The China AI and Autonomy Report

A biweekly newsletter on AI and autonomy developments in China

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Welcome to the China AI and Autonomy Report, a biweekly newsletter published by CNA. Read in browser.

In this issue, we highlight a number of *PLA Daily* articles discussing the future of warfare, including those reporting on the trends in intelligent warfare, cognitive warfare, and the use of the metaverse for training. These articles indicate the continued importance that the PLA places on understanding the role of AI in military operations. Following controversies over the use of its drones in the Ukraine War, PRC drone manufacturer DJI has announced that is has temporarily suspended all business activities in Russia and Ukraine. In other Ukraine War-related news, PLA National Defense University Professor Li Minghai analyzes the role of cognitive warfare in the conflict. In industry news, the city of Beijing has granted Pony.ai and Baidu's Apollo Go permits to operate driverless cars. These are the first permits of their kind in China. Relatedly, a document released by the PRC tech giant Baidu states that it leads the world in global patent applications for deep learning and autonomous driving.

THIS WEEK'S CONTENTS

RUSSIA-UKRAINE WAR

DJI suspends operations in Russia and Ukraine amidst continued controversy over the use of its UAVs in the Ukraine conflict. On April 26, DJI announced that it "is internally reassessing compliance requirements" and "will temporarily suspend all business activities in Russia and Ukraine."[1] The *Washington Post* noted that, while "most Chinese companies with a presence in Russia have chosen to stay silent about their plans," some firms "have quietly adjusted operations to minimize exposure to the Russia market."[2]

DJI reached the decision amidst continuing controversies it has faced over the past two months. In March, DJI was accused of limiting the capabilities of drones used by the Ukrainian military (see Newsletter 11) and, later that month, German electronics retailer MediaMarkt removed DJI drone from its stores (see Newsletter 12). Meanwhile, the *Wall Street Journal* reports that Ukrainian soldiers have been told not to connect DJI drones to Wi-Fi or mobile networks, and that US drone manufacturers are stepping in to fill Ukrainian military requirements for small commercial drones. Federal Communications Commissioner Brendan Carr, commenting on the controversy, stated that, "Reports about DJI drones being used by the Russian military in Ukraine only underscore the need for the US to adopt a clear and consistent response to the potentially serious national security threats posed by this Chinese drone maker."[3]

PLA National Defense University (NDU) professor argues that cognitive warfare operations in the Russia-Ukraine War represents the future of warfare. The *Global Times*, a widely read subsidiary of the *People's Daily* with a strong nationalist bent, published an op-ed by Senior Colonel Li Minghai, a professor at the PLA NDU National Security College War and Crisis Response Training Center, claiming that cognitive warfare is the "essence" of the confrontation between Russia and Ukraine.[4]

Cognitive domain operations, according to Li, use neuroscience, new information technologies (such as big data and AI), and mass communication channels and platforms to execute cyber, psychological, public opinion, legal, and other forms of information warfare across the conflict continuum and at all levels of war. Li argues that these operations influence opponents' thought processes and ideology through disseminating propaganda, indoctrinating populations, and infiltrating their culture and value systems. Li asserts that this "mind war" weaponizes language and ideas to "affect targets' cognition," influence their pursuit of their military and political objectives, and "change their decision-making and behavior."

Li alleges that Russia, Ukraine, and Western countries have effectively exploited the world's growing reliance on communications technologies and platforms to sway domestic and international support for their respective aims. According to Li, these states have accomplished this exploitation by selectively releasing key leadership statements and information—along with disinformation and misinformation—about the war, particularly in audio-visual formats, on global social media platforms. To illustrate his point, Li summarizes key statements that Vladimir Putin, Volodymyr Zelensky, and other global leaders have issued to muster their citizens' support and the support of other countries for their respective sides of the conflict.

FUTURE WARFARE

PLA Daily article discusses seven trends of intelligent warfare. The *PLA Daily*, the official newspaper of the PLA, published a lengthy examination of changes that will be brought about by intelligent warfare.[5] The

article argues that only by realizing and acting on seven trends in warfare can the PLA become "invincible."

Trend 1: From the "strong beating the weak" to the "intelligent beating the dull." The article argues that intelligent warfare will transform the basis for winning wars from traditional force advantages to the effective use of AI-enabled systems that will enable traditionally weaker militaries to defeat stronger militaries. Victory will go to the side that can not only develop AI-enabled weapons and equipment but also design strategies and tactics tailored to their effective use.

Trend 2: From "destructive power" to "manipulating cognition." The authors suggest that intelligent warfare will accelerate the transformation of war from an emphasis on physical destruction to an emphasis on the manipulation of human cognition to weaken enemy morale and the will to fight. In part through the use of AI, militaries will be able to tailor attacks against specific individuals or groups based on personality preferences, psychological characteristics, and decision-making habits.

