v. Southern Pacific Railroad Co., 118 U.S. 394 (1886)," Justia, Accessed December 4, 2024, https://supreme.justia.com/cases/federal/us/118/394/.

[42] Peter Crane, "Responsibility in Law and Morality," Uganda Martyrs University, 2002 pg. 106, https://ebooks.umu.ac.ug/librarian/books-file/Responsibility%20in%20Law%20and%20Moral%20-%20Peter%20Cane.pdf.

can, they can still be held liable. This can be done through insurance or other forms of compensation so that they are accountable for their actions.[43]

The distinction between responsibility and liability is also rooted in biblical understanding. In Deuteronomy 22:8, property holders were instructed to build parapets (protective barriers like railing) around their roofs to prevent people from falling. If a person fell off a roof that did not have a parapet the property holder would be held liable and responsible for the accident for not building the parapet. However, if the homeowner took the needed precautions by building a parapet and someone still fell off, then the homeowner would not be responsible. Similarly, the programmers and manufacturers would be liable and responsible if they did not take the needed precautions. In cases where they took the necessary precautions, then the autonomous vehicle would be liable, but nobody would be responsible. This model makes sure that fairness is given to the innocent parties while still encouraging safety in the design of autonomous vehicles.

One key difference between AVs and corporations is that corporations often have the financial capabilities to pay off the damage while AVs do not. While this is the case, there are legal mechanisms that can accommodate this problem. Insurance policies can be mandated for each AV which ensures compensation for the victims of the accidents without weighing down the drivers, manufacturers, or programmers with a financial burden. Requiring insurance would have the added benefit of incentivizing safety: insurers are only going to write policies for AV's they consider safe.

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[43] Peter Crane, "Responsibility in Law and Morality," Uganda Martyrs University, 2002, https://ebooks.umu.ac.ug/librarian/books-file/Responsibility%20in%20Law%20and%20Moral%20-%20Peter%20Cane.pdf.

Additionally, parallels can be taken from maritime law and applied to autonomous vehicles. Traditionally, maritime law assigns liability to shipowners, operators, or captains for damage caused by the vessel. However, with the rise of autonomous cargo ships, these traditional laws are being challenged. The question is whether an autonomous ship can be sued for damages independently of human fault.[44]

This issue remains unsolved, though various solutions are currently being explored. For example, the International Maritime Organization (IMO) has discussed adapting maritime law for autonomous cargo ships.[45] Additionally, countries such as Japan have conducted trials with fully autonomous cargo ships, which raises questions about who will be liable for accidents when these autonomous vessels are involved.[46]

Legal scholar Linlin Chen, in her article on "Maritime Rights, Obligations, and Liabilities of Intelligent Ships from the Perspective of Risk Distribution," argues that "granting a fully autonomous ship legal personality is at least acceptable in terms of compensation liability for

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[44] Chen, Linlin, "Maritime Rights, Obligations, and Liabilities of Intelligent Ships from the Perspective of Risk Distribution," Taylor & Francis Group, 2023, https://www.tandfonline.com/doi/epdf/10.1080/25725084.2023.2264566.

[45] "Joint MSC-LEG-FAL Working Group on Maritime Autonomous Surface Ships (MASS-JWG) 2nd session," International Maritime Organization, May 2, 2023, https://www.imo.org/en/MediaCentre/MeetingSummaries/Pages/Joint-MSC-LEG-FAL-Working-Group-on-Maritime-Autonomous-Surface-Ships-%28MASS%29-.aspx.

[46] "The Future of the Japanese Maritime Industry Lies in Commercialising Fully Autonomous Ships," Back to Blue Initiative, March 2022, https://backtoblueinitiative.com/the-future-of-the-japanese-maritime-industry-lies-in-commercialising-fully-autonomous-ships/.

damages."[47] This suggests that autonomous ships could be treated as legal entities, enabling them to assume liability separate from human manufacturers or shipping companies.[48]

The shift in maritime law toward recognizing fully autonomous ships provides a compelling precedent for AVs to bear liability as legal entities. If courts accept that ships can bear legal liability separate from their manufacturers or programmers, then AVs should be viewed in the same way—as independent legal entities that can be held liable for damages through structured insurance and liability frameworks.[49]

While the precedents and analogies of having AVs be liable for their actions set a strong foundation for holding AVs accountable, risk and justice must also be brought up. Beyond just legal precedents, it needs to be ensured that liability is placed on the right party. This brings up the final argument: principles of risk, fairness, and justice support assigning liability to the AV itself.

