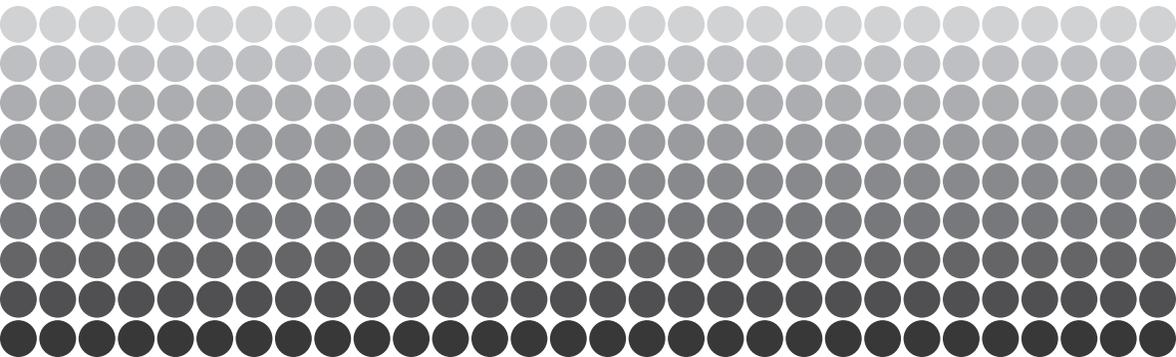


SIPRI YEARBOOK 2014

Armaments, Disarmament and International Security

The governance of autonomous weapons

IAN ANTHONY AND CHRIS HOLLAND



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II. The governance of autonomous weapons

IAN ANTHONY AND CHRIS HOLLAND

As early as the 1980s, all four branches of the United States armed forces saw advantages in increasing the degree of autonomy of weapons on the battlefield. Without a human operator there is no need for in-vehicle life support systems, and less need for an intervention force to rescue and evacuate personnel. Such systems can potentially be smaller and faster, diminish the manpower burden, reduce the need for high-bandwidth communication, enable a greater capability in difficult environments beyond human control, be less susceptible to signal jamming or hijacking and have longer endurance when patrolling, and they are likely to be cheaper than manned systems.¹

During 2013 the compatibility of autonomous weapons with international human rights law and international humanitarian law was closely examined in several international forums. The central questions were whether and how existing laws, guidelines and regulations apply to the tendency towards increased autonomy of weapon systems, and whether current and anticipated future developments—in particular, those related to unmanned aerial vehicles (UAVs, or drones)—require new rules.

The discussion of potential problems posed by autonomous weapons

In July 2013 the United Nations Secretary-General's Advisory Board on Disarmament Matters drew attention to the increasing trend towards automation of warfare and the development of fully autonomous weapon systems. In regard to lethal autonomous robots, the Advisory Board referred to concerns about

the ability of a fully autonomous system to conform to existing law (including international humanitarian law, human rights law or general international law); potential problems associated with the design of future fully autonomous weapons that could require disarmament action, or the ethical limits to robotic autonomy in deciding on the life or death of a human.²

The questions raised, therefore, include first, whether fully autonomous weapons (assuming that they can be developed) should be considered

¹ Guetlein, M., 'Lethal autonomous weapons: ethical and doctrinal implications', Joint Military Operations Department, US Naval War College, Newport, RI, 14 Feb. 2005, <<http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA464896>>. Developed in the 1980s, the AGM-136A Tacit Rainbow cruise missile was an example of a weapon with a longer time on mission and a lower cost compared to manned aircraft. National Museum of the US Air Force, 'Northrop AGM-136A Tacit Rainbow', Fact sheet, 3 Aug. 2011, <<http://www.nationalmuseum.af.mil/factsheets/factsheet.asp?id=418>>.

