

Autonomous Weapon Systems: A Brief Survey Of Developmental, Operational, Legal, And Ethical Issues

"[The] robotics revolution, represented by new systems ranging from the automated Roomba vacuum cleaner to guided missiles and automated interceptors, has understandably led to a heated debate over the rules of the road in this new era. This discussion is particularly contentious in the area of weapon systems (whether real or imagined) guided in large part by artificial intelligence. Do these systems just represent the latest iteration in the evolution of weapons dating to the dawn of human existence, or do they represent something fundamentally different than all the systems to come before them? Are the traditional laws of armed conflict, as detailed in The Hague and Geneva Conventions, sufficient to protect human rights in the robotic age? What, if anything, do these century-old principles have to say about autonomous weapon systems? These questions and others have led divergent groups of scholars, institutions, and government officials to stake out seemingly irreconcilable positions on the principles of warfare in the robotics age. These views range from calls for an outright, and preemptive, ban on all lethal autonomous weapon systems to the view that the current principles of lawful warfare are enduring and that continued application of these rules to new systems on a case-by-case basis is the best way to protect civilians and minimize unnecessary suffering. This paper will assess these disparate views and ultimately stake out a third position: while autonomous weapon systems do not, by their nature, violate the current laws of war, they do represent a fundamental departure from all the weapons to come before them. As such, this paper recommends the adoption of an additional standard: a requirement of 'meaningful human control' over all weapons systems developed or deployed by a nation-state"--Page 1.

A technology expert describes the ever-increasing role of artificial intelligence in weapons development, the ethical dilemmas these weapons pose, and the potential threat to humanity. Artificial intelligence is playing an ever-increasing role in military weapon systems. Going beyond the bomb-carrying drones used in the Afghan war, the Pentagon is now in a race with China and Russia to develop "lethal autonomous weapon systems" (LAWS). In this eye-opening overview, a physicist, technology expert, and former Honeywell executive examines the advantages and the potential threats to humanity resulting from the deployment of completely autonomous weapon systems. Stressing the likelihood that these weapons will be available in the coming decades, the author raises key questions about how the world will be impacted. Though using robotic systems might lessen military casualties in a conflict, one major concern is: Should we allow machines to make life-and-death decisions in battle? Other areas of concern include the following: Who would be accountable for the actions of completely autonomous weapons--the programmer, the machine itself, or the country that deploys LAWS? When warfare becomes just a matter of technology, will war become more probable, edging humanity closer to annihilation? What if AI technology reaches a "singularity level" so that our weapons are controlled by an intelligence exceeding human intelligence? Using vivid scenarios that immerse the reader in the ethical dilemmas and existential threats posed by lethal autonomous weapon systems, the book reveals that the dystopian visions of such movies as The Terminator and I, Robot may become a frightening reality in the near future. The author concludes with concrete recommendations, founded in historical precedent, to control this new arms race.

Research Paper (postgraduate) from the year 2021 in the subject Politics - International Politics - Topic: Peace and Conflict Studies, Security, grade: 7 (dutch System), Maastricht University (Faculty of Social Science), course: Science and Technology Studies (STS), language: English, abstract: The technology of LAWS is discussed controversially: At the political level of states, in international institutions, the scientific field of AI and robotics, the companies working in these fields, the public and the media landscape. This paper aims to shed light on the question: How is the globally discussed technology of LAWS and its ban perceived by different social groups? Currently, those who are against a ban dominate globally. These are powerful countries that are also leaders in the development of LAWS and refer to the justifications of experts and commercial players. In the following (Section 2), the controversy of banning LAWS is embedded in the scientific discourse on risk and uncertainty and a selection of the concepts is applied to the technology to not only emphasize the socio-political relevance mentioned in the introduction, but also the academic relevance. Next, the methodological concept of SCOT is introduced theoretically (Section 3) and then applied to the LAWS object of study (Section 4). Finally, the conclusion (Section 5) summarizes the main findings, highlights the limitations of the work, and suggests a way forward.

Challenging the focus on great powers in the international debate, this book explores how rising middle power states are engaging with emerging major military innovations and analyses how this will affect the stability and security of the Indo Pacific. Presenting a data-based analysis of how middle power actors in the Indo-Pacific are responding to the emergence of military Artificial Intelligence and Killer Robots, the book asserts that continuing to exclude non-great power actors from our thinking in this field enables the dangerous diffusion of Lethal Autonomous Weapon Systems (LAWS) to smaller states and terrorist groups, and demonstrates the disruptive effects of these military innovations on the balance of power in the Indo-Pacific. Offering a detailed analysis of the resource capacities of China, United States, Singapore and Indonesia, it shows how major military innovation acts as a circuit breaker between competitor states disrupting the conventional superiority of the dominant hegemonic state and giving a successful adopter a distinct advantage over their opponent. This book will appeal to researchers, end-users in the military and law enforcement communities, and policymakers. It will also be a valuable resource for researchers interested in strategic stability for the broader Asia-Pacific and the role of middle power states in hegemonic power transition and conflict.