Justice demands that liability for damages or harm be assigned to the party that was most capable of stopping the damage from occurring. Autonomous vehicles represent the designated party that is most capable of stopping accidents from occurring. To ensure fairness, it is required to assign liability to AVs.[50]

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[47] Chen, Linlin, "Maritime Rights, Obligations, and Liabilities of Intelligent Ships from the Perspective of Risk Distribution," Taylor & Francis Group, 2023, https://www.tandfonline.com/doi/epdf/10.1080/25725084.2023.2264566.

[48] Chen, Linlin, "Maritime Rights, Obligations, and Liabilities of Intelligent Ships from the Perspective of Risk Distribution," Taylor & Francis Group, 2023, https://www.tandfonline.com/doi/epdf/10.1080/25725084.2023.2264566.

[49] "What are the Legal Issues with Autonomous Shipping Technologies?" Godwin, Morris, Laurenzi & Bloomfield, P.C., December 3, 2024, https://www.gmlblaw.com/blog/2024/12/what-are-the-legal-issues-with-autonomous-shipping-technologies/.

[50] "Justice," Legal Information Institute, Accessed December 3, 2024, https://www.law.cornell.edu/wex/justice#:~:text=Justice%20is%20the%20ethical%20%2C%20philosophical,and%20the%20accused%20receive%20a.

Justice, the principle of giving everyone what they are due, is a key theme in biblical teachings. The Bible emphasizes the importance of justice particularly where harm is caused unintentionally. For example, in Exodus 21: 28-29, "when an ox gores a man or a woman to death, the ox shall be stoned, and its flesh shall not be eaten, but the owner of the ox shall not be liable. But if the ox has been accustomed to gore in the past, and its owner has been warned but has not kept it in, and it kills a man or a woman, the ox shall be stoned, and its owner also shall be put to death." This passage establishes a clear distinction: if the ox acts unpredictably with no prior history of aggression, its owner is not held liable. However, if the owner knew the ox was dangerous and failed to act, they bear liability for the harm it causes. The same principle applies to autonomous vehicles. Like the ox, AVs are entities that operate according to their programming. If an AV causes harm despite being properly designed and maintained, it is unjust to hold the manufacturer or programmer liable. However, if the AV has a known history of malfunctions and the manufacturer or programmer fail to correct it, they must answer for the consequences.

Risk assessment, also, clearly answers the question of who is liable. In Ezekiel 18:20, it states, "The one who sins is the one who will die." While autonomous vehicles are not capable of sinning since they are not moral entities, this verse still emphasizes the principle of accountability. Those who cause harm are those who should reap the consequences. For AVs, this principle can be extended to legal liability rather than moral responsibility.

Holding AVs liable creates incentives for programmers and manufacturers to prioritize safety as well as justice. If AVs carry liability brought out through insurance, companies will be motivated to reduce the amount of risks that vehicles have. This parallels what Proverbs 11:1 says, "The Lord detests dishonest scales, but accurate weights find favor with him." Just as

honesty promotes fairness in trade, just liability frameworks encourage ethical innovation in AVs.

Assigning liability to autonomous vehicles ensures justice is upheld. This approach aligns with secular principles of justice as well as biblical thoughts on fairness and accountability. Granting legal personhood to AVs would also help address societal challenges by establishing clear legal responsibilities for fully autonomous vehicles. This ensures that they are held accountable when accidents occur. Just as corporations are granted legal personhood to take responsibility for their actions, autonomous vehicles should also be recognized as legal entities. This would create a clear framework for liability, preventing legal ambiguity and ensuring accountability when accidents occur.

Legal scholar Phillip Kelly states that "it could be argued that if AI systems demonstrate a process of rationality, through being able to make independent decisions, then the AI should be held liable if it falls short of the parties' reasonable expectations in conducting that process."[51] This statement is compelling when in the context of AVs. AVs make independent decisions in real-time without human intervention. Because of this, when an AV's decision-making harms a person, assigning liability to the vehicle itself seems more logical than assigning it to another party.

By tying liability to the AV itself, society can ensure justice, encourage innovation, and promote the ethical development of fully autonomous vehicles. This suggested approach respects justice in both legal precedent and biblical wisdom.

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[51] Phillip Kelly, Marcus Walsh, Sofia Wzykiewicz, and Simone Young-Alls, "Man vs Machine: Legal liability in Artificial Intelligence Contracts and the Challenges that can arise," DLA Piper, October 6, 2021, https://www.dlapiper.com/en/insights/publications/2021/10/man-vs-machine-legal-liability-artificial-intelligence-contracts.

