

Artificial Intelligence Revolution: Contemporary Trends and Implications for the Future of Warfare

Dr. Adil Sultan¹ and Shayan Hasan Jamy²

Abstract

The Artificial Intelligence (AI) revolution has already begun, with major states integrating AI for a wide range of military applications, including decision making, Lethal Autonomous Weapon Systems (LAWS), and other defence-related systems. Major states like the US, China, and others plan to integrate AI for military applications entirely within the next decade. The US Third Offset Strategy (TOS) of 2014 and the 2021 US National Security Commission on Artificial Intelligence (NSCAI) report have linked AI with the future of the US global leadership. Similarly, China's 2017 Next Generation AI Development Plan envisions itself as the global AI leader by 2030 and labels AI as an essential strategic technology. This paper compares the AI-related progress of the US and China and examines the significance of AI for states like Russia, India, and some others. It predicts that the military adoption of AI would have several wide-ranging implications on the future of warfare and the global strategic environment.

¹ Dr. Adil Sultan is Acting Dean and Head of Department at the Faculty of Aerospace and Strategic Studies at AIR University, Islamabad.

² Shayan Hassan Jamy is a Masters' student of Strategic Studies at the Faculty of Aerospace and Strategic Studies at AIR University, Islamabad.

Keywords: Artificial Intelligence (AI), US-China Competition, Lethal Autonomous Weapon Systems (LAWS), National Security Commission on Artificial Intelligence (NSCAI), warfare

Introduction

Although the concept of AI can be traced back to the 1950s, developments within the last decade, in particular, have ignited the AI revolution. The US Joint Artificial Intelligence Centre (JAIC) mentioned four recent products. Modern AI has overgrown, including massive datasets, increased computer power, improved machine learning algorithms, and greater access to open-source code libraries.³ With AI-related software and hardware constantly growing, tremendous technological progress is being made quickly in human history. This progress will inevitably bring beneficial and some de-stabilizing effects that could impact the global strategic environment.

The ongoing US-China rivalry driven by economic, political, ideological, and military interests pushes both countries to engage in a technological competition with a significant focus on AI and its integration for military and non-military applications. Although the militarization of AI is currently in its initial phase, advancements in this field would eventually transform the militaries of both the US and China and other major states. This paper focuses on the US-China AI competition and its implications for strategic stability. It discusses some of the other players trying to join the new competition, which could potentially impact the future of warfare.

³ Clive Williams, "Artificial intelligence and the future of warfare," *Australian Strategic Policy Institute*, April 13, 2021, Available at: <https://www.aspistrategist.org.au/artificial-intelligence-and-the-future-of-warfare/> (Accessed on December 10, 2021).

Artificial Intelligence: Definition and Its Military Applications

AI is one of the emerging technologies with vast scope for civilian and military applications. Various scholars have tried to define the concept, but this is likely to evolve with the advancement of new technologies. John McCarthy, one of the founders of the discipline of AI, has defined it as the "science and engineering of making intelligent machines."⁴ Based on this definition and considering new technologies, AI can be defined as intelligence demonstrated by a machine without direct human control. It is also important to define 'intelligence' to differentiate between AI and non-AI technologies in this context. Intelligence can be considered the ability to learn and solve a task that requires logic and problem-solving. It is also crucial to understand that AI should not be viewed simply as a stand-alone technology but as an enabling technology. In much the same way as for electricity, it can be applied to and improve other technologies.⁵ Nevertheless, due to the revolutionary nature of AI, it can transform essentially every single industry. Some experts predict that AI will outperform humans in many activities by 2030, with a 50% chance of AI beating humans in all tasks by 2065 and automating all human jobs by 2140.⁶ Although this may seem a long way away, it is relatively short in the context of human history. In every sense of the word, AI will be a revolutionary technology. However, the focus of this research paper will be on the

⁴ Andy Peart, "Homage to John McCarthy, the Father of Artificial Intelligence (AI)," *Artificial Solutions*, October 29, 2020, Available at: <https://www.artificial-solutions.com/blog/homage-to-john-mccarthy-the-father-of-artificial-intelligence>(Accessed on December 10, 2021).

