Autonomous Robots and Their Legal Regime in the Context of Recodification of Civil Legislation of Ukraine

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Yurii Khodyko*
https://orcid.org/0000-0002-7768-4135

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Abstract

[Purpose] The issues of understanding what a robot is as an object of civil legal relations and the civil law regime that must be applied to ensure effective legal regulation of relations related to the use of robotics require legal solutions. Special attention should be paid to the study of liability for damage caused by robotics to a person or their property.

[Methodology/Approach/Design] The main methods on which this work was based are the method of systematization and the method of analysis. The article summed up various basic materials related to robots as objects of civil legal relations, as well as the impact of their existence on the current development of the world.

[Findings] Considering the purpose of robotics in the modern world, it is proposed to carry out legal regulation of robotics relations using an approach of the extension of civil law regulation applied to things. This does not exclude the introduction of special rules that will apply exclusively to robots as objects.

Keywords: Object of Civil Legal Relations. Autonomous Robot. Legal Regime. Concept Of Robot. Liability For Damage Caused by Robot.

INTRODUCTION

The development of technology and the desire of society to automate production processes has led to the emergence of robotic systems (robots). A fairly long process of technology development in the area of robotics and artificial intelligence, which is considered for more than a decade, has provided the "technological evolution" of robots from laboratory prototypes to the mass use of robots in the industrial sector and the first significant steps in the use of robotics in consumer services, medicine, military and space spheres. Every year,

*Yurii Khodyko is a PhD in Law, Associate Professor at the Department of Civil Law No. 1, Yaroslav Mudryi National Law University, Kharkiv, Ukraine. Address: Yaroslav Mudryi National Law University 61024, 77 Pushkinska Str., Kharkiv, Ukraine. E-mail: khodykoyurii@gmail.com.

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robots are given an increasing number of functions, they begin to be used in various fields, and robots become more autonomous when used (DANCHUK et al., 2021). All this is the path that humanity is quite successful in the field of robotics, the pinnacle of which is the creation of a universal intelligent anthropomorphic robot. The emergence of robots was predominantly conditioned upon the aim to simplify human life in the field of production, displace human labour in areas that are complex and dangerous, as well as to accelerate the pace of production at the expense of robots, making it more technologically advanced, accurate, and high-quality. Robotisation of production processes has led to changes in the labour market around the world, the emergence of new professions, which are usually associated with the management, control of technological processes, etc. (GINTERS et al., 2010).

Even though humanity has managed to replace humans with robots in many areas of production and life support, robots will never be on a par with humans in their status, regardless of what level technological advance has reached in the field of creating robots, in particular an intelligent anthropomorphic robot. For humanity, robots should remain only a means of a better way of life – helpers. As noted by N. Richards and W. Smart (2013), the idea of possible equality between a robot and a human in terms of its status should be unequivocally rejected. As the world is filled with robotic and artificial technologies, lives and relationships of social, political, and economic power are also changing, creating new and unexpected problems for law (LARSON, 2010; BALKIN, 2015). Solving problems of legal regulation of relations arising in the field of robotics use, their legal nature is a natural process, as with the emergence of any new objects of civil legal relations (KHARYTONOV et al., 2021).

To date, there is no civil law regulation, as well as in general legislative regulation of relations regarding robots as such in Ukraine. This cannot be stated about the European Union, which Ukraine seeks to join and has committed itself, in particular in the legislative sphere, to harmonise legislation with the latter. The European Parliament adopted a resolution "Report with recommendations to the Commission on Civil law Rules on Robotics" (2017), which defined the key issues and ways to form civil law regulation of relations in the European Union regarding the use of robots. Notably, legislation in the field of robotics in the form of a special law was adopted in 2008 (with subsequent changes) in South Korea "Intelligent Robots Development and Distribution Promotion Act" (2008). However, this law does not contain conceptual provisions of civil law regulation of relations regarding the use of robots but is only aimed at developing a national policy for the development of robotics in the state. The key issues to be resolved include determining what

should be understood by robots in general, from the standpoint of legal regulation, the civil law turnover of such robots, as well as liability for damage caused to a person or property during the robot's work (activity). The solution of these issues will ensure the development of the fundamental principles of the civil law concept of legal regulation of relations in the field of human use of robotics in Ukraine.

