

# 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](#).

We begin this issue by covering a number of research and development stories. PRC researchers have published an article on their use of a satellite to conduct real-time tracking of the aircraft carrier USS *Harry S. Truman*. Researchers from Zhejiang University have reportedly developed a novel technique to enable a swarm of small UAVs to fly autonomously in complex environments. Separately, the *PLA Daily* reports on what appears to be the development of UAV “decoys” that will perform electronic warfare missions autonomously. The city of Chengdu has made public its five-year plan for “new type” information infrastructure, including the construction of an AI computing center. In industry news, the Biden administration is reportedly again considering sanctioning the surveillance tech company and PRC national AI champion, Hikvision. Finally, the PRC is building a dam using AI-enabled robots and additive manufacturing techniques without humans.

## THIS WEEK’S CONTENTS

- Defense-Related R&D.....2
- Local Policy .....5
- Industry .....6
- Notes .....6

## DEFENSE-RELATED R&D

**A PRC journal article describes real-time tracking of US aircraft carrier by satellite.** According to the [South China Morning Post](#), an article published in April in the PRC peer-reviewed journal *Spacecraft Engineering* reported on research involving an unidentified PRC satellite that was able to track the aircraft carrier USS *Harry S. Truman* in real-time as it conducted training off the coast of Long Island, New York, in June 2021.<sup>1</sup> The article reports that previous use of satellite data by the PRC to track US naval vessels required extensive processing on the ground that would often be completed after an exercise was finished. According to the article, however, the satellite tracking the *Harry S. Truman* was able to detect the ship automatically using specially designed AI chips that are able to meet the space, weight, and power requirements of the satellite while also being hardened against radiation.

**Zhejiang University research team demonstrates fully autonomous miniature drone swarm flying through complex environments.** *Science Robotics*, a peer-reviewed journal of the American Association for the Advancement of Science, published an [article](#) by a Zhejiang University team summarizing its development of fully autonomous swarming micro robots capable of flying in uncontrolled complex environments.<sup>2</sup> The article notes that, while single-drone autonomous navigation has been aggressively developed by various industries, comparable autonomous performance by a swarm in complex, unknown, and changing environments is novel. The research team suggests that fully autonomous swarming has applicability for real-world tasks, including disaster relief, biological studies, dense air traffic systems, ready-to-deploy transportation for Mars exploration, and collaborative transportation to overcome payload weight limitations for single drones.

To achieve this new capability, the article claims that researchers from the Swarm Robot Research Center of the Huzhou Research Institute of Zhejiang University, a [PRC State Key Laboratory](#), leveraged “fully onboard” perception, planning, and control, using AI to process sensor inputs and produce optimized trajectory outputs within a few milliseconds when operating in “extremely” constrained and complex environments. In a [video](#) published by the research team, the swarm navigates from point to point through a bamboo forest, maintains a flexible swarm pattern while navigating a changing and occluded environment while collaboratively carrying out a “follow-person” task, and demonstrates re-swarming after one robot is stopped and moved by a researcher.

Of note, while the *Science Robotics* article and [other media reporting](#) suggest civil and scientific uses for this autonomous swarming technology, Zhejiang University’s website states that the project lead and head of the Swarm Robot Research Center, Gao Fei, has “undertaken a number of important scientific research projects” for the PRC Central Military Commission Science and Technology Committee.<sup>3</sup>



Images from *Science Robotics* journal article showing autonomous swarm transiting a bamboo forest via an AI-optimized trajectory while avoiding obstacles and inter-swarm drones. Source: Xin Zhou, Xiangyong Wen, Zhepei Wang, Yuman Gao, Haojia Li, Qianhao Wang, Tiankai Yang, Haojian Lu, Yanjun Cao, Fei Gao, "Swarm of Micro Flying Robots in the Wild," *Science Robotics*, May 4, 2022, Vol 7, Issue 66, DOI: 10.1126/scirobotics.abm5954, <https://www.science.org/doi/10.1126/scirobotics.abm5954>.

