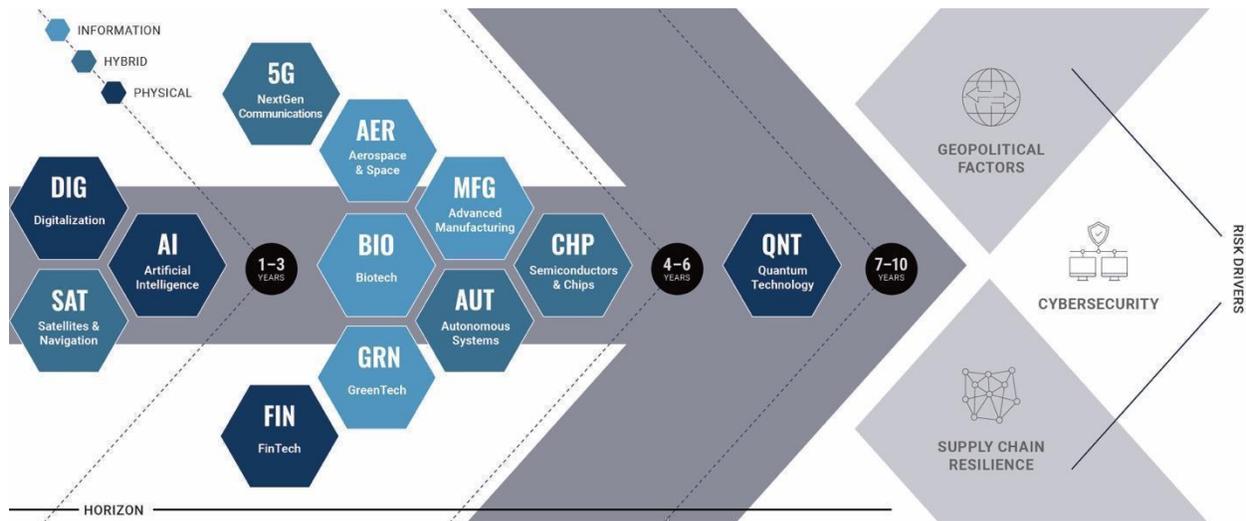




MATRIX MONITOR

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The only source dedicated exclusively to the emerging technologies shaping the future of business and national security.



This week's Next5 Matrix Monitor features Virgin Orbit's first effort to send a satellite into space, an AI program that will defend a speeding case in a US court, a Russian destroyer armed with hypersonic missiles, Walmart packages delivered by drone, a Biotech startup's "reprogramming" to rejuvenate old mice and extend their lives, China as the world's top EV market, an FDA approved robot for dental surgery, high energy laser beams to increase drones' endurance, OpenAI's ChatGPT as a tool for cybercriminals, and US supply chain concerns due to rising Covid infections in China.

NEXT5 EDITOR'S HIGHLIGHTS

→ **The House voted 365-65 to establish a select committee to assess the military, economic, and technological challenges posed by China - a Republican led effort with bipartisan support.** The panel will be chaired by Wisconsin Rep. Mike Gallagher, a steadfast China hawk. The new committee, which will last the length of this Congress but can be reupped, is the latest signal of growing bipartisan concern over China's military might and deepening skepticism over trade with the world's second leading economy. The Biden administration, like the Trump administration, has singled out China as the most significant long-term threat to U.S. security. Gallagher's agenda for the panel includes examining ways to beef up U.S. military posture, end dependencies on China in supply chains, curtail theft of U.S. IP, and highlight Beijing's authoritarian state. Democrats have not yet named members to the panel, but multiple lawmakers have indicated an interest in being the ranking member, including Rep. Elissa Slotkin. One issue likely to capture the Committee's attention soon is what to do about TikTok. Gallagher told Politico he hopes that the U.S. will ban TikTok and solidify a new bipartisan consensus to be tough on China similar to the U.S. stance against the former Soviet Union. "There were brutal, meaningful differences and disagreements between the parties and within the parties in the first decade of the Cold War," he said. "But by and large, we were able to build out a foundation for containment that served us well over the course of the next four decades." #USA #CHN #Geopolitics #DIG #RUS [Politico](#)

→ **In a January 10 briefing, analysts from the Royal Institute of Strategic Studies discovered that many of Russia's missiles have American and other Western components, despite export controls in place.** According to the researchers, nearly everything found in the systems they studied was manufactured or designed by American companies. The two largest suppliers of tech they found in Russian weapons were the U.S.-based Analog Devices and Texas Instruments - much of that technology has non-military applications, making a crackdown on their export harder. And according to the British think tank, Russia has various schemes to smuggle technology into the country, including front companies in third countries. The U.S. has put in place expansive export controls to prevent American technology and goods from heading to Russia since Moscow's invasion. However, some of the weapons used by Russia in Ukraine have been made in the past year. #SCRM #RUS #UKR #USA #GBR #CHP [Air & Space Forces Magazine](#)

→ **A Chinese government-controlled company has been accused of stealthily buying a U.K. semiconductor startup, and the British government has been accused of letting it happen despite security implications.** Flusso, a company which was spun out of the University of Cambridge's Electrical Engineering department, designs tiny flow sensors that can be used to regulate liquid and air flows in advanced technologies with industrial and consumer applications. It announced last August that it had been acquired by a "company and global private equity fund" without naming the ultimate acquirer. But a recent report by the tech news publication UKTN revealed that the Flusso startup had been bought by an investment vehicle based in China called Shanghai Sierchi Enterprise Management Partnership. Flusso's chief

executive denied that the acquirers had any connection to the Chinese government; however, one member of parliament - Alicia Kearns - warns that the investment vehicle is actually controlled by a Shanghai-based company that is 73% controlled by the Chinese government. MP Kearns also requested that the government review the takeover retroactively under the U.K.'s National Security and Investment Act, a law that came into force last year allowing the government to scrutinize and intervene in certain acquisitions. #CHP #GBR #CHN #SCRM #Geopolitics [The Record](#)

