Drones, Bots, and the Law: Charting the Terrain of Autonomous Weapon Systems in Compliance with Laws of War

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ABSTRACT

 This paper examines the challenges and future possibilities of Autonomous Weapon Systems (AWS) in the context of International Humanitarian Law (IHL). It investigates AWS definitions, focusing on substantial human oversight and differentiating AWS from artificial intelligence. The significance of understanding IHL is underscored by the author, given the UN's directive for AWS adherence to legal constraints on the use of force. The paper also discussed the three pillars of IHL – discrimination, proportionality, and precaution – are examined, highlighting challenges such as the complexities of discrimination in a post-9/11 era and the limitations of automated systems in applying common sense. The paper concludes by laying the groundwork for a comprehensive understanding of the ethical and legal dimensions of AWS about civilian protection. Ultimately, by addressing the legal and ethical challenges posed by autonomous weapons, policymakers and legal experts have the opportunity to shape the future of warfare, promote international peace and security, and protect the rights and well-being of individuals affected by armed conflicts.

1. **Introduction**

From routine domestic chores like controlling heating systems to serious situations like autonomous vehicle accidents, robots, and computers are crucial to decision-making processes that affect people in a variety of domains. The field of autonomous weapons systems (AWS) offers an extreme example of automated decision-making; these are weapon platforms that can choose and engage targets on their own without direct human intervention.

There has been much debate over what constitutes autonomy in weapon systems, but there is now a growing body of agreement on the nomenclature. AWS is defined as a weapon that can "pick and attack targets without additional intervention by a human operator" by the US Department of Defense (DOD directive 2012, updated 2017). Likewise, the International Committee of the Red Cross (ICRC) characterizes AWS as equipment with autonomy for the "critical functions" of locating, pursuing, identifying, and attacking targets to "independently select and attack targets" (ICRC 2014).

Human Rights Watch exemplifies how modern definitions frequently incorporate the idea of meaningful human control, characterizing AWS as weapons that "would detect and shoot on targets without meaningful human control" (HRW 2014 & Amoroso et al. 2018).

Autonomous Weapon Systems are defined as weapons that can "independently select and attack targets, possessing autonomy in the 'critical functions' of acquiring, tracking, selecting, and attacking targets" by the International Committee of the Red Cross (Righetti et al., 2014). "A weapon system that, once activated, can autonomously select and engage targets without requiring additional intervention from a human operator," is how the U.S. Department of Defense defines Autonomous Weapon Systems (AWS).

This includes human-supervised autonomous weapon systems that are intended to allow human operators to override the weapon system's functionality; however, these systems are also capable of autonomously selecting and engaging targets without the need for further human input after they have been activated (McFarland, 2014). As McFarland made clear in 2014, AWS is not the same as artificial intelligence. This is important to remember.

It is stressed by Wallach and Allen (2008) that "human qualities such as consciousness, emotion, sociability, and semantic understanding required for human moral decision-making" are absent. It is important to recognize that the term 'autonomy' in robotics has a different meaning than it does in everyday language, politics, philosophy, or individual freedom. When it comes to robotics, autonomy is more appropriately defined as "automatic," which refers to a robot that follows a pre-programmed set of instructions or movements in a controlled setting.

Understanding International Humanitarian Law (IHL) fundamentally is crucial, as the UN has stated that Autonomous Weapon Systems (AWS) must abide by current IHL restrictions on the use of force. Three pillars support International Humanitarian Law (IHL): proportionality, discrimination, and precaution. An additional requirement is to prevent "unnecessary suffering" during combat operations.

The first pillar, discrimination, requires that any use of force make a distinction between non-combatants seeking to surrender and combatants or between civilians and combatants. The problem of discrimination has become more pressing in the wake of 9/11, particularly in light of terrorists' efforts to pass for civilians. A paper presented by the "Institute of Electrical and Electronics Engineers" (IEEE) during the 15th International Symposium on "Applied Machine Intelligence and Informatics" brought to light that, despite advancements, facial recognition software is not infallible (Šimák et al., 2017).

Opponents of AWS deployment contend that, even if technological obstacles are resolved, robots will not be able to make discernment-based, intuitive judgment calls without a "man in the loop." Noel Sharkey, a roboticist and anti-AWS activist, claims that current technology cannot distinguish between combatants and civilians and that improvements in sensory processing, vision, programming language, and operationalizing "common sense" are necessary for this purpose (Sharkey, 2019).

