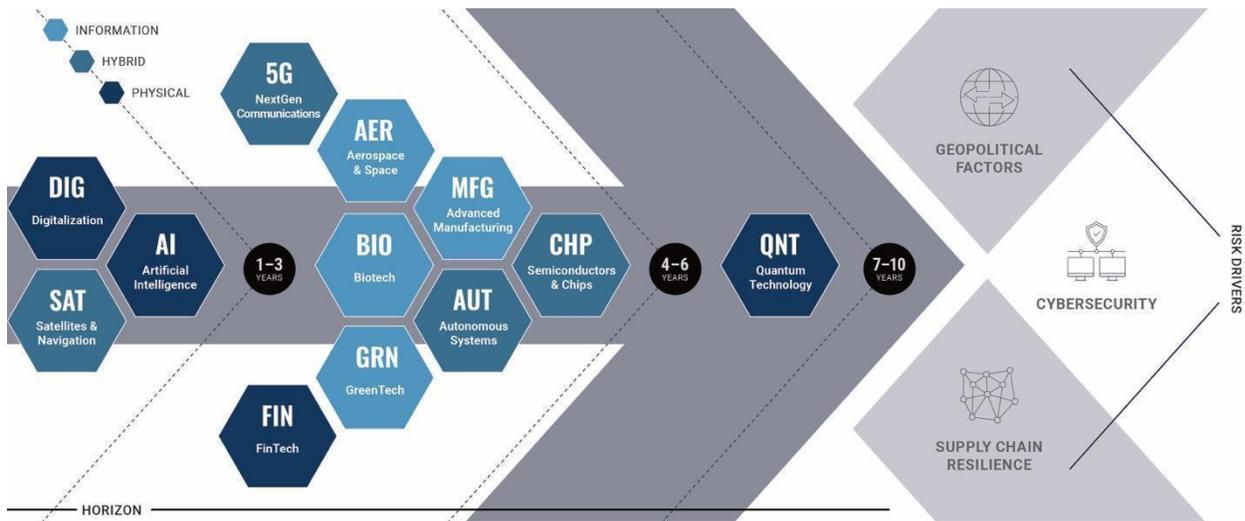




MATRIX MONITOR

Friday May 13, 2022

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



This week's Next5 Matrix Monitor features LookingGlass Cyber Solutions' acquisition of Next5, the adoption of cloud computing technologies by global capital markets, an AI-powered Chinese remote sensing satellite, final preparations of the James Webb Space Telescope, a new cloud of orbital Russian space debris, Columbia University's organ-on-a-chip system, electric aircraft technology, a dam project as the world's largest 3D printer, China's order for officials to replace foreign-branded computers with domestic alternatives, and the Biden administration's EO draft aimed at preventing foreign adversaries from accessing Americans' data.

NEXT5 NEWS & AMPLIFICATIONS

→ **We are excited to announce that LookingGlass Cyber Solutions has acquired Next5 and appointed our founder Bryan Ware as CEO.** We look forward to joining forces with LookingGlass to advance their products, support their growing customer base, and protect the nation from persistent cyber threats. As a subsidiary of LookingGlass, Next5 will maintain its brand and mission to advance U.S. technology leadership while delivering our signature intelligence products and supporting our customers. We are excited for the opportunity to make a more direct impact on the Mission as the nation prepares for another election, endures persistent low-level cyber conflict, and competes with autocratic adversaries for technological supremacy. As Russia consumes the headlines and endures heavy sanctions over its invasion of Ukraine, it remains a highly sophisticated cyber threat. Also of concern is China, which remains the greatest threat to the U.S. not only as a sophisticated cyber actor, but an economic rival, military adversary, supply chain choke point, and technological competitor. We cannot imagine a better opportunity to monitor, thwart, and defend against these threats than joining forces with a leading cyber company in support of our nation's frontline defenders and operators. **Thank you to all of our customers, partners, and supporters. Stay tuned for what's Next!** [Next5 Gov Info Security](#) [Washington Post Global Newswire](#)

→ **Covid restrictions in China are challenging US tech supply chains, forcing tech giants like Apple to outsource manufacturing oversight to local engineers.** Most US-based Apple engineers have been shut out of China for the past two years by rigid border controls intended to keep Covid at bay. To keep up with its annual product cycle, Apple has hired China-based engineers and given them more autonomy to make decisions, which is noteworthy as Apple is known for its centralized decision-making. This recent transfer of power underscores the growing technical expertise of China's workforce, honed over decades as Apple and other foreign companies have trained generations of engineers and technicians. Last month, Apple cautioned that resurgence of Covid in China threatens to reduce sales by as much as \$8B in the current quarter. In a survey released last week by the American Chamber of Commerce in China, 74% of the members said the nation's stringent Covid policies affected their ability to attract or retain skilled foreign staff. A third also said senior executives or essential foreign talent had declined China assignments because of the latest outbreak there. An EU Chamber of Commerce in China survey issued in April said >60% plan to localize their staff over the coming year. Many note that this kind of outsourcing and training of foreign engineers has also led to IP theft and technology transfer to China - a concern that will remain - but based on these figures, does not seem to deter them. #SCRM #Geopolitics #USA #CHN #EUR [WSJ](#)

→ **The US and its allies have condemned Russia for launching destructive cyberattacks against Ukraine.** Secretary of State Antony Blinken said in a [statement](#) on Tuesday that Ukraine has been subjected to a number of disruptive cyber operations, including website

defacements, distributed denial-of-service attacks, and cyberattacks that erased data from computers belonging to the Ukrainian government and private companies. The US and the EU confirmed that Russia was responsible for a cyberattack on Ukraine's satellite network in late February. The US, the EU, and other allies have joined forces and pledged to take additional steps to prevent and deter Russia's actions against Ukraine. The US State Department also issued a [list of several efforts](#) it has undertaken to counter Russia's cyber aggression against Ukraine. These efforts include direct assistance to Ukrainian law enforcement, sharing cyber threat information about potential or ongoing malicious cyber activity, and assisting in intercepting and disrupting nation-state disinformation efforts. #Cybersecurity #Geopolitics #USA #EU #RUS #UKR [The Hill](#)

