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International law and the problem of “legitimacy of purpose” in the context of the use of artificial intelligence in armed conflict

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Abstract

This article's purpose was to examine artificial intelligence's (AI) military applications, analysing its current state and compliance with humanitarian law using dialectical and comparative-legal methods. The study assessed AI's validity in military use, focusing on lethal autonomous weapons and their legal regulation across nations. The study addressed ethical dilemmas, including differentiating legitimate military targets from civilians and the necessity for new legal frameworks. The findings underscored the essential function of IHL principles, advocating for improved legislative frameworks to guarantee that AI systems comply with humanitarian standards and reduce dangers in armed conflict.

Keywords

military target – international humanitarian law – autonomous weapons systems – combatant – lethal weapons systems

Introduction

The development and deployment of artificial intelligence (AI) technologies have both improved the quality of life and many aspects of it, but they have also raised a number of challenges and questions that affect the basic principles of humanity's existence. While AI has brought benefits in health care, education, energy consumption, and other areas, there are increasing risks associated with its use and the way AI is regulated and managed. Especially, such is seen in the military sphere, given its ability to influence the nature of warfare. Already now, several experts say that it is AI technologies that can change the course and history of any war and therefore will affect the security of mankind on a global scale.

Despite the disagreements and debates regarding AI technologies, the fact that AI is already widespread is undeniable. Search engines in the online space, voice assistants, and personalised recommendations on platforms such as Amazon and Netflix have long been applying AI technologies. These broad capabilities and advantages make their use in the defence sector and thus military applications inevitable. The use of artificial intelligence is not only an indicator of dramatic changes and developments in national security, defence, military medicine, intelligence, counter-intelligence, and military logistics but also access to performing missions more efficiently and qualitatively, moreover, without the use of the human factor. Today, every modern government of any country sets itself the task of implementing AI technologies in order to increase the potential of the Armed Forces.[1], [2] The introduction and application of AI algorithms is significantly changing military affairs, demanding new approaches to strategy and defence. However, despite the presence of a certain range of systems with AI elements in service in most countries of the world, there is an acute issue with their legal regulation and harmonisation with IHL norms.

Given the high dynamics of the introduction and development of AI, the response of the international community to the need for legal regulation of this sphere requires extreme flexibility and speed. The legal framework must be able to quickly adapt to the rapidly changing environment while continuously ensuring the normal functioning of AI in accordance with high ethical standards and full respect for human rights. Although AI is undeniably a crucial asset in military operations, its prospective application, especially regarding lethal autonomous weapon systems (LAWS), raises unanswered concerns. Two experts have expressed divergent viewpoints on the issue.

Professor V. Koziulin contends that AI possesses the capacity to transform combat by rendering it "bloodless" and reducing civilian casualties. V. Koziulin asserts that AI technology may be engineered to guarantee rigorous conformity with the principles of international humanitarian law (IHL), therefore diminishing the likelihood of inadvertent civilian fatalities and upholding ethical standards in warfare.[3] He anticipates a future in which AI can accurately differentiate between authorised military targets and civilian objects, facilitating combat that is both more efficient and kinder. V. Koziulin's stance is predicated on the belief that AI will advance to a degree of complexity enabling it to function within the parameters of IHL without substantial blunders or ethical conflicts.

1 E. Xhafka, D. Sinoimeri and J. Teta, 'Evaluating the Impact of E-Governance on Public Service Improvement in Albania: A Quantitative Analysis', in Sustainability (Switzerland), 2024, vol. 16, no. 24, p. 10896.

2 Z. Avtalion, I. Aviv, I. Hadar, G. Luria and O. Bar-Gil, 'Digital Infrastructure as a New Organizational Digital Climate Dimension', in Applied Sciences (Switzerland), 2024, vol. 14, no. 19, p. 8592.

3 International Committee of the Red Cross, The impact of artificial intelligence on armed conflicts: Expert opinions, 2019. Retrieved 10 February 2025, https://www.icrc.org/ru/document/vliyanie-iskusstvennogo-intellekta-na-vooruzhennye-konflikty-mneniya-ekspertov

Conversely, professor N.K. Modirzadeh underscores the significant ramifications of AI on the essence of combat.[4] He contends that the use of AI technology might transform the trajectory of certain battles and fundamentally redefine the nature of military participation. N.K. Modirzadeh argues that the intricacy and unpredictability of combat render it imprudent to delegate life-and-death choices to AI. He proposes that prior to the integration of AI systems into military operations, a comprehensive examination of their possible hazards is essential, particularly regarding the possibility of undermining the norms of proportionality and distinction, which are fundamental to International Humanitarian Law (IHL). N.K. Modirzadeh's perspective is grounded in the apprehension that AI's deficiency in human judgement and its incapacity to comprehend the nuances of battle may result in disastrous consequences, including breaches of human rights and international law. The dispute between V. Koziulin and N.K. Modirzadeh arises from their divergent ideas of AI's capabilities and its function in combat. V. Koziulin thinks that technology improvements will allow AI to operate with the accuracy and ethical clarity mandated by IHL, whereas N.K. Modirzadeh expresses scepticism over AI's capacity to completely grasp the intricacies of human judgement and legal reasoning in conflict situations. These contrasting viewpoints establish the foundation for a thorough analysis of AI's function in combat and the necessity for legal structures to regulate its use.

Studies in the field of military use of AI have been conducted by various scholars and researchers. M. Kurmangali[5] focuses in his study on analysing the international legal framework for the regulation of AI, highlighting the problems associated with the lack of a single international instrument. Q. Li and D. Xie[6] conducted research on the legal regulation of the use of AI technologies, especially for military purposes, and emphasized the importance of compliance of such systems with international humanitarian law and the need to apply these rules to AI-based weapon systems. Opinion N. Patsuriya[7] is that AI can become a key tool in ensuring the national security and defence capability of any country, provided that ethical and legal standards are strictly observed. Z.U. Tlembaeva[8] studied the national strategies of Korea, USA, Japan, Kazakhstan, and EU countries in this area, but the main idea is the need to establish global standards for AI regulation. S. Ayapova[9] investigated the issue of AI directly in the context of journalism, but also touched upon the issue of its regulation in the legal dimension.

AI is already widely used for military purposes, including on the battlefield. However, there is a need to address such issues as the regulation of its use in war, and directly through the spectrum of IHL norms, including the regulation of the specifics of its implementation and use, as well as the issue of liability for violations of IHL in the use of AI. In this regard, the main objective of this study was to analyse the phenomenon of artificial intelligence in the context of its application in military situations and on the battlefield during armed conflicts. Within the framework of this goal, the following tasks were considered:

4 Ibid.

5 M. Kurmangali, International legal framework for regulation of artificial intelligence: Challenges and prospects, 2023. Retrieved 26 February 2025, https://online.zakon.kz/Document/?doc_id=37118334&pos=78;-48#pos=78;-48

6 Q. Li and D. Xie, Legal regulation of AI weapons under international humanitarian law: A Chinese perspective, 2019. Retrieved 3 February 2025, https://blogs.icrc.org/law-and-policy/2019/05/02/ai-weapon-ihl-legal-regulation-chinese-perspective/

7 N. Patsuriya, Implementation of artificial intelligence technologies in ensuring national security and defense capacity of Ukraine: Problems and prospects of the post-war period, 2023. Retrieved 15 February 2025, https://coordynata.com.ua/vprovadzenna-tehnologij-stucnogo-intelektu-u-zabezpecenna-nacionalnoi-bezpeki-ta-oboronozdatnosti-ukraini-problemi-ta-perspektivi-povoennogo-periodu

8 Z.U. Tlembaeva, 'On some issues of legal regulation of the use of artificial intelligence technology in the context of digital transformation', in Proceedings of Voronezh State University. Series: Law, 2021, vol. 4, no. 47, pp. 331-349.