The second pillar, proportionality, states that some collateral damage is unavoidable even if civilians are not deliberately targeted. In comparison to the expected military advantage, this principle limits the amount of force that can be used in a conflict to prevent causing undue harm to civilians and damage to civilian infrastructure (Righetti et al., 2018). Because automated systems are good at analyzing constantly changing scenarios but not so good at applying common sense, AWS faces difficulties in evaluating a dynamic environment and making decisions.

Parties to a conflict are required by the third principle, precaution, to take reasonable measures to shield civilians and property under their control from the consequences of an attack (Righetti et al., 2018). The term "constant care" in the UN "Additional Protocol I" begs the question of whether autonomous systems can provide this level of care in the absence of human communication and whether machines of any sophistication are subject to this requirement.

Against the backdrop of this literature, the author has delved into a detailed exploration of the challenges and prospects of Autonomous Weapon Systems, as well as how International Humanitarian Law addresses these issues.

2. <u>Challenges Autonomous Weapons Face in Following IHL</u>

In this section, we delve into the challenges that autonomous weapons encounter in adhering to international humanitarian law. Autonomous weapons, characterized by their reduced human control and decision-making capabilities, raise concerns regarding human control and accountability, compliance with distinction and proportionality, and the protection of civilians. These issues, stemming from the advanced algorithms and data-driven processes employed by autonomous weapons, have significant implications for the application of IHL principles in armed conflicts. By examining these problems, we can gain insights into the ethical, legal, and practical dilemmas surrounding the use of autonomous weapons and explore potential avenues for addressing these challenges within the framework of IHL.

2.1. Lack of Human Control and Accountability

The increased autonomy of weapons systems, with reduced or minimal human involvement in decision-making processes, presents significant challenges in terms of ensuring human control and accountability over their actions (Krishnan, 2016). This lack of human control raises several concerns regarding the adherence of autonomous weapons to the principles of international humanitarian law.

2.2. Responsibility and Accountability

With the delegation of decision-making to machines, questions arise regarding the assignment of responsibility for the actions and consequences of autonomous weapons. The attribution of liability becomes complex when there is limited or no human involvement in the decision-making process. Identifying who should be held accountable for any violations of IHL or wrongful actions becomes a challenging task, raising ethical and legal dilemmas (Clark, 2016).

2.3. Ethical Considerations

The reduced human control over autonomous weapons raises ethical concerns, particularly about the principles of proportionality and distinction. Proportionality requires that the anticipated military advantage of an attack is not excessive about the expected harm to civilians and civilian objects. The lack of human judgment in assessing the proportionality of an attack raises questions about the ability of autonomous weapons to make ethical decisions in complex and dynamic battlefield scenarios (FLI, 2015).

3.   Compliance with IHL Obligations

Autonomous weapons must comply with fundamental principles of IHL, such as the distinction between combatants and civilians, the prohibition of indiscriminate attacks, and the obligation to take precautions to minimize harm to civilians and civilian objects. However, the inherent limitations of autonomous systems, including their inability to fully understand the context, interpret human intentions, or exercise empathy, pose challenges in ensuring compliance with these principles. The risk of autonomous weapons causing unintended harm or violating the principles of IHL remains a significant concern (ICRC, 2014).

3.1. Decision-Making Transparency

The lack of transparency in the decision-making processes of autonomous weapons is another obstacle to their compliance with IHL (Khan, 2018). Understanding the algorithms, data inputs, and reasoning behind the actions of autonomous weapons is essential for assessing their conformity with legal and ethical standards. However, the complexity and opacity of these systems hinder the ability to scrutinize and evaluate their decision-making processes.

4.   Compliance with Distinction and Proportionality

Because of their intricate decision-making algorithms and data-driven processes, autonomous weapons face difficulties in effectively implementing the principles of distinction and proportionality, which are fundamental pillars of international humanitarian law.

4.1. Identification and Engagement of Legitimate Targets

Autonomous weapons use complex algorithms and data analysis to locate and attack. But there's a chance that these systems won't be able to tell the difference between real military targets and objects or people that belong to the civilian world. Targeting errors may arise from a lack of contextual awareness and the dependence on pre-programmed data inputs, which could expose protected civilian infrastructure or non-combatants to harm (Zając, 2023). This raises questions about whether autonomous weapons adhere to the principle of distinction, which calls for a distinct separation between civilian targets and military goals.