Refutatio

Critics argue that the personhood of AI is unjustified because they misunderstand the difference between granting an AV legal personhood and granting an AV philosophical personhood. Some say that AI lacks the qualities for having personhood, suggesting that AI needs to have sentient qualities including consciousness, self-awareness, and reasoning. Following this thinking, if AVs had personhood, then that would undermine accountability. For example, the European Parliament rejected a 2017 proposal to give robots "electronic personhood." [52]

However, this critique misrepresents the meaning of legal personhood. Granting an AV legal personhood is different from granting it philosophical personhood. Legal personhood acknowledges that an entity can be held liable under the law— such as a corporation—without granting human traits like consciousness or moral agency to the AV. In the case of fully AVs, granting legal personhood would allow them to be treated as legal entities that are responsible for their actions, but it would not mean that the vehicle has humanesque qualities or ethical decision-making abilities.

Assigning liability to fully autonomous vehicles has several benefits that counter many of the critics' concerns: first, using the principles of strict liability, previously defined, placing liability on AV creates only one responsible entity. According to Shavell's analysis in Strict Liability vs. Negligence, strict liability holds a party responsible for harm regardless of fault, eliminating the need to prove negligence, which is problematic for fully AVs since they operate independently from human oversight. This approach simplifies accident claims dramatically

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[52] Sergio Negri, "Robot as Legal Person: Electronic Personhood in Robotics and Artificial Intelligence," Frontiers, December 22, 2021, https://www.frontiersin.org/journals/robotics-and-ai/articles/10.3389/frobt.2021.789327/full.

while also ensuring that victims are compensated through insurance (this will be explained later). If this were the case, then victims would no longer need to untangle the liability thornbush involving the manufacturer, programmer, owners, and the vehicle. [53]

Second, AVs operate using machine-learning algorithms for unpredictable scenarios, and holding AVs liable would reinforce the principle that they function independently of human control. Third, assigning liability to AVs would create market incentives for manufacturers to develop safer technology, as insurance companies would price policies based on accident risk. Consumers, in turn, would favor AVs with lower insurance costs, which would be cheaper because they are involved in fewer accidents. This competitive pressure would cause companies to improve safety features to reduce liability. This leads to a natural cycle of innovation and safer autonomous vehicles.

A needed component when discussing fully autonomous vehicle liability is the insurance system that must be in place. This is what will ensure compensation to victims of the accident. In accidents involving fully autonomous vehicles, it is typical that another party (either a pedestrian or another driver) will need to be compensated. Insurance is how the victims will be financially protected from the AV to pay for vehicle damage or personal injuries. While the AV's owner assumes the risk of owning the vehicle, they should not be responsible for paying damages to a third party, since they have no direct involvement in operating the vehicle. All AV owners will contribute a small amount (via insurance premiums) that will be used to compensate victims. This is a reasonable solution since the AV owners are benefiting from the use of the AV.[54]

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[53] Steven Shavell, "Strict Liability Versus Negligence," SSRN, 2002, https://www.taylorfrancis.com/chapters/edit/10.4324/9781315188133-5/strict-liability-versus-negligence-steven-shavell.

[54] "Insuring Autonomy: How Auto Insurance Can Adapt to changing Risks," Travelers Institute, July 2018, 37bf1830a5ed11efb6a9120f28cb30ad.

As autonomous technology is produced, insurers will need policies regarding the safety

and reliability of autonomous vehicles. Vehicles that cannot meet safety standards will not be

insured. Since car insurance is needed to drive legally, these vehicles will not be sold until they

reach safety standards. This will incentivize manufacturers to create safe vehicles so that their

vehicles can be driven. AV insurance markets will cause competition between manufacturers to

see who can make the most reliable and safe vehicles.[55]

Another common argument against assigning liability to fully autonomous vehicles

instead of humans is that this would undermine holding the manufacturer and programmer

accountable. Traditional thought holds the responsibility to lie with the party capable of

intending or deciding to harm (or overseeing the party that harms). Because of this, people think

that if liability moves to AVs, that will excuse the programmers and manufacturers from their

role of supervising and designing complicated AI systems.[56]

Travelers Institute, the public policy division of the Travelers insurance company, claims

that it is important to insure AVs since it is impossible to expect what could become of these

vehicles in the future:

> Unlike auto insurance, alternative risk transfer mechanisms like product liability
> are not structured to be primary, comprehensive solutions. A product liability-type
> regime for AVs – in lieu of, or with primacy over, the current auto insurance
> structure – could force consumers and victims to pursue complex, lengthy
> lawsuits to seek compensation. Such suits involve intensive and drawn-out
> investigative and evidentiary hurdles before anyone sees a day in court. Further,
> the product liability legal and regulatory environment is ill-fitted for handling
> auto collisions – the sheer number of discrete incidents would bog down court

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[55] "Insuring Autonomy: How Auto Insurance Can Adapt to changing Risks," Travelers Institute, July 2018, 37bf1830a5ed11efb6a9120f28cb30ad.

