

Special Committee 1

Assessing the Potential Risk of Weaponization of Artificial Intelligence



Table of contents

Introduction	2
Definition of Key Terms	2
General Overview	4
Major Parties Involved	7
Timeline of Key Events	10
UN involvement, Relevant Resolutions, Treaties and Events	11
Previous Attempts to solve the Issue	11
Possible Solutions	12
Bibliography	14



Forum	Special Conference 1
Issue:	Assessing the Potential Risk of Weaponization of Artificial Intelligence
Student Officer:	Wiebe Uilenreef
Position:	Deputy Chair

Introduction

In the competition to lead the emerging technology race and the futuristic warfare battleground, artificial intelligence (AI) is rapidly becoming the center of global power play. We can see that across many different nations, the development in autonomous weapon system (AWS) is progressing rapidly, and this increase in the weaponization of artificial intelligence seems to have become a highly destabilizing development. It brings complex security challenges for not only each nation's decision makers but also for the future of humanity. However, opinions are divided and the general benefits and limitations will be discussed in this report. Some general arguments of the benefits are that less human troops can be used, it is financially beneficial, and it is more ethical. On the other hand, there are also limitations such as lack of evidence and understanding of the weaponization of AI, robots might not be able to distinguish between a civilian and combatant, and there is an issue of accountability.

Definition of Key Terms

Artificial Intelligence (AI)

According to OECD and UNCTAD, AI is defined as “the ability of machines and systems to acquire and apply knowledge and to carry out intelligent behaviour. This includes a variety of cognitive tasks such as but not limited to sensing, processing oral language, reasoning, learning, making decisions. They can also demonstrate an ability to move and manipulate objects accordingly. Intelligent systems use a combination of big data analytics,



cloud computing, machine communication and the Internet of Things (IoT) to operate and learn.”¹

Weaponization

Weaponization is the process during which something gets equipped with arms or it is turned into a weapon.² Weaponization of AI refers to the production of a machine with the purpose of creating an independent dangerous weapon that does not need manual controlling.³

Lethal Autonomous Weapons Systems (LAWS)

Lethal Autonomous Weapons Systems (LAWS) are also called ‘Killer Robots.’ They are a type of Autonomous Military Robot that are able to independently choose targets. Nations haven’t agreed on an international definition. Heather Roff, a writer for Case Western Reserve University School of Law, describes autonomous weapon systems as, “armed weapons systems, capable of learning and adapting their ‘functioning in response to changing circumstances in the environment in which [they are] deployed,’ as well as capable of making firing decisions on their own.”⁴ On the other hand, the United Kingdom defines autonomous weapon systems as “systems that are capable of understanding higher level intent and direction. From this understanding and its perception of its environment, such a system is able to take appropriate action to bring about a desired state. It is capable of deciding a course of action, from a number of alternatives, without depending on human oversight and control - such human engagement with the system may still be present, though. While the overall activity of an autonomous unmanned aircraft will be predictable, individual actions may not be.”⁵

¹UNESCAP. “Artificial Intelligence in Asia and the Pacific.” *UNESCAP*, 2019, www.unescap.org/sites/default/files/ESCAP_Artificial_Intelligence.pdf.

²UNIDIR. “The Weaponization of Increasingly Autonomous Technologies: Concerns, Characteristics and Definitional Approaches.” *UNIDIR*, 2017, www.unidir.org/files/publications/pdfs/the-weaponization-of-increasingly-autonomous-technologies-concerns-characteristics-and-definitional-approaches-en-689.pdf.

³UNIDIR. *UNIDIR*, 2018, Unidir.ch. (2018). [online] Available at: <http://www.unidir.ch/files/publications/pdfs/theweaponization-of-increasingly-autonomous-technologies-artificial-intelligence-en-700.pdf> [Accessed 5 Jan. 2019].

⁴Roff, Heather M. “Lethal Autonomous Weapons and Jus Ad Bellum Proportionality.” *School of Law Case Western Reserve University*, 2015, scholarlycommons.law.case.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1006&context=jil.