⁵ "The Militarization of Artificial Intelligence," *UN Office for Disarmament Affairs*, August 2019, Available at: <https://reliefweb.int/sites/reliefweb.int/files/resources/TheMilitarization-ArtificialIntelligence.pdf>(Accessed on December 10, 2021).

⁶ Katja Grace, John Salvatier, et al. "When Will AI Exceed Human Performance? Evidence from AI Experts," May 3, 2018, Available at: <https://arxiv.org/pdf/1705.08807.pdf> (Accessed on December 10, 2021).

potential impact that AI could have on the militaries of major states and the global strategic environment.

The AI-based technologies could be used for improving existing weapon systems and the decision-making processes,⁷ which could fully transform a state's military operations. Like the US, China, Russia, and others, major states have already begun integrating AI into their militaries. The US and China are the two leading competitors investing heavily in research and innovation for their military applications. Some other countries, such as Israel, have also demonstrated their potential in AI.

In May 2021, the Israeli Defence Forces (IDF) used AI-enabled technologies to collect and analyse data using signal intelligence, visual intelligence, human intelligence, geographical intelligence, and more⁸ during their operation against Hamas. The operation was dubbed the 'world's first AI war.'⁹ AI-based technologies were also used to generate recommendations for Military Intelligence and its use by the Israeli Air Force, which possibly made the conflict shorter and more efficient.¹⁰ The IDF also used AI-enabled drone swarms and 3D modelling to map the conflict territory and launch precision attacks.¹¹ Israel's Iron Dome, an anti-aircraft defence system, also used AI algorithms to stop 90% of

⁷ "The Militarization of Artificial Intelligence," *UN Office for Disarmament Affairs*, August 2019, Available at: <https://reliefweb.int/sites/reliefweb.int/files/resources/TheMilitarization-ArtificialIntelligence.pdf> (Accessed on December 10, 2021).

⁸ Ibid

⁹ Anna Ahronheim, "Israel's operation against Hamas was the world's first AI war," *The Jerusalem Post*, May 27, 2021.

¹⁰ Ibid

¹¹ Seth J. Frantzman, "Israel pushes digital military transformation in the age of 'artificial intelligence war'," *C4ISRNET*, July 23, 2021, Available at: <https://www.c4isrnet.com/battlefield-tech/it-networks/2021/07/23/israel-pushes-military-digital-transformation-in-the-age-of-artificial-intelligence-war/> (Accessed on December 10, 2021).

incoming missiles fired by Hamas.¹² After the operation, a senior IDF commander noted that AI was used as a "key component and power multiplier in fighting the enemy."¹³ The IDF's use of AI against Hamas provided a significant technological advantage, highlighting the importance of this new technology for the future of warfare.

US-China Artificial Intelligence Competition

Currently, the global strategic environment is in a state of flux. The unipolar world order that emerged after the disintegration of the former Soviet Union in 1989 proved to be short-lived, and China is emerging as a new threat to the US global hegemony. China uses its economic strength to enhance its global influence, mainly through its Belt and Road Initiative, while the US hopes to contain China's rise through its Indo-Pacific strategy. China's plan to be a global superpower and have a world-class military by 2049,¹⁴ is also a major cause for concern for the US. In recent decades, this plan has been backed up by tremendous Chinese economic growth, showing no signs of receding. According to the Centre for Economic and Business Research, China will surpass the US economically by 2028.¹⁵ The US-China competition will continue to grow in the coming years and decades. AI-based technologies could be a major factor in the ongoing competition between the two major powers as both are investing to reap their civil and military dividends. The US and China have already made tremendous progress in adopting AI for military purposes since the 2010s and are leading other central states by a significant margin.

¹² Ibid

¹³ Anna Ahronheim, "Israel's operation against Hamas was the world's first AI war," *The Jerusalem Post*, May 27, 2021.

¹⁴ Mark Moore, "China seeking to develop 'world class' military by 2049: Pentagon report," *New York Post*, November 9, 2021.

