Liability for Autonomous Vehicle-Related Damages: EU, U.S., and Chinese Approaches

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Abstract

The thesis examines the regulation of liability for damages caused by artificial intelligence-driven technologies within existing tort law frameworks, adopting a comparative perspective that focuses on the European Union, the United States, and China. The rapid development of AI necessitates the formulation of new regulations. Nowadays certain technologies can operate properly without human involvement at any stage. Self-driving cars, drones, and service robots are all recent inventions. The primary characteristic of all these technologies is that they possess autonomous decision-making capabilities. Thus, existing legal frameworks, established before recent legislative developments, have proven insufficient for effectively attributing liability in the context of emerging technologies. EU, the U.S., and China are home to some of the world's leading developers of AI technologies. As a result, they have been at the forefront of formulating comprehensive legal frameworks for AI, which may serve as potential models for other countries. This thesis will explore the existing regulations surrounding self-driven cars in the EU, U.S., and China, associated ambiguities, and potential solutions to address these uncertainties.

Author's declaration

I, the undersigned, **Mari Margishvili,** candidate for the LLM degree in **Global Business Law and Regulation** declare herewith that the present thesis titled "**Liability for Autonomous Vehicles-Related Damages: EU, U.S., and Chinese Approaches**" is exclusively my own work, based on my research and only such external information as properly credited in notes and bibliography. I declare that no unidentified and illegitimate use was made of the work of others, and no part of the thesis infringes on any person's or institution's copyright.

I also declare that no part of the thesis has been submitted in this form to any other institution of higher education for an academic degree.

Vienna, 16 June 2025

Mari Margishvili

Author's note on the use of AI tools

This document has been reviewed and edited using AI tools, Grammarly and ChatGPT for grammar correction and ChatGPT for synonym enhancement. While these tools assisted in refining the text, the academic content and ideas presented are entirely my own.

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1 Introduction

Autonomous vehicles represent one of the most significant technological advancements of the 21st century. Designed to operate with minimal or no human intervention, they are expected to have a huge impact on society. Alongside these technological advances, new regulations are necessary to address the unique challenges they pose.[1]

This thesis focuses on defining AI-driven technologies, particularly autonomous vehicles, the potential harm they may cause, and the crucial issue of liability when damage results from automated vehicles. Modern tort law no longer fully corresponds to today's realities. Currently, tort law mainly regulates compensation for damages caused by humans, creating a risk that certain areas involving AI may remain unregulated.[2] Therefore, additional regulation is both timely and essential.

Given the comparative nature of the thesis, the key question is how existing regulations in the U.S., the EU, and China – the leading jurisdictions in AI

[1] Jasmine Jade Lovell, 'Legal Aspects of Artificial Intelligence Personhood: Exploring the Possibility of Granting Legal Personhood to Advanced AI Systems and the Implications for Liability, Rights and Responsibilities' (2024) 4(2) International Journal of Artificial Intelligence and Machine Learning, 23 https://www.svedbergopen.com/files/1720696695_(3)_IJAIML202426281652UK_(p_23-40).pdf accessed 16.06.2025

[2] European Commission, 'Liability for Artificial Intelligence and Other Emerging Digital Technologies' (Directorate-General for Justice and Consumers, Publications Office 2019) 19

governance - address liability issues. This thesis explores the legal frameworks of these jurisdictions and offers suggestions for improvement.

Recently, the EU introduced a directive, establishing a uniform legal framework for the use of AI systems, aiming to protect health, safety, and fundamental rights against the harmful effects of AI.[3] Despite the initiatives, many countries still face challenges in developing comprehensive legal frameworks, which makes it hard to assign liability.

This thesis seeks to explore the challenges and implications of existing regulations concerning autonomous cars in these leading jurisdictions. As the subject matter is relatively new, regulatory gaps are possible. However, it is essential to regulate this field properly. By analyzing relevant provisions, the thesis aims to identify these gaps and propose solutions through extensive research and comparative analysis.

The first chapter will address the general definition of AI-driven technologies, their associated risks, and the role of tort law in this context. The second chapter will provide an overview of three jurisdictions – the EU, the US, and China and their respective regulations. The third chapter will propose potential solutions to

[3] Regulation (EU) 2024/1689 of the European Parliament and of the Council of 27 June 2024 on Artificial Intelligence, (EU AI Act) art 1 (2024) OJL 1689 https://artificialintelligenceact.eu/article/1/ accessed 15.06.2025

improve the existing regulatory frameworks. Finally, the conclusion will summarize the main findings.

2. AI-Driven Technologies: Definitions, Risks, and the Role of Tort Law

This chapter will provide a clear definition of AI-driven technologies and an overview of their key characteristics. It will examine the potential risks associated with the functioning of these technologies, particularly in the context of autonomous vehicles. Special attention will be given to the role of tort law, as it addresses the types of harm and liability that are central to the concerns of this thesis.

2.1. Definition of AI-Driven Technologies

Artificial intelligence (AI) has emerged as a significant challenge in the 21st century. Various new technologies are being integrated into our daily lives, yet regulatory frameworks often struggle to keep pace with these rapid developments and lack clarity in many aspects. There is a lack of consensus on the definition of "AI"[4] and, consequently, AI-driven technologies". This definitional ambiguity can create confusion and uncertainty, particularly in legal contexts. Therefore, a

[4]Tatjana Evas, 'European Framework on Ethical Aspects of Artificial Intelligence, Robotics, and Related Technologies: European Added Value Assessment', European Parliamentary Research Service, PE 654.179 (September 2020), 12

fundamental question arises: what precisely does "AI-driven" mean, and which technologies qualify as such?

AI is sometimes regarded as mathematics, software engineering, and sometimes even linguistics.[5] Communication skills, internal knowledge, intentionality, and creativity are considered essential characteristics of human intelligence.[6] However, all these characteristics might not be relevant when discussing AI. To address the ambiguity, it is essential to consider how AI is defined in different sources. Roger Schank, a scientist who made significant contributions to the field of AI,[7] argued that AI should have an issue-related definition, meaning that instead of defining it through the methodologies used in AI, it should be established by the problems attacked by these methodologies.[8] Machines should be able to absorb human knowledge and translate information into specific code.[9] According to the Oxford English Dictionary, AI is defined as „the capacity of computers or other machines to exhibit or simulate intelligent behavior."[10] Thus, something that was previously thought to be human intelligence nowadays can

[5] Roger C Schank, 'What is AI, Anyway?' (1987), 8(4) AI Magazine, 59
[6] Ibid 60
[7] Steve Lohr, 'Roger C. Schank, Theorist of Artificial Intelligence, Dies at 76' (The New York Times, 20 February 2023) https://www.nytimes.com/2023/02/20/technology/roger-c-schank-dead.html accessed 15.06.2025
[8] Schank (n 5) 62
[9] Ibid
[10] Oxford University Press, Oxford English Dictionary, „Artificial Intelligence" N., https://www.oed.com/dictionary/artificial-intelligence_n?tab=meaning_and_use#38531565 accessed 15.06.2025

be done by computers as well. While this definition is relatively straightforward, what constitutes intelligent behavior can be unclear.

A precise definition of AI is essential for the purposes of the thesis, particularly, for determining tort liability. For this thesis, the relevant definition is the one provided by Roger Schank, explaining that machines should be able to absorb and transform knowledge into specific code.[11] From my perspective, self-driving cars fit this definition and can be accurately described as AI-driven technologies, so this approach is particularly useful in this context. Although AI is used extensively in everyday life, human intervention remains largely necessary. It just serves the purpose of making life easier. However, some autonomous systems have the ability to operate without continuous human intervention.[12] Examples include self-driving cars, fully autonomous drones, and even robots that perform tasks without human control. The functioning of these technologies involves unique risks that are largely unaddressed in existing legislation due to their recent emergence.[13] Therefore, examining and addressing these risks is both relevant and essential.

[11] Schank (n 8)
[12] Abu Rayhan, 'Artificial Intelligence in Robotics: From Automation to Autonomous Systems' (ResearchGate, July 2023) 5
[13] European Commission (n 2) 39

2.2. Potential Risk and Harm From AI-Driven Technologies

AI-driven technologies differ from human intelligence in their inability to replicate the complexity and subjectivity of human intelligence.[14] Although AI development offers promising applications for everyday life, there is a significant responsibility to ensure its fair practice and ethical use.[15] Therefore, new risks emerge in connection with AI system functioning. These technologies can make decisions in place of humans. Their decision-making process is sometimes unclear and opaque, meaning that understanding the internal operations of the system is sometimes difficult.[16] Consequently, AI systems may cause harm in ways that would not occur with human decision-making.