9 S. Ayapova, 'Foreign and Kazakh media on the use of artificial intelligence in journalism', in Bulletin of Al-Farabi Kazakh National University, 60(2), 2021, pp. 95-104.

studying the basic principles of IHL and the possibility of their integration into the sphere of AI application; assessing the current state of AI use in the military sphere; analysing the legal regulation of AI application at the international and national levels; and, finally, formulating recommendations for improving the legal regulation of AI use for military purposes, taking into account compliance with IHL norms.

Materials and Methods

In the process of research, the following general and special methods and techniques of scientific cognition were used, among which the dialectical method, the method of synthesis and analysis, and the comparative legal method prevail. This research provides a detailed study and analysis of the phenomenon of artificial intelligence and its application in the military sphere, as well as the study of the legality of its use in the course of an armed conflict, taking into account the application and observance of the principles of IHL. This research also analyses the current state of development of this area in the context of international practice and the current normative-legal regulation of this issue. The dialectical method in the course of this research allowed studying the essence of the phenomenon of artificial intelligence, its features, especially in the context of its application in the military sphere, as well as in the sphere of national security and defence. It is about the study of the application of artificial intelligence technologies, their introduction and development in military operations, and the defence sector in the global community.

The study also used the comparative-legal method to analyse the strategies of artificial intelligence development in different countries and its application in the military sector and studied the stages of introduction and use of artificial intelligence in military conflicts. This method made it possible to assess the scale of the use of weapons with artificial intelligence and to study its role in modern wars. On the basis of the study, changes in international legislation were proposed to regulate the use of artificial intelligence at the global level, using the modelling method. Furthermore, a comparative characterisation of the principles of international humanitarian law and the principles applicable to the use of artificial intelligence in military operations was carried out. This study helped to gain a broad understanding of the state of development of artificial intelligence in the world and its role in the military sphere, as well as to propose specific measures for its regulation and compliance with the principles of humanitarian law.

Using a formal-legal method, the category of artificial intelligence was analysed in depth, and the technologies included in the spectrum of AI-enabled weapons were investigated. This method also allowed the structure and characteristics of these technologies to be explored. Additionally, within the formal-legal method, the principles of international humanitarian law and their essence were examined and analysed in detail. The method of hermeneutics contributed to the study and research of the definition of artificial intelligence, as well as the weaponisation of AI. Also, thanks to this method, all the concepts necessary for the research of this topic were studied.

The materials used in this research include scientific works by both national, post-Soviet, and foreign scholars and practitioners. Additionally, the study took into account the following legal and regulatory framework: DoD directive 3000.09 “Autonomy in Weapon Systems”,[10] DoD Digital Modernization Strategy,[11] Geneva Convention

10 DoD directive 3000.09 “Autonomy in Weapon Systems”, 2023. Retrieved 21 February 2025, https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodd/300009p.pdf

11 DoD Digital Modernization Strategy, 2019. Retrieved 16 February 2025, https://media.defense.gov/2019/Jul/12/2002156622/-1/-1/1/DOD-DIGITAL-MODERNIZATION-STRATEGY-2019.PDF

of 12 August 1949 for the Protection of Civilian Persons in Time of War,[12] as well as Decree of the President of the Republic of Kazakhstan No. 674 "On approval of the Concept of legal policy of the Republic of Kazakhstan until 2030".[13] The paper defines the relevance of the study, identifies the problem, formulates the goal, and outlines the methods that contribute to the results.

Results and Discussion

Historically, military conflict has consistently influenced social and political transformation. The issues presented by these conflicts, especially in governing developing technology like AI, underscore the intricacies of guaranteeing their ethical and legal use in wars. Today's way of coexistence is no different from the past, except for the technological process, which suggests that military conflicts in the future are inevitable. However, given the development of scientific technology and the technological leap of mankind, the nature of future wars is rather determined not so much by geopolitical conditions as by scientific progress in both weapons development and troop management.[14] Today, one of the advanced and most important technologies that every government is seeking to introduce into their country's defence complex is artificial intelligence technology. For example, the DoD Digital Modernization Strategy[15] says that the use of artificial intelligence will change society and the nature of warfare in general. According to the Stanford University Artificial Intelligence Index Report[16] research analysis, most nations have already developed and implemented national artificial intelligence strategies, which can be divided into several main groups:[17]

1. Strategies that are more declarative in nature and exist in a formalised form and include the basic goals of the country regarding the introduction of AI technologies in certain spheres of social activity. These include such goals as creating a resilient economy, developing research activities, improving education through artificial intelligence, introducing AI in logistics, and ensuring the development of AI with a human-centred approach (Bulgaria, Austria, Hungary, Finland, Israel, Australia, and Switzerland).

2. Strategies with a pragmatic approach, in which the real needs of the state are incorporated and separate unique tasks and goals of AI development are formed. These strategies include analyses of global trends in the development of artificial intelligence and set the goal of concentrating political actions related to this technology. Luxembourg, Malta, Lithuania are among the countries actively applying such strategies.

3. Realistic strategies for the development of artificial intelligence are distinguished by in-depth analyses of both the scope of its application and the needs for its development. They include detailed plans and tasks and are orientated towards public authorities and scientific enterprises for effective implementation of the strategy. Examples of such a strategy are Saudi Arabia, China, the USA, and Serbia.

12 Geneva Convention of 12 August 1949 for the Protection of Civilian Persons in Time of War, 1949. Retrieved 19 February 2025, https://www.un.org/ru/documents/decl_conv/conventions/geneva_civilian_1.shtml

13 Decree of the President of the Republic of Kazakhstan No. 674 "On approval of the Concept of legal policy of the Republic of Kazakhstan until 2030", 2021. Retrieved 9 February 2025, https://adilet.zan.kz/rus/docs/U2100000674

14 L. Kuznetsova, V. Kuznetsov and O. Matiushenko, 'Peculiarities of legal assessment of aiding and abetting the aggressor state: National and international dimensions', in Law Journal of the National Academy of Internal Affairs, 2024, vol. 14, no. 2, pp. 41-51.

15 DoD Digital Modernization Strategy, 2019. Retrieved 16 February 2025, https://media.defense.gov/2019/Jul/12/2002156622/-1/-1/1/DOD-DIGITAL-MODERNIZATION-STRATEGY-2019.PDF

16 Artificial Intelligence Index Report, 2022. Retrieved 17 February 2025, https://aiindex.stanford.edu/wp-content/

17 O. Kostenko, 'Analysis of national strategies for the development of artificial intelligence', in Information and Law, 2022, vol. 2, no. 41, pp. 58-69.

Artificial intelligence has been successfully integrated into various spheres of life in many nations, including financial systems and navigation maps, which has become a common reality.[18] In the modern era of the fourth industrial revolution, based on advanced technologies, the emergence of a new type of industrial production, orientated towards the use of big data, automation and computer algorithms, has been observed. However, fundamental questions arise regarding the application of artificial intelligence in areas where errors are unacceptable. These areas include military conflict and national security. Thus, despite the existence of strategies, there is a need for legal regulation of the use of artificial intelligence, especially in the context of military operations. For a more in-depth study of this problem, it is necessary to start by analysing the essence of artificial intelligence and its implementation in the mentioned areas, based on international experience and best practices in this field. The concept of artificial intelligence is multifaceted and is often used in a generalised way to characterise the work of computer algorithms in solving a particular task. The first definition of the concept was proposed by J. McCarthy in 1956 and defined as the science and technique of creating intelligent machines, in particular intelligent programmes.[19] B. Copeland[20] defines artificial intelligence as the ability of a digital computer or a computer-controlled robot to perform tasks peculiar to intelligent beings. Modern researchers propose the following definition of AI, namely as a branch of computer science which aims to develop tools that are able to solve intellectual tasks through human-computer interaction in a limited language.[21]

Artificial intelligence is systems and machines that can make decisions and perform tasks more efficiently than humans.[22] Everyday life sees examples of artificial intelligence, such as chatbots, spam filters and recommendation algorithms that improve people's quality of life. In the context of warfare, artificial intelligence is used in lethal Autonomous Weapon Systems (AWS), cyber-attack software, drones and various military robots.[23], [24] Artificial intelligence is being used to perform both unarmed functions and to detect, target, and even perform lethal operations without direct human involvement.[25] However, with the increasing use of artificial intelligence in military operations, questions are being raised about the ethical aspects of its use. One such aspect is the compliance of the use of artificial intelligence with the norms of international humanitarian law in its application in military conflicts. In order to investigate this problem, it is initially necessary to analyse the current state of implementation of artificial intelligence in the military sphere, based on international experience and practice.

