On the Necessity of Recognizing Artificial Intelligence as Subject to Criminal Law – The Case of Autonomous Vehicles

Dr. Laura Stănilă*

Abstract

Artificial Intelligence (AI) is a fashioned topic nowadays, it's multiple approaches in the field of law in general and in the field of criminal law in particular, becoming the new search for the Sorcerer's Stone for the scholars. The criminal doctrine of AI has already been split into two directions: the pro-recognizing legal personality for AI with the consequence of imposing criminal liability of AI, and the non-recognizing legal personality direction which aims to demonstrate the prematurity of the discussion of this subject due to the lack of theoretical schemes and insufficient knowledge on the evolution of the AI itself.

The analysis of the legal doctrine in this field has revealed the fact that the majority of the scholars had approached the issue from the perspective of the possibility of imposing criminal liability of the AI. But, in fact, the first logical step in a scientific approach is to determine the necessity of discussing the issue. In other words, we must answer to the question if we need a legal institution of criminal liability of AI in the first place, and only after we find the right answer, we may be preoccupied on how are we going to impose criminal liability for AI. The study aims to approach the question of AI criminal liability from the perspective of autonomous vehicles, which tend to increase on the public roads and to rise a lot of questions form de legal framework perspective.

In the article the author tries to find logical, ethical and social arguments addressing the issue of necessity of imposing criminal liability for AI in the case of autonomous vehicles, from the perspective of the level of AV technology development.

Keywords*: Artificial Intelligence (AI), legal personality, criminal liability, anthropomorphic model, social risk, autonomous vehicles*

Abbreviations

AI – Artificial Intelligence
RCC – Romanian Criminal Code adopted by Law nr. 286/2009[1]
Art. – article
Autonomous vehicles – AV

Acknowledgement

The technical data regarding AI and other specific explanations were provided for the author by Dr. Eng. Tudor Nicosevici, Head of ADAS Advanced Engineering, Continental Romania.[2]

* Senior Lecturer, Faculty of Law, West University Timișoara Contact: laura.stanila@e-uvt.ro.

[1] Published in the Official Monitor no. 510/24 July 2009.

[2] Contact: tudor.nicosevici@continental.com

Summary

I. Addressing the issue of AI in the legal criminal field

When we say „Artificial Intelligence" (AI), we usually think of SF movies and latest discoveries of the technology. But it is a fact that lately, AI has begun the favorite topic of the scholars in the legal sciences field, too.

The issue of AI and the criminal legal field may be addressed from three different points of view: AI as a tool for criminal justice, AI as means for committing crimes and offenses and AI as perpetrator, or in other words, AI as subject of criminal law.

a) AI as a tool for criminal justice

In the field of criminal justice AI has gained increasing importance becoming an important means for assessing criminal risk in areas such as parole, probation or preventive measures, USA, Canada and even European countries like UK and France using it in the criminal trial in its different stages.[3]

b) AI as means for committing crimes and offenses

AI has also become the only or the main tool for committing specific crimes and offenses (for a whole group of *mala prohibita* offenses) such as Computer fraud (art. 249 RCC), Making fraudulent financial operations (art. 250 RCC), Illegal access to a computer system (art. 360 RCC), Illegal interception of computer data transmissions (art. 361 RCC), Altering computer data integrity (art. 362 RCC), Disruption of the operation of computer systems (art. 363 RCC), Unauthorized transfer of computer data (art. 364 RCC) or Illegal operations with devices or software (art. 365 RCC)[4].

---

[3] On the algorithmic risk assessment tools see Laura Stănilă, *Artificial Intelligence and Human Rights. Evolution or involution?* in Conference proceedings: Towards a Beter Future: Democracy, EU Integration and Criminal Justice, Vol. I, Bitola 2019, p. 211-222; Laura Stănilă, *Artificial intelligence and Human Rights. A challenging Approach,* Journal of Eastern European Criminal Law, Issue 2/2018, p. 19-30.

[4] Art. 249 RCC - Computer fraud: *„Entering, altering or deleting computer data, restricting access to such data or hindering in any way the operation of a computer system in order to obtain a benefit for oneself or another, if it has caused damage to a person, shall be punishable by no less than 2 and no more than 7 years of imprisonment."*

Art. 250 RCC - Making fraudulent financial operations: *„(1) Making cash withdrawal operations, loading or unloading of an electronic money instrument or a fund transfer instrument, by using, without the consent of the owner, an electronic payment instrument or the identification information that allow its use, shall be punishable by no less than 2 and no more than 7 years of imprisonment. (2) The same penalty is applicable to the operations referred to in par. (1), performed by means of the unauthorized use of any identification information or by using fictitious identification data. (3) The unauthorized transmission to another person of any identification information, in order to perform one of the operations referred to in par. (1), shall be punishable by no less than 1 and no more than 5 years of imprisonment."*

c) AI as subject of criminal law

If AI is generally accepted as a tool of increasing importance in the field of criminal justice, and also as means of committing specific crimes and offenses, unfortunately there is a general opposition to AI as subject of law in general and criminal law in particular. The causes of this opposition are:

1. Insufficient development of AI towards self-conscious machines – it would be almost impossible to impose criminal liability due to lack of conscience.

2. Insufficient knowledge and understanding on how exactly AI works – transdisciplinary research approaches (juridical and technical) are inexistent.

3. Traditional models for imposing criminal liability have a long existence and strong jurisprudence.

4. Insufficient preoccupation for assessing societal impact of AI – a certain preoccupation in this area would lead to the conclusion that there is a certain societal risk in creating and operating AI.

