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AI, engineering

Pusan National University develops an AI framework for smarter ship navigation

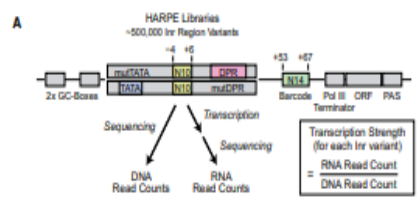
While maritime transportation forms the backbone of global trade, it is also a major contributor to air pollution in coastal cities. Although regulations such as cleaner marine fuels and speed restrictions have helped reduce emissions, nearby communities continue to face health risks because pollution levels depend not only on how much ships emit but also on how wind and weather disperse exhaust plumes. Conventional mitigation strategies often rely on blanket speed reductions, but these often increase travel time while failing to prevent short-term pollution spikes in densely populated areas.

To address this challenge, researchers from Pusan National University developed a physics-informed artificial intelligence framework that optimizes ship routes and speed profiles to simultaneously reduce fuel consumption and peak air-pollutant exposure during ship operations. The study was led by Assistant Professor Dowon Kim along with PhD Student Seongbeom Park and Professor Jinhyeok Yun from Pusan National University, South Korea.

Source: Pusan National University (14 August 2026)

AI, genomics

Researchers use AI to decode key DNA sequence in gene activation



Precise activation of tens of thousands of genes is critical for healthy development and growth. Specialized segments of our DNA are responsible for carefully orchestrating genetic sequences that result in the production of enzymes, hormones, proteins and other crucial components underlying cell structure and function. But if these genes are not correctly activated, cells can stop functioning or result in various disorders, including cancer.

To fully understand specific sequences within DNA that enable gene activation, researchers in University of California San Diego Professor James T. Kadonaga's laboratory set out to decipher an important segment of DNA known as the "initiator." This is the site at which the instructions coded in genes are first converted, or expressed, into functional products.

In the new study led by graduate student researcher Torrey Rhyne-Carrigg, scientists used high-throughput DNA sequencing technology to determine the gene expression activity of approximately 500,000 different versions of the initiator. With this information, they employed machine learning, a type of artificial intelligence, to create an AI model that then decoded the initiator's signature DNA pattern. With the initiator's DNA identity unmasked, the researchers could then search for its telltale sequence, finding that about 60% of human genes contain the initiator.

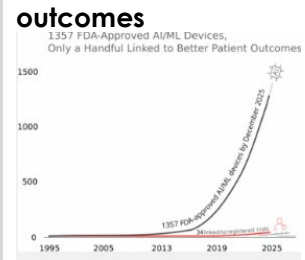
"These AI models were found to provide, for the first time, strong predictions of the presence or absence of the initiator in human genes, and were thus able to decode the DNA base sequence pattern of the initiator," said Kadonaga, a professor in the UC San Diego Department of Molecular Biology, School of Biological Sciences.

The newly uncovered information gives researchers the ability to predict the effects of DNA mutations that can lead to various disorders tied to the initiator. The data and models resulting from the new study could also be used to design synthetic promoters, sequences that turn genes on and off, with customized functions.

Source: University of California (21 August 2026)

AI, healthtech

Most AI medical devices cleared for use were not tested on patient outcomes



A new analysis shows that, of 1,357 artificial intelligence (AI)-based medical devices authorized by the U.S. Food and Drug Administration (FDA) for use in patient care, only three had been tested on whether they actually improve patients' health. Rawan Abulibdeh of the University of Toronto, Canada, and colleagues present these findings in the open access journal PLOS Digital Health on August 19, 2026.

New AI devices increasingly inform clinical care, such as systems that aid surgical planning, calculate cardiovascular risks, and guide interpretation of mammograms and other imaging. In order to be authorized for use in the U.S., AI devices typically only need to show "substantial equivalence" to an existing authorized device, and developers are not required to demonstrate whether new AI devices help people live healthier lives—with benefits shared equitably across diverse subgroups.

To deepen understanding of this topic, Abulibdeh and colleagues investigated how all 1,357 AI devices authorized by the FDA as of December 5, 2025, had been evaluated in patients prior to authorization.

