



STRATEGIC FILE

No. 24 (60), October 2014 © PISM

Editors: Marcin Zaborowski (Editor-in-Chief) • Wojciech Lorenz (Managing Editor)
Jarosław Ćwiek-Karpowicz • Aleksandra Gawlikowska-Fyk • Artur Gradziuk
Piotr Kościński • Sebastian Płóciennik • Patrycja Sasnal • Marcin Terlikowski

Remote and Autonomous: From Drones to “Killer Robots”

Maria Radziejowska

While Poland is only sketching out its national UAV programme, the international community has already embarked on discussions about the legality of autonomous weapons systems. The case against “killer robots” has been brought into the Convention on Certain Conventional Weapons forum. Transparent and common standards for the legal review of such weapons could balance the risks associated with their future illegal use. Before deciding whether to ban autonomous weapons systems and their development, there is a need to reach greater clarity on the understanding of autonomy and the level of human supervision over these systems in light of the existing legal framework. Autonomous robotic systems will continue to be developed for a variety of purposes.

Remotely piloted systems (RPS), and unmanned aerial vehicles (UAVs) in particular, are in the focus of global public attention, partly due to their infamous use for targeted killing. However, remotely piloted systems, be it air, land or maritime vehicles, are very important elements on today's battlefield. They are currently used predominantly for intelligence, reconnaissance and surveillance (IRS), as communication facilitators, in detection, identification and location of targets. According to the U.S. Government Accountability Office, the number of countries that acquired an unmanned aerial vehicle (UAV) system nearly doubled between 2005 and 2012, from about 40 to more than 75.¹ At the same time, unmanned combat vehicles (UCVs), which either carry, use or direct lethal or non-lethal force against enemy targets are becoming more common in use. Moreover, there is growing interest in developing weapons systems that are more autonomous and allow broader and easier infiltration into enemy forces. Such systems provide capabilities that have great potential in raising future military effectiveness while increasing safety and saving on human and financial resources. They can gather data, compute and act much faster and with greater precision without direct involvement of the “boots on the ground.” Consequently, they are often seen as the weapons of the future.

However, the means and methods of warfare are not unlimited. Greater autonomy poses fundamental policy questions ranging from those pertaining to the relationship and coexistence between humans and robots on the battlefield, through those relating to the compliance of these systems with the existing legal framework.² These have now been raised in a number of forums, including the Human Rights Council and the International Committee of the Red Cross. In November 2013, parties to the Convention on Certain

¹ U.S. Government Accountability Office, *Non-proliferation: Agencies Could Improve Information Sharing and End-Use Monitoring on Unmanned Aerial Vehicle Exports*, GAO-12-536, 30 July 2012 (publicly released: 12 September 2012), www.gao.gov/products/GAO-12-536.

² For a critical assessment see: *Loosing Humanity, The Case against Killer Robots*, Human Rights Watch, International Human Rights Clinic, Harvard Law School, November 2012, www.hrw.org/sites/default/files/reports/arms1112_ForUpload.pdf. This report served as a trigger for the international Campaign to Stop Killer Robots whose efforts contributed to putting the matter on the CCW agenda.

Conventional Weapons (CCW) (among them the front runners in developing autonomous technologies, such as the United States, China, Israel, Russia, South Korea and the UK) decided to hold an informal meeting of experts to discuss the lethal autonomous weapons systems “in the context of the objectives and purposes of the Convention,” which took place in May 2014.

The CCW and its five protocols regulate the use of a number of conventional weapons and constitute a “living forum” that could potentially address the issue of autonomous weapons systems.³ During its upcoming session in November, the CCW parties will decide whether and under what mandate to continue the work on “killer robots.” The question is whether there are prospects for states to reach an agreement comparable to that achieved with the adoption of the IV Protocol to the CCW (October 1995), prohibiting the use and transfer of blinding laser weapons, to pre-emptively ban the development and use of lethal autonomous weapons systems.