² United Nations, General Assembly, 'Work of the Advisory Board on Disarmament Matters', Report of the Secretary-General, A/68/206, 26 July 2013, para. 42.

illegal based on their technical characteristics, and second (assuming that they are found to be legal), how to reduce the risk of their illegal use. In a new and emerging debate, the understanding of the various terms under discussion is not final. At present, there are a number of baseline definitional issues that need to be agreed before further progress can be made towards regulation. Namely, there is no standard definition of autonomous weapons, and the International Committee of the Red Cross (ICRC) has noted that 'Though there is a wealth [of] expert literature on this subject, there is somewhat of a lack of consistency in the use of term'.³ As a result, whether a weapon is classified as autonomous or not depends on the definition of autonomy. Contentious issues centre on the weapon's adaptive capacity to make contingent discretionary decisions and—in relation to those decisions—if, and at what point, a weapon is under human supervision.

Each branch of the US armed forces develops, tests, purchases and deploys weapon systems independently, and over time each developed its own lexicon related to autonomous weapons. The attempt to coordinate and harmonize autonomous weapons development (e.g. through the Department of Defense Robotic Systems Joint Project Office) was impeded by the differences in approach, and the need for a more consolidated approach to definitions and terminology was recognized.

In a 2012 directive the US Department of Defense (DOD) broadly defined its meaning of the term 'autonomous weapon system' to capture a range of autonomy. One part of the definition encompasses 'a weapon system that, once activated, can select and engage targets without further intervention by a human operator'.⁴ A number of existing weapons bear such characteristics—for example, guns and missiles designed to provide ships or vehicles with a last line of defence by shooting down incoming missiles in the final phase of an attack. Once activated, these weapons will shoot at anything that enters their field of fire. These weapons are 'autonomous' in the sense that they are preprogrammed to engage a target based on specified criteria—such as detection of a radar emission—without requiring the consent of an operator.

In the second part of the definition, the DOD also includes systems that permit limited human intervention: 'human-supervised autonomous weapon systems', which are 'designed to provide human operators with the ability to intervene and terminate engagements, including in the event of a

³ Lawland, K., Head of the ICRC arms unit, 'Fully autonomous weapon systems', Presentation to a seminar on fully autonomous weapon systems at the Permanent Mission of France to the Conference on Disarmament, Geneva, 25 Nov. 2013, <<http://www.icrc.org/eng/resources/documents/statement/2013/09-03-autonomous-weapons.htm>>.

⁴ US Department of Defense, 'Autonomy in weapon systems', Directive 3000.09, 21 Nov. 2012, p. 13.

weapon system failure, before unacceptable levels of damage occur'.⁵ The class of 'human-supervised autonomous weapon systems' seems close to the definition of 'autonomous weapons' applied by a number of non-governmental experts.⁶

Both aspects of the DOD definition of 'autonomous' are closely aligned with what have traditionally been referred to as 'automated' or 'semi-autonomous' weapons—categories of weapon that the ICRC explicitly exempts from its meaning of the term autonomous weapon. A leading ICRC expert identifies weapons in the DOD's first group as being on the low end of automation in that they 'execute precisely pre-programmed actions or sequences within a well-defined and controlled environment'. The second group are seen as being 'highly automated systems [that] in practice operate with a "human-on-the-loop"'.⁷ Neither is regarded as autonomous in this approach to classification.

The ICRC has defined an autonomous weapon as 'one that is programmed to learn or adapt its functioning in response to changing circumstances in the environment in which it is deployed'.⁸ It reserves the term 'fully autonomous weapons' to describe a class of weapons that does not yet exist, stating that

A truly autonomous weapon system would be capable of searching for, identifying and applying lethal force to a target, including a human target (enemy combatants), without any human intervention or control.

This definition connotes a mobile system with some form of artificial intelligence, capable of operating in a dynamic environment with no human control.

