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The Impact of Autonomous Technologies on the Enforcement of International Humanitarian Law

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Abstract: The rapid advancement of autonomous technologies is reshaping the landscape of warfare and the enforcement of humanitarian law. This paper explores the dual-edged impact of autonomous technologies such as artificial intelligence (AI), drones, autonomous weapons systems, cyber warfare, and surveillance tools on international humanitarian law (IHL). These technologies present both significant opportunities and serious challenges for enforcing IHL. On one hand, autonomous technologies improve enforcement by providing advanced tools for monitoring and reporting violations. AI and satellite imagery facilitate more accurate and timely data collection, which is vital for documenting IHL breaches. Precision targeting systems and autonomous drones have the potential to reduce collateral damage and civilian casualties by allowing for more precise military operations. Additionally, advancements in logistics and communication technologies enhance the efficiency of humanitarian aid delivery. On the other hand, integrating these technologies raises critical ethical, legal, and practical concerns. The deployment of autonomous weapons systems and AI in decision-making processes introduces accountability issues and risks unintended consequences. Cyber warfare vulnerabilities can disrupt essential services, exacerbating humanitarian crises. Moreover, the use of surveillance technologies threatens privacy and human rights, complicating efforts to uphold humanitarian principles such as distinction, proportionality, and necessity. This paper combines qualitative analysis of case studies and a review of current regulatory frameworks to explore the benefits and challenges of autonomous technologies in humanitarian law enforcement. It calls for robust regulation and international cooperation to ensure responsible technological use while safeguarding core humanitarian principles.

Keywords: Humanitarian law, Autonomous technologies, International law, Accountability

1. Introduction

The rapid development and deployment of autonomous technologies are transforming the dynamics of modern warfare, presenting both unprecedented opportunities and significant challenges in enforcing International Humanitarian Law (IHL). IHL, a critical component of international law, is designed to alleviate human suffering during armed conflicts by protecting civilians, non-combatants, and civilian infrastructure. Unlike other areas of law

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concerned with political, economic, or territorial disputes, IHL is specifically focused on humanitarian principles, aiming to minimize harm in times of war. Established by the Geneva Conventions and their Additional Protocols, IHL creates a framework that seeks to balance military objectives with the imperative to protect human life and dignity (Geneva Conventions, 1949; Additional Protocols, 1977). However, as warfare becomes increasingly driven by autonomous technologies, the application and enforcement of these core principles are facing new and unforeseen challenges (ICRC, 2021).

Emerging technologies such as artificial intelligence (AI), drones, autonomous weapons systems, and cyber warfare tools are reshaping the nature of conflict, offering the potential for more precise military operations, improved efficiency, and reduced risks to combatants. These technologies enable real-time decision-making with minimal human intervention, promising improvements in military strategies and operational effectiveness (O'Connell, 2020). However, they also raise critical ethical, legal, and humanitarian concerns. The primary issue lies in accountability: when an autonomous system malfunctions and violates IHL, such as through the unintended targeting of civilians, determining responsibility becomes increasingly complex. Who should be held accountable? the designer of the algorithm, the operator, or the state deploying the weapon? This lack of clarity undermines the very foundations of accountability and responsibility that IHL is built upon (Asaro, 2019; Nagorno-Karabakh Conflict Report, 2020).

The challenges posed by autonomous systems are not merely hypothetical. In conflicts such as Nagorno-Karabakh, Syria, and Ukraine, autonomous technologies are actively deployed, sometimes with devastating consequences. Loitering munitions, for example, have been used to target civilian infrastructure, and cyberattacks have disrupted essential services, exacerbating humanitarian crises (Bhuta, 2021; Ukraine Analysis, 2022). Despite their theoretical promise of reducing collateral damage, autonomous systems often struggle to replicate the nuanced judgment that human operators can bring to complex and dynamic battlefields, particularly when distinguishing between combatants and civilians (Sharkey, 2020). Furthermore, the use of cyber warfare tools especially those targeting civilian infrastructure compounds the difficulties in applying IHL, as such actions often occur outside the traditional boundaries of armed conflict (UN Cybersecurity Report, 2021).