Lethal Autonomous Weapon Systems in Future Conflicts

Killing Civilians

Dehumanization of Warfare

The Case Against Killer Robots

Happiness is the Wrong Metric

The Legality and Accountability of Autonomous Weapon Systems

Humanity's quest to find innovative ways to deal with difficult, monotonous and dangerous activities has been an ever evolving and unending endeavor. The current proliferation of robotic technology is just the next step in this evolutionary sequence. Both civilian and military agencies alike are vying for this new round of technology. Most civilian applications of robots are innocuous and generally perform menial tasks. The same cannot be said for the military. Currently there are numerous systems in each branch of the military that have some autonomous lethal engagement ability. As military professionals, we have a duty to

ensure the legal framework, proper policy, moral and ethical considerations, as well as proper tactics and doctrine are in place to ensure compliance with the Rule of Engagement (ROE) and the Laws of Armed Conflict (LOAC) before embarking down a path to fully automated autonomous lethal force. This paper will investigate some of the more pressing issues and present recommendations for potential paths forward. To facilitate the discussion, the paper is divided into three major areas: the legal implications, ethical implications and professional implications of use of robots in warfare. This compilation includes a reproduction of the 2019 Worldwide Threat Assessment of the U.S. Intelligence Community. The giant leaps in technology during the past decade have also led to some very sophisticated robot technology. In fact, the 2013 Defense Advanced Research Projects Agency (DARPA) Robotics Challenge showcased some of the most advanced robots seen to date. The winning robot, SCHAFT, developed by Japanese company SHAFT Inc., attained an impressive 27 of 32 possible points during the challenge. The challenge consisted of eight distinct tasks: driving a vehicle, maneuvering the robot over rough terrain, going up an industrial ladder, removing debris from a pathway, opening different types of doors, cutting through a wall in a certain pattern, closing different types of valves, and finally, unwinding and connecting a hose to a spigot. While the DARPA robots are intended for peaceful and innocuous purposes, there are other robots being developed for uses that are more threatening. There are many governments and associated defense contractors working on various robots for use in combat situations. Some of these machines have the ability to autonomously target and engage adversaries. Recently, Rear Admiral Matthew L. Klunder, Chief of United States Naval Research, debuted a new swarming boat technology where as many as 20-30 autonomous boats can be designated to surround a single target. The boats can carry a number of different payload options including spotlights, high powers speakers, or even offensive weapons. Of course, the U.S. Navy is not the only service researching autonomous weapon systems. The U.S. Air Force and Army also have active programs. The Air Force developed the MQ-9 Reaper and deployed it successfully to both Iraq and Afghanistan.

The fields of automation and artificial intelligence are broad, having applications in diplomatic, informational, military, and economic activities. Within this realm, lethal autonomous weapon systems (LAWS) are a new enabler for achieving political ends through the application of the military instrument of power. As the world is past the point of considering whether robots should be used in war, the goal of the discussion herein is to examine how autonomous systems can be used ethically. This article seeks explicitly to demonstrate that fielding and employment of lethal autonomous weapons systems can be done effectively and ethically by maximizing the advantages and minimizing the shortfalls of both technology and the human mind.

"Technological advance continually offers new weapons and resources for combat operations. Subsequently, each technological advance necessitates of review of the current just war theory to ensure the current framework can handle the new technology and that combat is conducted in a manner that complies with the framework. One foreseeable advance in technology that will impact the current just war theory framework is the introduction of autonomous unmanned combat systems. Current human-controlled unmanned system success on the battlefield coupled with rapidly advancing processor technology will fuel the move to increasingly sophisticated autonomous combat vehicles. Additionally, the US Department of Defense has already pledged a several billion dollar investment to advance the research and development necessary to field these systems. This work will examine the rate of change of military technology throughout the centuries to highlight today's rapid development. It will then evaluate the current just war theory framework to see if autonomous weapons systems can comply with the existing framework and suggest areas for further study. The paper will then evaluate the current employment of unmanned systems and the feasibility of truly autonomous weapon systems in combat. The lessons of the past have demonstrated that all too often new technology is employed on the battlefield before it has been fully evaluated. This evaluation should include an examination of weapon system capability, the integration of new technology into existing military infrastructure and also consider how the new technology will impact current just war theory. Frequently, new technologies are pushed to the battlefield with only a consideration of actual capability with no consideration of moral or ethical impacts. This work seeks to avoid pitfalls of the past by beginning the look to the future of autonomous combat vehicles."--Abstract.

Expounding on the results of the author's work with the US Army Research Office, DARPA, the Office of Naval Research, and various defense industry contractors, *Governing Lethal Behavior in Autonomous Robots* explores how to produce an "artificial conscience" in a new class of robots, humane-oids, which are robots that can potentially perform more ethically than humans in the battlefield. The author examines the philosophical basis, motivation, theory, and design recommendations for the implementation of an ethical control and reasoning system in autonomous robot systems, taking into account the Laws of War and Rules of Engagement. The book presents robot architectural design recommendations for Post facto suppression of unethical behavior, Behavioral design that incorporates ethical constraints from the onset, The use of affective functions as an adaptive component in the event of unethical action, and A mechanism that identifies and advises operators regarding their ultimate responsibility for the deployment of autonomous systems. It also examines why soldiers fail in battle regarding ethical decisions; discusses the opinions of the public, researchers, policymakers, and military personnel on the use of lethality by autonomous systems; provides examples that illustrate autonomous systems' ethical use of force; and includes relevant Laws of War. Helping ensure that warfare is conducted justly with the advent of autonomous robots, this book shows that the first steps toward creating robots that not only conform to international law but outperform human soldiers in their ethical capacity are within reach in the future. It supplies the motivation, philosophy, formalisms, representational requirements, architectural design criteria, recommendations, and test scenarios to design and construct an autonomous robotic system capable of ethically using lethal force. Ron Arkin was quoted in a November 2010 New York Times article about robots in the military.

