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# **AUTONOMOUS WEAPON SYSTEMS AND THE NEED FOR ITS REGULATION**

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## **ABSTRACT**

The unprecedented emergence of autonomous weapon systems in the 21st century raises serious concerns with regards to global security. The ethical, legal, and moral implications of these developments pose significant challenges for the stability of the world, making it important for all countries to reach a consensus on their effective regulation. This paper provides a comprehensive analysis of the complex landscape surrounding autonomous weapons, addressing their evolution. The lacunas in the existing legal framework. The paper further analyses the impact of AWS from an ethical and security perspective. It also mentions numerous efforts being taken as well as the models being proposed for regulating AWS.

**Keywords:** Autonomous weapon systems, Artificial intelligence, Accountability, Responsibility, proliferation, morality, regulation, global security

## INTRODUCTION

In an era of rapid technological development, the emergence of Artificial intelligence and its convergences with military hardware poses significant risk for the global security potentially challenging established norms and principles dealing with regards to its security implications and ethical conduct of warfare. Artificial intelligence (AI) is “human intelligence or behaviour demonstrated by machines”. In practice, an AI is a computer program (software). There is no precise definition of AI, and the meaning has evolved over time, but a number of technologies are generally understood to be included: pattern recognition, image recognition, voice recognition, and understanding of natural language.<sup>1</sup> The use of autonomous weapon system is a topic of concern as it significantly lowers the threshold for states to enter into war, increasing the likelihood of conflict, it also includes the risk of delegating the right to kill a human being to machines

The international committee of red cross (ICRC) define AWS as any weapons that select and apply force to targets with ought human intervention <sup>2</sup> thus the definition clearly indicates that these systems would have no “human in the loop” to direct their use of force.<sup>3</sup> The fusion of AI with weapons signals a transformative era in the evolution of warfare, emphasizing the importance of its regulation in order to address the ethical and security implication in a timely fashion manner and to serves as a safeguard against the indiscriminate use of such weapons ensuring accountability and responsibility in case of any war crimes or any other grave breaches undermining human dignity, global security and right to life .numerous frameworks have been laid down in order to determine the model to be adopted for regulating AWS but the essential foundation lies in a universally accepted definition which would pave the way forward for the future regulatory regimes . failure to act on time risks the potential threat of arms race, proliferation of AWS increasing the risk of conflict and instability in the world .

## AUTONOMOUS WEAPON SYSTEM: AN OVERVIEW

The evolution of autonomous weapon systems (AWS) has a long history spanning centuries and culminating in the cutting-edge realm of AI-integrated weapons. Autonomous weapon systems have been used worldwide for decades, beginning with the invention of the Gatling

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<sup>1</sup> OICT Emerging Tech Team. "Artificial Intelligence." Emerging Technologies Whitepaper Series, July 2018

<sup>2</sup> Neil Davison, *what you need to know about autonomous weapons*, INTERNATIONAL COMMITTEE OF THE RED CROSS (July.26 2022), <https://www.icrc.org/en/document/what-you-need-know-about-autonomous-weapons>

<sup>3</sup> *Mind the Gap The lack of Accountability for killer Robots*, HUMAN RIGHTS WATCH (April. 9, 2015), [https://www.hrw.org/report/2015/04/09/mind-gap/lack-accountability-killer-robots#\\_ftnref3](https://www.hrw.org/report/2015/04/09/mind-gap/lack-accountability-killer-robots#_ftnref3)

gun, which opened the way for modern machine guns. Land and naval mines, which used simple pressure-activated explosives, are also attributed to being the first AWS. These rudimentary forms of AWS emerged in the 19th century and were devoid of any sophisticated technology, but marked the first time when humans were removed from the loop of military decision-making, commencing the era of autonomous weaponry<sup>4</sup>. The twentieth century warfare paved the door for precision guided weapons, often known as smart weapons. These smart weapons would use its passive acoustic sensors to accurately strike targets from a long distance. The 21<sup>st</sup> century marked the integration of Artificial intelligence in the weapons thereby providing them self-navigation capabilities with the ability to independently track and engage targets, blurring the lines between human and machine control. The most popular among these are the Unmanned Aerial Vehicles (UAVs), or drones, which have become ubiquitous in the 21st century. Ground-based and aerial robots are the next frontier, still in development, envisioned for autonomous combat operations.