**PLA developing "intelligent" air-launched decoys to conduct autonomous swarming for electronic warfare missions.** The *PLA Daily*, the official newspaper of the PLA, published an [article](#) describing an "intelligent air-launched decoy" that can conduct networked swarming and autonomous coordination through the use of AI, datalinks, and information fusion.<sup>4</sup> The decoy is described as having the following four capabilities:

1. The ability to penetrate air defenses by deceiving enemy radar and then collect enemy weapon system frequencies and other types of signals intelligence and targeting data
2. The ability to deceive enemy air defenses by emitting false radar and other electromagnetic signatures in advance of strike aircraft
3. The ability to blind enemy radar with dense false target jamming
4. The ability to conduct kinetic strikes against enemy air defense radar or other electromagnetic nodes

Although the *PLA Daily* article describes the decoy as capable of "cruising," it does not refer to a particular PLA prototype. However, an Aviation Industries Corporation of China promotional [video](#) simulation shown at the 2021 Zhuhai Air Show depicts intelligent air-launched decoys that appear as a coordinated swarm of

cruise missiles carrying out radar signature spoofing and electronic warfare attacks against an enemy ship's air defenses while a UCAV prepares for a kinetic strike.<sup>5</sup>

Earlier, in May 2021, an author affiliated with the PLA's National University of Defense Technology (NUDT) wrote an [article](#) for the *PLA Daily* that described "autonomous" air-launched decoys based on cruise missiles that are under development in other countries such as the US and UK, and contended that "an important direction for the improvement and transformation of air-launched decoys in the future is to realize networked autonomous and coordinated operations."<sup>6</sup> Of note, the 2022 *PLA Daily* article states that "with the development of AI technology... the intelligent air-launched decoy is emerging"; suggesting that the decoy is still under development and not ready to be fielded.



Screenshots of AVIC promotional video showing air-dropped intelligent decoys in a coordinated flight pattern simulating electromagnetic signatures of fighter aircraft to deceive enemy air defenses. Source: CCTV-7: *Military Enthusiast Around the World* (军迷行天下), Oct. 6, 2021, <https://tv.cctv.com/2021/10/06/VIDEDvh7bTvrZLxpQzLotoTI211006.shtml?spm=C52346.PkjaaUOixzFJ.EBK2gmakG12.W.163>.

**PLA NUDT researchers focused on AI-enabled intelligence synthesis for combat command systems enter research paper in prestigious international computing conference.** The *S&T Daily*, the official PRC newspaper overseen by the PRC's Ministry of Science and Technology, reports that a team of researchers from the Big Data Information Engineering Group of the NUDT School of Systems Engineering had their research paper on AI-enabled combat command systems development accepted by the 45th Association for Computing Machinery Special Interest Group on Information Retrieval (ACM SIGIR) conference.<sup>7</sup>

Titled "PTAU: Prompt Tuning for Attributing Unanswerable Questions" and written by six NUDT researchers and professors, the paper proposes a psycholinguistic-inspired method for training machines to "comprehend" whether a task is within the scope of its own ability. According to co-author and NUDT professor Zhao Xiang, the paper is part of the PRC Ministry of Science and Technology's "[Science and Technology 2030 - New Generation AI](#)" program<sup>8</sup>; a funding program for the 2017 State Council-promulgated "[New Generation Artificial Intelligence Development Plan](#)," which laid out Beijing's guiding ideology, strategic goals, key tasks, and safeguard measures for the development of China's new generation of artificial intelligence technology.<sup>9</sup>

## LOCAL POLICY

**“New Infrastructure Construction Plan” of the Chengdu 14th Five-year Plan lays out strategic objectives for developing “new type” information infrastructure.** The Chengdu City Development and Reform Commission [published](#) the “New Infrastructure Construction Plan” (hereafter referred to as “the plan”) laying out development priorities including AI, 5G and gigabit fiber coverage, new supercomputing facilities, “smart” infrastructure (transportation, parks, factories, hospitals, and schools), and constructing new high-tech R&D infrastructure.<sup>10</sup> The goal, according to the plan, is to improve quality of life for the city’s residents and develop such key industries as information technologies, biotech, aerospace, transit, new energy, and new materials.