Army of None

Modelling and Simulation for Autonomous Systems

The Rise of Robots: The Military's Use of Autonomous Lethal Force - Legal, Ethical, and Professional Implications, Tactical and Strategic

Advances in Human Factors in Robots, Unmanned Systems and Cybersecurity

Artificial Intelligence, Autonomous Weaponry, and the Future of Warfare

Proceedings of the AHFE 2021 Virtual Conferences on Human Factors in Robots, Drones and Unmanned Systems, and Human Factors in Cybersecurity, July 25-29, 2021, USA

The authors of this report examine military applications of artificial intelligence (AI); compare development efforts in the United States, China, and Russia; and consider the ethical implications of employing military AI in war and peace.

The use of autonomous weapon systems (AWS) in warfare is not a new concept. This book explores a diverse set of complex issues related to the developmental, operational, legal, and ethical aspects of AWS. It will briefly explore the recent history of the development and integration of autonomous and semi-autonomous systems into traditional military operations. It will examine anticipated expansion of these roles in the near future as well as outline international efforts to provide a context for U.S. use of the systems.

"This 50-page report outlines concerns about these fully autonomous weapons, which would inherently lack human qualities that provide legal and non-legal checks on the killing of civilians. In addition, the obstacles to holding anyone accountable for harm caused by the weapons would weaken the law's power to deter future violations"--Publisher's website.

This book focuses on the importance of human factors in the development of safe and reliable robotic and unmanned systems. It discusses solutions for improving the perceptual and cognitive abilities of robots, developing suitable synthetic vision systems, coping with degraded reliability in unmanned systems, and predicting robotic behavior in relation to human activities. It covers the design of improved, easy to use, human-system interfaces, together with strategies for increasing human-system performance, and reducing cognitive workload at the user interface. It also discusses real-world applications and case studies of human-robot and human-agent collaboration in different business and educational endeavors. The second part of the book reports on research and developments in the field of human factors in cybersecurity. Contributions cover the technological, social, economic and behavioral aspects of the cyberspace, providing a comprehensive perspective to manage cybersecurity risks. Based on the two AHFE 2021 Conferences such as the AHFE 2021 Conference on Human Factors in Robots, Drones and Unmanned Systems, and the AHFE 2021 Conference on Human Factors in Cybersecurity, held virtually on 25–29 July, 2021, from USA, this book offers extensive information and highlights the importance of multidisciplinary approaches merging engineering, computer science, business and psychological knowledge. It is expected to foster discussion and collaborations between researchers and practitioners with different background, thus stimulating new solutions for the development of reliable and safe, human-centered, highly functional devices to perform automated and concurrent tasks, and to achieve an inclusive, holistic approach for enhancing cybersecurity.

Fighting Machines

Perspectives on Lethal Autonomous Weapon Systems, November 2017

An Exploration of Issues and Recommendations

Legal Implications of New Weapon Technologies

Re-examining the Law and Ethics of Robotic Warfare

For policymakers, this book explains the ramifications under international humanitarian law of a major new field of weapon development with a focus on questions currently being debated by governments, the United Nations and other bodies. Based on a clear explanation of the principles of autonomous systems and a survey of technologies under active development as well as some that are in use today, it provides a thorough legal analysis grounded on a clear understanding of the technological realities of autonomous weapon systems. For legal practitioners and scholars, it describes the legal constraints that will apply to use of autonomous systems in armed conflict and the measures that will be needed to ensure that the efficacy of the law is maintained. More generally, it serves as a case study in identifying the legal consequences of use of autonomous systems in partnership with, or in place of, human beings.

Nearly 45 countries are at different stages of developing robotic weapons or lethal autonomous weapon systems (LAWS). The United States, for example, has recently test launched its robotic vessel Sea Hunter, a self-driving, 132-foot ship designed to travel thousands of miles without a single crew member on board. As reported, the vessel has the capability to detect and destroy stealth diesel-electric submarines and sea mines. However, though the militaries of the developed countries are in a race to develop LAWS to perform varied functions on the battlefield, a large section of robotic engineers, ethical analysts, and legal experts are of the firm belief that robotic weapons will

never meet the standards of distinction and proportionality required by the laws of war, and therefore will be illegal. This book provides an insight into lethal autonomous weapon systems and debates whether it would be morally correct to give machines the power to decide who lives and who dies on the battlefield.

This book constitutes the thoroughly refereed post-workshop proceedings of the 6th International Workshop on Modelling and Simulation for Autonomous Systems, MESAS 2019, held in Palermo, Italy, in October 2019. The 22 full papers and 13 short papers included in the volume were carefully reviewed and selected from 53 submissions. They are organized in the following topical sections: M&S of intelligent systems - AI, R&D and application; future challenges of advanced M&S technology; AxS in context of future warfare and security environment (concepts, applications, training, interoperability, etc.).

