The Significance of Artificial Intelligence and Robotics on the National Security of Nations

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ABSTRACT

In this essay, the author aims to discuss how China will embrace AI and Robotics to enhance its national security and how the security landscape will be affected by this pursuit. The author first identifies China's national interests and examines how it will use AI and Robotics technologies to enhance its national security. Secondly, the author will dive deeper into the military aspect by identifying the AI and Robotics technologies that China's military will likely adopt for their future warfare. Lastly, the author then analyses how China's adoption of military-use AI and Robotics implicates the region's security landscape.

Keywords: Artificial Intelligence; Robotics; National Security; War; Capabilities

INTRODUCTION

According to the author, with advancement in computer chips and processing powers in the last decade, Artificial Intelligence (AI) and Robotics are increasingly disrupting our lives in various ways. Analogous to how a body works with the brain, emerging AI capabilities *(the thinking ability)* has enabled new robotics capabilities *(what the body can do)*. Nations are now in a global AI competition, and China aims to be the world leader in AI by 2030 through its 'New Generation AI Development Plan (AIDP).'[1]

In this essay, the author aims to discuss how China will embrace AI and Robotics to enhance its national security and how the security landscape will be affected by this pursuit. The author first identifies China's national interests and examines how it will use AI and Robotics technologies to enhance its national security. Secondly, the author will dive deeper into the military aspect by identifying the AI and Robotics technologies that China's military will likely adopt for their future warfare. Lastly, the author then analyses how China's adoption of military-use AI and Robotics implicates the region's security landscape.

DEFINING AI AND ROBOTICS

Given the many definitions of AI and Robotics, it is imperative to first define the AI and Robotics technologies discussed in this essay. This essay focuses primarily on AI and Robotics that will enhance war-fighting capabilities and change future warfare.

There are typically two types of AI: Artificial General Intelligence (AGI) and Artificial Narrow Intelligence (ANI).[2] AGI exhibits human intelligence by sensing emotion, autonomously learning and applying knowledge and skills in different contexts. Although AI technologies are improving exponentially, experts predict that we will only achieve AGI no earlier than 2030. On the other hand, ANI performs a specifically defined task, which is the type of AI that we are experiencing today. ANI enables enhanced intelligence through computer vision and algorithms for automatic hostile identification, optimise logistics, enhance information operations and improve decision-making.[3] In recent years, developments in deep neural network exponentially improve what ANI can do and are also improving the capabilities of military-use robotics. All AI technologies mentioned henceforth refers to ANI.

Although the word 'robot' was first used in 1921, concerns of lethal autonomous robots that can dehumanise warfare only surfaced since 2013.[4] In this essay, the author defines a robot as an intelligent, physically embodied machine that can perform tasks autonomously and can sense and manipulate its environment.[5] They can be semi-autonomous, supervised autonomous or fully autonomous. Today, militaries worldwide are increasingly adopting the use of robotics technologies such as autonomous aerial drones, armed robots such as robot sentry gun and armed robotic ground vehicles and semi-autonomous armed boats.[6] As fully autonomous robots require AGI,

all robotics technologies mentioned henceforth are limited to semi-autonomous or supervised autonomous types only.

IMPACT OF AI AND ROBOTICS ON CHINA'S NATIONAL SECURITY
China's National Interests

