



DISCUSSION PAPER

# When Artificial Worlds Collide: The US-China Artificial Intelligence Arms Race

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## The US-China Artificial Intelligence Arms Race

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## Introduction

**T**he arms race between the great powers during the Cold War, particularly vis-à-vis the acquisition of nuclear weapons, created a dangerous environment. In the end, the race was eventually contained as a result of reduction treaties. Today, the race for Artificial Intelligence (AI) technology is beginning to replace the old arms race of the Cold War (Pecotic, 2019). According to many experts, states are increasingly investing in AI technology while seeking ways to apply it for military purposes. This new type of arms race requires the urgent collaboration of academia, media, and decision-makers to address its potential consequences.

Conversely, Tim Hwang and Alex Pascal assert that the discussion around the arms race on AI does not reflect reality while causing a deterioration in relations. These issues underline the necessity of countries that stand out in AI technology such as the US, China and, Russia to focus on cooperation and dialogue (Hwang & Pascal, 2019).

There have been many developments in AI technology, which show that states have turned it into a part of the arms race. For instance, the Summary of the 2018 Department of Defence Artificial Intelligence Strategy report highlights Chinese and Russian investments in AI weapons technologies. It states the steps that need to be taken within the framework of this competition (State, 2018). Moreover, the Pentagon's budget for AI arming, worth two billion dollars, and the Executive Order on Maintaining American Leadership in AI published by US President Donald Trump, reveals the importance for the US of AI technology.

Recently, the statements of US Defense Secretary Mark Esper have also been notable. Esper said that the growing threats posed by great power competitors, such as China, warrant a focus on high-intensity conflict across all the military services. Esper also stressed the necessity of modernising the army in AI, robotics, direct-

ed energy and hypersonic technologies (Slack, 2019). Esper stated that as Russia and China are actively seeking ways to develop military potential out of AI, the US should exert great efforts to able to compete with them.

Likewise, China has paid similar attention to the importance of AI in weaponisation. Chinese leader Xi Jinping has claimed that AI technology would become a global military competition in the future (Allen G. C., 2019). In this sense, China published an AI strategy report in 2017 and claimed that it would be the leading country in AI technologies by 2030.

The goal of global leadership in AI technology has been given strategic precedence and is increasingly prioritised by governments. This leadership race has seen the US, China and Russia come to the forefront. China and the US are in stern competition, both making large investments and producing research and publications on the AI race. In fact, the US considers China as its biggest competitor in AI weapons technologies.

The technology of AI weapons contains a different logic compared to conventional and nuclear weapons. Indeed, war strategies will change due to autonomous robotic soldiers and weapon systems that are on the agenda. In this context, the US defence ministry published a report, called 'Artificial Intelligence Strategy' in 2018. In this report, many issues, from the ethical aspect of AI to the security dimension, were addressed. This report showed that AI had become one of the most important agenda items of US policy within the scope of security. In a similar way, China attaches importance to this issue and develops both political and technological strategies.

In turn, it can be said that a new type of arms race has started. In light of this information, the background of the arms race will be examined first and then the topic of AI technology and the arms race will be discussed. Finally, the AI armament strategies of the US and China will be analysed.

## Background of the Arms Race

Following the development of weapon technologies and modern international relations, states have had the ambition to control weapons, increase their inventory, and obtain higher-tech weaponry. The race first appeared in the modern world as rivalries concerning conventional weapons. The First World War saw the competition between Great Britain and Germany in the number of warships (Glaser, 2000). The global armament race, which hitherto took place over conventional weapons, was one of the most significant agenda subjects of international relations until the beginning of the nuclear weapons period.

The nature of the arms race became a consideration that determined the balance of power for states. Another focal issue is that the race created a security dilemma in international relations. This dilemma essentially meant that, as states pursued even more power against threats, and as other states are likewise armed, states also attempted to increase their powers (Jervis, 1976).