For instance, the functioning of self-driving cars, an example of AI-driven technology, is rather complex. There is a classification system determining the level of human intervention necessary for cars to function properly. The level of autonomy for self-driving cars ranges from 0, where the autonomous system issues warnings, but has no sustained vehicle control, to 5, where no human

[14]Omafrume Oritsegbemi, 'Human Intelligence Versus AI: Implications for Emotional Aspects of Human Communication' (2023) Journal of Advanced Research in Social Sciences, 1 https://www.researchgate.net/publication/370797117_Human_Intelligence_versus_AI_Implications_for_Emotional_Aspects_of_Human_Communication#fullTextFileContent accessed 15.06.2025

[15] V Richard Benjamins and Idoia Salazar Garcia, 'Towards a Framework for Understanding Societal and Ethical Implications of Artificial Intelligence' (2020), 89 https://arxiv.org/pdf/2001.09750 accessed 15.06.2025

[16] Uwe Peters, 'Explainable AI Lacks Regulative Reasons: Why AI and Human Decision-Making are Not Equally Opaque' (2023) 3 AI and Ethics, 963

intervention is necessary.[17] As it is suggested, the risk of damage from driverless cars increases with higher classification levels. This classification might be used for determining the liable party, depending on the level of independence of the autonomous vehicle. Therefore, it is essential to determine their functional capacities and under what circumstances humans can be held liable when the damage is caused by technology, rather than human operators.

AI, as a decision-maker, can be utilized in various driving scenarios. The most known example is route planning,[18] where the vehicle's system determines the easiest route to the desired destination.[19] However, AI can also be used in riskier applications that create severe accident possibilities. This is called behavior selection, where the system is responsible for choosing the vehicle's actual driving behavior.[20] Several critical questions arise regarding this issue. First, although AI is highly developed and reliable today, it is still not human, and the probability of an error or complete system failure always exists. Additionally, what should the systems do in cases of inevitable accidents? For instance, when a pedestrian's life is endangered, who receives priority – the pedestrian, or the

[17] Claudine Badue and others, 'Self-Driving Cars: A Survey' (2019) Preprint Submitted to Expert Systems with Applications, 2 https://arxiv.org/pdf/1901.04407 accessed 15.06.2025
[18] Ibid 15
[19] Ibid
[20] Ibid 18

passenger? These questions remain unanswered, and no regulations exist to address the resulting problems.[21]

Generally, AI-driven harm can be defined as any harm or loss caused by AI usage or system malfunction. This concept extends beyond driverless cars to encompass various other AI applications.[22] Several AI-related accidents have already occurred. For example, in 2018, a pedestrian in Arizona was fatally struck by an autonomous vehicle operated by a ride-sharing company.[23] A similar incident occurred in 2020 when a Tesla driver was killed while using the Autopilot feature.[24] While AI-related car accidents are common, they are not exhaustive examples. Cases have also involved AI in healthcare, AI-powered weapons,[25] and there was even a documented incident where an AI-controlled robot attacked people during a festival in China before security intervened.[26] With increasing usage of AI-driven technologies, the risks and potential of harm also increase.

[21] Ibid
[22] Narayanan Sundaraparipurnan and Mark Potkewitz, 'A Risk-Based Approach to Assessing Liability Risk for AI-driven Harms Considering EU Liability Directive' (2023) 2 https://arxiv.org/pdf/2401.11697 accessed 15.06.2025
[23]Ibid citing https://www.theverge.com/2022/7/7/23197041/waymo-self-driving-car-pedestrian-attack-arizona
[24] Ibid citing https://www.ndtv.com/offbeat/tesla-smashes-into-truck-in-viral-video-driver-blames-autopilot-2240407
[25] Ibid
[26] Video of Robot Hitting People in China Goes Viral, Internet Asks 'Should We Bocie Worried?' The Economic Times (11 June 2024) https://economictimes.indiatimes.com/news/international/global-trends/video-of-robot-hitting-people-in-china-goes-viral-internet-asks-should-we-be-worried/articleshow/118621222.cms accessed: 15.06.2025

Although AI can potentially harm humans in various ways, this thesis focuses on accidents involving driverless cars and their regulation under tort law. The introduction of autonomous vehicles will result in the emergence of new gaps.[27] Therefore, proper regulation is essential to prevent catastrophic outcomes when human health is at stake.

2.3. The Role of Tort Law in AI regulation

Tort law generally allows victims to claim damages and obtain restrictive court orders to prevent further wrongdoings to property or persons.[28] With a civil claim, the party can request damages for injuries caused by harmful or wrongful acts done by another.[29] Countries adopt different approaches to achieving this goal. However, identifying the party liable for damages is not always straightforward, despite existing regulations.

Tort liability consists of several key elements: violation of codified normative rules, unlawfulness, fault, causation, and damage.[30] Based on these elements, a distinction is made between fault and strict liability.[31] Under strict liability, a

[27]Tatjana Evas, 'A common EU Approach to Liability Rules and Insurance for Connected and Autonomous Vehicles, European Added Value Assessment', (February 2018) European Parliamentary Research Service, 5 https://www.europarl.europa.eu/RegData/etudes/STUD/2018/615635/EPRS_STU%282018%29615635_EN.pdf accessed 15.06.2025

[28] Marcus Ayodeji Araromi, Adeola A. Oluwabiyi and Agboke Mutiu Olaleke 'Determination of Tort Liability in the Deployment of Artificial Intelligence Technology' (2024) 141, Journal of Law, Policy and Globalization, 29

[29] Hannah R. Sullivan and Scott J. Schweikart 'Are Current Tort Liability Doctrines Adequate for Addressing Injury Caused by AI?' (2019) 21 AMA Journal of Ethics 2, 160

[30] Cees van Dam, 'European Tort Law' (2014) Oxford University Press, 79

[31] Ibid 78

person can be held liable for the risk that occurs, regardless of whether he acted intentionally or negligently. For example, if an underage person drives a parent's car, the parent may be held strictly liable.[32]

By contrast, fault liability requires either intentional or negligent conduct. Intentional conduct is rarely required to be proven, more often negligent conduct will suffice.[33] The compensation of damages serves several functions, including punishing and preventing wrongful behavior.[34]

However, applying existing liability regimes to AI-driven technologies is associated with a number of challenges and might leave the victim partially or entirely uncompensated.[35] These challenges will be discussed in detail below. From my perspective, traditional legal concepts mentioned above might be difficult to apply when autonomous systems operate with limited or no human intervention. From a comparative perspective, it is interesting to review the regulations of AI-driven technologies in three leading jurisdictions – the EU, the U.S., and China - to identify effective regulatory strategies and gaps for improvement.

[32] Ibid 78
[33] Ibid
[34] Ibid 352
[35] European Commission (n 2)

3. Regulation of AI-driven Technologies in the U.S., EU, and China

3.1. The EU Regulation

EU law operates within a multi-level governance framework.[36] The diverse legal traditions and policy approaches of its Member States make regulatory uniformity across the EU challenging. When the Member State includes rules from the EU in its national legislation, it cannot give priority to local rules later. The EU legal system cannot be overridden by national laws.[37] Thus, regulating issues at the EU level carries considerable responsibility and inherent legal complexity.

The EU has taken a proactive regulatory approach to AI regulation. In 2021, the European Commission proposed the „Artificial Intelligence Act" (the EU AI Act) to establish „harmonised rules for the development, placing on the market and use of AI in the European Union."[38] The Act covers all AI systems capable of generating outputs such as content, predictions, and recommendations.[39] It adopts a risk-based approach, dividing AI into four risk categories based on their

[36] European Committee on Democracy and Governance (CDDG), 'Report on Multilevel Governance" (Secretariat Memorandum Prepared by the Directorate General of Democracy and Human Dignity Democratic Governance Division' Strasbourg, December 2023) 5.
[37] Case 6/64 Costa v Enel (1964) ECR 593
[38] Lilian Edwards, 'The EU AI Act: A Summary of Its Significance and Scope' (April 2022), Newcastle University, 4
[39] Ibid 7

intended use.[40] The highest category - unacceptable risk - includes systems that are entirely prohibited.[41]

One prohibited use of AI under the Act involves systems that use subliminal techniques to operate. [42] According to the act, AI systems that deploy subliminal techniques either beyond a person's consciousness or that use deceptive techniques are prohibited if they are likely to affect their decision, reasonably causing them significant harm.[43] Understanding the term is crucial for the Act's enforcement.[44] Depending on the definition of the term, it might cause implications for autonomous vehicles as well. Given the level of independence these systems possess, they can influence a person's decisions while driving, or even make decisions on behalf of the driver. Accordingly, one could argue that vehicles with a certain degree of autonomous driving can be considered a subliminal technique. And therefore, prohibited under the provision.