DIGITALIZATION

→ **Apple plans to announce its augmented and virtual reality headset this spring ahead of its annual WWDC conference in June.** The headset, which Apple has yet to formally announce, will come with features that have never been attempted in a mass-market headset before. Some of these features, such as foveated rendering and pass-through views, can also be found in competing headsets such as the Meta Quest Pro and Sony's upcoming PS VR2. However, Apple's headset will be designed to be lighter and more maneuverable than the Quest Pro, according to engineers working on the tech. One feature will include the internal sensors that adjust the 8K visuals (4K for each eyeball) to fit the users' individual facial features. Some of the features appear to be aimed at making the experience of wearing a headset feel less like a person has their own digital space. Internal cameras can translate facial expressions to a display on the device's exterior. There are some limitations as well, such as the fact that non-Apple Bluetooth buds reportedly do not sync well with the headset. #DIG #USA [Engadget WIRED](#)

→ **Before an examination by [ETH Zurich](#) researchers, an allegedly secure messaging app preferred by the Swiss government and army had numerous critical vulnerabilities - possibly for a long time.** The university's applied cryptography division presented [research](#) this week revealing seven vulnerabilities in Threema's proprietary encryption protocols. If exploited, the vulnerabilities might have allowed attackers to clone accounts and access their communications, steal private keys and contacts, and even create compromising material for extortion purposes. While the Switzerland-based app, which promotes itself as a more secure and non-US-based alternative to WhatsApp, isn't as extensively used as Signal or Telegram, its data centers are. As a result, it is a popular messaging software for users who want to evade potential eavesdropping from foreign governments, such as the Swiss army. It has over 10M users and 7,000 on-premise users, including German Chancellor Olaf Scholz. The vulnerabilities were found in a protocol that Threema no longer uses, and while the bugs may be "interesting from a theoretical standpoint, none of them ever had any considerable real-world impact," according to [a blog post](#). The researchers noted on a [website](#) about the Threema security flaws that they originally disclosed their finding to the company in October 2022, and later agreed on a January 9 public disclosure date. While the researchers concede these specific vulnerabilities no longer pose a threat to Threema customers, their discovery still highlights the difficulty in assessing "security claims made by developers of applications that rely on bespoke cryptographic protocols." #DIG #Cybersecurity #CHE [The Register](#)

→ **Propagators of influence operations will be able to automate social media posts, compose full-length articles to populate fake news sites, and build chatbots to interact with targets one-on-one with the help of more capable and readily available large language models (LLMs), according to new research by CSET, OpenAI and Stanford's Internet Observatory.** LLMs are expected to lower the cost of producing the propaganda that constitutes a large-scale influence campaign while also producing more impactful content. The researchers consider a number of interventions to prevent LLMs from being used in influence campaigns. These include access controls on AI hardware to make it more difficult to build LLMs in the first place, usage restrictions on existing AI models so that propagandists can't access the models they need, the adoption of digital provenance standards so that content produced by language models is easy to detect, and media literacy campaigns to make users more difficult to influence. The report illustrates the scale of addressing these challenges: The current U.S. approach to disinformation is "fractured" across social media platforms and among researchers. Addressing the threat posed by LLMs will require a "whole of society" approach with coordination among social media companies, government and civil society — a unity of effort sorely lacking from the effort to combat false information online. The researchers are urging firms and policymakers to be proactive in developing safeguards. Some nations, such as Japan, are already starting to address these disinformation campaigns by also using AI. In 2023, the Foreign Ministry will launch an AI-powered system to collect and analyze fake news on social media and other platforms, allowing it to track how foreign actors attempt to influence public opinion in the medium to long term. The framework will include information aimed not only at the Japanese audience, but also at harming foreign perceptions of Japan. #DIG #AI #Geopolitics #USA #JPN [CyberScoop](#) [Nikkei Asia](#)

SATELLITES & NAVIGATION

→ **Virgin Orbit's first effort to send a satellite into space from outside the US failed January 9th.** The failure was a blow to both the company's ambitions to compete in the rapidly growing market for commercial satellite launches and to the UK, which has tried to boost its presence in the commercial-space industry. The rocket's payload consisted of nine small satellites including for US, UK, and Omani government agencies, and companies including UK-based [Horizon Technologies](#), Poland's [SatRevolution](#), and Welsh space startup [Space Forge](#). The satellites weren't recoverable, according to the UK Space Agency. The Cornwall, England-based launch would have marked the first of a satellite into orbit from UK soil, and from anywhere in Western Europe. The launch was also the first international mission for Virgin Orbit as it moves to prove that its unconventional launch strategy – using a repurposed Boeing 747 to send satellites into orbit – can be operated from across the globe. The launcher reached space a little over an hour after takeoff, but shortly before midnight the company reported on Twitter that the attempt was unsuccessful. With the rocket traveling at faster than 11k miles an hour, the company said an anomaly occurred during the firing of the rocket's second stage engine leading it to prematurely scrap the mission. #SAT #AER #USA #GBR #OMN [WSJ](#) [Space News](#)

→ **The US Space Force is requesting information on laser communications systems to connect satellites in medium and high orbits.** Optical communications terminals that use lasers to beam data across space are being acquired by the Space Force's Space Development Agency and the Defense Advanced Research Projects Agency for low Earth orbit constellations. The new request for information (RFI), issued January 4th, describes possible plans to expand the military's information highway in space to much higher orbits. These optical links would connect satellites in orbits ranging from ~6k to more than ~22k miles above Earth. Optical terminals have become key components of commercial and DoD's low Earth orbit constellations which rely on satellite-to-satellite crosslinks so data collected in space can be securely transported and downlinked to data centers on the ground. A likely application for MEO laser terminals are missile-detection satellites the Space Force and the Missile Defense Agency are currently developing as an additional layer to the US missile-defense architecture. #SAT #USA [Space News](#)