Defining the Level of Human Control: In, On or Out of the Loop

The terminology applied to various levels of automisation of “killer robots” reflects their developing status. At the outset, one must draw a distinction between automated and autonomous systems, which are often mistakenly treated interchangeably. No universal definition has been yet accepted as to what constitutes autonomous weapons.⁴ One can generally posit that automated systems are those following a pre-programmed instruction, whereas autonomous systems can be understood as capable of carrying critical functions of acquiring, tracking, selecting and “deciding” to attack targets following an independently performed “reason”-based assessment.⁵ The key defining criterion is therefore the level of human control exercised over a machine in the decision making process.

The U.S. and the UK are the two states that have developed official positions on autonomous weapons systems. The UK policy distinguishes between automated weapons systems—programmed to follow a pre-defined set of rules logically, with predictable outcomes, and fully autonomous weapons systems—capable of deciding a course of action without depending on human oversight and control.⁶ The U.S. Autonomy in weapons directive, groups autonomous weapons systems into three categories. First are systems that “once activated, can select and engage targets without further intervention by a human operator.” Second are supervised autonomous weapons systems “designed to provide human operators with the ability to intervene and terminate engagements, including in the event of a weapon system failure, before unacceptable levels of damage occur.” Finally, semi-autonomous weapons systems are those that “once activated, are intended to only engage individual targets or specific target groups that have been selected by a human operator.”⁷ These three categories are more commonly referred to as the “out of the loop,” “on the loop” and “in the loop” systems, the latter being the least controversial. It is precisely the extent to which humans will control the actions carried out by robotic systems that is central to discussions on the development of and compliance of autonomous systems with existing international law.

Fully autonomous, “out-of-the-loop” weapons systems capable of gathering data, assessing the situation and “deciding” to launch an attack at a specific target fully independently from human control, are not yet in use. Official full-autonomy research projects, for instance those conducted by the U.S. Defence Advanced Research Projects Agency (DARPA), focus on non-combat functions. However, weapons systems with various levels of autonomy are in use. SGR-I stationary sentry robots deployed at the South Korean border can detect people from two miles away during daytime and one mile at night, thanks to heat and motion detectors. These robots are also equipped with 5.5 mm machine guns and 40 mm grenade

³ The 1980 *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* as amended on 21 December 2001 (CCW).

⁴ See: N. Marsh, *Defining the Scope of Autonomy, Issues for Campaign to Stop Killer Robots*, PRIO Policy Brief, February 2014.

⁵ *Report of the ICRC Expert Meeting on “Autonomous Weapons Systems: Technical, Military, Legal and Humanitarian Aspects,” 26–28 March 2014, Geneva, 9 May 2014*, pp. 3, 5, <https://www.icrc.org/eng/assets/files/2014/expert-meeting-autonomous-weapons-icrc-report-2014-05-09.pdf>. See also: N. Sharkey, “Automating Warfare: Lessons Learned from the Drones,” *Journal of Law, Information & Science*, vol. 21, no. 2, 2011/2012.

⁶ House of Commons, Defence Committee, *Remote Control: Remotely Piloted Air Systems – Current and Future UK Use, Tenth Report of Session 2013–14*, vol. II, written evidence, 25 March 2014, Defence Committee: Evidence Ev w2, para 2.13, www.globalsecurity.org/intell/library/reports/2014/remotely-piloted-air-systems-vol2_uk-hcdc_20140325.pdf.

⁷ Department of Defence Directive 3000.09, 21 November 2012, 21 November 2012, Glossary.

launchers, which can fire under human control.⁸ Similar systems are deployed by the Israeli Defence Forces along the border with Gaza. Unmanned aerial combat vehicles (UCAV) such as the MQ-9 Reaper operate with a human being kept in the loop. There are however projects underway that aim to increase the autonomy of UCAV systems. These include the BAE Taranis combat drone, the Northrop Grumman X-47B, and the Unmanned Carrier-Launched Airborne Surveillance and Strike System (UCLASS) of the U.S. Navy.

Legal Framework

Under the existing legal framework, the ultimate assessment of the legality of a weapon, including those with various levels of autonomy, depends on whether it is compliant with the basic principles of weapons law, existing international agreements, and whether they can be employed in a manner compliant with the International Humanitarian Law (IHL). The question of avenues available for attributing responsibility for violations committed with the use of such weapons systems is particularly important, given the specificity of unmanned combat systems.