¹⁵ "China set to surpass the US as world's biggest economy by 2028, says report," *CNBC*, December 25, 2020, Available at: <https://www.cnbc.com/2020/12/26/china-set-to-surpass-us-as-worlds-biggest-economy-by-2028-says-report.html> (Accessed on December 12, 2021).

Currently, it is believed that the US is still ahead of China in the AI race, but China is not far behind and is catching up. According to Bob Work, Vice-Chair of the US *National Security Commission on Artificial Intelligence* (NSCAI), China currently leads the US in three key AI metrics: data, applications, and integration.¹⁶ The US, Work believes, still leads China in AI-related talent, algorithms, and hardware. Perhaps even more telling is the language being used by US officials to describe China's AI progress. Nicholas Chaillan, the former US Pentagon Software Chief, stated that "we (the US) have no fighting chance against China (in AI) in 15-20 years."¹⁷ Such strong language has been rare in the US but is becoming more and more common now.

In terms of military applications of AI, the US already employs certain AI-enabled technologies, such as guided munitions, air-defence systems, unmanned vehicles, and others.¹⁸ Several other AI-related defence projects are currently in the Research and Development (R&D) phase, which are expected to be deployed within the next decade. These include projects for early warning and intelligence, surveillance, reconnaissance, command and control, and precision strike and delivery systems.¹⁹ However, less is known about the exact use of AI by the Chinese military. Nevertheless, China has made tremendous progress in AI and AI-enabled technologies in recent years. These

¹⁶ Sydney J. Freedberg Jr., "China Leads US In 3 of 6 AI Areas: Bob Work," *Breaking Defense*, April 9, 2021, Available at:<https://breakingdefense.com/2021/04/china-leads-us-in-3-of-6-ai-areas-bob-work/>(Accessed on December 12, 2021).

¹⁷ "China has won AI battle with the US, Pentagon's ex-software chief says," *Reuters*, October 12, 2021, Available at:<https://www.reuters.com/technology/united-states-has-lost-ai-battle-china-pentagons-ex-software-chief-says-2021-10-11/> (Accessed on December 12, 2021).

¹⁸ Vincent Boulanin, Lora Saalman, et al., "Artificial Intelligence, Strategic Stability, and Nuclear Risk," *SIRPI*, June 2020, Available at:https://www.sipri.org/sites/default/files/2020/06/artificial_intelligence_strategic_stability_and_nuclear_risk.pdf(Accessed on December 12, 2021).

¹⁹ Ibid

technologies include drone swarms, robotics, facial recognition technology, 5G, quantum computing, and much more.²⁰ Through AI applications, these technologies can be repurposed for military use. With China's rapid AI progress being led by President Xi Jinping's vision and an efficient merger between the state and Chinese technological companies, the US has a serious cause for concern about its technological and military advantage in the near future.

Significance of US-China AI Competition

Both the US and China, and other major states have identified AI as having strategic and military importance. In 2014, the US released its *Third Offset Strategy* (TOS), which aimed to improve US military capabilities through innovation and new technologies. The TOS stated that emerging technologies, such as AI, would play an essential role in bringing autonomy to its weapon systems to offset the threats emanating from its adversaries.²¹ This sentiment has been echoed by the US on multiple occasions, including in the 2018 *National Defence Strategy*,²² which states that "the Department of Defence (DOD) will invest broadly in military applications of autonomy, artificial intelligence, and machine learning, including the rapid application of commercial breakthroughs, to gain competitive military advantage."²³ Similarly, the US DOD released its *Artificial Intelligence Strategy* in 2018, in which it highlighted strategic focus areas in military ethics and

²⁰ Graham Allison and Eric Schmidt, "Is China Beating the US to AI Supremacy," *Belfer Center*, August 2020, Available at:<https://www.belfercenter.org/publication/china-beating-us-ai-supremacy>(Accessed on December 12, 2021).

²¹ Brian C. Kempf, "The Third Offset: The US Strategy to Combat Future Threats," (Master's Thesis, Missouri State University, 2017), Available

²² "Summary of the 2018 National Defense Strategy of the United States of America," *Department of Defense*, Available at:<https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>(Accessed on December 12, 2021).

²³ Ibid

AI safety, and a partnership with leading private sector technology companies and global allies.²⁴ The language used in these reports clearly shows the US military establishment's strategic importance given to AI.