HISTORICAL ASPECTS OF ROBOTISATION

The idea of ordinary people about robots, as a rule, is based on films and literature of the science fiction genre, and the robot is associated with the "Iron Man". Such a view, today, is not devoid of real content, but it is rather distorted and narrow. Thus, indeed, humanity is striving to create an anthropomorphic intelligent robot and there are real first steps in this direction. However, excessive "humanisation" of robots is to a certain extent a trend of modern realities (KHAN et al., 2012). Although a robot may once be considered a human, this situation is unlikely to happen in the near future (ASARO, 2007). Most of the robots that currently exist do not have a uniform similarity but are designed for practical application in a particular field, and in the first place is not its appearance, habits, abilities similar to human ones, but its autonomy and functionality according to the needs of the field of application. The word "robot" was first proposed in a science fiction play by Czech writer Karel Capek (2021) R.U.R. (Rossumovi univerzální roboti (Czech.), "Rossumi Universal Robots"), which the world saw in 1920. In the play, robots are considered as humanoid mechanisms used as slave labour in a factory. Later, in the collection of science fiction stories by Isaac Asimov "I, Robot" (2018), the "Three Laws of robotics" were formed for the first time, which are still relevant today and form the basis for developing the rules of ethics for robots around the world. These two literary works of the science fiction genre marked the beginning of robotics, the idea of which was picked up by the fields of engineering and programming to bring fantastic ideas to life.

Today, much attention is paid to defining the understanding of the robot for the purposes of legal regulation both in the legal scientific literature, and there are also the first steps to consolidate the legal understanding of the robot as an object of civil legal relations in regulations. R. Calo (2016) refers to a robot as an artificially created object or system that can receive and process information, as well as act according to their surrounding world. N. Richards and W. Smart (2013) define a robot as a developed system that demonstrates both physical and intelligent activity but is not alive in the biological sense. Evidently, in the definition of a robot, scientists emphasise that it is not a biological object, but an artificially created one. Even though the current

legislation of Ukraine does not govern the issue of robots, the Appendix to the Procedure for state control of international transfers of military goods provides a legal definition of a robot. The specified Appendix determines that robot is a manipulative mechanism that can move continuously or from point to point, can use sensitive elements (sensors) and has all the following characteristics:

(1) Multi-functionality;
(2) Ability to set or orient material, parts, tools, or special devices using variable movements in three-dimensional space;
(3) Equipped with three or more closed-loop or open-loop servomechanisms, which can include stepper motors;
(4) Ability "to be programmed by the user" using the teach/repeat method or using an electronic computer, which can be programmed by a logic controller, i.e., without mechanical intervention (RESOLUTION, 2002).

The legislator based this understanding of the robot on the fact that the robot is a manipulative mechanism that can perform tasks independently in space according to the programmed functionality of the robot.

MAIN CHARACTERISTICS OF ROBOTS

The Law of South Korea "Intelligent Robots Development and Distribution Promotion Act" (2008) indicates one of the main characteristics of a robot as its mechanical nature upon defining the concept of a robot, namely as a mechanical device that perceives the external environment for itself, distinguishes between circumstances and moves voluntarily (Article 2.1 of the Law). At the same time, clause 1 of the European Parliament resolution "Report with recommendations to the Commission on Civil law Rules on Robotics" (2017) emphasises that the following characteristics are necessary to qualify a certain device as a smart robot:

(1) Ability to become autonomous using sensors and/or exchange data with the environment, the ability to exchange this data and analyse it;
(2) Ability to self-learn based on experience gained and interaction (optional criterion);
(3) Presence of at least minimal physical support;
(4) Ability to adapt actions and behaviour according to environmental conditions;
(5) Absence of life from a biological standpoint.