4.2. Risk of Civilian Casualties and Damage to Civilian Infrastructure

There are serious questions about whether autonomous weapons will adhere to the principle of proportionality because they are unable to sufficiently evaluate the likelihood of collateral damage and the attack's proportionality (Kalmanovitz, 2016). For an attack to be considered proportionate, the expected military advantage must not outweigh the expected harm to civilians or civilian property. The dynamic and unpredictable nature of conflict situations may not be fully taken into account by the complex decision-making processes of autonomous weapons, which are based on data-driven calculations and algorithms. This increases the possibility of disproportionate attacks that cause casualties among civilians and damage to civilian infrastructure.

4.3.Accountability for Targeting Errors

In the context of autonomous weapons, accountability for targeting errors and distinction and proportionality violations becomes a complicated matter. It may be difficult to assign blame for any illegal or excessive acts when there is no direct human involvement in the decision-making process (Seixas-Nunes, 2020). Upholding the rights and protections of civilians in armed conflicts and ensuring compliance with IHL requires addressing violations and ensuring accountability.

4.4.Challenges in Protecting Civilians

When it comes to protecting civilian populations during armed conflicts, the deployment of autonomous weapons poses serious challenges (Kalmanovitz, 2016). These systems' intrinsic flaws can make it difficult for them to understand the context and make moral decisions, which makes it difficult to take the required safety measures and reduce needless suffering.

4.5.Comprehending Contextual Nuances

Autonomous weapons might find it difficult to fully understand how dynamic and complex conflict situations can be. They depend on pre-programmed algorithms and data inputs that might not fully represent the intricacies and contextual nuance present in armed conflicts. As a result, their comprehension of the unique conditions under which they function, such as the presence of civilians, cultural sensitivity, and shifting dynamics on the battlefield, may be restricted. Autonomous weapons may encounter difficulties in accurately identifying civilians from combatants if these contextual factors are not fully understood, which could result in increased harm to civilians.

4.6.Ethical Judgments and Precautions

Concerns have been raised about autonomous weapons' capacity to exercise moral judgment and take appropriate safety measures in compliance with international humanitarian law. These systems are incapable of moral reasoning, human empathy, or evaluating the subjective elements of a given circumstance. They might therefore find it difficult to think about humanitarian ideals and needless suffering during times of armed conflict. This calls into question whether they can adhere to the requirements of International Humanitarian Law (IHL) (Bakhsh et al., 2023), which include the need to minimize harm to civilians and the prohibition against causing needless suffering or unnecessary injury.

4.7.Complexities in Protecting Civilian Populations

The use of autonomous weapons makes protecting civilian populations more difficult. The efficacious execution of strategies aimed at shielding civilians from the aftermath of armed conflicts may be compromised by the constraints associated with comprehending contextual subtleties and rendering moral decisions (Kalmanovitz, 2016). This involves difficulties in determining the relative importance of military and civilian targets, determining the proportionality of attacks, and implementing the necessary precautions to avoid or reduce harm to non-combatants. The use of autonomous systems could make civilian populations more vulnerable to danger and make it more difficult to defend their IHL rights and protections.

5. Future Autonomous Weapons: Emerging Technologies and Implications

A fresh line of autonomous weapons systems with ever-more-advanced capabilities has emerged as a result of the rapid advancement of technology. These cutting-edge innovations, which include the Harpy and Reaper drones as well as autonomous swarm weapons, have the power to completely alter the face of warfare. These weapons present novel possibilities as well as difficulties in terms of military strategy,

moral considerations, and adherence to international humanitarian law because of their sophisticated sensor systems, autonomous decision-making, and improved operational capabilities (Jensen, 2014). The consequences of these new technologies are examined in this section of the paper, along with their features, possible applications, and moral and legal conundrums. By examining the features and consequences of these autonomous weapons of the future, we can gain a deeper comprehension of the intricate matters of their creation, implementation, and conformity to international humanitarian law.