The AI Act states that to safeguard public interests such as health, safety, and fundamental human rights, common rules must govern the use of high-risk AI

[40] Ibid 9
[41] Ibid 10
[42] Rostam J Neuwirth, 'The EU Artificial Intelligence Act: Regulating Subliminal AI Systems' (1st ed, Routledge 2022, London) 14
[43] The EU AI Act art.5
[44] Neuwirth (n 42) 17

systems.[45] While such applications can yield significant social and environmental benefits, they also pose substantial risks that require strict oversight.[46]

Although useful for risk categorization, this regulation alone may not be sufficient for addressing the risks posed by AI-driven technologies. While it might be true that autonomous cars are considered high-risk, this does not imply that they will not be in use. On the contrary, their deployment is expected to increase. Merely labeling them as high-risk has no direct consequences - what truly matters is assigning legal responsibility when damage occurs.

Against this backdrop, the AI Act marked an important regulatory milestone. However, the absence of a unified liability approach at the EU level still remains a major gap. A global initiative in this context would be preferable.[47] This point is especially significant considering the fact that one of the goals of the EU Artificial Intelligence Act is to ensure legal certainty, in order to encourage investment and innovation in AI.[48] Therefore, a harmonized liability framework would be a step forward toward fulfilling the aim of the act itself.

[45] The EU AI Act, recital 7
[46] European Commission, 'Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) and Amending Certain Union Legislative Acts' COM (2021) 206 final, (21 April 2021) Explanatory Memorandum, Section 1.1 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52021PC0206 accessed 15.06.2025
[47] Neuwirth, (n 42) 9
[48] European Commission (n 46)

Notably, a proposal for a new AI Liability Directive was introduced in 2022. The European Commission acknowledged the shortcomings of existing liability rules. It noted that current liability rules are not suited for handling liability claims for damage caused by autonomous systems. Currently, the victim still has to prove a wrongful act or omission by a person who caused the damage, but under new characteristics of AI, including complexity, autonomy, and opacity, this might be connected to severe issues.[49] Therefore, one of the goals of the proposed directive was to harmonize non-contractual civil liability rules across the EU for damage caused by AI.[50] In my view, this directive could have served as a foundation for more detailed regulation of liability tied to the use of AI-driven technologies.

However, as of 2025, the European Commission announced that the proposed new AI liability directive would be withdrawn. According to the Commission's 2025 Work Programme, no agreement was foreseeable among Member States.[51] The commission also indicated that it would reconsider its approach regarding the AI liability directive and either propose a new one or explore alternative

[49] European Commission, 'Proposal for a Directive of the European Parliament and of the Council on Adapting Non-contractual Civil Liability Rules to Artificial Intelligence (AI Liability Directive)' COM (2022) 496 final, Explanatory Memorandum, 1 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52022PC0496 accessed: 16.06.2025

[50] Tambiama Madiega, 'Artificial Intelligence Liability Directive' (February 2023) European Parliamentary Research Service, PE 739.342, 5 https://courses.ilac.eu/wp-content/uploads/2023/03/AI-DIRECTIVE.pdf accessed: 16.06.2025

[51] European Commission, Annexes to the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Commission Work Programme 2025, COM (2025) 45 final, 26

approaches.[52] The failure to adopt this directive is concerning. It is clear that new rules on liability arising from the use of AI technologies are needed to ensure the protection of fundamental human rights.

Another significant piece of legislation is the revised Product Liability Directive, which updates the existing product liability regime to reflect the challenges of the digital age and AI-driven products.[53] It addresses liability for products such as software, including AI systems and digital services that affect the functioning of the products. [54]

The essential element here is that the directive adopts a broader definition of the term „product ", explicitly including AI systems as part of the software.[55] Therefore, the directive seeks to regulate not only damages caused by human actions but also those resulting from AI systems.

The revised directive also introduces that manufacturers can still be held liable if a defect happens after the product is sold from AI/machine learning, which actually changes how the product behaves.[56] Therefore, in this context, the

[52] Ibid
[53] Stefano De Luca, „Revised Product Liability Directive" (February 2025) European Parliamentary Research Service, PE 739.741, 1
[54] Ibid
[55] Ibid 4
[56] Ibid 5

directive explicitly covers the liability for autonomous vehicles and their managing systems.

Additionally, the directive improves the position of injured parties, by allowing courts to presume causation in cases involving technically complex cases, like AI.[57] Therefore, the EU tried to solve the problem of causation, by making it easier for victims to prove that damage has occurred. The directive introduces several defenses that manufacturers may use to avoid liability.[58] However, it specifies that these defenses cannot be used if the damage results from software under the manufacturer's control, or from a failure to update the software.[59] Consequently, under this directive, the injured party is relatively better protected compared to the previous version. Victims have to prove only three elements: that the product was defective, that they suffered damage, and that there was a causal link between the software and the harm.[60] They do not have to prove that the manufacturer was negligent. Additionally, the causal link might be presumed by the court.[61] Therefore, the burden of proof is lighter under this directive, better serving the victims' interests. Consequently, it could be much easier for injured parties to succeed in compensation claims.

[57] Ibid
[58] Ibid 6
[59] Ibid
[60] Ibid 5
[61] Ibid 6

The General Safety Regulation (GSR) is also a key piece of EU legislation dealing with autonomous vehicles. The main goal was to minimize traffic accidents caused by human factors.[62] It includes requirements related to intelligent speed assistance, indicating that switching off the intelligent speed assistance has to be easily possible under certain circumstances.[63] If a person can override the autonomous system at any time, the likelihood of harm caused by the vehicle is reduced. As a result, questions about the vehicle's liability become less complex. In emergency situations, if the final decision rests with the human driver, determining the liability becomes easier. However, this applies only in cases where a human driver is present in the vehicle and able to override the system in critical moments. In the case of fully autonomous vehicles, this argument loses its relevance.

Certain EU Member States have already allowed the use of self-driving vehicles. For instance, in 2018, the Dutch Road Traffic Act was enacted, allowing the experimental use of self-driving vehicles without the requirement of human driver's presence, on public roads.[64] Similar legislation has been passed in

[62] A Milestone in the European Automotive Industry: General Safety Regulations (EMOTION3D July 26, 2024) https://emotion3d.ai/a-milestone-in-the-european-automotive-industry-general-safety-regulations/ accessed 15.06.2024

[63] Regulation (EU) 2019/2144 of the European Parliament and of the Council of 27 November 2019 on Type-Approval Requirements for Motor Vehicles and their Trailers, and Systems, Components and Separate Technical Units Intended for Such Vehicles, as Regards Their General Safety and the Protection of Vehicle Occupants and Vulnerable Road Users, (2019) OJ L325/1 Recital 10 https://eurlex.europa.eu/eli/reg/2019/2144/oj/eng accessed 15.06.2025

[64] Jenny Gesley and others, Regulation of Artificial Intelligence in Selected Jurisdictions' (2019), The Law Library of Congress, Global Legal Research Directorate, 97 citing: Act to Amend the Road Traffic Act 1994 in

Lithuania, allowing self-driving cars to operate without a driver being present. According to the Minister of Economy, the main goal of this legislation is for Lithuania to be the place where the self-driving vehicle will be tested. [65]

While other regulations exist, from my perspective, the lack of specific regulation regarding AI-driven technologies risks violating fundamental human rights, if not urgently addressed. EU legislation addresses important issues related to potential liability arising from the use of autonomous cars. However, there is still no uniform and comprehensive legal framework in place. The proposed EU AI liability directive[66] was a promising step forward, but its withdrawal highlights the differing positions among Member States and other stakeholders, such as developers, regarding liability standards.