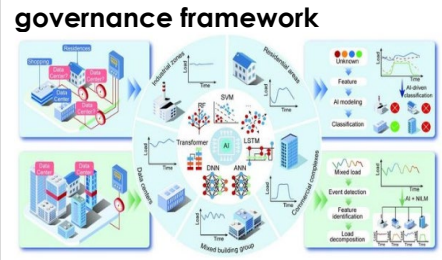
They found that only 34 of the devices had been included in registered clinical trials, with results posted for 12 and peer-reviewed manuscripts published for 12. Only 3 devices had been tested on patient-centered outcomes, such as death rates, strokes, hospitalizations, and quality of life. Most studies were conducted in highly resourced healthcare systems, and most excluded key patient subgroups, such as pregnant women, adults over 75, and non-English speakers.

The researchers suggest that structural barriers such as financial incentives and logistical challenges discourage developers from testing AI devices on patient outcomes, resulting in greater emphasis on speedy development than on rigor. They discuss how this framework could allow new tools to amplify existing disparities in healthcare and how it could lead to patients in low- and middle-income countries becoming inadvertent test populations for under-studied AI devices, as many countries rely on higher-income countries' authorization decisions.

Source: MIT (19 August 2026)

AI infrastructure, sustainability

Inconsistent data center energy estimates spur new statistical governance framework



A perspective article published in Engineering addresses widespread uncertainty in global data center energy accounting, proposing integrated technical and policy solutions to standardize energy-use tracking amid fast-expanding cloud and large-scale artificial intelligence infrastructure.

The article opens by highlighting severe inconsistency in existing global electricity consumption assessments for data centers, noting 2020 estimates span from 196 to 1200 TW·h, a disparity exceeding six times. The authors argue this massive variance stems from structural flaws within two mainstream energy calculation paradigms, which together distort carbon accounting, hinder power grid planning and slow renewable energy integration with rising computing loads. The research splits conventional estimation methods into bottom-up and top-down frameworks, each carrying distinct inherent limitations that undermine statistical reliability. Bottom-up modeling calculates total energy consumption through facility-level parameters such as rack density, server utilization and power usage effectiveness (PUE), yet suffers from broad parameter volatility across different sites, lab-biased efficiency benchmarks like SPECpower_ssj2008 that fail to reflect real-world heterogeneous workloads, and opaque self-reported enterprise operational data prone to underreporting without independent verification. Top-down modeling draws on aggregated national or utility electricity statistics for macro-sector evaluation, but cannot separate data center loads from mixed-use commercial premises due to absent dedicated industrial classification within official ICT energy datasets, leaving embedded small and medium-sized facilities uncounted in official tallies.

Source: Higher Education Press (21 August 2026)

AI, materials

AI mines research papers to discover new material: SNU team develops high-temperature-stable lead-free dielectric

Artificial intelligence has analyzed data scattered across hundreds of research papers to discover new lead-free dielectric materials that maintain stable performance even at high temperatures. The study presents a new approach that could transform materials discovery from a trial-and-error process into a data-driven one.

Seoul National University College of Engineering announced that a research team led by Professor Ho Won Jang of the Department of Materials Science and Engineering has developed a technology for designing lead-

AI, robotics

HKU pioneers 'RoboDojo': The first Hong Kong-led unified benchmark for embodied AI, setting new global standards for robot reliability

The Multimedia Laboratory (MMLab) at The University of Hong Kong (HKU) has spearheaded the development of "RoboDojo", an unified benchmarking platform designed to evaluate robotic manipulation across both simulated and physical environments. Co-initiated by Professor Ping LUO, Associate Director (AI Research and Tech Transfer) of the HKU School of Computing and Data Science (CDS), and his PhD student Mr Tianxing CHEN, this project was developed in collaboration with researchers from nearly 20 leading global universities, including the University of California, Berkeley, and Tsinghua University.

Embodied Artificial Intelligence (Embodied AI) represents the next frontier of robotics, aiming to

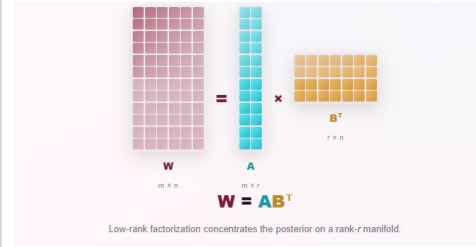
AI, robotics, materials discovery

Perspectives highlight the strength and limitations of AI-powered, "self-driving" labs

In two Perspectives, authors highlight the strengths and limitations of "self-driving" laboratories, spaces that combine robotics, high-throughput experiments, artificial intelligence (AI), and automated analysis to transform scientific discovery. They were envisioned to help discovery go from a slow process of trial and error into a continuous, adaptive learning cycle. These systems are already being used to discover molecules and optimize materials, sometimes exploring enormous experimental spaces while using far less material and time than conventional approaches.