In the international system, for a long time states have determined their perceptions of the power balance and threats according to conventional weapons. With the invention of nuclear weapons, there has been considerable improvement in the world's weapon technology since then (Koubi, 1999). Indeed, the acquisition of nuclear weapons by the Soviet Union after the US prompted a new dilemma in the international system. Threats concerning the balance of power in the

international system became determined through the possession of nuclear weapons (Glaser, 2000). States, in the scope of military innovation and nuclear weapons (ballistic, submarine, etc.), had the determining factors of the revamped arms race. Unlike conventional weapons, the all-consuming and destructive effect of nuclear weapons made the arms race more dangerous and difficult to manage. As a result, they occasionally signed international treaties, such as the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), the Intermediate-Range Nuclear Forces Treaty (INF), and the Strategic Arms Limitation Talks (SALT), to protect international security and to impose limits on nuclear armament. These international treaties have initiated a slowdown, especially in the nuclear arms race. Furthermore, it has restored the balance of terror and the doctrine of mutually assured destruction in the international system.

With the technological developments of the 21st century, the research and production of vehicles equipped with AI, which has a decision-making process arising from autonomous and acquired experiences, has accelerated. AI technology has provided a unique opportunity for the further development of weapon technologies. Countries have now autonomous unmanned aerial vehicles, missiles and robot soldiers on the agenda. Examples include the Sea Hunter, an autonomous US warship, and the Chinese made an unmanned combat aerial vehicle (UCAV) called Ziyan.

## AI Technology and the Arms Race

The most basic feature of weapons that work with AI technology is that they are autonomous systems. These autonomous weapons are divided into two distinct categories. The first is the systems that implement action against targets under human control, such as human-controlled drones. The second style is autonomous devices, which are capable of making decisions and reacting to changing situations without human interference. While autonomous systems have been used since WWII, these systems were operated with simple sensor logic. When looking at advanced artificial intelligence technologies, a system that can make decisions and power autonomous robot soldiers

is possible in the near future (Allen & Chan, 2017).

Elon Musk, Tesla's CEO and one of the most prominent figures working in the field of AI technology, stated in a tweet: "Competition for AI superiority at national level most likely cause of WW3 [in my opinion]." Musk is not the only one concerned about the adverse effects of technological advancements on humanity if used in the wrong way (Musk, 2017). Artificial intelligence technologies were not an agenda item in the policymaking processes of nations when they were first developed but they have become a top priority issue today. These priorities set by the states

have created an arms race and this race is expected to be more prominent in the future. The existence of an arms race in AI is not hidden anymore (Edward Moore Geist, 2016). In academia, the media, and government institutions, studies are being put forward on how this race can be stopped and be managed

Compared to previous periods, AI technology has made significant improvements in the last five years and continues to rapidly progress. Indeed, AI technology has changed and will continue to affect states' national security and military technology strategies. Furthermore, the improvement of robotic systems will enable the transformation of military power capacities (Allen & Chan, 2017). Weapons with AI technology are regarded as very strong and volatile tools; therefore,