A common-sense view on the contemporary society would provide us with the following truths:

- everyday life is dramatically influenced by AI;
- there is constant demand for better and faster decisions and for objectivity;
- we must be aware that if we overuse AI, there will be a weakening in our capacity of questioning;

Art. 360 RCC - Illegal access to a computer system: *„(1) Unlawful access to a computer system shall be punishable by no less than 3 months and no more than 3 years of imprisonment or by a fine. (2) The act set out in par. (1), committed in order to obtain computer data, shall be punishable by no less than 6 months and no more than 5 years of imprisonment. (3) If the act set out in par. (1) was committed on a computer system to which, through processes, devices or specialized programs, access is restricted or prohibited for certain categories of users, it shall be punishable by no less than 2 and no more than 7 years of imprisonment."*

Art. 361 RCC - Illegal interception of computer data transmissions: *„(1) The unlawful interception of a computer data transmission which is not public and which is intended for a computer system, originates from such a computer system or is carried out within a computer system shall be punishable by no less than 1 and no more than 5 years of imprisonment.(2) The same penalty shall apply to the unlawful interception of electromagnetic emissions from a computer system that contains computer data which is not public information."*

Art. 362 RCC - Altering computer data integrity: *„Unlawful altering, deleting or corrupting of computer data or restricting access to such data shall be punishable by no less than 1 and no more than 5 years of imprisonment."*

Art. 363 RCC - Disruption of the operation of computer systems: *„The act of unlawfully seriously disrupting the operation of a computer system by inputting, transmitting, modifying, deleting or corrupting data or by restricting access to data, shall be punishable by no less than 2 and no more than 7 years of imprisonment."*

Art. 364 RCC - Unauthorized transfer of computer data: *„The unauthorized transfer of computer data from a computer system or from a data storage device shall be punishable by no less than 1 and no more than 5 years of imprisonment."*

Art. 365 RCC - Illegal operations with devices or software: *„(1) Whoever unlawfully produces, imports, distributes, or makes available in any form: a) devices or software designed or adapted for the purpose of perpetrating any of the offenses referred to in art. 360 - 364; b) passwords, access codes or other such computer data allowing full or partial access to a computer system for the purpose of perpetrating any of the offenses referred to in Art. 360-364, shall be punishable by no less than 6 months and no more than 3 years of imprisonment or by a fine. (2) Unlawfully owning a device, a piece of software, a password, access code or other data as mentioned in par. (1) with the purpose of perpetrating any of the offenses referred to in Art. 360-364, shall be punishable by no less than 3 months and no more than 2 years of imprisonment or by a fine."*

- on the long term, using AI will determine the changing of our way of working and approaching different tasks;
- the only responsible actors for constructing, monitoring or misusing AI are us, humans.

It is obvious that we need to adapt our lives and our legal frameworks in order to keep up with the technology, we need to find the best legal solutions in order to proper respond to any harms or perils of the social values that may occur in our coexistence with AI.

II. AI as subject for criminal law. Between necessity and possibility

The issue of recognizing AI as subject to criminal law in particular arose with the increasing number of traffic incidents involving AV. And because AI is the core of technological systems which AV operate, the link between criminal liability and AI became obvious. „Machine-learning is what powers autonomous vehicle systems, and they must be trained on lots of real-world data to be able to operate in real-world environments. They need to be able to recognize all the features of the road environment including roads, curbs, traffic control signals, signs, as well as all the potential hazards they can encounter including other vehicles, pedestrians, and other potential obstructions. Not only do they need to be able to recognize the world around them, but they need to act on that recognition"[5]. Regarding all these, public opinion stated that there is a „technology immaturity" and, due to this immaturity, legal amendments and interventions are to be carefully analyzed[6].

However, the sine qua non condition for an entity to become subject of law is to be provided with legal personhood. As the contemporary legal framework does not allow legal personhood for AI, even if we are talking about advanced systems – neuronal networks which are capable of learning from their own experiences and develop new „conducts" – the current discussion is superfluous. However, there is a certain effervescence in the doctrine wondering „What if?". The scholars have been preoccupied in analyzing advantages and disadvantages of AI personhood[7]. Legal personhood of AI would benefit because it would allow to pool resources and centralize risks, it would allow artificial agents to be held liable for harms without the need to identify a responsible individual, thus avoiding a lengthy expensive and arduous process of identifying specific individuals. Also, it was stated that if, in the future, a general AI system will be developed indistinguishable from a person, by what argument would we deny that system the same rights as a human?

On the contrary, there are voices[8] that state we should act carefully in this field. The European Parliament suggests creating a collective insurance fund to cover

---

[5] Ron Schmelzer, *What Happens When Self-Driving Cars Kill People?*, Forbes, 26 September 2019, https://www.forbes.com/sites/cognitiveworld/2019/09/26/what-happens-with-self-driving-cars-kill-people/, accessed on 10.01.2020.

[6] Ibidem.

[7] Zevenbergen B., Kortz M., Schaich Borg J., Finlayson M.A., Pagallo U., Zapušek T., *Appropriateness and Feasibility of Legal Personhood for AI Systems*, in Bringsjord S., Tokhi M.O., Aldinas Ferreira M.I., Govindarajulu N.S. (eds.): *Hybrid Worlds: Societal and Ethical Challenges*, ICRES 2018 Proceedings, New York, USA 20-21 August 2018, CLAWAR Association Ltd, UK, pp. 62-63.