→ **Raytheon Intelligence & Space announced on January 4th it selected a Lockheed Martin bus to build a missile-tracking satellite for the US Space Force.** The US Space Systems Command selected two satellite designs – one by Raytheon and the other by Millennium Space Systems – for a planned constellation of sensors in medium Earth orbit (MEO) to detect and track ballistic and hypersonic missiles. Both companies' proposals last year cleared Space Force design reviews. The Pentagon is adding a layer of MEO satellites to the nation's missile-defense architecture to provide extra eyes on enemy hypersonic missiles. Compared to current sensors in geostationary satellites, sensors in medium orbits would see closer to Earth and track a wider area than satellites in low Earth orbit. Raytheon's infrared sensing payload will be integrated on a Lockheed Martin LM400, a new medium-size satellite bus the company introduced in 2021 with security features aimed at the military market. A "system critical design review" is scheduled for 2023, and the goal is to deliver the satellite for a 2026 launch. #SAT #USA [Space News](#)

→ **Taiwan is courting investors to help it establish its own satellite communications provider, inspired by the role Starlink has played in the war in Ukraine, as Taipei boosts efforts to fortify itself against a potential assault from China.** Taiwan is in preliminary talks with several domestic and international investors to raise funds for the project, which the country's space agency, known as TASA, wants to spin out of an existing satellite division. The project is part of Taiwan's broader efforts to build a communications infrastructure that could survive an attack by China. Beijing claims Taiwan as part of its territory and has made increasing threats over the use of force to bring the country under its control. According to an official, Taiwan wants to "facilitate societal resilience," to make sure, for example, that journalists can send videos to international viewers even during a large-scale disaster. Starlink has helped Kyiv maintain communications with its forces despite Russian attacks on Ukrainian infrastructure. #SAT #USA #TWN #CHN [Financial Times](#)

ARTIFICIAL INTELLIGENCE

→ **New York City schools have banned ChatGPT, the AI chatbot that generates human-like writing including essays, amid fears that students could use it to cheat.**

According to the city's education department, the tool will be forbidden across all devices and networks in New York's public schools. Released last November, OpenAI's chatbot can create human-like responses to a wide range of questions and various writing prompts. ChatGPT is trained on a large sample of text taken from the internet and interacts with users in a dialogue format. The decision to ban the chatbot in New York schools comes amid widespread fears that it could encourage students to plagiarize. Since New York's announcement, OpenAI has tried to reassure teachers. The company is developing mitigations to help anyone identify text generated by the system. #AI #USA [The Guardian](#)

→ **A company called DoNotPay will use its AI program to defend a speeding case that is due to be heard in a US court in February 2023.** Instead of addressing the court, the program, which will run on a smartphone, will supply appropriate responses through an earpiece to the defendant, who can then use them in the courtroom. Identities of the individual and the court were not released. Founded in 2015, DoNotPay is an AI solution that is aimed at helping individuals fight against large organizations for acts such as applying wrong fees, persistent robocalling, or distributing parking tickets. According to the company, most of these cases are winnable for individuals, but appeals fall by the wayside since defendants often cannot afford high legal fees or do not have the time and resources to fight bureaucracies. #AI #USA [Interesting Engineering](#)

NEXT GENERATION COMMUNICATIONS

→ **US aviation safety regulators intend to require passenger and cargo aircraft to meet requirements for navigation gear to deal with potentially dangerous interference from 5G mobile-phone signals by early next year.** The newer wireless signals are on frequencies close to those used by planes' radio altimeters, which determine altitude over ground and can cause them to malfunction, according to the Federal Aviation Administration. Because they paid the government more than \$80B for the new airwaves, wireless companies are eager for a solution. The changes would have to be implemented by February 1, 2024, according to a notice issued by the agency on January 9. The FAA said it couldn't rule out interference from 5G signals for about 100 incidents of aircraft navigation equipment issuing erroneous data. Such situations will increase as telecommunications providers expand 5G coverage throughout the US. The FAA estimates that out of 7,993 US-registered aircraft that would need revisions, approximately 180 would require radio altimeter replacements and 820 would require the addition of filters to comply with the proposed order, at an estimated cost of as much as \$26M. #5G #AER #Geopolitics #USA [Bloomberg](#)

FINANCIAL TECHNOLOGY

→ **Russia's central bank is reportedly set to begin developing a cross-border settlement system using a central bank digital currency (CBDC) amid ongoing sanctions in**

response to its invasion of Ukraine. The plans to move forward with Russia's digital ruble are expected to come in the first quarter of 2023 and will see Russia's central bank study two possible cross-border settlement models, according to a January 9 report by local media outlet Kommersant. The first proposed model sees various countries entering into separate bilateral agreements with Russia to integrate their CBDC systems. Each agreement would be made to ensure the conversion and transfer of assets between the countries are in accordance with the rules of the agreements. The second more complicated model proposes a single hub-like platform for Russia to interact with other countries, sharing common protocols and standards to facilitate payments between the connected countries. Reports in September claimed that Russia was planning to use its digital ruble for settlements with China by sometime in 2023. According to Russian officials, introducing a digital ruble won't change or improve Russia's global political situation, and trials for the CBDC platform can only be undertaken with countries that are friendly with the Russian government and technologically ready. #FIN #Geopolitics #RUS #CHN [Coin Telegraph](#)

→ **Coinbase Global will eliminate around 20% of its staff and enact broad cost cuts, the latest sign of pain in the cryptocurrency industry.** The company will reduce operating expenses by 25% from the previous quarter, including laying off about 950 people. The collapse of rival exchange FTX has kickstarted a fresh round of layoffs across the industry. Crypto lender Genesis eliminated about one-third of its staff last week, and crypto exchange Huobi plans to lay off about one-fifth of its staff. Coinbase's layoffs are part of a restructuring plan, which the company expects to be largely completed by the second quarter, according to a Securities and Exchange Commission filing. Coinbase estimated that it will have between \$149M and \$163M in total restructuring costs, with \$58M to \$68M in expenses related to employee severance benefits. #FIN #USA [WSJ](#)