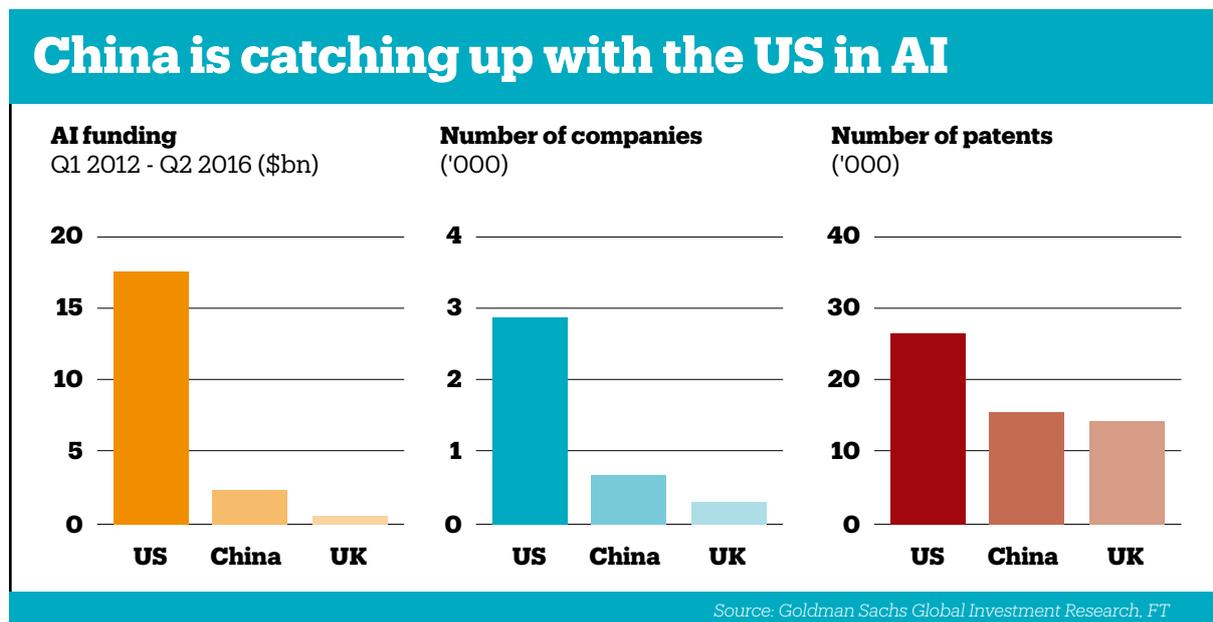
if the change of power capacity is not brought under control, the risks of the arms race will only intensify (Armstrong, Bostrom, & Shulman, 2013).

It is not currently known which states have weapons that use AI technology. This situation has caused significant uncertainty in the international system. The diversity in the potential use of artificial intelligence in war leads to an unpredictable uncertainty compared to other types of weapons. For instance, AI technology can be used in tanks, missiles, fighter jets, submarines, and cyberspace, among others (Meserole, 2018). In this context, while it can be said that the traditional arms race was inevitable but a manageable factor, the AI arms race is inevitable and impossible to prevent.

## The US Strategy on AI Weapons Technology

The United States and China are the two most prominent competitors in AI technology (Horowitz, 2018). The competition has emerged in published reports and high-level statements and China has been seen as the most prominent competitor in AI weapons technologies by the US (Service, 2019). By 2018, China currently has spent more on artificial intelligence technology than the US, and, according to Stanford

University's Artificial Intelligence Index Report 2019, Chinese researchers likewise have published more academic reports on AI technology. The US has started to pay more attention to these developments. The US president and the Pentagon have issued reports on this issue (Pecotic, 2019). The goal of global leadership in AI technology has become a strategic priority, a fact that is significant for both governments and companies.



The US is developing many strategies such as enhancing public-private sector cooperation, augmenting investments and, developing policies to defend itself against AI threats. In this context, the strategies outlined in the document 'The National Artificial Intelligence Research and Development Strategic Plan' published by the White House in 2016 will be examined.

