A biweekly newsletter on AI and autonomy developments in China

Welcome to the *China AI and Autonomy Report*, a biweekly newsletter published by CNA. Read in browser. Over the past two weeks, the digital economy has featured prominently in official Chinese Communist Party (CCP) and PRC government announcements. On January 12, the PRC government released the 14th Five-Year Plan for the development of the digital economy and an article by President Xi Jinping on the same topic followed a few days later. On January 21, the Central Commission for Discipline Inspection (CCDI) issued a communique on combating corruption, stating that the CCP must rein in the "disorderly expansion of capital and monopolization of [online] platforms." The CCP appears to be stressing two key features of its high-tech policy: its recognition of the industry's importance to the PRC's development and place in the world, and its desire that the high-tech industry develop according to its guidelines.

In this issue, we also cover the continuing exploration of future warfare in *China Military Online*, the official news outlet of the People's Liberation Army (PLA). The Chinese Academy of Sciences's (CAS's) unmanned underwater vehicles (UUVs) have made some notable achievements. Real estate company China Vanke has named an AI-powered avatar its 2021 employee of the year. Zhu Songchun, dean of the Beijing Institute for General Artificial Intelligence, has written a philosophical article in WeChat arguing that the development of artificial general intelligence needs to be focused more on giving human subjectivity and emotions to AI.

THIS WEEK'S CONTENTS

DNL-2022-U-031619-Final2
Approved for Public Release.

NEW CNA REPORT

A new CNA report, Dimensions of Autonomous Decision-making, identifies the risks associated with the use of autonomy technology. The report catalogs risks of concern from a large number of experts, organizations, and governments—including the PRC—who are both for and against the use of autonomy technology in weapons systems. Their differing perspectives on technology, human oversight, ethics, privacy, and civil rights were considered in creating a checklist for technology developers and commanders before they develop or deploy intelligent autonomous systems.

GOVERNING ONLINE PLATFORMS

CCP CCDI to strengthen efforts to curb "disorderly expansion of capital." The CCP's top disciplinary agency, the CCDI, released a communique on January 21, following its plenary meeting, vowing to crack down on corruption, including "working to investigate and deal with the corruption behind the disorderly expansion of capital and monopolization of [online] platforms, and to break the link between power and capital" (see communique in Chinese here and PRC English language reporting here).[1]

The announcement is being seen as a sign that the Party will continue its crackdown on China's high-tech sector.[2] According to Bloomberg, the phrase "disorderly expansion of capital" came into use in late 2020 and ushered in a clampdown on technology giants and private education companies, and "is among several Xi-isms feeding concerns that China is tilting away from free markets and back toward more ideologically driven centralized planning."[3] The communique also stresses anti-corruption efforts in the construction and financial sectors, state-owned enterprises, and in grain purchasing and sales.

Official PRC media stated that rumors that the Cyberspace Administration of China (CAC) has released a new regulation for IPO and investment activities of Internet companies are false. The rumored document was titled "Internet Enterprise [Stock Market] Listing, Investment, and Financing Operational Standards." CAC stated that those responsible for the rumors would be held strictly accountable according to law and expressed hope that the majority of enterprises and the public would not spread the rumors.[4] As previous issues of the *China AI and Autonomy Report* have documented, Chinese AI companies have faced difficulties attempting IPOs and have been subject to increasing regulation.

THE DIGITAL ECONOMY

China published its 14th Five-Year Plan on developing the digital economy (for full text in Chinese from the PRC government see here). Released on January 12, the plan outlines China's development targets for the digital economy and covers such topics as upgrading the digital infrastructure, leveraging the full potential of China's data, promoting the digital transformation of China's industries, strengthening governance and security of the digital economy, and building international cooperation in the digital economy.