[8] Ibidem.

damages arising from AI systems. This is a short-term solution meant to satisfy victims and cover damages produced by accidents involving AV. But does not solve neither the issue of legal personhood nor the question of recognizing AI as subject of law. It is only an „in-between" tool meant to calm down spirits. However, as the technological trajectory of the AI is uncertain and unpredictable, it would be unwise to construct a financial compensation resources today to meet as yet unknown future needs. Also, recognizing AI personhood would allow producers and owners of AI systems to shift liability to the artifact itself. This will disincentivize investment in adequate testing before deployment. AI personhood could thus result in an unsafe environment. Another true fact is that it will be difficult to bring proceedings against AI or hold it to account. An AI system has not yet the capacity to argue its case in court, appoint a lawyer to defend it or engage to reach a settlement with a plaintiff. Since AI does not have the capacity to suffer, nor have empathy, it is unclear how it would understand the suffering of others.

Even if we admit AI legal personhood, the question of how should we impose criminal liability to it still remains. Contemporary framework provides two models of criminal liability that were used and adapted in other tricky cases like imposing criminal liability to legal person: anthropomorphic model and constructivist model[9].

a) according with the anthropomorphic model blameworthiness is measured by using the standards traditionally applied to individual culpability[10], but the identification theory and the collective intent theory – specific to this model do not apply to AI systems in case these systems achieve a level of autonomy or self-determination (very probable in the future). Maybe an imitative anthropomorphic model is to be considered in case of AI by identifying the necessary elements of liability present in case of humans mens rea, actus reus. This could be very difficult because the human conscience could not be yet replied by AI.

b) the constructivist model determines culpability based on the characteristics of the collective entity, on its policies, and its practices.[11] According to the constructivist model the legal person has a life of his own, a will of his own, from which results also the unrestricted possibility in attributing specific mental states to the crimes. Constructivism allows labelling of an entity by assigning certain characteristics in accordance with the purpose pursued by the legislator. These characteristics become legally relevant. The constructivist model allows the identification of an AI system as a distinct actor in the social relations and a imposition of criminal liability even in the absence of a human conscience, its place being taken over by other elements to which this role or relevance is assigned. But these elements are difficult to identify since there are no moral anchors in the synapses of machine learning matrices.

c) the strict liability solution. Both previous models apply in case of a subjective criminal liability which is based on the culpability element and could be adapted to AI systems but need important amendments. AI systems do not have conscience (yet), cannot judge the consequences of their actions in moral terms (yet?) and sometimes

---

[9] The models of imposing criminal liability were also presented by the author in the study *Living in the Future: New Actors in the Field of Criminal Law – Artificial Intelligence*, presented at the University of Latvia, Faculty of Law with the occasion of the 7th International Scientific Conference "Legal science: Functions, significance and future in legal systems" – Riga, 18-19 October 2019.

[10] C. De Maglie, *Models of Corporate Criminal Liability in Comparative Law*, Washington University Global Studies Law Review, Volume 4, Issue 3, 2005, p. 556.

[11] De Maglie C, 2005, p. 556.

do not commit acts in traditional sense of the term. The culpability element (mens rea) is difficult to identify since they have no conscience. Relevant for their sanctioning are the consequences caused by their behavior. Thus, in the case of AI systems, the strict liability theory is probably the best choice. Strict liability implies an individual or company sanctioned for their deeds, conducts and outcomes that result in damages to others, not as a consequence of a foreplaned action or careless deed. Strict liability implies a retributive blame, which distinguishes wrongdoing (essentially, the ultimate harm) from culpability (essentially, the actor's mental state)[12]. And even if the imposition of severe criminal sanctions in the absence of any requisite mental element has been held by many to be incompatible with the basic requirements of law and „civilized jurisprudence"[13], in the case of AI agents, we can hazard to anticipate that the opposition of the doctrine will be from weak to absent. It would be almost natural to accept a strict liability in case of an agent lacking in conscience, based solely on the harmful results of its acts.

III. The unmanned vehicle issue: whom to blame for the collisions occurred?

Since the beginning of the XXth century[14], there has been an increased preoccupation on the safety of circulation and transport on the public roads. Criminal law became one of the main tools as driving on the public roads was qualified as an activity involving social risk. If a person drives in an unsafe manner, or if that person evades the scheme of regulation and compensation, criminal liability may be imposed.

But, as Du Savoy wondered, „What will happen, then, when drivers are taken out of the picture? As the technology advances, who should be responsible if a driverless car speed? Or drives in a way that, had it been the result of a human driver, would be considered careless or dangerous? Or if a driverless car kill someone?"[15]. Since the reality is running faster than the legislation, several road traffic incidents made us ask ourselves these questions, in a context in which autonomous vehicles (AV) technology is developing at a scary velocity.

Our discussion would seem a little out of place, but, as a woman in Arizona, United States, died on March 18, 2018, after being hit by a Uber-free car in the first incident of its kind, being the first time a car without a driver hits a pedestrian on public roads, we must admit that the reality doesn't wait for our legislators to keep up. The Uber vehicle was autonomous, but had a driver on board in case of "emergency". The woman struck off the wrong way, according to the Tempe police, the city where the incident occurred. Spokesperson Uber said the company was cooperating fully

---

[12] Simons K.W., *When is Strict Criminal Liability Just*. Journal of Criminal Law and Criminology, Vol. 87 Issue 4, 1997, p. 1095.

[13] Wasserstrom R.A., *Strict Liability in the Criminal Law*. Stanford Law Review Vol. 12, No. 4, 1960, p. 731.