More recently, and perhaps more indicative of the critical strategic role that, AI will play in the US-China competition, is the US NSCAI report released in March 2021. This report went into specific detail about the AI development plan. It presented a strategy for the US to "defend against AI threats, responsibly employ AI for national security and win the broader technology competition."²⁵ It recommended that the US take certain actions to ensure that it achieves a "state of military AI readiness by 2025", in order to stay ahead of China as the global AI leader.²⁶ The NSCAI report, while acknowledging the fact that the US is far from "AI-ready", urged the DOD and Intelligence Community to take action by 2025 to overcome this shortcoming,²⁷ and to accomplish this, the NSCAI recommends that the Pentagon should increase annual investment in AI R&D, which is currently at \$1.5 billion, to \$8 billion by 2025.²⁸ It also suggested that

²⁴ "Summary of the 2018 Department of Defense Artificial Intelligence Strategy," *Department of Defense*, Available at: <https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF?source=GovDelivery> (Accessed on December 10, 2021)

²⁵ "2021Final Report," *National Security Commission on Artificial Intelligence The USA*, March 19, 2021, Available at: <https://www.nsc.ai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf> (Accessed on December 12, 2021).

²⁶ Shayan Jamy, "US National Security Commission on Artificial Intelligence Report: A Call to Arms in the AI Era," *Institute of Strategic Studies Islamabad*, June 16, 2021, Available at: https://issi.org.pk/wp-content/uploads/2021/06/Final_IB_Shayan_June_16_2021.pdf (Accessed on December 12, 2021).

²⁷ "'Wakeup call': Report calls for massive AI investments to counter China," *c4isrnet*, March 1, 2021, Available at: <https://www.c4isrnet.com/artificial-intelligence/2021/03/01/wakeup-call-report-calls-for-massive-ai-investments-to-counter-china/> (Accessed on December 19, 2021).

²⁸ Ibid

the US government should increase non-defence AI R&D funding to \$32 billion by 2026.²⁹ Additionally, the NSCAI wants the DOD to implement a completely top-down approach through which it focuses on integrating AI-enabled technologies into every facet of war-fighting.³⁰ It also warns that “if the United States does not act, it will likely lose its leadership position in AI to China in the next decade and become more vulnerable to a spectrum of AI-enabled threats from a host of state and non-state actors.”³¹ The NSCAI report is significant as it highlights the US disadvantage to China when it comes to AI capabilities and in the ongoing competition between the two rivals for the global leadership role.³²

In 2017, China released the *Next Generation Artificial Intelligence Development Plan* (NGAI), in which it announced its strategy to become the world leader in AI by 2030. It intends to monetise AI into a \$150 billion industry and wants to emerge as the driving force in defining ethical norms and standards for AI.³³ China considers AI to be a “strategic technology.”³⁴ Although China plans to focus mainly on the civilian use of AI but due to its dual-use potential, these technologies

²⁹ Ibid

³⁰ “Stop the emerging AI cold war,” *Nature*, May 11, 2021, Available at: <https://www.nature.com/articles/d41586-021-01244-z> (Accessed on December 19, 2021).

³¹ “Wakeup call: Report calls for massive AI investments to counter China,” *c4isrnet*, March 1, 2021, Available at: <https://www.c4isrnet.com/artificial-intelligence/2021/03/01/wakeup-call-report-calls-for-massive-ai-investments-to-counter-china/> [PI address these minor mistakes] (Accessed on December 19, 2021).

³² Shayan Jamy, “US National Security Commission on Artificial Intelligence Report: A Call to Arms in the AI Era,” *Institute of Strategic Studies Islamabad*, June 16, 2021, Available at: https://issi.org.pk/wp-content/uploads/2021/06/Final_IB_Shayan_June_16_2021.pdf (Accessed on December 19, 2021).

³³ Roberts, H., Cowls, J., Morley, J. *et al*, “The Chinese approach to artificial intelligence: an analysis of policy, ethics and regulation,” *AI & Soc* 36, 59-77 (2021), Available at: <https://link.springer.com/article/10.1007/s00146-020-00992-2> (Accessed on December 19, 2021).