The means and methods of warfare are not unlimited.⁹ The principle of distinction prohibits the use of weapon which by its nature, even when directed at a specific objective, will result in indiscriminate attack,¹⁰ while the principle of humanity prohibits weapons that cause unnecessary suffering or superfluous injury.¹¹ There is no international treaty that would pre-emptively prohibit or limit the use or development of robotic weapons systems with some level of autonomy as inherently contrary to any of the above mentioned principles.

Therefore, one of the central points of the ongoing debate is the weapons review process under Additional Protocol I to the Geneva Conventions (AP I), pursuant to which states are obliged to assess the legality of every new weapon based on their design and their intended use, at the stage of “study, development, or acquisition.”¹² Although not all states are parties to the AP I,¹³ the review process is an established best practice of many countries, among them the United States. There is, however, no consistent state practice on how to conduct these reviews and with what level of transparency. Given the complexity of the systems in question and their modular character, which make testing of these weapons particularly challenging, common review standards and transparency of the ongoing research projects could offer a realistic alternative to a total ban at this point in time.

IHL Targeting Rules and Their Viability for Autonomous Weapons Systems

The legality of the autonomous or semi-autonomous systems equipped with the ability to use lethal or non-lethal force depends on their ability to comply with the basic IHL principles. That is the principle of distinction (parties to an armed conflict must distinguish at all times between military and civilian objects, combatants or persons participating in hostilities, and civilians),¹⁴ the principle of proportionality (incidental casualties and damages can be lawful only if they are not excessive in relation to the concrete and direct military advantage anticipated),¹⁵ and the principle of precaution (ensure that feasible precaution is taken in

⁸ Note that according to HRW Report, these robots have an “automatic mode, with which it can make decisions,” see: *Loosing Humanity...*, *op. cit.*, pp. 14–15, fn 46.

⁹ See the Hague 1899 Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land, article 22, the Hague 1907 Convention (IV) respecting the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land, reg. 22; Additional Protocol I to the 1949 Geneva Conventions, 1977, Article 35(1).

¹⁰ Additional Protocol I to the 1949 Geneva Conventions, 1977, Article 51(4); ICRC Customary Law Study, Rule 71.

¹¹ See Preamble to the 1868 Petersburg Declaration; Additional Protocol I to the 1949 Geneva Conventions, 1977, Article 35(2); 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 as amended on 21 December 2001 (CCW), Preamble, third paragraph; ICRC Customary Law Study, Rule 70.

¹² Additional Protocol I to the 1949 Geneva Conventions, 1977, Article 36.

¹³ Currently there are 174 States party to the AP I. The Islamic Republic of Iran, Pakistan and the U.S. have signed the Protocol upon its adoption but have not ratified the treaty.

¹⁴ Additional Protocol I to the Geneva Conventions 1949, article 48, see also articles 51, 52 and 54 providing for the protection of civilian population and objects as well as objects indispensable for the survival of civilian population; ICRC Customary Law Study, Rules 1,7.

¹⁵ Additional Protocol I to the Geneva Conventions 1949, Article 51(5)(b), Article 57; ICRC Customary Law Study Rule 14.

the choice of means and methods of attack to avoid and minimise incidental loss or injury of civilians or damage to civilian objects).¹⁶

These rules require from the decision making subject not only the ability to distinguish various statuses of objects and persons, but also to involve in a complex, context specific, qualitative rather than quantitative subjective assessment that often aims to compare the incomparable (for example, military advantage against the number of civilians killed). In the current state of technology, machines are not yet capable of conducting such a deeply nuanced exercise fully independently from human involvement. On the other hand, computer software or sensors with which robotic systems are equipped certainly outdo humans in data gathering and sorting, quantitative analysis, repetitive actions, and precision. Humans then, in making or approving decisions, often rely on the data and analysis provided by the faster and more precise “robots,” that are free from the “fog of war” confusion in their “judgment.” Eventually, it could be also argued, those who decide upon an attack, when having at their disposal highly autonomous robotic weapons systems capable of carrying out precise operations, be it IIR or targeting, with a proven greater level of precision than human soldiers, should choose these systems instead of human operated weapons in order to fulfil their obligations under the IHL.¹⁷

As long as there is space for human supervision in assessing the information available and taking a decision on whether or not to fire, the use of unmanned vehicles for combat does not necessarily differ much from using any other human operated weapon platforms. In the current state of technology, and in the light of the existing legal framework, the key is to decide on the minimum level of supervision necessary, and the means by which the connection between the machine and its human operator can be improved.