⁵Ministry of Defence. “Unmanned Aircraft Systems (JDP 0-30.2).” *GOV.UK*, GOV.UK, 15 Jan. 2018, www.gov.uk/government/publications/unmanned-aircraft-systems-jdp-0-302.



Militarisation

Militarisation refers to when something or someone is trained in order to support or achieve military aims.⁶

Unmanned Aerial Vehicle

An Unmanned Aerial Vehicle (UAV) is commonly known as a drone. It is an aircraft without any humans on board.⁷ It can be controlled in various ways, either through remote control by humans or by computers on board of the UAV.

Espionage

The practice of spying in order to obtain information about the plans of a foreign government or a company.⁸ Espionage is considered a crime and has been criminalised by legislation.

Hybrid Warfare

“Hybrid Warfare consists of a combination of two or multiple forms of warfare. It is clear that hybrid warfare refers to the simultaneous adoption of multiple modes of warfare.” According to European Union hybrid threat “is a phenomenon resulting from convergence and interconnection of different elements, which together form a more complex and multidimensional threat.”⁹ For example, an organisation might use military intimidation combined with diplomatic or technological means in order to achieve their aim.

General Overview

AI seems to be beneficial in most parts of our modern day society however, opinions are divided on the benefits and limitations of weaponization of AI. Brigadier General Pat Huston believes that weaponization of AI is inevitable and therefore the most important part is that we understand how we can regulate it legally and ethically. Huston also raised some interesting

⁶“Definitions for Militarizationmil·i·Ta-Riza-Tion.” *What Does Militarization Mean?*, 2019, www.definitions.net/definition/militarization.

⁷“Unmanned Aerial Vehicles in Humanitarian Response.” *Unocha*, UN, July 2014, www.unocha.org/sites/unocha/files/Unmanned%20Aerial%20Vehicles%20in%20Humanitarian%20Response%20OCHA%20July%202014.pdf.

⁸“Espionage.” *Merriam-Webster*, Merriam-Webster, 2019, www.merriam-webster.com/dictionary/espionage.

⁹ Tienhoven, Manon van. “Identifying Hybrid Warfare.” *Open Access Leiden University*, 2016, openaccess.leidenuniv.nl/bitstream/handle/1887/53645/2016_Tienhoven_van_CSM.pdf?sequence=1.



questions “What if AI-enhancements make autonomous weapons better than traditional weapons? What if autonomous weapons are more precise and cause less collateral damage? Would we be legally obligated to use them, if available? Would we have an ethical obligation to pursue them?” All these questions are important to keep in mind if we want to be able to understand how we can deal with the weaponization of AI.¹⁰

An argument in favour of weaponization of AI is that less military troops can be used in conflict or a mission. This would mean that AI can replace human warfighters in the battlefield and thus lead to fewer casualties. This can also encourage nations to undertake more dangerous missions as they have to worry less about human casualties.¹¹ The US Department of Defence further states that robots can replace boring tasks. For example, missions that take a long period of time. Furthermore, if the mission takes place in areas that are harmful for the human body such as places with high radioactivity robots can replace humans. A similar technique is already used nowadays as robots can be used for explosive disposal.¹² A further advantage would be that AI robots can act on their own. If communication links with a military base stop working, they can be programmed to make their own decisions in unfamiliar situations.¹³

There are also financial benefits to the weaponization of AI. Department of Defence figures show that every individual soldier in Afghanistan costs the Pentagon around \$850,000 a year. On the other hand the TALON Tracked Military Robot, a small armed rover, costs \$230,000.¹⁴ According to General Robert Cone, former commander of the U.S. Army Training and Doctrine Command, the U.S. army could reduce the size of a brigade from four thousand to three thousand soldiers if these soldiers were to be replaced by robots. This would have no negative impact on the effectiveness of the army.¹⁵

¹⁰Radin, Sasha. “Cyber-3662397_1280.” *Humanitarian Law & Policy Blog*, June 2019, blogs.icrc.org/law-and-policy/2019/03/19/expert-views-frontiers-artificial-intelligence-conflict/cyber-3662397_1280/.