These advancements are indicative of a broader technological trend known as the emergence of artificial intelligence, often referred to as the next industrial revolution. the AI revolution is enabling the cognitization of machines, creating machines that are smarter and faster than humans for narrow tasks<sup>5</sup>. Enhancing their autonomy by providing them with a target identification library and various sensor capabilities through which they can recognize the target and then fire upon it. Automation in the context of autonomous weapon systems (AWS) refers to the degree to which a weapon system can perform tasks without human intervention. Automation can range from simple functions, such as navigation or target detection, to complex functions, such as target selection or engagement. Automation can also vary depending on the type and level of human control, supervision, or oversight over the weapon system.<sup>6</sup>the common types of AWS are.

- Semi-autonomous weapon systems, which, on the basis of their level of autonomy, can also be classified as human-in-the-loop weapons, can perform some tasks autonomously but only with human command.

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<sup>4</sup> Richard Dunley, *Mines: the original “autonomous weapons” and the failure of early 20th century arms control*, HISTORY & POLICY (July. 18,2018), Mines: the original “autonomous weapons” and the failure of early 20th century arms control | History and Policy

<sup>5</sup> PAUL SCHARRE, *AUTONOMOUS WEAPONS AND THE FUTURE OF WAR* ARMY OF NONE 12 (W.w. Norton & Company 2018).

<sup>6</sup> Frank Sauer, *Autonomy in Weapons Systems: Playing Catch up With Technology*, Humanitarian Law & Policy (Jan. 27,2024, 8:26 PM) <https://blogs.icrc.org/law-and-policy/2021/09/29/autonomous-weapons-systems-technology/>.

- supervised autonomous weapon systems, which, based on autonomy, can be classified as human-on-the-loop weapons; these weapons can select targets and deliver force under the oversight of a human operator who can override the robots' actions; and
- autonomous weapon systems, also known as human-out-of-the-loop weapons; these weapons are capable of selecting targets and delivering force without any human input or interaction.

## GAPS AND CHALLENGES IN EXISTING LEGAL STRUCTURE

*"If there are recognizable war crimes, there must be recognizable criminals."*<sup>7</sup>

The notion of individual accountability for unlawful acts has been deeply rooted in various branches of law, including international, domestic, criminal law, and humanitarian law. According to Steven Ratner, this concept of individual accountability goes beyond the conventional boundaries of subjects of international law, encompassing a complex combination of legal principles and a broad range of punitive processes. Irrespective of whether illicit activities occur in international or non-international armed conflicts<sup>8</sup>, personal culpability remains a crucial component of customary international law.

As highlighted in the *Prosecutor v Tadic case*<sup>9</sup>, violations of the law result in individual criminal responsibility, regardless of whether they are committed in internal or international armed conflicts. Consequently, when it comes to personal responsibility for the utilization of certain weapons systems, such as AWS, the distinction between international and non-international armed conflicts becomes irrelevant. Asserting that AWS function as weapons rather than as combatants or fighters implies that in instances where a crime occurs due to the deployment of AWS, the individual responsible for deploying it bears criminal liability.

Nevertheless, as certain AWS gain more autonomy, determining liability becomes more complex. Throughout history, armed factions led by commanders or leaders have engaged in warfare. Justifications like "my commander instructed me" or "I had no alternative; it was the group's decision" were frequently employed to rationalize individual actions. The current frameworks encounter considerable difficulties in adequately addressing the legal intricacies

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<sup>7</sup> See generally MICHAEL WALZER, JUST AND UNJUST WARS A MORAL ARGUMENT WITH HISTORICAL ILLUSTRATIONS (2015)

<sup>8</sup> Ratner Et Al, Supra Note 114, At. 3

<sup>9</sup> Case No. It-94-1-T

and gaps linked to the advancement and implementation of autonomous weapon systems (AWS). These challenges can be ascribed to various significant factors.