Considering the above-mentioned scientific opinions and legislative provisions in terms of understanding the robot as an object of civil legal relations, the robot has 4 main components (features): materiality, intelligence, functionality, and autonomy.

Materiality. A robot is an object of the material world, a device created by human intelligent/manual labour, and not by nature. The materiality of the robot on the one hand allows considering it as a thing, on the other hand, the absence of life in the robot from a biological standpoint excludes the possibility of qualifying it as a person – an individual (subject of civil legal relations), and as an animal – an object of civil legal relations.

Intelligence. The intelligent component of the robot ensures that the latter performs all actions according to its functionality. The intelligent attribute of the robot is software, artificial intelligence, which in their unity form the "digital (electronic) brain" of the robot. It is the intelligent component of a robot that transforms it from a simple thing – an object of the material world – into a robot as an independent object in the system of objects of civil legal relations. The basic abilities of a robot are laid down (programmed) by a person according to its functionality. Thanks to artificial intelligence, which can be a component of the robot's "digital (electronic) brain", it can be programmed for self-study, considering the principles of ethics for robotics, which can ensure its functional self-improvement (BAPIYEV et al., 2021). In terms of artificial intelligence as a component of the "digital (electronic) brain" of the robot, artificial intelligence is an independent object of civil legal relations, and as a result of intellectual (creative) human activity, it is an object of intellectual property rights. From the standpoint of material features, "the difference between a robot and artificial intelligence is that artificial intelligence does not require physical form, and robots can be represented in forms of distinctive designs" (LARSON, 2010; BUIL et al., 2015).

Functionality. The functionality of a robot should be understood as a set of features that the robot can perform. The developer determines the functionality of the robot according to the needs of the scope of application of the corresponding robot. The robot can be equipped with one function or several (a combination of them). In a robot, functionality can be "physical" and/or "intelligent". Physical functionality lies in performing physically active actions in space – moving (walking, running, jumping, flying, etc.), transporting, or performing other actions with objects according to the established task. At the same time, intelligent functionality can include speaking, counting, learning, analysing, decision-making, etc.

Autonomy. The autonomy of a robot should be considered as the ability of a robot to perform its functional component independently, without external

interference. The robot's autonomy depends on two factors. First, the level of autonomy of the robot depends on the level of its intelligence component, since it activates the functionality component of the robot and thereby ensures its independent performance of certain actions. The second factor of robot autonomy depends on the level of human intervention in the robot's activity when the robot performs certain actions that make up its functional component. The level of human intervention that makes up the second factor of robot autonomy is majestic relative and is directly dependent and proportional to the first factor. Since engineers, programmers, and other specialists involved in the development of robotics face a considerable number of extremely complex problems that need to be solved for maximum autonomous operation of a robot that worked efficiently and would ensure the achievement of the goal in a particular field of robotics use. Thus, the robot is an object of the material world (device), which, depending on the level of autonomy and intelligence components, can perform the functions laid down by the developer according to the scope of application.

CIVIL LAW REGIME OF ROBOTS IN MODERN LEGAL REGULATION

Considering the civil law regime of robots in modern legal regulation, it can be compared with the legal status of slaves in the Roman state. Modern robots that are used in production, in human life support and other spheres of public life have a similar purpose as a slave in Rome. The main principle underlying the legal status of a slave was servi res sunt (slave – thing) (NOVITSKII, 2008). The slave was a thing that could speak. The only difference between a slave and an ox or mule was that they were an "instrument that speaks" (instrumentum vocale) (CHERNILOVSKIY, 1991). Robots are objects of the material world, i.e., de facto – things, but the combination of the above features that describe a robot as an object of civil legal relations gives grounds, de jure, to consider the robot along with things and other objects-goods as an independent object in the system of objects of civil legal relations. At the same time, the current level of development of robotics does not indicate the need to create an entirely new, special civil law regulatory regime for them as objects. The set of legal tools already formed in the legislation, which form the civil law regime of things, can be extended to robots, which is more than sufficient to ensure their effective civil law turnover for the next several decades (ELENEY et al., 2022; NASS et al., 2021). However, this does not exclude the addition of certain special provisions to the current civil legislation in the legal regulation of robotics (e.g., in the field of liability for damage caused by a robot to a person or their property).