As a result, determining liability for damages caused by autonomous cars is left to the national legislations and courts of Member States. This fragmented approach risks producing inconsistent decisions, undermining legal certainty both for victims seeking compensation and for companies developing AI systems.

connection With Making the Experimental Use of Automated Motor Vehicle Systems Possible, Sept. 26, 2018, https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1179&context=scholcom accessed 15.06.2025

[65] Ibid 95 see: The Lithuanian Parliament on Thursday opened up the country's roads to driverless autonomous vehicles, Delfi (Dec.8,2017) https://www.delfi.lt/en/lithuania/politics/parliament-opens-lithuanias-roads-to-driverless-autonomous-vehicles-76583023

[66] Proposal COM/2022/496 final

3.2. The U.S. Regulation

It is also interesting to consider the U.S. legislation on this topic. Due to the federal structure of the U.S. legal system, individual states have the authority to regulate issues related to AI-driven technologies independently. The U.S. lacks comprehensive AI regulation, as proposed in the EU, and instead relies on fragmented policies to foster innovations and manage risks.[67]

Several articles have examined different regulations across the U.S. For instance, one article mentions that states are better positioned to regulate the issue due to their stronger enforcement capacity via local police, state troopers, and state regulation agencies.[68] However, there are challenges associated with regulating this issue, particularly because the introduction of fully autonomous cars calls into question the idea of „vehicle operation "and creates new challenges for U.S. legislation.[69]

Despite these challenges, four states (California, Nevada, Florida, and Michigan) and the District of Columbia have enacted laws regarding the testing and usage of self-driving cars.[70] These regulations share the same requirement – a driver

[67] AI Legislation in the US: A 2025 Overview (January 2024, Software Improvement Group) https://www.softwareimprovementgroup.com/us-ai-legislation-overview/ accessed 15.06.2025
[68] Brian A. Browne, 'Self-Driving Cars: On the Road To a New Regulatory Era' (2017) 8, Journal of Law, Technology and the Internet, 12
[69] Ibid
[70] Ibid

must be present at all times to take over in case of emergency.[71] Fulfilling all the requirements stipulated in legislation may be difficult. As a result, the number of self-driving cars and their owners may remain relatively low. Moreover, besides these four states, other states have permitted self-driven cars, without any further clarification.[72]

As previously mentioned, California was the first state to regulate AI-driven cars. In 2018, the California Department of Motor Vehicles issued a policy, allowing self-driving cars to conduct fully autonomous driving tests, without any human interference.[73]

However, despite the fact that several regulatory models are available, there is no unified national self-driving law at the federal level in the U.S. Different states implement different regulations and technical standards, creating complications for automakers to meet the requirements of each state.[74] Passing a law that would be binding for all 50 states might be very complicated, but as AI technologies develop, the necessity of this step increases rapidly.

[71] Ibid, citing: Mich. Comp. Laws § 257.665 (2016); Fla. Stat. Ann. § 319.145 (2016); D.C. Code §50-2352 (2013). *See* also James M. Anderson et al. supra note 4, 44-48.

[72] Ibid 13, citing: S.598, 2015 Gen.Assemb., 109th Reg. Sess. (Tn. 2015).

[73] Ziyan Chen and Shiguo Liu 'China's Self-driving Car Legislation Study' (2021) 41, Computer Law & Security Review, 2

[74] Ibid

The federal government has yet to pass any legislation affecting autonomous vehicles.[75]Some scholars argue that the federal government should intervene and regulate the issue.[76] It is argued that federal preemption might be necessary to avoid inconsistent state laws in autonomous vehicle liability cases.[77] Another option could be for Congress to establish a governmental agency instead of passing the federal law.[78]

From my perspective, passing a federal law that addresses liability for damages arising from the use of autonomous vehicles is essential in the U.S. Otherwise, regulation of this issue is left to the states. In the absence of a specialized liability regime, U.S. courts would likely apply existing general rules on tort liability, which may not adequately address all risks associated with autonomous vehicles.

3.3. Chinese Regulation

Circumstances are different in Chinese legislation. China has taken several major steps to address the issue. For example, Shanghai's regulations stipulate that in cases involving serious injury, judicial organizations responsible for traffic accidents should undertake technical supervision of the cars. This means that,

[75] Matthew L Roth, 'Regulating the Future: Autonomous Vehicles and the Role of Government' (2020) 105 Iowa Law Review, 1414
[76] Jessica S Brodsky, 'Autonomous Vehicle Regulation: How an Uncertain Legal Landscape May Hit the Brakes on Self-Driving Cars' (2016) 31(2) , Berkeley Technology Law Journal, 871
[77] Ibid, citing James M. Anderson ET AL., RAND, Autonomous Vehicle Technology: A Guide for Policymakers (2014) 129
[78] Ibid, 872

based on the supervision results, manufacturers, drivers and even software system suppliers may be required to share responsibility.[79]

Similar to the United States, China does not have national-level legislation on autonomous vehicles. Instead, it relies on regulatory documents and protocols.[80] For instance, Beijing has developed a legal framework for autonomous driving systems.[81]

In 2025, BYD, a leading Chinese electric vehicle manufacturer, introduced advanced autonomous car models, with capabilities such as lane keeping, cruise driving, obstacle avoidance, emergency braking, and remote parking possibilities. Tesla also offered a full self-driving software subscription in China, with limited features.[82] Other major companies, including Huawei and Xiaomi, also introduced their own versions of autonomous vehicles. Consequently, China had a major market when it came to AI-driven cars.[83]

However, as of 2025, China's MIIT (Ministry of Industry and Information Technology) has tightened regulations relating to autonomous vehicles. New rules enforce strict hands-on requirements, meaning that driver monitoring

[79] Chen and Liu (n 73) 6
[80] Yu Lingyun, Zhu Qin and Zheng Lin, „Autonomous Vehicles Regulation in Beijing " (2024) 17(1), Tsinghua China Law Review, 133
[81] Ibid, 136
[82] Explainer: What Autonomous Driving Features are Available in China? (February 11, 2025, Reuters) https://www.reuters.com/business/autos-transportation/what-autonomous-driving-features-are-available-china-2025-02-11/ (accessed: 15.06.2025)
[83] Ibid

systems cannot be disabled and must detect when drivers remove their hands from the steering wheel. In case this exceeds 60 seconds, risk mitigation strategies have to be implemented, including slowing down or pulling over.[84] Therefore, China has adopted a very strict approach to AI-driven cars. Essentially, it is not possible for the car to drive without human interference for more than 1 minute. While this reduces the risk of the technology itself causing damage, it also reduces the point of the autonomous vehicles. The need for a stricter approach arose after a tragic accident, in which a semi-autonomous vehicle crashed into a barrier and caught fire, resulting in the deaths of three people. This regulation raises concerns about the future of autonomous vehicles in China.[85]

Chinese self-driving car market has been a major part of the autonomous world. The Chinese government has supported the sector by implementing several policies, such as the 2020 strategy for autonomous vehicle development. [86] Despite the tightened regulations, China is expected to remain a key player in the global autonomous vehicle market. While these regulations might slow the pace of innovation, they could also encourage more thorough testing.[87] Therefore,

[84] Liu Miao, China's MIIT Tightens Regulations on Autonomous Driving Features, Banning Key Functions (April 17, 2025, CarNewsChina) https://carnewschina.com/2025/04/17/chinas-miit-tightens-regulations-on-autonomous-driving-features-banning-key-functions/ accessed: 15.06.2025
[85] Tom Pattinson, China's Autonomous Driving Crackdown: What It Means for the Global Self-Driving Car Market (24 April, 2025, China-Britain Business Focus) https://focus.cbbc.org/xiaomi-ev-accident/ accessed 15.06.2025
[86] Ibid
[87] ibid

China will remain one of the key players in the world and it will be interesting how other regulations will take turns following this tightened rule.

China's stricter regulations on autonomous vehicles highlight the possible dangers of fully self-driving cars. Although China was initially more supportive of the idea of autonomous vehicles, it has recently adopted a more cautious approach following the accident. The EU and the U.S. should also take this shift into consideration when planning their own rules and policies. As Markus Levin, Co-founder of XYO, ('Decentralized Physical Infrastructure Network[88]) states that this should be a wake-up call for other leading industries, because current self-driving systems often fail to capture the broader environment, including road hazards and traffic conditions, which increases the risk of accidents.[89]

[88] Decentralized Location Oracle Network (XYO Network, 2024) https://xyo.network accessed: 16.06.2025
[89] Pattinson, (n 85)

4. Possible Gaps in the EU, the U.S., and Chinese Legislation

The previous chapter outlined the regulatory framework in three selected jurisdictions. However, a detailed analysis of existing legislation reveals that certain issues remain unregulated.