RAND's report on 'China's Grand Strategy' has identified China's core national interests and grouped them into three groups.[7] First is security, which refers to the maintenance of the Chinese Communist Party (CCP)'s rule over China. Notably, domestic issues such as natural disasters, social unrest, public health incidents and foreign influences that incite discontent among the Chinese will threaten the CCP's rule. Second is *sovereignty*, which includes national sovereignty, territorial integrity and national unification. These include China's territorial claim over Taiwan, Tibet, the East China Sea (ECS), and the South China Sea (SCS). The last group of China's national interest is development, which refers to the sustainment of Chinese economic growth and China's continued access to raw materials, markets and Sea Lines of Communication (SLOC). Chairman Xi Jinping summarised these China's national interests in what he termed as the 'China Dream', which aims for China to be 'well-governed, socially stable, economically prosperous, technologically advanced and militarily powerful by 2050.'[8]
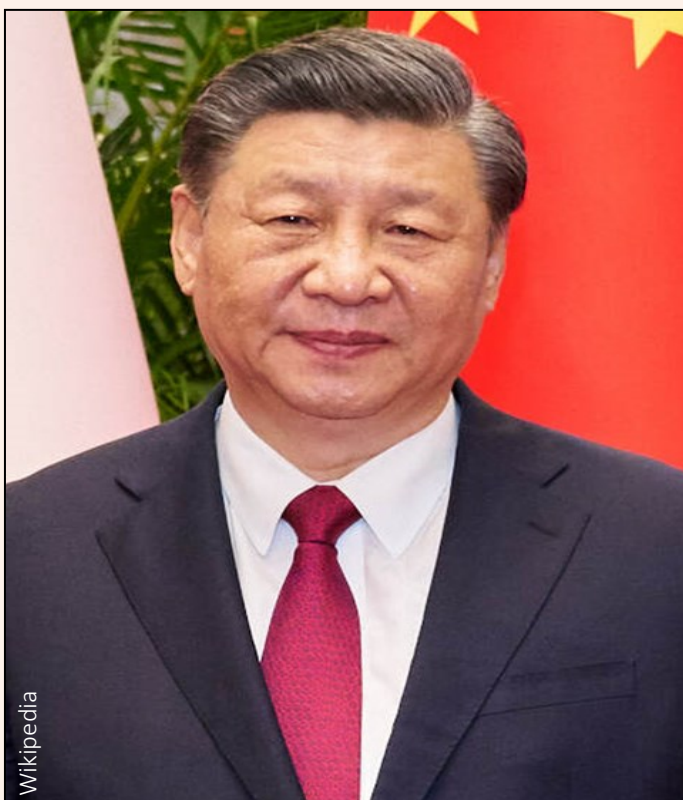
General Secretary of the Chinese Communist Party, Xi Jinping.

How AI and Robotics enhance China's National Security

The author adopts Buzan's definition of national security as 'the pursuit of freedom from threat and the ability of states and societies to maintain their independent identity and their functional integrity.'[9] Therefore, China's national security is its pursuit of maintaining its security, sovereignty and national development. To this end, China's leadership sees AI as a strategic technology to 'enhance national competitiveness and protect national security.'[10] From the AIDP and Made-in-China (MIC) 2025 plan, which forms the core of China's AI strategy, we can expect AI and robotics technologies to be used extensively to enhance China's national security.[11] Using Buzan's five sectors of security, the following paragraphs elaborate on how AI and Robotics can be adopted to enhance China's national security.[12]

China plans to build green data centres to support network infrastructure and data analytics, as well as intelligent environment monitoring networks and platforms to enhance China's environmental monitoring.

Political Security. China's leadership is concerned with the organisational stability of the CCP and the ideologies that give them the legitimacy to rule over China. For China to be well-governed and socially stable, China's leadership placed domestic stability as its highest priority and plans to do so through policing, propaganda and surveillance.[13] China plans to adopt AI to improve the efficiency of its education, healthcare, government and transportation systems.[14] AI will also be adopted to enhance surveillance and perform 'predictive policing' to improve public safety and security. For example, cities that piloted China's social credit and public trust systems have trialed such AI-enhanced surveillance systems.[15]

Military Security. A strong military with offensive and defensive capabilities is needed to defend China's national sovereignty and territorial integrity. A strong

military also reinforces political and economic security by supporting China's 'rebalancing diplomacy strategy' through opening doors for diplomacy with other major powers and enabling coercive diplomacy on its periphery.[16] Chairman Xi had announced plans to reform the People's Liberation Army (PLA) to support his 'China Dream.'[17] Militaries worldwide are increasingly adopting AI and Robotics to enhance their military capabilities, and China aims to be at the forefront of it. The author further elaborates on how China's military will be adopting AI and Robotics technologies in the next section.