The plan calls for “improving AI infrastructure service capabilities,” including pilot applications of AI for use in air traffic control, finance, and medical care. The plan also calls for building a public, collaborative AI development platform that provides a library of “training” and “testing” datasets to promote the construction of open-source AI algorithm libraries, and tools for machine learning, natural language processing, and human-computer interaction. Of note, the plan also calls for “accelerated construction” of the Chengdu AI Computing center (see following entry).

**Chengdu Intelligent Computing Center launched.** The Chengdu Intelligent Computing Center was [officially launched](#) on May 10.<sup>11</sup> The computing center is part of the “East-Data/West-Computing” project that is designed to promote high-tech development in China’s Western region through the establishment of computing centers (see [Newsletter Issue 10](#)). According to a [report](#) published by Xinhua, China’s official news agency, the Center broke ground on June 9, 2021, with an investment of 12.5 billion RMB (1.84 billion USD) with the goal of constructing the “world’s leading new-generation AI computing platform” based on Huawei software and hardware.<sup>12</sup>

The Center is the largest in southwestern China and will include platforms for AI computing, smart cities, and scientific innovation. It has the computing power of 300 petaflops, referring to the number of times per second the system can run a calculation, which is equivalent to 150,000 high-performance personal computers. The Center will support applications in transportation, security, medical treatment, government, emergency services, education, environmental protection, remote sensing, and the internet and will be used to strengthen research collaboration between academia and the business community.

**Wuhan launches automotive-focused AI development zone.** The China Semiconductor Industry Association [reports](#) that a consortium involving the Wuhan University of Technology and the Wuhan Economic and Technological Development Zone has established the Wuhan Institute of Artificial Intelligence and New Energy Vehicle Technology (hereafter referred to as “the institute”) with an initial 5 billion RMB investment (736 million USD).<sup>13</sup> The institute’s application of AI to China’s new-auto sector is meant to further Wuhan’s reputation as China’s “auto valley,” a moniker analogous to “Silicon Valley” in the US. Media [reports](#) suggest the institute will focus on developing AI for application in its three focus areas: (1) intelligent networked vehicles, (2) intelligent transportation, and (3) intelligent manufacturing.<sup>14</sup> According to the Chinese Communist Party Secretary of the Wuhan University of Technology, Xin Sijin, the institute will benefit from the university’s pool of students and researchers with AI expertise.

## INDUSTRY

**Hikvision and the PRC Foreign Ministry respond to rumors of potential US sanctions on Hikvision for enabling human rights abuses in Xinjiang.** On May 4, the [Financial Times](#) reported that the Biden administration was considering imposing sanctions on PRC state-affiliated company<sup>15</sup> and AI “national champion” Hikvision because of its activities enabling human rights abuses against Uyghurs in Xinjiang through its AI-enhanced surveillance cameras.<sup>16</sup> In an [email](#) to Reuters about the possible sanctions, Hikvision noted that they still needed to be “verified” and further stated, “We think any such sanction should be based on credible evidence and due process, and look forward to being treated fairly and unbiasedly.”<sup>17</sup>

When asked during a press conference about the rumored US sanctions on Hikvision, PRC Foreign Ministry spokesperson Zhao Lijian expressed “grave concern” over the issue. He added, “China firmly opposes the US using human rights and other excuses and abusing state power and domestic law to wantonly suppress Chinese companies,” accusing the US of concocting the lie of human rights abuses in Xinjiang “to smear and malign China.” He further affirmed that the Chinese government will “resolutely defend the legitimate and lawful rights and interests of Chinese companies.”<sup>18</sup> If imposed, this round of sanctions would be the [harsheset sanctions yet](#) on Hikvision.<sup>19</sup>

