WAR TORTS, AUTONOMOUS WEAPON SYSTEMS, AND LIABILITY: WHY A LIMITED STRICT LIABILITY TORT REGIME SHOULD BE IMPLEMENTED

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INTRODUCTION

Artificial intelligence (AI) has become a staple in many people's daily routine.[1] Commuters use ridesharing and Global Positioning System (GPS) applications;[2] teachers grade and assess essays through plagiarism checkers;[3] the general population receives emails through spam filters and smart email categorization;[4] and personal financial account holders use mobile check deposit, fraud prevention, and credit decision features.[5] Activities as simple as online shopping, social networking, and texting via voice-to-text features on a smart phone are

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[1] Gautam Narula, *Everyday Examples of Artificial Intelligence and Machine Learning*, TECHEMERGENCE, https://www.techemergence.com/everyday-examples-of-ai [https://perma.cc/ECQ6-25J8] (last updated Sept. 16, 2018).

[2] *Id. See also* Dan Richman, *Q&A: Uber's Machine Learning Chief Says Pattern-Finding Computing Fuels Ride-Hailing Giant*, GEEKWIRE (Oct. 19, 2016, 2:45 PM), https://www.geekwire.com/2016/uber-collapse-without-pattern-finding-computers-says-chief-machine-learning [https://perma.cc/ZEJ9-L8V7] (discussing how Uber uses machine learning, a sub-field of AI, to communicate arrival times and locations of its UberX and UberPOOL cars).

[3] *See* Narula, *supra* note 1.

[4] *Id. See also* Sri Harsha Somanchi, *The Mail You Want, Not the Spam You Don't*, OFFICIAL GMAIL BLOG (July 9, 2015), https://gmail.googleblog.com/2015/07/the-mail-you-want-not-spam-you-dont.html [https://perma.cc/NWU7-PMMB] (Gmail uses machine learning signals to identify and block spam emails, as well as identify users' individual preferences for the emails they receive).

[5] *See* Narula, *supra* note 1; *see also* Daniel Faggella, *Machine Learning in Finance—Present and Future Applications*, TECHEMERGENCE (Aug. 24, 2017), https://www.techemergence.com/machine-learning-in-finance [https://perma.cc/L78Z-7WBF].

all powered by some form of AI.[6] While these shifts have been beneficial and have made lives easier, AI has and will continue to impact the military sphere more severely.[7]

Although autonomous weapons have been the subject of many movies, such as *RoboCop* and *Terminator*, these weapons are slowly becoming commonplace in the military.[8] Some people use drones as recreational tools,[9] while the military uses drones for an entirely different purpose: to target and launch missiles on specific geographic areas.[10] These have become the norm within international warfare, and autonomous weapons in the form of drones, robotic soldiers, and pilotless military planes will continue to develop.[11]

While development of AI technologies has been consistent, regulation has not been at the forefront of AI sophistication and

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[6] *See* Narula, *supra* note 1.

[7] Tom Simonite, *AI Could Revolutionize War as Much as Nukes*, WIRED (July 19, 2017, 7:00 AM), https://www.wired.com/story/ai-could-revolutionize-war-as-much-as-nukes [https://perma.cc/B7PN-QHWB]. *See generally* GREG ALLEN & TANIEL CHAN, HARV. KENNEDY SCH. BELFER CTR. FOR SCI. & INT'L AFF., ARTIFICIAL INTELLIGENCE AND NATIONAL SECURITY 8 (2017), https://www.belfercenter.org/sites/default/files/files/publication/AI%20NatSec%20-%20final.pdf [https://perma.cc/9MNK-TBF8] ("[N]ational security leaders are confident that rapid progress in AI technology will continue and will have a significant impact on their mission.").

[8] Paul Scharre, *Why We Must Not Build Automated Weapons of War*, TIME (Sept. 25, 2017), http://time.com/4948633/robots-artificial-intelligence-war [https://perma.cc/8K7J-M3GT]. In 2017, Dubai added a real-life "Robocop" to its police force to help identify criminals and gather evidence, indicating that these autonomous systems are becoming more prevalent throughout the broader law enforcement sphere. *Robocop Joins Dubai Police to Fight Real Life Crime*, REUTERS (June 1, 2017, 6:02 AM), https://www.reuters.com/article/us-emirates-robocop/robocop-joins-dubai-police-to-fight-real-life-crime-idUSKBN18S4K8 [https://perma.cc/6XWK-TSGN]. *See generally* ROBOCOP (Orion Pictures 1987); THE TERMINATOR (Cinema '84/Greenberg Bros. P'ship 1984).

[9] Steve Hargreaves, *Drones Go Mainstream*, CNN BUS. (Jan. 9, 2013, 4:30 PM), http://money.cnn.com/2013/01/09/technology/drones/index.html [https://perma.cc/V4GR-Y4E3].

[10] Notably, drones' other key uses include: surveillance, listening to phone conversations, helping understand the daily routine of a particular area, and following or attacking suspected insurgents. *Drones: What Are They and How Do They Work?*, BBC NEWS (Jan. 31, 2012), http://www.bbc.com/news/world-south-asia-10713898 [https://perma.cc/9RS8-SN9Q].

[11] Steven Melendez, *The Rise of the Robots: What the Future Holds for the World's Armies*, FAST COMPANY (June 12, 2017), https://www.fastcompany.com/3069048/where-are-military-robots-headed [https://perma.cc/93HE-4XX6].

dominance.[12] Some believe that Isaac Asimov's Three Laws of Robotics[13] continue to hold significance for AI governance.[14]

> In 1950, Isaac Asimov set down three fundamental laws of robotics in his science fiction masterpiece *I, Robot*. (1) A robot may not injure a human being or, through inaction, allow a human being to come to harm; (2) A robot must obey the orders given [to] it by human beings, except where such orders would conflict with the First Law; (3) A robot must protect its own existence, as long as such protection does not conflict with the First or Second Laws.[15]

These laws especially seem to have some weight considering "[a] robot without AI software would not be subject to Asimov's laws, even if these laws had any real legal significance."[16] Nonetheless, regulation surrounding these speedily developing machines is virtually nonexistent.[17]

Part I of this Note will discuss the evolution of AI from early computer models in the 1980s to sophisticated and standalone thinking machines in today's world, while touching on some of the drawbacks. It

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[12] Darcie Thompson-Fields, *Lack of Regulation in AI Named as Top Global Risk in 2017*, Access AI (Jan. 12, 2017), http://www.access-ai.com/news/510/lack-of-regulation-in-ai-named-as-top-global-risk-in-2017 [https://web.archive.org/web/20170429040948/http://www.access-ai.com/news/510/lack-of-regulation-in-ai-named-as-top-global-risk-in-2017] ("The annual Global Risks report from the World Economic Forum has said that unregulated technological progress is one of the greatest threats to global prosperity, peace[,] and stability. The report . . . claims that regulation is trailing far behind technological innovation and that without action, 'could lead to the destruction of untold jobs and businesses and catalyse major social upheaval[.]'"). On December 12, 2017, the Fundamentally Understanding the Usability and Realistic Evolution (FUTURE) of Artificial Intelligence Act was proposed, which proposes to establish a federal advisory committee to advise, study, and report on various AI topics. FUTURE of Artificial Intelligence Act of 2017, H.R. 4625, 115th Cong. (2017); Michael Clamann, *Fundamentally Understanding the Usability and Realistic Evolution (FUTURE) of Artificial Intelligence Act of 2017 (HR 4625 / S 2217, 115th Congress)*, Duke SciPol (Dec. 13, 2017), http://scipol.duke.edu/content/fundamentally-understanding-usability-and-realistic-evolution-future-artificial-intelligence [https://perma.cc/9YSX-A2DM]; *see* discussion *infra* Section I.F.

[13] Gabriel Hallevy, *The Criminal Liability of Artificial Intelligence Entities—From Science Fiction to Legal Social Control*, 4 Akron Intell. Prop. J. 171, 172–73 (2010); *see also* Isaac Asimov, I, Robot 26–27 (1950).

[14] *See, e.g.*, Gary Marcus, *Moral Machines*, New Yorker (Nov. 24, 2012), https://www.newyorker.com/news/news-desk/moral-machines [https://perma.cc/D6LW-BT5P].

[15] *See* Hallevy, *supra* note 13, at 172–73; *see also* Asimov, *supra* note 13, at 26.

[16] Hallevy, *supra* note 13, at 173.

[17] *See* Thompson-Fields, *supra* note 12.

will also discuss the evolution of AI within the military, encompassing the current state of the debate over the use of autonomous weapons. Further, it explores the already proposed regulatory changes that surround AI and their hypothetical impacts on military AI and autonomous weapon systems. Part II first delves into factors to consider in regulating autonomous weapon systems. It then analyzes whether an AI machine can be considered human, while exploring the concept of war torts and its intersection with AI. Finally, Part III proposes a limited strict liability tort regime standard for regulating autonomous and semi-autonomous weapons, particularly focusing on a standard that will anticipate and account for issues facing evolving AI. This standard will attempt to propose issues, such as machine and reinforcement learning, which are becoming more sophisticated within AI. It will also discuss how AI-influenced weapons account for moral decisions that humans make intuitively, identify how sovereign immunity plays a role, and detail how an engineering design standard for these autonomous weapon systems is imperative. These inclusions will be guided by the history of AI and challenges that the field already faces.

I. BACKGROUND: THE EVOLUTION OF ARTIFICIAL INTELLIGENCE

A. *Technological Developments and Advancements of Artificial Intelligence in the Last Thirty Years*

Although it may seem like AI has only become a household commodity in the last decade, the reality is that it has been a developing aspect of daily life for decades. In fact, it can be traced back to ancient Greece.[18] But AI transformed from fiction to reality around 1950 when Alan Turing created "the idea of machines that think."[19] Although the idea did not take immediately, the 1950s brought about sufficient revolution in the AI sphere: in 1956, "artificial intelligence" was

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[18] Or Shani, *From Science Fiction to Reality: The Evolution of Artificial Intelligence*, WIRED, https://www.wired.com/insights/2015/01/the-evolution-of-artificial-intelligence [https://perma.cc/GB5P-4S8T] (last visited Oct. 29, 2018) ("AI isn't a new concept; its storytelling roots go as far back as Greek antiquity.").

[19] *Id.*

referenced for the first time by computer scientist John McCarthy.[20] Then, in 1959, an AI laboratory was founded at the Massachusetts Institute of Technology.[21] Although the 1960s and 1970s saw difficulty and criticism in AI progression, many areas, such as logic programming and common sense reasoning, were also explored in the AI sphere.[22] Subsequently, the revelation and popularity of the personal computer created greater intrigue around machines that think.[23]

By the 1980s, "[r]esearchers had come to believe that . . . intelligent behavior depended very much on dealing with knowledge, sometimes quite detailed knowledge, of a domain where a given task lay."[24] Expert systems[25] thrived within the corporate world at this time, as the majority of Fortune 1000 companies used them for daily business activities.[26] However, the general consensus that computers needed to become more knowledge-based meant that many countries around the world put more funding into various computer projects geared towards interpretation, translation, and learning.[27]

In 1997, IBM's chess-playing super computer "Deep Blue" became the first computer to defeat a reigning world champion in a game of chess, marking a milestone for AI as it was able to compute 200 million

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[20] Kate Mannix & Sean Hall, *How Artificial Intelligence Has Evolved Over Time*, TELEGRAPH (Mar. 19, 2017, 6:00 AM), http://www.telegraph.co.uk/technology/0/artificial-intelligence-has-evolved-time [https://perma.cc/WBS9-GBTJ].

[21] *See* Shani, *supra* note 18.