¹¹Marchant, Gary E., et al. “International Governance of Autonomous Military Robots.” *SpringerLink*, Springer, Dordrecht, 1 Jan. 1970, link.springer.com/referenceworkentry/10.1007%2F978-90-481-9707-1_102.

¹²Clapper, James R. “Worldwide Threat Assessment of the US Intelligence Community.” House Permanent Select Committee on Intelligence, 25 Feb. 2016, www.dni.gov/files/documents/Newsroom/Testimonies/HPSCI_Unclassified_2016_ATA_SFR-25Feb16.pdf.

¹³Thurnher, Jeffrey. “No One at the Controls: Legal Implications of Fully Autonomous Targeting.” *SSRN*, 21 July 2013, papers.ssrn.com/sol3/papers.cfm?abstract_id=2296346.

¹⁴Etzioni, Amitai. “Pros and Cons of Autonomous Weapons Systems.” *Army University Press*, May 2017, www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/.

¹⁵Ibid.



A third and arguably the most significant benefit is related to ethics. Robotist Ronald C. Arkin believes that it is possible that robots in the future will be able to act similar to humans on the battlefield. He states several reasons for this. Firstly, robots will not be influenced by the instinct to protect themselves. They won't be influenced by emotions such as fear which is beneficial for logical thinking in stressful situations. Secondly, they can process much more sensory information which enables them to observe their environment calmly and make valid judgements without the presence of any prejudice. Lastly, if a brigade would consist of a mix of robots and human soldiers, the robots can supervise the soldiers and report whether the soldiers break any ethical considerations. Usually, soldiers who work together are less likely to report this.¹⁶ According to Colonel Douglas Pryer of the U.S. army, soldiers' neural circuits can be affected which leads to lack of self-control and therefore performing ethical violations. Examples of ethical violations soldiers might perform is rape and torture.¹⁷

On the other hand, there are also limitations to the weaponization of AI. A counter-argument for the weaponization of AI is that there is a lack of evidence that robots in the near future would be able to function well enough in order to have accurate target identification, situational awareness, or make the right decisions in regards to use of force (International Committee for Robot Arms Control).¹⁸ This could result in unnecessary harmful situations. Additionally, scientists from thirty-seven countries stated that "decisions about the application of violent force must not be delegated to machines" (International Committee for Robot Arms Control).

A second counter-argument is that robots will be able to choose their own targets and this could result in unfortunate situations. For example, they will find it hard to identify the difference between an innocent civilian and an armed combatant. This is related to an important concept in conflict which is 'The Principle of Distinction.' This is an international humanitarian law that states that in conflict no harm is allowed to be done on non-

¹⁶ Arkin, Ronald C. "The Case for Ethical Autonomy in Unmanned Systems." *Taylor & Francis*, 16 Dec. 2010, www.tandfonline.com/doi/abs/10.1080/15027570.2010.536402.

¹⁷ A., Douglas. "The Rise of the Machines: Why Increasingly 'Perfect' Weapons Help Perpetuate Our Wars and Endanger Our Nation." *Military Review*, U.S. Army CGSC, 1 Mar. 2013, www.questia.com/library/journal/1G1-335627635/the-rise-of-the-machines-why-increasingly-perfect.

¹⁸ Etzioni, Amitai, and Oren Etzioni. "Pros and Cons of Autonomous Weapons Systems." *Army University Press*, May 2017, www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/.



combatants. Theoretically, if the AI is programmed to make its own decisions on who to target, it can result in civilian casualties (Sharkey 687-709).¹⁹

A third limitation is that there is the issue of accountability. Ethicist Robert Sparrow argues that a significant part of international humanitarian law is that there will always be a person that is accountable for civilian casualties. If weaponization of AI is implemented, it is hard to find someone accountable for the killing of civilians as robots can't be taken accountable. Therefore, Sparrow believes robots should not be allowed in conflict (Sparrow 62-77).²⁰ The main concern is that because AI make decisions on their own, it is hard to find out whether a detrimental mistake is due to an error in the AI's system or that the killing was deliberate. A real life example is self-driving cars. There is no driver who can be held accountable and if the car commits a traffic violation it would be unfair to punish the passengers.

