The Inevitability of an International Regulatory Framework for Artificial Intelligence

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Abstract—**AI is impacting humans in ways that have been unheard of. AI applications are now capable of being used in the manufacture and functioning of autonomous weapons, specifically in the Lethal Autonomous Weapons System (LAWS). There is lack of regulation in this regard and in order for any regulatory framework that can be out in place, it is imperative that certain basic principles of control have to be clarified, particularly the principle of 'meaningful human control'. This paper attempts to establish the need for an international regulatory framework for artificial intelligence in the context of lethal autonomous weapons systems and meaningful human control.**

Keywords—*defining AI, lethal autonomous weapons system, meaningful human control, international regulatory framework.*

I. INTRODUCTION

While writing this paper I was faced with the biggest dilemma of contextualizing the area of study for Artificial Intelligence (AI). The growth of AI in the past few years has been exponential and at the same time the policy makers, regulators and the concerned civic communities are not able to keep up with this growth while trying to understand or even foresee where and how the AI is going to impact humanity. As the science fiction writer Isaac Asinov says, "The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom". This paper suggests that there has to be an appropriate regulatory mechanism in place to deal with the issues of AI and the most effective manner in which it can be done is through an international consensus that can be procured by an organization like the United Nations. The paper focuses on the challenge of use of force which would be one of the issues on the application of AI. How will the regulators regulate the use of AI in weapon manufacturing and usage of the same, particularly in the development and deployment of autonomous weapons? The fact that AI, while used in weapon will lack human control and make war fare industrialized and hence it is utmost important to regulate them.

II. UNDERSTANDING AI AND ITS IMPACT

John McCarthy defines AI as "the science and engineering of making intelligent machines, especially intelligent computer programs" [1]. It is the process by which human intelligence is simulated through machine processes [2]. Artificial Intelligence (AI) is concerned with the design, development and implementation of computer systems that can perform tasks and solve problems of a sort for which human intelligence is normally thought to be required [3]. These machines are so artificially-intelligent, that they are capable of performing, those tasks that were traditionally carried out by humans, with much more efficiency than humans ever could do. These machines are extremely complex an almost fictional in nature and like normal people they have the ability to reason out generally, thereby incorporating a kind of artificial intelligence called General AI [4]. What AI essentially does is it minimizes the unpredictability and complexity of human behavior and produces powerful predictive reasoning.

According to Gartner 2019 CIO Survey, 37% of the organizations of the world have implemented AI in some form. The Survey conducted across 89 countries from data gathered from more than 3000 CIOs, revealed that the number of enterprises that implemented artificial intelligence (AI) grew 270 percent in the past four years and tripled in the past one year [5].

Any research on AI poses two different but overlapping thoughts, as this writer had encountered at the beginning of writing this paper. First, is the question of how the AI application is going to be used across various fields of science and non-scientific fields like law, human resources, etc. For example, a vast amount of practical breakthroughs in machine learning, which is an important branch of AI, has been the outcome of a massive increase in the computational power and access to training data. These innovations have underpinned the recent successes across a wide range of applied domains, varying from diagnosing precancerous moles to driving an automobile. This has enhanced the potential of Al to be used for both good and ill [6]. Second, is the question of regulating the application of AI, since it is positively and negatively impacting the present and future of human kind. The policy makers have started discussions with stakeholders both at national and international levels in this regard [7].

At the national level, there have been several demands to policy makers to address the issue of impact of AI. However, the response to these did not come until 2016, when the United States House Energy and Commerce Committee held a hearing on Advanced Robotics (robots with AI) and the Senate Joint Economic Committee held the "first ever hearing focused solely on artificial intelligence" [8]. Also, under the Obama administration, several workshops on AI were held and three official reports detailing their findings were published [9]. Also, in the recent years, the Governments of Japan [10] and the European Union [11] have proposed or formed official commissions around robots and Al [12]. Also, in UK, the House of Lords has set up a Select Committee on Artificial Intelligence "to consider the economic, ethical and social implications of advances in artificial intelligence" who have submitted their first report [13].

Why should AI be regulated?