³⁴ Ibid

can be used for military purposes, such as for drone swarms, facial recognition technology, and autonomous intelligent systems. China has also indicated a push toward military-civil fusion which furthers the strategic importance of AI.³⁵ These developments have also been acknowledged in the US DOD's 2021 China Military report, which states that China's future military will be shaped by advances in AI and emerging technologies.³⁶

Looking at these developments and the emerging strategic thought, it seems that the US and China both consider AI-based technologies to be critical to providing their leadership with an edge in decision making. This is likely to influence other players in the field, resulting in the spiralling of arms competition at the global level.

Other Major Competitors in AI

“The one who becomes the leader in this sphere (Artificial Intelligence) will be the ruler of the world.” *Russian President Vladimir Putin.*³⁷ While both the US and China are the two frontrunners when it comes to AI, other major states, like Russia, India, Israel, and some others, have also given importance to AI in their military strategies and have made certain AI-related advancements in their own. Within the next few decades, the US-China AI competition will likely have a spillover effect on other major states regarding the militarization of AI. The US NSCAI report, besides mentioning China, also refers to Russia as a

³⁵ Ibid

³⁶ Michael C. Horowitz and Lauren A. Kahn, “DoD’s 2021 China Military Power Report: How Advances in AI and Emerging Technologies Will Shape China’s Military,” *Council on Foreign Relations*, November 4, 2021, Available at: <https://www.cfr.org/blog/dods-2021-china-military-power-report-how-advances-ai-and-emerging-technologies-will-shape>(Accessed on December 19, 2021).

³⁷ “Putin: Leader in artificial intelligence will rule world,” *CNBC*, September 4, 2017, Available at: <https://www.cnb.com/2017/09/04/putin-leader-in-artificial-intelligence-will-rule-world.html>(Accessed on December 19, 2021).

significant threat. While President Putin views AI to be linked with global supremacy, it significantly lags behind the US and China.

In 2019, Russia announced its National Strategy for the Development of AI until 2030, which was focused mainly on the civilian uses of AI and its economic benefits.³⁸ Russia has been largely dependent on imports when it comes to technology. In terms of high-tech goods, it imports \$19 billion annually from the EU, the US, and China.³⁹ Through its AI strategy, it hopes to attain technological sovereignty and build a domestic AI industry.⁴⁰ Much like in China, the extent of the Russian militarization of AI has not been publicly revealed. Judging from the words of President Putin and other officials, however, it seems unlikely that Russia would not use AI for military purposes. According to a May 2021 report by the US Centre for Naval Analyses, Russia has more than 150 AI-enabled military systems in various stages of development, including autonomous air, underwater, surface, and ground platforms.⁴¹ The extent of deployment and use of these AI-enabled platforms by Russia is unknown. However, following Russia's recent invasion of Ukraine, reports have stated that Russia has

³⁸ "Putin approves National Strategy for AI until 2030," *TASS*, October 11, 2019, Available at: <https://tass.com/economy/1082644> (Accessed on December 19, 2021).

³⁹ Monika Grzegorzcyk, J. Scott Marcus et al., "The decoupling of Russia: high-tech goods and components," *bruegel*, March 28, 2022, Available at: <https://www.bruegel.org/2022/03/the-decoupling-of-russia-high-tech-goods-and-components/#:~:text=Russia's%20dependency%20on%20Western%20high,2%25%20from%20the%20United%20Kingdom> (Accessed on March 30, 2022).

⁴⁰ Julien Nocetti, "The Outsider: Russia in the Race for Artificial Intelligence," *French Institute of International Relations*, December 2020, Available at: https://www.ifri.org/sites/default/files/atoms/files/nocetti_russia_artificial_intelligence_2020.pdf (Accessed on December 19, 2021).

