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***Navigating the Intersection of Military AI and International Humanitarian Law: Challenges  
and Prosecution Principles***

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**ABSTRACT**

*The rapid integration of Artificial Intelligence (AI) into military operations presents unprecedented challenges for International Humanitarian Law (IHL). This paper explores the legal and ethical implications of military AI, focusing on accountability, compliance with IHL, and the application of prosecution principles to AI-driven violations. The manuscript emphasizes the necessity of adapting existing legal frameworks to address the complexities of autonomous technologies in warfare.*

*The adoption of Artificial Intelligence (AI) in military applications has redefined the dynamics of warfare, offering capabilities like autonomous targeting, predictive analytics, and enhanced decision-making. However, these advancements raise critical questions about compliance with International Humanitarian Law (IHL), particularly regarding accountability and prosecution for potential violations. This article delves into the challenges AI poses to the established legal framework, focusing on the principles of distinction, proportionality, and necessity, while offering solutions to bridge the legal and ethical gaps.*

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**Introduction**

The rapid escalation of a global arms race in military artificial intelligence (AI) development underscores its transformative potential in redefining modern warfare. Technologies such as autonomous drones, advanced surveillance systems, and decision-making algorithms are increasingly being deployed to enhance efficiency, precision, and operational capabilities. These innovations promise a new era of combat where technological superiority may significantly influence outcomes. However, the growing reliance on AI systems with varying levels of autonomy raises profound concerns about their compatibility with the foundational

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principles of International Humanitarian Law (IHL) that regulate conduct during armed conflicts.

The principles of distinction, proportionality, and necessity—core tenets of IHL aimed at minimizing human suffering and safeguarding non-combatants—are particularly vulnerable to erosion when decision-making responsibilities shift from humans to machines. Autonomous systems lack the ability to fully grasp the contextual nuances of a battlefield or make moral judgments in the way human operators can. This inability poses a significant risk of unlawful actions, such as misidentifying legitimate military targets or failing to account for disproportionate harm to civilian populations. Compounding this issue is the notorious "black box" problem, where the internal workings of AI systems remain opaque, making it exceedingly difficult to trace their decision-making processes. This lack of transparency not only impedes accountability for potential IHL violations but also undermines efforts to build trust and legitimacy around the use of AI in military operations.

Addressing these challenges requires a multifaceted approach. Legal and ethical frameworks must evolve alongside technological advancements to ensure that the principles of IHL are upheld in the age of AI-driven warfare. Governments, international organizations, and AI developers must collaborate to create systems with built-in safeguards that prioritize compliance with humanitarian standards. Transparency in AI design and deployment, coupled with mechanisms for assigning accountability, is essential to bridge the gap between innovation and responsibility. Without such measures, the transformative potential of AI in military contexts risks being overshadowed by its capacity to exacerbate the very suffering IHL seeks to prevent.

This article examines these challenges and outlines prosecutorial mechanisms to ensure that the use of military AI adheres to international legal standards.

### **1. Military AI and Its Challenges Under IHL**

The use of AI in military applications poses challenges to the core principles of International Humanitarian Law (IHL), such as distinction, proportionality, and necessity. Autonomous systems may fail to differentiate between combatants and civilians in complex situations, leading to unlawful targeting. Proportionality assessments, requiring nuanced human



judgment, are difficult to program into AI systems. Moreover, the deployment of AI without adequate human oversight risks unnecessary harm, undermining the principle of necessity. These issues highlight the difficulty of aligning military AI technologies with IHL's humanitarian objectives.

**1.1 Understanding the Principles of IHL:** IHL aims to balance military necessity with humanitarian considerations during armed conflicts. However, applying these principles to military AI introduces complexities:

The deployment of autonomous systems in military operations raises profound concerns about their ability to uphold the core principles of International Humanitarian Law (IHL), including distinction, proportionality, and necessity.

**Distinction:** One of the most critical challenges lies in the principle of distinction, which mandates the clear differentiation between combatants and civilians to prevent unlawful targeting. Autonomous systems, relying heavily on pattern recognition algorithms, are prone to errors in dynamic and ambiguous scenarios, such as urban warfare where civilians and insurgents may intermingle. This technological limitation increases the risk of misidentifying civilians as combatants, potentially leading to catastrophic violations of IHL and the loss of innocent lives.

**Proportionality:** Similarly, the principle of proportionality—designed to ensure that the collateral damage inflicted during military actions is not excessive in relation to the anticipated military advantage—poses significant challenges for AI systems. Assessing proportionality requires nuanced contextual judgment and the ability to weigh complex ethical considerations, which are beyond the capabilities of pre-programmed algorithms. AI systems, devoid of human intuition and moral reasoning, may fail to balance these factors, resulting in decisions that disproportionately harm civilians and non-combatant infrastructure.