[14] On the evolving of road transport regulations see Hayargreeva Rao, Jitendra Singh, *The Construction of New Paths: Institution-Building Activity in the Early Automobile and Biotech Industries*, in Ragu Garud, Peter Karnøe (eds.): *Path Dependence and Creation*, Psychology Press 2012, p. 253.

[15] Alex Du Savoy, *Are we there yet? Criminal liability in the era of driverless cars*, Lexology, January 31 2019, https://www.lexology.com/library/detail.aspx?g=987ce516-7217-450a-895f-8174cd1617bb, accessed on 10.01.2020.

with local authorities. Uber announced suspending Autonomous Machine Tests in Tempe, Pittsburgh, San Francisco and Toronto.[16] In less than a week, a Tesla SUV with driverless technology on autopilot mode crashed into a road divider in Mountain View, California, killing its driver, Apple engineer Walter Huang.[17]

Are the regulating preoccupations serious enough worldwide? Our research conducted to a satisfactory result, as follows.

In 2010, the European Commission launched the Digital Agenda for Europe, a flagship initiative within Europe 2020, a 10-year strategy for the advancement of the EU economy[18]. The Digital Agenda for Europe is one of the seven flagship initiatives of the Europe 2020 Strategy, set out to define the key enabling role that the use of Information and Communication Technologies (ICT) will have to play if Europe wants to succeed in its ambitions for 2020. The objective of this Agenda is to chart a course to maximize the social and economic potential of ICT, most notably the internet, a vital medium of economic and societal activity: for doing business, working, playing, communicating and expressing ourselves freely. Successful delivery of this Agenda will spur innovation, economic growth and improvements in daily life for both citizens and businesses. Wider deployment and more effective use of digital technologies will thus enable Europe to address its key challenges and will provide Europeans with a better quality of life through, for example, better health care, safer and more efficient transport solutions, cleaner environment, new media opportunities and easier access to public services and cultural content[19].

According with the European Commission, digital technologies make transport and mobility smarter, safer and greener. „Human error is involved in 95% of all traffic accidents on Europe's roads, in which more than 27 000 people are killed and 1.2 million injured every year. Road transport also burns one quarter of the European Union's overall energy consumption, with one fifth of the EU's CO_2 emissions caused by road vehicles. iMobility "smart" technologies, based on the powers of computers and telecoms, can make a major difference to these figures."[20]

In this wider context, it is obvious that the interest and use of AV will increase, making the analysis and proper regulation of AV dramatically necessary.

According to SAE – Society of Automotive Engineers – AV may be categorized into six types, depending on their level of autonomy in supporting and assisting the driving tasks as results in the figure below[21]:

---

[16] http://www.zf.ro/auto/primul-accident-mortal-produs-cu-o-masina-fara-sofer-o-femeie-care-traversa-neregulamentar-a-murit-dupa-ce-a-fost-lovita-de-un-vehicul-autonom-uber-17070679 accessed 29.05.2018.

[17] See Dan Noye, *I-TEAM EXCLUSIVE: Victim who died in Tesla crash had complained about Autopilot*, ABC 7 News, March 29, 2018, https://abc7news.com/automotive/i-team-exclusive-victim-who-died-in-tesla-crash-had-complained-about-autopilot/3275600/ accessed on 10.01.2020; also see Tesla Team, *What We Know About Last Week's Accident,* March 27, 2018, https://www.tesla.com/blog/what-we-know-about-last-weeks-accident, accessed on 10.01.2020.

[18] http://ec.europa.eu/europe2020/index_en.htm, accessed on 10.01.2020.

[19] European Commission, Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions, *A Digital Agenda for Europe*, p. 3, https://ec.europa.eu/eurostat/cros/system/files/09_Digital%20Agenda.pdf, accessed on 10.01.2020.

[20] http://ec.europa.eu/digital-agenda/en/about-mobility, accessed on 10.01.2020.

[21] SAE – Society of Automotive Engineers. On-Road Automated Vehicle Standards Committee, 2014. Taxonomy and definitions for terms related to on-road motor vehicle automated driving systems, https://www.sae.org/search/?qt=levels+of+autonomy, accessed on 10.01.2020.

SAE level	Name	Narrative Definition	Execution of Steering and Acceleration/ Deceleration	*Monitoring* of Driving Environment	Fallback Performance of *Dynamic Driving Task*	System Capability *(Driving Modes)*
***Human driver* monitors the driving environment**						
0	No Automation	the full-time performance by the *human driver* of all aspects of the *dynamic driving task*, even when enhanced by warning or intervention systems	Human driver	Human driver	Human driver	n/a
1	Driver Assistance	the *driving mode*-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	Human driver and system	Human driver	Human driver	Some driving modes
2	Partial Automation	the *driving mode*-specific execution by one or more driver assistance systems of both steering and acceleration/ deceleration using information about the driving environment and with the expectation that the *human driver* perform all remaining aspects of the *dynamic driving task*	**System**	Human driver	Human driver	Some driving modes
***Automated driving system* ("system") monitors the driving environment**						
3	Conditional Automation	the *driving mode*-specific performance by an *automated driving system* of all aspects of the dynamic driving task with the expectation that the *human driver* will respond appropriately to a *request to intervene*	System	**System**	Human driver	Some driving modes
4	High Automation	the *driving mode*-specific performance by an automated driving system of all aspects of the *dynamic driving task*, even if a *human driver* does not respond appropriately to a *request to intervene*	System	System	**System**	Some driving modes
5	Full Automation	the full-time performance by an *automated driving system* of all aspects of the *dynamic driving task* under all roadway and environmental conditions that can be managed by a *human driver*	System	System	System	**All driving modes**