It should be stressed that such 'fully' autonomous weapons are still only in the research phase and have not yet been developed, even less so deployed in armed conflict. Yet technological capabilities in this field are advancing at a high pace.⁹

The ICRC's use of the term 'autonomous weapon' is close to that used by Christof Heyns, the UN Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, who defines a class of 'lethal armed robots' as 'weapon systems that, once activated, can select and engage targets without further intervention by a human operator. *The important element is that the*

⁵ US Department of Defense (note 4), p. 14.

⁶ E.g. at a Pugwash workshop in Mar. 2013 participants defined autonomous weapons as 'weapons that once launched would select and attack targets without further human intervention'. 'Report to COMEST of Workshop on Ethics of Modern Robotics in Surveillance, Policing and Warfare', SHS/EGC/COMEST2013/EN/9, Working documents of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) Follow-up Conference 'Emerging Ethical Issues in Science and Technology', Bratislava, 30–31 May 2013, <<http://unesdoc.unesco.org/Ulis/cgi-bin/ulis.pl?catno=226478>>.

⁷ Lawland (note 3).

⁸ Lawland (note 3).

⁹ Lawland (note 3).

*robot has an autonomous “choice” regarding selection of a target and the use of lethal force.*¹⁰

This concept of choice was also used by the US DOD in its Unmanned Systems Integrated Roadmap for 2013–38, where an autonomous system is referred to as one that can ‘self-decide how to operate itself’ and be ‘untethered from human interaction’.¹¹ This usage in a document that does not have the same instructive authority as a directive adds to the complexity of definitions in use by the USA.

One influential non-governmental report, by Human Rights Watch and International Human Rights Clinic, has argued that it is probably more accurate to think in terms of an evolving spectrum of autonomy, rather than fixed classes of items. The continuous adaptation of existing weapons could progressively increase their complexity and be the pathway to future fully autonomous weapons.¹² This notion is similar to the ICRC approach that sees autonomous weapons at the end of a continuum or spectrum of incremental automation of weapons that has been developing over time. The US DOD’s Defense Science Board has also noted that a more useful way of thinking about autonomy might be to focus on it as ‘a capability (or set of capabilities) that enables the larger human–machine system to accomplish a given mission’, rather than having a more narrow scope on individual weapons.¹³

The applicability of international human rights law and humanitarian law

International human rights law and international humanitarian law are separate and distinct paradigms of public international law. In situations outside the scope of an armed conflict, international human rights law will apply. In situations classified as an armed conflict, international humanitarian law will also apply.

The International Court of Justice and UN human rights bodies have confirmed that the protection afforded by international human rights law continues in times of armed conflict (save through the effect of any provisions in a treaty permitting derogations from certain rights).¹⁴ In prin-

¹⁰ United Nations, General Assembly, Human Rights Council, Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions, Christof Heyns, A/HRC/23/47, 9 Apr. 2013, para. 38 (emphasis added).

¹¹ US Department of Defense (DOD), *Unmanned Systems Integrated Roadmap, FY 2013–2038*, 14-S-0553 (DOD: Washington, DC, 23 Dec. 2013), p. 67.

¹² Human Rights Watch (HRW) and International Human Rights Clinic (IHRC) at Harvard Law School, *Losing Humanity: The Case against Killer Robots* (HRW: Cambridge, MA, Nov. 2012).

¹³ US Defense Science Board (DSB), *The Role of Autonomy in DoD Systems* (DSB: Washington, DC, July 2012), p. 21.

¹⁴ International Court of Justice, ‘Legal consequences of the construction of a wall in the Occupied Palestinian Territory’, Advisory Opinion, 9 July 2004, para. 106. See also United Nations,

principle, while norms of international human rights law apply in situations of armed conflict, the relevant analysis in situations of overlap between the two paradigms is to be determined by the applicable international humanitarian law.