First of all there is lack of definitional clarity of AI [14]. Secondly AI applications applies to a wide spectrum and it becomes difficult to address a single use of AI. AI therefore poses several challenges and there is lack of consensus among the stakeholders in dealing with the several issues posed by AI applications. For example, DeepMind Ethics and Society are concerned with the ethical and moral issues and the risks involved in the misuse and unintended consequences of AI [15].

Prof. Ryan Calo, identifies the following key challenges for the policy makers: 1. Justice and Equality; 2. Use of Force; 3. Safety and Certification; 4. Privacy and Power; 5. Taxation and Replacement of Labour [16]. Certain other writers have identified the problems associated with the current applications of AI as follows: 1. Bias; 2. Safety; 3. Legal Decision Making; 4. Privacy; 5. Unemployment [17].

In a recent study [18] the following principles were identified, after assimilating the several principles from Academia, Non-profits and Non-Governmental Organizations [19], from Governments [20], and from Industry [21]: humanity, collaboration, share, fairness, transparency, privacy, security, safety, accountability and AGI/ASI [22].

This paper is not subtracting the major worries that the effect that AI is going to bring about, particularly the large-scale unemployment that may be the likely result of machines replacing humans [23]. In fact, this was also the concern raised by the International Bar Association (IBA) in finding an appropriate way to bridge the gap between the existing employment legislations and the law which are necessary to reflect the new reality of automated workplace. There is a huge risk at all levels in society that the jobs which are presently being carried out by humans will be, in future, reassigned to robots or AI. According to Gerlind Wisskirchen from the IBA's Global Institute, this scenario will pose a problem to the legal arena, whereby the legislations which are not made for the protection of rights of human workers will not be fit to be applied to these robots or AI. [24].

However, this paper focuses on the central question that the policy-makers face here is when the AI-based decision making involves the decision to use force. The regulators will find it difficult to regulate the use of AI in weapon manufacturing and its usage, particularly in the development and deployment of autonomous weapons.

III. AI APPLICATION IN WEAPONS

Any innovation should be promoted. From time immemorial, this has been the norm and will remain so for the future as well. Innovation can only usher in development and progress, or so we think. Even utilization of atomic energy and nuclear energy had led to the most important and destructive innovation of the past century. An atomic bomb led to the most destructive world war and the Nuclear Bomb is keeping the countries at ransom and checks with the possibility of a worst war which has the potential to destroy nations. Enter Artificial Intelligence, hailed as the mother of all innovations and as some fear as the 'final invention of humankind' [25] and which can be considered as "Third revolution" in warfare technologies after atom bombs and nuclear bombs, capable to destroying and controlling the human race if it gets into the wrong hands. As opined by the eminent scientist Prof. Stephen King "The development of full artificial intelligence could spell the end of the human race" [26]. Elon Musk, the technology entrepreneur also warns that AI is "our biggest existential threat" [27].

Though, atomic and nuclear energies are utilized for various benefits of humans, it is known for the destructive weaponry that are made and the fear it has instilled in each one of us. This very fear is the reason that countries who have been sworn enemies like the US and N. Korea has engaging in dialogues with a prime aim to avoid future catastrophes. Likewise, the continuous tensions between countries like India and Pakistan who have nuclear capabilities are being called upon to have effective dialogues to diffuse tense situations. There are several regulations in place for use of atomic and nuclear weapons and the restraint shown by the countries that have the nuclear capabilities arise out of the sense of obligations that these regulations place in the international arena.

IV. HOW DO YOU REGULATE THEM?

The size and power of the multinational companies that develop most of the world's AI-such as Google, Facebook, and Microsoft-raise fundamental issues about the ability of governments to regulate in this area at all. Far fewer of the traditional tools of regulation once available to governments seeking to regulate AI remain viable or available [28]. According to Elon Musk some kind of regulatory oversight at the national and international level is the need of the hour, so as to avoid doing anything foolish. [29].

AI should and can be regulated both at the national level and international level. At either level, there are diverging issues that the regulators will face in implementing any regulations. I will briefly go through the various issues that may be faced at the effective regulatory measures being enacted and implemented at the national and international levels.