**Necessity:** The principle of necessity, which requires that military actions be limited to what is essential to achieve legitimate objectives, is another area where AI systems may falter. Autonomous systems, programmed to execute specific objectives, may lack the capacity to adapt to evolving circumstances on the battlefield. This rigidity can lead to

actions that go beyond what is militarily required, causing unnecessary harm and undermining the humanitarian goals of IHL. For instance, an AI system may continue to pursue a target despite the opportunity for de-escalation, simply because it is following pre-defined instructions without the ability to reconsider its actions in real time.

Addressing these challenges requires robust safeguards and oversight mechanisms to ensure that the deployment of autonomous systems aligns with the principles of IHL. Human oversight, transparency in AI decision-making processes, and strict regulatory frameworks are essential to mitigate the risks posed by these technologies. Without such measures, the use of AI in warfare threatens to undermine the fundamental tenets of IHL, leading to consequences that are not only unlawful but also profoundly unethical.

**1.2 The Role of Autonomy and Human Oversight:** AI systems operate with varying degrees of autonomy. Fully autonomous systems, which can select and engage targets without human intervention, pose significant risks of IHL violations. While human-in-the-loop systems involve human oversight, decisions made under time pressure may still lack adequate scrutiny.

## **2. Legal and Ethical Gaps in AI-Driven Warfare**

AI in warfare exposes significant legal and ethical gaps. Accountability becomes ambiguous when autonomous systems make decisions, as traditional legal frameworks rely on identifying intent and causation. The “black box” nature of AI, where decision-making processes are opaque, complicates investigations into IHL violations. Ethical dilemmas arise as delegating life-and-death decisions to machines challenges moral norms and human dignity. Addressing these gaps requires updating legal frameworks and embedding ethical safeguards in AI systems to ensure their compliance with humanitarian principles.

**2.1 Accountability Challenges:** Determining who is accountable for the actions of autonomous systems is a critical challenge. Traditional prosecution principles rely on identifying a clear chain of responsibility, but AI introduces ambiguity:

**Developers:** Are they liable for programming flaws or biased algorithms?

**Operators:** Should they be held responsible for deploying systems beyond their understanding?



**Commanders:** Can they be prosecuted for outcomes they did not directly control?

**2.2 The “Black Box” Problem:** The inherently opaque nature of numerous artificial intelligence (AI) systems poses profound challenges in understanding and interpreting their decision-making processes. Unlike human decision-makers, whose reasoning can often be articulated and scrutinized, AI systems frequently operate within "black boxes," where the logic behind their outcomes remains concealed. This lack of transparency becomes particularly problematic in contexts where adherence to International Humanitarian Law (IHL) is essential. Without a clear understanding of how an AI system arrives at a decision, evaluating whether its actions comply with IHL becomes an arduous task. This opacity obstructs efforts to determine if a particular action constitutes a violation, leaving investigators grappling with incomplete information. Furthermore, the absence of insight into the system’s underlying logic makes attributing accountability for potentially unlawful actions speculative at best. In such scenarios, the inability to trace responsibility undermines the principles of justice and accountability that form the cornerstone of legal frameworks like IHL.

**2.3 Ethical Dilemmas:** The deployment of military AI raises ethical concerns about delegating life-and-death decisions to machines. Critics argue that removing human judgment from lethal actions undermines the moral accountability central to IHL.

### **3. Prosecuting Violations Involving AI**

Prosecuting IHL violations involving military AI is challenging due to the complex chain of responsibility. Proving intent is difficult since AI systems lack consciousness, and their actions result from programming and data inputs. Developers, operators, and commanders could all share liability, creating uncertainty in accountability. Command responsibility is particularly problematic if commanders lack full control over AI outcomes. To address these challenges, new accountability models are needed, such as holding developers liable for design flaws, ensuring operator training, and requiring commanders to oversee AI deployment rigorously.

**3.1 Intent and Causation in Prosecutions:** Prosecution under IHL requires proving intent or negligence. However, AI systems lack intent, and their actions are the result of programming and data inputs. This creates challenges in attributing liability:

- If an AI system acts unpredictably due to poor programming, should the developer or operator be prosecuted for negligence?
- Can the principle of command responsibility be applied if commanders could not foresee the AI's actions?

**3.2 Proposed Accountability Models:** To address these challenges, a hybrid model of accountability is needed:

**Strict Liability for Developers:** Hold developers accountable for defects in the AI system's design or functionality.

Operator responsibility and command oversight are critical components in ensuring the ethical and lawful deployment of artificial intelligence (AI) systems, particularly in sensitive areas such as military operations. It is imperative that operators of AI systems are adequately trained to comprehend the limitations, potential biases, and risks inherent in these technologies. Proper training equips operators with the necessary knowledge to mitigate errors, prevent misuse, and make informed decisions when interacting with AI systems. This understanding fosters a sense of accountability, ensuring that the technology is used within its intended scope and does not lead to unintended consequences.