This paper explores the dual-edged impact of autonomous technologies on the enforcement of International Humanitarian Law. On the one hand, these technologies offer the potential to improve compliance with IHL by enabling precision targeting, enhanced surveillance, and reducing risks to military personnel (Maurer, 2020; Roff, 2019). On the other hand, they present serious risks, such as the loss of human oversight, ethical challenges, and gaps in accountability, which threaten core IHL principles such as distinction, proportionality, and necessity. The research aims to critically analyze these technologies' effects on the enforcement of IHL, identifying the risks and opportunities they present, and proposing regulatory and ethical solutions to bridge the existing gaps (GGE on LAWS, 2021; Campaign to Stop Killer Robots, 2022).

To achieve this, the paper employs a qualitative methodology that includes a legal analysis of key IHL documents, such as the Geneva Conventions, Additional Protocol I, and Article 36 of the Additional Protocol I. The research incorporates case studies from conflicts in Syria, Gaza, Afghanistan, and Ukraine, using them to assess how autonomous technologies are being applied in real-world situations and their consequences on IHL enforcement (Syria Report, 2019; Gaza Report, 2021; Ukraine Analysis, 2022). Additionally, expert perspectives

from the fields of AI ethics, military strategy, and international law will be integrated to provide a multidisciplinary approach to the complex challenges posed by these technologies (Sharkey, 2020; Bhuta, 2021).

Ultimately, this paper seeks to address a critical gap in the regulation of autonomous systems under IHL. While these technologies are being rapidly developed and deployed, existing legal frameworks remain insufficient to tackle the challenges they present. While bodies like the United Nations and advocacy groups such as the Campaign to Stop Killer Robots have raised concerns, international regulatory efforts have been slow (UN CCW Report, 2021; Campaign to Stop Killer Robots, 2022). This paper aims not only to identify these gaps but also to offer concrete recommendations for reforming existing IHL frameworks. It advocates for a balanced approach that harnesses the potential of autonomous technologies while ensuring that the fundamental humanitarian principles of IHL are not compromised (Bhuta, 2021).

2. Foundational Concepts and Legal Framework

The integration of autonomous technologies into modern warfare is reshaping how conflicts are conducted, with profound implications for International Humanitarian Law (IHL). While these technologies, such as autonomous weapons systems (AWS), drones, and artificial intelligence (AI), promise greater efficiency, precision, and reduced risk to combatants, they simultaneously present significant challenges to the foundational principles of IHL. IHL is grounded in principles such as distinction, proportionality, necessity, and precaution, which seek to protect civilians, minimize unnecessary harm, and regulate the conduct of hostilities. However, the use of autonomous systems raises critical questions about whether these principles can be effectively applied to machines capable of making independent decisions on the battlefield.

One of the primary concerns associated with autonomous technologies is their impact on the principle of distinction, which requires that combatants distinguish between military targets and civilians, as well as military objectives and civilian infrastructure. Autonomous systems, which rely on algorithms and artificial intelligence to make real-time decisions, often struggle to meet this fundamental requirement. For instance, in the 2021 Kabul drone strike, a U.S. drone, relying on an AI-driven targeting system, mistakenly targeted a civilian vehicle, killing ten people, including seven children. This tragic incident highlights the vulnerability of autonomous systems to errors in distinguishing between combatants and non-combatants, leading to violations of the principle of distinction (UN Cybersecurity Report, 2021). The reliance on algorithmic decision-making instead of human judgment presents a real risk to civilian populations, especially in situations where the rules of engagement are complex or where the civilian population is interspersed with military targets.

Similarly, the Nagorno-Karabakh conflict in (2020) exposed the dangers of using loitering munitions like the Harop drone to target both military and civilian infrastructure. Although these weapons are designed to autonomously detect and strike targets, they cannot fully replicate the nuanced understanding that human operators bring to targeting decisions. In this conflict, autonomous weapons were used to destroy civilian infrastructure, including hospitals and residential areas, raising serious concerns about the proportionality of the attacks and the necessity of using such weapons in these contexts (Nagorno-Karabakh Conflict Report, 2020). The proportionality principle in IHL prohibits attacks that may cause excessive civilian harm in relation to the anticipated military advantage. Autonomous systems, especially those that operate in complex, dynamic environments like urban warfare,

may struggle to accurately assess proportionality, leading to unintended and excessive civilian harm.