5.1. Reaper Drone

Many armed forces currently employ the highly sophisticated and potent autonomous weapon system known as the Reaper drone. The Reaper drone is capable of autonomous target engagement, surveillance, and target identification thanks to its long endurance, high-resolution sensors, and precision-guided munitions (Umbrello & Wood, 2021). Its sophisticated autonomous capabilities, such as its capacity to engage numerous targets and linger over a predetermined area for extended periods, raise serious concerns about both adherence to international humanitarian law and the safety of civilians.

5.2. Harpy Drone

One example of a loitering autonomous weapon system intended to neutralize enemy air defense systems is the Harpy drone. It is intended to locate, recognize, and take immediate action against radar emitters on its own. Because of its independence and capacity to decide for itself what targets to engage in, the Harpy poses a risk of indiscriminate attacks, civilian casualties, and difficulties in adhering to the principles of distinction and proportionality in international humanitarian law (Bode & Watts, 2023).

5.3. Swarm Autonomous Weapons

Swarm autonomous weapons are a potential future technology in which several autonomous systems cooperate to accomplish military goals. These swarms can be made up of different kinds of platforms that work together in a coordinated way, like ground robots, drones, or naval vessels (Scharre, 2014). The emergence of swarm autonomous weapons presents special difficulties for IHL compliance because of the possibility of many simultaneous large-scale attacks, the difficulty of assigning blame, and the higher risk of unintended consequences and harm to civilians. In swarm operations, maintaining effective control and the capacity to distinguish between non-combatants and military objectives is a challenging task that necessitates careful assessment of the ethical and legal ramifications (Hambing, 2015).

5.4. Other Emerging Autonomous Weapons

Other emerging autonomous weapon systems, outside of the Reaper drone, Harpy drone, and swarm autonomous weapons, are being developed or envisioned by different actors. These comprise, among other things, underwater autonomous systems, unmanned combat vehicles, and intelligent missiles (Hambing, 2015). Every one of these systems has unique technical requirements, operational considerations, and potential difficulties adhering to IHL.

6. Technological Impacts on Warfare
6.1. Changing Dynamics of Warfare with the Deployment of Autonomous Weapons

The introduction of autonomous weaponry changed the nature of military operations dramatically and ushered in a new era of warfare. These cutting-edge technological systems are capable of exceeding human capabilities in a variety of warfare domains by executing tasks with previously unheard-of precision, speed, and endurance (Smalley, 2014). Autonomous weapons are revolutionizing military

strategy and tactics by operating autonomously or with minimal human intervention, in contrast to traditional weapons that depend on human operators.

Numerous benefits could arise from integrating autonomous systems into military operations. These weapons are excellent at engagement, target acquisition, surveillance, and reconnaissance. Autonomous weapons use cutting-edge algorithms and sensor technologies to improve situational awareness and give military commanders access to real-time data, facilitating quicker and more informed decision-making. The effectiveness and efficiency of military forces can be increased by the force multiplier effect that autonomous weapons' capacity to function independently and complete challenging missions can produce.

6.2. Strategic Stability and the Risk of an Autonomous Arms Race

Concerns regarding potential conflict escalation and strategic stability are raised by the use of autonomous weapons. The spread of autonomous weapons among states can result in an arms race as countries try to maintain a balance of power and obtain a competitive edge (Horowitz, et al., 2018). The possibility of an autonomous arms race increases in the absence of explicit international agreements and regulations controlling the creation and application of autonomous weapons.

International security may be significantly impacted by an independent arms race. It might lead to a destabilizing accumulation of military power, raising the possibility of war and escalating international tensions (Horowitz, et al., 2018). In addition, the lack of established standards and regulations regarding the use of autonomous weapons in armed conflicts gives rise to moral and legal questions about the possibility of unforeseen outcomes as well as the abuse or misuse of these cutting-edge technologies.

Comprehensive regulations and international cooperation are needed to address the potential ramifications and consequences of deploying autonomous weapons. The international community must hold talks and create policies that guarantee the responsible use of autonomous weapons while preserving stability and security throughout the world. Establishing precise rules for the creation, application, and handling of autonomous weapons following moral principles and international humanitarian law is part of this.

7. <u>International Governance and Regulation</u>
7.1. The Need for International Cooperation

The development, deployment, and use of autonomous weapons require effective norms and regulations, which will require international cooperation in light of their advent. Collaboration between nations is essential to addressing the complex challenges posed by these cutting-edge technologies, given the transnational nature of armed conflicts and the potential global impact of autonomous weapons (Krishnan, 2016).