[22] *See generally* DANIEL CREVIER, AI: THE TUMULTUOUS HISTORY OF THE SEARCH FOR ARTIFICIAL INTELLIGENCE 163–96 (1993).

[23] *See generally id.*

[24] PAMELA MCCORDUCK, MACHINES WHO THINK: A PERSONAL INQUIRY INTO THE HISTORY AND PROSPECTS OF ARTIFICIAL INTELLIGENCE 421 (A K Peters, Ltd. 2004).

[25] PETER JACKSON, INTRODUCTION TO EXPERT SYSTEMS 2 (3d ed. 1998) ("An *expert system* is a computer program that represents and reasons with knowledge of some specialist subject with a view to solving problems or giving advice."); *see also 1980s: Artificial Intelligence (AI)— From Lab to Life*, WORLD-INFOSTRUCTURE, http://world-information.org/wio/infostructure/100437611663/100438659445/?ic=100446326244 [https://perma.cc/43FB-SFEZ] (last visited Oct. 29, 2018) (Expert systems included three main elements: "(1) an interface which allows interaction between the system and the user, (2) a database . . . which consists of axioms and rules, and (3) the inference engine, a computer program that executed the inference-making process.").

[26] John Durkin, *History and Applications*, *in* EXPERT SYSTEMS: THE TECHNOLOGY OF KNOWLEDGE MANAGEMENT AND DECISION MAKING FOR THE 21ST CENTURY 1–22 (Cornelius T. Leondes ed., 2002).

[27] *See* MCCORDUCK, *supra* note 24, at 436–41.

moves per second—an unprecedented feat.[28] Following this accomplishment, IBM sought more challenges. Its next great success in the AI sphere was the development and success of "Watson."[29] Watson analyzed questions and content comprehensively and quickly and eventually won *Jeopardy!* against former champions.[30] It understands natural language through a combination of sophisticated hardware and software that delivers a precise answer with evidence to support it, allowing the machine to win.[31]

Watson then sparked the development of ROSS, a legal research tool that will improve research time and results for law firms.[32] ROSS does this by sifting through over a billion text documents per second and then displaying the exact relevant passage a user, who has asked a question in natural language, needs.[33] ROSS also gets smarter over time by learning from feedback.[34] Fundamentally, ROSS and Watson are learning to understand the law, rather than just generating results from key words for users.[35] ROSS has become more sophisticated since the start of its development. So much so that in 2016, one of the United States' biggest law firms, BakerHostetler, hired ROSS as a legal

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[28] *Id.* at 480–83; *see also* Gil Press, *The Brute Force of IBM Deep Blue and Google DeepMind*, FORBES (Feb. 7, 2018, 9:18 AM), https://www.forbes.com/sites/gilpress/2018/02/07/the-brute-force-of-deep-blue-and-deep-learning/#49c576ad49e3 [https://perma.cc/UJS4-NVAX].

[29] *See* Bernard Marr, *The Rise of Thinking Machines: How IBM's Watson Takes on the World*, FORBES (Jan. 6, 2016, 2:28 AM), https://www.forbes.com/sites/bernardmarr/2016/01/06/the-rise-of-thinking-machines-how-ibms-watson-takes-on-the-world/#3cdf22841e43 [https://perma.cc/LDN3-3UR5] ("IBM has put [Watson] to use tackling tough problems in every industry from healthcare to finance."); *see also A Computer Called Watson*, IBM, https://www.ibm.com/ibm/history/ibm100/us/en/icons/watson [https://perma.cc/C95B-B3UQ] (last visited Nov. 28, 2018).

[30] *The DeepQA Research Team*, IBM RES., http://researcher.watson.ibm.com/researcher/view_group.php?id=2099 [https://perma.cc/V2XR-QJXL] ("[Watson] analyzes natural language questions and content well enough and fast enough to compete and win against champion players at *Jeopardy!*"); *see also A Computer Called Watson*, *supra* note 29.

[31] Chris Nay, *Dave Ferrucci at Computer History Museum: How It All Began and What's Next*, IBM (Dec. 1, 2011), https://www.ibm.com/blogs/research/2011/12/dave-ferrucci-at-computer-history-museum-how-it-all-began-and-whats-next [https://perma.cc/L4Z4-Y6HC].

[32] Anthony Sills, *ROSS and Watson Tackle the Law*, IBM (Jan. 14, 2016), https://www.ibm.com/blogs/watson/2016/01/ross-and-watson-tackle-the-law [https://perma.cc/FNZ5-2CNG] ("[ROSS is] a legal research tool that will enable law firms to slash the time spent on research, while improving results.").

[33] *Id.*

[34] *Id.*

[35] *Id.*

researcher in its bankruptcy practice in New York.[36] This marked ROSS as the first robo-lawyer in the country. Other prestigious firms in the country, such as Simpson Thacher & Bartlett and Latham & Watkins, have since begun to use ROSS as well.[37] This is only one example of the progression of AI and the reality of machines learning and becoming more autonomous through the algorithms they initially possess.

While the above illustrates its development and impact in the technology industry, AI has simultaneously affected other industries as well. For example, deep learning algorithms have been successful in radiology, pathology, ophthalmology, and cardiology.[38] AI has shown a ninety-six percent accuracy rate in detecting the presence or absence of tuberculosis in patients—better than many human radiologists.[39] These AI machines go through so-called "training" where they are shown hundreds of x-ray images from patients with or without a disease, such as tuberculosis, until the AI learns to detect what the x-ray is presenting at that moment.[40] Once trained, an AI is able to detect the spread of certain diseases as accurately, if not more so, than a human.[41] Some AIs have even detected changes in diabetics by looking at images of patients' retinas at a slightly more accurate rate than human physicians.[42]

Today, nearly every major technology company, including IBM, Microsoft, Google, and Facebook, has laboratories specifically dedicated to AI research and development.[43] These labs are based all over the

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[36] Karen Turner, *Meet 'Ross,' the Newly Hired Legal Robot*, WASH. POST (May 16, 2016), https://www.washingtonpost.com/news/innovations/wp/2016/05/16/meet-ross-the-newly-hired-legal-robot/?utm_term=.cde153975ddd [https://perma.cc/6P7P-SC34].

[37] Ava Chisling, *Technology in Business is a No-Brainer*, ROSS INTELLIGENCE, https://blog.rossintelligence.com/technology-business [https://perma.cc/QU8Q-AHR2] (last visited Jan. 23, 2019); *see generally* ROSS INTELLIGENCE, http://www.rossintelligence.com [https://perma.cc/EWV3-9B54] (last visited Oct. 29, 2018).

[38] Paul Hsieh, *AI in Medicine: Rise of the Machines*, FORBES (Apr. 30, 2017, 12:10 PM), https://www.forbes.com/sites/paulhsieh/2017/04/30/ai-in-medicine-rise-of-the-machines/#4b94c5e9abb0 [https://perma.cc/JC9K-XGPD].

[39] *Id.*

[40] *Id.*

[41] *Id.* ("Researchers at Google were able to train an AI to detect spread of breast cancer into lymph node tissue on microscopic specimen images with accuracy comparable to (or greater than) human pathologists.").

[42] *Id.*

[43] *See, e.g.*, Jonathan Vanian, *Facebook's Artificial Intelligence Is Spreading to This City*, FORTUNE (Sept. 15, 2017), http://fortune.com/2017/09/15/facebook-artificial-intelligence-lab [https://perma.cc/BX9K-CZKW].

world, and they focus not only on furthering AI algorithms, but also on developing AI's ability to use reinforcement learning, which, if successfully enforced, will allow AI machines to think for themselves more than they do now.[44] This concept has the potential to reimagine the impact of AI in the military in addition to the technology industry as a whole.

B.   *Artificial Intelligence in the Military*

Like the origin of AI in the technology industry, AI in the military dates back to World War II in the form of Goliath Tracked Mines.[45] Germany was the first country to deploy and use "remotely piloted—as opposed to preprogrammed—aerial drones."[46] Throughout the war, the Allies quietly established and worked on remote-controlled weapon programs, though there was too much volatility in the eventual products for them to be used consistently.[47] After the War, development of remotely operated weapons slowed considerably.[48] The U.S. Army and U.S. Navy were tasked with furthering research and development, while the U.S. Air Force deemed any unmanned aircraft to be "a professional threat."[49]

Throughout the Vietnam War, the U.S. Army manufactured unmanned reconnaissance aircrafts, which included an air-launched, jet-powered drone that completed nearly 3,500 missions.[50] After these systems stopped being used in the mid-1970s, the military had little progression and success with AI and automated systems until 1995,

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[44] *Id.* (Facebook announced the opening of a "new AI research lab in Montreal, already home to other AI labs operated by Google and Microsoft. . . . [T]wo areas of AI [] are of great interest to Facebook. One area involves teaching computers to understand speech and human language in what are known as dialog systems. The other area, called reinforcement learning, focuses on training computers to make the best possible choices when making decisions . . . .").

[45] P.W. Singer, *Drones Don't Die—a History of Military Robotics*, HISTORYNET (May 5, 2011), http://www.historynet.com/drones-dont-die-a-history-of-military-robotics.htm [https://perma.cc/XUT7-3FML] (describing Goliath Tracked Mines, small vehicles that carried explosives into enemy territory, powered by electric motors and then gasoline engines).

[46] *Id.*

[47] *Id.*

[48] *Id.*

[49] *Id.*

[50] *Id.*

when there was a so-called "magic moment."[51] GPS-equipped, Unmanned Aerial Vehicles (UAVs)[52] were created and could be dispatched anywhere in the world for reconnaissance and targeting missions.[53] These systems collected updated information on everything, including air defenses and refugee movements.[54] Eventually, the military began to use a machine called Packbot, which facilitated "intelligence, surveillance and reconnaissance; battle damage assessment; hostage/barricade situations; and explosive ordinance disposal."[55] Packbots are relatively small machines, measuring 20.2 inches wide, 34.6 inches deep, and standing 7 inches high.[56] These compact dimensions give them the ability to climb stairs, search tunnels, examine equipment for explosive materials, and provide soldiers with a safe first look into an area.[57] Although Packbots were predominantly used on missions in Iraq and Afghanistan,[58] the U.S. military now possesses more than 12,000 ground robots and 7,000 UAVs in its inventory.[59]

While the Packbot and the military's other inventory items have been used primarily for extensive reconnaissance purposes, there has been great debate surrounding autonomous weapons or, as some have characterized them, "killer robots."[60] Killer robots are weapons systems that have the ability to select and fire on targets without human

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[51] *Id.*

[52] *UAV*, DICTIONARY.COM, http://www.dictionary.com/browse/uav [https://perma.cc/ M9UZ-QJ4W] (last visited Oct. 29, 2018) (defining UAV as an "unmanned aircraft (or aerial) vehicle: an aircraft that can navigate without a human pilot on board; a drone").

[53] *See* Singer, *supra* note 45 ("Military operators could now dispatch GPS-equipped UAVs anywhere in the world and undertake reconnaissance and targeting missions with extreme precision."); *see also* Anthony Wood, *Open Letter Petitions U.N. to Ban the Development on Weaponized AI*, NEW ATLAS (July 27, 2015), https://newatlas.com/open-letter-un-weaponized-artificial-intelligence/38645 [https://perma.cc/SXH8-9HMW].

[54] *See* Singer, *supra* note 45.

[55] *The Price of Freedom: Americans at War: Packbot*, SMITHSONIAN NAT'L MUSEUM NAT. HIST., https://amhistory.si.edu/militaryhistory/collection/object.asp?ID=480 [https://perma.cc/ L766-ZWJG].

[56] *Id.*

[57] *Id.*

[58] *Id.*

[59] *See* Singer, *supra* note 45.