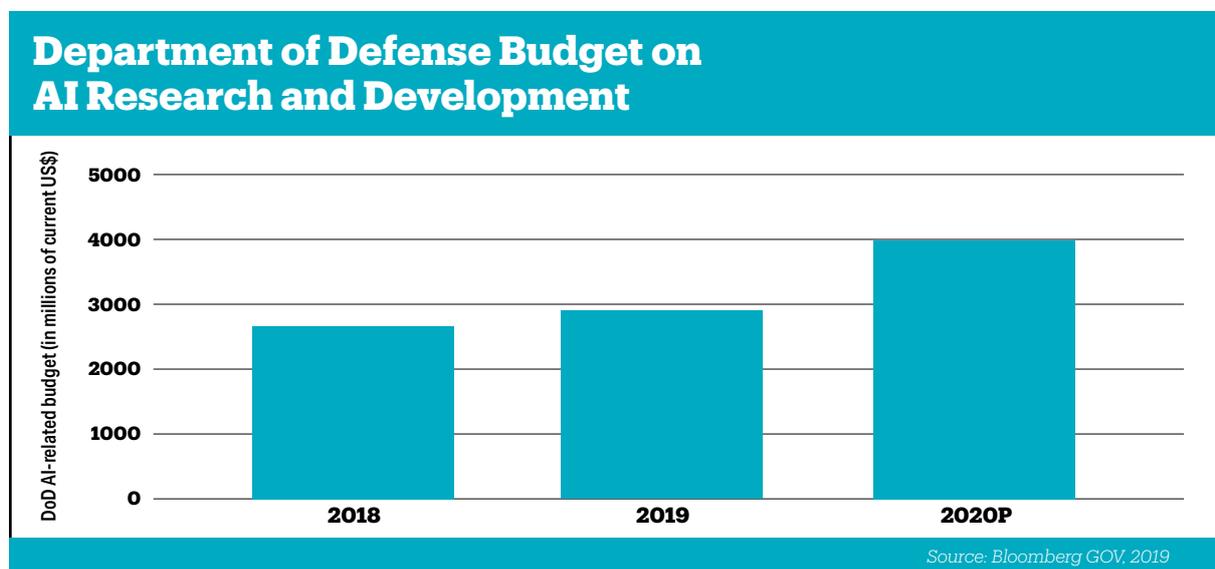
Firstly, long-term investment in AI research was introduced as a strategy. The main approach of this strategy was to develop the knowledge of AI technology with an increased investment to maximise its effectiveness. Other strategies are also mentioned in this document, which are not directly related to autonomous weapons. However, the issue of investing in AI technology, which forms its basis, was the most crucial element.

Moreover, the route of many strategies put forward on AI technology was determined in the order that US President Trump signed and published as the 'Presidential Order for Maintaining American Leadership in Artificial Intelligence' in 2019. Firstly, President Trump highlighted the necessity of the US focusing on maintaining its strong and long-term emphasis on basic research and development (R&D) in the field of AI. This was done by directing the Investment Initiatives for Artificial Intelligence Research and Development to give priority to artificial intelligence investments in R&D studies through federal organisations. He stated that these investments will strengthen and develop industries, academia, and the R&D system of the country. He also mentioned in

the Presidential order that federal AI spending would give priority to the newest and most cutting-edge ideas that can directly benefit the American people (Trump, 2019).

According to the presidential order, agencies would "make Federal data, models, and computing resources more available to America's AI R&D experts, researchers, and industries to foster public trust and increase the value of these resources to AI R&D experts."

The US administration also mentioned the need to maintain an artificial intelligence advantage through international contacts. Trump stated that, while supporting the R&D of AI and the opening of markets for the AI industries of America, the US is determined to promote an international environment that enables this technology to be developed per the values and interests of the American people. In addition, the US Presidency office stated: "The Trump Administration is committed to promoting an international environment that supports AI R&D and opens markets for American AI industries while also ensuring that the technology is developed in a manner consistent with our Nation's values and interests. Federal agencies will also develop and implement an action plan to protect the advantage of the United States in AI and technology critical to United States national and economic security interests against strategic competitors and foreign adversaries." This statement is similar to what was referred to in the document prepared by the US Department of Defense. In short, the US recognises there is an international competition in AI. However, the US would like to gain the edge with its allies' support.



In the "leading in military ethics and AI safety" section of the report, prepared by the US Department of Defence, the focus was placed upon the funding process, national security issues, international threats, as well as the policies for artificial intelligence in all matters, both domestically and internationally. Moreover, strategies for the development of weapon technologies and handling the arms race were introduced.

In addition to the attempts of the US to establish a formal policy, AI initiatives for military weapons such as 'DARPA' and 'ATLAS,' continue (Gronlund, 2019). The US gained valuable AI weapon technology experience with the unmanned aerial vehicles used in Afghanistan and Iraq. Indeed, it aims to increase the experience, gained from these autonomous weapons to even higher levels.