China's leadership sees AI as a strategic technology to 'enhance national competitiveness and protect national security.

Economic Security. Since the opening of China in 1978 under the leadership of Deng Xiaoping, China has been transformed from a poor and under-developed economy into a market-driven economic powerhouse.[18] China needs to maintain access to resources and markets to sustain Chinese welfare at acceptable levels and grow China's state power. To do so, China will continue to sustain and open more markets through diplomacy.[19] China also aims to achieve an 'economic prosperous' society through the Belt-and-Road Initiative (BRI) and the MIC 2025 plan launched in 2013 and 2015, respectively. In addition, laid out in the AIDP launched in 2017, China aims to develop new AI industries and foster a highly efficient, high-end smart economy.[20] Using intelligent automation, augmentation of labour capacity and capabilities through AI and Robotics, and stimulation of innovation, the AI-driven economy is projected to increase China's annual growth rate by 1.6 percentage points gross value added by 2035.[21]

Societal Security. China will also need to retain its national identity and culture despite the changing environment. Internally, Chinese authorities prevent external influences on its domestic population by blocking most Chinese citizens from accessing overseas internet materials and monitoring and censoring Chinese cyberspace. It also sees peaceful protests or open articulation of grievances by ethnic minorities such as ethnic Uighur and Tibetan as a threat.[22] Externally,

since 2003, China promotes its culture and language by establishing Confucius Institutes overseas.[23] AI systems have already been trialed in China to crack down on the Uighurs to enhance societal security.[24] As part of China's plan to establish an intelligent monitoring platform for comprehensive community management, one can also expect AI to be used to enhance China's cyber-surveillance on its citizens, over-and-above the earlier mentioned 'predictive policing.'[25]

Environmental Security. Environmental issues have been a major reason for mass protests in China and have resulted in labour production losses.[26] Being able to lead the world in renewable energy will put China in a good position on the world map and mitigate internal socioeconomic instability. To this end, China has invested and made significant progress in the energy-saving environment, new-energy and new-energy automobile industries and will continue to do so in the next 30 years.[27] China plans to build green data centres to support network infrastructure and data analytics, as well as intelligent environment monitoring networks and platforms to enhance China's environmental monitoring.[28]

AI AND ROBOTICS IN CHINA'S FUTURE WARFARE CAPABILITIES
Modernisation of the PLA

In 2018, Major General Ding Xiangrong, Deputy Director of the General Office of China's Central Military Commission, highlighted how China aims to adopt AI and Robotics as part of their ongoing military revolution to 'narrow the gap between the Chinese military and global advanced powers.'[29] China's white paper released in July 2019 highlighted PLA's plan to modernise and transform from a personnel-intensive armed force to one that focuses on Science and Technology (S&T).[30] The PLA Grand Force (PLAGF)'s active force has since been significantly downsized, with PLA Air Force (PLAAF)'s number maintained and the force size in PLA Navy (PLAN) and PLA Rocket Force (PLARF) moderately increased. The white paper also highlighted China's plan to promote innovation in defence S&T, particularly in strategic, cutting-edge and disruptive technologies.

With China's Military-Civil Fusion (MCF) strategy that aims to promote deeper integration of China's civilian and defence technological ecosystems, we can expect PLA to exploit new AI and Robotics development

laid out in the AIDP.[31] This includes new AI technological frontiers such as swarm intelligence technology, human-machine hybrid enhanced intelligent systems, autonomous unmanned systems and neural network architectures.[32] In Aug 2016, China's Central Military Commission (CMC) Joint Staff Department also called upon PLA to leverage AI to enhance operational command, planning and deductions and decision support.[33] AI and AI-enhanced Robotics technologies will be adopted throughout the different services in PLA to enhance China's military capabilities to defend its national sovereignty and territorial integrity. The following paragraphs elaborate on the approach and some of the AI and Robotics technologies adopted or trialed by the various services.