[60] *See* HUM. RTS. WATCH & THE INT'L HUM. RTS. CLINIC AT HARV. LAW SCH., LOSING HUMANITY: THE CASE AGAINST KILLER ROBOTS 1 (2012), https://www.hrw.org/sites/default/ files/reports/arms1112_ForUpload.pdf [https://perma.cc/EE5Q-JPUC] [hereinafter CASE AGAINST KILLER ROBOTS].

control.[61] Control refers to the who, what, where, and how of weapons use, as well as the effects of their use.[62] So far, the expectation is that weapons use requires some level of human involvement.[63] In the summer of 2017, however, Kalashnikov Group, a Russian weapons manufacturer, announced that it had not only developed fully automated combat robots, but that the range of robots also used AI to identify necessary targets and make independent decisions.[64] This description sounds eerily similar to that of a "killer robot."[65]

Fundamentally, one of the main sources of AI in the military is autonomous weapon systems.[66] Semi-autonomous weapon systems[67] are also included in the military's terms.[68] Additionally, distinctions have been made between an *autonomous* system and an *automated* system.[69] The removal of meaningful human control—or a "man-in-the-loop" element—allows robotic weapons to pinpoint and attack particular

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[61] *Frequently Asked Questions*, BAN LETHAL AUTONOMOUS WEAPONS, http://autonomous weapons.org/sample-page [https://perma.cc/LWH6-WHJL] (last visited Oct. 29, 2018) ("Killer robots are weapons systems that, once activated, would select and fire on targets without meaningful human control.").

[62] *Killing by Machine: Key Issues for Understanding Meaningful Human Control*, ARTICLE 36 (Apr. 9, 2015), http://www.article36.org/autonomous-weapons/killing-by-machine-key-issues-for-understanding-meaningful-human-control [https://perma.cc/2QT3-HAC6] (control "means when, where and how weapons are used; what or whom they are used against; and the effects of their use.").

[63] *Id.*

[64] Rich Haridy, *Kalashnikov's New Autonomous Weapons and the "Terminator Conundrum"*, NEW ATLAS (July 20, 2017), https://newatlas.com/kalashnikov-ai-weapon-terminator-conundrum/50576 [https://perma.cc/HX3R-22W3].

[65] *See* CASE AGAINST KILLER ROBOTS, *supra* note 60.

[66] U.S. DEP'T OF DEF., UNMANNED SYSTEMS INTEGRATED ROADMAP, FY 2013-2038 (2014), https://apps.dtic.mil/dtic/tr/fulltext/u2/a592015.pdf [https://perma.cc/Y5C5-V58M] (Reference No. 14-S-0053). *See generally* U.S. Dep't of Def. Directive 3000.09 from Ashton B. Carter, Deputy Secretary of Defense on Autonomy in Weapon Systems, 13–14 (Nov. 21, 2012) (defining "autonomous weapon system" as "[a] weapon system that, once activated, can select and engage targets without further intervention by a human operator. This includes human-supervised autonomous weapon systems that are designed to allow human operators to override operation of the weapon system, but can select and engage targets without further human input after activation").

[67] U.S. Dep't of Def. Directive 3000.09, *supra* note 66, at 14 (defining "semi-autonomous weapon system" as "[a] weapon system that, once activated, is intended to only engage individual targets or specific target groups that have been selected by a human operator").

[68] *Id.*

[69] FRANK SLIJPER, PAX FOR PEACE, WHERE TO DRAW THE LINE: INCREASING AUTONOMY IN WEAPON SYSTEMS—TECHNOLOGY AND TRENDS 5 (2017).

targets of its own calculation, constituting an autonomous system.[70] Automated systems, on the other hand, support the "man-in-the-loop" element, as they mainly assist weapons operators with their tasks.[71]

The Pentagon first addressed fully autonomous weapons systems in 2012 when it released Directive Number 3000.09.[72] For up to ten years, the Directive "generally allows the Department of Defense to develop or use only fully autonomous systems that deliver non-lethal force."[73] Considering that AI and robotics researchers believe that the use of autonomous weapons systems may create an international AI arms race,[74] these systems require attention sooner than 2022, especially with the Kalashnikov Group's announcement.[75] Although there are a plethora of considerations that come with the development and existence of these weapons, there is considerable debate over whether killer robots should be allowed or used at all.

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[70] *Id.*

[71] *Id.* (describing automated systems as "systems in which there is a meaningful man-in-the-loop element to a weapon's employment, and any robotic element serves to assist the weapon operator at varying stages in the kill chain").

[72] *See* U.S. Dep't of Def. Directive 3000.09, *supra* note 66.

[73] *U.S.: Ban Fully Autonomous Weapons*, HUM. RTS. WATCH (Apr. 16, 2013, 10:13 AM), https://www.hrw.org/news/2013/04/16/us-ban-fully-autonomous-weapons [https://perma.cc/W56P-SK78].

[74] *Autonomous Weapons: An Open Letter From AI & Robotics Researchers*, FUTURE LIFE INST. (2015), https://futureoflife.org/open-letter-autonomous-weapons [https://perma.cc/QV3F-ZKSB]. Unsurprisingly, the United States, Russia, and China have all spoken out about AI development:

> The prospect of developing fully autonomous weapons is no longer a matter of science fiction and is already fueling a new global arms race. President Putin famously told Russian students last September [2017] that "whoever becomes the leader in this sphere [of artificial intelligence] will become the ruler of the world." China is racing ahead with an announced pledge to invest $150 billion in the next few years to ensure it becomes the world's leading "innovation centre for AI" by 2030. The United States, still the largest incubator for AI technology, has identified defending its public-private "National Security Innovation Base (NSIB)" from intellectual property theft as a national security priority.

Ted Piccone, *How Can International Law Regulate Autonomous Weapons?*, BROOKINGS INST. (Apr. 10, 2018), https://www.brookings.edu/blog/order-from-chaos/2018/04/10/how-can-international-law-regulate-autonomous-weapons [https://perma.cc/4YAJ-U7GA] (second alteration in original).

[75] *See* Haridy, *supra* note 64.

C.   *The Controversy Surrounding Autonomous Weapons*

The topic of autonomous weapons, particularly lethal autonomous weapons systems, has been controversial.[76] In 2015, thousands of AI and robotics researchers, including Elon Musk and the late Stephen Hawking, signed an open letter urging the United Nations to ban the development and use of AI-generated weapons.[77] The letter argues that a ban on autonomous weapons would be beneficial to humanity.[78] It describes these autonomous weapons as being "ideal for tasks such as assassinations, destabilizing nations, subduing populations and selectively killing a particular ethnic group," none of which are actions that would make battlefields safer for soldiers or society a safer place to live.[79] The letter argues that these weapons would inevitably be sold on the black market and would give whoever holds them too much power, especially if they fall into the hands of terrorists, dictators, or warlords.[80]

In November 2017, the Future of Life Institute, which is supported by Musk and Hawking, released a video depicting life with little flying killer robots having a mind of their own, targeting anyone from senators to students.[81] The video showcases a small, explosive drone that could target anyone in the world after collecting data from something seemingly as harmless as a hashtag by using its cameras, sensors, and

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[76] *Compare* Evan Ackerman, *We Should Not Ban 'Killer Robots' and Here's Why*, IEEE SPECTRUM (July 29, 2015), https://spectrum.ieee.org/automaton/robotics/artificial-intelligence/we-should-not-ban-killer-robots [https://perma.cc/G97N-8YSN] (explaining that killer robots have the potential to be extremely useful for the army, but that the focus should be on making these robots ethical in order for them to be effective), *with Autonomous Weapons: An Open Letter from AI & Robotics Researchers*, *supra* note 74 (strongly encouraging the United Nations to ban killer robots because they will cause greater destruction for humanity than assistance to military personnel).

[77] *See Autonomous Weapons: An Open Letter from AI & Robotics Researchers*, *supra* note 74.

[78] *Id.* The letter pinpoints that these weapons require no costly or difficult-to-obtain materials, making it easy for all military powers to mass-produce, potentially giving these military entities too much power. *Id.* Further, the use of these weapons may actually set back the overall progress of AI and AI research due to its detrimental effects, curtailing the potential benefits AI may have on society. *Id.*

[79] *Id.*

[80] *Id.*

[81] *See* Stop Autonomous Weapons, *Slaughterbots*, YOUTUBE (Nov. 12, 2017), https://www.youtube.com/watch?v=9CO6M2HsoIA [https://perma.cc/G2XJ-ME76].

facial recognition software.[82] It notes that while it is not guns that kill people, but rather people who kill people, these machines have a processor that reacts up to one hundred times faster than any human and, to top it off, unlike humans, these machines do not get emotional or disobey orders.[83] The end of the video reveals a harsh reality: Stuart Russell, a professor of computer science at the University of California, Berkeley, explains that the film was more than speculation—it was actually a depiction of the integration and miniaturization of technologies that already exist.[84]

The video was shown at a meeting of the Convention on Certain Conventional Weapons (CCW) at the United Nations on November 17, 2017. The CCW bans or restricts the use of particular weapons that are either deemed too dangerous or may cause unnecessary suffering.[85] In the past, weapons, such as blinding lasers, have been preemptively banned before they were acquired or used.[86] This time, the CCW meeting included over eighty countries discussing the future of autonomous weapons systems and whether a ban should be put in place.[87] While the United Nations has yet to make a decision on said ban, the United States has stated that any engagement involving lethal force must have human approval, meaning autonomous weapons can

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[82] *Id.*

[83] *Id.* Any Second Amendment implications are outside the scope of this Note.

[84] *Id. See also* Piccone, *supra* note 74 ("Some militaries are already far advanced in automating everything from personnel systems and equipment maintenance to the deployment of surveillance drones and robots. Some states have even deployed defensive systems (like Israel's Iron Dome) that can stop incoming missiles or torpedoes faster than a human could react."). The emergence of blockchain and "smart contracts" make this even more of a reality, with a smart contract having the ability to predetermine or change a drone's path in the span of a split second. *See* Primavera De Filippi & Aaron Wright, *The Blockchain of Things*, SLATE (June 19, 2018, 7:30AM), https://slate.com/technology/2018/06/blockchain-is-likely-to-advance-the-internet-of-things-and-robot-rights.html [https://perma.cc/3MRN-9HYM].

[85] *Frequently Asked Questions*, *supra* note 61 ("The [CCW] is a framework treaty that prohibits or restricts certain weapons considered to cause unnecessary or unjustifiable suffering.").

[86] *Id.*

[87] Nick Whigham, *United Nations to Consider Controls Around Autonomous Weapons Amid Growing Concerns*, NEWS.COM.AU (Nov. 20, 2017, 1:27 PM), http://www.news.com.au/technology/innovation/inventions/united-nations-to-consider-controls-around-autonomous-weapons-amid-growing-concerns/news-story/1962c6464a6d21e0f98fa76b4dd471fa [https://perma.cc/FZ3M-D2HL].

currently be deployed only for non-lethal missions.[88] Although this seems like a rational policy now, the meeting put an emphasis on defining killer robots and how much human interaction needs to be involved in order to allow these weapons to persist.[89] While these issues were not resolved at the November 2017 Convention,[90] the results, or lack thereof, showcase just a couple of drawbacks in the current state of military AI machines.

D.   *A Shortcoming: Defining Artificial Intelligence*

AI is constantly changing, and many claim that to properly regulate the field, AI needs to be defined more concretely.[91] Even though AI has become relatively present in daily life, a uniform definition has yet to be established.[92] Although most have shied away from defining AI, there are various frameworks that attempt to define and characterize it.[93]

From a philosophical and scientific standpoint, AI has been organized into four categories: (1) system thinking as human; (2) system acting as human; (3) rationally thinking system; and (4) rationally acting system.[94] These categories encompass the criteria scientists and

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88 *See* Haridy, *supra* note 64 ("[T]he United States' official stance on autonomous weapons is that human approval must be in the loop on any engagement that involves lethal force.").