The principle of necessity requires that any military action be necessary to achieve a legitimate military objective, and that no excessive force be used. The growing reliance on autonomous weapon systems raises concerns about whether these systems are truly necessary, or if their use could potentially lead to overreach. Autonomous technologies, designed for efficiency, might prioritize military objectives over the protection of civilians, potentially resulting in actions that could be classified as excessive under IHL. For example, autonomous drones and AI-powered targeting systems can operate much faster than human decision-makers, potentially leading to a disproportionate response in the heat of battle, where the nuance required to apply necessity may be lost (Bhuta, 2021).

In addition to concerns over distinction, proportionality, and necessity, the use of autonomous systems also introduces significant ethical challenges. Peter Asaro (2019) argues that AI-driven warfare dehumanizes military decisions by removing the human judgment necessary to assess the ethical implications of using force. Autonomous systems operate based on programmed algorithms and machine learning, which lack an understanding of the moral complexities of warfare. The decision-making processes in autonomous systems are rooted in data processing, not moral reasoning, which means they cannot fully account for the humanitarian impact of their actions. This lack of moral judgment is especially problematic when these systems are deployed in situations where civilians may be inadvertently harmed. Asaro warns that delegating life-and-death decisions to machines not only undermines IHL but also erodes the humanity inherent in warfare, which IHL aims to preserve (Asaro, 2019).

The concerns raised by autonomous technologies also extend to accountability. One of the central tenets of IHL is that individuals responsible for violations of the law must be held accountable. However, when an autonomous system commits a violation of IHL, such as targeting civilians or civilian infrastructure, it is unclear who should bear responsibility. Should the programmer who designed the system be held accountable for the algorithm's failure? Or should the operator who deployed the system be liable? These questions remain largely unanswered under the current legal framework, which fails to adequately address the responsibility of autonomous systems in armed conflict. Mary Ellen O’Connell (2020) highlights this accountability dilemma, noting that the lack of clarity in determining responsibility for autonomous weapons systems undermines the legal and moral foundations of IHL. This gap in accountability mechanisms is exacerbated by the opacity of AI decision-making, where it is often impossible to trace the reasoning behind a system's decision to use force.

Several real-life conflicts have highlighted these issues. For example, in the ongoing Ukraine conflict (2022), autonomous drones such as the ZALA Lancet have been used to target critical civilian infrastructure, including energy facilities. These attacks, which have led to widespread power outages and humanitarian suffering, violate the principle of proportionality by targeting non-combatant infrastructure. The destruction of infrastructure during wartime has long been a concern for IHL, as it exacerbates human suffering and can be seen as an act of collective punishment. The use of autonomous drones to carry out these strikes, which bypass human decision-making, highlights the risk that military objectives can be prioritized at the expense of civilians (Ukraine Analysis, 2022).

The growing reliance on autonomous systems in warfare also exposes significant gaps in existing legal frameworks. The Geneva Conventions and their Additional Protocols were developed in an era before the advent of AI and autonomous weapons, and as such, they do not provide specific guidelines for the regulation of these technologies. The lack of clear international agreements governing the use of autonomous weapons systems (LAWS) has led to a situation where states are largely free to interpret their IHL obligations in a way that aligns with their military and strategic interests. As Nehal Bhuta (2021) points out, this regulatory gap has led to a situation where autonomous systems are deployed without sufficient oversight, often prioritizing military objectives over the protection of civilians.

To address these challenges, there is a growing call from international organizations such as the ICRC, UN, and advocacy groups like the Campaign to Stop Killer Robots for a more comprehensive regulatory framework for autonomous technologies. The GGE on LAWS (2021) has proposed measures such as banning fully autonomous weapons systems and establishing accountability mechanisms for violations committed by autonomous systems. However, despite these efforts, significant challenges remain in creating an international consensus on the regulation of these technologies.