Major Parties Involved

Soviet Union

In September 2017, Putin addressed a speech to students at the beginning of the school year in which he states "Artificial intelligence is the future, not only for Russia, but for all humankind. It comes with colossal opportunities, but also threats that are difficult to predict. Whoever becomes the leader in this sphere will become the ruler of the world."²¹

Putin is not the only one in support of the development of AI. Russian General Gerasimov told the military news agency Interfax-AVN that robots will play a leading role in future wars.

In 2015, Russian weapons maker, Degtyarev, was able to develop a tank with a 7.26mm machine gun.²² The tank is able to act autonomously, move silently and explodes in order to destroy surrounding tanks or buildings. Furthermore, Russia has developed another tank -

¹⁹Ibid.

²⁰Sparrow, Robert. "Killer Robots." *Staffwww*, 2007, staffwww.dcs.shef.ac.uk/people/A.Sharkey/Sparrow.pdf.

²¹Druzhinin, Alexei. "'Whoever Leads in AI Will Rule the World': Putin to Russian Children on Knowledge Day." *RT International*, 1 Sept. 2017, www.rt.com/news/401731-ai-rule-world-putin/.

²²"Russian Robotic System Nerektha Will Be Ready Soon for Trials 41510155." *October 2015 Global Defense Security News UK | Defense Security Global News Industry Army 2015 | Archive News Year*, 15 Oct. 2015, www.armyrecognition.com/october_2015_global_defense_security_news_uk/russian_robotic_system_nerektha_will_be_ready_soon_for_trials_41510155.html.



the Uran-9 - which has no room for a crew on board and purely consists of weapons and ammunition. This tank was deployed in Syria in order to test its abilities.²³

United States

The United States believes that a ban on autonomous weapons is too premature. They support this statement with their argument that the weaponization of artificial intelligence will have humanitarian and military benefits.

The United States are currently developing robotic tanks that can function autonomously and be remotely controlled. Additionally, the US Navy released in 2016 an autonomous war ship. The purpose of the new Navy ship is to contribute to a new tactic to counter Chinese maritime developments. The Chief of Naval Operations Admiral John Richardson stated that the increased competition with Russia and China called for new developments in the Navy and technological developments. The plan is to further expand the navy with more of these autonomous ships in order to strengthen the US Navy.²⁴

United Kingdom

The Defense Ministry of the United Kingdom has stated that “the UK Government’s policy is clear that the operation of UK weapons will always be under human control as an absolute guarantee of human oversight, authority and accountability.” The United Kingdom prefers to define Lethal Autonomous Weapons Systems (LAWS) as “machines with the ability to understand higher-level intent, being capable of deciding a course of action without depending on human oversight and control.” Due to the fact that the United Kingdom has implemented a new definition for (LAWS) which differs from that in other countries, it is hard to understand their position.²⁵ For example, the campaign group Drone Wars UK, revealed that the United Kingdom is funding the development of killer robots even though they stated

²³Sharkey, Noel. “Killer Robots From Russia Without Love.” *Forbes*, Forbes Magazine, 29 Nov. 2018, www.forbes.com/sites/noelsharkey/2018/11/28/killer-robots-from-russia-without-love/#3f3e03e1cf01.

²⁴Marr, Bernard. “Weaponizing Artificial Intelligence: The Scary Prospect Of AI-Enabled Terrorism.” *Forbes*, Forbes Magazine, 23 Apr. 2018, www.forbes.com/sites/bernardmarr/2018/04/23/weaponizing-artificial-intelligence-the-scary-prospect-of-ai-enabled-terrorism/#7440f67a77b6.