89 *See* Whigham, *supra* note 87.

90 *Id.* (discussing the plethora of topics that were discussed but not necessarily resolved during the Convention talks).

91 Gary Lea, *The Struggle to Define What Artificial Intelligence Actually Means*, POPULAR SCI. (Sept. 3, 2015), https://www.popsci.com/why-we-need-legal-definition-artificial-intelligence [https://perma.cc/W2JN-GM5Z].

92 George S. Cole, *Tort Liability for Artificial Intelligence and Expert Systems*, 10 COMPUTER/L.J. 127, 130 (1990) ("No single, universally-accepted, definition for artificial intelligence or expert system exists.").

93 *See generally* Bernard Marr, *The Key Definitions of Artificial Intelligence (AI) That Explain Its Importance*, FORBES (Feb. 14, 2018, 1:27 AM), https://www.forbes.com/sites/bernardmarr/2018/02/14/the-key-definitions-of-artificial-intelligence-ai-that-explain-its-importance [https://perma.cc/S8T3-P8UH] (explaining that while "we're not all operating from the same definition of the term and while the foundation is generally the same, the focus of artificial intelligence shifts depending on the entity that provides the definition"). Amazon, Google, Merriam-Webster, Encyclopedia Britannica, among others, all produce varying definitions of AI, showcasing that while definitions may be similar, there is not uniformity. *Id.*

94 Dániel Eszteri, *Liability for Operation and Damages Caused by Artificial Intelligence— with a Short Outlook to Online Games*, 153 STUDIA IURIDICA AUCTORITATE UNIVERSITATIS PECS PUBLICATA 57, 58 (2015). The proposed FUTURE of Artificial Intelligence Act of 2017

philosophers have advocated for in defining AI.[95] Modern information technology sciences have adopted the fourth criterion that aims for systems to behave rationally rather than to think and imitate human-like behavior.[96] This is supported by AI technology's goal to learn from its collected data.[97]

Additionally, AI brings about many concerns through machine learning, a subfield of computer science that encompasses computer programs that learn from experiences and are then able to improve their performance.[98] Today, this is applied mainly in Internet search results, facial recognition, fraud detection, and data mining.[99]

As AI becomes more sophisticated, it can further be divided into two additional categories: semi-autonomous and fully autonomous.[100] Wherever a human is able to operate or override a machine, it is, at best, semi-autonomous.[101] Completely autonomous machines, on the other hand, have a distinguishing factor: rather than being "tools *used* by humans; they will be machines *deployed* by humans that will act independently of direct human instruction, based on information the machine itself acquires and analyzes."[102] These machines may make

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includes several factors when defining AI: systems that perform tasks without significant human oversight; systems that think like humans; systems that act like humans; machine learning that aims to approximate a cognitive task; and systems that act rationally. FUTURE of Artificial Intelligence Act of 2017, H.R. 4625, 115th Cong. § 3(a)(1) (2017).

[95] Eszteri, *supra* note 94, at 58 (the first "trend considers such systems AI that model the functions of human mind and cognition." The second adopts Alan Turing's approach, which claims that the "criteria and purpose of AI is human-like acting." The third viewpoint "considers the purpose of AI in developing more rational or perfect systems than human cognition").

[96] *Id.* (stating that rational behavior includes, inter alia, clearly diagnosing diseases, accurately predicting natural disasters).

[97] *See* Shani, *supra* note 18 ("The very premise of AI technology is its ability to continually learn from the data it collects.").

[98] Harry Surden, *Machine Learning and Law*, 89 WASH. L. REV. 87, 89 (2014).

[99] *Id.* at 89–90.

[100] David C. Vladeck, *Machines Without Principals: Liability Rules and Artificial Intelligence*, 89 WASH. L. REV. 117, 120–21 (2014).

[101] *Id.* at 120 (a machine is semi-autonomous where a human "defines, guides, and ultimately controls the process, either directly or because of the capacity to override the machine and seize control").

[102] *Id.* at 121 (emphasis added).

influential decisions in circumstances that the machine's creators may have never considered or addressed.[103]

While autonomous and semi-autonomous weapons have been defined, the CCW's convention shows that a definition for killer robots is necessary.[104] Although there is no established definition for killer robots, their characteristics are expository.[105] The main commonality in publications' definitions of killer robots is the robots' abilities to pinpoint and engage targets without any human input.[106] This aspect seems to encompass killer robots—or fully autonomous weapons—but, regardless, they do not serve as an official definition. The ambiguity and reluctance to create a definition for killer robots may stem from the lack of a concrete definition of AI generally.

Semi-autonomous and fully autonomous AI machines create different and prevailing liability issues that have yet to be fully addressed by legislation or regulation. This will be discussed in detail in the forthcoming Section.

E.   *Regulations Surrounding Artificial Intelligence*

AI liability and regulation continue to be under-defined. However, academics have explored legal doctrines as they apply to autonomous machines in the context of tort law, contract law, and the law of war.[107] In its current form, AI liability has been divided into different categories based on three situations:

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[103] *Id.* (stating that these machines "will often make highly consequential decisions in circumstances that may not be anticipated by, let alone directly addressed by, the machine's creators").

[104] *See States Convene to Discuss Killer Robots*, CAMPAIGN TO STOP KILLER ROBOTS (Nov. 8, 2017), https://www.stopkillerrobots.org/2017/11/ccwun-2 [https://perma.cc/T7PS-VQ6M].

[105] *See* HUM. RTS. WATCH, MAKING THE CASE: THE DANGERS OF KILLER ROBOTS AND THE NEED FOR A PREEMPTIVE BAN (2016), https://www.hrw.org/report/2016/12/09/making-case/dangers-killer-robots-and-need-preemptive-ban [https://perma.cc/9U5N-P66Q]; *see also Killer Robots: Experts Warn of 'Third Revolution in Warfare'*, BBC NEWS (Aug. 21, 2017), http://www.bbc.com/news/technology-40995835 [https://perma.cc/CGE9-NQ43].

[106] *Killer Robots*, HUM. RTS. WATCH, https://www.hrw.org/topic/arms/killer-robots [https://perma.cc/NMZ4-5MVQ] (last visited Oct. 29, 2018).

[107] Mark A. Chinen, *The Co-Evolution of Autonomous Machines and Legal Responsibility*, 20 VA. J.L. & TECH. 338, 347 (2016) ("[L]egal scholars have engaged in relatively detailed applications of current legal doctrines to problems that could arise with autonomous machines in the areas of tort, contract, and the law of war.").

> First, a self-driving vehicle collides with a human and harms him. Second, a computer program operated by an online business enters into a contract with a human being where the online business did not authorize the contract. Third, an autonomous weapons system capable of selecting its own targets fails to distinguish between civilians and military personnel.[108]

Products liability law mainly governs issues about self-driving vehicles with potential impact through agency law.[109] Online contracting is assessed through agency law.[110] Autonomous weapons systems implicate doctrines of command responsibility[111] and state responsibility.[112]

Notably, there has been no federal agency tasked with creating regulations or assessing new AI technologies that go to market.[113] While Matthew Scherer lays out a comprehensive proposal for a federal agency for AI,[114] some established agencies have already taken to analogizing certain AI systems to existing regulatory schemes to both gain jurisdiction and address them in a more relevant legal context. For example, the Federal Aviation Administration (FAA) characterized drones as aircrafts, creating many problems and limitations in their uses.[115] Additionally, the Food and Drug Administration (FDA) analogized surgical robots to laparoscopic surgery, which allowed these robots to go to market quicker.[116]

Currently, aside from some agencies analogizing to existing products, each instance involving AI that results in liability is judged

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108 *Id.*

109 *Id.*

110 *Id.*

111 *See* Weston D. Burnett, *Command Responsibility and a Case Study of the Criminal Responsibility of Israeli Military Commanders for the Program at Shatila and Sabra*, 107 MIL. L. REV. 71, 76 (1985) (defining command responsibility as "the responsibility of military commanders for war crimes committed by subordinate members of their armed forces or other persons subject to their control").

112 *See* Danwood Mzikenge Chirwa, *The Doctrine of State Responsibility as a Potential Means of Holding Private Actors Accountable for Human Rights*, 5 MELBOURNE J. INT'L L. 1, 4 (2004) (explaining that state responsibility governs when a state commits a wrong against another state and breaches its international obligations); *see also* Chinen, *supra* note 107, at 347.

113 *See* Matthew U. Scherer, *Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies*, 29 HARV. J.L. & TECH. 353, 356 (2016).

114 *See infra* Section I.F.

115 Ryan Calo, *Robots as Legal Metaphors*, 30 HARV. J.L. & TECH. 209, 215 (2016).

116 *Id.*

through a comparable area of law, such as agency or contract law.[117] While the need for an overarching organization that oversees AI standards and regulations has been debated,[118] the reality is that the field as a whole is not yet as highly regulated as others.[119] Though an overarching regulatory body may be a sufficient, temporary solution for some products, autonomous weapons and general AI used in the military are likely to present more difficulties.

As is evidenced through its advancements, AI has been applied in a number of ways in industry, military services,[120] medical services, science, and games.[121] This shows that AI and autonomous systems as a whole will not only become widespread among industries but will also make a substantial impact on how jobs are performed and how malfunctions or accidents are addressed.[122] However, even though many benefits have encompassed the evolution of AI, it is difficult to understand the full impacts AI will have until regulation is considered.

F.   *Existing Proposals: Potential Regulatory Changes and Their Hypothetical Impacts on Artificial Intelligence in the Military*

There are various published proposals that lay out policies and frameworks that should be enforced in order to better regulate the AI sphere.[123] The most encompassing proposal details a potential agency that will use a particular liability standard by which AI will be evaluated before it has an opportunity to go to market.[124] Scherer proposes legislation titled the Artificial Intelligence Development Act (AIDA), which would create an agency that certifies AI systems' features and overall safety.[125] Beyond legislation, it has been suggested that an agency

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117 *See* Chinen, *supra* note 107, at 347–53.

118 *See* Scherer, *supra* note 113.

119 *Id.*

120 *See* Hallevy, *supra* note 13, at 177; *supra* Sections I.A–B.

121 Hallevy, *supra* note 13, at 177.

122 Larry Boyer, *Jobs, AI and Automation: What You Need to Know*, FORBES (Nov. 3, 2017, 7:00 AM), https://www.forbes.com/sites/forbescoachescouncil/2017/11/03/jobs-ai-and-automation-what-you-need-to-know/#35d34b37cb5c [https://perma.cc/G24P-TKF8].

123 *See generally* Scherer, *supra* note 113; Alžběta Krausová, *Legal Regulation of Artificial Beings*, 1 MASARYK U. J.L. & TECH. 187 (2007).

124 *See* Scherer, *supra* note 113.

125 *Id.* at 393–97.

be established in order to test and certify AI machines before they reach the market, similar to the responsibilities of the FDA.[126] The new agency Scherer proposes would have two missions: policymaking and certification.[127] However, this also presents certain problems, such as agency personnel not having the appropriate knowledge to properly judge quickly developing AI systems.[128]

While a new agency is an enticing idea, some agencies have already linked AI systems to existing regulation in order to gain jurisdiction and attend to these systems in more relevant legal contexts.[129] Similarly, arguments have been made for the need to establish a so-called "Federal Robotics Commission" that will aim to "deal with the novel experiences and harms robotics enables."[130] This may have a potentially useful application to the military environment, since killer robots and autonomous weapons systems as a whole have the potential to wreak havoc if there is even a slight deviation in their algorithms.[131]

In December 2017, Congress proposed a bill titled Fundamentally Understanding The Usability and Realistic Evolution (FUTURE) of Artificial Intelligence Act of 2017 (FUTURE of AI Act),[132] establishing a federal advisory committee that would oversee the development and evolution of AI.[133] The committee's goals are to promote innovation; to optimize development of AI; to promote and support development and application of AI; and to protect the privacy of individuals.[134] While this may be beneficial to society in the grand scheme of work force productivity and technological innovation, it does little to regulate the

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[126] *Id.*

[127] *Id.* at 395.