The call for greater international regulation of autonomous weapons systems is not just about ensuring compliance with IHL but also about protecting human dignity in warfare. The principle of humanity is a central tenet of IHL, and as autonomous technologies continue to shape the future of warfare, ensuring that these technologies comply with the core values of IHL is critical. As Heather Roff (2020) and others have argued, without meaningful human control, autonomous systems will continue to operate in a legal and ethical vacuum, with devastating consequences for civilian populations.

In outline, autonomous technologies present both opportunities and risks for International Humanitarian Law. While these technologies can improve precision, efficiency, and reduce risks to combatants, they also challenge the fundamental principles of IHL, including distinction, proportionality, necessity, and humanity. The real-life incidents discussed in this section such as the Kabul drone strike (2021), the use of loitering munitions in Nagorno-Karabakh (2020), and the targeting of civilian infrastructure in Ukraine demonstrate the risks that autonomous technologies pose to IHL. There is a critical need for legal reforms, including the amendment of Article 36 of Additional Protocol I, the introduction of binding international treaties, and the establishment of human oversight mechanisms to ensure that these technologies are used responsibly and ethically in conflict.

3. Findings and Analysis

The integration of autonomous technologies into modern warfare presents a dual-edged impact on International Humanitarian Law (IHL). These technologies promise greater precision, efficiency, and reduced risk for combatants, but they simultaneously challenge foundational IHL principles such as distinction, proportionality, and precaution. By examining real-world case studies and scholarly insights, this section highlights both the opportunities and risks posed by autonomous systems.

3.1 Real-World Impacts and IHL Violations

One of the most prominent examples of the risks associated with autonomous systems is the 2021 Kabul drone strike. Conducted by a U.S. drone, the strike targeted a civilian vehicle based on algorithmic assessments, resulting in the deaths of ten civilians, including seven children (UN Cybersecurity Report, 2021). The incident highlights the fallibility of AI

systems in distinguishing between combatants and non-combatants. The violation of the principle of distinction in this case underscores the dangers of relying on flawed data or misinterpreted intelligence. The Geneva Conventions and their Additional Protocols emphasize the importance of distinguishing between military and civilian targets, yet autonomous systems often fail to meet this requirement, which is central to Article 48 of Additional Protocol I to the Geneva Conventions (1977). The principles of distinction and proportionality were similarly violated in several other instances of autonomous warfare, as seen in Nagorno-Karabakh in (2020), where loitering munitions such as the Harop drone were deployed to strike civilian and military targets, causing extensive damage to civilian infrastructure and raising concerns about compliance with proportionality and necessity (Nagorno-Karabakh Conflict Report, 2020). The inability of autonomous systems to weigh the proportionality of civilian harm against military advantage underscores the need for meaningful human oversight in their deployment, particularly as autonomous systems often lack the nuanced judgment required to make ethical decisions on the battlefield.

The ongoing conflict in Ukraine illustrates the growing role of autonomous drones in warfare. Russian forces have used drones like the ZALA Lancet to target civilian energy facilities, causing widespread power outages and plunging cities into darkness during winter (Ukraine Analysis, 2022). These attacks violate the principle of proportionality and exacerbate humanitarian crises by depriving civilians of essential services. They also demonstrate the weaponization of infrastructure destruction, which is increasingly facilitated by autonomous technologies. The United Nations' Group of Governmental Experts on Lethal Autonomous Weapons Systems (GGE on LAWS) has highlighted these issues, stressing the necessity for international regulation of such technologies (GGE on LAWS, 2021). However, current IHL instruments lack specific provisions to address such autonomous technologies, leaving states with wide discretion in their interpretation of military necessity.