PLA Ground Force (PLAGF). PLAGF has 7 commands, comprising 5 Theatre Commands (TC), the Xinjiang military command and the Tibet military command. Amidst the changing security landscape, the PLAGF is transforming itself to perform regional defence and trans-theatre operations, with improved capabilities for precise, multi-dimensional, trans-theatre, multi-functional and sustained operations.[34] With significant downsizing, PLAGF will likely adopt military robotics and autonomous ground systems for manpower augmentation.[35] Since 2016, the PLAGF conducted AI competitions to encourage civilian and military innovators to build and experiment with new capabilities to accelerate the development of military-use autonomous technologies. Capabilities trialed include ground-air 'recon-strike' unmanned swarm systems, robots that fight alongside PLA human war-fighters, and high-mobility autonomous mountain vehicles.[36]

The use of AI and Robotics technologies by the PLAN will potentially cause a rapid escalation of tensions when nations increasingly deploy similar capabilities to counter China's aggressive claims in the disputed areas in ECS and SCS.

PLA Navy (PLAN). PLAN has 3 commands, comprising the East TC Navy (Donghai Fleet), the South TC Navy (Nanhai Fleet), the North TC Navy (Beihai Fleet), and the PLAN Marine Corps. Given China's strategic interests over the ECS and the SCS, the PLAN is modernising to improve its capabilities for strategic deterrence and counter-attacks, maritime manoeuvre operations, joint maritime operations, comprehensive defence and integrated support.[37] The PLAN has deployed and experimented with a range of

The 5 Theater Commands of the PLA.

Wing Loong II side view, Dubai Air Show 2017.

autonomous surface and underwater vessels such as the *Jinghai* (精海) and *Haiyi* (海翼) for surface and underwater surveillance, respectively.[38] Hitherto, there have been at least 5 reported incidents where fishermen found the Haiyi in various parts of Asia.[39] China has also embarked on the '912 Project', a classified programme working to develop underwater robots to supplement crewed submarines by relying on AI for surveillance, mine-laying, and attacks on enemy vessels.[40]

PLA Air Force (PLAAF). PLAAF has 5 TC commands and one airborne corps. As it transits from territorial air defence to both offensive and defensive operations, the PLAAF is improving its capabilities for strategic early warning, air and missile defence, information countermeasures, airborne operations, airstrikes, strategic projection and integrated support.[41] The PLAAF has been developing and operationalising various semi-autonomous Unmanned Aerial Vehicles (UAVs) for manned-unmanned teaming co-operative reconnaissance and air combat, and the use of UAVs to enhance its logistics capabilities.[42] PLAAF also conduct competitions to test new intelligent UAV and drone swarm technologies, such as multi-target recognition, precision target strikes, real-time planning, and force-on-force air combat.[43]

PLA Rocket Force (PLARF). China believes in nuclear deterrence and is modernising the PLARF to enhance its strategic counter-balance capability. The PLARF emphasises applying machine learning and neural network to support targeting, improve maintenance of weapon systems and intelligent reasoning and decision-making. Like the PLAGF and PLAAF, the PLARF also leverage AI competitions to push AI development, specifically in precision-strike related capabilities such as image detection and recognition and multimodal remote sensing image registration capabilities.[46]

PLA Strategic Support Force (PLASSF). PLASSF is a new combat force that focuses on new combat capabilities.[47] The PLASSF leverages AI advancements to support space, cyber, electronic and psychological warfare. It partners with various institutes and universities to enhance PLASSF's capabilities in areas such as cybersecurity, cryptography, quantum information and the use of AI in electronic reconnaissance.[48] The PLASSF also focuses on applying AI to improve the processing and analytics of meteorological and hydrological data.[49]