However, it is a fact that, at this point, due to the momentary nature of the actions of active safety systems, their intervention does not change or eliminate the role of the driver in performing part or all of the dynamic driving task, and thus are not considered to be driving automation.[22]

As resumed in the doctrine, „an autonomous vehicle is any vehicle that adopts a technology capable of *supporting and assisting a human driver* in the tasks of:

1) controlling a vehicle (and its main functions of steering and controlling its speed); and

2) monitoring the surrounding environment (e.g., other vehicles/pedestrians, traffic signals, road markings etc.). The two functions are clearly interconnected and depend on each other, given that the execution of particular control functions (e.g., accelerating or decelerating) will depend on inputs and signals received from the surrounding environment (e.g., a traffic light turning red)."[23]

Domestic legislations are not to be amended yet, still there are few states which are few steps ahead, as they were preoccupied in regulating AV at different levels. For example, four US states have enacted legislation that defines autonomous vehicles[24].

---

[22] SAE – Society of Automotive Engineers, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles J3016_201806, 2018, https://www.sae.org/standards/content/j3016_201806/, accessed on 10.01.2020.

[23] F.M. Favarò, N. Nader, S.O. Eurich, M. Tripp, N. Varadaraju, *Examining accident reports involving autonomous vehicles in California*. PLoS ONE. 2017; 12:e0184952. doi: 10.1371/journal.pone.0184952, accessed on 15.01.2020.

[24] The definitions were retrieved from Erica Palmerini, Federico Azzarri, Fiorella Battaglia, Andrea Bertolini, Antonio Carnevale, Jacopo Carpaneto, Filippo Cavallo, Angela Di Carlo, Marco

The State of Nevada regulates AV to exclude a vehicle enabled with a safety system or driver assistance system, including, without limitation, a system to provide electronic blind spot assistance, crash avoidance, emergency braking, parking assistance, adaptive cruise control, lane keep assistance, lane departure warnings and traffic jam and queuing assistance, unless the vehicle is also enabled with artificial intelligence and technology that allows the vehicle to carry out all the mechanical operations of driving without the active control or continuous monitoring of a natural person. In California, an autonomous vehicle is defined as any vehicle equipped with technology that has the capability of operating or driving the vehicle without the active physical control or monitoring of a natural person, whether or not the technology is engaged, excluding vehicles equipped with one or more systems that enhance safety or provide driver assistance but are not capable of driving or operating the vehicle without the active physical control or monitoring of a natural person, while in Michigan, it is a motor vehicle on which automated technology has been installed, either by a manufacturer of automated technology or an up fitter that enables the motor vehicle to be operated without any control or monitoring by a human operator. Automated motor vehicle does not include a motor vehicle enabled with 1 or more active safety systems or operator assistance systems, including, but not limited to, a system to provide electronic blind spot assistance, crash avoidance, emergency braking, parking assistance, adaptive cruise control, lane-keeping assistance, lane departure warning, or traffic jam and queuing assistance, unless 1 or more of these technologies alone or in combination with other systems enable the vehicle on which the technology is installed to operate without any control or monitoring by an operator. Finally, Florida legislation defines AV as any vehicle equipped with autonomous technology. The term "autonomous technology" means technology installed on a motor vehicle that has the capability to drive the vehicle on which the technology is installed without the active control or monitoring by a human operator. The term excludes a motor vehicle enabled with active safety systems or driver assistance systems, including, without limitation, a system to provide electronic blind spot assistance, crash avoidance.

The recently updated UK Code of Practice for Automated Vehicle Trialing provides important definitions on specific terms and also defines the automated driving system (ADS) as a vehicle system that uses both hardware and software to perform all of the dynamic driving tasks needed to undertake a journey. When activated, the vehicle enters automated mode ("self- driving mode"), and the driver does not need to monitor the road traffic environment, or the ADS. The ADS may work within specific driving situations (sometimes referred to as an operational design domain), or in any driving situation. Outside of these situations, a driver is needed to control the vehicle.[25]

Cempini, Marco Controzzi, Bert-Jaap Koops, Federica Lucivero, Nikil Mukerji, Luca Nocco, Alberto Pirni, Huma Shah, Pericle Salvini, Maurice Schellekens, and Kevin Warwick, *RoboLaw. Regulating Emerging Robotic Technologies in Europe: Robotics facing Law and Ethics,* Collaborative project (CP), FP7-SiS-Challenge 1-3: Regulating emerging scientific and technological developments, D6.2 Guidelines on Regulating Robotics, 2014, p. 68, www.robolaw.eu, accessed on 10.01.2020.

[25] The Department for Transport and the Centre for Connected and Autonomous Vehicles, *Code of Practice: Automated vehicle trialing,* February 2019, p. 25, https://assets.publishing.service.

Also, in its *Future of Mobility: Urban Strategy*[26], the UK Government stated that its approach to innovation in urban mobility will be underpinned by nine principles, stating that the new modes of transport must be safe and secure by design:

1. The benefits of innovation must be available to everyone.
2. Walking and cycling must remain the best options for short urban journeys.
3. Mass transit must remain fundamental to an efficient transport system.
4. New mobility services must lead the transition to zero emissions.
5. Mobility innovation must help to reduce congestion, for example through sharing rides, increasing occupancy or consolidating freight.
6. The marketplace for mobility must be open to stimulate innovation and give the best deal to consumers.
7. New mobility services must be part of an integrated transport system combining public, private and multiple modes of transport.
8. Data from new mobility services must be shared where appropriate to improve choice and the operation of the transport system.
9. In other words, innovative services should be safe, accessible and lead the transition to zero emissions. They should also feed into an integrated transport system which uses mass transit and increased occupancy to reduce congestion. They should do this in a way which encourages active travel, such as walking and cycling.