The plan aims for the output of the core industries in China's digital economy to account for 10 percent of the country's GDP by 2025 (compared with 7.8 percent in 2020).[5] According to the plan, China will also seek to enhance its basic research capabilities in "strategic areas" such as sensors, quantum information, communications, integrated circuits, key software, big data, AI, blockchain, and new materials.[6]

Data: Data features prominently in the plan, which dedicates an entire section to "giving full play to

data elements." The plan encourages market entities to collect data in accordance with the law and to improve data processing capabilities and quality.[7] The plan also calls for the construction of a national-level integrated big data center system to coordinate computing power, algorithms, data, and application resources across China.[8]

AI: The plan promotes the development of intelligent computing centers and building a new intelligent infrastructure that integrates intelligent computing power, common-use algorithms, and development platforms. It also advocates that systemized AI services be provided for key emerging fields such as government services, smart cities, intelligent manufacturing, autonomous driving, and language intelligence.[9] The plan further seeks to build an intelligent and efficient integrated infrastructure and to incorporate AI into various industries, such as agriculture, animal husbandry, water conservancy, environmental protection, and services, especially those that help older adults.[10]

International cooperation: The plan also aims to strengthen the development of the Digital Silk Road, which is part of China's overall Belt and Road Initiative (BRI).[11] The plan endorses cooperation on the digital economy with the Association of South East Asian Nations and European and African countries. It also endeavors to carry out optical cable construction with countries in the BRI, build a blockchain-based service network and platform for digital economic cooperation, and promote the globalization of emerging service capabilities, such as data storage and intelligent computing. In addition, the plan seeks to expand innovation in new modes for international cooperation in the fields of finance, logistics, and e-commerce and supports China's digital economic companies to "go out"[12] and pursue opportunities abroad.[13]

Xi Jinping writes article on the importance of developing China's digital economy (for full article in Chinese see here).[14] Xi's article was published in *Seeking Truth*, the official theoretical journal of the CCP's Central Committee, on January 15 and contains some of the same language used in the January 21 CCDI communique. Xi writes that the rapid development of China's digital economy has resulted in some "unhealthy" and "irregular developments" that "have not only affected the development of the digital economy but have also violated laws and regulations and have threatened the economic and financial security of the country and must be resolutely corrected and governed." Xi writes that the Party must promote the "healthy development" of the digital economy by "preventing [online] platform monopolies and the disorderly expansion of capital" and "plugging supervision loopholes."

However, Xi also describes the digital economy as becoming a key force that is "reorganizing global factors and resources, reshaping the global economic structure, and changing the pattern of global competition." Xi writes that when compared to other countries, China's digital economy is "large but not strong" and "fast but not superior." He views the healthy development of a digital economy as conducive to building a modern economic system and providing new competitive advantages for China.

Xi also discusses AI as an integral component of China's digital economy, emphasizing it as necessary to promote the "deep integration" of the Internet, big data, and AI with industry. He names "intelligent hardware" as one of the key areas for China to focus on developing, along with integrated circuits, new displays, and communications equipment.

LOCAL POLICY

Shanghai announces support for semiconductor industry. As part of its 14th Five-Year Plan, the city of Shanghai has announced that it will subsidize up to 30 percent of investments up to 100 million yuan ($15 million) in semiconductor materials, equipment, and software projects. The city also

announced that it will provide cash incentives up to 500,000 yuan ($79,000) and housing assistance to attract qualified workers to the industry.[15] Semiconductor Manufacturing International Corp., China's largest chip manufacturer, is located in Shanghai. According to the *South China Morning Post,* the incentives reflect a larger effort by the PRC government to mitigate the effects of US sanctions against China's high-tech industry.[16] In March 2021, the Shanghai government released its 14th Five-Year Plan, which prioritizes Shanghai's semiconductor, biomedicine, and AI industries for development.[17]

UNMANNED SYSTEMS

UUVs complete series of scientific missions in the Marianas Trench and Arctic Ocean. The PRC's national academy for the natural sciences, CAS, reports that the Haidou-1 UUV has conducted a series of dives in the Marianas Trench, including in the deepest part of the ocean, the Challenger Deep. According to CAS, Haidou-1 broke a national record for the longest continuous dive under 10,000 meters (more than 10 hours), and while in autonomous mode broke the world records for the longest cruising time under 10,000 meters (more than 8 hours), the longest distance traveled under 10,000 meters (more than 14 kilometers), and the maximum diving depth (10,908 meters). The CAS Shenyang Institute of Automation developed the Haidou-1.

