



Autonomous Vehicles as a Category of Transport Law: Definition and Classification

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Abstract

In this paper, the authors consider issues related to the legal definition and understanding of the essence of vehicles with assisted driving and varying degrees of automation. It is pointed out on the need to study the terminological features and definitional difficulties in this area in order to optimize the current Russian transport legislation. The world experience of practical use of vehicles with assisted driving, as well as the legal regulation of related issues is analyzed. The characteristics of various types of automated vehicles are given and investigated. There are considered the current proposals for making amendments to the Rules of the road, aimed at regulating the legal status of unmanned vehicles. The imperfection of these additions, which do not take into account the presence of various levels of vehicle automation, is substantiated. An alternative approach to the formation of an effective conceptual apparatus based on the degree of automation of the driving process is proposed.

Keywords: assisted driving, autonomous vehicle, robotic vehicle, international experience.

1. Introduction

The development of on-board electronics of modern vehicles and the transport environment as a whole has already achieved very significant successes: artificial intelligence can now operate a vehicle (partially or completely). The ability to process large volumes of information with high speed and quickly make optimal decisions allows an autonomous vehicle to move in all directions much more efficiently and safely than a conventional vehicle driven by a person. At the same time, the use of such technology in management makes the vehicle not just a unique mechanism from a technical point of view, but also predetermines a specific locus of identifying the features of its legal mediation in all branches of business and public relations.

According to experts, already now the roads (including those of general use) are technically largely adapted for the movement of automated transport (first of all, according to safety parameters) equipped with elements of intelligent transport systems and need only minimal additional technological equipment [1].

However, the constant difficulties that arise on the road due to the use of self-moving devices become a serious obstacle to the implementation of the results of scientific progress in life, the bright prospects of which are massively drawn by "robot positive" experts.

So, for example, a case with an Uber car in the USA had a wide public resonance, which on March 19, 2018 hit a pedestrian who crossed the road outside the pedestrian crossing [2]. Almost two years earlier, also in the USA, the Tesla Model S electric car got into an accident, the result of which was the death of the driver. The vehicle itself was not faulty, but its automatic control system did not recognize the obstacle that appeared ahead and did not activate the braking system due to the high ground clearance of the trailer of the other car [3]. It should be noted that in both cases

there was a passenger in the passenger compartment (it was namely the passenger, because he had no relation to the control of the vehicle at that moment), and the car moved independently in autopilot mode.

Immediately after the first incident, the German authorities very prudently asked Tesla to stop using the definition of "autopilot" in advertising. The rationale was quite logical: in the everyday sense, this term is perceived as a tool that can fully take over control, without any human control. The US authorities have acted even tougher, completely banning the use of this concept. As a result of this legislative burden, the company itself replaced the term "autopilot" with the phrase "driving assistant" [4].

Thus, it is obvious that the one moment transition to technologies of automated / autonomous transport is not possible. This is preceded by a period of gradual technological accumulations and improvements that ultimately provide the necessary technological breakthrough. However, in addition to issues of a technical nature, the solution of which, undoubtedly, will not be easy, there are also not less complex issues of a legal nature. Simultaneously with overcoming technological difficulties, we believe that steps should be taken towards regulatory support for the direct implementation of such developments through the adoption of special legal regulations defining standards for the use of robotic vehicles. The need for this was explicitly enshrined in the latest edition of the Roadmap of the National Technology Initiative "Avtonet". In particular, direction 2 of the implementation of the action plan involves "Phased improvement of the regulatory framework in order to eliminate barriers to the use of advanced technological solutions and create a system of incentives for their implementation" [5].

Thus, the task of researching issues related to the legal definition and understanding of the essence of vehicles with assisted driving of varying degrees of automation is extremely important.



2. Methods

The analysis of world experience shows that in a number of countries regulatory issues for cars with intelligent control systems are already at the development stage. For example, in the EU there are already officially adopted legal norms aimed at the operation of autonomous vehicles. So, in June 2017 in Germany, a law was passed that authorizes the use of autonomous cars on the roads, and Estonia legalized the rules for the movement of robots couriers. But the main "breakthrough" document was the Resolution of the European Parliament dated February 16, 2017 2015/2013 (INL) P8_TA-PROV (2017) 0051, which notes that in developing effective rules both at the EU level and globally, first of all, needs the automotive sector [6]. At the same time, special attention in this resolution addresses the need for a realistic approach to solving security and responsibility problems.