1. National law regulators may encounter the following hurdles:
   a. Jurisdictional Issues
   b. Only few countries will be willing to have a AI regulations in place
   c. The domestic law principles that may be adopted in each country may be different
2. Regulatory Framework at the International level may face the following issues
   a. Lack of Consensus among the participating states
   b. Various Principles that may be applied to AI
   c. Absence of a single authority to implement any regulation
   d. The International Organization which will lead in taking steps to regulating AI

V. UNITED NATIONS: THE INTERNATIONAL ORGANIZATION THAT IS LEADING THE WAY

Major researches in the application of AI is in the area of Health and Weaponry. This is evident from the current discussions in United Nations. The United Nations has given an international platform by initiating dialogue on Artificial Intelligence through its "AI for Good" series. Flagging off the series on 25th September 2017 the UN Secretary General

highlighted the importance of Artificial Intelligence at the UN General Assembly by stating that the rapidly developing fields like "artificial intelligence, block chain and biotechnology have the potential to turbo change progress towards the Sustainable Development Goals" [30].

Mr. Houlin Zhao, the Secretary General of the International Telecommunication Union (ITU) emphasized the critical role that the UN should play in "balancing technological progress with social progress…and work towards building a common understanding of the capabilities of the emerging AI technologies" [31]. In pursuing the UN's "AI for Good" series, and under the auspices of the UN, the ITC has organized two summits in partnership with the UN and it's sister agencies. The first one named UN AI for Good Global Summit 2017paved way for the first ever comprehensive international dialogue on beneficial AI. This summit was successful in generating AI- related strategies and other supporting projects with the purpose of accelerating advancement towards achieving the UN Sustainable Development Goals (SDGs). The Summit had endeavored to connect the AI innovators with public and/or private sector decision-makers. It also contribute to the formulation of global strategies in order to ensure trusted, safe and inclusive development of AI technologies as well as equitable access to their benefits [32].This was followed by the UN Global Summit 2018 whereby 33 UN partner agencies met on 16 May 2018 for the 'UN Partner's Meeting'. In this each partner agency discussed their respective roles in AI and vouched their support for a UN wide partnership by scaling up the AI enabled innovative solutions towards advancement of sustainable development. Subsequently, another round table discussion was held on 24 September 2018, where a compendium of work on the United Nations Activities on Artificial Intelligence (AI) was presented and discussed at the AI for Good UN Partner's Meet held in New York [33].

One of the central issue in these discussions was raised by the United Nations Institute for Disarmament Research (UNIDIR), whose focus was on the impact that AI will have on international security. According to UNIDIR, if they need to harness 'AI for Good', it will be absolutely essential to reduce or mitigate the potentially harmful impact that will be caused by AI. A work-stream was already established in 2013 itself to study on the weaponisation of increasingly autonomous technologies. This was primarily because there were major concerns regarding the 'emerging technologies in the area of lethal autonomous weapons system' and was extensively discussed by the State parties on the Convention on Certain Conventional Weapons (CCW) at their 2013 meeting. Subsequently several expert meetings were held every year, which identified a major lacuna in the area. This led to the recommendation made by Advisory Board to the Secretary General, whereby the State parties commissioned UNIDIR to study on the impact of AI on international security [34].

Hence, we can see that even though the major focus for UN was to use AI for achieving Sustainable Development Goals, they are also paying attention to the negative impacts of use of AI, particularly the use of autonomous weapons, which are capable of massive destruction of mankind itself.

VI. MAJOR WORRIES

A. Ethical Issues of Military 'Killer' Robots

The research community face their biggest ethical challenge, should they support the development of these lethal autonomous weapons or to oppose them for possibly saving the mankind from these killer robots [35]. The question of machine ethics was raised by Prof. James Moor in his 2006 paper [36] whereby he argued that since future machines will likely to have increased control and autonomy, and that more powerful the machines get, more powerful the machine ethics should be [37].