²⁵Evans, Hayley. “Too Early for a Ban: The U.S. and U.K. Positions on Lethal Autonomous Weapons Systems.” *Lawfare*, 16 Apr. 2018, www.lawfareblog.com/too-early-ban-us-and-uk-positions-lethal-autonomous-weapons-systems.



in the past that they had no interest in it. The United Kingdom's Defense and Security Accelerator is funding research to develop more (LAWS) with no direct human involvement.²⁶

Human Rights Watch (HRW)

The HRW is one of the main opponents to the weaponization of Artificial Intelligence. The HRW have published a report in cooperation with Harvard Law School's International Human Rights Clinic called "Heed the Call: A Moral and Legal Imperative to Ban Killer Robots."²⁷ According to the HRW Autonomous weapons would be "unable to comply with the principles of humanity" and "dictates of public conscience."²⁸

Google

In 2017, Google created an artificial Intelligence system that could train itself to such a high-level that would outperform other human-built AI. This was quite a significant invention as it brought up fears and discussion on what else AI could do without human involvement.²⁹

Google also had a contract with the Pentagon to create an AI that would analyse drone footage. However, in June 2018, thousands of Google employees signed a petition which urged Google to cease project Maven, a project with the Department of Defense to develop Artificial Intelligence. Google Employees feared that one day this developed Artificial Intelligence would be used as Lethal Autonomous Weapons. Therefore, Google decided not to renew their contract with the Pentagon.³⁰

Other companies such as Apple, Microsoft and Amazon are also focussing on the development of AI with Apple currently being in the lead with \$248,100 billion revenue.³¹

²⁶Burt, Peter. "Off The Leash." *RegMedia*, Nov. 2018, regmedia.co.uk/2018/11/12/drone_wars_uk_off_the_leash_report.pdf.

²⁷"Heed the Call | A Moral and Legal Imperative to Ban Killer Robots." *Human Rights Watch*, 21 Aug. 2018, www.hrw.org/report/2018/08/21/heed-call/moral-and-legal-imperative-ban-killer-robots.

²⁸Ibid.

²⁹Sulleyman, Aatif. "Google AI Creates Its Own 'Child' Bot." *The Independent*, Independent Digital News and Media, 6 Dec. 2017, www.independent.co.uk/life-style/gadgets-and-tech/news/google-child-ai-bot-nasnet-automl-machine-learning-artificial-intelligence-a8093201.html.

³⁰Evans, Hayley, and Natalie Salmanowitz. "Lethal Autonomous Weapons Systems: Recent Developments." *Lawfare*, 11 Mar. 2019, www.lawfareblog.com/lethal-autonomous-weapons-systems-recent-developments.

³¹"Top Artificial Intelligence (AI) Software Companies in the USA and Internationally." *Top Artificial Intelligence (AI) Software Companies in the USA and Internationally*, 2019, www.thomasnet.com/articles/top-suppliers/ai-software-companies.



Timeline of Key Events

Date	Description of event
1973	The first prototype system of the Phalanx CIWS was offered to the U.S. Navy for evaluation on the destroyer leader USS King.
Jan 25 1979	First human killed by a robot.
April 10 1981	The Convention on Certain Conventional Weapons was signed by 50 nations.
1st of March 1999	The Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction was put into force. SoftBank Robotics introduces a semi-humanoid robot called Pepper which can read emotions.
March 25 2019	
March 25-29, 2019	UN Secretary-General António Guterres calls for a ban on 'killer robots.' Convention on Certain Conventional Weapons (CCW)



UN involvement, Relevant Resolutions, Treaties and Events

- Campaign to stop Killer Robots, 2018. It encourages all states to “work towards a legally binding instrument that prohibits fully autonomous weapons.” and “adopt national policy and laws to prevent the development of fully autonomous weapons.”³²
- Opening of the UN General Assembly, September 25, 2018. Around 50 states discuss their concerns on Lethal Autonomous Weapons Systems (LAWS) at the 73rd session of the UNGA in 2018. This was the highest number of countries that commented in an annual UNGA session.³³
- U.N Secretary-General António Guterres has called several times for a ban on ‘Killer Robots’ the last time was on March 25, 2019.
- Convention on Certain Conventional Weapons (CCW), March 25-29, 2019. The U.N.’s Group of Governmental Experts (GGE) met for the third time to discuss methods and developments related to LAWS.³⁴

Previous Attempts to solve the Issue

On the 3rd of September 2018 in Geneva, negotiations were held in regard to the creation of an international treaty that would ban Lethal Autonomous Weapons. However, little to no

³² “UN Head Calls for a Ban.” *Killer Robots*, 2019, www.stopkillerrobots.org/2018/11/unban/.