Of course, it is the issues of responsibility that are of most interest to lawyers. We believe that the issues on distribution of the burden of possible losses with respect to the use of vehicles, which are not fully under control of a person, should be at the forefront in the reformation of the existing legal norms.

The first and fundamental issue should be the consideration of the need to eliminate the terminological diversity used to denote the type of a vehicle being investigated. And it is precisely this interpretation which determines many other issues that are important for law and the usual civil turnover.

International acts and special studies use different terms in the same ways: "autonomous", "automated", "robotized", "unmanned", "highly automated", "significantly or fully automated driving function", "self-driving car" and others practically as synonymous.

It should be noted that terminology diverges not only at the level of multi-national regulation, but also within the different levels of the legal field of one country. So, at the national level in the United States there is adopted a law called "The SELF DRIVE Act" [7] - as we can see, the term "self-drive car" is used there. The normative act of the state of California (February 27, 2018), which permits to test unmanned vehicles without a human operator in the cabin dated April 2 of this year, uses the term "autonomous car" [8].

It should be noted that the formulation of the concept cannot be done in isolation from the technological component. The difference in the division of all these terminological solutions, meanwhile, has long been noticed and rather thoroughly studied in relation to medical technologies [9, 10].

For example, with regard to vehicles, such differentiation is indicated in the text of the European Parliament Resolution dated February 16, 2017: "The list of autonomous vehicles includes all types of road, rail, air and water transport which is remotely controlled, being automatic, autonomous and equipped with communication means".

Domestic legislation also has developed a number of regulatory documents and guidance materials on terminology in robotics. Closest to the area in question is the terminology of GOST R ISO 8373-2014 "Robots and robotic devices. Terms and definitions", in which the term "robot" means a multi-functional reprogrammable machine for fully or partially automatic performance of motion functions in the same way as living organisms, as well as some human intellectual functions [11]. "Reprogrammable" is meant by the possibility of replacing, correcting or generating a control program automatically or with the help of a person.

In our opinion, the most successful from the point of view of consolidating the conceptual apparatus is the classification developed within the framework of the International Society of Automobile Engineers (SAE). This Community has developed the standard J3016: "Classification and Definition of Terms Relating to Road Motor Vehicles with Autonomous Driving Systems" [12]. This standard establishes 6 levels of automation starting from

level 0 (no automation) to level 5 (full automated). The levels located between zeros and fifth, suggest the phased automatization of varying complexity.

Level 0 (without automation) corresponds to the situation when a vehicle is in no way automated; all control signals are generated by a person.

Level 1 (driver assistance) describes a situation where a person and an onboard control system work together, with most of the work being done by a person. The electronic control system is able to control acceleration / deceleration, prevent wheel lock, etc.

Level 2 (partial automation) assumes that the direction and speed of the vehicle is controlled by driver assistance systems, but the systems are controlled by humans.

Level 3 (conditional automation) assumes that vehicles can independently monitor driving conditions and make decisions about the performance of certain actions without human intervention. Human intervention may be required only in the event of any difficult situations "if something goes wrong."

Level 4 (increased automation) assumes that the onboard vehicle control systems can fully function without human intervention in all cases "even if a driver does not respond properly to a request for intervention". In other words, even in the event of emergency situations, the car can correctly work it out.

Level 5 (full automation) implies the absence of any control over the vehicle by the person in it. In fact, vehicles of this level do not imply the presence of drivers: all the people inside them can be considered as passengers.

In addition to fixing the classification of vehicles themselves depending on the degree of automation, this document is valuable due to the fact that it describes in detail the characteristics and signs of step-by-step automation from level to level. The use of this document allows us to avoid confusion of concepts when conducting various studies, including interdisciplinary.

3. Results and discussion

For the development of transport law in general and the solution of issues related to the definition of the legal personality of participants in transport relations, in our opinion, it is enough, to distinguish three levels of automation. In this case, it would be sufficient to carry out the classification according to the degree of involvement of the driver (or operator) in the process of driving a vehicle, and, therefore, the distribution of responsibility between the participants of transport relations.

It is proposed to highlight the following levels:

Level 0 - complete lack of automation, which means the absence in the vehicle of any devices capable of acting autonomously, without the participation of the driver. At this level, the driver is solely responsible for the operation of the vehicle, since it is he/she who makes all the decisions related to driving this vehicle. Within this level, it is also permissible to consider vehicles that are referred to as "smart-car" in the Avtonet roadmap, i.e. vehicles with intelligent systems that are not related to driving, but make life much easier and provide comfort to the driver.