AEROSPACE & SPACE

→ **The next generation of rockets built to launch US spy satellites into orbit will have to be capable of fending off interference by China and Russia,** according to people briefed on a coming Pentagon competition. The Defense Department is preparing to issue new requirements for the contractors vying to build the rockets, intended to counter China's growing capabilities in space. That marks a change from previous contract awards, which were driven primarily by reliability and cost concerns. Rocket launches are easily monitored, given that the vehicles noisily blast off from a handful of launch sites. The physics of space renders rockets and the satellites they carry trackable in orbit, potentially enabling adversaries to interfere in their operations or destroy them. In the latest national-defense strategy, Pentagon officials cited China's capabilities in space as a major concern, but Russia's space operations have also drawn attention from military planners. In 2021, the country used a missile to destroy one of its defunct satellites. More recently, officials raised the prospect that US commercial satellites could be targeted if they were found to be assisting Ukraine. Space officials have highlighted a range of threats to satellites, including direct attacks from other satellites, ground-launched missiles, and cyber threats, and the Pentagon has changed its strategy in an effort to make its

communications systems less susceptible to attack and interference. This includes distributing their functions across hundreds of small satellites instead of larger ones that are easier to target. At least three rocket companies are expected to compete for deals to handle launches under the new contracting round, according to people familiar with the matter. #AER #SAT #USA #CHN #RUS [WSJ](#)

→ **Admiral Gorshkov, the Russian frigate commissioned in 2018 to replace Soviet-built destroyers, has now entered combat service armed with the Tsirkon (Zircon) hypersonic missile.** While the US has been lagging in the development of hypersonic missiles, countries like Russia and North Korea have claimed to have made advances by testing them successfully. The new Russian claim of having deployed these missiles on a warship further strengthens their case and could be aimed at increasing tensions with the Western world that has continued to support Ukraine throughout Russia's invasion of its neighbor. As per Russian claims, the missile is capable of traveling at speeds nine times that of sound and has a range of over 620 miles. For now, the frigate is expected to sail to the Atlantic and Indian Oceans but is also expected to carry out missions in the Mediterranean Sea. According to experts, a single frigate with a hypersonic missile is not really a threat to the US. However, Russia has plans to commission 15 such frigates in the near future and also boasts of other hypersonic missiles for times of conflict. #AER #Geopolitics #USA #RUS #UKR #PRK [Interesting Engineering](#)

→ **For the first time ever, some Walmart customers in Florida, Texas, and Arizona will be able to have their packages delivered by drone.** The nation's largest retailer has been working with national drone services provider [DroneUp](#) since 2020 when it began trialing deliveries of at-home COVID-19 self-collection kits. Walmart announced in May 2022 that it was expanding its DroneUp delivery network to reach 4M US households across six states including Arizona, Arkansas, Florida, Texas, Utah, and Virginia by the end of the year. This means drone deliveries will be available in 23 cities across the nation by the end of the year, according to Walmart. The drones, which are powered by certified pilots that operate within FAA guidelines, will drop off packages to customers' front yards, backyards, and driveways.



#AUT #USA [Fox10 Phoenix](#)

BIOTECHNOLOGY

→ According to new [legislation](#) passed by President Biden, new medications do not need to be tested in animals in order to get FDA approval. The law allows the FDA to advance a drug or biologic — a bigger molecule such as an antibody — to human trials after either animal or non-animal testing. "Animal models are incorrect more frequently than they are right," according to Don Ingber, a Harvard University bioengineer whose lab pioneered organ-on-a-chip technology that is now being commercialized by [Emulate](#). Last month, Emulate published a study highlighting the potential of this technology. The company's liver chips [correctly identified 87%](#) of a variety of drugs that were moved into humans after animal studies, but then either failed in clinical trials because they were toxic to the liver or were approved for market but then withdrawn or scaled back because of liver damage. The chips didn't falsely flag any nontoxic drugs. However, there are some non-animal technologies available to conduct studies specifically for humans. For example, organoids, which are hollow 3D clusters of cells produced from stem cells and imitate certain tissues, are another animal alternative. They've demonstrated promise in terms of forecasting liver and heart toxicity. Experts also highlight the promise of digital artificial neural networks for promptly diagnosing drug toxicity. #BIO #Geopolitics #USA [Science](#)

→ Biotech startup [Rejuvenate Bio](#) claims it has used a technology called reprogramming to rejuvenate old mice and extend their lives, a result suggesting that one day older people could have their biological clocks turned back with an injection. Scientists have previously demonstrated that it works on single cells in the laboratory, and they are now attempting to determine whether the rejuvenation effect works in living animals as well. The [paper](#) by Rejuvenate Bio is widely anticipated proof that this method can indeed extend the lives

of animals. The company used gene therapy to insert three powerful reprogramming genes into the bodies of mice that were the equivalent of 77-year-old humans. According to the company, the treatment doubled their remaining life span. On average, treated mice lived another 18 weeks, while control mice died after nine weeks. Overall, the mice who were given the treatment lived about 7% longer. Although the increase in lifespan was modest, the company claims the study demonstrates age reversal in an animal. Scientists unaffiliated with the company called the study an exciting milestone, but cautioned that whole-body rejuvenation via gene therapy is still a poorly understood concept with significant risks. One risk is that the powerful programming process can cause cancer, which has been observed in mice. Nonetheless, the possibility that reprogramming could reverse aging has fueled a surge in research and investment. Another company, [Altos Labs](#), claims to have raised more than \$3B. #BIO #USA [MIT Technology Review](#)