Trend 3: From "human-based" to "human-machine collaboration." The article predicts that the use of unmanned systems will become widespread and characterized by extensive human-machine collaboration, including the organic integration of humans and machines.

Trend 4: From "big eats small" to "fast eats slow." The article states that extensive use of AI will enable the speed of the kill chain to overcome the traditional advantage of numerical superiority. The ever-increasing speed and effectiveness of AI-enabled systems will reduce human involvement on the battlefield and will result in humans taking a supervisory role over unmanned systems, known as a "human-on-the-loop" approach to the command and control of machines.

Trend 5: From "winning through integration" to "winning through clusters." The authors assert that in future wars the use of swarms of low-cost, distributed, single-function unmanned systems will replace the traditional reliance on costly high-end, multifunctional manned platforms. Swarms of autonomous drones will be able to self-organize and independently carry out missions, and their large numbers will allow them to saturate enemy systems and make them more resistant to attrition.

Trend 6: From "military dominance" to "hybrid warfare." The authors suggest that intelligent warfare will be conducted across many domains, including space, cyber, diplomatic, economic, and cultural. This will result in fewer clear boundaries between peace and war and in more common, but lower-intensity conflicts that occur in the "gray zone" between peace and war. These operations will integrate traditional military operations with economic warfare, diplomatic warfare, cyber warfare, public opinion warfare, psychological warfare, and legal warfare.

Trend 7: From "practical test" to "experimental exercise." According to the article, the use of advanced virtual reality will allow militaries to train under a variety of simulated conditions that may be superior in some ways to real-world training and exercising. The use of virtual technologies will better predict the outcome of wars and thus reduce the chances of war or limit the size of war as countries decide either not to start a war or that a military response to an act of aggression would be futile.

PLA Daily article calls battle management systems the "core" of modern combat systems. A *PLA Daily* article, written by the deputy director of the Training Management Department of the People's Armed Police Command College, argues not only that battle management systems are the "core" of modern combat systems but also that AI will become the "core support and driver" of future battle management systems.[6] According to the author, effective battle management helps ensure that "commanders and troops can smoothly exchange information and instructions." The author defines battle management systems as

"command information systems used to support battle management activities, including intelligence collection, information transmission, target identification, threat determination, weapons assignment, and mission planning that evolves with the evolution of warfare and technological progress."

The article argues that as multidomain operations make warfare more complex, commanders will require AI-enabled battle management systems that can achieve real-time connectivity between sensors and shooters and help commanders make rapid decisions at all levels of command. The use of AI-enabled battle management systems will allow for improved cross-domain operations as communications and data collected from different domains will be fused and disseminated more effectively. This will lead to battle management systems providing an adaptive operational advantage and decision support by spontaneously identifying and classifying threats, autonomously assessing tradeoffs, and automatically assigning weapons.

PLA Daily article emphasizes role of software assurance in future combat systems. A *PLA Daily* article predicts that software will come to replace hardware as the most important component of AI-enabled weapon systems.[7] The author argues that more attention needs to be placed on finding and fixing software errors that can result in faulty performance and expose systems to cyber attack. The author recommends that software developers and the military be more vigilant in their quality assurance measures and recommends that the military establish software security centers that are authorized by the developer to fix software errors independently.

PLA Daily article predicts that the metaverse will improve training. An article in the *PLA Daily* argues that the metaverse has the potential to improve training by effectively combining real and virtual training in a variety of scenarios.[8] The article defines the metaverse as the fusion of the virtual and real worlds through the use of extended reality, digital twin, blockchain, and AI technologies.

According to the author, although the ultimate form of the metaverse is unknown, the metaverse will be able to provide a means to train military personnel in complex, changeable, and harsh battlefield environments in an immersive, realistic, and practical way. The article states, "There is no doubt that if troops can be subjected to such an environment and conditions, their level of combat and combat capabilities will be greatly enhanced and strengthened." Because of the newness of the metaverse, the article argues that it should be developed incrementally to take into account the changing nature of war as well as military strategy, existing conditions, and future requirements that create realistic scenarios conducted at simulated training bases that will give military personnel an immersive experience that will accurately reflect the "nature, fierceness, and cruelty of future war."

PLA Daily article discusses essential role of cognitive warfare in future warfare. A *PLA Daily* article states that cognitive warfare is a primary component of achieving the Sun Zi maxim of "winning without fighting" because of its focus on undermining adversary will.[9] The author describes cognitive warfare as attacks against human will, spirit, and psychology for the purpose of destroying the enemy's cognitive base and sapping its will to fight. The ultimate goal of cognitive war is to destroy the "spiritual core of the enemy's personnel" either to prevent war or limit its scope. Cognitive warfare operations are aided by analysis of the target's politics, military, cultural history, and national character so as to identify the fundamental values of the target.