Adoption of AI and Robotics in the PLA

Thus far, the development of military-use AI has focused primarily on enabling the PLA to collect and

process data faster for intelligence and decision-making. AI and Robotics technologies will not replace the use of conventional weapons. Lethal AI-enabled Robotics has, by far, been supervised autonomously, with man-unmanned teaming to augment the human war-fighting capabilities or with unmanned but human-controlled aerial and surface vessels to reduce the risk of human lives in a hostile environment. These capabilities are not unique to China, and many countries worldwide are increasingly investing in AI-enabled military equipment.[50] While AI and AI-enabled Robotics will be at the forefront of PLA's modernisation in the next decade, it is unlikely that China will adopt the use of fully autonomous lethal weapons to avoid backlashes for their development of more advanced military AI and autonomy.[51] That said, we do not rule out the possibility of China doing so if its adversaries deploy such fully autonomous lethal weapons.

SECURITY IMPLICATIONS OF CHINA'S MILITARY-USE AI AND ROBOTICS

Based on the modernisation and the adoption of AI and Robotics technologies mentioned above, the modernisation of the PLAN and PLARF will have the most significant strategic security implications as China builds up its national AI capabilities.

Escalation of Tensions in the East China Sea and South China Sea

The use of AI and Robotics technologies by the PLAN will potentially cause a rapid escalation of tensions when nations increasingly deploy similar capabilities to counter China's aggressive claims in the disputed areas in ECS and SCS. The PLAN already started deploying sea drones and unmanned vessels in the ECS and SCS, and China may be expected to continue along this trajectory in the coming years. AI and Robotics capabilities such as sea drones and unmanned systems will allow China to expand its Anti-Access/Area-Denial (A2/AD) capabilities beyond the First Island Chain.[52] The PLAN will be able to see further and react faster to any 'intrusion' to protect their sovereignty within the self-proclaimed 'nine-dash line' map. These directly threaten the other claimants of the disputed islands, and they will have to react to protect their own national interests. Since sea drones and unmanned systems can be inexpensive, developing states will be able to easily buy such systems off the shelves and deploy similar systems to counter China's aggression.

The expansion of China's A2/AD zones will also impede the United States (US) freedom of navigation in the SCS. The PLAN plans to use AI-enhanced Unmanned Underwater Vehicle (UUV) to enhance its underwater monitoring and antisubmarine capabilities and challenge US undersea military superiority. If armed with AI-enhanced semi or supervised autonomous cruise missiles, encounters between China's sea drones and US conventional equipment can become complicated, accident-prone and destabilising.[53] Given that the US is also developing similar Robotics systems to counter China, there will be no lives lost in a Robotics face-off. This can potentially lead to the lowering of the threshold for war.

Impact Strategic Stability in the Region

The use of AI and Robotics technologies will also have a destabilising effect on nuclear deterrence. Based on the PLARF's modernisation plans, one can expect China to adopt AI-enhanced precision-strike capabilities coupled with drone swarms to conduct Intelligence, Surveillance and Reconnaissance (ISR) operations to locate and track nuclear and non-nuclear mobile missile launchers and their accompanying radar systems speedily and effectively.[54] Improved processing and analytics of meteorological data by the PLASSF can also be fed to the PLARF to enhance their missile precision. Although China's nuclear warhead arsenal is small compared to the US and Russia, such AI-enhanced capabilities, if left uncontested, can allow them to strike more effectively, thereby tilting the balance of power in the region.[55]

CONCLUSION

The world can expect China to continue to develop its AI and Robotics technologies to enhance its national security. AI and Robotics technologies will allow China to boost its economy and enhance its military capabilities to defend its national sovereignty and territorial integrity, including over the contested areas in ECS, SCS, Taiwan and Tibet. The PLA will transform into a modernised force with proliferated adoption of military-use AI and Robotics technologies that will change the way China fight wars. Although AI and Robotics will not replace conventional weapons, these technologies will allow PLA to expand its naval force

over a broader area in ECS and SCS with lesser cost and human resource. AI will also enhance China's missile capabilities that can directly threaten its adversaries. These will potentially escalate tensions, lower the threshold for war, and adversely impact the region's security landscape.

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