A separate aspect of the civil law regime of robots that requires attention is the issue of liability for damage caused by the robot to a person or their property. Being an object of civil legal relations, a robot cannot be held liable for damage caused to a person or property, since the responsibility is borne by the subject of civil legal relations, and not by the object. Accordingly, it can be assumed that the subject of liability for damage caused by the robot may be the owner of the robot or its manufacturer (developer), etc. In this case, the resolution of the European Parliament "Report with recommendations to the Commission on Civil law Rules on Robotics" (2017) identifies two approaches to liability for damage caused by a robot:

(1) Objective liability, wherein it is necessary to prove the damage caused and the causal relationship between the functioning of the robot and the damage caused;
(2) Risk management, when responsibility is assigned to the person who should have minimised risks and consider negative consequences.

Considering that the robot is essentially a mobile thing and guided by the provisions of the Civil Code of Ukraine (2003), on compensation for damage caused by defects in goods, works and the Law of Ukraine No. 3390-VI "On liability for damage caused by product defects" (2011), it can be stated that in Ukraine, as a general rule, the first approach is laid down – the objective responsibility of the manufacturer (developer). And today, if harm is caused by a robot in Ukraine, the manufacturer (developer) will be held responsible. However, since the robot is not just an object of the material world, the choice of the approach of liability for damage caused by the robot is not sufficiently unambiguous towards the responsibility of the manufacturer (developer).

Quite striking in this regard will be the example of the use of robotics in the field of medicine. At the end of January 2022, Johns Hopkins University published information that for the first time in the world, the STAR (Smart Tissue Autonomous Robot) performed laparoscopic surgery without human assistance (GRAHAM, 2022). The STAR robot performed the procedure on animals, which requires the surgeon to apply stitches with high accuracy and consistency. A unique feature of the STAR is that it is the first robotic system that plans, adapts, and performs a surgical plan in human soft tissues. In this case, an autonomous robot in surgical intervention acted as a high-precision tool that substituted the hands of a human surgeon in terms of applying high-precision and consistent sutures to soft tissues (DE PAGTER, 2021).

Without detracting from advances in technology and artificial intelligence, carrying out such an operation would not be without human

participation, namely making a diagnosis, preparing for surgery, administering anaesthesia, monitoring vital signs during the operation, and most importantly quality control of the work performed by the robot on suturing soft tissues and stating the success of the surgical intervention by the human doctor. Ultimately, the surgeon who performed the operation using an autonomous robot is responsible for the quality of the operation as a whole and is obliged to assess all risks when performing such a surgical intervention using an autonomous robot as an instrument. If a patient dies during such an intervention using an autonomous robot, then when determining who should bear responsibility (manufacturer (developer) of the robot or a surgeon) the degree of autonomy of the robot, the quality of the work performed by it (considering its technological capabilities in this situation) and the actions of the doctor, who was generally responsible for such a surgical intervention, regarding its taking all sufficient, in this situation, measures according to medical instructions. Only after evaluating these two circumstances can one determine the degree of guilt of the manufacturer (developer) of the robot and the surgeon, and accordingly the amount of responsibility or lack thereof.