The article describes cognitive war as being based on changes in material conditions that are then exploited to change a human's understanding of reality. In this respect, cognitive warfare will be enabled by advancements in AI-enabled weapons and their improved accuracy and lethality. The destruction wrought by these advanced weapon systems will then be quickly disseminated as credible information using AI-

enabled communication, information acquisition, and dissemination technologies.

UNMANNED SYSTEMS

A PLA reconnaissance company adapts tactics for combined drone-vehicle operations to improve mobility and extend the range of reconnaissance operations. According to *China Military Online*, the PLA's official news and information portal, a Xinjiang-based reconnaissance company of an unidentified regiment conducted tactical drills to control drones from reconnaissance vehicles with the goal of extending the range of the reconnaissance team.[10] During the training, the unit studied the parameters of the UAVs' command link, accumulated data, and manipulated tactical relays. PLA representatives noted that if drones can be paired with reconnaissance vehicles and effective tactics are employed, the overall mobility of the unit can be improved.

GOVERNANCE AND POLICY

Chinese Academy of Sciences publishes AI principles for climate action. The Chinese Academy of Sciences International Research Center for AI Ethics and Governance published the "Principles of AI for Climate Action," which proposes principles governing the use of AI to fight climate change and to lessen the environmental impact of AI technologies. The Center drafted the principles with input from Tsinghua University and the Chinese University of Hong Kong, among others, and international partners from the Technical University of Munich, Singapore Management University, and the South Africa-based Centre for AI Research.[11] According to the *S&T Daily*, an official PRC newspaper overseen by the Ministry of Science and Technology, the goal of the document is to empower AI-enabled technologies to promote energy conservation and optimize industrial processes to reduce pollution.[12] The "values and principles" outlined in the consensus for AI include "for the good of humans and ecology," energy conservation, privacy protection, fairness and justice, education promotion, and cooperation. The AI Ethics and Governance Center specifically noted the potential use of AI for climate forecasting, reducing emissions, carbon storage, and smart energy systems.[13]

The PRC Ministry of Industry and Information Technology (MIIT) sets deadline for software developers to ensure that mobile internet applications follow new privacy and user rights regulations. On April 20, the MIIT's Information and Communications Management Bureau announced that the ministry had recently "organized third-party testing" to inspect various mobile internet applications.[14] MIIT stated that at least 37 applications have not yet "completed rectification" to ensure compliance with laws such as the Personal Information Protection Law (discussed in newsletter 3), the Cybersecurity Law (passed in 2017, English translation available here), and related telecommunications regulations.[15] The non-compliance applications list provides the application name, developer, platform or host, version, and information on the issue.[16] Problems listed among the 37 applications included illegally collecting personal information, excessive permissions required, and deceptive or misleading information for users.[17] The MIIT announcement did not specify exactly how software developers must fix individual problems but stated that all corrections should be implemented by April 26.[18]

INDUSTRY

City of Beijing grants first permits for autonomous driving in China to ride-hailing rivals Baidu and Pony.ai. On April 27, the city of Beijing loosened restrictions on driverless cars by allowing autonomous vehicle company Pony.ai and Baidu's Apollo Go to operate driverless cars in the city.[19] They were the first-ever permits of their kind issued in China. Pony.ai, a leading autonomous driving company with operations in both the US and China, announced that Beijing municipal authorities awarded the company a permit to operate its robotaxis "in a 60 square kilometer (23.1 square mile) area in a Pilot Zone in Yizhuang, Beijing."[20] According to Baidu's press release, "the regulatory milestone . . . represents a major step towards a fully driverless future."[21] The *Financial Times* notes that a safety supervisor will still be required in the car "but does not need to be behind the wheel as in previous trials."[22] Baidu has also secured permits for its self-driving taxi service in other Chinese cities, such as Shanghai, Guangzhou, Shenzhen, and Zhejiang Province, but unlike the Beijing permits, these require a human behind the wheel.[23]

Baidu announces lead in global patent applications for deep learning and autonomous driving. *China Daily,* the PRC's official English-language newspaper, reports that, according to a white paper published by Baidu, as of April 2022 the company "has filed more than 22,000 AI-related patent applications worldwide" and ranks first in patent applications globally for deep learning and autonomous driving.[24] Of that total, "over 16,000 patents" applications were filed in China, and approximately 4,600 patents related to AI were granted. *China Daily* also reports that "over 90 percent of the patented technologies have been leveraged into products," which means that Baidu is one of the most successful companies in terms of commercializing its applications. Excerpts of the white paper published by Baidu and posted on social media highlight that, in 2021, Baidu's research and development accounted for 23 percent of core revenue.[25] Baidu Chief Technology Officer Wang Haifeng attributed the company's success to upgrading through open-source platforms. *China Daily* specifically noted the importance of patents related to PaddlePaddle, Baidu's deep learning platform, and autonomous driving applications, such as Apollo Go.

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