Before addressing the specific issues involved, it is essential to define the term „legislative gap“ in this context. Generally, a legal gap is “the complete or partial absence of the necessary legal provisions in the current regulations.”[90] Legal relations are in constant development, trying to adapt to emerging challenges. Under such circumstances, it is not surprising that „defects of the legal system “arise, which include gaps.[91] Given that it is impossible to regulate everything by law, new situations inevitably arise, requiring fresh legislative responses. It is the responsibility of lawmakers to adapt to these challenges as efficiently as possible. In this context, a legal gap refers to the absence or ambiguity in existing regulations, that determine who is liable for damage caused by AI-driven cars.

Because self-driven car technology is relatively recent, the legal issues it raises are often addressed broadly, vaguely, or not at all. This lack of legislative clarity

[90] Anatoliy Kostruba, Mykola Haliantych, Svitlana Iskra and Andrii Drushliuk, ‘Legal Gaps: Concept, Content, Problems of the Role of Legal Doctrine in Overcoming Them’ (2022) Statute Law Review, 3
[91] Ibid 1

also leads to another problem – the „responsibility gap ". This term refers to situations where it is unclear who can justifiably be held responsible for outcomes caused by AI technology.[92] For example, there has been debate over whether a commander can be held liable if a person is killed by a military robot. It is arguably unfair to hold people responsible for outcomes they cannot fully predict or directly control.[93] This concern is equally relevant in the context of autonomous cars and their owners.

This issue is becoming increasingly important as several major companies invest heavily in autonomous vehicle development. For instance, in 2015, Uber opened its own self-driving car lab with the vision of creating autonomous taxis.[94] Similarly, Tesla has been developing self-driving cars for several years and has already released its own versions of self-driving vehicles.[95]

In a press release, the CEO of Volvo noted that regulatory–rather than technological - hurdles are acting as barriers to advancing the development of self-driven cars. Therefore, he stated that Volvo would accept full responsibility

[92] Sven Nyholm, 'The Ethics of Crashes With Self-Driving Cars: A Roadmap. II' (2018) 13(7) Philosophy Compass e12506, 3 https://compass.onlinelibrary.wiley.com/doi/pdf/10.1111/phc3.12506 accessed: 15.06.2025
[93] Ibid, citing: Sparrow, R. (2007). Killer robots. Journal of Applied Philosophy, 24(1), 62–77.
[94] Brodsky (n 80) 856 Citing: Jemima Kiss, Uber: 'We'll Ease the Transition to Self-driving Cars, GUARDIAN (Sept. 16, 2015), http://www.theguardian.com/technology/2015/sep/17/uber-well-ease-the-transition-to-self-driving-cars [https://perma.cc/7WP2-MKK9].
[95] Ibid, Citing: Cadie Thompson, Elon Musk Says Tesla's Fully Autonomous Cars Will Hit the Road in 3 Years, TECH INSIDER (Sept. 25, 2015), http://www.techinsider.io/elon-musk-on-teslas-autonomous-cars-2015-9 [https://perma.cc/L4HL-YPB5]

whenever one of its cars, while in autonomous mode, caused a crash.[96] This statement represented a significant step towards addressing the regulatory challenges surrounding autonomous vehicles.[97] However, while this appears reassuring on the surface, it raises important questions. It is unclear what kind of liability Volvo is referring to, given the absence of a clearly defined legislative framework on liability. Even if a company claims that it will accept liability, it is uncertain how courts will deal with the issue without explicit regulations for autonomous vehicles. Moreover, not all companies have followed this approach. For instance, Tesla appears to design its semi-autonomous cars in a way that places liability on human drivers in the event of an accident.[98]

As these examples indicate, there is currently no consistent legal standard for determining liability in accidents involving autonomous vehicles. Under current product liability laws, if a car operates at the highest level of autonomy and causes an accident, the manufacturer can be held responsible.[99] However, if an accident is caused solely by an autonomous vehicle, holding any person liable for it might

[96] Ibid, 857 Citing: Chris Ziegler, Volvo Says It Will Take the Blame If One of Its Self-Driving Cars Crashes, THE VERGE (Oct. 7, 2015), http://www.theverge.com/2015/10/7/9470551/volvo-self-driving-car-liability [https://perma.cc/NAG2-JATV].

[97] Ibid

[98] Ibid, citing: Mike Ramsey, Who's Responsible When a Driverless Car Crashes? Tesla's Got an Idea, WALL ST. J. (May 13, 2015), http://www.wsj.com/articles/tesla-electric-cars-soon-to-sport-autopilot-functions-such-as-passing-other-vehicles-1431532720 [https://perma.cc/YFF8-K32Y] ("Hitting the turn signal not only tells the car it can pass, but also ensures the driver has given thought to whether the maneuver is safe.")

[99] Who Is Liable in a Self-Driving Car Accident? (November 12, 2024, Brumley Law Firm) https://www.brumleylawfirm.com/who-is-liable-in-a-self-driving-car-accident/ accessed: 15.06.2025

raise concerns. There are cases where even a highly skilled human driver would not have been able to avoid a collision. In contrast, assigning liability to a human or a company might be appropriate, if, for instance, a programming error by the manufacturer causes the malfunction, or if the AI fails to respond in a situation that a human driver could have handled, liability could justifiably lie with the driver or manufacturer.[100] Therefore, comprehensive regulation is essential to prevent additional confusion.

4.1. Legal personhood of AI

When examining the issue of liability in the context of AI, a fundamental question arises: can AI systems, in principle, be regarded as legally responsible entities? This leads to the debate over whether AI can be granted legal personhood - a status that entails the capacity to hold rights and duties under the law,[101] including the ability to act independently and have the capacity for legal relations.[102]

On one hand, AI is considered merely a tool – an advanced technological assistant that supports human activity without acting autonomously in a legal or moral sense.[103] On the other hand, some emerging AI systems can act like persons in

[100] Ibid
[101] Bryant Smith, 'Legal Personality', (1928), XXXVII (3), Yale Law Journal, 283
[102] Ibid citing: SALMoND, *op. Cit. supra* note 2, at 272; HoLLAND, *op. cit. supra* note 2, at 88, 91; *of.* Geldart, *Legal Persomality* (1911) 27 L. Q. RE%,. 90, 95.
[103] Visa AJ Kurki, 'The Legal Personhood of Artificial Intelligences' (2019) Oxford University, 179

many aspects, own property, sign contracts, and potentially be held liable under the law. [104]

The concept of responsibility is a longstanding philosophical and legal issue. For instance, Aristotle argued that exercising responsibility requires certain conditions to be met, one key condition being whether the agent is in control of their behavior. According to this idea, being aware of what a person is doing, includes not only knowing how to operate the machine but being aware of the entire situation, including the environment itself, in which the action takes place, such as the road and the traffic conditions.[105] This enables a person to respond properly to the situation. [106] This raises the question of whether AI can possess situational awareness similar to humans. Answering this question is not only of theoretical interest but also has practical importance. If it is declared that AI can be aware of the situation, then logically, it might also be liable for its actions.

In the European Union, the European Parliament introduced a recommendation that AI should be granted legal personality.[107] However, this approach was not welcomed by the scholars.[108] Despite some efforts to regulate this issue, the

[104] Ibid 185
[105] Mark Coeckelbergh, 'Responsibility and the Moral Phenomenology of Using Self-Driving Cars', (2016) 30(8) Applied Artificial Intelligence, 750 See: Nicomachean ethics. In The Complete Works of Aristotle, ed. J. Barnes, Vol. II, 1729–867. Princeton, New Jersey, US: Princeton University Press
[106] Ibid
[107] Fatima Rizq Moustafa 'Towards Recognition of the Legal Personality of Artificial Intelligence (AI) : Recognizing Reality and Law', (2024) 9(1), International Journal of Criminal Justice Science, 272
[108] Aditi Bharti and Gagandeep Kaur 'Legal Personhood of Artificial Intelligence: A Contemporary Perspective on Juristic &Electronic Personality' (2024) 30(5), 10396

European Parliament's resolution on the civil liability regime for AI states that no legal personality should be granted to AI since it does not possess human consciousness and its whole aim is to serve humanity.[109]

By contrast, the U.S. adopts a more radical approach. AI is generally regarded more as a tool, a product, not as an autonomous legal subject. Consequently, from the U.S. perspective, AI cannot be held responsible in its own right, as it is seen more as an instrument that assists humans rather than the individual itself.[110] Therefore, it cannot be held solely responsible for the damage it causes.