CAS also reports that the autonomous UUV Exploration 4500, also developed by the CAS Shenyang Institute of Automation, completed scientific research in the Arctic Ocean focusing on collecting multi-beam sonar, hydrological, and magnetic data. CAS reports that this is the first time that the PRC has used an autonomous UUV in the high latitudes of the Arctic to conduct research near the ocean floor. According to CAS, the research conducted by the Exploration 4500 will be used to help protect the Arctic environment.[18]

PRC state-run media outlet suggests using PRC UAVs to assist in Tonga volcano disaster relief. The *Global Times* conducted an interview with a PRC-based telecommunications industry analyst who suggested that UAVs could be used as satellite communication base stations to help restore severed communications with the island nation after the eruption of the Hunga Tonga volcano. According to the state-run Global Times, "China's self-developed UAV Wing Loong drone was deployed to restore communications in Central China's Henan Province in July 2021, after network signal was cut off by record downpours and floods. The drone traveled around 1,200 kilometers in four and a half hours to arrive in the targeted area, and it operated for eight hours there."[19]

FUTURE WARFARE

Two researchers at the PLA's Army Command College discuss relationships between machines and humans in intelligent warfare. In an article titled "Exploring the 'Underlying Logic' of Intelligent Warfare from Four Basic Relationships," the researchers argue that "the most fundamental contradiction in intelligent warfare is the relationship between man and machine." They conclude that, even as AI becomes more prevalent in military operations, humans will retain their essential role in warfare, and that "four basic relationships need to be dealt with" to fully understand the nature of future warfare. According to the article, these relationships are the following:

The relationship between manned and unmanned systems. The authors argue that currently most unmanned systems are not fully autonomous and that all operate by some form of human control. This results in a situation in which the unmanned system is in the "front" and humans are in the "back" controlling or managing the system's operation. Even in systems that display a high degree of autonomy, human operators monitor their operations and can intervene if necessary.

The relationship between machine intelligence and human intelligence. AI systems today are capable only of weak AI. Currently, AI is best suited to operate in environments based on logic and empirical facts and are less suited to operate in situations that require conceptual thought. As a result, machines cannot now replace humans in analyzing and judging situations, understanding the commander's intent, making combat determinations, deploying troops, and handling unexpected situations. Thus, machines can conduct tasks related to sensing, calculation, storing and retrieving data, and understanding, judging, and decision-making in simple situations. Humans, on the other hand, will continue to be responsible for "understanding the core, overall, and complex situations of a problem."

The relationship between victory through technology and victory through human involvement. AI lacks the creativity of humans and will not be able to respond as well to new situations that may not correspond to existing data. According to the article, "the core essence of why people become people is that people can recognize, evaluate, educate, and motivate themselves, and can realize their potential, which is difficult for AI to achieve." The authors cite the PLA during the Korean War and the Taliban in the US war in Afghanistan as examples of technologically inferior forces that were able to successfully resist a technologically superior force that demonstrate the limitations of technology-centric warfare and the important role of the human factor in war.

The relationship between benefit and risk. Although AI promises to increase the effectiveness of military operations, it also entails some risk. AI presents new ethical issues in the command and control (C2) of machines. AI systems, for example, lack value systems that constrain human behavior and cannot judge right from wrong, which may result in mistaken and indiscriminate killings.

The increased interconnectivity of AI systems also increases risk by raising the complexity of C2 systems, which can increase reliability issues and software errors that can affect the entire system.[20]

INDUSTRY

PRC AI chip startup Axera has raised 800 million yuan ($126 million) from investors. Investors include the food delivery giant Meituan and the venture capital firm Qiming Venture. Axera focuses on AI chips for computer vision. According to CNBC, the funding reflects the overall effort in China to achieve self-sufficiency in computer chip production.[21]

ByteDance disbands investment arm. The owner of TikTok, ByteDance, has announced that it will disband its investment arm. According to CNBC, ByteDance states that the move is intended to "strengthen the focus of the business, reduce investments with low connection (to the main business) and disperse employees from the strategic investment department to various lines of business."[22]