³³ “UN Head Calls for a Ban.” *Killer Robots*, 2019, www.stopkillerrobots.org/2018/11/unban/.

³⁴ Evans, Hayley, and Natalie Salmanowitz. “Lethal Autonomous Weapons Systems: Recent Developments.” *Lawfare*, 11 Mar. 2019, www.lawfareblog.com/lethal-autonomous-weapons-systems-recent-developments.



progress was made as the military powers, the United States, Russia, South Korea, Israel, and Australia were against such plans.³⁵ They believed that there are potential benefits to Lethal Autonomous Weapons and hope to investigate them more. They also stated that it is important to continue discussions on LAWS but would not agree on measures opposing 'Killer Robots.'³⁶ This is one of the main challenges that the UN faces in regards to this topic.

An interesting fictional regulation of 'Killer Robots' was created in 1942 by Isaac Asimov, a science fiction author. He came up with the Three Laws of Robotics (also called Asimov's laws). The first law of these set of rules states that: "a robot may not injure a human being, or, through inaction, allow a human being to come to harm." The second rule states: "A robot must obey the orders given it by human beings except where such orders would conflict with the First Law." The third rule states: "A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws."³⁷ Although these laws have been written by a science fiction author, they have influenced the thoughts on ethics in AI and would be a good inspiration for any future agreements that could be created.

Scientists and NGOs have been heavily involved in this debate. For example, Elon Musk of Tesla, famous theoretical physicist Stephen Hawking, and Mustafa Suleyman of Google DeepMind. They have been arguing for international bans on the development of 'Killer Robots' Although they haven't managed to get countries to come to a mutual international agreement, they have gotten a lot of recognition from the public. It is also important to note that the debate on a ban on the weaponization AI is quite a recent issue and therefore future agreements are not outruled.

Possible Solutions

One of the first things that states should agree on is an international definition for Lethal Autonomous Weapons. A current issue is that most nations have their own definition of Lethal Autonomous Weapons. This makes it more difficult to agree upon effective international treaties as these treaties might not address the definition of LAWS. The fact

³⁵Busby, Mattha. "'Killer Robots' Ban Blocked by US and Russia at UN Meeting." *The Independent*, Independent Digital News and Media, 3 Sept. 2018, www.independent.co.uk/life-style/gadgets-and-tech/news/killer-robots-un-meeting-autonomous-weapons-systems-campaigners-dismayed-a8519511.html.

³⁶ Ibid.

³⁷ Lewis, Dave. "Asimov's Laws For Artificial Intelligence." *Forbes*, Forbes Magazine, 12 Dec. 2017, www.forbes.com/sites/davelewis/2017/12/12/asimovs-laws-for-artificial-intelligence/#24d5478b12a9.



that most nations have their own definition helps them to avoid possible regulations and limit further progress in discussions.³⁸

It seems as it is hard to stop the development of AI as there already has been much progression. Therefore, we could focus on regulations. For example, we could create a set of rules that countries should follow when developing LAWS. This could prevent certain issues that would violate any ethical guidelines. These set of rules can be based on, for example, Asimov's rules. It should also be noted that there is the issue of whether robots can distinguish innocent civilians from combatants. In order to follow the humanitarian law 'The Principle of Distinction', we should try to find that solutions that will reduce the risk on innocent civilians. We could try and come up with a system that enables robots to distinguish soldiers from combatants. We could also give innocent civilians a chip or something similar to that. Of course ethical issues arise with this.