DIGITALIZATION

→ **Many of the world's largest financial exchanges are transforming the way they run global capital markets through the adoption of cloud computing technologies.** In November, CME Group entered a 10-year partnership with Google to move its IT infrastructure and markets to the cloud. A month later, Nasdaq and Amazon Web Services announced a similar collaboration. Traditional institutions such as financial exchanges are drawn to cloud infrastructure because they want to increase market access and streamline operations according to experts. They can achieve these goals due to the flexible and scalable nature of cloud technology, which enables organizations to scale capacity up or down. Cloud computing also provides a range of security and privacy benefits for financial institutions that hold vast amounts of sensitive data – and have become prime targets for cybercriminals. Furthermore, cloud technology enables a move away from outdated networking equipment and servers, which are often expensive and time-consuming to maintain. #DIG #USA [Financial Times](#)

→ **NASA announced it was partnering with Epic Games to deliver a "challenge" to game developers to create virtual reality assets and experiences based on Mars that can help prepare for an eventual trip there.** The challenge was issued through the HeroX platform, which allows organizations to crowdsource solutions for unique projects. NASA is seeking five different styles of experiences, so developers can choose which makes the most sense for them. The five "categories" that NASA will be evaluating include "Set Up Camp," "Scientific Research," "Maintenance," "Exploration," and "Blow Our Minds," the latter of which perhaps means some Mars aliens will come into the picture. There will be 20 individual prizes, 4 for each category, and a total prize pool of \$70k. The overall winner for each category will receive \$6k. #DIG #AER #USA [Game Rant](#) [NY Post](#)

SATELLITES & NAVIGATION

→ **A report by the Atlantic Council argues that if the US is to maintain space superiority, it will need to make substantive cultural, doctrinal, and operational changes to its multidimensional relationship with the commercial space industry.** This is because, over the next decade or so, commercial space activities will increase the number of operational

satellites by nearly a full order of magnitude, mainly through the development of small satellites. With the growth in the number of satellites come increased capabilities in remote sensing, communications, data processing, and on-orbit operations. Competing in this changing environment will require the US to make substantial changes in long-established defense acquisition processes, research and investment strategies, data classification and distribution, and the commercial space regulatory environment.

Key Findings:

1. The US will most likely lose space superiority to China within the next decade.
2. The DoD and the IC are increasingly investing in commercial small-satellite data to increase collection capabilities and provide military support.
3. The DoD does not generally take a “buy commercial first” approach to space services.
4. No commercial small-satellite service has proven itself viable without government support and the growth of this industry will dramatically impact US national security. (Analyst Comment: Next5 recognizes that commercial small satellite services have seen success without the need for significant government funding).
5. DoD acquisition processes are designed to reduce risk and, as a result, are ill-prepared for the high-speed commercial space environment.
6. The US Department of Commerce (DoC) Office of Space Commerce (OSC) has made little progress over the last year in executing its responsibilities for Space Traffic Management (STM) and on-orbit mission authorities. Being subordinate to the National Oceanographic and Atmospheric Administration (NOAA) has hampered the office’s ability to function effectively.

#SAT #USA #CHN [Atlantic Council](#)

→ **According to a new study by Chinese space scientists, an AI-supported Chinese remote sensing satellite automatically detected a Nimitz-class aircraft carrier near Long Island, NY on June 17 last year and alerted Beijing with the precise coordinates.** In the past, the Chinese military had to collect and analyze a large amount of raw satellite data on the ground to determine the details of drills taking place in US home waters, and the results usually came after the event was over. But with AI-supported satellites, Beijing could detect and “live stream” military activities or assets of interest globally, according to space scientists from DFH Satellite in Beijing in a paper published in the domestic peer-reviewed journal Spacecraft Engineering last month. The satellite that spotted the carrier could identify a wide range of tactical or strategic targets by analyzing more than 200 frames of high-definition images per second, a speed that some ground-based computers would struggle to achieve, according to the Chinese team. #SAT #AI #USA #CHN [SCMP](#)

ARTIFICIAL INTELLIGENCE

→ **Researchers at MIT developed an AI technique that learns to represent data in a way that captures concepts shared between visual and auditory modalities.** The method can,

for example, learn that the action of a baby crying in a video is related to the spoken word “crying” in an audio clip. Using this knowledge, their machine-learning model can identify where a certain action is taking place in a video and label it. The researchers focus their work on representation learning – a form of machine learning that seeks to transform input data to make it easier to perform a task like classification or prediction. The representation learning model takes raw data, such as videos and their corresponding text captions, and encodes them by extracting features, or observations about objects and actions in the video. Then it maps those data points in a grid, known as an embedding space. The model clusters similar data together as single points in the grid. Each of these data points, or vectors, is represented by an individual word. This technique could someday help robots learn about concepts in the world through perception, more like the way humans do. #AI #USA [MIT News](#)

→ **The global market is nearing a critical AI tipping point that will unlock major productivity gains, according to IBM CEO Arvind Krishna.** Supporting that assertion, IBM released its Global AI Adoption Index 2022, which surveyed 7,502 senior business decision-makers. It shows that currently, 35% of companies are using AI in their business, up four points from 2021. Additionally, 30% say employees at their organization are already saving time with new AI and automation software and tools. According to Krishna, those numbers will steadily climb until a tipping point of around 50%, at which point he predicts they will tip further to 90% very quickly. Krishna said that level of AI adoption could add nearly \$16T to the economy by 2030, referencing a well-cited PWC [report](#). #AI #USA [ZDNet](#)