18 A. Kireyeva, A. Nurbatsin, A. Yessentay, N. Bagayeva and S. Turdalina, 'Exploring determinants of innovation potential of enterprises in Kazakhstan', in Problems and Perspectives in Management, 2021, vol. 19, no. 2, pp. 433-443.

19 O. Baranov, 'The Internet of Things and law: Looking to the future', in Materials of the 3rd Scientific and Practical Conference "Internet of Things: Problems of Legal Regulation and Implementation, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute", Kyiv, 2017, pp. 8-13.

20 B. Copeland, Artificial intelligence, 2023. Retrieved 9 February 2025, https://www.britannica.com/technology/artificial-intelligence

21 O.S. Bulgakova, V.V. Zosimov, V.O. Pozdeev, Methods and Systems of Artificial Intelligence: Theory and Practice, OLDI-PLUS, Kherson, 2020.

22 J. Borana, 'Applications of artificial intelligence & associated technologies', in Proceedings of the International Conference on Emerging Technologies in Engineering, Biomedical, Management and Science, ETEBMS, London, 2016, pp. 64-67.

23 S. Yevseiev, R. Hryshchuk, K. Molodetska, M. Nazarkevych, V. Hrytsyk, O. Milov, et al., 'Modeling of security systems for critical infrastructure facilities', Technology Center, Kharkiv, 2022.

24 B.R. Rexhepi, B.I. Berisha and B.S. Xhaferi, 'Analysis of the Impact of the War on the Economic State of Agriculture in Ukraine', in Economic Affairs (New Delhi), 2023, vol. 68, pp. 839-844.

25 I. Aviv, M. Leiba, H. Rika and Y. Shani, 'The Impact of ChatGPT on Students' Learning Programming Languages', in Learning and Collaboration Technologies. HCII 2024. Lecture Notes in Computer Science, Springer, Cham, 2024, p. 14724.

Artificial intelligence technologies have long been in service in some countries.[26] An example is the use of trajectory-corrected missiles, which, although guided by operators from afar, still use artificial intelligence to optimise and correct the flight in real time. Unmanned Aerial Vehicles (UAVs), which are already widely used in modern armed conflicts, are also one of the results of the development of artificial intelligence.[27], [28] However, due to the direct connection of such vehicles with the operator who partially controls them, and consequently the effectiveness of such devices, there are discussions about the exclusion of humans (operators) from the control loop of the system and the creation of such weapon systems that would be fully controlled by AI. Such ideas are not unequivocally perceived by the international community, so the UN and the International Committee of the Red Cross (ICRC) are studying the problems of using such systems, especially in the context of their compliance with IHL norms. From a technical perspective, such systems should have the ability to independently select and attack targets. As mentioned earlier, such weapons equipped with artificial intelligence and capable of acting autonomously are called lethal autonomous weapon systems (LAWS). According to the ICRC, LAWS are weapons capable of selecting targets, detecting and tracking them, and then attacking them on their own, without operator input. However, the question of whether fully autonomous weapon systems should be used on the battlefield in the future remains controversial, as they are devoid of human intervention, and the question of compliance with international humanitarian law in their use remains unresolved. Consequently, one of the key challenges that needs to be addressed for the full implementation of artificial intelligence in the military sphere is to ensure that artificial intelligence technologies comply with international humanitarian law. Autonomous weapon systems are platforms that are capable of operating without direct human control, using solely artificial intelligence algorithms to find and identify targets.[29], [30] The most well-known examples of this technology are drones, which the US actively uses for reconnaissance as well as targeted strikes in conflict zones.[31]

The advantages of using autonomous weapons are enormous. Firstly, by eliminating the human operator from the process chain, these systems significantly reduce the risks to the military personnel themselves, allowing them to use missions in dangerous or inaccessible locations, including the territory of a potential military enemy.[32] The most prominent examples of the use of unmanned aerial vehicles (drones) are their use in the Syrian conflict in February 2019 to attack terrorist targets and during the Nagorno-Karabakh conflict in 2020, where Azerbaijan and Armenia used drones extensively for both attacks and reconnaissance operations.

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26 M. Kurmangali, International legal framework for regulation of artificial intelligence: Challenges and prospects, 2023. Retrieved 26 February 2025, https://online.zakon.kz/Document/?doc_id=37118334&pos=78;-48#pos=78;-48

27 I. Bodi, E. Piperi, E. Xhafka, J. Teta and M. Kosta, 'Role of Industry 4.0 in Albanian Industry Transformation: An Integrated Understanding of Industry 4.0', in Lecture Notes in Networks and Systems, 2021, vol. 233, pp. 251-259.

28 R. Shults and A. Annenkov, 'BIM and UAV photogrammetry for spatial structures sustainability inventory', in International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives, 2023, vol. 48, no. 5/W2-2023, pp. 99-104.

29 F. G. Alzhanova, A.A. Kireyeva, Z.T. Satpayeva, A.A. Tsoy and A. Nurbatsin, 'Analysis of the Level of Technological Development and Digital Readiness of Scientific-Research Institutes', in Journal of Asian Finance, Economics and Business, 2020, vol. 7, no. 123, pp. 1133-1147.

30 I. N. Bondarenko, Yu.S. Vasiliev, A.S. Zhizhiriy and A.L. Ishenko, 'Arrangement device for monitoring of parameters of microwave resonators', in KpbiMuKo 2010 CriMiCo - 2010 20th International Crimean Conference Microwave and Telecommunication Technology, Conference Proceedings, IEEE Computer Society, 2010, pp. 969-970.

31 AI Principles: Recommendations on the ethical use of artificial intelligence by the Department of Defence, 2019. Retrieved 15 February 2025, https://govwhitepapers.com/whitepapers/ai-principles-recommendations-on-the-ethical-use-of-artificial-intelligence-by-the-department-of-defense

32 D. Lewis, 'International legal regulation of the employment of artificial-intelligence-related technologies in armed conflict', in Moscow Journal of International Law, 2020, vol. 2, pp. 53-64.

Drones were also heavily used by armed groups in Libya in 2020, and in January 2020 Iran used them to attack military bases in Iraq. The conflict in Nagorno-Karabakh continued into 2021, and drones remained an important component of combat operations. These examples demonstrate the significant impact of drones on modern armed conflicts and national security operations. Another advantage is the speed of such platforms, which are able to operate much more quickly, efficiently, and accurately than human resources, giving them a military advantage in combat. However, with the high accuracy and efficiency of artificial intelligence applications, an important challenge is determining the legitimacy of target selection and the ability of artificial intelligence to distinguish between a civilian and a combatant. The main difficulty is that from an external perspective, they may be virtually indistinguishable, which can lead to serious violations of international humanitarian law.

Opinion and perception of the content of lethal automatic systems differ not only in the works of scientific experts but also in the positions of states. Belgium, for example, considers such systems to be fully autonomous from humans at any stage, while France speaks of the existence of such systems only in the future, in the mechanism of action of which there will be a complete absence of human control, taking into account the fact that nowadays there is still a factor of human control even in weapon systems with the use of AI. Germany takes a similar view and says that remotely controlled automatic systems, such as charges that detonate after a predetermined time, automated missile defence systems, and navigation and reconnaissance systems, cannot be considered LAWS. The Dutch position centres on the fact that such systems are weapons that operate according to algorithms and human will but without human intervention and without the ability to stop the process once it has started.[33]

Considering all of the above, it is worth concluding that the main characteristic of such systems is precisely their autonomy. However, autonomy does not imply the presence of free will as in humans, on the contrary, the autonomy of such systems is realised only due to certain algorithms and by the will of the person, but without his participation in the process. This is why some scientists do not see a problem in using such AI systems on the battlefield, as they believe that the control over the use of force is still in the hands of humans.[34] However, issues related to so-called “bias” and errors, as well as determining the legitimacy of target selection and the legality of attacking that target, remain outside the scientific debate.