The PRC's third-largest home seller by sales, China Vanke, announced that its top employee for 2021 is a software robot. According to China Vanke chairman Yu Liang, a robot debt collector represented by a female avatar named Cui Xiaopan had "a 91.4 percent success rate in collecting accounts receivable and overdue loan repayments." According to the *South China Morning Post,* China Vanke's use of a software robot for debt collection represents a broader industry trend in the PRC to replace workers with AI.[23]

RESEARCH AND DEVELOPMENT

PRC researchers have developed a robot capable of performing doctor-guided minimally invasive surgery. *Phoenix News* reports that researchers at the Minimally Invasive Surgical Center of the Institute of Medical Engineering, Shenzhen Institute of Advanced Technology, CAS, have developed a human-controlled robot that can conduct minimally invasive surgeries based on the

application of the Fiber Bragg Gratings sensing principle. Doctors were able to operate on pigs using the robot, which can sense tactile information.[24]

AI WORKFORCE

Twenty institutes of higher learning and several corporations have established the Qingdao Intelligent Internet of Things and Industry Talent Integration Center. The center held its first meeting on January 9, 2022 (see article here). The center is a collaborative effort between Shandong University, Ocean University of China, China Petroleum University, and more than 20 other colleges and universities, as well as the companies Hainayun, a subsidiary of Haier, a PRC-based home appliance and consumer electronics manufacturer, information technology provider Sugon, and Baidu Online Network Technology, a subsidiary of PRC online giant Baidu.

The center was established to develop the PRC's AI workforce through collaboration between industry and higher education. It will develop academic curriculum related to AI, train students in AI-related disciplines, work to develop technological breakthroughs, and develop AI applications. According to the PRC Ministry of Human Resources and Social Security, China's AI workforce has a shortfall of 5 million AI-related positions and for every job filled, 10 go unfilled.[25]

ARTIFICIAL GENERAL INTELLIGENCE

PRC researcher discusses use of Chinese philosophy to develop artificial general intelligence. Former UCLA professor Zhu Songchun, who is now dean of the Beijing Institute for General Artificial Intelligence, a professor at Peking University, and a professor of basic science at Tsinghua University, posted a lengthy and highly philosophical article on the PRC social media platform WeChat titled "Zhu Songchun: Intelligence Needs to be Driven by the 'Heart,' Realize the Dynamic Balance of 'Heart' and 'Reason'" (see English translation here).

Zhu uses the Chinese poet Su Shi's poem, "Ode to the Red Cliff," written in 1082, to explore the concept of artificial general intelligence. Su Shi was a government official during the Song Dynasty and an influential writer who was exiled for perceived criticism of the emperor. According to Zhu, the poem emphasizes the interaction of the "heart" and "reason" or, in other words, the disparity between what an individual desires and reality that causes a person's "inner pain." Achieving the correct balance between the two will ultimately lead to a meaningful life, Zhu claims.

Based on this assumption, Zhu argues that for AI to become artificial general intelligence it must capture the essence of being human and balancing the "heart" and "reason." The goal of artificial general intelligence, he writes, "is to create general-purpose agents with autonomous perception, cognition, decision-making, learning, execution, and social collaboration capabilities that conform to human emotions, ethics, and moral values."

He adds that, although being able to sense the world properly is a must for artificial general intelligence, it is the subjective world view that humans possess that will truly make AI human-like and able to interact with humans on an equal level. As a result, advancements in artificial general intelligence need to be based not only on technology but also on philosophy, the humanities, and social sciences. Zhu further argues that Buddhism and Confucianism can form the necessary philosophical underpinnings to develop an artificial general intelligence with Chinese cultural characteristics.[26]

NOTES

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The China AI & Autonomy Report is produced by CNA's China and Indo-Pacific Security Affairs Division. The division's team of nearly 40 language-skilled regional specialists has provided sponsors and the public with the context to make informed, data-based assessments about this critical region since 1998. CNA is a nonprofit research and analysis organization dedicated to the safety and security of the nation. It operates the Center for Naval Analyses — the only federally funded research and development center serving the Department of the Navy — as well as the Institute for Public Research. CNA is dedicated to developing actionable solutions to complex problems of national importance.

For additional information, contact: CHINAAI@CNA.ORG

This work was performed under Federal Government Contract No. N00014-16-D-5003.

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