→ **Scientists are creating blueprints for novel proteins using many of the same processes that underpin DALL-E and other AI art generators.** Comparable to how DALL-E uses the relationship between captions and photos, similar systems can use the relationship between a description of what the protein can accomplish and the shape it takes. Researchers can sketch up a rough outline of the protein they want, and a diffusion model will construct its 3D shape. The human eye, on the other hand, can rapidly determine the fidelity of a DALL-E image. It is unable to do so with a protein structure. After artificial intelligence systems generate these protein blueprints, scientists must test them in a wet lab — where experiments can be performed with real chemical substances — to ensure they function properly. As a result, several experts advise taking the latest artificial intelligence technology with a grain of salt. However, for many researchers, these new approaches are doing more than just speeding up the development of novel protein candidates for the wet lab. They enable researchers to investigate new breakthroughs that they could not previously investigate on their own. #BIO #AI #DIG #USA [NY Times](#)

GREEN TECHNOLOGY

→ **Policymakers in Europe and the U.S. are racing to counteract early Chinese dominance in electrolyzers - a key piece in the next generation of clean energy: hydrogen.** Plugging in electrolyzers to clean electricity like solar power makes it possible to extract hydrogen from water without producing any planet-warming emissions. That is a crucial step in creating a green fuel capable of decarbonizing such industries as steel, cement, or shipping. Countries around the world are already revving up electrolyzer production, green hydrogen plants are under construction, and the industry is finally making the leap from pilot projects to industrial scale. Bloomberg estimates electrolyzer production will need to grow 91x by 2030 to meet demand. But more than 40% of all electrolyzers made today come from China. While Chinese electrolyzers are not as efficient as those manufactured in the U.S. and Europe, they are cheaper - costing about a quarter less than those produced in the West. Hydrogen advocates are worried the E.U. is not following through on its hydrogen goals as it has yet to decide which methods will qualify as “green,” making it hard for companies to commit to big hydrogen production projects that would drive electrolyzer orders. Meanwhile, many analysts

expect the efficiency of Chinese electrolyzers to improve, eroding any technological advantage U.S. and European companies now have. And China has a head start as many chemical equipment manufacturers have made electrolyzers there for years, installing large-scale water electrolysis systems for various manufacturing industries such as polysilicon production for solar cells. #USA #EUR #CHN #SCRM #GRN [Bloomberg](#)

→ **China sold more than 4M all-electric vehicles in 2022, five times more than that sold in the US last year, cementing China's place as the world's top EV market.** The sales came as state subsidies and high oil prices led buyers to switch from gas-guzzling models. Soaring EV sales created some positivity for another tough year for automakers in China. Retail sales for "new-energy vehicles," a category that includes electric and plug-in hybrid vehicles, vastly outgrew those of traditional cars, which saw sales shrink 13% last year. This year might remain challenging for automakers as a result of a sluggish global economy, higher interest rates in the US, and a large inventory held by China's manufacturers and dealers, according to the China Passenger Car Association (CPCA). #GRN #USA #CHN [WSJ](#)

→ **As the auto industry shifts to EVs, Japanese brands are falling behind.** Tesla is the world's top EV maker by vehicles sold, followed by companies including China's BYD and Germany's Volkswagen AG, according to Bloomberg Intelligence. No Japanese carmaker makes the top 20, leaving them on the sidelines of the auto industry's fastest-growing sector. Japan's biggest auto brands have long been consumer favorites around the world, typically accounting for more than a third of new car sales in the US and dominating markets from Southeast Asia to Africa. Their absence from the EV segment is shocking because of their early start with eco-friendly vehicles, including Toyota's Prius, the mass-market hybrid launched in 1997. In 2009, Nissan unveiled the Leaf, an all-electric hatchback considered a pioneer in mass-market EVs. That same year, Mitsubishi also launched its first EV. Enthusiasm over the early EV models, though, quickly faded due to tepid sales. Convinced the battery revolution would happen slowly, Japanese carmakers focused on gasoline-electric hybrids and cooperated with the ambitions of Tokyo technocrats to develop hydrogen fuel-cell vehicles, a nascent technology with the potential to be greener than EVs. Now, even as high gasoline prices and government incentives boost demand, Japan's automakers have little to offer those seeking to avoid gasoline-powered cars. Critics worry the automakers are replicating the decline of Japan's semiconductor and consumer electronics industries. These once reigned supreme with products like NEC's memory chips and Sony's Walkman, but were caught flat-footed by major disruptions such as Apple's iPhone and failed to innovate their way out of commoditization. Realizing that EVs are no longer the niche product they once were, however, Japanese companies are now stepping up investment projects, with Toyota spending \$30B to launch 30 EVs by 2030. Honda is co-developing an electric SUV with GM for a 2024 debut and has another partnership with Sony to deliver premium EVs starting in 2026. Furthermore, Nissan, which began delivering Ariya electric SUVs to US customers in December, has boosted spending to introduce more models. #GRN #USA #JPN #CHN #DEU [Bloomberg](#)

→ **Mercedes-Benz announced it would install a network of 2,500 high-powered chargers in the US by 2027.** The fast chargers, distributed among 400 stations, will operate under the

Mercedes brand. Owners of the company's cars will have preferential access, although the network will be open to cars from other manufacturers. Even when complete, Mercedes's network will be only about one-third as large as Tesla's is now. Still, the effort is more ambitious than any by other traditional automakers. The company, already a partner with European charging network Ionity, also plans to install Mercedes-brand chargers in Europe and China but is beginning with the US. Mercedes will split the cost of the network with [MN8](#), a solar energy producer that will provide energy to the sites. The automaker plans to start building the charging hubs this year. At least some of the devices will pump energy into cars at 350 kilowatts per hour, much faster than chargers typically found in the US. #GRN #USA #DEU #CHN [NY Times](#)

ADVANCED MANUFACTURING

→ **A new robot, called Yomi, is the first FDA approved robot for dental surgery.** According to the device's creators, through a combination of haptic feedback, intuitive visualization, and audio cues, Yomi helps doctors place implants with accuracy and precision. The inventors further state that patients who choose to have implants placed with the help of Yomi can undergo the procedure the same day. With conventional methods, such a process would take months. The system consists of a robotic arm, which is guided by the clinician at all times, a tracking arm that connects to the patient and follows their position in real time, like GPS, and an easy-to-use software suite, YomiPlan. Yomi combines detailed digital planning and multi-sensory guidance of surgical instrumentation. As such, the device helps dentists place implants with a high degree of precision, efficiency, and safety. Surgeries undertaken with Yomi require smaller incisions and no sutures. Therefore, the robot reduces pain for patients and enables much faster recovery times. #MFG #USA [Interesting Engineering](#)