Meanwhile, China has shown some of the strongest support for autonomous vehicles – at least prior to the most recent regulations mentioned above. The Chinese government has recognized the potential of autonomous cars to enhance safety and reduce carbon emissions. As a result, the development of self-driven cars has been integrated into the country's strategic goals and national planning initiatives.[111] It is interesting to observe the shift in approach, considering the ban introduced by China that limits the use of autonomous vehicles without driver supervision.

[109] Ibid
[110] Ibid (n 109) 272
[111] China, The Global Leader in Autonomous Vehicles – How Did That Happen? (10 April, 2025, INTERTRAFFIC) https://www.intertraffic.com/news/autonomous-driving/china-the-global-leader-in-autonomous-vehicles accessed: 15.06.2025

There are certain types of liability relevant to AI systems in China, specifically product liability, which can hold manufacturers liable for product defects, motor vehicle traffic accident liability, and medical malpractice.[112] However, even with the developments of AI systems, they are not recognized as independent legal entities under Chinese legislation. [113]

As previously suggested, currently, cars are not attributed to legal personalities, but from my perspective, this may become necessary in the future. Attributing at least partial liability to AI systems could be reasonable, especially as AI decision-making becomes increasingly complex - some systems will operate without human intervention. Therefore, re-examining the liability framework in light of these developments could help prevent unfair consequences for both parties.

4.2. Causality Between the AI's Action and The Resulting Harm

Attributing wrongful acts to AI-driven technologies involves not only determining whether AI can be considered a legal person but also assessing whether there is a causal connection between the AI's actions and the resulting outcome. Causality is a fundamental concept in legal theory and practice, as

[112] AI, Machine Learning& Big Data Laws and Regulations 2025 – China (May 15, 2025, Global Legal Insights) https://www.globallegalinsights.com/practice-areas/ai-machine-learning-and-big-data-laws-and-regulations/china/#:~:text=China%20does%20not%20recognise%20AI,case%2Dby%2Dcase%20basis accessed 15.06.2025

[113] Ibid, citing Article 2 of the Civil Code

establishing a causal link between an act or omission and the resulting harm is essential for assigning legal responsibility.[114]

Generally, a person is responsible for the harm they cause, but not for harm that is not directly connected to their actions, for instance, harm caused by their employees, children, or things in their custody.[115] In this context, the question of legal personhood becomes relevant once again. If autonomous vehicles are considered objects under a person's custody, liability for harm caused by these vehicles might be determined similarly to liability for damage caused by animals or employees. This issue remains highly controversial due to the limited number of legal models available to determine liability.

According to Gabriel Hallevy, there are three legal models by which offenses committed by AI systems can be categorized.[116] The first option is the „perpetrator-via-another "model, meaning that if a crime is committed by a mentally deficient person, animal, or child, then they are considered innocent agents because they lack the mental capacity to form *mens rea.* This is even true for strict liability cases.[117]

[114] Ruta Liepina, Giovanni Sartor, Adam Wyner, and Francesca Lagioia, 'Argumentation Schemes for Legal Presumption of Causality' (Nineteenth International Conference on Artificial Intelligence and Law (ICAIL 2023), 19-23 June 2023, Braga, Portugal), 1
[115] Ibid
[116] John Kingston, "Artificial Intelligence and Legal Liability", (February 2018), 3
[117] Ibid 4

Another model for determining liability is the natural-probable-consequence model. In this case, a person can be held liable if part of the AI model is activated inappropriately, even though it was intended for good purposes. Programmers might be held liable if they knew that the criminal outcome was a natural/probable consequence of the application.[118] Therefore, humans can be held responsible for the actions of AI, when the outcome is foreseeable. The third and final possible option is attributing direct liability to AI systems themselves. In this case, responsibility is fully attributed to the AI. For strict liability offenses, where no intent is required, it may be possible to hold an AI system criminally responsible. This perspective can be spread not only to the programs but also to autonomous cars. From this point of view, if a self-driving car is found violating the speed limit, the law may assign liability to the program that was driving the car. [119]

While these perspectives consider criminal liability for AI-driven cars, the regulation might be relevant to civil liability as well. According to an article on civil liability, three conditions must be proven for a negligence claim. First, there must be a duty of care, meaning the entity has a responsibility to act carefully. Second, a breach of that duty, so, the entity failed to meet the requirement. Third, causation must be established, meaning the failure caused harm to the user. If the AI is a complex mechanism, the threshold for the duty of care is higher and

[118] Ibid 5
[119] ibid

reaches that of a professional or expert. Therefore, a duty of care usually exists for AI-driven technologies as well. This duty can be breached in several ways.[120] Depending on how the duty is breached, proving the causation might be confusing.

Determining the liability for AI-driven technologies might be even more complicated by the fact that machines and computer programs lack intent. Intent is often a means of finding out whether a person intended to cause harm, therefore, this might establish the severity of penalty for humans. Because AI-driven technologies have no intent of doing harm, this element is not relevant when considering penalties. Instead, the intent of the designer or user would be relevant.[121]

The situation is further complicated by the fact that none of the mentioned countries have proper legislation addressing this issue yet. The initial problem is determining whether AI can have legal personhood, but even if AI is recognized as a legal person, it is still hard to prove causation. Establishing a connection between an action and its consequence can be challenging even when only humans are involved, and it becomes harder when one party is a machine or

[120] Ibid 6
[121] Yavar Bathaee, 'The Artificial Intelligence Black Box and The Failure of Intent and Causation' (2018) 31(2), Harvard Journal of Law&Technology, 906

software. The question if AI can be deemed to cause the damage is open to debate. The key assumption here is whether AI recommends, or takes an action itself.[122]

It can be said that the EU has taken some steps forward regarding the regulation of AI-driven technologies, but from my perspective, it still has a long way to go. Currently, the regulation is very general and only one directive includes the specific provisions connected to the possible implications of AI-driven cars. However, the EU is still one step ahead of the U.S. No regulation can be found in the U.S. on the federal level similar to this. Therefore, it can cause confusion as to how the states regulate the issue.[123] The U.S. needs to work on the idea of how to protect the victims and how to ensure that someone should be held responsible if the damage is done by fully automated cars.

Chinese legislation is also worth considering. The Shenzhen guidelines in China split the liability between the parties involved. Particularly, if the vehicle has a driver, the driver will be responsible for any accidents that occur. If the driver is not needed, liability either falls on the controller or the owner. [124] Additionally, it is stated that if the accident occurs due to a defect, the victim can seek

[122] Ibid (n 116), 6
[123] Gregory Smith, Karlyn D.Stanley, Krystyna Marcinek, Paul Cormarie, Salil Gunashekar, 'Liability for Harms from AI Systems' (November 20, 2024 RAND) https://www.rand.org/pubs/research_reports/RRA3243-4.html accessed 16.06.2025
[124] Brittany Eastman and others, 'A Comparative Look at Various Countries' Legal Regimes Governing Automated Vehicles', (2023), 2023 Journal of Law and Mobility 15 Citing: Dashveenjit Kaur, *Everything about China's self-driving vehicle standards*, Techwire Asia, Oct 4, 2021), https://techwireasia.com/2021/10/everything-about-chinas-self-driving-vehicle-standards/.

compensation from the manufacturer instead of the driver. [125] Therefore, although China does not recognize autonomous vehicles as separate legal entities, the legislation ensures that the injured party is fully reimbursed and clearly determines who can be held liable in cases of accidents, depending on the circumstances. China seems to have taken the furthest step regarding the regulation of the issue. This approach also considers the issue of causation between the damage and the person liable, because depending on the circumstances, it is determined who will be personally liable for the damage done. In my opinion, this is the most reasonable approach that exists today among the three jurisdictions discussed.