Lethal Autonomous Weapon Systems (LAWS) are not the only application of artificial intelligence technology on the battlefield, but they are the most debated, given their autonomy from humans.[35] Artificial intelligence can also be used for non-lethal functions, such as systems that collect and analyse data from on-board sensors to predict engine failures. There are many artificial intelligence developments and programmes that are already being actively deployed in the military, but they are not relevant to LAWS. In 2016, the United States announced the creation of the Alpha computer program, which makes it possible to control the flight

33 M. Clegg, Robotic revolution: Does artificial intelligence and autonomous weapon systems have a place in armed conflict?, 2022. Retrieved 5 February 2025, https://cove.army.gov.au/article/robotic-revolution

34 D. Saxon, ‘A human touch: Autonomous weapons, directive 3000.09, and the “Appropriate levels of human judgment over the use of force”‘, in Autonomous Weapons Systems: Law, Ethics, Policy, Cambridge University Press, Cambridge, pp. 185-208, 2014.

35 A. Trofymchuk, A. Stenin and I. Drozdovych, ‘Modeling of information systems of service-oriented architecture’, in 2019 International Conference on Information and Telecommunication Technologies and Radio Electronics, UkrMiCo 2019 – Proceedings, Institute of Electrical and Electronics Engineers, Odessa, 2019, p. 9165416.

of a fighter jet and defeat the enemy in the air through virtual combat.[36] That is, thanks to this program, the US Air Force is able to identify the enemy on radar, conduct an aerial battle, and defeat them with missiles. Another breakthrough in the field of AI was the creation of the Atlas virtual assistant for use by ground forces, specifically within the crews of tanks and combat vehicles.[37] With it, it can detect targets that have gone unseen by humans, as well as assess their danger and aim the gun at the target, but it is left up to the operator to destroy the target.

For the purposes of the United States Navy, the Aegis system is actively used, which allows receiving and processing information from ships as well as aircraft. In this case, the system is programmed to issue instructions on the launch of missile launchers, although the decision on the launch itself is made by a person but with the possibility of setting the programme to hit the target in automatic mode. AI-enabled lethal combat weapons are installed on Navy ships, and the decision to use them is made remotely, not in the field. In fact, the US Department of Defence is using or developing well over six hundred AI programs, with AI funding reaching $874 million in 2022. And a key goal of the US government is to integrate AI algorithms into military hardware production.[38] China is also actively developing weapons using AI in its defence industry. Thus, according to statistics, China spends more than $1.6 billion per year on systems with AI technologies, excluding secret developments.[39] Israel is also successfully using AI technologies. For example, in May 2021, special programmes successfully targeted Hamas and Palestinian Islamic Jihad targets during the fighting in the Gaza Strip, killing numerous militants.[40]

In early 2020, the UK announced a campaign to develop the Istar's intelligence, surveillance, and targeting system on UK Armed Forces aircraft.[41] This system was built specifically on artificial intelligence algorithms that provide surveillance of land-based maritime objects as well as their movements. Such systems facilitate reconnaissance, as well as identification of objects in the process of processing video and photographic materials. Also, AI technologies are actively used in UAVs, ground vehicles, and surface and underwater vehicles.[42] The Canadian government is guided by the principles of the "Responsible Use of Artificial Intelligence", which aim to ensure that AI is used transparently and ethically.[43] These principles include do no

36 G. Reim, DARPA tests artificial intelligent dogfighting in two-versus-one simulations, 2021. Retrieved 26 February 2025, https://www.flightglobal.com/fixed-wing/darpa-testsartificial-intelligent-dogfighting-in-twoversus-one-simulations/142993.article

37 S. Freedberg, ATLAS: Killer Robot? No. Virtual Crewman? Yes, 2019. Retrieved 7 February 2025, https://breakingdefense.com/2019/03/atlas-killer-robot-no-virtual-crewman-yes/

38 Al Principles: Recommendations on the ethical use of artificial intelligence by the Department of Defence, 2019. Retrieved 15 February 2025, https://govwhitepapers.com/whitepapers/ai-principles-recommendations-on-the-ethical-use-of-artificial-intelligence-by-the-department-of-defense

39 Q. Li and D. Xie, Legal regulation of AI weapons under international humanitarian law: A Chinese perspective, 2019. Retrieved 3 February 2025, https://blogs.icrc.org/law-and-policy/2019/05/02/ai-weapon-ihl-legal-regulation-chinese-perspective/

40 A. Ahronheim, 'Israel's Operation Against Hamas Was the World's First AI War', The Jerusalem Post, 2021. Retrieved 19 February 2025, https://www.jpost.com/arab-israeli-conflict/gaza-news/guardian-of-the-walls-the-first-ai-war-669371

41 N. Patsuriya, Implementation of artificial intelligence technologies in ensuring national security and defense capacity of Ukraine: Problems and prospects of the post-war period, 2023. Retrieved 15 February 2025, https://coordynata.com.ua/vprovadzenna-tehnologij-stucnogo-intelektu-u-zabezpecenna-nacionalnoi-bezpeki-ta-oboronozdatnosti-ukraini-problemi-ta-perspektivi-povoennogo-periodu

42 P. Maxwell, Artificial intelligence is the future of warfare (just not in the way you think), 2020. Retrieved 19 February 2025, https://mwi.westpoint.edu/artificial-intelligence-future-warfare-just-not-way-think/

43 B. Marijan, *More clarity on Canada's views on military applications of artificial intelligence needed,* 2019. Retrieved 20 February 2025, https://www.ploughshares.ca/publications/more-clarity-on-canadas-views-on-military-applications-of-artificial-intelligence-needed

harm, autonomy, fairness, explainability, and beneficence. The main goal is to preserve human autonomy and human decision-making ability, even while using AI in various applications. Regarding the application of artificial intelligence in the military sphere, Canada has resorted to strict adherence to codes of military ethics that emphasise the importance of values such as integrity, courage, and loyalty. And before using artificial intelligence instead of humans to perform an operation, it is important to determine if the AI can honour these principles.[44] In 2021, the Kingdom of the United Kingdom published the Defence AI Strategy, which established goals and objectives for the development of artificial intelligence in the military, as well as requirements for the use of AI in military conflict.[45]

Israel's experience in an operation involving the identification and targeting of a network of underground tunnels used by Hamas is also important for the use of AI technologies.[46] The use of artificial intelligence in this operation allowed Israel to accurately identify and localise militants, which helped reduce civilian casualties. Thus, AI helped analyse a huge amount of data collected from various roadside and street surveillance cameras, satellites, and intercepted communications. Furthermore, Israel has made active use of AI in the context of lethal weapons. Through the use of GPS-guided autonomous submarines, the Israeli army has successfully destroyed much of the Hamas naval command's infrastructure and weaponry through missile strikes as well as drone strikes.[47]

In February 2023, the first international conference on the application of artificial intelligence in the military sphere, REAIM 23, was held in The Hague. Following the summit, all attendees, with the exception of Israel, pledged to utilise artificial intelligence in accordance with international legal principles.[48] The petition, while emphasising issues with artificial intelligence, does not address the current problems associated with its use. At present, there is no general and specialised legal regulation for the use of artificial intelligence, similar to that for cluster munitions and other weapons. However, when discussing the use of artificial intelligence, it should be considered in light of international humanitarian law and the laws of military conflict. In 2020, the NATO Military Committee adopted a doctrine recognising artificial intelligence as a key element in the development of military technology and stressing the importance of respecting the principles of international humanitarian law and human rights in its use.[49]

44 C. Currie, The evolution of war: How AI has changed military weaponry and technology, 2022. Retrieved 18 February 2025, https://montrealethics.ai/the-evolution-of-war-how-ai-has-changed-military-weaponry-and-technology/

45 Defence Artificial Intelligence Strategy, 2022. Retrieved 26 February 2025, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1082416/Defence_Artificial_Intelligence_Strategy.pdf

46 Z. Hbur, 'The possibility of adapting the Israeli experience of using artificial intelligence in military operations in the East', in Investments: Practice and Experience, 2021, vol. 12, pp. 54-61.