[128] Katherine Medianik, Note, *Artificially Intelligent Lawyers: Updating the Model Rules of Professional Conduct in Accordance with the New Technological Era*, 39 CARDOZO L. REV. 1497, 1509–10 (2018) (discussing how federal agencies do not necessarily understand the mechanics and specific algorithms of these AI systems, especially considering their complexity and the fast pace at which they have been developing).

[129] Calo, *supra* note 115, at 215–16 (discussing the Federal Aviation Administration and the Food and Drug Administration).

[130] Ryan Calo, *The Case for a Federal Robotics Commission*, BROOKINGS INST. 2 (Sept. 2014), https://www.brookings.edu/wp-content/uploads/2014/09/RoboticsCommissionR2_Calo.pdf [https://perma.cc/DAD8-T4FN].

[131] *See supra* Sections I.B–I.E.

[132] FUTURE of Artificial Intelligence Act of 2017, H.R. 4625, 115th Cong. (2017).

[133] *Id.*

[134] *Id.* § 2(4).

potential negative consequences of AI's sophistication, specifically within autonomous weapons systems.[135]

Until recently, arguments have been made to predominantly use products liability in legal proceedings if an autonomous machine ever malfunctioned.[136] Others have suggested that courts should apply a negligence standard to cases involving certified AI and a strict liability standard to cases involving uncertified AI.[137] The imperative issue of distinguishing liability between a designer, manufacturer, distributor, and operator would be a central part of the liability scheme in these cases.[138] Although products liability has been a basis for determining liability in AI,[139] specifically in relation to self-driving cars, the same concepts may be difficult to apply to the military and to autonomous weapons.[140] Applying products liability in this industry means that anyone from the programmer or robotics developer—who creates or designs the weapon—to the manufacturer of the weapon may be liable for any damaging result of a mission.[141] This scenario may specifically create problems when autonomous weapon systems begin to learn and develop, getting further away from the initial program that the programmer designed or the manufacturer built.[142]

Based on the scope of today's legal framework, it may be difficult to account for the progression and evolution of AI. As a result, the current system may not be equipped to evaluate the legal repercussions that

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[135] *Id. See also supra* Section I.C.

[136] *See, e.g.*, Woodrow Barfield, *Liability for Autonomous and Artificially Intelligent Robots*, 9 PALADYN J. BEHAV. ROBOTICS 193, 196–97 (2018) (describing the application of products liability to various types of robots, including both industrial and home robots).

[137] Calo, *supra* note 115.

[138] *Id.*

[139] *See* Kyle Colonna, Note, *Autonomous Cars and Tort Liability*, 4 CASE W. RES. J.L., TECH. & INTERNET 81 (2012).

[140] *Id.* at 95–97 (explaining the closest analogy––liability when planes crash from a failed autopilot mechanism).

[141] *See* Scherer, *supra* note 113; *see also* Frank Finn & John H. Martin, *Strict Liability in Military Aviation Cases–Should It Apply?*, 48 J. AIR L. & COM. 347, 379 (1983) (concluding that "[g]iven the differences which exist between 'typical' products liability actions and actions involving products manufactured for military use, no solid basis can be seen for imposing the doctrine on manufacturers of military aircraft, especially in a design context."). The difficulty of the use of AI in the military creates similar concerns as those created with the increasing use of military aviation in the twentieth century, where strict liability as applied to manufacturers was not the best liability regime.

[142] *See* Medianik, *supra* note 128, at 1499 (discussing how ROSS learns from experience and its users as it sifts through data, quickly researches, and engages in interaction).

occur from possible misuse of military AI, specifically autonomous weapons systems. Therefore, a different framework will need to be enacted.

II.   Analysis

A.   *Considerations in Regulating Autonomous Weapons*

While a new regulatory framework is needed to govern autonomous weapons systems, various characteristics of AI systems impact these weapons systems and will need to be seriously considered before any structure is enacted.

1.   Machine and Reinforcement Learning

Machine learning, as well as reinforcement learning, are two aspects that will need to be considered in relation to AI as its technology advances.[143] First, machine learning involves computer algorithms that can "learn" or improve their performance on a given task as time passes.[144] Reinforcement learning, a category of machine learning, entails experimentation.[145] Reinforcement learning is already prevalent in some forms of AI. For example, a computer developed by a subsidiary of Alphabet learned and mastered Go, a notoriously complicated board game, and eventually beat one of the world's best human players.[146] It is likely that this type of learning will begin to flourish within AI. It not only improves self-driving cars, but the same technology also allows robots to grasp objects it has never encountered before, and it can figure out the optimal configuration for the equipment in a data center.[147]

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[143] Surden, *supra* note 98.

[144] *Id.* at 88 (citing Peter Flach, Machine Learning: The Art and Science of Algorithms that Make Sense of Data 3 (2012)).

[145] Will Knight, *Reinforcement Learning*, Mass. Inst. Tech., Tech. Rev. (2017), https://www.technologyreview.com/s/603501/10-breakthrough-technologies-2017-reinforcement-learning [https://perma.cc/M77M-RBCG].

[146] *Id.* ("AlphaGo, a computer developed by a subsidiary of Alphabet called DeepMind, mastered the impossibly complex board game Go and beat one of the best human players in the world . . . .").

[147] *Id.*

While reinforcement learning in AI machines is still in relatively early stages of development, it will eventually become sophisticated and prevalent across many AI machines and throughout various sectors, including the military. While learning has great potential for the evolution of these AI systems, it may create further difficulties to determine liability in the event of a harmful situation or event because these machines will eventually become sophisticated enough to make their own decisions and come to their own conclusions without a human's influence.[148]

2.   The Ethics Problem: Machines Making Moral Decisions

While AI continues to develop, the possibility of AI systems thinking and making decisions in certain situations in the future, especially where autonomous weapons are involved, must be considered. This state of affairs may become particularly problematic with fully autonomous weapons that remove all levels of human interaction.[149] There are many potential issues that arise with machines learning as they go and detaching themselves further from their initially engineered prototypes.[150]

Machine learning technologies lack intuition, which is an important characteristic humans possess that cannot be engineered into technology.[151] Intuition is sometimes essential to properly assessing and reacting to a situation.[152] Although the military has extensive opportunities to develop a soldier's training in the field, there are still situations in which a person's intuitive judgment and so-called "gut feeling" need to be taken into account to respond to a situation.[153] At this stage, artificial intuition is a concept that some have proposed to be a subset of AI, but it has yet to have widespread implementation.[154] It is

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[148] *See* Stop Autonomous Weapons, *supra* note 81.

[149] *See* Vladeck, *supra* note 100, at 121.

[150] *See* Scherer, *supra* note 113.

[151] *See* Shani, *supra* note 18 ("As easy as it is for machine-learning technology to self-improve, what it lacks is intuition. There's a gut instinct that can't be replicated via algorithms, making humans an important piece of the puzzle.").

[152] *Id.*

[153] EUGENE SADLER-SMITH, INSIDE INTUITION 255 (2008).

[154] *See* Monica Anderson, *A New Possible Path to Artificial Intelligence*, ARTIFICIAL INTUITION, http://artificial-intuition.com/intuition.html [https://perma.cc/8VAW-3EEG] (last

difficult to imagine an AI system ever being able to generate similar feelings, considering that these systems are built in such a scientific manner.[155] For this reason, "[t]he best way forward is for humans and machines to live harmoniously, leaning on one another's strengths."[156] While this is a nice sentiment, it is difficult to incorporate into a liability analysis.[157]

When considering autonomous weapons systems, specifically, the main legal and moral issue is the act of assigning human decision-making responsibilities to autonomous systems that are designed to kill humans.[158] What does this mean?

Common examples of moral decisions that need to be made by autonomous AI machines are seen in driverless cars.[159] For example, if Person A's car is speeding down a road and a school bus with twenty children crosses its path, does Person A swerve and risk their own life to save the children or does Person A continue driving, potentially placing the bus full of children at risk?[160] Likewise, if a pilotless, completely autonomous aircraft is traveling with explosives that need to hit a target, but then data presents that there are one hundred civilians in the midst of the targeted terrorist, what does the machine do in that instance? These are the types of decisions that humans contemplate in scenarios that present themselves, and computers will need to make these calls in milliseconds. One notable disadvantage is that these AI machines are completely devoid of human compassion.[161] This may create a different standard for judgment within liability if a mission is to go wrong.

While decisions constitute a large part of humans' daily lives, as machines continue to learn and as machine and reinforcement learning continue to flourish, a dilemma is presented for liability. There are two perspectives to consider: (1) regulating and creating standards for programmers; or (2) creating a framework to regulate the actual machine. With the former, it must be noted that regardless of the

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visited Jan. 23, 2019) (indicating that AI intuition is a feature of AI that is difficult to develop since it is impossible to make it instinctual in the ways that it is for humans).

[155] *See* Stop Autonomous Weapons, *supra* note 81.

[156] *See* Shani, *supra* note 18.

[157] *See* Scherer, *supra* note 113.

[158] Peter Asaro, *On Banning Autonomous Weapon Systems: Human Rights, Automation, and the Dehumanization of Lethal Decision-Making*, 94 INT'L REV. RED CROSS 687, 695 (2012).

[159] *See* Marcus, *supra* note 14.

[160] *Id.* (detailing a similar example).

[161] *Id.*

advancements of AI technology, a human being—who is bound by the law—will always be at the starting point of these systems.[162] It would even be possible to keep the current liability framework unaltered, since anywhere human involvement is evident, a human would be responsible for the wrongful acts committed by or involving a machine.[163] With the latter, there is ample opportunity for regulatory innovation.

B. *Can Artificial Intelligence be Considered Human?*

To determine the answer to this question, we must ask what exactly constitutes the characteristics of being human? This Note previously discussed machine and reinforcement learning.[164] It can be argued that the process of thinking is directly related to characteristics of a human, but much of the progress in AI development shows that machines exhibit more characteristics similar to those of humans.[165] Although case law would provide the most direct answer to this question, it is, unfortunately, likely unhelpful because, so far, the only AI-related lawsuits that have occurred have had to do with patents on the robotics.[166]

Though case law is unhelpful in the quest to determine whether AI can reach personhood to the point where it will have legal ramifications, Autonomous Intelligent Systems (AIS) have also been at the forefront of the discussion of impact on society and are useful in determining legal

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[162] GARY D. SOLIS, THE LAW OF ARMED CONFLICT: INTERNATIONAL HUMANITARIAN LAW IN WAR 544 (2d ed. 2016) ("However far we go into the future and no matter how artificial intelligence will work, there will always be a human being at the starting point . . . an autonomous weapon system will always operate within the limits of its software; software designed by humans. . . . This human being is bound by the law.") (quoting Marco Sassóli, *Autonomous Weapons and International Law: Advantages, Open Technological Questions and Legal Issues to be Clarified*, 90 INT'L LEGAL STUD. 308, 323 (2014)) (alterations in original).

[163] Vladeck, *supra* note 100, at 120–21 ("Any human . . . that has a role in the development of the machine and helps map out its decision-making is potentially responsible for wrongful acts–negligent or intentional–committed by, or involving, the machine."). Human responsibility on behalf of AI is outside the scope of this Note.