→ **Devo Technology, the cloud-native logging and security analytics company, announced the findings of its research on May 3 – cybercriminals are winning the AI race against enterprises.** The survey found that more than 30% of cybersecurity pros admit malicious actors are more adept at using AI to attack their organization than they are at leveraging AI for defense. Findings also reveal the extent to which organizations are struggling to effectively implement AI to aid and augment cybersecurity efforts, with more than 50% having to undertake major changes, or reset and start over. The research, conducted by [Wakefield Research](#) on behalf of Devo earlier this year, surveyed 200 IT security professionals. The survey covers AI implementations that comprise a gamut of defensive disciplines including threat detection, understanding strengths and gaps in cybersecurity, breach risk prediction, incident response/management and IT asset inventory management. #AI #Cybersecurity #USA [GloboNewsWire](#)

NEXT GENERATION COMMUNICATIONS

→ **Qualcomm unveiled the Qualcomm Robotics solutions at its annual Qualcomm 5G Summit event as it recognizes how 5G is proliferating beyond smartphones.** The company revealed its Qualcomm Robotics RB6 Platform and the Qualcomm RB5AMR reference design, which can be used to build advanced edge-AI and robotics products using Qualcomm’s chips. The platform is aimed at taking enterprise and industrial robotics innovation to the next level with enhanced AI and 5G. The new solution delivers 5G connectivity with support for global

sub-6GHz and millimeter-wave bands in the mainstream, enterprise, and private networks. #5G #MFG #AI #CHP #USA [VentureBeat](#)

→ **Meta has teamed up with computer hardware firm AMD on a mobile infrastructure program to develop multiple Evenstar radio units (RUs) and expand the 4G/5G global network.** The Evenstar program, which is led by Meta Connectivity, aims to create metaverse-ready radio access network (RAN) reference designs for 4G and 5G networks, according to a May 11 AMD [press release](#). Evenstar RUs with AMD's radio technology allow users to deploy 4G/5G, mmWave, and sub-6GHz from the same foundational hardware, which means radio vendors can react quickly to new market opportunities, according to the AMD press release. #5G #CHP #DIG #USA [Reuters Pymnts](#)

FINANCIAL TECHNOLOGY

→ **China's sovereign digital currency, known as e-CNY, is on track to achieve greater exposure in more cities across the mainland as leading domestic mobile payments providers Alipay and WeChat Pay install new features to support its wider roll-out.** Alipay, operated by financial technology giant Ant Group, announced on Thursday, May 5, that its app has added a button that enables users to search for and download the official e-CNY wallet within its platform. By opening an account using the same phone number associated with Alipay, users can make purchases with e-CNY on the app. WeChat Pay, operated by Tencent Holdings, last month set up a similar e-CNY wallet function on its app about three months after it adopted digital yuan as a payment option. The moves by Alipay and WeChat reflect Big Tech companies' commitment to help promote the country's digital fiat currency. #FIN #CHN [SCMP](#)

→ **Thieves are targeting digital currency investors on the street in a wave of "crypto muggings," police have warned, with victims reporting that the assets were stolen after their mobile phones were seized.** Anonymized crime reports provided to the Guardian by City of London police, as part of a freedom of information request, reveal criminals are combining physical muscle with digital know-how to steal cryptocurrency. One victim reported they had been trying to order an Uber near London's Liverpool Street station when muggers forced them to hand over their phone. While the gang eventually gave the phone back, the victim later realized that ~\$4,700-worth of ethereum digital currency was missing from their account with the crypto investing platform Coinbase. In another case, a man was approached by a group of people offering to sell him cocaine and agreed to go down an alley with them to do the deal. The men offered to type a number into his phone but instead accessed his cryptocurrency account, holding him against a wall and forcing him to unlock a smartphone app with facial verification. They transferred £6,000-worth of ripple, another digital currency, out of his account. Cryptocurrency transfers are irreversible, unlike a bank transfer, making this type of crime more attractive to thieves. #FIN #GBR #Cybersecurity [The Guardian](#)

AEROSPACE & SPACE

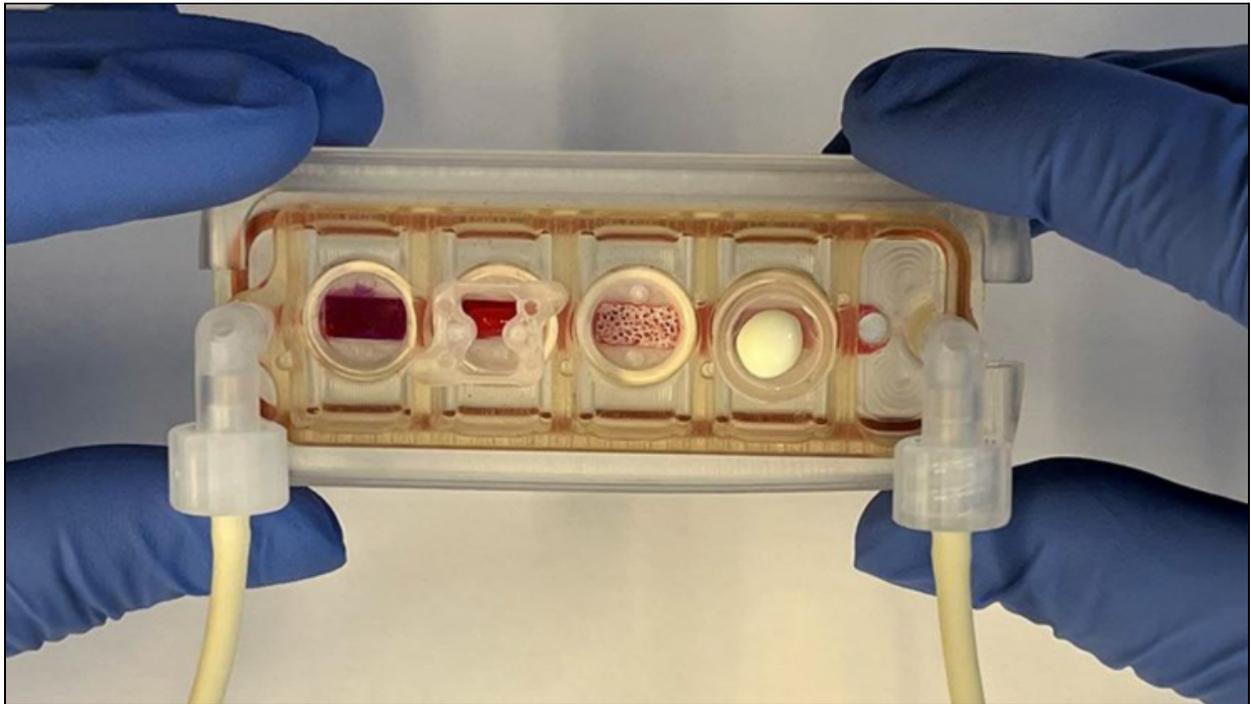
→ **The US military is ready to take the next step in developing a nuclear rocket to help monitor Earth-moon space, an area it has deemed a high strategic priority.** The Defense Advanced Research Projects Agency (DARPA) announced on May 4 that it's seeking proposals for the second and third phases of a project to design, develop, and assemble a nuclear thermal rocket engine for an expected flight demonstration in Earth orbit by 2026. The proposals will support DARPA's Demonstration Rocket for Agile Cislunar Operations (DRACO) program, which aims to develop a nuclear thermal propulsion (NTP) system for use in Earth-moon space. DRACO is part of the US military's larger push to keep an eye on cislunar space as government and commercial activities increase in this sector in the coming decade. Phase 1 for Draco included awards in April 2021 for General Atomics, Blue Origin, and Lockheed Martin. NASA is also interested in nuclear thermal propulsion for its potential to get missions to Mars in half the time than the current six to nine months possible with current propulsion systems. NASA's fiscal 2023 budget request, not yet approved by Congress, includes \$15M to support nuclear propulsion. #AER #USA [Space.com](#)