Another illustrative example that indicates that a risk management liability approach to robot harm should be considered when using robotics occurred in the United States. With the widespread advent of autopiloted cars, accidents involving such vehicles have become more frequent in the United States. The very first high-profile case was in December 2019 with 27-year-old driver Kevin George Aziz Riad in the Los Angeles suburb of Gardena. He was driving at high speed in a Tesla Model S car using autopilot, left the freeway, ran a red light, and crashed into a Honda Civic at the intersection. Two people who were in the Civic died at the scene. Riad was charged with manslaughter, although he denied his guilt, since the car was not driven by him, but by autopilot. Tesla, in this case, stated that autopilot and the more complex “full self-driving” system cannot control the car independently, and that drivers must be careful and ready to respond at any time, as indicated in the instructions (KRISHER and DAZIO, 2022). In this case, as with the robot surgeon, autopilot is a tool (assistant) for more comfortable and safe driving, and not a full-fledged driver. The absence of the driver's fault, in this case, could only be said if there were defects in the autopilot, which clearly could have caused the accident, and the driver, with all caution, could not prevent it (O'SULLIVAN et al., 2019).

Therefore, when it comes to liability for damage caused by a robot, it is considered that the approach of risk management is more correct than objective liability. When considering the issue of liability for damage caused by a robot, one cannot fail to pay attention to the conditionally third alternative approach of liability, according to which the robot is given the status of a subject – a legal or

electronic entity. Giving the robot the status of a subject suggests its tort status, and accordingly the ability of the robot to independently bear responsibility for the damage caused (LI et al., 2022). This, in turn, will eliminate such a problem as the difficulty of determining the presence of guilt and its degree in relation to the manufacturer (developer) and the owner of the robot. This approach is most beneficial for the manufacturer (developer) of robots, since it factually exempts them from liability for damage caused by the robot. One of the key issues of civil liability of the robot as a subject is the availability of property, at the expense of which compensation for the damage caused will be carried out. Evidently, the robot itself does not possess property as such.

Appropriate legal structures are required to ensure that the robot has such a property component. There are several solutions in this aspect: robot's civil liability insurance; creation of a financial fund, into which a certain percentage of the amount will be deducted when purchasing a robot (e.g., according to the principle of how value-added tax is paid when buying goods), which can later serve as a source of compensation for damages. However, despite some positive aspects of this approach for certain participants in civil legal relations, this approach is currently at least premature and impractical. Since the introduction of robots into the status of a subject will complicate their civil law turnover, the question arises whether a subject can be an object of turnover.

CONCLUSIONS

This scientific study suggests that an autonomous robot is an independent object of civil legal relations in the system of objects and is described by four key features: materiality, intelligence, functionality, and autonomy. Considering the legal nature of the robot as an object of civil legal relations, first of all its materiality, it allows introducing a regime of things regarding the legal regulation of robotics relations. This does not exclude the existence of special legislation exclusively for autonomous robots, which will determine the specific features of certain aspects of legal regulation. Furthermore, the available legal structures of civil liability in civil law are quite competitive in the approach of liability of the robot as a subject, formed doctrinally and worked out in law enforcement.

Liability for damage caused by the robot to a person or their property should be assigned to the manufacturer (developer) or owner of the robot. An analysis of the two approaches of objective responsibility and risk management suggests that the approach of responsibility of risk management is fairer. At the same time, giving the robot the status of a subject of law and assigning responsibility to the robot is not relevant, since the available well-established structures are quite effective and worked out in practice. Despite everything,

regardless of what difficulties legal science currently faces in legal regulation of robotics relations, the introduction of effective legal regulatory mechanisms is an inevitable process, since this is required by the present, and all the shortcomings and gaps of legal structures that will sometimes be identified in practice can be eliminated in the future.

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Contact:
Universidade de Brasília - Faculdade de Direito - Núcleo de Direito Setorial e Regulatório
Campus Universitário de Brasília
Brasília, DF, CEP 70919-970
Caixa Postal 04413

Phone: +55(61)3107-2683/2688

E-mail: getel@unb.br

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