Level 1 - the presence of auxiliary devices that facilitate the process of driving a vehicle which can operate autonomously, but under the control of the driver, which should be called "operator" at this level. We will call vehicles of this level as the "vehicles with assisted driving". At this level, a person behind the wheel is considered to be a driver, but he/she shares responsibility with the developers of the vehicle. Developers call such vehicles in the road map "Avtonet" as an "autocar".

Level 2 - full automation of the driving process of a vehicle. Such vehicles in the Avtonet roadmap are referred to as "robocar" by developers. This term implies a completely autonomous vehicle. In such vehicles, the person inside the vehicle should be regarded precisely as a "passenger", what entails the corresponding legal consequences - the lack of responsibility of the person driving the car for any adverse effects of the operation of such a vehicle.

Thus, robotization implies helping a person, but not his/her complete replacement, which in general does not correspond to the common understanding of robot transport. We believe that it is more correct and suitable for the purposes of the progressive development of transport legislation to reinforce the concept of "assistance", i.e. the duties of assistants (by such, it is commonly understood as an assistant of a high-class specialist [13]).

Thus, the crucial aspect in the legal provision of the introduction of vehicles with artificial intelligence control is the need to determine the essence and characteristics of the legal status of such cars. Specialists in this field prepared a draft decree of the Government of the Russian Federation "On Amendments to the Rules of the Road Traffic of the Russian Federation" (developed by ANO PravoRobotov) which has already been submitted to the Government of the Russian Federation for consideration [14].

According to the document, it is proposed to add item 1.2 of the Rules of the Road [15] with the following paragraphs of the following content.

After the second paragraph: "Unmanned vehicle" is a vehicle equipped with an automatic control system, an emergency shutdown system of automatic control and a Black Box of an unmanned vehicle having the technical ability to carry out independent automatic control of an unmanned vehicle for autonomous movement along a given route and having the corresponding designation "Unmanned vehicle".

After the paragraph 30: "A Responsible Person in an Unmanned Vehicle" is a person in the cab of an Unmanned Vehicle who has sufficient skills to emergently deactivate the automatic control of the Unmanned Vehicle and who is responsible for the results of the movement of the Unmanned Vehicle in accordance with the provisions of paragraph 1.6 of this Regulation. All the provisions of this Regulation applicable to a driver of the vehicle could be applied to the Responsible person in an unmanned vehicle."

The proposed additions define the terms "Unmanned vehicle" and "Responsible person of an unmanned vehicle". However, all responsibility for the results of the operation of such a vehicle rests with the person being an operator of the vehicle (as in the case of conventional cars). We believe that this approach is not perfect, because it does not allow taking into account the peculiarities of the functioning of vehicles with automated driving. First of all, this relates to the issue of assessing the surrounding reality and decision-making by the onboard information and control system of the vehicle.

4. Summary

The analysis shows that the development of vehicles with varying degrees of automation of the driving process is one of the global trends. At the same time, the practical use of such mechanisms is impossible without the development of an appropriate regulatory framework. In the United States and the countries of the European Union, approaches are beginning to take shape in defining the essence of automated vehicles and the legal regulation of their functioning. In Russia, this aspect is not being actively developed, and the definitions currently offered are not complete and do not reflect all the features of such vehicles. We believe that the formation of an effective conceptual apparatus is impossible without taking into account the degree of automation. Therefore it is necessary to amend the Rules of the road related to the degree of automation of vehicles. Such a thesis can be the basis for an equitable distribution of the burden of responsibility in situations of partial assistance in transport management.

This division should reflect on the legal status of the object of law under consideration, and often speak about the possibility of recognizing a part of the legal status as belonging to the same objects.

5. Conclusions

In the presented work, the current state of the issues on the legal regulation concerning vehicles in various degrees of automation of the driving process was analyzed. It is shown that currently existing approaches to the definition of the essence of such vehicles in Russia are not fully perfect. A new approach was proposed to the classification of vehicles in terms of the degree of human involvement in the driving process; the classification can be used to determine the degree of responsibility for the results of the functioning of such mechanisms. New, more advanced definitions of vehicles with different degrees of automation, and also proposals for amending current legislation can be formulated on the basis of the proposed approach.

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