→ **Engineers are preparing to make final tweaks to the instruments on board the James Webb Space Telescope as the observatory readies for operations this summer.** Webb's throughput – how much of the light entering the telescope reaches the detectors and is recorded – needs to be measured. While no telescope can accurately collect every photon that comes through to it, engineers will still want to know the throughput at several light wavelengths to assess Webb's performance at gathering infrared light. The Webb telescope will also be assessed for its sharpness of stellar images through all of the instruments' optics. A final testing activity will be observing moving targets such as planets, satellites, rings, asteroids, and comets. #AER #USA [Space](#)

→ **Another cloud of Russian space debris has been created in orbit.** An Earth-orbiting object cataloged as #32398 broke up on April 15, the US Space Force's 18th Space Defense Squadron tweeted on Tuesday, May 3. Sixteen pieces of space debris associated with the event are currently being tracked, the squadron added. The object was an ullage motor from a space tug that helped deliver three Russian GLONASS satellites to orbit in 2007. GLONASS is Russia's version of the GPS navigation system. Space junk is a growing problem for satellite operators and mission planners. The European Space Agency estimates that about 36,500 pieces of debris at least 4 inches wide are currently orbiting Earth. And Earth orbit likely harbors about 1M objects with diameters between 0.4 inches and 4 inches, according to ESA. As we previously [reported](#), Russia added to the debris population with a widely condemned anti-satellite (ASAT) test in November 2021. The nation destroyed one of its own defunct satellites with a missile, spawning a new debris field in the same orbital region as the International Space Station. ISS operators have had to conduct engine burns to dodge the Russian ASAT debris. #AER #USA #RUS [Scientific American](#)

BIOTECHNOLOGY

→ **Columbia University's Engineering School, in collaboration with colleagues at Irving Medical Center, created an organ-on-a-chip system composed of human heart, liver, bone, and skin tissues, as well as circulating immune cells, to mimic the physiology of the human body.** The new multi-organ-on-a-chip system is the size of a microscope slide. It is made up of the human heart, bone, liver, and skin tissues, each of which is distinct in its embryonic origin, structural and functional properties, and need for its own independent environment. The vascular flow of immune cells connects all organ tissues. The researchers achieved this by employing selectively permeable endothelial barriers. The tissue types on the chip system are derived from the same cell line as the human-induced pluripotent stem cells (iPSC) technology, which allows researchers to create patient-specific lines from a small blood sample. While the tissue type took four to six weeks to grow and mature, the researchers were able to keep these tissues in their respective environments for another four weeks. Now, the researchers are using variations of the chip to investigate metastasis in breast cancer, prostate cancer, leukemia, the effects of ischemia on other organs, and the impact of SARS-CoV-2 infection on the heart, lung, and vascular system.



#BIO #CHP #USA [Interesting Engineering](#)

GREEN TECHNOLOGY

→ **Technology for electric aircraft has been evolving, boosting prospects for a new era in commuting believed to be coming between 2023 and 2026.** Technological challenges in developing commercially viable electric aircraft include reducing the weight of core parts like batteries and motors while enhancing power. Yet electric planes are expected to have a cost advantage over traditional planes when traveling short distances with a limited number of

passengers. Rolls-Royce's electric plane is equipped with a 400-kW powertrain including light, high-powered motors and inverters. The powertrain rivals that of a high-performance electric vehicle. The battery pack provides a range of about 320 km – the distance between London and Paris – on one charge. According to Rolls-Royce, it is the world's most energy-dense flying battery pack. The jet-engine maker plans to increase the range, working with Italian airframe maker [Tecnam](#) and Nordic regional airline [Wideroe](#) with a goal of delivering a fully electric passenger aircraft for the Nordic domestic commuter market in 2026. Rolls-Royce also wants to produce an electric aviation propulsion system for vertical takeoff and landing (eVTOL) vehicles for urban transportation, setting 2025 as when it hopes makers start installing the system. #GRN #GBR #ITA #NOR [Nikkei Asia](#)