AI safety

McGill researchers develop a more efficient way to identify when AI responses may need human review



McGill University researchers have developed a more energy-efficient method of building AI systems that are better at measuring – and indicating – their own uncertainty. This will help users determine when human oversight is needed, when additional data should be collected and when a model is being asked to work beyond the conditions it was trained for, the researchers said.

"Artificial intelligence systems now play a central role in daily life, from medical diagnosis and content moderation to autonomous driving and AI agents that act on our behalf," said Mame Diarra Touré, lead author and PhD Candidate in the Department of Mathematics and Statistics. "As these systems take on more

free dielectric materials by combining data extracted from scientific literature with physics-informed machine learning. Kwanwoo Song, an integrated M.S./Ph.D. student, served as the first author and led the overall research, while integrated M.S./Ph.D. student Youngmin Kim and postdoctoral researcher Jaehyun Kim participated in the collaborative study.

Source: SNU (19 August 2026)

equip machines with the ability to perceive, reason, and act autonomously in physical spaces. However, a major bottleneck in the field has been the lack of standardised evaluation metrics. Existing assessments are often confined to simulated environments or conducted under disparate hardware configurations and scoring criteria. Consequently, AI models that deliver impressive performance in isolated demonstrations frequently fail to exhibit the same level of reliability and robustness when deployed in complex, real-world scenarios.

Addressing this critical industry gap, RoboDojo seamlessly integrates simulation-based evaluation, standardised physical robot testing, and policy benchmarking under a single, cohesive framework. The platform currently encompasses 42 simulation tasks, 18 real-world robotic tasks, and 30 representative robot policies, rigorously assessing capabilities such as generalisation, memory, precision, and long-horizon task execution.

Source: The University of Hong Kong (20 August 2026)

In one Perspective, Milad Abolhasani highlights a major challenge in using AI tools in laboratories…

In another Perspective, Martin Burke and colleagues highlight "blocc" chemistry. Blocc chemistry is a modular approach to building small molecules from standardized chemical building blocks that could make organic synthesis faster, more automated, and accessible to nonspecialists…

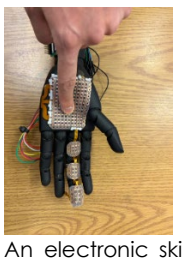
Source: AAAS (20 August 2026)

responsibility, they need to become more trustworthy. They should recognize when they are uncertain, rather than giving confident answers in situations where they may be wrong."

Source: McGill University (20 August 2026)

Healthtech, sensors, robotics

Researchers develop electronic skin for prosthetics to sense temperature and pressure



An electronic skin with a sensing system that can detect pressure and temperature could someday be used to help amputees gain feeling in their prosthetics.

The work, led by Washington State University researchers and published in the journal Cell Reports Physical Science, can sense at ten times a finer scale than current commercial glove sensors.

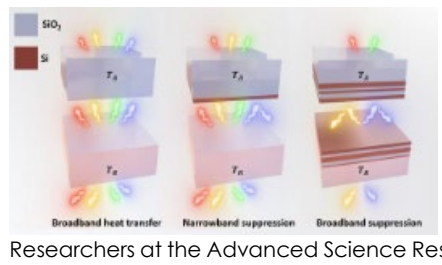
"This approach democratizes the production of medical-grade e-skins, making advanced tactile feedback viable for widespread clinical adoption," said Hongyi Shen, graduate student in the School of Mechanical and Materials Engineering and first author on the paper. "This work lays a crucial foundation for a full bionic skin with both sensing and haptic stimulation functions on prosthetics."

Haptic stimulation replicates the sense of touch. Providing even partial sensation for amputees could greatly improve their ability to perform tasks. While there are electronic skins available now, they are expensive and have low sensing resolution. They also often don't fit people well and only cover small regions. In fact, the more that e-skins are made to a custom shape, the worse they perform in sensing ability. Furthermore, the large amount of data generated from the sensing arrays mean that they don't work well in real-time.