The same document provides also important definitions for specific terms:

- *Assisted driving:* When individual automation features such as adaptive cruise control or lane changing features assist the driver.

- *Automated driving system:* A vehicle system that uses both hardware and software to exercise dynamic control of a vehicle on a sustained basis. Sometimes abbreviated to ADS.[27]

- *User-in-charge:* a human who is in position to operate the controls of a highly automated vehicle. The user-in-charge would not be a driver while the automated driving system is correctly engaged but must be qualified and fit to drive. Their main role is to take over in planned circumstances after the vehicle has come to a safe stop. They would also have obligations to maintain and insure the vehicle and report accidents. A highly automated vehicle would require a user-in-charge unless it is authorized to operate without one. The user-in-charge must be in the vehicle (or in line of sight of the vehicle) and can be distinguished from a remote supervisor (discussed above).

In terms of civil liability for injury or damage caused by AV there is a general agreement that the insurer is directly liable to compensate the victim. The insurer may then reclaim these damages from any other party liable for the accident, in other words the civil liability regime is generally "good enough for now"[28], although the increase of case-law in this field would reclaim for a specific set of rules.

---

gov.uk/government/uploads/system/uploads/attachment_data/file/776511/code-of-practice-automated-vehicle-trialling.pdf, accessed on 15.01.2020.

[26] Scottish Law Commission, *Automated Vehicles: Consultation Paper 2 on Passenger Services and Public Transport. A joint consultation paper,* 16 October 2019, pp. 16-17, https://www.scotlawcom.gov.uk/publications, accessed on 10.01.2020.

[27] Idem, p. xi.

[28] Idem, p. 2

In terms of criminal liability, things are different. Traditional contemporary legal models are challenged by the AV. The doctrine has revealed that, in order to find the best solution to impose criminal liability related to AV, one must answer to the following questions: *"What crimes may be committed in context of autonomous vehicles? Who should be held responsible in case when using an AV a crime is committed (the owner of the vehicle; the person who is sitting in the driver's seat – if there is any kind of it; the vehicle manufacturer; the mechanic who mounted the autonomous technology to the vehicle or another entity)? The incidents may happen under various circumstances. Will the responsible subject change depending on these circumstances and if so, how? What are basic model scenarios of incidents related to the use of autonomous vehicles? How should the law react, if the criminally responsible subject is a legal entity? As for the criminal responsibility for harm caused by an AV, according to most European states' criminal codes, the driver (or vehicle owner) may be charged with negligence even if the AV was in control (in autonomous mode). If no negligence is proved, the criminally responsible entity is the manufacturer. Since in most cases, a vehicle manufacturer is a legal entity, it is highly important to consider the issue of corporate criminal responsibility. The European Union countries do not have an identical legislation in this area. Some countries' criminal codes (including the Slovak republic as well) are built on the idea of personal guilt. These codes would definitely need an amendment. Hence, any research questions focusing on corporate criminal responsibility are on high importance."*[29]

Du Sautoy oppinates that *„the assignment of fault between the company that designed the system, the registered keeper of the car and the user-in-charge raises three issues of which legislators and practitioners will need to be mindful"*[30], but also expresses concerns that developers may think twice about investing in this technology if their liability and legal expenses are going to be extortionate[31].

IV. Talking about the AI AV legal regulation necessity. Standards, expectations and conclusions

Even there is an important social opposition in regulating AI AV, important steps were made in regulating AV and the doctrine agrees on the need to encourage progress. If driverless vehicles will be, on the whole, safer than human-driven cars, then the legislators should be careful not to introduce laws that prevent use and development of the technology. „As the law tries to develop in step with the technology, it is an unenviable task to walk the line between effective protection of road-users in the short-term and the encouragement of a potentially life-saving innovation in the long-term".[32]

---

[29] Ilková V., Ilka A., *Legal aspects of autonomous vehicles—An overview*, Proc. 21st Int. Conf. Process Control (PC), pp. 428-433, Jun. 2017, retrieved from https://www.researchgate.net/publication/317580822_Legal_aspects_of_autonomous_vehicles_-_an_overview_pre-print accessed on 30.01. 2020.

[30] Alex Du Sautoy, *Are we there yet? Criminal liability in the era of driverless cars*, Lexology, January 31 2019, https://www.lexology.com/library/detail.aspx?g=987ce516-7217-450a-895f-8174cd1617bb, accessed on 10.01.2020.

[31] Idem.

[32] Alex Du Sautoy, *Are we there yet? Criminal liability in the era of driverless cars*, Lexology, January 31 2019, https://www.lexology.com/library/detail.aspx?g=987ce516-7217-450a-895f-8174cd1617bb, accessed on 10.01.2020.

At present, autopilot is an assistance driving tool and does not replace the human driver. So, AV are not 100% autonomous yet.