→ **Hyundai plans to build a new EV manufacturing plant in the US.** The new Georgia EV facility, if it is finalized, would serve both Hyundai and Kia as the brands move to roll out a pair of fully electric SUVs – the Ioniq 7 and EV9 – aimed at the US market, according to three people with knowledge of the plans. The announcement of an investment deal by Hyundai would come at a time when the administration of President Joe Biden has been pushing for more investment in EVs and related suppliers to create jobs and drive a clean-energy agenda. It would also mark a major economic development win for Georgia, which has pushed to establish itself as a regional hub for the emerging EV industry. As we previously [reported](#), the Biden administration will allocate more than \$3B in infrastructure funding to finance EV manufacturing. Biden wants half of the vehicles sold in the US to be electric by 2030. Other Asian companies that have announced plans to build US battery plants include Korea's LG Energy Solution and Samsung SDI. #GRN #USA #KOR [Reuters](#)

ADVANCED MANUFACTURING

→ **China is using AI to effectively turn a dam project on the Tibetan Plateau into the world's largest 3D printer, according to scientists involved in the project.** The 590-foot high Yangqu hydropower plant will be built slice by slice – using unmanned excavators, trucks, bulldozers, pavers, and rollers, all controlled by AI – in the same additive manufacturing process used in 3D printing. When completed in 2024, the Yangqu dam will send nearly 5B kilowatt-hours of electricity each year from the upper reaches of the Yellow River to Henan. The power will travel via a 932-mile-high voltage line built exclusively for green energy transmission. After “slicing” a computer model of the dam into layers, the AI at the heart of the project would assign a team of robots to add one layer at a time, according to the paper. Unmanned excavators will identify and load materials from a stockpile yard into a fleet of automated trucks, some powered by electricity. Following an optimized route calculated by the central AI, the trucks will deliver the materials to the right locations to be located by robotic bulldozers and pavers. The materials will then be turned into a layer of the dam structure. Automated rollers press the added layer until it is tight and firm, but they are also equipped with sensors. The central AI uses these to monitor build quality by analyzing ground vibration and other data. Breakthroughs in AI technology, including deep reinforcement learning, mean the machines can

now recognize nearly all objects on site, deal with uncertainties in a changing environment, and perform various tasks flexibly, according to the paper. #MFG #AI #CHN [SCMP](#) [Business Insider](#)

AUTONOMOUS SYSTEMS

→ [Waabi](#), an autonomous driving startup is hiring veteran engineers from competing self-driving tech companies as it prepares to compete with larger players in the race to commercialize autonomous trucking, including Alphabet's Waymo and TuSimple. The Toronto-based company, which initially focused on developing its AI-enabled technology with an advanced driving simulator it developed, is expanding to add a team of hardware engineers to integrate sensors, lidar, vision, and computing systems into trucks. Waabi's new hardware team is led by experts and engineers who previously worked for Uber, Otto, Apple, robot truck startup [Ike](#), and autonomous tech developer [Aurora](#). The company emerged from stealth in June 2021 with a \$83.5M funding round, intending to catch up to large companies by relying heavily on cutting-edge AI tools and less on a "robotics mindset," which requires vastly more data, solving an almost endless list of tasks, and incalculable miles of on-road driving to train the software. Trucking and delivery services have emerged as a key focus of autonomous driving research because the operating environment — highways rather than city streets — is perceived to be easier for autonomous drivers to fully interpret. Because of the ongoing shortage of long-haul drivers, the \$800B trucking industry is looking for solutions to meet rising shipping demand. #AUT #AI #SCRM #CAN #USA [Forbes](#)

SEMICONDUCTORS & CHIPS

→ On Tuesday, May 10, Intel launched a new chip called Gaudi2 focused on artificial intelligence computing, as the chip manufacturer makes a bigger push into the AI chip market, which is currently dominated by Nvidia. Gaudi2 is the second generation processor by Habana Labs, an Israeli AI chip startup Intel bought in late 2019 for about \$2B. In addition to new AI computing chips, Intel has been focusing on software development. Intel introduced a new chip called Greco for inferencing work, which involves using an AI algorithm to make a prediction or identify an object. According to Intel, the AI chip market is estimated to grow about 25% a year in the next 5 years to reach around \$50B. #CHP #AI #USA #ISR [Reuters](#)

→ The US Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL) has joined industry efforts to extend the process and develop new techniques for making more powerful, efficient, and cost-effective chips, such as atomic layer etching. Through the use of modeling, laboratory scientists correctly predicted a fundamental phase in atomic-scale chip production in the first PPPL research conducted under a Cooperative Research and Development Agreement with Lam Research, a global producer of chip-making equipment. The researchers modeled "atomic layer etching" (ALE), a critical fabrication step that aims to remove single atomic layers from a surface at a time. This method can be used to etch complex 3D structures into a film on a silicon wafer with critical dimensions thousands of times thinner than a human hair. On an atomic scale, the model simulated the sequential use of

chlorine gas and argon plasma ions to control the silicon etch process. In contrast to the ultra-hot plasma used in fusion experiments, the plasma used in semiconductor device processing was near room temperature. #CHP #USA [SciTechDaily](#)