Firstly, the lack of a universally agreed-upon definition of autonomous weapon systems hinders the establishment of clear legal boundaries and regulations. Without a precise understanding of what constitutes an AWS, it becomes difficult to effectively govern their use and hold responsible parties accountable.

Determining responsibility and accountability for the actions of autonomous weapons is another major challenge. When an AWS causes harm, it is unclear who should be held legally responsible – the programmer, the manufacturer, or the entity deploying the system. This ambiguity further complicates the legal framework surrounding AWS.

Moreover, existing international humanitarian law, which governs armed conflicts, may not adequately address the use of autonomous weapons. Complex issues such as distinguishing between civilians and combatants and ensuring proportionality in the use of force become more intricate when decisions are made by machines. The existing legal frameworks need to adapt to effectively address these complexities.

Furthermore, there is a lack of pre-emptive regulation specifically designed for autonomous weapons. The rapid pace of technological advancement often outpaces the ability of legal frameworks to keep up. This creates a gap where AWS can be developed and deployed without adequate legal oversight.

Ethical considerations also pose challenges in the existing legal frameworks. The potential for indiscriminate use and violations of human dignity by autonomous weapons are not explicitly addressed. The ethical implications of AWS need to be explicitly incorporated into the legal frameworks to ensure responsible and ethical use.

In conclusion, the existing legal frameworks encounter various obstacles in adequately addressing the legal challenges and gaps associated with autonomous weapon systems. These challenges include the lack of definition and clarity, responsibility and accountability issues, compliance with international humanitarian law, the absence of pre-emptive regulation, ethical considerations.

## **ETHICAL CONSIDERATIONS IN AUTONOMOUS WEAPON USE**

The advancement of technology has brought humanity to a critical juncture in its approach to warfare. Science and technology luminaries such as Stephen Hawking, Elon Musk, and Apple

cofounder Steve Wozniak have spoken out against autonomous weapons, warning they could spark a “global AI arms race.”<sup>10</sup> With nations pursuing autonomy in their weaponry Autonomous weapons raise, serious moral and humanitarian concerns

From a moral standpoint, giving robots the ability to decide a person's life or death is very unacceptable. Unexpected actions can lead to tragic incidents, such as the Patriotic Fratricide of 2003, where the Patriotic weapon system misclassified an aircraft as an anti-radiation missile, resulting in the deaths of several service members of the U.S. Navy.

AWS also contravene the combat regulations established by international Humanitarian law which are as follows

- The rule of Distinction – AWS would face difficulty in distinguishing between civilian and military targets as it lacks human qualities that facilitate making such determinations, this problem becomes more complex in context where an active combatant often tries to conceal its identity, or in case of surrendering soldier
- The rule of proportionality – prohibits attacks in which expected civilian harm outweighs anticipated military advantage<sup>11</sup>. Proportionality, being subjective and context-dependent, renders it infeasible to pre-program machines to navigate the multitude of situations they may encounter.
- The rule of precaution – This rule requires militaries to “take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects.”<sup>12</sup> Under this rule the utilization of fully autonomous weapons would be restricted to only those situation where it would have the lowest civilian impact compare to other weapons capable of accomplishing the desired military objective.

There is a need for clearer standards regarding the level of human control required in the deployment and use of autonomous weapons. Meaningful human involvement in critical decisions is crucial to maintaining ethical and legal standards. The existing frameworks should provide guidance on the extent of human control necessary to ensure responsible use of AWS.

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<sup>10</sup>*Supra* note 4

<sup>11</sup> *Supra* note 2

<sup>12</sup> Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I), adopted June 8, 1977, 1125 U.N.T.S. 3, entered into force December 7, 1978, art. 57(2)(a)(ii).

Lastly, transparency and information sharing are essential in addressing the legal challenges posed by autonomous weapons. The creation and application of autonomous systems should be accompanied by transparent processes and the sharing of relevant information to ensure accountability and facilitate effective regulation

While autonomous weapons may have an upper hand due to the absence of human emotions such as fear, anger, and frustration, they lack the innate inhibitions humans possess against harming fellow beings, thus compromising a vital ethical restraint in warfare. Thereby, the cumulative risk outweighs any benefits.