→ **University of Virginia researchers made new discoveries that can expand additive manufacturing in aerospace and other industries that rely on strong metal parts.** Their peer-reviewed paper addresses the issue of detecting the formation of keyhole pores, one of the major defects in a common additive manufacturing technique called laser powder bed fusion, or LPBF. LPBF uses metal powder and lasers to 3-D print metal parts. But porosity defects remain a challenge for fatigue-sensitive applications like aircraft wings. Some porosity is associated with deep and narrow vapor depressions which are the keyholes. The formation and size of the keyhole is a function of laser power and scanning velocity, as well as the materials' capacity to absorb laser energy. If the keyhole walls are stable, it enhances the surrounding material's laser absorption and improves laser manufacturing efficiency. If, however, the walls are wobbly or collapse, the material solidifies around the keyhole, trapping the air pocket inside the newly formed layer of material. This makes the material more brittle and more likely to crack under environmental stress. The team developed an approach to detect the exact moment when a keyhole pore forms during the printing process. #MFG #AER #USA [Tech Xplore](#)

→ **Supply chain disruption and uncertainty is causing more businesses to solve production problems with additive manufacturing technologies.** The need to shorten supply chains in the face of ongoing global uncertainty and disruption is a pressing issue for many organizations, especially for multinational manufacturing companies that have come to

rely on cheap labor in Southeast Asia. A [report](#) by McKinsey and Company exploring the status of 3D printing points out that additive manufacturing (AM) technology can generate any 3D component that will perform better and cost less than conventional manufacturing methods. It also highlights there's no need for molds or fixed tooling, and that it also allows for mass-scale customization. Such simplicity of fabrication reduces time-to-market and the need for spare-parts inventories, enabling the on-demand production of items. The report cites the example of carmaker Mercedes-Benz, which uses AM to produce spare parts for its classic vehicles. General Motors, Siemens, and Airbus Defense and Space joined major industrial manufacturing company Stratasys last year for a roundtable to discuss 3D printing, and organizations are beginning to hold more of these events as the technology continues to develop. #MFG #SCRM [Supply Chain Digital](#)

AUTONOMOUS SYSTEMS

→ **A team of Chinese researchers claim to have developed a way to use high-energy laser beams, to keep drones in the air “forever.”** The researchers assessed that if a drone was fitted with a photoelectric conversion module that converted light energy into electricity, a high-energy laser beam could not only track it but also power it remotely. According to the team, a recent experiment successfully combined the autonomous charging process with intelligent signal transmission and processing technology – demonstrating the unlimited endurance potential for optics-driven drones (ODD). The research team said it carried out three field tests: an indoor follow-up flight, an outdoor daytime flight, and an outdoor night flight. The drones operated successfully in all scenarios. An animated schematic illustration presented in a report suggested an ODD could fly as high as a skyscraper. Drones are widely used in military, agricultural, and commercial applications, but their endurance limitations have proven a challenge to operators. Some analysts say that in a military context, autonomous ground-to-air wireless charging could amplify the advantages and efficiency of drone clusters – such as the coordinated UAV “swarm” system unveiled by China Electronics Technology Group Corporation in September 2020. #AUT #CHN [SCMP](#)

SEMICONDUCTORS & CHIPS

→ **Taiwanese lawmakers have passed new rules that allow local chip firms to claim tax credits for 25% of their annual R&D expenses, as part of efforts to keep cutting-edge semiconductor technologies in Taiwan and maintain the island's technological leadership.** Officials there have repeatedly stated that they will ensure that the latest chip technologies remain in Taiwan, a point that executives at TSMC and other local chip giants have reaffirmed. Taiwan has previously assisted local chipmakers with infrastructure construction and other measures, but the island is now stepping up its efforts. The new incentives are expected to go into effect in 2023. Taiwanese chip companies can also claim tax credits on 5% of the annual costs of purchasing new equipment for advanced process technologies, according to the ministry in what has been dubbed the local version of America's Chips Act. However, any credits earned cannot exceed 50% of the total annual income taxes owed by a company. The most

expensive aspect of establishing a new chip plant is the acquisition of equipment. ASML's essential EUV lithography machines, for example, now cost close to \$200M each. #CHP #SCRM #Geopolitics #TWN [Bloomberg](#)

→ **Apple is developing a new in-house chip that will power cellular, Wi-Fi, and Bluetooth capabilities on its devices.** Apple plans to release its first cellular modem chip by the end of 2024 or early 2025, allowing it to replace Qualcomm and Broadcom electronics. The moves will further destabilize a chip industry that earns billions of dollars from supplying Apple components, according to analysts. Already, the world's most valuable tech company has removed the majority of Intel processors from its Mac computers, instead opting for in-house chips known as Apple Silicon. The changes are now affecting the largest manufacturers of wireless electronics. With the shift away from Qualcomm modems, Apple plans to initially just use its in-house component in one new product, such as a high-end iPhone model. It will then gradually move away from Qualcomm modems during a period it anticipates will take about three years — similar to how it handled past transitions. #CHP #SCRM #USA [The Verge](#) [Bloomberg](#)