**China is building a 180-meter-high hydroelectric dam in Qinghai province using AI-powered robotic equipment, additive manufacturing techniques, and no humans.** According to an [article](#) published by the *South China Morning Post*, and echoed in a [report](#) by CGTN, China’s official television network for foreign audiences, China is using AI and 3D printing methods to construct a 180-meter-high, 5-billion kWh hydropower station on the Tibetan plateau.<sup>20</sup> The project’s lead scientist, Liu Tianyun, [published](#) an article in the peer-reviewed *Journal of Tsinghua University (Science and Technology)* in April that describes the benefits of using AI-enabled robots and 3D printing processes to build large “filled construction” projects such as dams, including increased efficiency (AI robots can work 24 hours per day) and decreased risk of accidents and construction errors.<sup>21</sup> According to these reports, the central AI program will primarily function to assign teams of unmanned robotic trucks to optimally deliver the right materials to the right locations, at the right time to then “print” a thin layer of the dam based on a computer model. In addition, AI technology on board the construction robots will enable them to recognize most objects on site, manage uncertainties in a changing environment, and perform various tasks flexibly.

## NOTES

<sup>1</sup> Stephen Chen, “Chinese Smart Satellite Tracks U.S. Aircraft Carrier in Real Time, Researchers Say,” *South China Morning Post*, May 10, 2022, <https://www.scmp.com/news/china/science/article/3177079/chinese-smart-satellite-tracks-us-aircraft-carrier-real-time>.

<sup>2</sup> Xin Zhou, Xiangyong Wen, Zhepei Wang, Yuman Gao, Haojia Li, Qianhao Wang, Tiankai Yang, Haojian Lu, Yanjun Cao, Fei Gao, “Swarm of Micro Flying Robots in the Wild,” *Science Robotics*, May 4, 2022, Vol 7, Issue 66, DOI: 10.1126/scirobotics.abm5954, <https://www.science.org/doi/10.1126/scirobotics.abm5954>.

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Navigation Research Center of Swarming Robots, Huzhou Research Institute Zhejiang University, Apr. 7, 2022, <https://m.gccrcw.com/view.php?aid=64335>.

<sup>4</sup> Zhang Yuan, Gu Ranran, Wang Xiaowen, "Intelligent Air-Launched Decoy" (智能空射诱饵), *PLA Daily*, May 6, 2022, [http://www.81.cn/jfjbmap/content/2022-05/06/content\\_314954.htm](http://www.81.cn/jfjbmap/content/2022-05/06/content_314954.htm).

<sup>5</sup> CCTV-7: *Military Enthusiast Around the World* (军迷行天下), Oct. 6, 2021, <https://tv.cctv.com/2021/10/06/VIDEDvh7bTvrZLxpQzLotoTl211006.shtml?spm=C52346.PkjaajUoixzFJ.EBK2gmakG12.W.163>.

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<sup>7</sup> Zhu Mengying and Zhang Qiang, "A New Generation of Command Information Systems Is Moving Toward 'Cognitive Intelligence'" (新一代指挥信息系统 向“认知智能”迈进), *S&T Daily*, May 9, 2022, [http://digitalpaper.stdaily.com/http\\_www.kjrb.com/kjrb/html/2022-05/09/content\\_534771.htm?div=-1](http://digitalpaper.stdaily.com/http_www.kjrb.com/kjrb/html/2022-05/09/content_534771.htm?div=-1).

<sup>8</sup> "Scientific and Technological Innovation 2030—'New Generation Artificial Intelligence' Major Project 2021 Annual Project Application Guidelines" (科技部关于发布科技创新 2030 “新一代人工智能” 重大项目申报指南的通知), Ministry of Science and Technology, 2021, <http://invest.beijing.gov.cn/xxpt/tzzc/bjsgjjcyzc/202108/P020210813589750824480.pdf>.

<sup>9</sup> "The State Council issued the 'New Generation Artificial Intelligence Development Plan'" (国务院印发《新一代人工智能发展规划》), People's Republic of China Central Government website, Jul. 20, 2017, [http://www.gov.cn/xinwen/2017-07/20/content\\_5212064.htm](http://www.gov.cn/xinwen/2017-07/20/content_5212064.htm).