The US has formulated its AI weapon technology strategy based on 'balance of power' and 'national

security threat.' It is emphasised that it is unacceptable to remain behind in this arms race for the US in the rhetoric of the US politicians and the documents prepared by preeminent institutions. Strategic elements related to this subject are particularly highlighted. By realising the seriousness of China's and Russia's ambitions regarding AI, the US aims to develop advanced weapon technology to address these threats and the dynamics of the new arms race.

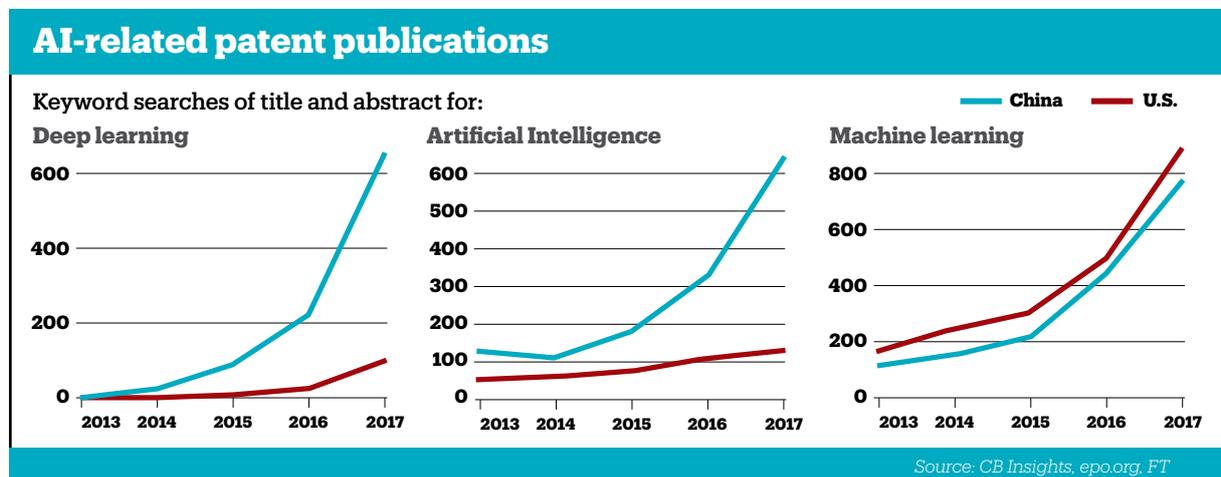
It is understood that the US, which had significant experience in the arms race during the Cold War period, is ready to make the necessary strategic moves, within the scope of a cost-benefit analysis. The prepared documents of the US prove that the knowledge and a strategic road map with high capacity required for AI technology and competition. It is expected that the US will develop its strategic plan further in this arms race, which has no end currently in sight.

## China's Strategy on AI Weapons Technology

According to the Centre for Security and Emerging Technology, the US Government, and Bloomberg Government data, China is now outspending the US in AI technology, but the expenditure is not primarily allocated on the AI defence sector. In 2018, while the US spent \$5.9 billion for AI technology, \$4.9 billion was allocated to the defence sector. China, conversely, spent \$8.4 billion on AI, with \$2.7 billion allocated for the AI defence sector in 2018. Despite this difference, China has carried out many strategies and practices in AI military technology. In fact, the Chinese military has been concentrating immensely on AI; the strategy

encompasses the central government, domestic companies and international trade.

China aims to sell the AI technology it builds its plans for achieving commercial success in AI-related industries are well underway. In Deciphering China's AI Dream, Jeffrey Ding, the China Lead for the Governance of AI Program at Oxford University, contends that China's core AI industry gross output and AI-related industry gross output may climb over \$22.5 billion and \$150.8 billion respectively. This would make China one of the most advanced countries in this sector by 2020.