## **SECURITY IMPLICATIONS OF UNREGULATED AUTONOMOUS WEAPONS**

With countries of all sizes, especially the major powers, jumping in and frenetically investing in the autonomy of weapons, AWS could also trigger an arms race with one state obtaining it, which would compel other states to acquire them too. militaries are in a fanatic race to deploy robots across sea, land, and air, with drones actively patrolling the skies in more than ninety countries. While no country openly declares its pursuit of AWS, AI technology is rapidly advancing in covert defence research facilities and in its commercially viable sectors. Rapid technological advancements present serious security concerns, including the risk of weapons falling into the hands of non-state entities and the potential for political manipulation to suppress dissent.

The swift dissemination of drones to nearly a hundred nations globally, coupled with their usage by non-state groups like Hamas, Hezbollah, ISIS, and Yemeni Houthi rebels, indicates that the proliferation of armed drones is forthcoming, posing significant challenges for international security and regulatory frameworks. Armed robots are also proliferating on the ground and at sea. South Korea has stationed a robot sentry gun along its border with North Korea, while Israel has dispatched an armed robotic ground vehicle, the Guardium, for patrols near the Gaza border. Armed robots are also taking to the seas. Israel has engineered an armed unmanned boat, the Protector, for coastal patrols, while Singapore has acquired and deployed it for counterpiracy operations in the Straits of Malacca<sup>13</sup>.

The autonomous nature of these weapons, while promising efficiency, opens a Pandora's box of potential misuse and unintended consequences. The other security implications in relation to AWs are the algorithmic bias. As AWs are designed by humans, they may reflect human

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<sup>13</sup> PAUL SCHARRE, AUTONOMOUS WEAPONS AND THE FUTURE OF WAR ARMY OF NONE 116-117 (W.w. Norton & Company 2018).

values and decisions<sup>14</sup>, which may not leave them remaining neutral, thereby leaving a possibility that they could be used for targeting specific groups, leading to indiscriminate attacks and civilian casualties.

Hacking and manipulation of these weapons also pose serious concerns, as they may even turn these weapons against their owners. Thus, the nature of AWS opens a Pandora's box of potential misuse and unintended consequences which demands a cautious approach, urging responsible development and effective regulations.

## THE NEED FOR INTERNATIONAL COLLABORATION

The critical importance of international collaboration is highlighted by the global development and deployment of autonomous weapon systems (AWS). This necessity arises due to the ethical, legal, and security issues associated with AWS. Ethically, it is crucial to consider the diverse perspectives and cultural values of different nations when making decisions that involve matters of life and death. By working together, collaborative efforts can result in the creation of universally accepted ethical guidelines, ensuring that the development and deployment of autonomous weapons adhere to a set of shared principles.

Another compelling reason for international collaboration is the prevention of an arms race. If individual nations independently advance their AWS technology, it may lead to a competitive race that could destabilize the global arena. Collaborative initiatives can pave the way for arms control agreements, reducing the likelihood of an uncontrolled proliferation of autonomous weapons and fostering stability on an international scale. Furthermore, such collaboration is crucial in developing a comprehensive legal framework that addresses the current gaps in international law concerning the use of autonomous weapons.

Technical considerations also emphasize the necessity of collaboration. It is essential to establish common technical standards and interoperability protocols for AWS to ensure effective communication and coordination between different autonomous systems. This not only reduces the risk of accidents or unintended conflicts but also facilitates a more transparent and accountable development process. Overall, international collaboration is key to navigating the ethical, legal, and technical complexities surrounding AWS. It promotes responsible innovation while addressing the concerns of the global community.

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<sup>14</sup> United Nation Institute for Disarmament Research, *Algorithmic Bias and the Weaponization of Increasingly Autonomous Technologies A PRIMER*, 9 UNIDIR RESOURCES. 1 (2018)

## **PROPOSED REGULATORY APPROACHES**

### **Existing Proposals and Initiatives**

Various international discussions, proposals, and initiatives have been put forth to address the challenges presented by autonomous weapon systems (AWS). Here are several existing proposals and initiatives that have been undertaken:

#### **1. United Nations Discussions:**

The United Nations (UN) has been actively involved in deliberations concerning the consequences of autonomous weapons. The Convention on Certain Conventional Weapons (CCW) has convened gatherings with the specific aim of examining the legal and ethical ramifications of AWS. The Group of Governmental Experts (GGE) on Lethal Autonomous Weapons Systems has played a pivotal role in establishing a forum for these discussions.