47 A. Ahronheim, 'Israel's Operation Against Hamas Was the World's First AI War', The Jerusalem Post, 2021. Retrieved 19 February 2025, https://www.jpost.com/arab-israeli-conflict/gaza-news/guardian-of-the-walls-the-first-ai-war-669371

48 REAIM, 2023. Retrieved 9 February 2025, Retrieved 22 February 2025, https://www.drishtiias.com/daily-updates/daily-news-analysis/reaim-2023

49 E. Christie, 'Artificial intelligence in NATO: Dynamic deployment, responsible use', in *NATO Review*, 2020. Retrieved 8 February 2025, https://www.nato.int/docu/review/ru/articles/2020/11/24/iskusstvennyj-intellekt-v-nato-dinamichnoe-vnedrenie-otvetstvennoe-ispol-zovanie/index.html; O. Taran and M. Hryha, 'Application of international humanitarian law by the European Court of Human Rights', in *Scientific Journal of the National Academy of Internal Affairs*, 2024, vol. 29, no. 2, pp. 9-17.

Another example of resolving this issue at the international level is DoD directive 3000.09 "Autonomy in Weapon Systems".[50] However, there is no single legal document that could regulate these issues. For this purpose, it is necessary to talk about adopting a new Convention on Weapons with the Application of AI Technologies, similar to the Arms Convention or the Convention on Cluster Munitions. It is within the framework of this Convention that standards for the design and programming of AI weapons in accordance with IHL principles, their use and implementation, as well as state responsibility for the production and use of weapons with a high level of autonomy, should be specified. In addition, compliance with IHL principles and human rights must be clearly stipulated. In addition, international society should work in the following directions:

1. Development of new principles for the use of AI for military purposes.

2. Implementation of effective monitoring and control systems for the use of AI in the military sphere.

3. Building relationships between government, developers, experts, and the public.

4. Continued research aimed at improving the safety of using AI on the battlefield.

5. Creation of an international forum to coordinate issues on the use of AI weapons for military purposes.

As for the position on lethal autonomous systems (LAWS), it is quite ambiguous. Experts do not call for a complete ban on such technologies, but it is clear that their emergence will change the paradigm of military operations. To date, the key role of military operations still belongs to humans, but the introduction of LAWS raises serious questions about compliance with the principles of international humanitarian law. These questions include the distinction between robot combatants and non-combatants, legitimate and illegitimate targets, and the ability to adequately assess and react to changes in the environment. One of the main issues is the feasibility of handing over full control over decisions involving the use of force to artificial intelligence. The UN Human Rights Council argues that humans should ultimately make this decision. Thus, the operator should remain in the control loop of such systems, at least to be able to control their actions. At the moment, in the absence of a special treaty on the use of LAWS, this area can be regulated by the Geneva Convention,[51] which prohibits the use of weapons, which contradicts the principle of humanity and other principles of IHL.

With regard to the legal regulation of artificial intelligence in Kazakhstan, this aspect was first identified in 2021 in the context of the Concept of Legal Policy until 2030.[52] In this context, the need to create an effective mechanism of legal regulation of AI is discussed, including issues such as determining the subject of liability for damage caused by AI, as well as resolving issues related to intellectual property rights for the creation of various types of works by AI. These two areas have become the main vectors for the development of legal work on AI issues. At the moment, the aspects of interaction between artificial intelligence and personal data protection, as well as intellectual property issues, are increasingly being worked out. However, despite the

50 DoD directive 3000.09 "Autonomy in Weapon Systems", 2023. Retrieved 21 February 2025, https://www.esd.whs.mil/portals/54/documents/dd/issuances/dodd/300009p.pdf

51 Geneva Convention of 12 August 1949 for the Protection of Civilian Persons in Time of War, 1949. Retrieved 19 February 2025, https://www.un.org/ru/documents/decl_conv/conventions/geneva_civilian_1.shtml

52 Decree of the President of the Republic of Kazakhstan No. 674 "On approval of the Concept of legal policy of the Republic of Kazakhstan until 2030", 2021. Retrieved 9 February 2025, https://adilet.zan.kz/rus/docs/U2100000674

absence of clear signs of AI use for military purposes, Kazakhstan should initially define the fundamental aspects of AI use and enshrine them in legislation. Among such aspects, the designation of AI itself and its main characteristics, issues of responsibility for the use of AI, ownership and data protection in the use of AI should be considered.[53]

The use of artificial intelligence in military operations can certainly create highly effective weapons that can potentially replace conventional weapons and even soldiers, as well as eliminate the human factor in operations.[54] In addition, the active application of AI allows for the improvement of weapon systems with the help of machine learning capabilities and AI algorithms. However, the introduction and proliferation of such technologies also raises serious discussions about the need to adapt international humanitarian law to evolving technologies and their impact on international law. The militarisation of artificial intelligence continually highlights the risks and concerns of using these technologies, as well as contributing to the debate on the ethical and legal aspects of AI's role in warfare.

International humanitarian law is indeed evolving with the emergence of new technologies, and this raises important questions about how to adapt IHL to modern technology and how to ensure that AI is consistent with the principles of IHL. There is a debate whether IHL should adapt to new technologies in order to regulate the use of AI in military operations or whether AI should conform to existing IHL norms. However, it is important to emphasise that these two approaches are not necessarily mutually exclusive. Artificial intelligence interventions in military operations must take into account the norms of IHL to ensure that the principles of humanity and the protection of human rights are respected.[55]

In order to explore this issue, it is first worth examining the basic principles of international humanitarian law, under which hostilities are actually conducted. These principles are based on the norms and customs of international law, as well as the Geneva Convention.[56] The main principles of IHL, in the context of their applicability to the use of AI in military operations, are:[57]

1. The principle of legitimacy of purpose – from which it follows that any military action must be directed exclusively against legitimate military objectives, in other words, against objects that by their purpose, position, or essence make an effective contribution to military action. These are objects such as military bases, weapons, military equipment, transport hubs, bridges, command posts, communication systems, airfields or ports, and facilities that directly or indirectly support military operations. That is, the intended target must necessarily be a military objective, but if the target is a military objective but excessive collateral damage to civilians or objects is to be expected because of its attack, such a target is

53 V. Simonova, A. Seitova and Z. Aubakir, *Legal regulation of artificial intelligence in Kazakhstan and abroad*, 2021. Retrieved 25 February 2025, https://online.zakon.kz/Document/?doc_id=32145977&pos=5;-111#pos=5;-111

54 A. Kuchansky, A. Biloshchytskyi, S. Bronin, S. Biloshchytska and Y. Andrashko, 'Use of the Fractal Analysis of Non-stationary Time Series in Mobile Foreign Exchange Trading for M-Learning', in *Advances in Intelligent Systems and Computing,* 2021, vol. 1192, pp. 950-961.

55 A. Falko, O. Gogota, R. Yermolenko and I. Kadenko, 'Analysis of LArTPC data using machine learning methods', in *Journal of Physical Studies*, 2024, vol. 28, no. 1, p. 1802.