But there is few understandings among jurists on how the AI AV systems work and how is it possible for traffic incidents to occur? If we consider in the future to recognize AI as subject to criminal law, we must be aware that the whole discussion is on debate strictly in relation with „machine-learning" type AI systems. These are designed as matrices composed by cells displayed on layers and the more cells are, the more complex AI system is. A „machine-learning" system learns by recognizing patterns and creating new connections between data, and thus, creates new patterns. AI „machine-learning" type system copies the neuronal synapses of the human brain (as we all know, human brain recognizes patterns, too). The biased output that occurs sometimes is due to a false connection the system creates during the „learning process" (acting similarly with occurrence of optical illusions) or due to the lack quality of data the system was fed with. Actually, studies revealed that in case of traffic incidents involving AV, in 95% humans are to blame. Tests with autonomous cars conducted in California by Google-Waymo have shown that 19 out of 21 accidents that the autonomous cars were involved in, were caused by expectation violations done by humans.[33] Other studies confirm that human factor is mainly to blame in case of AV collisions.[34]

Despite the technology used to build AV, there still are a several aspects their designers and engineers must resolve in order to make the public roads safer. Some of the issues needed to be taken care of are: developing of problem-solving capabilities for „trolley problem"-type scenarios[35] because moral judgments are required in these cases. Other problems which need specific abilities still needed to be developed are the choice dilemmas (situations in which committing small crimes, like slight speeding, is better for traffic or to avoid accidents or cases where accidents are not preventable, but a driver's choices will either hurt more or fewer people).[36]

Another aspect that is still on debate is the double standard in anticipating risk situations: We tend to impose a lower standard for the humans, who are to blame only if they could have reasonably prevented the traffic incident (otherwise fortuitous case shall erase their criminal liability), and a higher standard for the AI (which is expected to reach a 100% level of prevention rate no matter the particular circumstances of the collision occurred). If humans cannot avoid and predict all negative events, why should we impose a higher standard for AI?

With so many questions still without answers a discussion on criminal liability of AI systems used to build AV seems premature. Since AI systems are not 100% autonomous, do not have conscience and self-determination, they apparently cannot be granted rights and imposed obligations because it would be a nonsense. In the

---

[33] Gunnar Deinboll Jenssen, Terje Moen, Stig Ole Johnse, *Accidents with Automated Vehicles -Do self-driving cars need a better sense of self?*, Proc. of 26th ITS World Congress, Singapore, 21-25 October 2019 p. 5, retrieved from https://www.researchgate.net/publication/337211374_Accidents_with_Automated_Vehicles_-Do_self-driving_cars_need_a_better_sense_of_self, accessed on 10.01.2020.

[34] See Don Reisinger, *Humans—Not Technology—Are the Leading Cause of Self-Driving Car Accidents in California,* Fortune, August 29, 2018, https://fortune.com/2018/08/29/self-driving-car-accidents/, accessed on 10.01.2020.

[35] Joshua D. Greene, *Solving the trolley problem*, 2016, Wiley Online Library, pp. 175–178.

[36] Flankie Wallace, *Will Self-Driving Cars Reduce Accidents and Improve Safety?* Science &Tech, 26 February 2019, https://www.headstuff.org/topical/will-self-driving-cars/.

actual stage of development, AI reactions and involvement in social relations depend 100% of human conduct. And in this case, it is better to focus on blameworthiness of humans who designed, operated or manipulated the algorithms. But, still, the research in the area of machine-learning points to a rapid achievement[37] of an „artificial" conscience. We need to prepare ourselves for this moment, but, until then, we must be aware of the importance of creating the proper framework in order to achieve general goals: Progress, Accessibility, Equity, Damage recovery. We do not need to recognize yet AI as subject of law even we could think some legal-logical schemes in order to impose criminal liability for AI…but we need to be prepared for the future.

References

1. De Maglie, C., *Models of Corporate Criminal Liability in Comparative Law*, Washington University Global Studies Law Review, Volume 4, Issue 3, 2005.

2. Department for Transport and the Centre for Connected and Autonomous Vehicles, *Code of Practice: Automated vehicle trialing,* February 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776511/code-of-practice-automated-vehicle-trialling.pdf, accessed on 15.01.2020.

3. Du Sautoy, A., *Are we there yet? Criminal liability in the era of driverless cars*, Lexology, January 31 2019, https://www.lexology.com/library/detail.aspx?g=987ce516-7217-450a-895f-8174cd1617bb, accessed on 10.01.2020.

4. Du Savoy, A., *Are we there yet? Criminal liability in the era of driverless cars*, Lexology, January 31 2019, https://www.lexology.com/library/detail.aspx?g=987ce516-7217-450a-895f-8174cd1617bb, accessed on 10.01.2020.

5. European Commission, Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committe of the Regions, *A Digital Agenda for Europe*, https://ec.europa.eu/eurostat/cros/system/files/09_Digital%20Agenda.pdf, accessed on 10.01.2020.

6. Favarò, F.M., Nader, N., Eurich, S.O., Tripp, M., Varadaraju, N., *Examining accident reports involving autonomous vehicles in California*. PLoS ONE. 2017; 12:e0184952. doi: 10.1371/journal.pone.0184952, accessed on 15.01.2020.

7. Greene, J.D., *Solving the trolley problem*, 2016, Wiley Online Library.

8. http://ec.europa.eu/digital-agenda/en/about-mobility, accessed on 10.01.2020.

9. http://ec.europa.eu/europe2020/index_en.htm, accessed on 10.01.2020.

10. http://www.zf.ro/auto/primul-accident-mortal-produs-cu-o-masina-fara-sofer-o-femeie-care-traversa-neregulamentar-a-murit-dupa-ce-a-fost-lovita-de-un-vehicul-autonom-uber-17070679 accessed 29.05.2018.