⁴¹ Jeffrey Edmonds, Samuel Bendett et al., "Artificial Intelligence and Autonomy in Russia," *CNA*, May 2021, Available at: https://www.cna.org/CNA_files/centers/CNA/sppp/rsp/russia-ai/Russia-Artificial-Intelligence-Autonomy-Putin-Military.pdf (Accessed on December 22, 2021).

used the KUB-BLA kamikaze drone in its operations.⁴² The KUB-BLA drone, which can stay airborne for 30 minutes and explode once its intended target has been found, uses AI for real-time recognition and classification of targets.⁴³ India is another country with AI-related ambitions. Though currently in its initial phase, India's AI industry is expected to grow exponentially within the next few decades, reaching around \$7.8 billion by 2025.⁴⁴ Militarily, India has identified AI as a critical technology. In 2018, the Indian government established two AI task forces, one of which was under the Indian Ministry of Defence (MOD). The MOD task force studied the strategic implications of AI from a national security perspective.⁴⁵ Although the MOD's report has not been made public, the strategic importance given to AI by India is clear. In 2018, Indian PM Modi mentioned AI as an important "determinant of defensive and offensive capabilities for any defensive force in the future."⁴⁶ Given the US-India strategic partnership and the US support for India as a regional competitor to China, AI cooperation between the two countries is likely. This would pose several new challenges to the regional stability of South Asia, which has already faced numerous challenges in recent years.

⁴² Thomas Harding, "Russia's KUB-BLA kamikaze drone intercepted in Ukraine," *The National News*, March 15, 2022.

⁴³ "Zala KYB Strike Drone, Russia," *Army Technology*, March 25, 2022, Available at: <https://www.army-technology.com/projects/zala-kyb-strike-drone-russia/> (Accessed on March 28, 2022).

⁴⁴ Aarti Betigeri, "India's AI conundrum," *the interpreter*, October 20, 2021, Available at: <https://www.lowyinstitute.org/the-interpreter/india-s-ai-conundrum#:~:text=The%20overarching%20goal%20is%20%E2%80%9Cmaking,set%20at%20US%24949%20million> (Accessed on December 10, 2021).

⁴⁵ Vincent Boulanin, Lora Saalman et al., "Artificial Intelligence, Strategic Stability, and Nuclear Risk," *SIRPI*, June 2020, Available at: https://www.sipri.org/sites/default/files/2020-06/artificial_intelligence_strategic_stability_and_nuclear_risk.pdf (Accessed on December 10, 2021).

⁴⁶ Ranjat Pandit, "India now wants artificial intelligence-based weapon systems," *The Times of India*, May 21, 2018.

Some of the European countries have also made significant progress in the field of AI. In 2020, the European Commission adopted various projects of new military technologies, including algorithms for drone swarms, high-precision missiles, cyber security, and more.⁴⁷

The *United Kingdom* (UK) has also released its National AI Strategy in September 2021, which has highlighted a 10-year vision to make the UK a “global AI superpower.”⁴⁸ The report also linked AI with future national security concerns. Likewise, *France* has also released its National AI Strategy in 2018, which plans to use AI for future military modernization.⁴⁹ Another recent military use of AI was during the 2020 Azerbaijan-Armenia conflict, in which Azerbaijan used low-cost, high-technology AI drones supplied by Turkey and Israel to inflict significant damage on Armenia.⁵⁰ Armenia lost 47% of its combat vehicles and 93% of its artillery in the conflict. The conflict showed that not only has the militarization of AI begun, but smaller states can also possess AI-enabled technologies and use them to their advantage.

Pakistan is another state with the potential to become a significant AI player in the future. Currently, its AI-related progress is limited, although there have been some developments about the use

⁴⁷ Elena Sanchez Nicolas, “EU’s AI military strategy poses ‘threat to Europeans,’” *Euobserver*, January 18, 2021, Available at: <https://euobserver.com/science/150628> (Accessed on December 10, 2021).

⁴⁸ “National AI Strategy,” *HM Government*, September 2021, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1020402/National_AI_Strategy_-_PDF_version.pdf (Accessed on December 10, 2021).

⁴⁹ Vincent Boulanin, Lora Saalman et al., “Artificial Intelligence, Strategic Stability, and Nuclear Risk,” *SIRPI*, June 2020, Available at: https://www.sipri.org/sites/default/files/2020-06/artificial_intelligence_strategic_stability_and_nuclear_risk.pdf (Accessed on December 10, 2021).