It was the international non-governmental community that initially raised awareness about potential risks arising from the development and use of autonomous weapons. In 2009 several experts formed the International Committee for Robot Arms Control to focus discussion on the topic. In 2013 a newly formed Campaign to Stop Killer Robots issued a call for a pre-emptive ban on the development, production and use of fully autonomous weapons.¹⁵

International human rights law

It is a cornerstone of international human rights law that, whenever the lawful use of force is unavoidable, every effort should be made to exercise restraint in such use and act in proportion to the legitimate objective to be achieved. Human life should be preserved to the greatest degree possible.

In 2010 the Human Rights Council of the UN General Assembly tasked the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, Philip Alston, to investigate the impact of new technologies on extrajudicial, summary or arbitrary executions. In his interim report of August 2010, Alston found that 'Although robotic or unmanned weapons technology has developed at astonishing rates, the public debate over the legal, ethical and moral issues arising from its use is at a very early stage, and very little consideration has been given to the international legal framework necessary for dealing with the resulting issues'.¹⁶ Alston's report recommended that

Urgent consideration needs to be given to the legal, ethical and moral implications of the development and use of robotic technologies, especially but not limited to uses for warfare. The emphasis should be not only on the challenges posed by such technological advances, but also on the ways in which proactive steps can be taken to ensure that such technologies are optimized in terms of their capacity to promote more effective compliance with international human rights and humanitarian law.¹⁷

Heyns replaced Alston as Special Rapporteur in August 2010 and was subsequently tasked with making a specific investigation into issues arising from the development of lethal autonomous robotics. In April 2013 he

International Covenant on Civil and Political Rights (CCPR), 'CCPR General Comment no. 29: Article 4: Derogations during a state of emergency*', CCPR/C/21/Rev.1/Add.11, 31 Aug. 2001, para. 3.

¹⁵ Campaign to Stop Killer Robots, 'Our first year of campaigning', 20 Dec. 2013, <<http://www.stopkillerrobots.org/2013/12/first-year-of-campaigning/>>.

¹⁶ United Nations, General Assembly, Interim report of the Special Rapporteur on extrajudicial, summary or arbitrary executions, A/65/321, 23 Aug. 2010, para. 29.

¹⁷ United Nations, A/65/321 (note 16), para. 48.

issued a report focusing on lethal autonomous robotics and the preservation of life, which found that lethal autonomous robots

raise far-reaching concerns about the protection of life during war and peace. This includes the question of the extent to which they can be programmed to comply with the requirements of international humanitarian law and the standards protecting life under international human rights law. Beyond this, their deployment may be unacceptable because no adequate system of legal accountability can be devised, and because robots should not have the power of life and death over human beings.¹⁸

The report was discussed in the Human Rights Council and a number of states represented there also raised the question of how a lethal action by a robot that is not controlled by a human can be either accountable or ethical.¹⁹

As Special Rapporteur, Heyns recommended that states ‘establish national moratoria on aspects of [lethal autonomous robotics]’ and called for the establishment of a high-level panel ‘to articulate a policy for the international community on the issue’.²⁰

International humanitarian law

International humanitarian law rests on two central principles: distinction and proportionality.²¹ The principle of distinction differentiates civilian and military targets and prohibits attacks directed against civilians. The principle of proportionality prohibits military action that can be expected to cause incidental civilian deaths, injuries or damage to civilian objects that would be excessive in relation to the concrete and direct military advantage anticipated.

Applying the principles of distinction and proportionality requires a judgement to be made in the specific context of a military operation. Although a field commander works within agreed rules of engagement, a legal opinion may be required in each case to ensure that a planned action is consistent with humanitarian law. If it is determined that an action is consistent with humanitarian law, the people tasked with carrying it out must determine whether their specific behaviour is legitimate in the light of the rules that have been established. A number of non-governmental observers have raised the question of whether a fully autonomous weapon

¹⁸ United Nations, A/HRC/23/47 (note 10), p. 1.

¹⁹ ‘States discuss UN expert report on “lethal autonomous robotics”’, Article 36, 1 June 2013, <<http://www.article36.org/weapons-review/states-discuss-un-expert-report-on-lethal-autonomous-robotics/>>.