4.3. „Black box“ issue

The “black box” issue refers to the lack of transparency in how machines arrive at their conclusions. This is an essential consideration when discussing the decision-making process of self-driven cars. It is particularly complicated because the software does not explain how it makes choices, therefore, not only the lack of transparency is the problem, but also the risk of wrong decisions. An explanation technology would greatly facilitate companies in creating safer AI technologies and managing any possible liability that may lie within them[126]

[125] Ibid, 16
[126] Dino Pedreschi and others, ‘Meaningful Explanations of Black Box AI Decision Systems’ (The Thirthy-Third AAAI Conference on Artificial Intelligence, 2019) 1

Black box AI refers not only to the transparency of AI systems but also to their trustworthiness. To determine the extent to which people can trust these systems, the process of reaching certain conclusions by AI should be understood. The appeal of AI, in general, is that it is supposed to make life easier for people, they should be reliable, however, our relationship with technology is one of reliance rather than trust.[127]

The black box issue is highly relevant to autonomous cars as well. These systems are very complicated and the decisions they make might not be easily understandable for humans. Sometimes, AI-driven technologies may act in ways that are opaque and confusing, which can result in damage. Typically, AI algorithms operate behind a veil, meaning that the input and output of the program might be accessible, but how one is transformed into the other is vague and difficult to determine.[128]

Black box AI may also function in ways that are difficult to predict, even for the creators of the program. [129] Generally, this means that humans can only observe the results of AI's actions, rather than understand the logic behind them. There is

[127] Warren J. Von Eschenbach, 'Transparency and the Black Box Problem: Why We Do Not Trust Ai' (2021) 34, 1608-1610

[128] George Pavlidis, 'Unlocking the Black Box: Analysing the EU Artificial Intelligence Act's Framework for Explainability in AI', (2024) 16(1) Law Innovation and Technology, 3 Citing: Jenna Burrell, 'How the machine 'thinks': Understanding opacity in machine learning algorithms' (2016) 3 Big Data & Society 1; Davide Castelvecchi, 'Can we open the black box of AI?' (2016) 538 Nature 21; Warren von Eschenbach, 'Transparency and the Black Box Problem: Why We Do Not Trust AI' (2021) 34 Philosophy & Technology 1607.

[129] Yavaee (n 121) 907

also the possibility of a „weak black box", meaning that the program's reasoning can be understood to some extent, but not completely. The similarity in both cases is that AI's actions change depending on the data it consumes, therefore, after some time, it might be impossible for the creators to understand the functioning of the program.[130] In this case, the result might be unforeseeable even for the creators, which raises, significant liability issues. If the creator cannot be held liable for the actions of black box AI, then who should be responsible? And how would the compensation for the victim be determined? Given the fact that no regulations currently exist, the answers to these questions remain vague and difficult to establish. An Additional problem that might arise in this case is the increased risk of unintended consequences. Generally, AI is created with the sole purpose of helping people, however, if black box AI becomes frequent, it might cause more harm than good. Once again, we return to the question of trustworthiness: how can people trust something that they do not understand how it operates? Although it is a machine and lacks the capacity for true reasoning like human beings, it is still, or even more capable of causing extensive damage. This is especially true when talking about cars, considering they are high-risk machines.

[130] Ibid, 913

Explainable AI aims to make machine decisions more understandable to humans. It goes a step further than transparency and aims to show people why AI made certain decisions. However, this also involves several implications. The AI decision-making process is complex, relying on algorithms and networks, producing results that are difficult to explain in simple terms. Human explanations typically draw on personal experiences, emotions, intuition, ethics, morals, and personal values, while on the other hand, AI does not consider these things and instead, relies on factual findings that it found through the data provided.[131] The EU introduced the non-binding Ethics Guidelines for Trustworthy AI, which established key principles for solving this issue.[132] These principles include the requirement that AI should be safe, allow for human oversight, respect privacy, and ensure transparency.[133]

As previously mentioned, the EU introduced regulations prohibiting certain types of AI, due to the dangers it might cause.[134] Therefore, black box AI might fall within that scope, however, it is still ambiguous what exactly is meant by each of those terms. On the other hand, U.S. states are not aligned on this regulation. There is no specific federal regulation.[135] Additional regulation is needed not only

[131] Ibid (n 128), 4
[132] Ibid 6, See: European Commission, 'Fostering a European approach to Artificial Intelligence' (Communication) COM (2021) 205 final.
[133] Ibid
[134] Edwards (n 38)
[135] Roth (n 75)

to ensure accountability and fair compensation for the victims but also for further development of AI-driven technologies. If companies do not know specifically what they might be held liable for, they may refrain from developing new technologies. There is a necessity to determine what exactly the remedies will be and in what cases are either developers, manufacturers, or owners of autonomous cars liable, otherwise, they will never be a proper part of our lives.

It's interesting to consider the Chinese approach in this context. Particularly, China encouraged the companies to develop several scenarios that might take place, to test how automated vehicles would respond. [136]It also adopted SafetyPool, which is the largest database for these theoretical scenarios for testing the vehicles.[137] This might be considered as an attempt to resolve the "black box issue", because, with different scenarios developed by the researchers, it might become clearer how the AI decision-making system is functioning. This approach helps to ensure transparency because, with this approach, it would be more understandable how the AI reaches certain decisions.

[136] Eastman and others (n 124) 20 citing: Xinghua Wang, Yong Peng, Tuo Xu, Qian Xu, Xianhui, Guoliang Xiang, Shengen Yi, & Honggang Wang, Autonomous driving testing scenario generation based on in-depth vehicle-to-powered two-wheeler crash data in China, 176 Accident Analysis and Prevention, 1 (2022).
[137] Ibid citing: Luke Walton, *China welcomes world's largest scenario database for autonomous vehicle safety*, Warwick News and Events (Sept 9, 2021), https://warwick.ac.uk/newsandevents/pressreleases/china_welcomes_worlds/.

5. Possible Solutions

Certain scholars have explored what could be done differently in regulating AI-driven cars. There are a couple of options regarding who could be held liable for harm caused by autonomous vehicles. The first and most obvious option is the driver. While automated cars aim to operate without human intervention, many current models still require human assistance. In such cases, the driver can be held liable.[138] From my perspective, this is a relatively straightforward situation to attribute liability, because still, a human is responsible for the functioning of the vehicle and there are no additional requirements for determining the legal responsibility for the car itself.

However, as vehicles become more autonomous, it is expected that responsibility will increasingly shift to the manufacturers or software developers. Manufacturers would be liable if the crash was caused due to the malfunction of the vehicle's software or hardware. For example, if the sensors fail or the vehicle fails to detect an obstacle, or if the manufacturer fails to test the car properly, then the liability might be attributed to them. Obviously, software developers are also

[138] Liability in Self-Driving Car Accidents: Who Pays the Price? (February 20, 2025, Hauptman, O'Brien, Wolf&Lathrop LLC) https://www.hauptman-obrien.net/blog/liability-in-self-driving-car-accidents/ accessed: 15.06.2025

essential in this context. Software, which controls the car must be up to date and operating properly, otherwise, they would also be involved.[139]

An interesting approach to the liability of autonomous vehicles is the idea of vicarious liability. This view is quite controversial, as it implies that automated machines are legal actors, whose actions can create legal liability for the humans or companies that use them. [140] The idea of vicarious liability in the context of AI-driven technologies is that, just as employers are held liable for harm caused by their employees, those who operate autonomous vehicles might be held liable when the vehicle causes harm while acting in the scope of what was assigned to them. [141] However, this idea is highly criticized because AI-driven technologies do not have minds, intentions, or legal status. Therefore, the principle of vicarious liability cannot apply. But on the other hand, the crucial thing is how these systems act socially and functionally. They might be treated as „pure legal agents "(„legal agents without legal personhood")[142]. The first condition for the autonomous vehicle to trigger liability is the commitment of a tort. Here, the need for evaluating external behavior emerges. There is no need to examine the

[139] Ibid

[140] Pinchas Huberman, 'A Theory of Vicarious Liability for Autonomous-Machine-Caused Harm' (2021) 58(2) Osgoode Hall Law Journal, 241

[141] Ibid, 256, see: Jack B Balkin, "The Path of Robotics Law" (2015) 6 Cal L Rev 45 at 47-48.