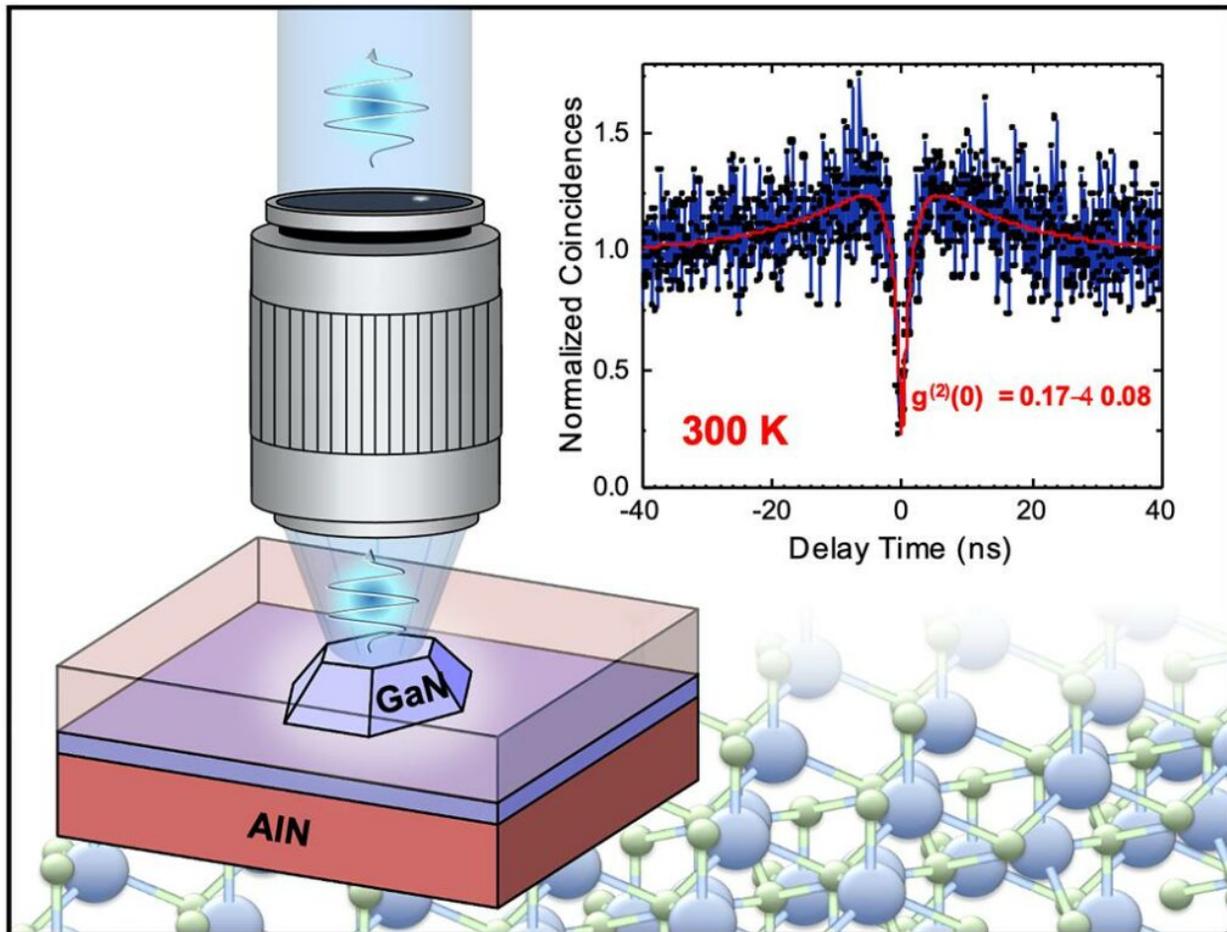
QUANTUM TECHNOLOGY

→ **Adamant Namiki Precision Jewel and researchers from Saga University in Kyushu, Japan, have developed a new method for mass-producing two-inch diamond wafers, bringing quantum computers that use diamond wafers one step closer to reality.** The novel ultra-high-purity diamond contains no more than three nitrogen atoms per billion, which is required for quantum applications such as quantum computers, quantum memory, and quantum sensing devices. The diamond wafers, known as Kenzan Diamond, could be used for quantum memory because their ultra-high purity allows them to store 25 exabytes of data, the equivalent of 1B Blu-Ray disks. Diamond wafers are created by growing crystals on a substrate material, which is typically a flat surface. Because nitrogen gas is required in diamond crystal growth technology to achieve a high growth rate, nitrogen impurities with concentrations of several ppm are mixed into the diamond crystal and cannot be used in a quantum computer. The main disadvantage of this method is that the diamond may crack under the strain, reducing its quality. In the new method, the team uses a substrate surface shaped like steps, which spreads the strain horizontally and prevents cracking. This newly developed surface enables them to produce larger diamond wafers of higher purity. This new technology is expected to lead to the development of quantum computers in the future. #QNT #CHP #MFG #JPN [Interesting Engineering](#)

→ **ColdQuanta announced the acquisition of Chicago-based Super.tech, a world leader in quantum software application and platform development, as well as the beta launch of Hilbert, the world's first gate-based cold atom quantum computer.** Hilbert, from ColdQuanta, supports the Qiskit API and will be initially available to customers in beta via ColdQuanta's comprehensive multi-tenant cloud platform. Hilbert will be integrated with public cloud services later this year. Super.tech is expected to advance Hilbert's capabilities by improving circuit performance through pulse-level optimization, optimized transpilation, and error mitigation techniques. Deep optimization of quantum computer physics can greatly increase efficiency and shorten the time required to address practical applications. #QNT #DIG #USA [The Quantum Insider](#)

→ **Researchers at Switzerland's École Polytechnique Fédérale de Lausanne (EPFL) have developed "bright and pure" single photon emitters (SPEs) based on wide-bandgap semiconductor quantum dots grown on cost-effective silicon substrates.** One of the primary requirements of quantum technologies is the development of non-classical light sources capable of emitting exactly one photon at a time on demand. Despite the fact that the first demonstration of SPEs date back to the 1970s, their low reliability and efficiency have prevented any meaningfully practical use. Conventional light sources, such as incandescent bulbs or LEDs, emit large numbers of photons at once. In other words, the likelihood of emitting a single photon at a time is extremely low. Laser sources can emit streams of single photons,

but not on demand, which means that there are times when no photons are emitted at all. For a light source to qualify as a SPE, it must have a single-photon purity greater than 50%. Now researchers can use SPEs to emit a single photon on demand — or maintain single-photon purity at an ultrafast timeframe. The quantum dots are made of gallium nitride and aluminum nitride (GaN/AlN) and have a single-photon purity of 95% at cryogenic temperatures while maintaining excellent resilience at higher temperatures, with a purity of 83% at room temperature. The SPE also exhibits photon emission rates of up to 1 MHz while maintaining single-photon purity of more than 50%.