Despite China's objective of providing an effective human-machine interface and wholly utilising the opportunities created by AI, its leaders have emphasised that the country needs synergy between civilian industry and the military – or what is known as Civil-Military Integration. This means that the science and technology that emerge within the civilian sector must aid innovation and development for the military. After all, AI is dual-use technology; for instance, facial-recognition algorithms can be designed to identify humans walking into a store as well as to identify a terrorist activity using UAVs (Bommakanti, 2020).

Two rapidly growing Beijing-based research organisations, which focus on the military use of AI and related technology, have been formed. These are the Unmanned Systems Research Centre (USRC), led by Yan Ye, and the Artificial Intelligence Research Centre (AIRC), led by Dai Huadong. Each organisation was established in early 2018, and each now has at least 100 research staff, putting them among the largest and fastest-growing government AI research organisations in the world (Allen G. C., 2019).

Additionally, China's State Council published the National Plan for Scientific and Technological Innovation during the 13th Five-year Plan period in 2016. This notably determined AI as the main direction for growing next-generation information technology and emphasised that the effort to build a modern industrial technology system should focus on "developing natural human-computer interaction."

At present, AI has become a core part of China's 'Deep Blue' programme geared to safeguard national security and strategic interests with strategic high tech. The report to the 19th CPC National Congress highlighted the commitment to "building China into

a manufacturer of quality and develop advanced manufacturing and promoting further integration of the internet, big data, and artificial intelligence with the real economy." Such a drive reveals that AI has become a key national strategy and an important direction of China's industrial transformation. Hence, China attaches great importance to AI, boosting its various fields independently (University, 2018).

With respect to autonomous unmanned systems, China has been researching air, ground, surface and undersea autonomous unmanned vehicles (AUV), similar to the US. In terms of air AUVs, China has made considerable achievements, especially when it comes to swarm drones. China managed to fly 119 swarm drones in June 2017 – breaking the American record of 103 drones – which were all endowed with systems that enabled the drones to communicate with each other. TYW-1 and ASN-216 are the two models of Chinese UAVs, which, with the help of AI, can now operate semi-autonomously. Currently, both ASN-216 and TYW-1 can take off and land without human intervention, and the latter can even identify and attack a target with minimal human intervention. When it comes to unmanned surface vehicles, Sea Fly is an example that needs to be mentioned. Currently, Sea Fly can learn how to avoid obstacles without human intervention and recover by using algorithms that allow Sea Fly to arrange its actions based on its assessment of sea conditions (Özdemir, 2019).

Finally, with regards to the implementation of AI into LAWS, China's delegation to the UN Group of Governmental Experts on LAWS said in 2018 that they accepted the conclusion of a new protocol, which would in principle ban the usage of fully autonomous lethal weapons systems.

## Conclusion

AI technology has been considered one of the most significant developments of the 21st century. Today, AI technology is used in industries such as the car industry, education, healthcare and defence, among others. For this reason, states have been crafting policies and strategies to control and pioneer AI. AI military technology particularly comes to the forefront as it contains sensitive issues, such as right violations caused by the unmanned use of weapons and the arms race. Therefore, multi-dimensional AI research in the military domain has been regularly conducted by various relevant powers.

The two major states in the international system, the US and China, stand out in AI studies in the military field, going over direct competition. Both countries view AI as a priority. This drive is reflected in the statements of politicians and institutions as well as in the advancement of the AI technology. The AI

technology strategies of both countries have different advantages and disadvantages, especially with respect to armament. The US spending on artificial intelligence weapons is higher than in China. Despite this situation, China's total AI budget is higher than that of the US. Indeed, it should not be forgotten that general AI technology can also be used in the military field.

Although data on the AI arms race is restricted, it seems that both states accept the existence of this tacit competition and are planning their next moves. Therefore, countries should come together to initiate negotiations on the future of the AI arms race. Otherwise, the world may face new, more dangerous types. States can and should protect international security by limiting the use of AI weapons technology. Just as states were able to achieve arms restraint during the Détente phase of the Cold War, they should take the necessary steps to regulate the weaponising of AI.

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