Accountability Confusion

Parties involved in an armed conflict are responsible for the violations of humanitarian law committed by their armed forces, or persons or entities acting under state authority control. The national political interest, however, will often go against accountability and favour protecting one’s own armed forces.

The use of autonomous or semi-autonomous systems raises further questions relating to the possibilities of attributing responsibility for the acts and possible violations “committed” by or with the use of robotic systems.¹⁸ Machines are after all not subjects to law and they will not be held to account or pay for damages caused by their illegal actions. The employment of autonomous weapons systems therefore raises concerns of a possible dehumanisation of international humanitarian law that will also result in the dilution of responsibility.¹⁹ Possible legal frameworks to pursue include the state responsibility regime, criminal responsibility or civil responsibility under schemes similar to strict product liability. Apart from choosing the right avenues, the challenge lies in attributing responsibility. The “chain” of potential culprits may range from software programmers and manufacturers of software and hardware, through those taking decision to deploy the weapons systems or their subordinates and political leaders. There definitely needs to be more common understanding on the responsibility of those who decide on and/or supervise the use of such systems, as well as the liability of software programmers or manufacturers. Eventually, the question of finding or developing appropriate avenues allowing impunity to be avoided for possible violations “committed” by autonomous systems, might be key in terms of ultimate considerations on the use of these weapons systems as regards both ethics and legality.

¹⁶ Additional Protocol I to the Geneva Conventions 1949, Article 57; ICRC Customary Law Study, Rules 15-18.

¹⁷ For detailed discussion see J. Herbach, “Into the Caves of Steel: Precaution, Cognition and Robotic Weapons Systems under the International Law of Armed Conflict,” *Amsterdam Law Forum*, vol. 4, no. 3, 2012.

¹⁸ A/HRC/23/47, Report of the Special Rapporteur on extrajudicial, summary or arbitrary, executions, Christof Heyns, 9 April 2013. See also Advanced version Report of the 2014 informal Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS), paras. 30-33.

¹⁹ M. Wagner, *The Dehumanization of International Humanitarian Law: Legal, Ethical and Political Implications of Autonomous Weapons Systems*, 2012, http://robots.law.miami.edu/wp-content/uploads/2012/01/Wagner_Dehumanization_of_international_humanitarian_law.pdf.

The Way Forward: To Ban or to Develop?

On one hand there are those who believe that further development and possible use of autonomous weapons systems should be pre-emptively banned, as machines will never be able to comply with the standards set out under international law. Moreover, autonomous weapons raise ethical concern by creating inequality on the battlefield or the future possibility of subjecting decisions, including those relating to the use of force against human life, to machines. On the other hand, there are those who believe that the current legal framework does not exclude the legality of weapons systems with various degrees of autonomy. According to the latter, these systems might even contribute to greater compliance with the IHL principle, provided that they are equipped with adequate software and hardware solutions. For both perspectives to meet, given the current state of technology, it seems necessary not to ban such systems, but to elaborate a common understanding of various degrees of human control over semi-autonomous systems alongside inevitable further developments.

Currently, only the U.S. and the UK have developed publically available position papers on autonomous weapons systems. While the UK officially declares that the operation of weapons will always be under human control, and that it has no plans to develop fully autonomous weapons systems,²⁰ the U.S. represents a more open approach. The Autonomous Weapons Directive provides that “autonomous and semi-autonomous weapons systems shall be designed to allow commanders and operators to exercise appropriate levels of human judgment over the use of force.”²¹ These positions are closer to one another than it might seem. They confirm that the key elements that need to be addressed by states at this point in time is the meaning of the necessary level of human involvement in the operation of “autonomous” weapons systems, and to establish common review procedures of developing and acquiring such weapons systems.