#### **2. Campaign to Stop Killer Robots:**

The Coalition to Prevent Killer Robots comprises various non-governmental organizations (NGOs) that actively promote the implementation of a proactive prohibition on fully autonomous weapons. Their primary aim is to establish a global agreement that effectively forbids the creation and deployment of lethal autonomous systems.

#### **3. Joint Declaration on AI:**

In April 2018, a joint declaration was signed by 26 countries, focusing on the export and subsequent use of armed or strike-capable unmanned aerial vehicles (UAVs). Although not exclusively centered on autonomous weapons, this declaration aims to ensure responsible export and use of armed UAVs, with a strong emphasis on the importance of human control.

#### **4. Ethical AI Guidelines:**

Numerous entities, including industry stakeholders and academic bodies, have developed ethical principles for artificial intelligence (AI) and autonomous systems. These principles often emphasize concepts such as transparency, accountability, and human supervision to ensure the conscientious advancement and deployment of AI, including autonomous weaponry.

#### **5. The European Parliament Resolution:**

The European Parliament has passed a resolution calling for a ban on lethal autonomous weapons and the development of a unified position among member states of the European

Union. This reflects a growing concern within the EU regarding the potential risks associated with autonomous weapon systems.

These proposals and initiatives demonstrate the global recognition of the challenges posed by autonomous weapon systems and the need for international cooperation to address them effectively.

## **COMPARATIVE ANALYSIS OF REGULATORY MODELS**

The absence of universally recognized international regulatory frameworks tailored specifically for autonomous weapon systems (AWS) is evident. Nevertheless, numerous countries and entities are actively investigating diverse strategies to govern the advancement and utilization of AWS.

Among these approaches, the Preemptive Ban Model stands out as a noteworthy example. This model advocates for a comprehensive prohibition on the development and deployment of fully autonomous weapons. Notably, organizations such as the Campaign to Stop Killer Robots lend their support to this particular model.

The pros of this model include providing a clear stance against the potential dangers of AWS and preventing the proliferation of lethal autonomous systems. However, it may face challenges in achieving widespread international agreement, and some argue that a total ban could hinder the development of beneficial autonomous technologies.

Another model is the Human-in-the-Loop Model, which emphasizes human control and oversight in autonomous systems. This model requires a human operator to be involved in decision-making processes. The pros of this model include ensuring a level of accountability and ethical control, addressing concerns related to the delegation of lethal decisions to machines. However, the definition of "meaningful human control" may vary, and the model may not fully address the potential risks associated with human-machine interactions.

The Transparency and Accountability Model focuses on establishing regulations that require transparency in the development and deployment of autonomous weapons. It emphasizes accountability mechanisms for developers and operators. The pros of this model include addressing concerns related to the lack of transparency and accountability in AWS and encouraging responsible behavior from both state and non-state actors. However, it may not be sufficient on its own to prevent misuse, and challenges may arise in defining and enforcing transparency requirements.

The absence of widely recognized international regulatory frameworks specifically tailored for autonomous weapon systems (AWS) has prompted different nations and organizations to explore diverse approaches to regulate the development and utilization of AWS. One such approach is the International Treaty Model, which involves the negotiation and establishment of an international treaty or convention that specifically addresses AWS. This model aims to establish common standards, norms, and guidelines for the development and use of AWS.

However, there are also challenges associated with the International Treaty Model. Achieving consensus among diverse nations with varying interests and perspectives can be a complex and time-consuming process. Negotiating and implementing a treaty requires extensive deliberation and coordination among participating nations, which can further prolong the regulatory process.

In response to the lack of established international regulatory models for autonomous weapon systems (AWS), different nations and organizations have been exploring various approaches to regulate the development and deployment of AWS. One such approach is the Case-by-Case Approval Model, which entails a meticulous assessment and approval process for each individual AWS.