States can share information, skills, and best practices through international cooperation, which encourages a group effort to manage the security, morality, and legal ramifications of autonomous weapons. It makes it possible to create uniform standards and policies that encourage responsible use, reduce risks, and guarantee adherence to international humanitarian law. A major obstacle in this endeavor is reaching an agreement among states that have different interests, capacities, and viewpoints.

7.2. Legal and Policy Frameworks

To efficiently tackle the possible effects of autonomous weapons within the international community, strong legal frameworks and policies must be developed. International bodies like the United Nations

(UN) are essential in promoting debates, forming laws, and offering forums for communication and collaboration.

Legal frameworks need to cover several topics, such as the use, development, deployment, and acquisition of autonomous weapons. Concerns about adhering to IHL, safeguarding civilians, responsibility, openness, and averting an arms race must all be taken into consideration. These frameworks should also take into account how autonomous technologies are developing and be flexible enough to accommodate new developments in the future (Crootof, 2015).

In addition to legal mechanisms, policy frameworks offer states recommendations and guidelines for navigating the complexities associated with autonomous weapons. These regulations could cover topics like human-machine interaction, human control, education and training, data security and privacy, and determining whether autonomous weapon systems comply with international humanitarian law.

The international community can evaluate the possible effects and ramifications of using autonomous weapons in armed conflicts by holding thorough talks and consultations. A deeper comprehension of both the difficulties they present for adhering to IHL and the changing nature of warfare itself can result from such discussion. States can attempt to achieve a balance between the protection of basic humanitarian principles during times of armed conflict and technological advancements through a concerted effort to develop international governance mechanisms and regulatory frameworks.

8. Conclusion

In conclusion, the advent of autonomous weapons presents a complex and rapidly evolving landscape that necessitates careful consideration from policymakers, legal experts, and the international community. While autonomous weapons offer potential advantages in military operations, their compliance with international humanitarian law and the implications for the dynamics of warfare require thorough examination.

Through the analysis of treaty law, including the Geneva Conventions, the Convention on Certain Conventional Weapons, and the legal review process outlined in Article 36 of Additional Protocol I, it becomes evident that existing frameworks can provide a foundation for assessing the compatibility of autonomous weapons with international law. However, challenges arise due to the intricate nature of autonomous systems and the need to adapt legal interpretations to keep pace with technological advancements.

Customary international law also plays a crucial role in regulating warfare and imposing obligations on states. Evaluating the application of customary law to autonomous weapons requires careful consideration of evolving state practice and opinio juris, particularly regarding the prohibition of indiscriminate attacks and the protection of civilians.

The deployment of autonomous weapons introduces several challenges regarding compliance with IHL. The lack of human control and accountability raises concerns about responsibility for actions and outcomes, necessitating the development of appropriate attribution mechanisms. Moreover, ensuring compliance with the principles of distinction and proportionality becomes increasingly complex due to the sophisticated decision-making algorithms and potential for targeting errors, emphasizing the need for robust safeguards.

Additionally, protecting civilians in armed conflicts poses significant challenges with the use of autonomous weapons. Their limited contextual understanding and ethical judgment capabilities require

careful consideration to minimize unnecessary suffering and uphold the necessary precautions in conflict situations.

Looking to the future, emerging technologies such as reaper drones, harpy drones, swarm autonomous weapons, and others, are likely to shape the landscape of warfare further. Their implications demand ongoing research, international cooperation, and the development of legal and ethical frameworks to address the unique challenges they present.

In response to these complexities, policy and legal experts are encouraged to consider the recommendations put forth. These include establishing clear definitions, strengthening legal frameworks, conducting robust legal reviews, fostering international cooperation, developing ethical guidelines, enhancing accountability mechanisms, promoting awareness and education, and supporting continued research and analysis. By embracing these recommendations, stakeholders can navigate the complexities of autonomous weapons and work towards ensuring their responsible development, deployment, and use while upholding the principles of international humanitarian law.

Ultimately, by addressing the legal and ethical challenges posed by autonomous weapons, policymakers and legal experts have the opportunity to shape the future of warfare, promote international peace and security, and protect the rights and well-being of individuals affected by armed conflicts. The journey towards effective regulation and responsible use of autonomous weapons requires ongoing dialogue, collaboration, and a commitment to upholding the principles of humanity in the face of evolving technological advancements.

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