Lethal autonomous weapons are weapon systems that can select and destroy targets without intervention by a human operator. *Fighting Machines* explores the relationship between lethal autonomous weapons (LAWS), the concept of human dignity, and international law. Much of this analysis speaks to three fundamental and related problems: When a LAWS takes a human life, is that killing a violation of human dignity? Can states and non-state actors use LAWS in accordance with international law? And are there certain responsibilities of human decision-making during wartime that we should not delegate to machines? In the book, Dan Saxon argues that the use of LAWS to take human life constitutes a violation of human dignity. Rather than concentrating on the victims of the use of lethal force, Saxon instead focuses on the technology and relevant legal principles and rules to advance several propositions. First, as LAWS operate at increasingly greater speeds, their use will undermine the opportunities for, and the value of, human reasoning and judgment. Second, by transferring responsibility for reasoning and judgment about the use of lethal force to computer software, the use of LAWS violates the dignity of the soldiers, commanders, and law enforcement officers who historically have made such decisions, and, therefore, breaches international law. Third, weapon designs that facilitate teamwork between humans and autonomous systems are necessary to ensure that humans and LAWS can operate interdependently so that individuals can fulfil their obligations under international law—including the preservation of their own dignity—and ensure that human reasoning and judgment are available for cognitive functions better suited to humans than machines. *Fighting Machines* speaks to the fields of international humanitarianism, human rights, criminal law, and legal philosophy. It will also be of interest to non-lawyers, especially military officers, government policy makers, political scientists, and international relations scholars, as well as roboticists and ethicists.

Military Applications of Artificial Intelligence: Ethical Concerns in an Uncertain World

Autonomous Weapons and the Future of War

Autonomous Weapon Systems

A Brief Survey of Developmental, Operational, Legal, and Ethical Issues

KI 2019: Advances in Artificial Intelligence

Governing Lethal Behavior in Autonomous Robots

This book constitutes the refereed proceedings of the 42nd German Conference on Artificial Intelligence, KI 2019, held in Kassel, Germany, in September 2019. The 16 full and 10 short papers presented together with 3 extended abstracts in this volume were carefully reviewed and selected from 82 submissions. KI 2019 has a special focus theme on "AI methods for Argumentation" and especially invited contributions that use methods from all areas of AI to understand, formalize or generate argument structures in natural language.

This examination of the implications and regulation of autonomous weapons systems combines contributions from law, robotics and philosophy.

The question of whether new rules or regulations are required to govern, restrict, or even prohibit the use of autonomous weapon systems has been the subject of debate for the better part of a decade. Despite the claims of advocacy groups, the way ahead remains unclear since the international community has yet to agree on a specific definition of Lethal Autonomous Weapon Systems and the great powers have largely refused to support an effective ban. In this vacuum, the public has been presented with a heavily one-sided view of Killer Robots. This volume presents a more nuanced approach to autonomous weapon systems that recognizes the need to progress beyond a discourse framed by the Terminator and HAL 9000. Re-shaping the discussion around this emerging military innovation requires a new line of thought and a willingness to challenge the orthodoxy. *Lethal Autonomous Weapons* focuses on exploring the moral and legal issues associated with the design, development and deployment of lethal autonomous weapons. In this volume, we bring together some of the most prominent academics and academic-practitioners in the lethal autonomous weapons space and seek to return some balance to the debate. As part of this effort, we recognize that society needs to invest in hard conversations that tackle the ethics, morality, and law of these new digital technologies and understand the human role in their creation and operation.

What does the Department of Defense hope to gain from the use of autonomous weapon systems (AWS)? This Letort Paper explores a diverse set of complex issues related to the developmental, operational, legal, and ethical aspects of AWS. It explores the recent history of the development and integration of autonomous and semi-autonomous systems into traditional military operations. It examines anticipated expansion of these roles in the near future as well as outlines international efforts to provide a context for the use of the systems by the United States. As these topics are well-documented in many sources, this Paper serves as a primer for current and future AWS operations to provide senior policymakers, decisionmakers, military leaders, and their respective staffs an overall appreciation of existing capabilities and the challenges, opportunities, and risks associated with the use of AWS across the range of military operations. Emphasis is added to missions and systems that include the use of deadly force. AUDIENCE: This paper serves as a primer for current and future autonomous weapon system (AWS) operations to provide senior policymakers, decision-makers, military leaders and their respective staffs an overall appreciation for existing capabilities and the challenges, opportunities, and risks associated with AWS across the range of military operations. Emphasis is added to missions that include the use of deadly force. Additionally defense contractors and technology manufacturers may be interested in this work. Related products: Arms Control History collection is available here: <https://bookstore.gpo.gov/catalog/us-military->

history/arms-control-history Arms & Weapons resources collection can be found here: <https://bookstore.gpo.gov/catalog/security-defense-law-enforcement/arms-weapons>

Governing Autonomous Weapon Systems

Giving Meaning to the "meaningful Human Control" Standard for Lethal Autonomous Weapon Systems

Legality and Ethicality of Autonomous Weapons

Compatibility with International Humanitarian Law

Lethal Autonomous Weapon Systems Legal, Ethical and Moral Challenges

U. S. Ground Forces Robotics and Autonomous Systems (Ras) and Artificial Intelligence (Ai)

The DSB Task Force on the Role of Autonomy in DoD Systems was asked to study relevant technologies, ongoing research, and the current autonomy-relevant plans of the Military Services, to assist the DoD in identifying new opportunities to more aggressively use autonomy in military missions, to anticipate vulnerabilities, and to make recommendations for overcoming operational difficulties and systemic barriers to realizing the full potential of autonomous systems. The Task Force has concluded that, while currently fielded unmanned systems are making positive contributions across DoD operations, autonomy technology is being underutilized as a result of material obstacles within the Department that are inhibiting the broad acceptance of autonomy and its ability to more fully realize the benefits of unmanned systems. Overall, the Task Force found that unmanned systems are making a significant, positive impact on DoD objectives worldwide. However, the true value of these systems is not to provide a direct human replacement, but rather to extend and complement human capability by providing potentially unlimited persistent capabilities, reducing human exposure to life threatening tasks, and with proper design, reducing the high cognitive load currently placed on operators/supervisors. Unmanned systems are proving to have a significant impact on warfare worldwide. The true value of these systems is not to provide a direct human replacement, but rather to extend and complement human capability in a number of ways. These systems extend human reach by providing potentially unlimited persistent capabilities without degradation due to fatigue or lack of attention. Unmanned systems offer the warfighter more options and flexibility to access hazardous environments, work at small scales, or react at speeds and scales beyond human capability. With proper design of bounded autonomous capabilities, unmanned systems can also reduce the high cognitive load currently placed on operators/supervisors. Moreover, increased autonomy can enable humans to delegate those tasks that are more effectively done by computer, including synchronizing activities between multiple unmanned systems, software agents and warfighters--thus freeing humans to focus on more complex decision making.