²⁰ United Nations, A/HRC/23/47 (note 10), p. 1.

²¹ The principles of discrimination and proportionality are codified in the 1977 Protocol I Additional to the 1949 Geneva Conventions, and Relating to the Protection of Victims of International Armed Conflicts, in particular in Article 57. For a summary and other details of the protocol see annex A, section I, in this volume.

could exercise judgement, an inherently human characteristic, and whether the use of fully autonomous weapons could ever be consistent with responsible military practice.²²

In September 2013, France—in its capacity as the designated President of the Meeting of States Parties to the 1980 Certain Conventional Weapons (CCW) Convention—hosted a seminar to discuss the issues related to fully autonomous weapon systems in the framework of international humanitarian law.²³ The issue was subsequently taken up at the November Meeting of States Parties to the CCW Convention, and the decision was taken to continue with meetings of experts in 2014 to explore in more depth what fully autonomous weapon systems are, what is meant by ‘autonomous’, what challenges such weapons may pose to international humanitarian law and what action states can take in response to developments in this area.²⁴

Unmanned aerial vehicles

Within the overall discussion of autonomous weapons, the evolving roles and missions assigned to armed, but unmanned, aerial vehicles have been prominent. Unmanned aerial vehicles already perform various military tasks. When equipped with payloads such as cameras, radars and information and communication technologies, UAVs play a role in tactical reconnaissance and communications and in target acquisition for strikes by artillery or manned aircraft. They also play a role in, for example, the research and development of manned aircraft and the test and evaluation of air defence systems. UAVs are increasingly being used in non-military security-related missions—such as border surveillance and patrol, as well as in police operations. UAVs are also being used for civilian functions, such as traffic control.

One class of UAVs is equipped with lethal weapons, usually a stand-off missile with fairly short range. The reduced risk afforded by the lack of personnel on board, together with other relatively low costs associated with UAVs, has led to a dramatic increase in the numbers of UAVs deployed by armed forces around the world—including the numbers of armed UAVs.

²² E.g. Fihn, B., Campaign to Stop Killer Robots, Statement to the Human Rights Council, Geneva, 30 May 2013, <[http://webtv.un.org/search/clustered-id-on-executions-and-idps-contd-10th-meeting-23rd-regular-session-of-human-rights-council/2419860367001?term=10th meeting](http://webtv.un.org/search/clustered-id-on-executions-and-idps-contd-10th-meeting-23rd-regular-session-of-human-rights-council/2419860367001?term=10th%20meeting)>.

²³ Permanent Mission of France to the Conference on Disarmament, ‘Séminaire sur les systèmes d’armes entièrement autonomes’ [Seminar on fully autonomous weapons systems], Geneva, 3 Sep. 2013, <<http://www.delegfrance-cd-geneve.org/03-09-2013-Seminaire-sur-les,692>>. For a summary and other details of the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects (CCW Convention) and its protocols see annex A, section I, in this volume.

²⁴ United Nations Office at Geneva, ‘Disarmament: lethal autonomous weapons’, <[https://www.unog.ch/80256EE600585943/\(httpPages\)/6CE049BE22EC75A2C1257C8D00513E26](https://www.unog.ch/80256EE600585943/(httpPages)/6CE049BE22EC75A2C1257C8D00513E26)>.