On 23rd August 2017, inventors like Elon Musk of Tesla and Mustafa Suleiman, Head of Applied AI at Google Deep Mind led a team of 16 experts from 26 countries - appealing to the United Nations to adopt a treaty to ban autonomous weapons or the killer robots since they were not only "morally wrong" but also would inevitably "industrialize warfare" [38]. The UN has responded to this plea by appointing an Expert group to study the potential impact of autonomous military robots- from drones to driverless tanks and automated machine guns.

B. Problem of Lethal Autonomous Weapons System (LAWS)

A Lethal Autonomous Weapons system subtract an element of human control, as evidenced by the various definitions given to LAWS. While there is no internationally agreed definition of LAWS, various countries and organizations have given their own set of definitions. According to US, it is "a weapon system that, once activated, can select and engage targets without further intervention by a human operator" [39]. Most of the NATO countries like France [40], Norway [41], Austria [42], Italy [43], Switzerland [44] and the Netherlands [45] have also given various definition for LAWS [46]. UK's House of Lords has recommended to convene a panel of military and AI experts to define LAWS in alignment with other definitions [47]. The International Committee of the Red Cross (ICRC) has defined LAWS as a weapon system which is autonomous while exercising critical functions. This enables the system to select (i.e. search for or detect, identify, track, select) and attack (i.e. use force against, neutralize, damage or destroy) targets without any kind of human interventions.[48]. Absence of human supervision is highlighted in the definition given by the Holy See which states that such a weapon system is capable of identifying, selecting and triggering action on a target with absolute lack of human supervision [49]. It is to be noted that all these definitions highlight that there is negligible or a total absence of human supervision or control.

In April 2016, the UN had convened an informal meeting of experts on Lethal Autonomous Weapons Systems (LAWS) in order to analyze if there are any national policies and legal framework that have been developed on LAWS, as well as to discuss the possibility of bringing LAWS within the ambit of Convention on Certain Conventional Weapons (CCW). [50]. CCW is a disarmament treaty the purpose of which is to prohibit or restrict the use of certain conventional weapons, including incendiary weapons and blinding lasers which are capable of causing extreme injuries to combatants or indiscriminately effect the civilian population. [51]   94

countries recommended that a formal discussion on lethal autonomous weapons systems must commence. In November 2017, 86 countries participated in a meeting of the UN's Convention on Certain Conventional Weapons Group of Governmental Experts. Countries including Brazil, Uganda and Iraq, a total of 22 countries lend their support for a total prohibition on fully autonomous weapons. This is being opposed by few states such as the United Stated and Russia, who feels that it is too nascent a stage to negotiate on a new policy-binding measures or international law. [52] The stand taken by some of these states who are opposing a new legal order in this regard, will indeed pose a serious threat to the efforts taken by other countries to address fully, the concerns of autonomous weapons at the CCW, primarily because any decision by the CCW will be taken through consensus and if these countries oppose, a consensus in the matter is unlikely. In order to do address the issue of autonomous lethal weapons effectively, it should not only address the ethical issues but also legal issues. The legality of the autonomous weapons system was raised by several organizations like International Committee of the Red Cross, International Human Rights Watch, etc [53]. One aspect of effectively addressing the legality would be to have an appropriate definition. The element of human control plays a vital part in regulating autonomous weapons systems, which brings us to the problem of defining 'meaningful human control'.

C. The Importance of defining meaningful human control

A meaningful human control is the ability to make moral decisions while retaining adequate levels of agency. It is important that an appropriate definition should be given to meaningful human control, if there should be any consensus at the international plane. There is a pre-supposition that as autonomous weapons systems become increasingly controlled by AI, human can still have meaningful control over it [54]. According to Elke Schwarz, there are limitations for meaningful human control due to certain technological features, namely "1) cognitive limitations produced in human-machine interface operations; 2) epistemological limitations that accompany the large amounts of data upon which AI systems rely; 3) temporal limitations that are inevitable when LAWS take on identification and targeting functions" [55]. Some argue that autonomous control in itself can be seen as an exercise of human control which are independent of any human supervision is in a position to oversee or intervene in the operation in real time [56]. In the absence of any human element, it may become difficult for international law to govern them. Hence it is crucial for UN to draw the legal parameters correctly.