[56] Patrick Lin, "Why Ethics Matters for Autonomous Cars," Springer pp. 69-85: 2016, https://link.springer.com/chapter/10.1007/978-3-662-48847-8_4.

systems and significantly delay compensation. Victim compensation, if it happens at all, could take years.[57]

Instead of drawn-out court cases, it would be easier to have the autonomous vehicle be liable, with both parties being compensated through insurance. [58]

Patrick Lin articulated this concern in his book *Why Ethics Matters for Autonomous Cars.* He worries that the switch in liability could cause the designers to lose oversight when creating these vehicles. He continues that this might cause the programmers and manufacturers to be left off the hook if they are not held liable. What is stopping them from creating faulty vehicles if they are not the ones that are held liable?[59]

While these concerns have merit, assigning liability to AVs does not eliminate accountability. Under this proposed model, accountability shifts to the AV to reflect its autonomous decision-making. For example, manufacturers as well as programmers can still be accountable by creating standards regarding the design and testing of autonomous vehicles. Additionally, the owners of autonomous vehicles can ensure that the vehicles meet the regulatory guidelines through maintenance protocols. Once both conditions are met, the AV would be liable in an accident.

For instance, manufacturers will need to be required to rigorously test their vehicles to ensure that they can operate safely without error. If the manufacturers and programmers do not fulfill their duty to make sure the vehicle is safe, then they should be liable. However, when both

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[57] "Insuring Autonomy: How Auto Insurance Can Adapt to changing Risks," Travelers Institute, July 2018, 37bf1830a5ed11efb6a9120f28cb30ad.

[58] "Insuring Autonomy: How Auto Insurance Can Adapt to changing Risks," Travelers Institute, July 2018, 37bf1830a5ed11efb6a9120f28cb30ad.

[59] Patrick Lin, "Why Ethics Matters for Autonomous Cars," Springer pp. 69-85: 2016, https://link.springer.com/chapter/10.1007/978-3-662-48847-8_4.

the manufacturer and programmers fulfill their duties, and the vehicle autonomously makes a vehicle that results in harm, then the AV should be held liable.

This approach ensures that AVs align with their autonomous decision-making. When a vehicle makes a decision, it is logical to assign responsibility to the vehicle itself. If humans are the only ones found accountable, this could punish individuals for outcomes that they could not control. If this AV-specific framework is in place, then accountability would be clearer to enforce with only one party being liable and damaged parties still being compensated through insurance.

Assigning liability and legal personhood to fully autonomous vehicles does not eliminate human accountability. It serves to benefit the future with the rise of AV technology's unique nature. This method incentivizes the creation of safer technology while ensuring that the law adapts to this technology. As these vehicles become more of a reality every day, it is important to ensure that accountability is managed effectively without dampening innovation.

Peroratio

Imagine a child crossing the street, clutching tight to her mother's hand, when an autonomous vehicle barrels through, striking them both. The mother survives. The child does not. In the aftermath, justice needs to be served—yet no one is held accountable. The manufacturer points to the programmer. The programmer points to the complexity of the AI. The company points to the empty driver's seat. What is the result? A grieving mother left with nothing but silence, no accountability, and, most of all, no justice.

If society refuses to recognize autonomous vehicles as legally responsible, this is the future people will face—a world where responsibility vanishes entirely. To avoid this outcome, lawmakers must take active steps to establish comprehensive legislation that holds fully

autonomous vehicles accountable for accidents. Clear legal guidelines must also be created to address AV liability, particularly in cases where the vehicle itself causes harm.

  In addition to legal liability, insurance frameworks must be adopted to provide fair compensation to victims. Insurance systems should be designed to fairly reimburse those affected by AV-caused accidents, ensuring that no one is left without financial support in the event of tragedy. True progress is not just about creating smarter machines; it is about building a just society. A society where innovation does not come at the expense of justice, and where harm does not go unanswered. Justice must ride with the AV. It must never be left behind on the road.

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