#QNT #CHP #CHE [The Quantum Insider](#)

GEOPOLITICS

→ **Chinese tech companies are quietly pulling back from doing business in Russia under pressure from US sanctions and suppliers, despite calls by Beijing for companies to resist.** Several major companies are curtailing shipments in Russia, where Chinese tech firms dominate the market for many products, without making any public announcements, to include PC giant Lenovo and major telco Xiaomi. In contrast to many Western firms, the companies

have avoided making public statements about Russia's war in Ukraine or their business there as Beijing opposes Western sanctions. China's exports of tech products to Russia fell sharply in March from February with shipments of laptops declining by more than 40%, smartphones down by nearly two-thirds, and exports of telecom base stations down 98%. Official trade data shows that China's exports to Russia fell 27% overall. China's Ministry of Commerce last month acknowledged that the sanctions have disrupted China's trade with Russia, but urged companies, "not to submit to external coercion and make improper external statements." China has expanded its tool kit of measures to counter foreign sanctions, including rules that could compel Chinese companies not to comply with foreign sanctions it deems unjustified, but so far Beijing has not issued any such noncompliance orders. As US sanctions hit Chinese companies, the actions threaten to widen the rift between Washington and Beijing over the Russia-Ukraine conflict, and further galvanize China's ambitions to develop supply chains independent of American technology. Western sanctions include strict controls that block exports to Russia's defense sector and the export of products made using US equipment, software, or blueprints, even when those products are made by non-US companies. The measures have proven especially effective in the tech sector, where complex global supply chains offer numerous levers for the US government to pull. #SCRM #Geopolitics #DIG #5G #CHP #RUS #UKR #CHN #USA [WSJ](#)

→ **According to China's top envoy in Moscow, China will continue to deepen cooperation with Russia on military technology, energy, and space, amid speculation that Beijing may assist its neighbor in avoiding sanctions related to the Ukraine conflict.** Zhang Hanhui stated that bilateral trade with Russia was difficult, but that the two sides would improve settlements in their respective national currencies to ensure stable trade, which they hoped would reach \$200B by 2024. Last month, China's monthly imports of Russian goods, including energy, reached an all-time high. According to SCMP calculations based on General Administration of Customs data, the value of Russian imports in April was \$8.89B, up 56.6% from the previous year and 13.3% from March. Additionally, there are concerns in the West that an isolated Russia might try to increase technological cooperation with China, particularly in sensitive areas like military and space. "China attaches great importance to cooperation in this field and will work together with the Russian side to promote military-technical cooperation between the two countries to a higher level and a broader field," Zhang Hanhui said in an interview with Russian state news agency Tass. #Geopolitics #GRN #AER #CHN #RUS #UKR [SCMP](#)

→ **Ping An Insurance wants to split up HSBC, 20 years after the "global bank" invested in its future; highlighting the difficulties of doing business in China.** Shock reverberated through the top ranks of the \$3T British bank when it was revealed that the company's largest shareholder was pushing for the most dramatic split in banking history. Ping An, led by Peter Ma, is urging HSBC Chairman Mark Tucker to consider options such as dissolving the bank and listing its Asian operations separately on the stock exchange. In a recent private memo, the Chinese financial giant detailed a litany of perceived management failures at HSBC, ranging from poor returns to rising costs. The ramifications could be vast. According to analysts, HSBC is headquartered in London but operates in 64 countries and regions, including Hong Kong,

Singapore, India, and Malaysia. Asia, home to roughly half of the group's 220k employees, contributed roughly 65% of the group's reported profit before tax in 2021. Any breakup would cost billions of dollars, with analysts at Barclays estimating that the changes could reduce the group's market value by 3% to 8%. It would also be a setback for London as the global banking model. Ping An told HSBC that establishing a standalone Asian business headquartered in Hong Kong would be a significant boost for the city. #Geopolitics #GBR #CHN #SGP #IND #MYS [Bloomberg](#) [SCMP](#)

CYBERSECURITY

→ **The US Treasury Department sanctioned a virtual currency mixer, citing that North Korea used it to help launder stolen virtual currency as part of the country's malicious cyber activities program on Friday, May 6.** The ban of Blender.io marks the first time the Treasury has placed a cryptocurrency mixer on its sanctions list. According to the Treasury's Office of Foreign Assets Control, which implements and enforces US sanctions, Blender.io operates on the bitcoin blockchain and aids in the facilitation of illicit transactions by concealing their origins, destination, and counterparties. Blender.io has assisted in the transmission of more than \$500M in bitcoin since its inception in 2017. According to the Treasury, entities such as Blender.io mix various transactions and are frequently used by suspicious groups. Blender.io is also accused of assisting in the laundering of money for several Russian-linked ransomware groups. In late March, the state-sponsored North Korean hacking group, Lazarus, stole \$540M from a decentralized protocol that allows users to transfer their cryptocurrency between Ethereum and Axie Infinity. Faced with US and UN sanctions, North Korea is allegedly using unlawful cyber activities to fund its ballistic missile and WMD programs, according to the Treasury Department. #Cybersecurity #Geopolitics #FIN #USA #PRK #RUS [The Hacker News](#) [WSJ](#)

→ **Costa Rica's newly elected President Chaves declared a national emergency on Sunday, May 8, citing continued Conti ransomware attacks as the reason.** Last month, Conti claimed a ransomware strike targeting Costa Rican government entities. Conti also published the majority of the 672 GB dump, which looks to contain data from Costa Rican government entities. The Ministry of Finance was the first government entity to be harmed by Conti's malware, and it has yet to thoroughly assess the scale of the security problem. According to Swissinfo.ch, Conti wanted a \$10M ransom from the Ministry, which the government refused to pay. Conti threat actor "UNC1756" and their associate have claimed sole responsibility for the hack. The Administrative Board of the Electrical Service of the Province of Cartago (Jasec), the Ministry of Science, Innovation, Technology, and Telecommunications National Meteorological Institute (IMN), Radiographic Costarricense (Racsa), and the Costa Rican Social Security Fund (CCSS) have also been impacted by Conti's attacks. Previously on May 6, the US offered a reward of up to \$15M for information on the Russia-based Conti ransomware group, which has been blamed for cyber extortion attacks around the world, according to the State Department. #Cybersecurity #Geopolitics #CRI #USA [Bleeping Computer](#) [Reuters](#)