56 Geneva Convention of 12 August 1949 for the Protection of Civilian Persons in Time of War, 1949. Retrieved 19 February 2025, https://www.un.org/ru/documents/decl_conv/conventions/geneva_civilian_1.shtml

57 How does artificial intelligence influence conflict?, 2023. Retrieved 12 February 2025, https://education.cfr.org/learn/reading/how-does-ai-influence-conflict#:~:text=Additionally%2C%20AI%20is%20used%20in,technology%20to%20identify%20enemy%20targets

not legitimate. Based on this principle, it is important to realise that despite the high efficiency and the possibility of so-called "bloodless battles", by destroying only important military and strategic targets, and in consequence capturing territory, armed systems with AI are unable to distinguish whether a target is legitimate or not. However, artificial intelligence acts solely according to algorithms and therefore lacks the ability to assess potential damage. The legitimacy of the target is one of the most important and fundamental principles of IHL, which, if respected, ensures that the risk of unintended effects on civilians as well as civilian objects is reduced. Adherence to this principle when using autonomous systems (AWS) is critical. With artificial intelligence, the development of high-performance algorithms and systems capable of accurately identifying and classifying objects in accordance with international law becomes a priority. These tasks may involve the use of advanced data processing, image analysis and machine learning techniques to identify and classify objects according to the target's legitimacy criteria. The development of such systems should be based on rigorous research and testing to ensure accuracy, reliability, and compliance with IHL principles.

2. The principle of distinction – which obliges belligerents to distinguish between civilian and belligerent objects. This principle is particularly important in the context of AI applications, as technologies must be designed to avoid unintended civilian casualties. This principle is directly related to the principle of target legitimacy. According to it, only military targets can be attacked, and facilities such as schools, hospitals, residential buildings, and social infrastructure cannot be attacked. LAWS systems lack the innate human qualities they need to make ethical decisions. In addition, one of the major problems is the inability of the program algorithm to distinguish between a combatant and a civilian. Hence, the programmability of the system to perform such a distinction is rendered impossible. In the context of using artificial intelligence, it is important to design and utilise autonomous systems in such a way that they respect the principle of differentiation. This goal can be achieved by programming the system to identify and distinguish between military and civilian objects and by establishing rules that prohibit the use of autonomous systems to attack civilian objects. The principle of distinction also implies the need to educate military personnel and users of autonomous systems on the rules and norms of international humanitarian law so that they can properly assess objectives and risks when deciding on military action. In general, respecting the principle of distinction in the use of autonomous systems will help reduce the number of civilian casualties in armed conflicts.

3. The principle of humanity aims to prevent the infliction of suffering, injury or destruction that has no military value in a conflict. Thus, the use of artificial intelligence for military purposes should take into account that autonomous systems should avoid unacceptable effects on the environment and human life. In this context, the principle of humanity requires that the design and application of autonomous systems must include measures to avoid undesirable consequences for humans and the environment. This can be achieved by programming the system in such a way that it is capable of adequately assessing the possible consequences of its actions and setting rules and restrictions on its use, taking this principle into account.

4. The principle of proportionality, according to IHL, ensures that collateral damage from military action is not disproportionate to the expected military benefit. In the context of the use of artificial intelligence, this principle requires that autonomous systems be able to objectively assess whether their actions comply with the principle of proportionality. To achieve this goal, the system must be programmed to

analyse the situation and determine which actions will be considered proportional and to set rules and limits on the use of the system to prevent excessive damage.

5. The principle of military necessity requires that military action be limited to measures necessary to achieve a legitimate military objective. In the context of the use of artificial intelligence, this principle implies that AI systems should be designed and used in accordance with it to avoid the unnecessary use of force. To enforce this principle, rules and restrictions on the use of autonomous systems must be established, ensuring that they are consistent with military objectives that can only be achieved by their use.

M. Clegg[58] suggests that IHL principles are an indicator of the possibility and right to legitimise the use of new technologies on the battlefield. Having analysed all the principles and agreeing with M. Clegg's opinion, it is worth concluding that weapons with artificial intelligence technologies should be included in the legal framework of international humanitarian law, and all norms and principles of this law should be applicable to artificial intelligence systems. The legality of the target and the distinction between military and civilian objects are the main ethical issues with such weapons. Therefore, given the inevitability of the use of artificial intelligence on the battlefield and in the military sphere in general, a strict legal framework regarding the military use of AI must be developed and adhered to.

Each state must fulfil its obligations regarding the means and methods of warfare under the Protocol to the Geneva Conventions. This implies that the responsibility for errors in the use of AI extends beyond simply adhering to the principles and conforming to the norms of IHL. The issue of liability for violations of the rules of warfare and conflict resolution is one of the key problems of international humanitarian law. If armed systems equipped with artificial intelligence are used outside the established framework or if they inadvertently cause harm to civilians or objects, the responsibility for such actions will lie with the state that uses these systems. The question of who should bear specific responsibility, whether programmers, manufacturers, or military commanders, has long been debated but still has no definitive answer. However, it is logical to assume that if the system is not fully autonomous and the initial decisions are made by the operator, then the responsibility for an error falls on the operator. Nevertheless, the possibility of technical failures in the software cannot be ruled out, especially in the context of target recognition. Faulty algorithms could lead to a situation in which an illegal target is incorrectly recognised as legitimate and a strike ensues, which could result in civilian deaths or the destruction of civilian infrastructure. On this basis, it is important to establish clear rules and restrictions for the use of such weapons, as well as to define programming parameters taking into account the basic principles of international humanitarian law, in particular the principle of legitimacy of the target, in particular:

1. Correctness of programming – is the need to develop autonomous systems taking into account the principles and norms of IHL, thus avoiding civilian casualties and civilian objects.

2. Testing and trials of systems and algorithms – to prevent harm and damage to civilians and to prevent attacks on unlawful targets. These procedures aim to ensure compliance with IHL norms and the correct functioning of artificial intelligence algorithms.

3. System Monitoring – A system for monitoring and controlling the operation of autonomous systems

58 M. Clegg, *Robotic revolution: Does artificial intelligence and autonomous weapon systems have a place in armed conflict?*, 2022. Retrieved 5 February 2025, https://cove.army.gov.au/article/robotic-revolution

by military personnel should be implemented in order to comply with IHL norms and standards.

4. Training of military personnel in IHL principles is essential when using autonomous systems. All parties involved in the use of such systems should be trained to properly assess risks and objectives when making decisions about military action. Implementing a system to regulate the use and proliferation of weapons with AI technologies can reduce the suffering and destruction of armed conflicts and facilitate a shift towards bloodless warfare tactics with minimal civilian casualties.

The growing deployment of AI in military operations prompts essential enquiries about accountability when these systems violate the principles of IHLAI systems are fundamentally developed and taught by human programmers, rendering them significant contenders for culpability in instances of IHL violations. The intricate structure of AI decision-making and the possibility of unforeseen results confound the attribution of accountability. Ethical dilemmas emerge when programmers must anticipate all possible circumstances in which AI systems may operate, especially when these systems are intended to work independently in unexpected, high-stakes contexts like armed combat. Furthermore, AI's capacity to "learn" from data may result in unforeseen implications that were not explicitly coded, complicating the prediction of all potential outcomes in military operations.

Military leaders are generally accountable for the conduct of their forces under current military law, including instances involving the use of AI systems.[59] As AI systems gain autonomy, the responsibilities of commanders in supervising AI decision-making become increasingly unclear. If AI is designed to operate autonomously or make instantaneous judgements without human oversight, military leaders may claim that they lacked the ability to affect the particular choices made by AI systems. From a legal standpoint, commanders are still obligated to guarantee that their troops, including AI-enabled systems, adhere to IHL. The ethical quandary pertains to the extent of authority commanders need to have over autonomous systems and the hazards linked to entrusting military choices to computers.

Producers of AI technologies may potentially be held accountable for violations of IHL, particularly if the technology is defective or inadequately evaluated before deployment.[60], [61] If AI systems are developed or marketed without sufficient protections to assure compliance with IHL, producers may incur legal responsibility, especially if they neglect to mitigate recognised dangers or deficiencies in the technology. Nonetheless, the problem lies in ascertaining the degree to which manufacturers need to be held liable for the implementation of technologies not originally designed for military applications or for their exploitation by military entities. Furthermore, producers may assert that their responsibility is limited to the creation of the technology, absolving themselves of accountability for its application in practical contexts.