The need for transparency is also quite important in the development of LAWS. If countries keep their 'Killer Robots' secretive it will be hard to investigate whether they would follow new international agreements.

In order to have more control over AI we can suggest the requirement that there always should be partial human interference. For example, LAWS might be supervised from headquarters and can be stopped or reset in critical situations.

³⁸Busby, Mattha. "Killer Robots' Ban Blocked by US and Russia at UN Meeting." *The Independent*, Independent Digital News and Media, 3 Sept. 2018, www.independent.co.uk/life-style/gadgets-and-tech/news/killer-robots-un-meeting-autonomous-weapons-systems-campaigners-dismayed-a8519511.html.



Bibliography

1. Arkin, Ronald C. "The Case for Ethical Autonomy in Unmanned Systems." *Taylor & Francis*, 16 Dec. 2010, www.tandfonline.com/doi/abs/10.1080/15027570.2010.536402.
2. Burt, Peter. "Off The Leash." *RegMedia*, Nov. 2018, regmedia.co.uk/2018/11/12/drone_wars_uk_off_the_leash_report.pdf.
3. Busby, Mattha. "Killer Robots' Ban Blocked by US and Russia at UN Meeting." *The Independent*, Independent Digital News and Media, 3 Sept. 2018, www.independent.co.uk/life-style/gadgets-and-tech/news/killer-robots-un-meeting-autonomous-weapons-systems-campaigners-dismayed-a8519511.html.
4. Clapper, James R. "Worldwide Threat Assessment of the US Intelligence Community." House Permanent Select Committee on Intelligence, 25 Feb. 2016, www.dni.gov/files/documents/Newsroom/Testimonies/HPSCI_Unclassified_2016_AT_A_SFR-25Feb16.pdf.
5. "Definitions for Militarizationmil·i·Ta·Riza·Tion." *What Does Militarization Mean?*, 2019, www.definitions.net/definition/militarization.
6. Druzhinin, Alexei. "Whoever Leads in AI Will Rule the World': Putin to Russian Children on Knowledge Day." *RT International*, 1 Sept. 2017, www.rt.com/news/401731-ai-rule-world-putin/.
7. "Espionage." *Merriam-Webster*, Merriam-Webster, 2019, www.merriam-webster.com/dictionary/espionage.
8. Etzioni, Amitai, and Oren Etzioni. "Pros and Cons of Autonomous Weapons Systems." *Army University Press*, May 2017, www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/.



9. Evans, Hayley, and Natalie Salmanowitz. "Lethal Autonomous Weapons Systems: Recent Developments." *Lawfare*, 11 Mar. 2019, www.lawfareblog.com/lethal-autonomous-weapons-systems-recent-developments.
10. Evans, Hayley. "Too Early for a Ban: The U.S. and U.K. Positions on Lethal Autonomous Weapons Systems." *Lawfare*, 16 Apr. 2018, www.lawfareblog.com/too-early-ban-us-and-uk-positions-lethal-autonomous-weapons-systems.
11. "Heed the Call | A Moral and Legal Imperative to Ban Killer Robots." *Human Rights Watch*, 21 Aug. 2018, www.hrw.org/report/2018/08/21/heed-call/moral-and-legal-imperative-ban-killer-robots.
12. Lewis, Dave. "Asimov's Laws For Artificial Intelligence." *Forbes*, Forbes Magazine, 12 Dec. 2017, www.forbes.com/sites/davelewis/2017/12/12/asimovs-laws-for-artificial-intelligence/#24d5478b12a9.
13. Marchant, Gary E., et al. "International Governance of Autonomous Military Robots." *SpringerLink*, Springer, Dordrecht, 1 Jan. 1970, link.springer.com/referenceworkentry/10.1007%2F978-90-481-9707-1_102.
14. Marr, Bernard. "Weaponizing Artificial Intelligence: The Scary Prospect Of AI-Enabled Terrorism." *Forbes*, Forbes Magazine, 23 Apr. 2018, www.forbes.com/sites/bernardmarr/2018/04/23/weaponizing-artificial-intelligence-the-scary-prospect-of-ai-enabled-terrorism/#7440f67a77b6.
15. Ministry of Defence. "Unmanned Aircraft Systems (JDP 0-30.2)." *GOV.UK*, GOV.UK, 15 Jan. 2018, www.gov.uk/government/publications/unmanned-aircraft-systems-jdp-0-302.
16. Radin, Sasha. "Cyber-3662397_1280." *Humanitarian Law & Policy Blog*, June 2019, blogs.icrc.org/law-and-policy/2019/03/19/expert-views-frontiers-artificial-intelligence-conflict/cyber-3662397_1280/.
17. Roff, Heather M. "Lethal Autonomous Weapons and Jus Ad Bellum Proportionality." *School of Law Case Western Reserve University*, 2015, scholarlycommons.law.case.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1006&context=jil.
18. "Russian Robotic System Nerektha Will Be Ready Soon for Trials 41510155." *October 2015 Global Defense Security News UK | Defense Security Global News Industry Army 2015 | Archive News Year*, 15 Oct. 2015, www.armyrecognition.com/october_2015_global_defense_security_news_uk/russian_robotic_system_nerektha_will_be_ready_soon_for_trials_41510155.html.
19. Sharkey, Noel. "Killer Robots From Russia Without Love." *Forbes*, Forbes Magazine, 29 Nov. 2018, www.forbes.com/sites/noelsharkey/2018/11/28/killer-robots-from-russia-without-love/#3f3e03e1cf01.