⁵⁰ Arnaud Sobrero, “Can Artificial Intelligence shape the way we conduct war in the future?,” *Strife*, July 19, 2021, Available at: <https://www.strifeblog.org/2021/07/19/can-artificial-intelligence-shape-the-way-we-conduct-war-in-the-future/> (Accessed on December 10, 2021).

of AI for Intelligence, Surveillance, and Reconnaissance (ISR) purposes.⁵¹ With India expected to make major strides in AI within the next few decades, Pakistan would not want to be left behind and will likely make concerted efforts to offset any military advantage that India might gain in AI-related developments. In this regard, it may benefit from the Chinese expertise in the field, but to make progress in the civilian and military applications of the AI-based technologies, it will have to build its indigenous capacity as per national requirements and avoid imbalance in the region.

AI and the Future of Warfare

AI has the potential to be both a revolutionary and disruptive technology. While most people worry about Lethal Autonomous Weapon Systems (LAWS), the scope is much broader than that when it comes to the military applications of AI. Experts predict that AI will become integrated into various aspects of defence within the next few decades, from actual warfare to cyber security and decision-making.⁵² This would have several global implications.

Firstly, AI could further blur the lines of warfare. Technology developed purely for civilian purposes, such as facial recognition technology or 3D modelling, could easily be adopted for use in various objectives and used for military purposes. With this blurring of civilian and military technology lines, the lines of warfare would also become blurred further. Identifying a new technology with potential military applications would become even more difficult. As we have seen

⁵¹ Aamna Rafique, "Militarization of Artificial Intelligence and Future of Arms Control in South Asia," *Institute of Strategic Studies Islamabad*, August 10, 2021, Available at: https://issi.org.pk/wp-content/uploads/2021/08/4_SS_Aamna_Rafiq_No-3_2021.pdf.pdf (Accessed on December 22, 2021).

⁵² Michael E. O'Hanion, "The role of AI in future warfare" *Brookings*, November 29, 2018, Available at: <https://www.brookings.edu/research/ai-and-future-warfare/> (Accessed on December 22, 2021).

historically, states that take the lead over others in understanding and implementing a certain technology militarily often become major global players. The British after the Industrial Revolution and the US after acquiring nuclear weapons serve as good examples. Whoever takes the lead in AI could become the dominant superpower for years to come. Also of importance is the potential for widening the gap between AI-enabled states and the others, as was the case with nuclear-weapon states.

Secondly, the character of warfare could change as a result of major states integrating AI-enabled technologies into their militaries.⁵³ With states potentially having LAWS and AI-assisted decision-making systems, human involvement in war could be minimized. This raises some ethical and moral questions and the likely conflict with the International Humanitarian Law (IHL). How LAWS would act towards enemy combatants or civilians is an interesting debate. In terms of the software used, states would have different AI algorithms programmed into their LAWS, meaning they would not all act the same way. An AI algorithm written by China for military purposes would be completely different from one written by the US or any other state for that matter. With AI potentially involved in future military decision making and command-and-control systems, the risk of escalation of war might also increase.⁵⁴ How an AI defence system would have acted during the Cuban Missile Crisis, an event during which humanity came so close to destruction, or other such events needs to be considered thoroughly. There are also potential issues will arise that we cannot imagine today. Such is the revolutionary nature of AI.

Thirdly, there is a very likely scenario of an AI arms race occurring between major states.⁵⁵ With the rapid progress in AI-related software

⁵³ Ibid

⁵⁴ Ibid

⁵⁵ Ibid

and hardware, it will be difficult to stop this arms race. As AI-related hardware is relatively cheap and software can be found or written by a non-state actor, preventing the proliferation of AI-enabled technologies would be difficult.⁵⁶ A potential AI arms race would be much more difficult to control than the Cold War-era nuclear arms race between the US and the former Soviet Union.⁵⁷ In many ways, this AI arms race has already begun.