1.0 Executive Summary * 1.1. Misperceptions about Autonomy are Limiting its Adoption * 1.2. Create an Autonomous Systems Reference Framework to Replace "Levels of Autonomy" * 1.3. Technical Challenges Remain, Some Proven Autonomy Capability Underutilized * 1.4. Autonomous Systems Pose Unique Acquisition Challenges * 1.5. Avoid Capability Surprise by Anticipating Adversary Use of Autonomous Systems * 2.0 Operational Benefits of Autonomy * 2.1. Unmanned Aerial Vehicles * 2.2. Unmanned Ground Systems * 2.3. Unmanned Maritime Vehicles * 2.4. Unmanned Space Systems * 2.5. Conclusion * 3.0 Technical Issues of Autonomy * 3.1. Motivation: What Makes Autonomy Hard * 3.2. Defining Levels of Autonomy is Not Useful * 3.3. Autonomous System Reference Framework * 3.4. Needed Technology Development * 3.5. Technical Recommendations * 4.0 Acquisition Issues of Autonomy * 4.1. Requirements and Development * 4.2. Test and Evaluation * 4.3. Transition to Operational Deployment * 5.0 Capability Surprise in Autonomy Technology * 5.1. Overview of Global Unmanned Systems * 5.2. Unmanned Symmetric Adversary Scenarios * 5.3. Value for Asymmetric Adversaries * 5.4. External Vulnerabilities * 5.5. Self-Imposed Vulnerabilities * 5.6. Recommendations . * Appendix A--Details of Operational Benefits by Domain * A.1. Aerial Systems Strategy * A.2. Maritime Systems * A.3. Ground Systems * A.4. Space Systems * Appendix B--Bibliography * Appendix C--Task Force Terms of Reference * Appendix D--Task Force Membership * Appendix E--Task Force Briefings * Appendix F--Glossary

This book addresses the technological evolution of modern warfare due to unmanned systems and the growing capacity for cyberwarfare. The increasing involvement of unmanned means and methods of warfare can lead to a total removal of humans from the navigation, command and decision-making processes in the control of unmanned systems, and as such away from participation in hostilities – the “ dehumanization of warfare. ” This raises the question of whether and how today ’ s law is suitable for governing the dehumanization of warfare effectively. Which rules are relevant? Do interpretations of relevant rules need to be reviewed or is further and adapted regulation necessary? Moreover, ethical reasoning and computer science developments also have to be taken into account in identifying problems. Adopting an interdisciplinary approach the book focuses primarily on international humanitarian law, with related ethics and computer science aspects included in the discussion and the analysis.

This is a book about how civilians suffer in war and why people decide that they should. Most civilian suffering in war is deliberate and always has been. Massacres, rape, displacement, famine and disease are usually designed. They are policies in war. In meetings or on mobile phones, political and military leaders decide that civilians are appropriate or inevitable targets. The principle that unarmed and innocent people should be protected in war is an ancient, precious but fragile idea. Today, the principle of civilian immunity is enshrined in modern international law and cherished by many. But, in practice, leaders in most wars reject the principle. Using detailed historical and contemporary examples, Killing Civilians looks at the many ways in which civilians suffer in wars and analyses the main anti-civilian ideologies which insist upon such suffering. It also exposes the very real ambiguity in much civilian identity which is used to justify extreme hostility. But this is also, above all, a book about why civilians should be protected. Throughout its pages, Killing Civilians argues for a morality of limited warfare in which tolerance, mercy and restraint are used to draw boundaries to violence. At the heart of the book are important new frameworks for understanding patterns of civilian suffering, ideologies of violence and strategies for promoting the protection of civilians. This is the first major treatment of the hard questions of civilian identity and protection in war for many years. Written by one of the humanitarian world's leading thinkers and former aid worker, it provides a unique and accessible text on the subject for professional and public readerships alike.

The conversation on Lethal Autonomous Weapon Systems (LAWS) centers on the ethics of allowing a computer to decide to kill (or not to kill) a human-being. Much of the current discourse on the topic of autonomous weapons comes from a concern over the ethical implications. Over the coming fifteen years, the technology industry will achieve many milestones that will significantly alter the argument about the use of LAWS. There are currently efforts to institute laws and regulations that will inhibit or remove the use of LAWS. This research will clarify what will be technically possible in the future and take a holistic look at the topic. This study will explore the current technological abilities of Artificial Intelligence (AI) and its impacts on civil society. It will further look at AI and its impact on lethal weapons. Additionally, the study will explore the acceptance of AI in civil society verse the acceptance of AI in conflict. Such exploration is important as the newer technology may change the conversation about the ethics of employing robotics. This conversational change may encourage or even compel policymakers to use LAWS in future conflicts.