→ **China directed central government agencies and state-owned enterprises to replace foreign-branded personal computers with domestic alternatives within two years.** The push to replace foreign suppliers is also part of a long-running effort to remove China from its reliance on American technology, a vulnerability exposed after sanctions against companies such as Huawei hammered local firms and businesses. Since 2021, when the Chinese central government quietly authorized a secretive government-backed organization to vet and approve local suppliers in sensitive areas ranging from cloud to semiconductors, the initiative has accelerated. The latest PC replacement project also reflects Beijing's growing concerns about information security, as well as its confidence in its hardware: the world's largest laptop and server makers today include China-based Lenovo, Huawei, and Inspur, while local developers such as Kingsoft and Standard Software have made rapid strides in office software against Microsoft and Adobe. #Cybersecurity #Geopolitics #SCRM #CHN #USA [Bloomberg](#)

→ **The Biden administration expanded its national security investigation into Russia's Kaspersky antivirus software earlier this year, amid increased concerns of Russian cyberattacks following Moscow's invasion of Ukraine.** As tensions between Moscow and the West rise, there is a risk that the Kremlin will use antivirus software, which has privileged access to a computer's systems, to steal sensitive information from American computers or tamper with them. Access to the networks of federal contractors and operators of critical US infrastructure like power grids is particularly concerning, according to the sources. The expanded security investigation is being carried out using broad new powers created by the Trump administration, which allow the Commerce Department to ban or restrict transactions between US firms and "foreign adversary" nations, such as Russia and China. "I am still very worried about US companies that are using Kaspersky," said Rob Joyce, the NSA's director of cybersecurity, in an interview, revealing the investigation. #Cybersecurity #Geopolitics #USA #RUS #CHN [Reuters](#) [Bloomberg](#)

→ **The Biden administration has drafted an executive order that would give the DOJ vast powers to prevent foreign adversaries like China from accessing Americans' personal data,** according to a person familiar with the matter and excerpts seen by Reuters. The proposal, which is being reviewed by government agencies, would also direct the Department of Health and Human Services to prohibit federal funding from being used to support the transfer of US health data to foreign adversaries, according to experts. The draft order reflects an effort by the administration to respond more aggressively to alleged national security threats posed by Chinese companies that acquire reams of US personal data, such as popular social media platforms TikTok and Wechat. US intelligence has issued a warning about the risks posed by Chinese companies collecting Americans' personal data through investments in US firms that handle sensitive healthcare information. China's BGI purchased US genomic sequencing firm Complete Genomics in 2013, and Chinese WuXi Pharma Tech acquired US firm NextCODE Health in 2015, according to a [2021 fact sheet](#) from the National Counterintelligence and Security Center. The new draft order expressly authorizes the DOJ to "monitor compliance with and enforce any prohibitions, licenses, or mitigation agreements" issued under previous executive orders, "thereby supporting the Secretary of Commerce's authority". #Cybersecurity #Geopolitics #DIG #BIO #USA #CHN [Reuters](#)

SUPPLY CHAINS

→ **Electricity shortages are becoming more likely across the US as traditional power plants are retired faster than they can be replaced by renewable energy and battery storage.** Power grids are facing strain as the US makes a historic shift away from conventional power plants fueled by coal and natural gas and toward cleaner forms of energy such as wind and solar power, and aging nuclear plants are set to retire in many parts of the country. The problem is that wind and solar farms, which are among the cheapest forms of energy generation, do not always produce electricity and require large batteries to store their output for later use. While much battery storage is being developed, regional grid operators have recently warned that the pace may not be fast enough to compensate for the closures of traditional power plants that can operate around the clock. Accelerating the deployment of renewable energy and batteries has become a particularly difficult proposition in the face of supply-chain challenges and inflation. More recently, a Commerce Department investigation into whether Chinese solar manufacturers are evading trade tariffs on solar panels has halted imports of key components required to build new solar farms, effectively bringing the US solar industry to a halt. California regulators said that up to 3,800 megawatts of new supply could be delayed until 2025. Such delays would be a significant challenge for the state, which is racing to procure a massive amount of renewable energy and storage to offset the closure of several gas-fired power plants and a nuclear plant. #SCRM #GRN #Geopolitics #USA #CHN [WSJ](#)

→ **The US is considering banning American suppliers from selling advanced equipment to Chinese chip makers,** according to a report by [The Information](#). Proposed rules would tighten the screws on SMIC, China's top chip foundry, as well as state-backed chip makers Hua Hong Semiconductor, ChangXin Memory Technologies (CXMT), and Yangtze Memory Technologies Corp (YMTC), all of which rely on core US technology to varying degrees to fabricate chips. SMIC, which was added to the US Commerce Department's entity list in December 2020, is already barred from importing ASML's extreme UV lithography machines, which are required for producing advanced chips at 7 nanometres and below. Companies producing less advanced equipment based on US technologies, on the other hand, can still sell to SMIC with Washington's approval. SMIC has been investigating the possibility of importing equipment for its new plants in Shenzhen and Beijing. Hua Hong Semiconductor, CXMT, and YMTC – all Tsinghua Unigroup subsidiaries – are not on any US trade ban list. The Financial Times reported two weeks ago that the US was investigating claims that YMTC violated sanction rules by providing chips to Huawei. Despite efforts, some analysts believe it will be nearly impossible for China, or even strong semiconductor producers such as Japan and South Korea, to create a chip supply chain free of any US technology. Furthermore, China's import volume of integrated circuits (ICs) [fell](#) in the first four months of 2022, at a time when the country is attempting to reduce its reliance on foreign technologies while imposing strict Covid-19 measures. #SCRM #CHP #Geopolitics #USA #CHN #JPN #KOR [SCMP](#)