Fourthly, the impact of AI on nuclear weapons and strategic stability is another cause for concern. According to a 2020 report by SIPRI, recent advances in AI contribute to nuclear risk.⁵⁸ The report claims states that advances in machine learning and autonomy could unlock new and varied possibilities in a wide array of nuclear weapons-related capabilities, ranging from early warning to command and control and weapon delivery.⁵⁹ It also highlights the lack of transparency of nuclear-weapon states regarding the role of AI in their nuclear forces.

In terms of efforts toward developing some set of international standards and laws for the use of AI in warfare, no substantial progress has been made so far.⁶⁰ Most recently, at the December 2021 meeting

⁵⁶ Shayan Jamy, "US National Security Commission on Artificial Intelligence Report: A Call to Arms in the AI Era," *Institute of Strategic Studies Islamabad*, June 16, 2021, Available at: https://iss.org.pk/wp-content/uploads/2021/06/Final_IB_Shayan_June_16_2021.pdf (Accessed on December 22, 2021).

⁵⁷ Ibid

⁵⁸ Vincent Boulanin and Lora Saalman et al., "Artificial Intelligence, Strategic Stability, and Nuclear Risk" *SIRPI*, June 2020, Available at: https://www.sipri.org/sites/default/files/2020-06/artificial_intelligence_strategic_stability_and_nuclear_risk.pdf (Accessed on December 22, 2021).

⁵⁹ Ibid

⁶⁰ Shayan Jamy, "US National Security Commission on Artificial Intelligence Report: A Call to Arms in the AI Era," *Institute of Strategic Studies Islamabad*, June 16, 2021, Available at: https://iss.org.pk/wp-content/uploads/2021/06/Final_IB_Shayan_June_16_2021.pdf

of the UN Convention of Certain Conventional Weapons (CCW), an effort to establish new regulations on the development and use of LAWS failed.⁶¹ Despite a majority consensus, the proposed regulations were opposed by states such as the US, Russia, India, and Israel.⁶² Other such international efforts to regulate the use of AI in warfare have also failed, as states with a military edge in AI refuse to halt their progress. Major states also broadly differ in terms of the role AI and LAWS should be allowed to play in warfare, although there seems to be a consensus that a certain level of human involvement must be ensured.⁶³ Unfortunately, the current rate of technological advancement regarding AI far outweighs the speed of international diplomacy to address the potential risks associated with it.

Conclusion

In the past, states that have gained technological edge over their rivals have become the global military leaders of that era. AI can play a similar role. Currently, major states have begun integrating AI into their military capabilities. The US and China are leads this race for AI integration and competing for AI supremacy. The on-going AI competition will have a major effect on the US-China rivalry, as it could decide the fate of the future global power. Both the US and China, and other major states have identified AI as a strategic technology. Other

[content/uploads/2021/06/Final_IB_Shayan_June_16_2021.pdf](#)(Accessed on December 22, 2021).

⁶¹ Coralie Consigny, "Are Killer Robots Better Soldiers? The Legality And Ethics Of The Use Of AI At War," *Human Rights Pulse*, February 8, 2022, Available at: <https://www.humanrightspulse.com/mastercontentblog/are-killer-robots-better-soldiers-the-legality-and-ethics-of-the-use-of-ai-at-war> (Accessed on March 7, 2022).

⁶² Ibid

⁶³ Shayan Jamy, "US National Security Commission on Artificial Intelligence Report: A Call to Arms in the AI Era," *Institute of Strategic Studies Islamabad*, June 16, 2021, Available at: https://issi.org.pk/wp-content/uploads/2021/06/Final_IB_Shayan_June_16_2021.pdf (Accessed on March 7, 2022).

states, such as Russia, India, Israel, and a few others, are following this trend and have begun the militarization of AI. AI is being used for military purposes in the modern-day, and its role in the military will only continue to grow. From LAWS to decision making and much more, AI could change the very character of warfare. This would have several wide-ranging implications, such as an AI arms race, nuclear risks, proliferation of AI-enabled technologies, etc. There is currently a lack of international debate and consensus surrounding the military use of AI, making it difficult to develop a consensus on preventing the proliferation of these technologies. Resultantly, most states are likely to engage in this new AI competition for both civilian and military applications, which could have an adverse impact on strategic stability at the regional as well as global levels.