3.2 Cyber Warfare: A New Challenge for IHL

Cyber warfare represents another domain where autonomous systems challenge IHL. In 2019, during the Syrian conflict, cyberattacks targeted hospital infrastructure, disrupting medical services for civilians (Syria Report, 2019). These attacks violated the principles of humanity and precaution by deliberately harming non-combatants and undermining the delivery of essential humanitarian aid. Moreover, the anonymity and complexity of cyber operations make it difficult to attribute responsibility, complicating accountability under IHL. Article 52 of Additional Protocol I protect civilian infrastructure from attacks, but cyberattacks do not easily fall under traditional definitions of "attack" or "armed conflict," leaving gaps in regulation.

3.3 The Challenge of Accountability

A key challenge in the deployment of autonomous systems in warfare is accountability. Scholars like Mary Ellen O'Connell argue that autonomous systems blur the lines of responsibility in warfare. When an autonomous system commits a violation of IHL, it is unclear whether liability lies with the programmer, the operator, or the deploying state (O'Connell, 2020). This ambiguity erodes the moral and legal foundations of IHL, making it imperative to establish clear accountability mechanisms.

The lack of specific legal frameworks for autonomous systems in existing IHL instruments is a critical issue. The ICRC has called for "meaningful human control" over autonomous weapons, stressing the importance of human oversight to ensure compliance with IHL principles (Maurer, 2020). However, current IHL provisions, including Article 36 of

Additional Protocol I, fail to comprehensively address the deployment of autonomous technologies. This regulatory gap allows states to interpret their obligations independently, often prioritizing military advantage over humanitarian considerations (Bhuta, 2021). The UN's GGE on LAWS has proposed the adoption of binding international agreements to regulate autonomous weapon systems, yet progress has been slow, and the international community remains divided on how to approach these issues (GGE on LAWS, 2021).

3.4 The Ethical Dilemma of Autonomous Systems

The ethical implications of autonomous technologies further complicate their deployment. Peter Asaro emphasizes that delegating life-and-death decisions to machines risks dehumanizing warfare. Autonomous systems, lacking moral judgment, operate solely based on algorithms, which are incapable of understanding the broader humanitarian context in which decisions are made (Asaro, 2019). This detachment from human considerations could normalize violations of IHL and undermine the principles of humanity and necessity. Moreover, the deployment of autonomous systems in warfare raises concerns about the legal personhood of machines. As argued by Noel Sharkey, systems that operate independently could potentially be held liable for their actions, but current IHL lacks provisions for assigning responsibility to autonomous entities, further exacerbating the accountability dilemma (Sharkey, 2020).

3.5 The Positive Potential of Autonomous Technologies

Despite these risks, autonomous technologies also present opportunities to enhance compliance with IHL. AI-powered drones and surveillance systems can provide real-time data that helps military forces adjust operations to minimize civilian harm. During operations in Gaza, surveillance drones documented violations of IHL, aiding humanitarian organizations in their investigations and supporting evidence collection for war crimes tribunals (Gaza Report, 2021). These advancements demonstrate how autonomous systems, when responsibly deployed, can strengthen the enforcement of IHL.

3.6 Legal and Ethical Gaps: The Need for Reform

While international efforts such as those from the ICRC, the UN, and advocacy groups like the Campaign to Stop Killer Robots are pushing for reform, the legal frameworks governing autonomous technologies remain inadequate. As Nehal Bhuta (2021) points out, autonomous systems pose challenges that current IHL instruments cannot fully address. The absence of clear regulations for these technologies leaves room for states to exploit the regulatory gaps, prioritizing military objectives over the protection of civilians and respect for IHL.

The loopholes in existing IHL are particularly concerning in the context of autonomous systems that act with limited human intervention. For instance, Article 36 of Additional Protocol I mandate that new weapons must be reviewed to ensure compliance with IHL, but the review process is insufficient to address the specific challenges of autonomous systems. The ICRC has recommended amendments to this article, suggesting the inclusion of new criteria for evaluating the humanitarian impact of autonomous technologies before their deployment (Maurer, 2020).