Whether or not using armed UAVs poses threats that need to be controlled under specific rules was an issue discussed extensively in, for example, the UN Secretary-General's Advisory Group on Disarmament in 2013. The Advisory Group concluded that

existing armed unmanned aerial vehicles are under the real-time remote control of a human operator. They are not inherently indiscriminate and the concerns expressed by the international community relate to the political, legal or security aspects of the way they are operated rather than to their design. Hence concerns associated with the use of drones are primarily an issue of the application of and respect for the existing law.²⁵

The use of armed UAVs in so-called targeted killings has been a particular focus of concern. The applicability of existing human rights law to the use of armed UAVs has been considered in two different assessments under the auspices of the Human Rights Council of the UN General Assembly. As noted above, successive Special Rapporteurs on Extrajudicial, Summary or Arbitrary Executions have addressed the issue of robot weapons. The use of armed UAVs was prominent in those investigations. However, the Human Rights Council also tasked a different special rapporteur—Ben Emmerson, the Special Rapporteur on the Promotion and Protection of Human Rights and Fundamental Freedoms while Countering Terrorism—to address the issue of armed UAVs.

Emmerson had a mandate to consider the use of armed UAVs in counterterrorism operations under international law principles governing the use of force, as well as international humanitarian and human rights law. In determining what existing laws should apply, he posed the question 'When does a non-international conflict come into existence, and what, if any, are the geographical limitations to the application of the law of armed conflict in this context?'²⁶

The answer would provide guidance on the challenge of reducing civilian casualties to a minimum—an existing legal requirement that was one focus of Emmerson's investigation. He noted that clearly determining the meaning of civilian casualties could be a challenge for commanders when an attack on a non-state armed group took place in proximity to civilians—who may be regarded as taking part in hostilities by providing varying degrees of voluntary or involuntary support to the target. Emmerson noted that 'Difference of view about the forms of activity that amount to direct participation in hostilities under international humanitarian law will almost inevitably result in different assessments of civilian casualty level'.²⁷

²⁵ United Nations, A/68/206 (note 2), para. 40.

²⁶ United Nations, General Assembly, 'Delegates consider deadly use of drone technology as Third Committee hears more presentations by experts on human rights obligations', News Release GA/SHC/4078, 25 Oct. 2013, <<http://www.un.org/News/Press/docs/2013/gashc4078.doc.htm>>.

²⁷ United Nations, GA/SHC/4078 (note 26).

His recommendation was also to seek greater clarity on the application of existing law.

In their respective reports, Heyns and Emmerson both concluded that a body of existing law applied to the use of armed UAVs in all circumstances, that armed UAVs are not illegal and that no new laws are needed to regulate them.²⁸ However, both special rapporteurs concluded that there is a strong case for clarification on how existing law applies to the use of armed UAVs. They both concluded that increased information and transparency would be necessary for the wider international community to judge whether existing law was being properly applied in operations involving the use of armed UAVs.²⁹

On 10 December 2013 the UN General Assembly called unanimously on all states ‘to ensure that any measures taken or means employed to counter terrorism, including the use of remotely piloted aircraft, comply with their obligations under international law, including the Charter of the United Nations, human rights law and international humanitarian law, in particular the principles of distinction and proportionality’.³⁰

Conclusions

The international community, individual states and their armed forces face two challenges. The first is to ensure that the ongoing use of existing weapons—in particular, armed UAVs—conforms with the law. The second challenge is to ensure that, as technology develops—in particular, as the degree of autonomy of weapons is increased, and as weapons start to make the choices that are currently made by humans—the legal framework also develops adequately.

²⁸ United Nations, General Assembly, ‘Extrajudicial, summary or arbitrary executions’, Report of the Special Rapporteur on extrajudicial, summary or arbitrary executions, A/68/382, 13 Sep. 2013; and United Nations, General Assembly, ‘Promotion and protection of human rights and fundamental freedoms while countering terrorism’, Report of the Special Rapporteur on the promotion and protection of human rights and fundamental freedoms while countering terrorism, A/68/389*, 18 Sep. 2013.

²⁹ In his report Heyns called for a ‘consensus-seeking processes to determine the correct interpretation and application of the established international standards for the use of drones that are equally applicable to all States’. United Nations, A/68/382 (note 28), para. 117.

³⁰ UN General Assembly Resolution 68/178, 18 Dec. 2013, para. 6(s).