11. Ilková, V., Ilka, A., *Legal aspects of autonomous vehicles—An overview*, Proc. 21st Int. Conf. Process Control (PC), pp. 428-433, Jun. 2017, retrieved from https://www.researchgate.net/publication/317580822_Legal_aspects_of_autonomous_vehicles_-_an_overview_pre-print, accessed on 30.01. 2020.

12. Jenssen, G.D., Moen, T., Johnse, S.O., *Accidents with Automated Vehicles -Do self-driving cars need a better sense of self?*, Proc. of 26th ITS World Congress, Singapore, 21-25 October 2019, retrieved from https://www.researchgate.net/publication/337211374_

[37] McLain C., *Can Artificial Intelligence Be Conscious?* March 27, 2018, https://medium.com/hummingbird-ventures/can-artificial-intelligence-be-conscious-e316c2ac4769, accessed on 10.10.2019.

Accidents_with_Automated_Vehicles_-Do_self-driving_cars_need_a_better_sense_of_self, accessed on 10.01.2020.

13. McLain, C., *Can Artificial Intelligence Be Conscious?* March 27, 2018, https://medium.com/hummingbird-ventures/can-artificial-intelligence-be-conscious-e316c2ac4769, accessed on 10.10.2019.

14. Noye, D., *I-TEAM EXCLUSIVE: Victim who died in Tesla crash had complained about Autopilot*, ABC 7 News, March 29, 2018, https://abc7news.com/ automotive/i-team-exclusive-victim-who-died-in-tesla-crash-had-complained-about-autopilot/3275600/ accessed on 10.01.2020.

15. Palmerini, E., Azzarri, F., Battaglia, F., Bertolini, A., Carnevale, A., Carpaneto, J., Cavallo, F., Di Carlo, A., Cempini, M., Controzzi, M., Koops, B.-J., Lucivero, F., Mukerji, N., Nocco, L., Pirni, A., Shah, H., Salvini, P., Schellekens, M., Warwick, K., *RoboLaw. Regulating Emerging Robotic Technologies in Europe: Robotics facing Law and Ethics,* Collaborative project (CP), FP7-SiS-Challenge 1-3: Regulating emerging scientific and technological developments, D6.2 Guidelines on Regulating Robotics, 2014, www.robolaw.eu, accessed on 10.01.2020.

16. Rao, Hayargreeva, Singh V. Jitendra, *The Construction of New Paths: Institution-Building Activity in the Early Automobile and Biotech Industries*, in Ragu Garud, Peter Karnøe (eds.): *Path Dependence and Creation*, Psychology Press 2012.

17. Reisinger, D., *Humans—Not Technology—Are the Leading Cause of Self-Driving Car Accidents in California,* Fortune, August 29, 2018, https://fortune.com/2018/08/29/self-driving-car-accidents/, accessed on 10.01.2020.

18. SAE - Society of Automotive Engineers, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles J3016_201806, 2018, https://www.sae.org/standards/content/j3016_201806/, accessed on 10.01.2020.

19. SAE - Society of Automotive Engineers. On-Road Automated Vehicle Standards Committee, 2014. Taxonomy and definitions for terms related to on-road motor vehicle automated driving systems, https://www.sae.org/search/?qt=levels+of+autonomy, accessed on 10.01.2020.

20. Schmelzer, R., *What Happens When Self-Driving Cars Kill People?*, Forbes, 26 September 2019, https://www.forbes.com/sites/cognitiveworld/2019/09/26/what-happens-with-self-driving-cars-kill-people/, accessed on 10.01.2020.

21. Scottish Law Commission, *Automated Vehicles: Consultation Paper 2 on Passenger Services and Public Transport. A joint consultation paper,* 16 October 2019, https://www.scotlawcom.gov.uk/publications, accessed on 10.01.2020.

22. Simons, K.W., *When is Strict Criminal Liability Just*. Journal of Criminal Law and Criminology, Vol. 87 Issue 4, 1997.

23. Stănilă L., *Living in the Future: New Actors in the Field of Criminal Law – Artificial Intelligence*, paper presented at the University of Latvia, Faculty of Law with the occasion of the 7th International Scientific Conference "Legal science: Functions, significance and future in legal systems" – Riga, 18-19 October 2019.

24. Stănilă, L. *Artificial intelligence and Human Rights. A challenging Approach,* Journal of Eastern European Criminal Law, Issue 2/2018.

25. Stănilă, L., *Artificial Intelligence and Human Rights. Evolution or involution?* in Conference proceedings: Towards a Better Future: Democracy, EU Integration and Criminal Justice, Vol. I, Bitola 2019.

26. Tesla Team, *What We Know About Last Week's Accident,* March 27, 2018, https://www.tesla.com/blog/what-we-know-about-last-weeks-accident, accessed on 10.01.2020.

27. Wallace, F., *Will Self-Driving Cars Reduce Accidents And Improve Safety?* Science &Tech, 26 February 2019, https://www.headstuff.org/topical/will-self-driving-cars/.

28. Wasserstrom, R.A., *Strict Liability in the Criminal Law*. Stanford Law Review Vol. 12, No. 4, 1960.

29. Zevenbergen B., Kortz M., Schaich Borg J., Finlayson M.A., Pagallo U., Zapušek T., *Appropriateness and Feasibility of Legal Personhood for AI Systems*, in Bringsjord S., Tokhi M.O., Aldinas Ferreira M.I., Govindarajulu N.S. (eds.): *Hybrid Worlds: Societal and Ethical Challenges*, ICRES 2018 Proceedings, New York, USA 20-21 August 2018, CLAWAR Association Ltd, UK.