[142] Ibid, 257 see: Samir Chopra & Laurence F White, A Legal Theory for Autonomous Artificial Agents (The University of Michigan Press, 2011) at 25. A pure legal agency classification also responds to Ryan Calo's suggestion that the law may need to adopt a "new category of legal subject, halfway between person and object." "Robotics and Lessons of Cyberlaw", supra note 3 at 549

operating system of the vehicle, if, from the outside, it creates greater risk than what would be expected from a reasonable person.[143] Some scholars, such as Ryan Abbot, have suggested that AI-driven technologies might be considered as „potential tortfeasors.“[144] Additionally, Jeffrey Gurney points out that with automated vehicles, drivers have little control over their cars, especially if they are designed without steering wheels or brakes.[145] As a result, liability shifts from drivers to the manufacturers of the product.[146]

Autonomous vehicles may be considered as tortfeasors, but they cannot act on their own. They serve the deployer's goals, therefore, it is logical to presume that any harmful action caused by them should be attributed to the deployer.[147] This could be a potential solution. The word „deployer "can refer to either owner, company, or operator, depending on who is in control of the vehicle.

Another possible solution to the question of the legal personhood of AI is introduced as „electronic personhood ". This term does not exist in EU Member States and seems different from the idea of „legal personhood ", because of the usage of different words from the legislator. This could mean that AI-driven

[143] ibid, 258
[144] Ibid, 259, see: Ryan Abbott, "The Reasonable Computer: Disrupting the Paradigm of Tort Liability" (2018) 86 Geo Wash L Rev at 23.
[145] Ibid 260, see: Jefrey K Gurney, 'Imputing Driverhood: Applying a Reasonable Driver Standard to Accidents Caused by Autonomous Vehicles in Patrick Lin, Keith Abney & Ryan Jenkins, eds, Robot Ethics 2.0: From Autonomous Cars to Artificial Intelligence (Oxford University Press, 2017) 53
[146] Ibid 260
[147] Ibid 266-267

technologies would have their own specific rights and duties,[148] in order to resolve the „responsibility gap “, which means that even though the blame is appropriate, no one can be blamed for it.[149] This would suggest that the autonomous vehicles would be granted their own legal personalities, making them personally liable for the damage. This idea was proposed by the European Parliament as well, concentrating on the idea that a set of regulations should govern AI, ensuring certain rights and obligations attributed to them.[150] According to the resolution, it would possibly apply „electronic personality to cases where robots make autonomous decisions or otherwise interact with third parties independently “.[151] However, this idea met heavy criticism and finally was dropped.[152]

[148]Andrea Bertolini, ‘Artificial Intelligence and Civil Liability’ (Study requested by the Committee on Legal Affairs, Policy Department for Citizens’ Rights and Constitutional Affairs, Directorate-General for Internal Policies, European Parliament, July 2020) PE 621.926. 35 https://www.europarl.europa.eu/RegData/etudes/STUD/2020/621926/IPOL_STU(2020)621926_EN.pdf accessed 15.06.2025

[149] Herman Veluwenkamp, ‘What Responsibility Gaps are and What They Should Be’ (2025) 27(14) Ethics and Information Technology, 4 citing: Braham, M., & van Hees, M. (2018). Voids or fragmentation: Moral responsibility for collective outcomes. The Economic Journal, 128(612), F95-113.

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[152] Christiane Wendehorst, ‘AI Liability in Europe, Legal Context and Analysis on How Liability Law Could Support a More Effective Legal Framework for AI’ (22 September 2022) Ada Lovelace Institute https://www.adalovelaceinstitute.org/resource/ai-liability-in-europe accessed 15.06.2025

6. Conclusion

This thesis explored regulatory frameworks for liability for AI-driven technologies, particularly, autonomous vehicles in the EU, the U.S., and China. While each jurisdiction has taken a step forward in the regulation of this issue, certain legal gaps remain, particularly in attributing the liability when autonomous vehicles cause damage with little or no human intervention.

One of the main unresolved issues, as previously mentioned, is the legal personhood of AI systems. Current legislation do not have specific regulations about granting the legal personality to AI. One thing that needs to be taken into consideration is the fact that fully autonomous vehicles are still developing and not yet on the market. For instance, based on the companies operating in the U.S., Waymo and Tesla in particular, fully autonomous vehicles are expected to be widely available until 2030 at the earliest. No self-driving cars are available for consumer purchase yet.[153] Therefore, there is still time to develop the regulations for fully autonomous vehicles.

For the issue of legal personhood discussed above, two main solutions appear to be the most viable. Before the widespread deployment of fully autonomous

[153]When Will Self-Driving Cars Be Common? (CBS 42, 8 February 2024) https://www.cbs42.com/automotive/when-will-self-driving-cars-be common/#:~:text=Based%20on%20the%20rate%20of,around%202030%20at%20the%20earliest.accessed 16.05.2025

vehicles, the question of legal responsibility can be approached differently, with vicarious liability as a sole framework.[154] Here, it would operate similarly to the principle applied when an employer is held responsible for the actions of their employee.[155] Accordingly, when semi-autonomous cars cause harm, multiple actors might be liable, depending on the circumstances. For instance, if the manufacturer makes an error in the vehicle's production, they could be held liable under vicarious responsibility. Alternatively, if the harm results from the driver's actions, then liability should be attributed to him.[156] Other alternatives can also be explored depending on the circumstances of how the harm occurs. From my perspective, if the vehicle is partially automated and the driver is still somewhat controlling the functioning of the vehicle, then it makes sense to hold them responsible because they bear the risk of proper functioning of the device. However, under today's regulatory framework, the car itself cannot be held liable. This can become an issue when fully autonomous vehicles start taking over the market. Determining legal personality for AI-driven technologies becomes even more crucial. This plays a central role in determining liability for harm. In my view, in the case of semi-autonomous vehicles, the question of causation is relatively easier to answer, because the driver retains partial control of the vehicle, and therefore, usually, they can be held responsible. However, with fully

[154] Huberman (n 140)
[155] Huberman (n 141)
[156] See above (n 138)

autonomous cars, human interaction is expected to be minimal. In such scenarios, determining the connection between the actor and the result might be challenging. The "black box issue" mentioned previously,[157] complicates the issue even more because sometimes AI decision–making process is opaque and vague. Lack of transparency makes it even harder to attribute liability to the person responsible.

Granting electronic personhood to AI might be a viable solution for the future. This would allow cars to be considered legal persons under the legislation and, consequently, held independently liable for the harm.[158] If the scenario, where a fully autonomous vehicle causes an accident injuring a pedestrian is considered, determining causation in such a case is complex. Here, vicarious liability is still relevant, as it allows the shared responsibility between the car and whoever is responsible for the deployment of the car, like the driver, owner, or even the manufacturer.

Assigning electronic personality might be a good start, but it does not resolve the issue of victim compensation. Therefore, the combined model – incorporating both, electronic personhood and vicarious liability could be the best solution. This approach would ensure both accountability and compensation, regardless of who caused the harm. It makes sure that the interest of the victim is also protected.

[157] Pedreschi and others, (n 127)
[158] Bertolini (n 148)

The lack of regulatory consistency in these jurisdictions is also a significant issue that was previously mentioned. This problem is evident in all of them, with certain particularities. In the U.S., there is no unified federal framework on liability for damages arising from the use of autonomous vehicles, allowing individual states to regulate the issue themselves.[159] A similar situation is in China, where different regions have different restrictions.[160] Likewise, within the EU, the EU AI Liability Act has not been adopted yet, resulting in different frameworks in different Member States.[161] This highlights the need for legislative harmonization. This would enhance legal certainty, and consistency and reduce confusion for interested parties. Otherwise, this could have a chilling effect on the development of autonomous vehicles, resulting in regulatory chill for the investors and major companies. The benefits of autonomous vehicles might never be realized if lawsuits make it financially unrealistic to produce them. [162]At present, however, the regulatory framework remains highly fragmented.

Addressing the issue has become increasingly urgent. As fully autonomous vehicles begin to enter the market, determining the liability for their actions becomes more pressing. The unified framework of these major jurisdictions and the hybrid approach suggested above, offer a viable path toward resolving this

[159] Chen and Liu (n 73)
[160] Lingyun, Qin and Lin (n 84)
[161] European Commission (n 2) 15
[162] Brodsky (n 76) 865

issue. Nevertheless, it remains essential to assess each case individually, considering the unique circumstances involved.

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