<sup>10</sup> "New Infrastructure Construction Plan" (成都市“十四五”新型基础设施建设规划), Chengdu Development and Reform Committee, Apr. 2022, <http://gk.chengdu.gov.cn/uploadfiles/0703050209/2022050713343485.pdf>.

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<sup>13</sup> "The Project of Wuhan Institute of Artificial Intelligence and New Energy Automobile Industry Technology Officially Launches" (武汉人工智能与新能源汽车工业技术研究院项目正式启动), China Semiconductor Industry Association, May 12, 2022, <http://www.csia.net.cn/Article/ShowInfo.asp?InfoID=108323>. See also, Deng Zhipeng, "The Third Institute of Wuhan University of Technology 'Intelligently Enters' Junshan and the High-Level Automobile Valley Industry's Innovation Corridor's Rise Accelerates" (武汉理工大三院“智入”军山, 万亿级车谷产业创新大走廊加速崛起), *Great Wuhan*, May 10, 2022, <http://www.app.dawuhanapp.com/p/7644318.html>;

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<sup>15</sup> Hikvision Is Part of China's AI "National Team," and Its Controlling Shareholder Is PRC Defense Industry State-Owned Enterprise Chinese Electronics Technology Group (CETC). See: 2021 Annual Report Hikvision, Hikvision, Apr. 16, 2022, Shenzhen Stock Exchange, p. 221-222, <http://www.szse.cn/disclosure/listed/bulletinDetail/index.html?1c0d4a88-1ffd-4f89-8501-47299de1cb23>; Sarah Dai, China Adds Huawei, Hikvision to Team Spearheading Country's AI Efforts, *TechInAsia*, Sept. 3, 2019, <https://www.techinasia.com/china-adds-huawei-hikvision-ai-national-team>.

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<sup>16</sup> Demetri Sevastopulo, "US Moves Towards Imposing Sanctions on Chinese Tech Group Hikvision," *Financial Times*, May 4, 2022, <https://www.ft.com/content/7bc70335-138e-4f56-afe1-ae4383eefb2b>; Hikvision AI Training In Xinjiang Paramilitary Base, Now Denies, IVP, Mar. 10, 2020, <https://ipvm.com/reports/hik-xj-pap>.

<sup>17</sup> "U.S. Considers Imposing Sanctions on China's Hikvision-FT," Reuters, May 5, 2022, <https://www.reuters.com/technology/us-plans-impose-sanctions-chinas-hikvision-ft-2022-05-04/>.

<sup>18</sup> "Foreign Ministry Spokesperson Zhao Lijian's Regular Press Conference on May 5, 2022," Ministry of Foreign Affairs of the People's Republic of China, May 5, 2022, [https://www.fmprc.gov.cn/mfa\\_eng/xwfw\\_665399/s2510\\_665401/2511\\_665403/202205/t20220505\\_10681955.html](https://www.fmprc.gov.cn/mfa_eng/xwfw_665399/s2510_665401/2511_665403/202205/t20220505_10681955.html).

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<sup>20</sup> Stephen Chen, "China's Robot-Built 3D-Printed Dam Ready in 2 Years: Scientists," *South China Morning Post*, May 8, 2022, <https://www.scmp.com/news/china/science/article/3176777/chinas-robot-built-3d-printed-dam-ready-2-years-scientists> and "Yangqu Hydropower Plant Construction Uses 3D Printing Technology," CGTN, May 10, 2022, <https://news.cgtn.com/news/2022-05-10/Yangqu-hydropower-plant-construction-uses-3D-printing-technology-19VDJ4hqANI/index.html>.

<sup>21</sup> Liu Tianyun, "3D Printing of Large Filled Construction Projects," *Journal of Tsinghua University (Science and Technology)*, <http://jst.tsinghuajournals.com/EN/10.16511/j.cnki.qhdxxb.2022.25.045>.



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