Clearly, the issue of liability in the military application of AI is a complex problem. While it is impossible to determine exactly how AI makes decisions, the responsibility for the system's actions lies with the state

59 R. Yermolenko, D. Klekots and O. Gogota, 'Development of an algorithm for detecting commercial unmanned aerial vehicles using machine learning methods', in *Machinery and Energetics*, 2024, vol. 15, no. 2, pp. 33-45.

60 M. Beisenbi and S. Kaliyeva, 'Synthesis of the control systems by the state of an object with single input and single output by a gradientvelocity method of A.M. Lyapunov vector functions', in *International Journal of Civil Engineering and Technology,* 2018, vol. 9, no. 10, pp. 2080-2086.

61 Z.C. Dai, M. Tan, Y. Yang, X. Liu, R. Wang and Y.X. Su, 'Massive Coordination of Distributed Energy Resources in VPP: A Mean Field RL-Based Bi-Level Optimization Approach', in *IEEE TRANSACTIONS ON CYBERNETICS*, 2025, vol. 55, no. 3, pp. 1332-1346.

that uses the technology. Each state using autonomous systems and AI technologies must recognise the risks associated with their use and take responsibility for the possible consequences. However, training all personnel, including users and operators, on IHL principles and standards is important to ensure that risks and objectives are properly assessed when making decisions about military action. But the more autonomous the weapon, the stricter the programming and system design standards for IHL compliance, as the operator's role and responsibility are nearly eliminated. In addition, a system should be legislated to regulate the rights, duties, and responsibilities of officials who use AI systems to prevent offences with AI weapons. Otherwise, there is a possibility that such weapons as LAWS could become a means of achieving criminal goals. Given these complexities, it is essential to analyse how AI technologies, particularly in wartime contexts, conform to the IHL standards. The use of AI in military operations necessitates that these systems adhere to IHL while also tackling distinct issues presented by their unique capabilities. Table 1 summarises the fundamental principles of IHL, the difficulties posed by artificial intelligence in complying with them, and possible strategies to address these obstacles.

Table 1. IHL principles and AI regulation challenges

IHL principle	Description	AI-related challenge	Potential solutions/mitigation
Legitimacy of purpose	Military operations should exclusively focus on genuine military targets, including military installations or equipment.	AI systems may find it challenging to appropriately evaluate the authenticity of a target, particularly in intricate situations.	Construct AI systems utilising sophisticated algorithms for target identification and verification, while guaranteeing human supervision in the decision-making process.
Distinction	Combatants must differentiate between civilian and military targets, guaranteeing the prevention of innocent casualties.	Artificial intelligence may struggle to accurately differentiate between combatants and non-combatants, resulting in possible targeting inaccuracies.	Enhance AI's capacity to distinguish between fighters and civilians using machine learning, and include real-time human verification.
Humanity	Military operations must refrain from causing superfluous pain or devastation that lacks military significance.	Artificial intelligence lacks human empathy and discernment, prompting apprehensions over its capacity to make ethical judgements in combat situations.	Establish stringent ethical protocols for artificial intelligence in combat contexts, guaranteeing that all operations are evaluated for adherence to IHL norms.
Proportionality	Collateral harm must not exceed the military benefit obtained.	AI may inaccurately assess the proportionality of a strike, potentially resulting in disproportionate civilian casualties.	Develop resilient AI systems capable of properly evaluating and balancing proportionality, integrating human oversight of judgements.
Military necessity	Military operations should be confined to those essential for attaining a valid military goal.	AI may execute acts autonomously, prompting apprehensions regarding its capacity to evaluate the requirement of an assault.	Implement human-in-the-loop mechanisms for essential decision-making processes, guaranteeing that AI operates solely under human direction and oversight.

Table 1 above delineates the significant issues that AI presents with the fundamental tenets of IHL in military operations. As AI systems gain autonomy, the necessity for stringent protections and human supervision becomes increasingly apparent. Although AI might potentially enhance target identification and reduce collateral damage, the absence of human judgement presents considerable difficulties, especially with the concepts of distinction and proportionality. The options presented in the table, including enhancing AI's capacity to differentiate between combatants and civilians and implementing human-in-the-loop systems, are essential measures for assuring the appropriate use of AI in conflict. A balance must be achieved between utilising the technological benefits of AI and upholding the ethical and legal norms necessary for the protection of people in war areas.

The issue of the use of AI in armed conflicts can also be addressed through the Martens clause. The Martens clause has been part of the law of international conflicts since 1899 and has been interpreted both broadly and narrowly.[62] The clause has been incorporated into a number of international conventions, such as the 1980 Convention on the Prohibition of Certain Conventional Weapons. It was also used by the International Court of Justice in its 1996 Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons. The reservation itself can be interpreted both narrowly and broadly. Thus, in a narrow sense, it should be understood to mean that international law continues to apply after the adoption of any treaty rules. In a broader sense, however, the Martens reservation implies that actions taken during an armed conflict are assessed not only in terms of treaties and customs but also in terms of the principles of international law to which the reservation refers. As V. Pustogarov[63] states, the reservation implies that what is not authorised is not what the treaty does not expressly prohibit and also serves as a reminder that customary law continues to apply even after the adoption of a treaty rule. The Martens clause allows one to go beyond treaty law and custom by utilising the principles of humanity and the requirements of public conscience. In international humanitarian law, the Martens clause is a separate juscogens norm. This means that, in the absence of a norm in international humanitarian law that corresponds to the circumstances, it is necessary to refer to the Martens clause in order to decide on the situation that has arisen.

It is worth believing that it is the Martens clause that should be taken as the basis for the creation of a Convention on weapons using AI technologies. That is, the fundamental article should stipulate that civilians and military personnel are subject to the protection and operation of the principles of international law derived from established custom, principles of humanity and norms of public morality. The use of AI cannot be brought to full automation, based on the inability of artificial intelligence to independently determine the legitimacy of a target, calculate the probability of changes in conditions in the area of a possible strike, and identify the extent of potential damage, including civilian casualties.[64] Even if the above-mentioned principles are observed, namely correctness of programming, testing, and trials of systems and algorithms; control of AI systems by military personnel; and training of military IHL principles to wage a so-called bloodless war with minimal casualties, the main principle of the Convention on Weapons with the Application of AI Technologies must remain the protection of human personality during an armed conflict. That is, there can be no question of both arbitrary use of AI weapons at the discretion of military commanders and automated use of AI without the presence of human thinking.

It is worth considering separately the ethical issue of the application of artificial intelligence on the battlefield. N. Patsuriya[65] says that even with correct programming and correct use of algorithms, AI weapons do not possess human minds and feelings, which means that the probability that their use will lead to violations of the basic principles of IHL is very high. This opinion is worth agreeing with because, for example, such systems are unlikely to comply with the principle of military necessity and proportionality even if all design

62 R. Ticehurst, 'Martens clause and the law of armed conflict', *International Journal of the Red Cross*, 1977, vol. 22, no. 140, pp. 131-141.

63 V. Pustogarov, 'Martens clause – History and legal content', *Law and Politics*, 2003, vol. 3, pp. 56-64.

64 A. Annenkov, Y. Medvedskyi, R. Demianenko, O. Adamenko and V. Soroka, 'Preliminary accuracy assessment of low-cost UAV data processing results', in *International Conference of Young Professionals "GeoTerrace 2023",* European Association of Geoscientists and Engineers, Lviv, 2023, pp. 1-4.