QUANTUM TECHNOLOGY

→ **Quantum startup [Oxford Ionics](#) has raised \$36M after discovering a way to control trapped ions, one of the most promising quantum computing technologies, removing the need for expensive and complex lasers typically used in such systems.** Instead of lasers, the trapped-ion processors from Oxford Ionics use a proprietary, patented Electronic Qubit Control (EQC) system to control the qubits. This enables them to combine the quantum performance of individual atoms with the scalability and reliability of silicon-chip-integrated electronics. Oxford Ionics will use the funding to bring its technology to market and expand its workforce, which currently includes 10 PhDs and over 130 peer-reviewed publications, including being cited in the 2022 Nobel Prize for Physics award. [Oxford Ionics'](#) announcement comes at the start of a year that is expected to herald a number of shifts in thinking and doing about quantum computing. Instead of focusing on one processor, one very large quantum computer, 2023 will see “modular quantum computers,” with a number of relatively small quantum computing processors linked over short and long distances. There will also be increased investment in the development of software specific to quantum computing, more explorations of “hybrid” systems incorporating both quantum and classical computing elements, and new methods for error correction. Specifically, a [survey](#) of 300 U.S. and European early quantum computing adopters, sponsored by [D-Wave](#), found that the three most promising workloads were machine learning applications, finance oriented optimization, and logistics/supply chain management. According to a separate [survey](#) sponsored by [Classiq](#), more than 500 U.S. professionals, found that 83% have already started investing in quantum research and/or technology, led by financial services, accounting, and medtech. 72% of the companies surveyed predicted that quantum computing will figure into their daily decision-making in the next 5 years. 86% are currently hiring quantum talent and 95% plan to hire quantum talent by the end of 2023. #QNT #CHP #MFG #DIG #AI #SCRM #GBR #EUR #USA #ISR [Forbes](#)

GEOPOLITICS

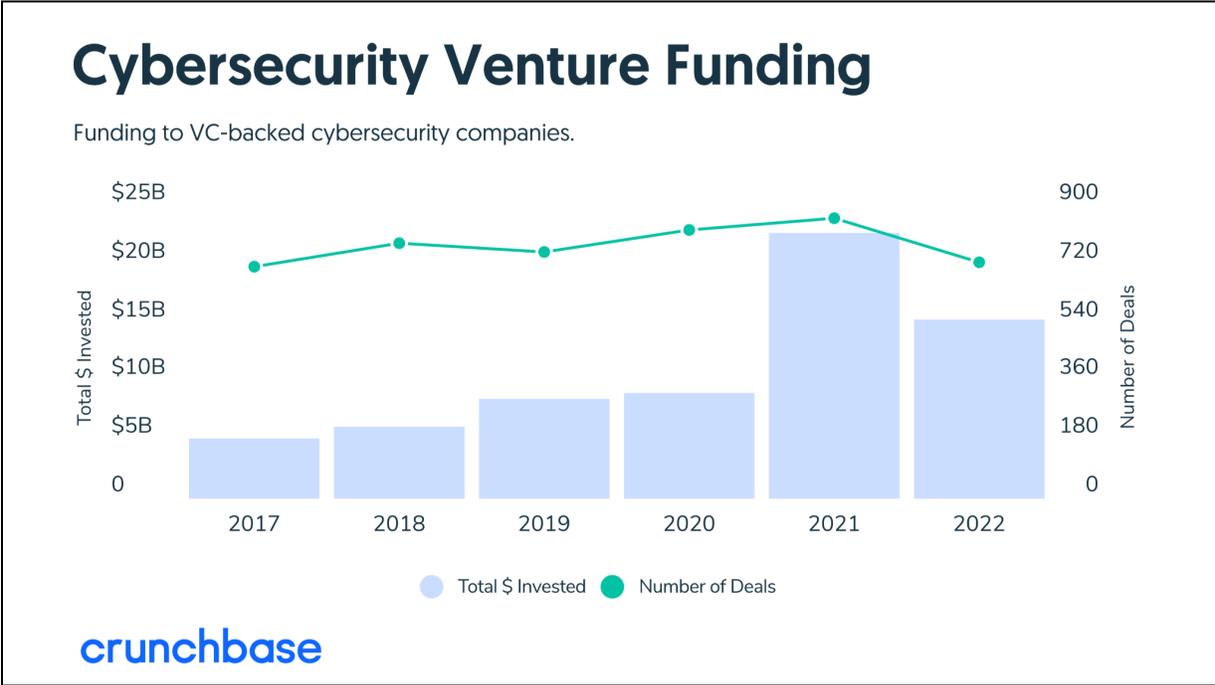
→ **The US Treasury on Friday, January 6 imposed sanctions on officials tied to an Iranian defense manufacturer that designs and produces drones which have been used by Russia in the war in Ukraine.** According to US Secretary of State Antony Blinken, Russia has used Iranian drones to barrage Ukraine, targeting civilian sites and critical infrastructure to turn off the country's power, heat, and water as Ukraine heads into winter. Last week's sanctions target "six executives and board members of US designated Qods Aviation Industries" and the director of Iran's Aerospace Industries Organization, according to a Treasury press release. In a separate statement, Secretary of State Blinken noted that Iran has become Russia's top military backer, and the US will continue to use every tool at its disposal to disrupt these transfers. The US has for years made efforts to deter Iran's drone program through sanctions and export controls. However, CNN reported last week that parts made by more than a dozen US and Western companies were found inside a single Iranian drone downed in Ukraine last fall, according to a Ukrainian intelligence assessment. #Geopolitics #AUT #USA #IRN #RUS [CNN](#)

→ **Over a five-week stretch, nearly two dozen state governors and officials have imposed government restrictions of TikTok in their states.** Most are Republicans, but a few Democrats are joining them. The bans range from prohibiting the device on government internet networks to restricting state employees from using or downloading the app on state devices. TikTok faces growing pressure in Washington, where lawmakers last month banned TikTok on federal employees' government devices. US officials have said that because businesses in China are not truly independent from the government in Beijing, Chinese Communist Party officials might force TikTok to hand over data it has collected on American users, or TikTok might use the app to promote Chinese propaganda or censor material that Beijing doesn't like. The company is working on a potential deal with the Committee on Foreign Investment in the US. So far, TikTok has agreed to cut off ByteDance's decision-making abilities over TikTok's US operations and agreed to let US authorities veto executives at the company and impose standards for TikTok's hiring practices. #Geopolitics #DIG #USA #CHN [The Washington Post](#)