The concept of 'meaningful human control' was endorsed by more than 19 State parties to CCW, however the precise definition has not been agreed on. This is because there is lack of consensus as to where the focus should be, while defining meaningful human control. While some countries support a more technical definition taking a technology centric approach, others support a more human centered approach where the focus is on the relation of AWS to a human user. Yet another group of states support a task or functions approach, since they argue that the functions that are performed by AWS, namely the selecting and attacking, are more crucial [57].

Defining legal ambit of 'meaningful human control' is crucial, since it will be the main tool to prove the *mens rea* or the mental element of a crime. It will be essential to prove this mental element, if we are to restrict the destructive use of AI. As is mentioned previously, the lethal weapons will be capable of mass killings, and if devoid of any human control, it will be difficult to find the 'wrong doer' who have committed the crime. Thus, having a uniform definition of 'meaningful human control' is absolutely crucial to bring in any form of accountability.

D. Figuring out the appropriate legal framework

Another major problem that the UN is facing is the application of an appropriate international framework. For this, it has to address the question of which international law applies to regulating the AI's with respect to autonomous weapons and its human control. According to e-briefing by the International Committee of the Red Cross (ICRC) [58], it has to be first considered whether their use is lawful under international law. More pertinent question will be to consider the lawfulness of the threat or use of force (*jus ad bellum*) and the manner in which force is applied (*jus in bello*). The first question would be to consider the lawfulness of the use of force using lethal autonomous weapons system. The second question is how the force may be used ensuring that a minimum level of humanity is retained. This second question will have to be considered both under the International Humanitarian Law (IHL) and the international human rights law [59]. The IHL particularly is aimed at regulating the behavior of parties at the time of armed conflicts and the international human rights law protects a person's inherent right against any kind of abusive power.

VII. CONCLUSION AND FUTURE WORKS

Regulating the AI will bring in questions of lawfulness of the threat raised by the AI and its applications. Any study on AI and the challenges posed by it requires a researcher to approach the problems from multi-dimensional angles. In so far as the present scenario is concerned there is unanimity among nations, experts, researchers, and academicians that the time is ripe for a regulation to be in place for AI. It is imperative that a regulation on AL for use as weapon is need of the time. However, it is challenging for policy makers and regulators to decide on what aspect of AI requires immediate attention. Hence through this study, the author has endeavored to further the argument that the most crucial aspect of AI which is likely to have a huge impact on the international community.

As can be seen, though on an international platform the UN is the best regulatory body for AI regulation, it faces varying dimensions of challenges due to the exponential growth of AI. This challenge is two-pronged. First challenge would be decided on the appropriate international legal framework. As was explained earlier, the UN being the torchbearer of protecting human rights and the enforcer of humanitarian law, it will be the best body to regulate AI. This is necessary because AI weapons are capable of being used both during times of war and otherwise, both the human rights regime and the humanitarian law regime will have to converge at some point.

Drawing the legal parameters for addressing the accountability issues while using the lethal autonomous

weapons is the second and major challenge. For this it becomes pertinent to define 'meaningful human control', which will throw light on the mental element of 'crime' or the *mens rea* required for committing a crime. There is inconsistency and disagreement among states to bring about a uniform definition and therefore the role that the UN play here will be crucial.

While artificial intelligence grows in Gods speed, the intelligence to tackle AI is still stumbling, Therefore, it is the duty of the UN, a duty towards the future of the international community, to effectively bring about an international regulatory framework for AI, evolving newer principles to address the challenges raised by AI now and in the future.

This research intends, as future work, to develop an appropriate legal framework which will encompass the international applications of AI both in times of peace and war.

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[42] "[AWS are] weapons that in contrast to traditional inert arms, are capable of functioning with a lesser degree of human manipulation and control, or none at all."

[43] "[Lethal AWS are systems that make] autonomous decisions based on their own learning and rules, and that can adapt to changing environments independently of any pre-programming" and they could "select targets and decide when to use force, [and] would be entirely beyond human control."