65 N. Patsuriya, *Implementation of artificial intelligence technologies in ensuring national security and defense capacity of Ukraine: Problems and prospects of the post-war period*, 2023. Retrieved 15 February 2025, https://coordynata.com.ua/vprovadzenna-tehnologij-stucnogo-intelektu-u-zabezpecenna-nacionalnoi-bezpeki-ta-oboronozdatnosti-ukraini-problemi-ta-perspektivi-povoennogo-periodu

and programming standards are observed. Most likely, the machine will not be able to distinguish a person's readiness to fight or determine the value of a certain object. And even with correct algorithms and an attack on a legitimate target, the machine is unlikely to be able to calculate the associated unintended damage to nearby civilian objects and civilians, thus violating the principles of IHL. In the case of a human perpetrator, however, the ability to calculate the risks is very high. This is why, following the ideas of N. Patsuriya, despite the increased efficiency and speed of military tasks, the introduction of AI should be considered with strict adherence to ethical standards. In 2020, the US Department of Defence formed five ethical principles for the use of artificial intelligence for military purposes:[66]

1. Responsibility – full personnel responsibility for the actions of the AI, starting from development, deployment, and use of the system

2. Impartiality – minimizing any deviations in artificial intelligence systems, which should be controlled by the US Department of Defence

3. Training – All military AI weapon systems must be developed in such a way that personnel clearly understand the technology, development process and methods of use

4. Reliability – all weapon systems must be tested and proven from a security point of view.

5. Submission – AI systems must fully utilize the tasks assigned to them, but the military must be able to identify and prevent undesired consequences, including the ability to remove from combat or turn off systems that have detected an error in performing a particular task.

However, even with the active introduction of AI weapons, the US Joint Centre for Artificial Intelligence warns against equipping strategic weapons control centres with artificial intelligence systems. In its opinion, the decision to use weapons of mass destruction should be made exclusively by humans, not artificial intelligence. This is due to the high degree of responsibility and moral aspects that accompany the use of such weapons. A similar system of ethical principles is proposed by Z. Hbur,[67] basing it, however, on the idea of lack of full autonomy and close control by military commanders and employees. It is reasonable to consider legal regulation in light of such a system of principles, referring to the principles of IHL, in which the main decision always remains with the individual.

C. Currie[68] is of the opinion that it is impossible to create and put into circulation weapons over which human control will be lost. This idea should be the basis of legal regulation, even if there is a desire to make the use of AI as autonomous from humans as possible. Firstly, in this case, in case of any malfunction, for example, erroneous targeting or other malfunctions, it will be impossible to avoid damage to the civilian population; secondly, it will be impossible to verify compliance with IHL norms, and thirdly, such weapons can be used for criminal purposes

66 AI Principles: Recommendations on the ethical use of artificial intelligence by the Department of Defence, 2019. Retrieved 15 February 2025, https://govwhitepapers.com/whitepapers/ai-principles-recommendations-on-the-ethical-use-of-artificial-intelligence-by-the-department-of-defense

67 Z. Hbur, 'The possibility of adapting the Israeli experience of using artificial intelligence in military operations in the East', in *Investments: Practice and Experience*, 2021, vol. 12, pp. 54-61.

68 C. Currie, *The evolution of war: How AI has changed military weaponry and technology*, 2022. Retrieved 18 February 2025, https://montrealethics.ai/the-evolution-of-war-how-ai-has-changed-military-weaponry-and-technology/

or can be directed against humanity itself. On the issue of liability, as mentioned above, the blame cannot be shifted to the developer or programmer. Such proceedings can only be allowed in the case of programming or design errors; in all other cases, it is solely the responsibility of military personnel. For example, in the case of searching for and finding a target, the final decision to attack rests with the commander, who should be held responsible in the event of an error or proof of an attack on an illegal target. However, according to Q. Li and D. Xie,[69] the responsibility for the misuse of AI weapons or the illegality of a target should lie with the state that produces them, and the responsibility should be applied internationally. Agreeing with the researchers' point of view, it is worth seriously considering the adoption of the Convention discussed above for proper legal regulation.

According to the technologies on which the use of AI weapons is based, the factor of human judgement should be completely excluded, which may lead to non-compliance with humanitarian norms. Although today, society is at the stage of development of these technologies that AI does not make decisions on the battlefield 100% independently; as these technologies develop, this may happen. However, if empirical studies show that machines make fewer mistakes than humans and therefore cause less damage to civilians in target selection, object recognition and other nuances, it would be logical to use AI more widely than human resources. In this case, the human will be left solely with the function of control and the ability to cancel the command in case of detecting a failure or error in the system. It is likely that with the development of technology, the gap between human and AI activities will become more and more noticeable, but even so, humans should not be displaced from leadership positions, especially when it comes to the use of lethal autonomous systems, and left without full control. The use of AI for military purposes still needs to be researched in detail and requires extensive disciplinary work in both the scientific and legislative spheres; only then will it be possible to talk about the effective and safe use of AI on the battlefield.

Conclusions

The introduction of artificial intelligence and its application on the battlefield is an inevitable process that mankind is actively pursuing. Several countries have been using machines with partial AI for several decades, but the introduction of fully autonomous weapon systems is still out of the question, although discussions are actively underway. According to IHL, the use of weapons, including autonomous systems, must comply with the principles and rules of law in order to avoid unnecessary suffering and destruction. However, the challenge is the ability of autonomous systems to follow all these IHL principles, even when properly programmed and designed. It is therefore important that AI-enabled weapons can adapt and strictly adhere to them. However, the question arises whether it is possible to absolutely respect the principle of legitimacy of the target, especially if the chosen object to attack is a legitimate target, but its proximity to civilian infrastructure or civilians may result in an excessive number of unintended casualties. There is no single answer as to whether an autonomous system is capable of distinguishing such aspects in the execution of an operation, as well as reacting and adapting quickly to changes. Furthermore, with regard to the principle of differentiation, the issue of compliance is even more relevant here. The fact is that, visually, a combatant may not be distinguishable from a non-combatant, and therefore it is not clear in which algorithm this principle should be observed. In the context of the use of autonomous weapon systems and artificial intelligence in military operations, compliance with the principles of international humanitarian law is fundamental. In order to ensure compliance with these principles and minimise potential violations and liability for the use of ASW,

69 Q. Li and D. Xie, *Legal regulation of AI weapons under international humanitarian law: A Chinese perspective*, 2019. Retrieved 3 February 2025, https://blogs.icrc.org/law-and-policy/2019/05/02/ai-weapon-ihl-legal-regulation-chinese-perspective/

certain rules (frameworks) have been proposed, such as correct programming, whereby the development of autonomous systems must strictly comply with IHL norms, providing for tools and algorithms aimed at avoiding harm to civilians and objects; testing and trials aimed at verifying their compliance with IHL and the correctness of the AI algorithms; monitoring the operation of the systems, including the use of artificial intelligence algorithms; and monitoring the performance of autonomous weapons systems.

The application of the above principles and framework will ensure better compliance with IHL in the use of autonomous weapon systems and will reduce the risks of violations of armed conflicts while maintaining the high effectiveness of military operations. Regarding the legal regulation of the use of AI in the military sphere, it is proposed to consider the possibility of creating a new Convention on Armaments with the use of AI technologies, similar to the Arms Convention. However, it is important to take into account Martens' reservation. The purpose of such a Convention should not only be to regulate the use of AI in armed conflicts but, above all, to protect civilian and military objects during armed conflicts. The Convention should establish clear norms and principles for the use of AI while excluding full automation, given the limited ability of AI to determine the legitimacy of targets, calculate likely changes in battlefield conditions, and assess potential damage, including civilian casualties. Establishing such a Convention on the basis of the Martens Reservation could provide the necessary legal framework to regulate the use of AI in military operations, ensuring compliance with international humanitarian law and the law of all parties to armed conflicts. However, the process of draughting and adopting such a Convention may be complex and require the agreement of multiple States Parties.

Areas for further research on the military use of AI should include developing new principles for the military use of AI, implementing effective systems for monitoring and controlling the military use of AI, building relationships between government, developers, experts, and the public, continuing research to improve the safety of AI use on the battlefield, and establishing an international forum to coordinate issues related to the military use of AI weapons.

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