In conclusion, the findings reveal the dual-edged nature of autonomous technologies in warfare. While such systems offer potential benefits, such as improved targeting accuracy and enhanced surveillance, their deployment without adequate safeguards poses significant risks to IHL. Case studies from Kabul, Nagorno-Karabakh, Ukraine, and Syria demonstrate the profound challenges these technologies pose to humanitarian principles. Addressing these

challenges requires a coordinated international effort to develop robust legal frameworks and ethical standards, ensuring that technological advancements align with the fundamental values of IHL. The ICRC's call for meaningful human control and the UN's GGE on LAWS are important first steps, but much more must be done to close the existing legal gaps and ensure accountability in autonomous warfare.

4. Recommendations

The integration of autonomous technologies into warfare has created new challenges for International Humanitarian Law (IHL). While these technologies offer the potential for greater precision, reduced risk to combatants, and enhanced efficiency, they also pose significant risks to the foundational principles of IHL, such as distinction, proportionality, and precaution. To mitigate these risks and ensure that the use of these technologies aligns with humanitarian values, this section outlines detailed recommendations aimed at strengthening existing legal frameworks, addressing gaps, and ensuring responsible deployment of autonomous systems in warfare.

4.1 Strengthening International Legal Frameworks

One of the most pressing issues identified is the lack of specific legal frameworks to regulate autonomous technologies in warfare. Existing IHL instruments, including the Geneva Conventions (1949) and Additional Protocol I (1977), were not designed with autonomous systems in mind, and as such, they fail to address the challenges posed by these technologies. To bridge these gaps, the following steps are recommended:

- **Amendment of Article 36 of the Additional Protocol I**: Article 36 of the Additional Protocol I mandates that states must evaluate new weapons to ensure they comply with IHL. However, the current language does not account for the unique challenges posed by autonomous weapons systems (AWS). It is recommended that Article 36 be amended to include specific criteria for evaluating autonomous technologies, particularly with regard to their ability to comply with the principles of distinction and proportionality. The ICRC has called for the inclusion of such criteria, noting that current provisions do not adequately regulate autonomous systems (Maurer, 2020).

- **Adoption of Binding International Treaties on Autonomous Weapons**: A global regulatory framework is essential for the responsible development and deployment of autonomous systems. A binding international treaty should be established to regulate Lethal Autonomous Weapons Systems (LAWS) and set out clear standards for their development, use, and oversight. This treaty should build on existing UN frameworks such as the Convention on Certain Conventional Weapons (CCW), which has been addressing emerging technologies like LAWS through the Group of Governmental Experts (GGE on LAWS). Key elements of such a treaty should include:

    - A ban on fully autonomous weapons that operate without human oversight, particularly in situations that involve targeting decisions.
    - Regulations for human oversight of all autonomous systems, ensuring that human judgment remains involved in critical decisions regarding the use of force.
    - Clear accountability mechanisms for the use of autonomous systems in warfare, holding states and manufacturers responsible for violations of IHL.

4.2 Meaningful Human Control and Accountability

A central concern regarding the deployment of autonomous systems in warfare is the ambiguity of accountability when violations of IHL occur. Autonomous technologies often lack the capacity to make contextual ethical judgments, raising significant concerns about the principle of accountability. To address this:

- **Mandatory Human Oversight in Autonomous Operations**: The ICRC has strongly advocated for meaningful human control over all autonomous systems (Maurer, 2020). This recommendation should be enshrined in both national and international regulations, ensuring that human operators retain final authority over critical decisions, particularly in targeting and the use of force. This oversight should be mandatory in all military contexts, ensuring that autonomous systems do not act independently in life-and-death situations.

- **Clarification of Accountability Structures**: Current IHL does not provide clarity on accountability when autonomous systems are involved in violations of IHL. Legal frameworks must explicitly define who is responsible when an autonomous system commits a violation:
    - Those who design algorithms for autonomous systems should be held responsible for ensuring that their systems comply with IHL.
    - Military personnel using autonomous systems should be held accountable for ensuring that the systems are deployed within the confines of IHL principles.
    - States deploying autonomous technologies must bear the ultimate responsibility for ensuring that their use complies with IHL, and they must take responsibility for any IHL violations caused by their deployment.