[44] "[AWS are] weapons systems that are capable of carrying out tasks governed by IHL in partial or full replacement of a human in the use of force, notably in the targeting cycle."

[45] "a weapon that, without human intervention, selects and attacks targets matching certain predefined characteristics, following a human decision to deploy the weapon on the understanding that an attack, once launched, cannot be stopped by human intervention."

[46] See House of Lords, Select Committee on Artificial Intelligence, 'AI in the UK: ready, willing and able?', Report of Session 2017-2019 https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf, accessed on 23 January 2019

[47] House of Lords, Select Committee on Artificial Intelligence, 'AI in the UK: ready, willing and able?', Report of Session 2017-2019 https://publications.parliament.uk/pa/ld201719/ldselect/ldai/100/100.pdf, accessed on 24 January 2019

[48] Views of the International Committee of the Red Cross on autonomous weapon systems at the CCW Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS) 11-15 April 2016, Geneva

[49] Working Paper submitted by the Holy See, 'Elements Supporting the Prohibition of Lethal Autonomous Weapons Systems', April 2016, https://www.unog.ch/80256EDD006B8954/(httpAssets)/752E16C02C9AECE4C1257F8F0040D05A/$file/2016_LAWSMX_CountryPaper_Holy+See.pdf, accessed on 24 January 2019

[50] United Nations Working Paper, Informal Meeting of Experts: Lethal Autonomous Weapons Systems, Geneva, 11-15 April 2016, https://www.unog.ch/80256EDD006B8954/(httpAssets)/4423082AB7EF30E4C1257F7A00501844/$file/LAWSMX_FoodforThoughtFinal.pdf, accessed on 28 January 2019

[51] 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, 1980 (as amended on 21 December 2001)

[52] 'Support grows for new international law on killer robots', Campaign to stop killer robots (17 November 2017) https://www.stopkillerrobots.org/2017/11/gge/, accessed on 24 January 2019

[53] See International Committee of the Red Cross, "Autonomous Weapon Systems: Implications of Increasing Autonomy in the Critical Functions of Weapons" (2010), https://www.icrc.org/en/publication/4283-autonomous-weapons-systems#, accessed on 5th February 2019; Human Rights Watch and International Human Rights Clinic, "Mind the Gap: The Lack of Accountability for Killer Robots, Human Rights Watch" (2015), https://www.hrw.org/sites/default/files/reports/arms0415_ForUpload_0.pdf, accessed on 5th February 2019.

[54] See Elke Schwartz, "The (im)possibility of meaningful human control for lethal autonomous weapons systems", *Humanitarian Law & Policy*, 29 Aug 2018, https://blogs.icrc.org/law-and-policy/2018/08/29/impossibility-meaningful-human-control-lethal-autonomous-weapon-systems/, accessed on 25 January 2019

[55] Elke Schwartz, "The (im)possibility of meaningful human control for lethal autonomous weapons systems", *Humanitarian Law & Policy*, 29 Aug 2018 https://blogs.icrc.org/law-and-policy/2018/08/29/impossibility-meaningful-human-control-lethal-autonomous-weapon-systems/ accessed on 25 January 2019

[56] Tim McFarland, 'Autonomous weapons and human control', *Humanitarian Law & Policy*, 18 July 2018 https://blogs.icrc.org/law-and-policy/2018/07/18/autonomous-weapons-and-human-control/ accessed on 25 January 2019

[57] UNIDIR Report, "The Weaponization of Increasingly Autonomous Technologies: Concerns, Characteristics and Definitional Approaches" (2017 UNIDIR Pub)

[58] [58] Natalie Weizmann, 'Remotely Piloted Aircraft and International Law', 2016, http://e-brief.icrc.org/wp-content/uploads/2016/09/16.-Remotely-piloted-aircraft-and-international-law.pdf, accessed on 25 January 2019

[59] [59] See Natalie Weizmann, 'Remotely Piloted Aircraft and International Law', 2016, http://e-brief.icrc.org/wp-content/uploads/2016/09/16.-Remotely-piloted-aircraft-and-international-law.pdf, accessed on 25 January 2019.