Losing Humanity

Re-Examining the Law and Ethics of Robotic Warfare

An Introduction to Ethics in Robotics and AI

Exploring the Disruptive Impact of Lethal Autonomous Weapon System Diffusion in Southeast Asia

Drones and Other Unmanned Weapons Systems under International Law

Autonomous Weapon Systems and the Law of Armed Conflict

The variety, pace, and power of technological innovations that have emerged in the 21st Century have been breathtaking. These technological developments, which include advances in networked information and communications, biotechnology, neurotechnology, nanotechnology, robotics, and environmental engineering technology, have raised a number of vital and complex questions. Although these technologies have the potential to generate positive transformation and help address 'grand societal challenges', the novelty associated with technological innovation has also been accompanied by anxieties about their risks and destabilizing effects. Is there a potential harm to human health or the environment? What are the ethical implications? Do these innovations erode or antagonize values such as human dignity, privacy, democracy, or other norms underpinning existing bodies of law and regulation? These technological developments have therefore spawned a nascent but growing body of 'law and technology' scholarship, broadly concerned with exploring the legal, social and ethical dimensions of technological innovation. This handbook collates the many and varied strands of this scholarship, focusing broadly across a range of new and emerging technology and a vast array of social and policy sectors, through which leading scholars in the field interrogate the interfaces between law, emerging technology, and regulation. Structured in five parts, the handbook (I) establishes the collection of essays within existing scholarship concerned with law and technology as well as regulatory governance; (II) explores the relationship between technology development by focusing on core concepts and values which technological developments implicate; (III) studies the challenges for law in responding to the emergence of new technologies, examining how legal norms, doctrine and institutions have been shaped, challenged and destabilized by technology, and even how technologies have been shaped by legal regimes; (IV) provides a critical exploration of the implications of technological innovation, examining the ways in which technological innovation has generated challenges for regulators in the governance of technological development, and the implications of employing new technologies as an instrument of regulatory governance; (V) explores various interfaces between law, regulatory governance, and new technologies across a range of key social domains.

"Because of the increasing use of Unmanned Aerial Vehicles (UAVs, also commonly known as drones) in various military and para-military (i.e., CIA) settings, there has been increasing debate in the international community as to whether it is morally and ethically permissible to allow robots (flying or otherwise) the ability to decide when and where to take human life. In addition, there has been intense debate as to the legal aspects, particularly from a humanitarian law framework. In response to this growing international debate, the United States government released the Department of Defense (DoD) 3000.09 Directive (2011), which sets a policy for if and when autonomous weapons would be used in US military and para-military engagements. This US policy asserts that only "human-supervised autonomous weapon systems may be used to select and engage targets, with the exception of selecting humans as targets, for local defense ...". This statement implies that outside of defensive applications, autonomous weapons will not be allowed to independently select and then fire upon targets without explicit approval from a human supervising the autonomous weapon system. Such a control architecture is known as human supervisory control, where a human remotely supervises an automated system (Sheridan 1992). The defense caveat in this policy is needed because the United States currently uses highly automated systems for defensive purposes, e.g., Counter Rocket, Artillery, and Mortar (C-RAM) systems and Patriot anti-missile missiles. Due to the time-critical nature of such environments (e.g., soldiers sleeping in barracks within easy reach of insurgent shoulder-launched missiles), these automated defensive systems cannot rely upon a human supervisor for permission because of the short engagement times and the inherent human neuromuscular lag which means that even if a person is paying attention, there is approximately a half-second delay in hitting a firing button, which can mean the difference for life and death for the soldiers in the barracks. So as of now, no US UAV (or any robot) will be able to launch any kind of weapon in an offensive environment without human direction and approval. However, the 3000.09 Directive does contain a clause that allows for this possibility in the future. This caveat states that the development of a weapon system that independently decides to launch a weapon is possible but first must be approved by the Under Secretary of Defense for Policy (USD(P)); the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)); and the Chairman of the Joint Chiefs of Staff. Not all stakeholders are happy with this policy that leaves the door open for what used to be considered science fiction. Many opponents of such uses of technologies call for either an outright ban on autonomous weaponized systems, or in some cases, autonomous systems in general (Human Rights Watch 2013, Future of Life Institute 2015, Chairperson of the Informal Meeting of Experts 2016). Such groups take the position that weapons systems should always be under "meaningful human control," but do not give a precise definition of what this means.

One issue in this debate that often is overlooked is that autonomy is not a discrete state, rather it is a continuum, and various weapons with different levels of autonomy have been in the US inventory for some time. Because of these ambiguities, it is often hard to draw the line between automated and autonomous systems. Present-day UAVs use the very same guidance, navigation and control technology flown on commercial aircraft. Tomahawk missiles, which have been in the US inventory for more than 30 years, are highly automated weapons with accuracies of less than a meter. These offensive missiles can navigate by themselves with no GPS, thus exhibiting some autonomy by today's definitions. Global Hawk UAVs can find their way home and land on their own without any human intervention in the case of a communication failure. The growth of the civilian UAV market is also a critical consideration in the debate as to whether these technologies should be banned outright. There is a \$144.38B industry emerging for the commercial use of drones in agricultural settings, cargo delivery, first response, commercial photography, and the entertainment industry (Adroit Market Research 2019) More than \$100 billion has been spent on driverless car development (Eisenstein 2018) in the past 10 years and the autonomy used in driverless cars mirrors that inside autonomous weapons. So, it is an important distinction that UAVs are simply the platform for weapon delivery (autonomous or conventional), and that autonomous systems have many peaceful and commercial uses independent of military applications"--