4.3 Establishment of a Universal Drone Registry

To improve accountability and transparency, the creation of a universal drone registry should be considered. This registry would track all drones and autonomous systems used for military purposes, providing detailed information on their capabilities, operational use, and compliance with IHL standards. Key features of this registry should include:

- **Mandatory Registration for All Military Drones**: States should be required to register all military drones and autonomous systems with an international registry, overseen by a regulatory body such as the United Nations or the ICRC. This registry would track weaponized drones, loitering munitions, and autonomous systems in real-time, allowing for greater transparency and accountability in their use.
- **Transparency in Deployment**: The registry should include information on the specific operational roles of autonomous systems, including details on their intended use, location of deployment, and the types of targets they are programmed to engage. This information should be made available to relevant international bodies, such as the ICRC and UN, to monitor compliance with IHL.
- **Verification Mechanism**: The registry should be complemented by a verification mechanism to ensure that states are adhering to international regulations and IHL principles when deploying autonomous systems. This verification could include inspections, audits, and the use of satellite monitoring to track drone activity.

4.4 Ethical Guidelines for Autonomous Warfare

The deployment of autonomous systems in warfare raises significant ethical concerns. To ensure that these technologies are used responsibly, ethical guidelines must be developed that prioritize human dignity, humanitarian values, and the protection of civilians:

- **Adoption of Ethical AI Standards**: The UN and ICRC should collaborate with AI experts and military ethicists to develop ethical guidelines for the design and use of autonomous systems in warfare. These guidelines should ensure that AI algorithms used in warfare align with the principles of IHL, including necessity, proportionality, and distinction. The ICRC's ethical standards for autonomous technologies should emphasize the need for machines to be programmed to understand and uphold humanitarian values during combat.
- **Ethical Training for Operators**: Human operators of autonomous systems should undergo mandatory ethics training that covers the complexities of deploying autonomous technologies in warfare. This training should focus on the ethical challenges posed by autonomous systems, including AI's limitations and the importance of maintaining human oversight in all critical decisions.

4.5 International Cooperation and Capacity Building

To address the global challenges posed by autonomous technologies, international cooperation is essential. States must work together to create a unified approach to the regulation of autonomous systems, ensuring that all parties adhere to the same standards.

- **Multilateral Negotiations**: States should engage in multilateral discussions under the auspices of the United Nations or the CCW to develop binding international agreements governing the use of autonomous technologies in warfare. These agreements should aim for global consensus on the regulation of autonomous weapons systems and the ethical deployment of these technologies.
- **Capacity Building for Developing States**: International organizations such as the ICRC, UN, and World Bank should offer capacity-building programs to help developing states regulate autonomous technologies. These programs should include legal and technical assistance to help states draft regulations, build regulatory frameworks, and implement oversight mechanisms for the deployment of autonomous systems.

5. Conclusion

The integration of autonomous technologies into warfare has brought both opportunities and challenges to International Humanitarian Law (IHL). These technologies, such as artificial intelligence (AI), autonomous weapon systems (AWS), and drones, offer increased precision and reduced risks to combatants. However, as demonstrated by incidents like the 2021 Kabul drone strike and Nagorno-Karabakh, autonomous systems can fail to comply with IHL principles, particularly distinction, proportionality, and necessity, potentially causing harm to civilians. While these technologies hold promise, their deployment must be carefully regulated. This paper has outlined the need for stronger legal frameworks, such as amending Article 36 of Additional Protocol I, establishing international treaties for Lethal Autonomous Weapons Systems (LAWS), and ensuring meaningful human control over autonomous systems. These actions will safeguard IHL principles and ensure accountability in cases of violations. Further, the creation of a universal drone registry, the development of ethical AI standards, and enhanced international cooperation are crucial to improving transparency, accountability, and oversight in the use of autonomous technologies. The establishment of independent oversight bodies and capacity-building programs will help ensure compliance with IHL, especially in conflict zones where these technologies are most heavily deployed. In conclusion, while autonomous technologies have the potential to enhance operational efficiency, their responsible use requires robust legal, ethical, and regulatory frameworks. It is imperative for the global community to take action now to ensure that these systems are deployed in a way that upholds the core values of humanity, dignity, and humanitarian protection central to IHL.

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