Possible future delegation of decision making power to autonomous systems machines raises obvious ethical dilemmas that go beyond the existing legal framework and therefore constitute a large part of the discussion. The Martens clause introduced to the preamble of the Hague 1899 Convention (II) with Respect to the Laws and Customs of War on Land, provides that “in cases not covered by the law in force, the human person remains under the protection of the principles of humanity and the dictates of the public conscience.”²² As noted by the International Court of Justice in its Nuclear Weapons Advisory Opinion, the clause “has proved to be an effective means of addressing the rapid evolution of military technology.”²³ There is no accepted interpretation of the clause, but it may provide some guidance in the evaluation of these emerging weapons. The question to be answered when considering a ban on autonomous systems will be whether there exists at all the level of lethal weapons autonomy acceptable, not necessarily under the constraints of the existing legal framework, but under the “principles of humanity and dictates of public conscience.”

Poland’s Priorities

In line with current legal regulations in Poland, UAVs not heavier than 25 kg may operate within sight of the operator (but only recreational and sport vehicles. Others must fulfil additional requirements). Those heavier require special authorisation. Further, flights out of sight, due to persisting lack of specific regulation and security reasons, are allowed only in designated zones. Clearly, there is a need to elaborate national standards, particularly for the use of UAVs by public authorities as well as for commercial market purposes, both of which are also issues vital at the EU level.²⁴

²⁰ House of Commons, Defence Committee, *Remote Control...*, *op. cit.*, Evidence Ev w2.

²¹ Department of Defence Directive 3000.09, 21 November 2012, November 21, 2012, p. 2, para. 4a.

²² See the Hague 1899 Convention (II) with Respect to the Laws and Customs of War on Land and its annex: Regulations concerning the Laws and Customs of War on Land, preamble; 1977 Additional Protocol I, Art. 1(2); 1977 Additional Protocol II, Preamble; 1980 CCW, Preamble.

²³ ICJ, Advisory Opinion on the Legality of the Threat or Use of Nuclear Weapons, 8 July 1996, para. 78.

²⁴ The European Commission adopted on 8 April 2014 the Communication, <http://ec.europa.eu/enterprise/sectors/aerospace/uas>.

At the same time, developing UAV platforms is among the main priorities set out in the Polish Armed Forces modernisation plan 2013–2022.²⁵ The preparation of a national UAV programme was proposed by the National Security Bureau in March 2014. Developing and obtaining UAV systems is expected to boost the country's military capability, stimulate research and industry in the field of defence, and provide opportunities for increased industry cooperation at an European/NATO level. According to the modernisation plan, Poland will acquire and develop, micro, mini, tactical and medium-range, long-endurance (MALE) drones, the latter also later in armed versions. The introduction of highly computerised UAVs and robots, has been noted as an inevitable step forward in defence and internal security, as well as in the commercial market.²⁶ Such straightforwardly expressed policy goals highlight the fact that already at this stage Poland should debate the issues of autonomous and semi-autonomous weapons systems, not only from operational and industry standpoints but also in the legal context.

Poland is a party to the four Geneva Conventions and its protocols, as well as to the CCW and its five protocols and, apart from the 2008 Convention on Cluster Munitions, other major treaties regulating the means and methods of warfare. The country was among 87 of 117 states party to the CCW that were present at the informal meeting on autonomous weapons systems in Geneva in May. The tragic incident of Nangar Khel has proven that Poland is capable and ready to seek accountability for violations committed by members of its military forces, and to reach out to the victims of these violations. Taking a proactive approach in relation to autonomy in weapons, and on the legal review of these weapons systems under article 36 AP I, would fall in line with the increased attention and resources devoted to elaborating a national UAV programme.

²⁵ Main directions for the development of Polish Armed Forces as well as their preparation for defence of the state in the period 2013–2022, decision of the president, 2011, www.cepa.org/content/insider-view-head-polish-national-security-bureau-stanis%C5%82aw-koziej-poland%E2%80%99s-defense.

²⁶ See Foreword to A. Gontarz, S. Kosieleński (eds.), *Roboty w przestrzeni publicznej in statu nascendi*, Fundacja Instytut Mikromakro, September 2014, p. 5; S. Koziej, "Pięć żywiołów. Wolność – informacja – bezpieczeństwo," speech of the Head of the National Security Bureau, 17 June 2014, www.bbn.gov.pl/pl/wydarzenia/5631,Piec-zywiolow-Wolnosc-informacja-bezpieczenstwo-wystapienie-Szefa-BBN.html?search=423911.