[164] *See supra* Section II.A.1.

[165] *See* Medianik, *supra* note 128, at 1498 n.5 (discussing how AI machines can use "algorithms to mimic the human brain's learning, analytical, and decision-making processes") (quoting Sherry Xin Chen & Mary Ann Neary, *Artificial Intelligence: Legal Research and Law Librarians*, AALL SPECTRUM, May/June 2017, at 16, 20)).

[166] *See, e.g.*, InTouch Techs., Inc. v. VGo Commc'ns, Inc., 751 F.3d 1327 (2014); Ross-Hime Designs, Inc. v. United States, 126 Fed. Cl. 299 (Fed. Cl. 2016).

personhood.[167] AIS not only perform tasks like those of other intelligent machines, but they are also sophisticated enough to have the ability to interact with each other and with human beings.[168] There are now even institutes dedicated to researching robot morality and determining just what encompasses a "friendly robot"[169]—seemingly fitting when there are also killer robots on the other end of the spectrum.

Other factors have also been considered when discussing an AI's personhood. For example, courts have had a loose interpretation of personhood for artificially-created business entities.[170] There have already been arguments as to whether an AI can own real property, and the likelihood of that becoming a reality is not far off—though with a few strings attached, namely the discretion and management of a group, such as a Board of Directors.[171] It would be unsurprising if a military equivalent will be a topic for discussion in the near future.

Further, the Restatement (Third) of Agency includes an individual, an organization, and a government in its definition of "person."[172] Notably, it includes "any other entity that has legal capacity to possess rights and incur liability."[173] There has been debate over whether an AI system can feasibly fall under the category of "any other entity." However, the Restatement also specifies that:

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[167] Madeleine de Cock Buning, *Autonomous Intelligent Systems as Creative Agents Under the E.U. Framework for Intellectual Property*, 7 EUR. J. RISK REG. 310 (2016).

[168] *Id.* at 312.

[169] Coby McDonald, *The Good, the Bad and the Robot: Experts Are Trying to Make Machines Be "Moral"*, CAL. MAG. (June 4, 2015, 12:37 PM), https://alumni.berkeley.edu/california-magazine/just-in/2015-06-08/good-bad-and-robot-experts-are-trying-make-machines-be-moral [https://perma.cc/WD9M-764C].

[170] David Marc Rothenberg, *Can Siri 10.0 Buy Your Home: The Legal and Policy Based Implications of Artificial Intelligent Robots Owning Real Property*, 11 WASH. J.L., TECH. & ARTS 439, 460 (2016).

[171] *Id.* This can even be analogized to corporate personhood, which "allows companies to hold property, enter contracts, and to sue and be sued just like a human being." Ciara Torres-Spelliscy, *The History of Corporate Personhood*, BRENNAN CTR. FOR JUST., (Apr. 7, 2014), https://www.brennancenter.org/blog/hobby-lobby-argument [https://perma.cc/34BJ-G3V6]. Although corporations are not entitled to all human rights, the entities are entitled to certain constitutional rights, such as equal protection and freedom of speech. *Id.* While some of these rights may not necessarily directly apply to AI, the fact that legal personhood has been applied to an arguably intangible entity shows that treating an AI machine with certain standards of personhood may not be implausible.

[172] RESTATEMENT (THIRD) OF AGENCY § 1.04(5) (AM. LAW INST. 2006).

[173] *Id.*

> [a]t present, computer programs are instrumentalities of the persons
> who use them. If a program malfunctions, even in ways
> unanticipated by its designer or user, the legal consequences for the
> person who uses it are no different than the consequences stemming
> from the malfunction of any other type of instrumentality.[174]

As one academic states, an AI or AIS "is an instrumentality of the person who presses 'go,' even though the complex computer program promises to act fully autonomously."[175] But what happens when a machine learns for itself and becomes sophisticated enough to make its own decisions without the human interaction that currently swarms most autonomous functions? Neither the Restatement nor any other publication has explicitly included guidelines for this issue.

Even though there is extensive debate surrounding whether AI systems can reach legal personhood, arguments have been made for machines attaining a place in this category.[176] One sociologist explains that, while intelligence is a relatively obvious factor in both humans and AI machines, this is not all that is considered in people; sentience, consciousness, and self-awareness are also vital traits of humans.[177] The ability to feel things, awareness of one's body and surroundings, and recognition of that consciousness are all factors that arguably make humans who they are.[178] While machines may be as smart or smarter

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[174] *See id.* § 1.04 cmt. e.

[175] Clint W. Westbrook, *The Google Made Me Do It: The Complexity of Criminal Liability in the Age of Autonomous Vehicles*, 2017 MICH. ST. L. REV. 97, 124 (2017).

[176] *See* George Dvorsky, *When Will Robots Deserve Human Rights?*, GIZMODO (June 2, 2017, 9:20 AM), https://gizmodo.com/when-will-robots-deserve-human-rights-1794599063 [https://perma.cc/F62U-UCKH]. The European Union has also suggested creating a legal status to "smart robots, specifically those which . . . can learn, adapt, and act for themselves. This legal personhood would be similar to that already assigned to corporations around the world, and would make robots, rather than people, liable for their self-determined actions, including for any harm they might cause." Rachel Withers, *The E.U. is Trying to Decide Whether to Grant Robots Personhood*, SLATE (Apr. 17, 2018, 9:30 AM), https://slate.com/technology/2018/04/the-eu-is-trying-to-decide-whether-to-grant-robots-personhood.html [https://perma.cc/7L76-TCQZ]. However, over 150 robotics, legal, ethics, and medical experts penned an open letter against this idea, detailing that legal personality for a robot is inappropriate since it would not only give robots human rights, but it would also create complexities for any humans behind these robots. *Open Letter to the European Commission Artificial Intelligence and Robotics* (May 4, 2018), https://g8fip1kplyr33r3krz5b97d1-wpengine.netdna-ssl.com/wp-content/uploads/2018/04/RoboticsOpenLetter.pdf [https://perma.cc/WD6E-MBQV].

[177] *See* Dvorsky, *supra* note 176.

[178] *Id.*

than humans, these aspects of emotional intelligence come into question when debating AI's humanity. Laws cover the mental incapacities that certain humans may experience, so could an AI's capacity be similar to that of a mentally insane person? The capabilities of AI have been analogized to those of mentally limited people, such as children, those who are mentally incompetent, or generally to those who lack a criminal state of mind.[179]

Lastly, AI might surpass humans in curiosity and desire to learn.[180] Once an objective is defined for an AI system, achieving that goal becomes the machine's top priority.[181] This becomes not only the system's biggest motivation but also essentially an obsession.[182] This is another aspect of AI that is similar to human traits, furthering the case for AI to be able to be considered on par with humans. Autonomous weapons are particularly relevant here. Considering the fact that these weapons select and target specific individuals, places, or things, it is easy to see how hitting that target would become the weapon's number one priority.

C.   *Can a Machine Have Intent?*

While targeting and achieving a particular goal may become an AI's or, specifically for the context of this Note, a fully autonomous weapon's sole priority, another important question is whether a machine can have intent. It would be difficult to establish that an AI system has its own intent at this point in time, despite AI's sophistication.[183] Autonomous weapons systems can act with one goal (or target) in mind, but it is unclear whether this would equate to acting with intent.[184] Some argue that intentional torts will not apply to AI.[185]

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[179] GABRIEL HALLEVY, LIABILITY FOR CRIMES INVOLVING ARTIFICIAL INTELLIGENCE SYSTEMS 110 (2014).

[180] Tomas Chamorro-Premuzic & Ben Taylor, *Can AI Ever Be as Curious as Humans?*, HARV. BUS. REV. (Apr. 5, 2017), https://hbr.org/2017/04/can-ai-ever-be-as-curious-as-humans [https://perma.cc/4THV-CDPR].

[181] *Id.*

[182] *Id.* (discussing how because an AI system prioritizes a specific goal, "[i]n that sense, AI is way more obsessed with learning than humans are").

[183] *Id.*

[184] *See Drones: What Are They and How Do They Work?*, *supra* note 10.

In fact, a distinction is made between acting with intent and acting intentionally based on limited, established functions that an AI is programmed to exhibit.[186] Notably, AI that assists officers and armed forces is distinguished in this capacity, and though it may be difficult to hold AI to the standards of intentional torts, there are still tort actions that may be brought in instances where military AI and autonomous weapons systems are used.[187]

If AI is like a mentally-limited individual,[188] then it may be judged based on similar systems of liability.[189] For example, in tort cases involving a person who is mentally incompetent, that person is considered a mere instrument rather than an actual perpetrator.[190] Based on this brief analysis, two other options exist. The programmer creates the AI or autonomous weapons system with some sort of specific intent to cause harm; or a programmer or another individual involved in the creation process did not act intentionally, making the state responsible for its grievances.[191] This is where the concept of war torts comes to the forefront.[192]

D. *War Torts*

War crimes[193] and, more broadly, the law of war[194] have been at the center of international law for centuries. Historically, states rather than

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185 John Frank Weaver, Robots Are People Too: How Siri, Google Car, and Artificial Intelligence Will Force Us to Change Our Laws 18 (2014).

186 *Id.*

187 *Id.* at 18–19; *see also infra* Section II.D.

188 *See supra* Section II.B.

189 *See* Hallevy, *supra* note 179, at 110.

190 *Id.* (stating that a mentally incompetent person is "regarded as a mere instrument, albeit a sophisticated instrument, while the party orchestrating the offense . . . is the actual perpetrator as a principal in the first degree and is held accountable for the conduct of the innocent agent").

191 *See* Scherer, *supra* note 113.

192 *See infra* Section II.D.

193 *See* Rebecca Crootof, *War Torts: Accountability for Autonomous Weapons*, 164 U. Pa. L. Rev. 1347, 1354 (2016) ("A 'war crime' is commonly understood as any serious violation of international humanitarian law, in either an international or non-international armed conflict.").

194 *See* Kenneth Bullock, *United States Tort Liability for War Crimes Abroad: An Assessment and Recommendation*, 58 Law & Contemp. Probs. 139, 141–42 (1995). "The international humanitarian law of armed conflict, more commonly referred to as 'the law of war,' is the

individuals were responsible for these crimes.[195] This responsibility has now largely shifted to the individual, as individual criminal liability has become a focus of war crimes, while state liability has decreased.[196]

In its current state, the law of state responsibility indicates that a state may owe an international legal obligation to individuals, another state, or the international community in its entirety.[197] While internal legal systems include separate civil and criminal responsibilities of its citizens, state responsibility does not include such a distinction.[198] Generally, states are responsible for investigating and prosecuting war crimes committed by their nationals and members of their armed forces and for war crimes committed on their territory.[199] Additionally, states need to be aware of crimes committed by non-state actors, such as "individuals or entities empowered to exercise governmental authority," those who "act under a state's direction or control," and "private individuals or entities which the state acknowledges and adopts as its own."[200] However, there has been a global shift from state responsibility to individual criminal liability in the realm of international war crimes over the last seventy years.[201]

While individual criminal liability is the leading regime for international war crimes, war torts have also been discussed by academics.[202] Rebecca Crootof proposes "explicitly identifying 'war torts' as serious violations of international humanitarian law that give

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oldest branch of international law, having existed in some form since ancient times." *Id.* at 142 n.9. These laws have been governing warfare for centuries among many civilizations around the globe. *Id.* After World War II, principles taken from the Geneva conventions were widely ratified around the world. *Id.* Clauses from these conventions, as well as the Hague conventions, "affirm[ed] the continued obligation of all nations to observe the customary principles of international law." *Id.* Notably, "the effectiveness of the international law of war and of related human rights precepts depends upon the availability and application of enforcement mechanisms." *Id.* at 142. To date, the "primary method of enforcing the law of war has been criminal prosecution of suspected war criminals in national criminal justice systems." *Id.* For additional background on the law of war, see DOCUMENTS ON THE LAWS OF WAR 1–2 (Adam Roberts & Richard Guelff eds., 3d ed. 2000).