The absence of widely established international regulatory models specifically designed for autonomous weapon systems (AWS) has led different nations and organizations to explore various approaches to regulate the development and use of AWS. One such approach is the Industry Self-Regulation Model, which relies on autonomous weapons developers and manufacturers to establish and adhere to industry-wide ethical guidelines and standards under the Industry Self-Regulation Model<sup>15</sup>.

## TECHONOLOGICAL CHALLENGES IN REGULATION

Addressing the technological challenges associated with the regulation of autonomous weapon systems (AWS) is crucial to ensure responsible development and deployment. There are several key challenges that need to be considered in this regard.

Firstly, the lack of clear technical definitions for autonomous weapon systems is a primary challenge. The absence of universally accepted terminology and classifications hinders

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<sup>15</sup> Nansumba H, Ssewanyana I, Tai M, *Et Al.*: Role Of A Regulatory And Governance Framework In Human Biological Materials And Data Sharing In National Biobanks: Case Studies From Biobank Integrating Platform, Taiwan And The National Biorepository, Uganda [Version 2; Peer Review: 2 Approved]. *Wellcome Open Res.* 2020; **4**: 171.

effective regulation. Therefore, international collaboration is essential to establish standardized definitions, ensuring a common understanding of AWS characteristics and capabilities.

Secondly, the complex decision-making algorithms employed by AWS pose challenges in interpreting and regulating their actions. These algorithms are intricate and require regulatory frameworks that account for their complexity and potential implications. Collaboration among experts in artificial intelligence, ethics, and international law can contribute to crafting effective regulations in this regard.

Thirdly, ensuring the verifiability of compliance with regulations is challenging due to the dynamic nature of autonomous systems. Establishing mechanisms for accountability, such as transparent reporting and auditing processes, requires technological solutions that can track, interpret, and explain the decisions made by AWS in various scenarios.

Moreover, the integration of autonomous systems introduces cybersecurity risks. Hackers could exploit vulnerabilities in these systems, compromising their functionality and posing significant risks. Therefore, collaborative efforts are needed to establish robust cybersecurity measures and protocols to safeguard autonomous weapon systems against unauthorized access and manipulation.

Lastly, developing effective interfaces that enable human control and intervention in AWS operations is a technological challenge. It is crucial to ensure a seamless and understandable interaction between human operators and autonomous systems. This requires interdisciplinary collaboration to design interfaces that facilitate human oversight and intervention when necessary.

In conclusion, addressing the technological challenges associated with the regulation of autonomous weapon systems is essential for responsible development and deployment. International collaboration, interdisciplinary expertise, and technological solutions are key to overcoming these challenges and establishing effective regulations.

## **CONCLUSION**

The development and implementation of autonomous weapon systems (AWS) represent a significant shift in modern warfare, giving rise to profound ethical, legal, and security concerns. In order to effectively address the complex challenges associated with AWS, fostering global cooperation becomes imperative in light of rapid technological advancements. The ethical aspect highlights the importance of diverse perspectives and shared values in the decision-making processes that govern life-and-death situations. By working collaboratively, it is

possible to establish universally accepted ethical guidelines that ensure the development of AWS aligns with a global consensus on humane and responsible use.

Another compelling reason for international collaboration in the realm of AWS is the avoidance of an arms race. If individual nations pursue autonomous weapons unilaterally, it risks triggering a destabilizing competition. This underscores the need for arms control agreements and collaborative initiatives to prevent such a scenario. Additionally, a comprehensive legal framework is crucial to address the existing gaps in international law regarding the use of AWS. Through collaborative efforts, it is possible to formulate robust legal standards that clearly define responsibilities, limitations, and consequences, thereby establishing a foundation for accountability in the deployment of autonomous weapons.

Furthermore, technical standards and interoperability highlight the necessity of international collaboration. By establishing common protocols, effective communication and coordination between diverse autonomous systems can be ensured, minimizing the risks of accidents and unintended consequences. This technical collaboration not only enhances the safety and reliability of AWS but also contributes to transparency, fostering trust among nations. In navigating the multifaceted challenges of AWS, international collaboration emerges as a fundamental element for responsible innovation, offering a pathway towards a future where autonomous weapons are developed and deployed with careful consideration for ethical and legal implications.