Rapid technological advances in the field of robotics and autonomous systems (RAS) are transforming the international security environment and the conduct of contemporary conflict. Bringing together leading experts from across the globe, this book provides timely analysis on the current and future challenges associated with greater utilization of RAS by states, their militaries, and a host of non-state actors. Technologically driven change in the international security environment can come about through the development of one significant technology, such as the atomic bomb. At other times, it results from several technologies maturing at roughly the same pace. This second image better reflects the rapid technological change that is taking us into the robotics age. Many of the chapters in this edited volume explore unresolved ethical, legal, and operational challenges that are only likely to become more complex as RAS technology matures. Though the precise ways in which the impact of autonomous systems - both physical and non-physical - will be felt in the long-run is hidden from us, attempting to anticipate the direction of travel remains an important undertaking and one that this book makes a critical effort to contend with. The chapters in this book were originally published as a special issue of the journal Small Wars & Insurgencies.

A Pentagon defense expert and former U.S. Army Ranger explores what it would mean to give machines authority over the ultimate decision of life or death.

Autonomous Unmanned Systems and Impacts to Moral Decision-making in Future Warfare

42nd German Conference on AI, Kassel, Germany, September 23-26, 2019, Proceedings

Considerations for Congress

The Role of Autonomy in DOD Systems - Reports on Unmanned Aerial Vehicles (UAV), Robotics, Teleoperation, Haptics, Centibot, Remote Presence, UxV, DARPA Research, and Space and Ground Systems

A Liberal Communitarian Response to Populism

Lethal Autonomous Weapons

Autonomous Weapon Systems A Brief Survey of Developmental, Operational, Legal, and Ethical Issues Letort Papers

Current discussions around autonomous weapon systems (AWS) have generated concerns whether existing regulatory regimes are still fit for purpose in light of the challenges posed by new military technologies. Major military powers are actively exploring the utility and use of autonomous systems in war in order to gain a military competitive edge. Thus far, the notion of 'meaningful human control' (MHC) has been central to international discussions about AWS. These discussions have stalled, both because of different interpretations of MHC and due to the unwillingness of key participants to curtail their ability to potentially leverage AWS in the future. This paper therefore seeks to reframe the discussion. It first surveys alternative suggestions for AWS oversight and control, and then moves beyond current conceptual scoping to offer actionable insights and recommendations for policymakers working on AWS governance at the crossroads of security and technology in the ministries of Foreign Affairs, Defense, and Economic Affairs. The relevance for these three groups of policymakers is arms control and international cooperation on related technology; the development of these technologies within legal and ethical boundaries; and the development of relevant industry standards respectively.

A close examination of the interface between autonomous technologies and the law with legal analysis grounded in technological realities.

This open access book introduces the reader to the foundations of AI and ethics. It discusses issues of trust, responsibility, liability, privacy and risk. It focuses on the interaction between people and the AI systems and Robotics they use. Designed to be accessible for a broad audience, reading this book does not require prerequisite technical, legal or philosophical expertise. Throughout, the authors use examples to illustrate the issues at hand and conclude the book with a discussion on the application areas of AI and Robotics, in particular autonomous vehicles, automatic weapon systems and biased algorithms. A list of questions and further readings is also included for students willing to explore the topic further.

Autonomous Weapons and Human Dignity

Robotics, Autonomous Systems and Contemporary International Security

Taming Killer Robots

A Humanitarian Law Perspective

6th International Conference, MESAS 2019, Palermo, Italy, October 29–31, 2019, Revised Selected Papers

Law, Ethics, Policy

Military robots and other, potentially autonomous robotic systems such as unmanned combat air vehicles (UCAVs) and unmanned ground vehicles (UGVs) could soon be introduced to the battlefield. Look further into the future and we may see autonomous micro- and nanorobots armed and deployed in swarms of thousands or even millions. This growing automation of warfare may come to represent a major discontinuity in the history of warfare: humans will first be removed from the battlefield and may one day even be largely excluded from the decision cycle in future high-tech and high-speed robotic warfare. Although the current technological issues will no doubt be overcome, the greatest obstacles to automated weapons on the battlefield are likely to be legal and ethical concerns. Armin Krishnan explores the technological, legal and ethical issues connected to combat robotics, examining both the opportunities and limitations of autonomous weapons. He also proposes solutions to the future regulation of military robotics through international law.

This publication considers lethal autonomous weapon systems, approaching the issue from five different perspectives. It has been published ahead of the first meeting of the Group of Governmental Experts of the High Contracting Parties to the Convention on Certain Conventional Weapons mandated to examine issues related to emerging technologies in the area of lethal autonomous weapon systems in the context of the objectives and purposes of the Convention. The United Nations Office for Disarmament Affairs Occasional Papers are a series of ad hoc publications featuring, in edited form, papers or statements made at meetings, symposiums, seminars, workshops or lectures that deal with topical issues in the field of arms limitation, disarmament and international security.