[195] Crootof, *supra* note 193, at 1354.

[196] *See id.* at 1350 n.8, 1355.

[197] *Id.* at 1355–56.

[198] *Id.* at 1356.

[199] *Id.* at 1356–57.

[200] *Id.* at 1357–58 (citing Draft Articles, *supra* note 29, arts. 5, 8, 11); *see also* G.A. Res. 56/83, Responsibility of States for Internationally Wrongful Acts, arts. 5, 8, 11 (Dec. 12, 2001).

[201] *See* Crootof, *supra* note 193, at 1355.

[202] *See generally* Crootof, *supra* note 193.

rise to state responsibility."[203] She puts emphasis on the fact that the structure can be similar to that of internal domestic law: an individual action may be both a war tort and a war crime.[204] The war torts regime would be tailored mainly to international wrongful acts,[205] much like regular tort actions are brought for wrongful acts. Importantly, while criminal law contemplates moral culpability, tort law does not; rather, it aims to minimize accidents and deter others from engaging in similar behavior.[206]

Crootof identifies four reasons and benefits for implementing a war torts regime: (1) "[i]t would clarify the applicability of the law of state responsibility in armed conflict"; (2) it would create an international norm for lawful behavior if states accept fault and take responsibility; (3) it would "deter states from employing means and methods of warfare that result in serious violations of international humanitarian law"; and (4) it would allow individuals injured from internationally wrongful actions to seek and accept remedies, which would not be possible in solely a war crimes regime.[207] This kind of regime would become especially useful with the establishment of autonomous weapons and more general military AI systems.

E. *Artificial Intelligence in a War Torts Context*

Crootof lays out a quintessentially lawyer-like answer to the question of who should be liable when an autonomous weapons system acts wrongfully: she says it depends.[208] Either international criminal law should govern when an autonomous weapons system is used recklessly or with intent to commit a war crime.[209] Or, states should sometimes be held responsible for war torts with respect to certain war crimes and some instances where no individual acts willfully.[210] This posits bringing

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203 *Id.* at 1386.

204 *Id.*

205 *Id.*; *see also* G.A. Res. 56/83, *supra* note 200, art. 2.

206 Crootof, *supra* note 193, at 1387; *see also id.* at 1387 & n.217.

207 *Id.* at 1388; *see also* Rebecca Crootof, *War, Responsibility, and Killer Robots*, 40 N.C. J. Int'l L. & Com. Reg. 909 (2015) (discussing how autonomous weapons systems would potentially change how the United States acts in armed conflict).

208 Crootof, *supra* note 193, at 1389.

209 *Id.*

210 *Id.*

state responsibility back to the center of international humanitarian law when there is a clear war tort committed.[211]

International law is usually formulated as law governing states rather than individuals.[212] This concept would be reinforced when AI and autonomous weapon systems are brought into the equation. States are better equipped to deal with tort claims brought due to the wrongful acts resulting from autonomous weapons.[213] In practice, states will be responsible for developing, purchasing, and integrating autonomous weapon systems into their military entities,[214] accounting for most aspects of the liability chain.[215] Additionally, states could internalize any costs from weapons that commit crimes.[216] The shift to state responsibility for autonomous weapon related liability would only require a clarification of the applicability of existing law rather than the creation of completely new regimes, making this a significantly more plausible option.[217]

Once this is clarified, there are several options of tort liability regimes that can be implemented to govern war torts. These include strict liability,[218] negligence liability,[219] an integrated international and

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[211] *Id.*

[212] Bullock, *supra* note 194, at 144 ("It is a basic premise of international law that states, not individuals, are its subjects.").

[213] *See* Crootof, *supra* note 193, at 1390 ("At the practical level, not only is the state in the best position to ensure that autonomous weapon systems are designed and employed in compliance with international humanitarian law, states will also have pockets deep enough to adequately compensate victims of their actions.").

[214] *Id.*

[215] *Id.*

[216] *Id.* at 1390 n.233; *see also* Daniel N. Hammond, Comment, *Autonomous Weapons and the Problem of State Accountability*, 15 CHI. J. INT'L L. 652, 669 (2015).

[217] Crootof, *supra* note 193, at 1391.

[218] *Id.* at 1394–96. "Under strict liability, an actor is held responsible for any injury caused by her behavior." *Id.* at 1394.

[219] *Id.* at 1394–96. "[U]nder negligence liability, an actor is held responsible to the extent her failure to exercise reasonable care resulted in an injury." *Id.* at 1394. Notably, there has been debate surrounding an engineer's involvement in developing an AI system that then commits a wrongful act. "[I]t would seem that where a programmer has launched an AI program with the ability to grow independently, the programmer should not have the same claim to the integrity of the resulting work product as an author who has created the work in the specific manner they intended." James Wagner, *Rise of the Artificial Intelligence Author*, 75 ADVOCATE (VANCOUVER) 527, 532 (2017). This point was almost immediately disputed by the very same author stating "[o]n the other hand, some practical level of control over the content created by AI programs may be necessary . . . ." *Id.*

domestic liability regime,[220] an independent tribunal system,[221] or a limited strict liability tort regime.[222] While each of these present interesting arguments, this Note argues for the implementation of a limited strict liability tort regime.

III.   PROPOSAL: IMPLEMENTING A LIMITED STRICT LIABILITY TORT REGIME AS THE STANDARD OF JUDGMENT IN CASES

A.   *The Standard—Autonomous Weapons and State Liability*

Because lethal autonomous weapon systems have the potential to be substantially more dangerous than semi-autonomous and non-lethal autonomous weapons, they should be governed by a strict liability standard. Generally, strict liability is applied much more narrowly and under more strict circumstances than any other theory of liability within tort law.[223] Most commonly, strict liability is applied to situations with animals, some nuisance cases, libel, misrepresentation, vicarious liability, workman's compensation, and ultra-hazardous activities.[224] Although the use of fully autonomous weapon systems, specifically those that are lethal, is not within the confines of any of the initially listed categories, its use arguably can fall under the category of ultra-hazardous activities. In this scenario, an ultra-hazardous or dangerous

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[220] *See* Crootof, *supra* note 193, at 1396–99. Under this integrated regime, state responsibility would be reinforced. *Id.* at 1397. "It could also clarify common definitions, describe overarching regulatory aims, and require member states to pass legislation creating domestic liability for both war crimes and war torts." *Id.*

[221] *Id.* at 1397; *see also* Rebecca Crootof, *The Killer Robots Are Here: Legal and Policy Implications*, 36 CARDOZO L. REV. 1837 (2015). Crootof suggests an independent tribunal specifically for autonomous weapons systems, "much like the ICC or other specialized criminal tribunals." Crootof, *supra* note 193, at 1397. It should be noted that the International Court of Justice, though seemingly a suitable forum for engaging with this material, will face jurisdictional issues, making this a less useful option. *Id.*

[222] *See* Crootof, *supra* note 193, at 1400–02. This regime aligns autonomous weapons systems with strict liability, while aligning non-autonomous and non-lethal weapon systems with a negligence standard. *Id.*; *see infra* Part III.

[223] Gregory C. Keating, *The Theory of Enterprise Liability and Common Law Strict Liability*, 54 VAND. L. REV. 1285, 1289 (2001).

[224] Charles E. Cantu, *Distinguishing the Concept of Strict Liability for Ultra-Hazardous Activities from Strict Products Liability Under Section 402A of the Restatement (Second) of Torts: Two Parallel Lines of Reasoning That Should Never Meet*, 35 AKRON L. REV. 31, 33 (2001).

activity is performed, and a defendant is held liable for an injury even if there is absence of any fault.[225]

This concept traces back to the original case establishing strict liability: *Rylands v. Fletcher*.[226] The English court in this case differentiated between a "natural" and "non-natural" use of land.[227] American courts have generally adopted *Rylands*, but remain reluctant to impose strict liability without considering more.[228] This means that courts will take not only the activity into account, but also the area and circumstances under which it is being executed.[229]

The Restatement (Third) of Torts considers four main factors when strict liability is being debated. An abnormally dangerous activity will provide for strict liability if (1) the activity creates a foreseeable risk of physical harm; (2) the risk is a "highly significant" risk; (3) the risk remains "even when reasonable care is exercised by all actors;" and (4) "the activity is not a matter of common usage."[230] The strongest case within this realm of strict liability is where a defendant knows and understands the significant risk the activity poses but decides to follow through anyway.[231] In these instances, strict liability will undoubtedly govern.[232]

Autonomous weapons have an inherent highly significant risk associated with them. Analyzed through both the *Rylands* approach and the Restatement (Third) of Torts approach, strict liability would be appropriate to govern fully autonomous weapons. Based on *Rylands*, while, arguably, using autonomous weapons is a function that the military is privileged to exercise, these weapons will not have meaningful human contact.[233] This puts them out of the realm of

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225 *Id.* at 34.

226 [1868] LRE & I. App. 3 (HL). In this case, the defendant undertook to erect reservoirs so that he could supply his mills with a source of energy. *Id.* After consulting with an engineer and a contractor, the pools were constructed. *Id.* The weight of these pools caused the tanks to collapse into an underground coal mine belonging to the plaintiff. *Id.* When the lawsuit was heard, the British House of Lords held that, "even in the absence of fault, the defendant should be held responsible." Cantu, *supra* note 224, at 35.

227 Cantu, *supra* note 224, at 35.

228 *Id.*

229 *Id.* at 35–37.

230 RESTATEMENT (THIRD) OF TORTS § 20 (AM. LAW INST. 2010).

231 *Id.* at cmts. f & i.

232 *Id.*

233 *Cf.* Rylands v. Fletcher, [1868] LRE & I. App. 3 (HL). *Compare* Vladeck, *supra* note 100, at 121 (reinforcing that fully autonomous weapons systems will act "independently of direct

"ordinary" uses of similar items,[234] especially considering human control would not be guaranteed with fully autonomous weapons.[235]

The Restatement provides a stronger reason for lethal autonomous weapon systems to be governed under strict liability. Autonomous weapons are inherently dangerous and pose significant risk regardless of their sophistication. Because killer robots will have the ability to select and target on their own, rather than through human guidance, there is no indication as to how their paths will change from the point at which they depart to the point at which they hit a target. Machine learning reinforces this risk since these killer robots can eventually become sophisticated enough to act and think on their own.[236] This scenario also provides a case where a negligence standard would fail because there would be no way to avoid the risk when the machines have a mind of their own, unless these weapons are not used at all.[237]

Take, for example, the miniature drone-like lethal autonomous weapon in the "Stop Autonomous Weapons" video[238] played at the CCW convention. If that weapon was deployed with one target in mind, but then reexamined the data in its software and determined that a different person should be targeted instead, it would undoubtedly follow the new route rather than the original.[239] Meanwhile, the military that was going to control the operation does not have any meaningful input or control since the killer robot is fully autonomous.[240] Therefore, there is no reasonable way for one to avoid the risk that is created since a human would neither be able to change the machine's course nor be

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human instruction" and so will not have significant human contact), *with Killer Robots and the Concept of Meaningful Human Control*, Hum. Rts. Watch (Apr. 11, 2016, 12:01 AM), https://www.hrw.org/news/2016/04/11/killer-robots-and-concept-meaningful-human-control [https://perma.cc/W5RX-A9KP] ("In the arms arena, the term 'meaningful human control' signifies control over the selection and engagement of targets, that is, the 'critical functions' of a weapon.") (internal citation omitted).