Source: Washington State University (20 August 2026)

Materials, optics

Innovative metasurfaces offer a new way to block radiant heat



Researchers at the Advanced Science Research Center at the CUNY Graduate Center (CUNY ASRC) and Honeywell Aerospace have developed a new way to reduce the transfer of radiant heat between closely spaced bodies by using thin, nonmetallic coatings. In laboratory tests, the novel metasurface reduced thermal radiation emission by over 80% compared to nonstructured surfaces made of the same dielectric materials. The system also maintained its performance across a wide range of operating temperatures and showed resilience to small variations that could occur during design and fabrication.

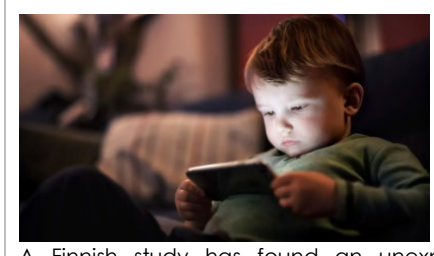
"Our findings demonstrate the value of looking at thermal radiation as a system-level interaction," said principal investigator Andrea Alù, director of the CUNY ASRC Photonics Initiative and Distinguished and Einstein Professor of Physics at the CUNY Graduate Center. "Instead of asking how to make a single nonmetallic surface reflect everything, we asked how two surfaces could be designed to exchange as little energy as possible. That shift in perspective allowed us to overcome longstanding bandwidth restrictions associated with conventional approaches."

The new approach, resulting from an academic/industry partnership between the CUNY ASRC Photonics Initiative and Honeywell Aerospace's Advanced Cryogenics Platform Group, was detailed in a recently published paper in Nature Communications. It will improve thermal insulation and temperature control in electronic devices, infrared sensors, spacecraft components and other technologies where conventional metallic coatings may create problems.

Source: Advanced Science Research Center (20 August 2026)

Smart devices, digital health

Scientists tracked kids for 8 years — the screen time result was unexpected



A Finnish study has found an unexpected association between screen use and cognitive performance. Children who accumulated more screen time as they grew up tended to show better cognitive processing during adolescence. One of the researchers cautions against viewing screen time as entirely harmful and says the goal should be to balance physical activity with screen use that encourages active thinking.

Low levels of physical activity among adolescents remain a significant public health concern. Sedentary behavior has been associated with poorer academic achievement, while physical activity is known to support brain function, particularly in adults. Much less is known, however, about how physical activity and sedentary behavior during childhood and adolescence relate to cognitive processing later in adolescence.

These years are especially important because the brain is still developing. Factors that shape cognitive abilities during childhood and adolescence may have lasting effects that extend into adulthood, potentially influencing education and working life.

Researchers examined how physical activity, sedentary behavior, and screen time from childhood through adolescence were related to cognitive processing in the teenage years. They also looked for differences between girls and boys and investigated whether the intensity of physical activity played a role.

Source: University of Jyväskylä (12 August 2026)

Sustainability, engineering

Carbon Capture Goes Electric Microwaves and resistive heating make direct air capture systems more efficient

A quiet shift is happening in the carbon capture sector. For years, most machines that pull carbon dioxide out of ambient air, known as direct air capture (DAC) systems, have relied on steam for heat. Heating is a critical step for freeing and collecting the CO2 after it's captured. But using steam for this is inefficient, and lately several companies have been experimenting with novel electrical approaches.

One company, AirCapture in Berkeley, Calif., uses microwaves to generate heat and in June won a Tencent CarbonX 2.0 award for it. Another, the startup Sustaera, in Durham, N.C., uses resistive heating in its lab-scale machine and in March announced it had reached an efficiency that's more than three times higher than steam. And London-based Mission Zero Technologies built a membrane electrodialysis machine that bypasses the need for heat altogether.

The efforts follow a tumultuous batch of years for commercial DAC technologies. Companies in this sector aim to remove gobs of CO2 from the atmosphere to slow global warming and sell the credits on carbon markets. But they're plagued by high costs, inefficiencies, commercial setbacks, struggling carbon markets, and political headwinds in the United States. So far, they haven't made a dent in removing the greenhouse gas.

DAC "is something we all need to have, but no one wants to pay for, so we need to make it as low-cost as possible," says Cory Sanderson, CEO and co-founder at Sustaera. "People are pivoting into [electrical approaches] because steam is not going to work, and I think the industry is finally realizing that."

Source: IEEE Spectrum (19 August 2026)