This book is open access under a CC BY 4.0 license. This timely book addresses the conflict between globalism and nationalism. It provides a liberal communitarian response to the rise of populism occurring in many democracies. The book highlights the role of communities next to that of the state and the market. It spells out the policy implications of liberal communitarianism for privacy, freedom of the press, and much else. In a persuasive argument that speaks to politics today from Europe to the United States to Australia, the author offers a compelling vision of hope. Above all, the book offers a framework for dealing with moral challenges people face as they seek happiness but also to live up to their responsibilities to others and the common good. At a time when even our most basic values are up for question in policy debates riddled with populist manipulation, Amitai Etzioni's bold book creates a new frame which introduces morals and values back into applied policy questions. These questions span the challenges of jobless growth to the unanswered questions posed by the role of artificial intelligence in a wide range of daily life tasks and decisions. While not all readers will agree with the communitarian solutions that he proposes, many will welcome an approach that is, at its core, inclusive and accepting of the increasingly global nature of all societies at the same time. It is a must read for all readers concerned about the future of Western liberal democracy. Carol Graham, Leo Pasvolksy Senior Fellow, The Brookings Institution and College Park Professor/University of Maryland In characteristically lively, engaging, and provocative style Etzioni tackles many of the great public policy dilemmas that afflict us today. Arguing that we are trapped into a spiral of slavish consumerism, he proposes a form of liberal communitarian that, he suggests, will allow human beings to flourish in changing circumstances.

Jonathan Wolff, Blavatnik Chair of Public Policy, Blavatnik School of Government, University of Oxford

The capacity to generate and project power is central to state relations in what is an inherently anarchic environment. The emergence of a major military innovation acts as a sort of circuit breaker between competitor states. By shifting the paradigm of conflict, a major military innovation can disrupt the conventional superiority of the dominant hegemonic state, giving a rising challenger who becomes a successful adopter a distinct advantage over their opponent. This is already apparent with LAWS, with China openly pursuing increasingly autonomous systems as part of a plan to leap-frog the United States, which in turn adopted the Third Offset Strategy and is investing heavily in related technologies. The political, ethical and legal challenges raised by development toward LAWS has prompted a growing body of research. While valuable, there has been a clear focus major states, particularly the United States and China, leaving a gap in understanding of the role of middle powers. Therefore, this thesis focuses on exploring how the diffusion of increasingly autonomous platforms will impact the nature of power projection in the context of Southeast Asian rising middle powers. The key goal of this thesis is to make a substantive contribution to the emerging understanding of how middle states can interact with early generation autonomous weapon systems and the impact of their initial proliferation. This thesis utilises a composite theoretical framework, which builds on Adoption Capacity Theory as the basis for its evaluation of the adoption capacity of Singapore and Indonesia. This thesis will demonstrate how the levelling effect of increasingly autonomous weapon systems will impact relations of power. This thesis concludes by demonstrating how the adoption of autonomous unmanned platforms could assist Singapore and Indonesia to maintain their careful balancing in the event of worsening hegemonic competition between China and the United States.

Ethical Imperatives for Lethal Autonomous Weapons

Method, Madness and Morality in War

Killer Robots

Modern Melians and the Dawn of Robotic Warriors

UNODA Occasional Papers No.30

Expanding the Solution Space, from Scoping to Applying

The nexus of robotics and autonomous systems (RAS) and artificial intelligence (AI) has the potential to change the nature of warfare. RAS offers the possibility of a wide range of platforms-not just weapon systems-that can perform "dull, dangerous, and dirty" tasks- potentially reducing the risks to soldiers and Marines and possibly resulting in a generation of less expensive ground systems. Other nations, notably peer competitors Russia and China, are aggressively pursuing RAS and AI for a variety of military uses, raising considerations about the U.S. military's response- to include lethal autonomous weapons systems (LAWS)-that could be used against U.S. forces. The adoption of RAS and AI by U.S. ground forces carries with it a number of possible implications, including potentially improved performance and reduced risk to soldiers and Marines; potential new force designs; better institutional support to combat forces; potential new operational concepts; and possible new models for recruiting and retaining soldiers and Marines. The Army and Marines have developed and are executing RAS and AI strategies that articulate near-, mid-, and long-term priorities. Both services have a number of RAS and AI efforts underway and are cooperating in a number of areas. A fully manned, capable, and well-trained workforce is a key component of military readiness. The integration of RAS and AI into military units raises a number of personnel-related issues that may be of interest to Congress, including unit manning changes, recruiting and retention of those with advanced technical skills, training, and career paths. RAS and AI are anticipated to be incorporated into a variety of military applications, ranging

from logistics and maintenance, personnel management, intelligence, and planning to name but a few. In this regard, most consider it unlikely that appreciable legal and ethical objections to their use by the military will be raised. The most provocative question concerning the military application of RAS and AI being actively debated by academics, legal scholars, policymakers, and military officials is that of "killer robots" (i.e., should autonomous robotic weapon systems be permitted to take human life?). Potential issues for Congress include the following: Would an assessment of foreign military RAS and AI efforts and the potential impact on U.S. ground forces benefit policymakers? Should the United States develop fully autonomous weapon systems for ground forces? How will U.S. ground forces counter foreign RAS and AI capabilities? How should the Department of Defense (DOD) and the Services engage with the private sector? What are some of the personnel-related concerns associated with RAS and AI? What role should Congress play in the legal and ethical debate on LAWS? What role should the United States play in potential efforts to regulate LAWS?

Drone strikes have become a key feature of counterterrorism operations in an increasing number of countries. This work explores the various domestic and international legal regimes that govern the manufacture, transfer, and use of armed drones as well as fully autonomous weapons systems where computer algorithms decide who or what to target and when to fire.

Genius Weapons

Analysis of the Controversy of a ban on Lethal Autonomous Weapons Systems (LAWS) based on the SCOT concept

The Disruptive Impact of Lethal Autonomous Weapons Systems Diffusion

The Oxford Handbook of Law, Regulation and Technology

Autonomous Weapons Systems