Equally important is the role of military commanders in exercising oversight over AI deployments and their outcomes. Commanders must retain ultimate control and decision-making authority, ensuring that AI systems function as tools to assist human judgment rather than replace it. By maintaining stringent oversight, commanders can monitor the performance and implications of AI applications, intervening whenever necessary to ensure compliance with ethical standards and legal frameworks, such as International Humanitarian Law. This dual approach of operator responsibility and command oversight creates a balanced framework that minimizes risks while optimizing the potential benefits of AI in complex and high-stakes environments.



#### **4. Recommendations for Bridging the Gap**

To bridge the gap between military AI and International Humanitarian Law (IHL), several steps are crucial. Legal frameworks must be updated to define accountability for AI systems and establish clear regulations for their deployment in warfare. Ethical guidelines should mandate the incorporation of IHL principles in AI design, ensuring systems prioritize distinction, proportionality, and necessity. Human oversight should be emphasized, integrating fail-safes to mitigate unintended harm. Additionally, international collaboration is vital to create universal standards, promote responsible AI development, and enforce compliance through treaties and multilateral agreements. Together, these measures can ensure AI technologies enhance military operations without compromising humanitarian principles. The rapid advancement of military AI necessitates a comprehensive approach to ensure its compliance with International Humanitarian Law (IHL) and global ethical standards. Below are the key areas of focus to address the unique challenges posed by autonomous systems in warfare:

**4.1 Adapting Legal Frameworks-** Existing IHL frameworks must evolve to account for the distinct challenges that military AI introduces to the battlefield. Specific steps include:

**Developing International Treaties or Conventions:** It is essential to create legally binding agreements that define the permissible scope and limits of AI deployment in armed conflicts. Such treaties should explicitly outline the boundaries within which AI technologies can operate while ensuring alignment with IHL principles such as distinction, proportionality, and necessity.

**Establishing Guidelines for Human Oversight:** Human involvement must remain integral to the use of autonomous systems in military operations. Clear legal standards should be established to mandate human oversight at critical decision-making junctures, ensuring that machines do not operate entirely without human intervention.

**4.2 Strengthening Ethical Guidelines-** To prevent the misuse of AI in warfare, robust ethical safeguards must be incorporated into its design and deployment. This involves:

**Embedding IHL Compliance in AI Programming:** AI systems must be programmed to prioritize adherence to IHL principles. Developers should focus on creating algorithms

that inherently avoid actions violating the principles of distinction, proportionality, and necessity.

**Integrating Fail-Safe Mechanisms:** Autonomous systems should include built-in fail-safes capable of overriding potentially harmful actions. These mechanisms would allow for the prevention of catastrophic errors in scenarios where AI misjudges or operates outside its intended parameters.

**Implementing Ethical Review Processes:** Regular audits and reviews should be conducted to ensure AI systems are functioning within ethical and legal boundaries, reducing the likelihood of misuse or unintended consequences.

**4.3 Promoting International Collaboration-** The regulation of military AI cannot be achieved unilaterally; it demands collective efforts at a global level. Key measures include:

**Developing Universal Standards:** States must work together to establish globally accepted norms and technical standards for the development, deployment, and use of AI in warfare. These standards should address transparency, accountability, and safety.

**Conducting Joint Research:** Collaborative research initiatives among nations, academia, and industry experts can help assess AI's impact on warfare and identify solutions to emerging challenges. Sharing knowledge and resources will accelerate the development of responsible AI practices.

**Enforcing Compliance through Multilateral Agreements:** International agreements must include mechanisms for monitoring and enforcing adherence to established legal and ethical guidelines. Such agreements should enable collective accountability and impose penalties for violations, thereby strengthening global governance over military AI.

### **Conclusion**

The intersection of military artificial intelligence (AI) and International Humanitarian Law (IHL) brings forth a complex blend of opportunities and challenges that demand careful navigation. On one hand, AI has the potential to significantly enhance operational efficiency, streamline decision-making processes, and reduce human error in high-pressure scenarios. These advantages could lead to more precise targeting, minimizing collateral damage and the





loss of civilian lives, which aligns with the humanitarian objectives of IHL. On the other hand, the autonomous and often opaque nature of AI systems introduces significant risks to the core principles of IHL, such as distinction, proportionality, and accountability. The inability of AI systems to fully comprehend nuanced ethical considerations or adapt to unforeseen circumstances raises concerns about their deployment in contexts where adherence to IHL is paramount.

To address these multifaceted challenges, there is an urgent need for proactive legal reform to establish robust regulatory frameworks that govern the use of AI in military operations. Such reforms should be complemented by ethical innovation, fostering the development of AI systems designed with built-in safeguards to ensure compliance with international norms. Furthermore, global collaboration among states, technology developers, and international organizations is essential to create a unified approach to the responsible use of AI in warfare. This collaborative effort can help harmonize legal standards, promote transparency, and build trust among nations. By embracing these measures and navigating the complexities of military AI with foresight and diligence, the international community can ensure that the deployment of AI systems upholds the principles of humanity and law, even amidst rapid technological advancements in warfare.