CYBERSECURITY

→ **Funding for cybersecurity startups dropped by ~33% in 2022, according to Crunchbase data.** While a record \$22.8B was invested in startups in 2021, that figure dropped to \$15.3B last year. However, the 2022 venture total represents a 68% increase over 2020, which until last year was the industry high-water mark for venture funding. The downside is that investment dollars have been trending downward over the last year, which may not bode well for startups in 2023. According to Crunchbase data, only \$2.4B was invested in cyber startups in Q4, the lowest amount of venture investment in the sector since Q3 of 2020, when \$1.6B was invested. This came after a [significant decrease in venture funding in the third quarter](#). One reason for the decrease in funding was the fact that far fewer large growth rounds were raised overall. A quick look at the numbers shows that while 18 rounds of more than \$250M were raised in 2021, only seven such rounds were raised last year. While early-stage rounds

remained strong in many sectors, cyber saw a significant drop in deal flow, falling from 862 announced rounds in 2021 to 730 last year. While 2021 is an outlier, nearly 830 funding agreements were announced in 2020. The drop in deal flow and the downward trend in investment appear to point to a potentially difficult year for cyber startups. When it came to VC-backed startups being purchased, M&A deal making was down nearly 33%. Cybersecurity giants, such as Palo Alto and CrowdStrike have been battered by the public market's tech selloff. These companies may be unwilling to do stock deals in which their shares are discounted, and investors may be unwilling to see large sums of reserved cash used. Companies will undoubtedly continue to spend on security, and innovation will be required, so some startups will continue to receive the capital they require to survive, but 2023 may force them to become more creative. It could also mean the end for many others.



#Cybersecurity #USA [Crunchbase News](#)

→ **Cybercriminals are starting to use OpenAI's massively popular ChatGPT technology to quickly and easily create malicious code.** A search of underground hacking forums revealed early instances of criminals developing cyberthreat tools using the large language model (LLM) interface, according to Check Point Research. Similar to the rise of as-a-service models in the cybercrime world, ChatGPT opens up another avenue for cybercriminals to easily launch cyberattacks, according to the [report](#). A thread named "ChatGPT - Benefits of Malware" appeared on a popular underground hacker forum on December 29, written by someone who indicated they were experimenting with the interface to recreate common malware strains and techniques. On December 21, a person calling themselves USDoD posted an encryption tool written in Python that includes various encryption, decryption, and signing operations. Cybercriminals discussed several methods to use ChatGPT for other operations last week on underground forums, including utilizing it with OpenAI's Dall-E 2 technology to produce art to

sell online through respectable sites like Etsy and making an ebook or short chapter on a certain topic that can be sold online. To get more information about how ChatGPT can be abused, the researchers asked ChatGPT. In its answer, ChatGPT talked about using the AI technology to create convincing phishing emails and social media posts to trick people into giving away personal information or to click on malicious links or to create video and audio that could be used for misinformation. #Cybersecurity #AI #DIG #USA [The Register](#)

→ **Hackers disrupted access to the websites of Denmark's central bank and seven private banks this week, according to the central bank and an IT firm that supports the industry.** The websites of the central bank and [Bankdata](#), the business that produces IT solutions for Denmark's financial industry, were attacked by distributed denials of service (DDoS), which route traffic to specific servers in an attempt to bring them down. Access to the websites of seven private banks was briefly restricted on January 10 after the DDoS attack on Bankdata. #Cybersecurity #DNK [Reuters](#)

SUPPLY CHAINS

→ **As Covid infections surge across China, the US again risks falling short of medical supplies as it struggles to keep factories running and goods flowing out of its ports.** US hospitals, healthcare companies, and federal officials worked to lessen their dependence on China for medical goods after the first wave of Covid infections in 2020 revealed the major role China plays in manufacturing such crucial items as masks, latex gloves, and surgical gowns, along with key drugs and components in many medical devices. Those efforts over the past three years are expected to be tested as the virus rolls through China following the lifting of nearly all Covid restrictions there last month. China has stopped releasing official figures for infections and deaths, but media reports show hospitals overwhelmed with patients, funeral homes out of space for bodies, and factories unable to operate with so many workers ill. The US is already grappling with unrelated shortages of medications for children, including pain relievers and antibiotics. Officials warn the impact of China's latest Covid wave could take months to work its way through the supply chain. Much will depend on the trajectory of the pandemic in the coming weeks – something officials in the US have limited insight into given the lack of data from China. Potential shortages could range from generic drugs, like antibiotics and blood thinners, to electronic components used in advanced medical devices. #SCRM #USA #CHN [NBC](#)

→ **India is expected to assemble up to 50 percent of Apple's iPhones by 2027, up from fewer than 5 percent at present, to rival the scale of production in mainland China.** The need to diversify supply chains away from China stems from uncertainties surrounding China's pandemic control. According to a DigiTimes report, India, which surpassed the UK last year to rank as the world's fifth-largest economy, is already predicted to account for up to 25 percent of total iPhone production by the end of 2023, and as much as 40 percent by 2025. China, where up to 85 percent of iPhones were produced globally last year, is at risk of losing its dominant role as a manufacturing hub for Apple devices because of US-China decoupling moves. Officials expect India and Vietnam to be the biggest beneficiaries of Apple's efforts to shift more of its

manufacturing supply chain outside China. Foxconn, Apple's main iPhone supplier, has been one of the most aggressive Apple contractors to bolster its efforts in India. The world's largest electronics contract manufacturer in December made a \$500M cash injection into its Indian subsidiary, Foxconn Hon Hai Technology India Mega Development. Foxconn has scrambled to restore full production capacity at its manufacturing complex in Zhengzhou, China, following severe disruptions including worker protests that turned violent and the exodus of tens of thousands of employees amid a Covid-19 outbreak that started last October. #SCRM #USA #CHN #TWN #IND #VNM [SCMP](#)