[234] *See* Dan B. Dobbs, Paul T. Hayden & Ellen M. Bublick, The Law of Torts § 441 (2d ed. 2000).

[235] *See Killer Robots and the Concept of Meaningful Human Control*, *supra* note 233 ("Humans should exercise control over individual attacks, not simply overall operations. Only by prohibiting the use of fully autonomous weapons can such control be guaranteed.").

[236] *Id.*

[237] *Cf.* Restatement (Third) of Torts: Liability for Physical and Emotional Harm § 20 & cmt. b (Am. Law Inst. 2010).

[238] *See* Stop Autonomous Weapons, *supra* note 81.

[239] *Id.*

[240] *Id.*

able to stop the machine. Although this is dangerous, in this hypothetical, the state may nonetheless choose to deploy the weapon.

Although there have been several United Nations conventions held to discuss the aforementioned ban on these weapons,[241] the world has yet to come to a consensus on a plan for the rise of autonomous weapons. Without an enforced strict liability tort regime for accidental injuries sustained from killer robots, the possibility of catastrophic accidents that go without remedies would be incredibly high. Such a liability system would make a state think twice when choosing whether to use or deploy certain AI.

B.   *The Standard—Semi-Autonomous and Non-Lethal Weapons and Manufacturer Liability*

By contrast, non-lethal fully autonomous weapons and semi-autonomous weapons will be better governed under a negligence scheme. Largely, these categories of weapons already exist, including Packbots,[242] drones, and other UAVs. Unlike AI, these machines include some form of human guidance or support at some stage.[243] This difference is fundamental to the analysis of the type of liability regime that should be implemented for these weapons because, unlike with fully autonomous weapons, the risk here can be avoided or at least minimized through human involvement.[244]

Notably, the Restatement (Second) of Torts provides that both a negligence approach and a strict liability approach can be applied when

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[241] This includes the CCW Convention that meets annually. *See* Steven Groves, *U.N. Conference Debating a Ban on Autonomous Weapons: Understanding Key Issues*, HERITAGE FOUND. (Apr. 16, 2015), http://thf_media.s3.amazonaws.com/2015/pdf/IB4385.pdf [https://web.archive.org/web/20160410231250/http://thf_media.s3.amazonaws.com/2015/pdf/IB4385.pdf]; David Z. Morris, *U.N. Moves Towards Possible Ban on Autonomous Weapons*, FORTUNE (Dec. 24, 2016), http://fortune.com/2016/12/24/un-ban-autonomous-weapons [https://perma.cc/5NN5-QR8U]; Patrick Caughill, *The United Nations is Considering a Possible Ban on "Killer Robots"*, FUTURISM (Nov. 18, 2017), https://futurism.com/un-discusses-banning-killer-robots [https://perma.cc/RN9E-HP8X].

[242] *See The Price of Freedom: Americans at War: Packbot*, *supra* note 55.

[243] Vladeck, *supra* note 100, at 120–21.

[244] *See* Ryan Browne, *US General Warns of Out-Of-Control Killer Robots*, CNN POL. (July 18, 2017, 9:18 PM), http://www.cnn.com/2017/07/18/politics/paul-selva-gary-peters-autonomous-weapons-killer-robots/index.html [https://perma.cc/EA8M-ACRF].

it comes to ultra-hazardous activities.[245] This merely shows the normality in separating out the approaches for these two categories of autonomous weapons.

While a negligence standard may not have been appropriate with fully autonomous weapons, since even the most careful designer "could not . . . [necessarily anticipate] the decisions [an autonomous weapon system] might eventually make in a complex battlefield scenario,"[246] it is more appropriate here. Autonomous weapons systems are designed specifically for independent decision-making.[247] Semi-autonomous weapons systems, on the other hand, require human interaction. Therefore, a finding of negligence is much more likely against semi-autonomous weapons designers or manufacturers.

In reality, it will likely be difficult to establish or bring an action for a design or manufacturing defect in this scenario.[248] This proposed regime does not provide a significant shift, but it will nonetheless provide reinforcement for personnel, despite any immunity or exemptions.

C. *Issues to Consider: Sovereign Immunity Through the FTCA and MCA*

The main obstacle to be addressed is sovereign immunity, which not only keeps states from being sued in foreign courts, but also eliminates state-to-state tort actions.[249] While sovereign immunity exists within many nations, this Note will discuss its relevance only in the context of the United States.

At the forefront of exemptions made for cases that cannot be brought against the United States lies the Federal Tort Claims Act (FTCA). In theory, the FTCA exists so that civilians and wronged individuals can bring a suit against a government employee if they were

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245 RESTATEMENT (SECOND) OF TORTS § 520 cmt. f (AM. LAW INST. 1977).

246 *See* Daniel N. Hammond, *Autonomous Weapons and the Problem of State Accountability*, 15 CHI. J. INT'L LAW 652, 667 (2015) (quoting CASE AGAINST KILLER ROBOTS, *supra* note 60, at 43).

247 *Id.*

248 *See infra* Section III.C.

249 Bullock, *supra* note 194, at 144 ("[T]he principle of sovereign immunity prevents states from being sued in foreign courts without their consent and removes state-to-state tort actions to the realm of diplomacy.").

wronged while the employee was acting within the scope of his duties.[250] However, the FTCA also allows the United States to invoke any judicial or legislative immunity available to it in order to minimize the damages, or to eliminate a lawsuit altogether.[251] Notably, the FTCA makes an exception for any intentional torts, ensuring that no such claims will be brought against the United States government.[252]

States typically do not take responsibility for tort actions, particularly in a war setting.[253] However, if the United Nations does not decide on a preemptive ban on lethal autonomous weapons systems, then a regime will need to be put in place since humans will have less control over machines' actions. If a system is not put in place, then there is a real possibility that these weapons systems will wreak havoc and cause harm to civilians and people who should not be in the line of fire at all.

Another consideration is that no civil liability claims can be brought under the FTCA where the government or its contractors are operating during wartime.[254] However, if these weapons systems are being tested domestically, become uncontrollable, and cause an injury to a civilian, then a negligence action under the FTCA may be brought.[255] Based on the FTCA's exceptions, there are instances where a lawsuit can be brought. While it will undoubtedly be difficult to establish certain negligence actions around semi-autonomous and non-lethal weapons, there is room for breaking down the exceptions and creating a standard for these lawsuits.

Additionally, the United States military has its own Military Claims Act (MCA)[256] that compensates individuals for damages caused by

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[250] "The United States shall be liable, respecting the provisions of this title relating to tort claims, in the same manner and to the same extent as a private individual under like circumstances, but shall not be liable for interest prior to judgment or for punitive damages." 28 U.S.C. § 2674 (2018); *Federal Tort Claims Act*, U.S. HOUSE REPRESENTATIVES, https://www.house.gov/doing-business-with-the-house/leases/federal-tort-claims-act [https://perma.cc/5ULV-BGTA] (last visited Oct. 29, 2018).

[251] 28 U.S.C. § 2674.

[252] 28 U.S.C. § 2680(h) (2018).

[253] Crootof, *supra* note 193, at 1391 ("In practice, states often refuse to take responsibility for actions akin to war torts.").

[254] Benjamin Kastan, *Autonomous Weapons Systems: A Coming Legal "Singularity"?*, 2013 U. ILL. J.L., TECH. & POL'Y 45, 72 (2013) (citing 28 U.S.C. § 2680(j)).

[255] *Id.*

[256] 10 U.S.C. § 2733 (2018).

government activity.[257] MCA claims are broken down into two categories: (1) injury or damages caused by military personnel or civilian employees acting within the scope of their employment; and (2) injury or damages caused by noncombatant.[258] The second prong is irrelevant here. The first prong, however, may be relevant if AI systems are deemed to be military personnel or, at least, an extension of military employees. One major distinction between the MCA and FTCA is that, while the MCA applies worldwide, if a claim is denied, there is no right to sue. If the agency denies a claim under the FTCA, one can still pursue a lawsuit.[259] MCA claims present similar challenges to those under the FTCA, such as the exemption of combat activities during times of war.[260] However, that may create a claim under both statutes (assuming weapons are being tested and the situation goes awry).

Although it currently appears as though states can avoid liability under the FTCA and MCA if combatant activity goes amiss, the use of AI, and especially of fully autonomous weapons, would require a review of the activities included in these exceptions.[261] This is especially the case because they do not have any meaningful human control, and many aspects of war need to be evaluated by humans before action is taken.[262]

Even if the aforementioned ban is implemented by the United Nations, the liability aspects will still be relevant for semi-autonomous and non-lethal weapons because these weapons will likely continue to be used.[263] A liability scheme will be marginally clearer than that of fully

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257 *Id.*

258 *Id.*

259 *Claims Against the Military*, MIL. L. CTR., https://militarylawcenter.com/practice-area/claims-government [https://perma.cc/HRU3-HEVU] (last visited Oct. 29, 2018).

260 *Id.* (noting that noncombatant activities include "damages arising out of military exercises, tank and artillery live fire exercises, and military aircraft bombing exercises").

261 Notably, according to customary international humanitarian law, parties in any sort of armed conflict, on both an international and domestic scale, must distinguish between civilians and combatants at all times. *See Customary IHL: Rule 1*, INT'L COMMITTEE RED CROSS, https://ihl-databases.icrc.org/customary-ihl/eng/docs/v1_cha_chapter1_rule1 [https://perma.cc/3BC4-JT4N] (last visited Oct. 29, 2018).

262 Browne, *supra* note 244 (explaining that it is crucial to keep a human operator in the decision-making process when autonomous weapons systems are incorporated into the inventory). General Paul Selva, America's second-highest ranking military officer, "pointed to the laws of war and the need to consider issues like proportional and discriminate action against an enemy, something he suggested could only be done by a human." *Id.*

263 *See supra* Section I.B.

autonomous weapons systems since semi-autonomous systems still adhere to the "man-in-the-loop" model.[264] This does, however, bring about a discussion of potential regulation governing programmers and the standard to which they must adhere when initially creating the software for these autonomous weapons.[265]

CONCLUSION

Autonomous weapons systems can be enormously advantageous to military efforts across many nations, but there is also potential for unnecessary devastation.[266] When there is both great potential for growth and destruction, an international standard for judgment surrounding potential horrors is necessary.[267] Although it is unclear whether autonomous weapons will be preemptively banned, it is vital to prepare if they are not. A limited strict liability tort regime is the most versatile and customizable standard for judging these actions in the current climate. This will allow lethal fully autonomous weapons systems to fall under a strict liability regime, while semi-autonomous and non-lethal autonomous weapons will fall under a negligence standard. Obstacles such as sovereign immunity are not to be ignored but, if addressed properly, the outcome will be a functioning and sensible governing standard for war torts—actions that are becoming only increasingly more real.

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[264] *See* SLIJPER, *supra* note 69, at 5.

[265] *See* James Foy, *Autonomous Weapons Systems: Taking the Human Out of International Humanitarian Law*, 23 DALHOUSIE J. LEGAL STUD. 47, 61 (2014); Tim McFarland & Tim McCormack, *Mind the Gap: Can Developers of Autonomous Weapons Systems Be Liable for War Crimes?*, 90 INT'L L. STUD. 361 (2014). This concept is not expanded upon in this Note, but is one that should be noted in conjunction with considerations for liability of autonomous weapons systems.

[266] As Professor Stuart Russell explained, "Its potential to benefit humanity is enormous, even in defense. But allowing machines to choose to kill humans will be devastating to our security and freedom." *See* Stop Autonomous Weapons, *supra* note 81, at 7:23.

[267] *Id.*; *see also* Piccone, *supra* note 74.