20. Sparrow, Robert. "Killer Robots." *Staffwww*, 2007, staffwww.dcs.shef.ac.uk/people/A.Sharkey/Sparrow.pdf.
21. Sulleyman, Aatif. "Google AI Creates Its Own 'Child' Bot." *The Independent*, Independent Digital News and Media, 6 Dec. 2017, www.independent.co.uk/life-style/gadgets-and-tech/news/google-child-ai-bot-nasnet-automl-machine-learning-artificial-intelligence-a8093201.html.
22. Thurnher, Jeffrey. "No One at the Controls: Legal Implications of Fully Autonomous Targeting." *SSRN*, 21 July 2013, papers.ssrn.com/sol3/papers.cfm?abstract_id=2296346.
23. Tienhoven, Manon van. "Identifying Hybrid Warfare." *Open Access Leiden University*, 2016, openaccess.leidenuniv.nl/bitstream/handle/1887/53645/2016_Tienhoven_van_CSM.pdf?sequence=1.
24. "Top Artificial Intelligence (AI) Software Companies in the USA and Internationally." *Top Artificial Intelligence (AI) Software Companies in the USA and Internationally*, 2019, www.thomasnet.com/articles/top-suppliers/ai-software-companies.
25. "Unmanned Aerial Vehicles in Humanitarian Response." *Unocha*, UN, July 2014, www.unocha.org/sites/unocha/files/Unmanned%20Aerial%20Vehicles%20in%20Humanitarian%20Response%20OCHA%20July%202014.pdf.
26. "UN Head Calls for a Ban." *Killer Robots*, 2019, www.stopkillerrobots.org/2018/11/unban/.
27. UNIDIR. *UNIDIR*, 2018, Unidir.ch. (2018). [online] Available at: <http://www.unidir.ch/files/publications/pdfs/theweaponization-of-increasingly-autonomous-technologies-artificial-intelligence-en-700.pdf> [Accessed 5 Jan. 2019].
28. UNIDIR. "The Weaponization of Increasingly Autonomous Technologies: Concerns, Characteristics and Definitional Approaches." *UNIDIR*, 2017, www.unidir.org/files/publications/pdfs/the-weaponization-of-increasingly-autonomous-technologies-concerns-characteristics-and-definitional-approaches-en-689.pdf.
29. UNESCAP. "Artificial Intelligence in Asia and the Pacific." *UNESCAP*, 2019, www.unescap.org/sites/default/files/ESCAP_Artificial_Intelligence.pdf.



