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AI
Why the Latest AI Model Isn't Always Best for Edge AI: Optimizing models for hardware-constrained devices isn't easy

"As you prepare for an evening of relaxation at home, you might ask your smartphone to play your favorite song or tell your home assistant to dim the lights. These tasks feel simple because they're powered by the artificial intelligence that's now integrated into our daily routines. At the heart of these smooth interactions is edge AI—AI that operates directly on devices like smartphones, wearables, and IoT gadgets, providing immediate and intuitive responses.

What Is Edge AI?

Edge AI refers to deploying AI algorithms directly on devices at the "edge" of the network, rather than relying on centralized cloud data centers. This approach leverages the processing capabilities of edge devices—such as laptops, smartphones, smartwatches, and home appliances—to make decisions locally.

Edge AI offers critical advantages for privacy and security: By minimizing the need to transmit sensitive data over the Internet, edge AI reduces the risk of data breaches. It also enhances the speed of data processing and decision-making, which is crucial for real-time applications such as health care wearables, industrial automation, augmented reality, and gaming. Edge AI can even function in environments with intermittent connectivity, supporting autonomy with limited maintenance and reducing data transmission costs.

While AI is now integrated into many devices, enabling powerful AI capabilities in everyday devices is technically challenging. Edge devices operate within strict constraints on processing power, memory, and battery life, executing complex tasks within modest hardware specifications."

Source: IEEE Spectrum (20 Jul 2025)

AI
Light Reveals Secrets Encoded in Chiral Metasurfaces
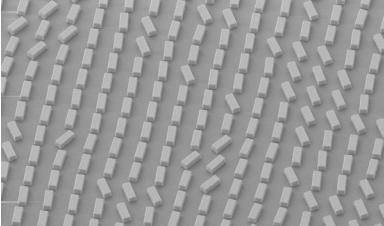
"Scientists from the Bionanophotonic Systems Laboratory in EPFL's School of Engineering have collaborated with those in Australia to create artificial optical structures called metasurfaces: 2D lattices composed of tiny elements (meta-atoms) that can easily tune their chiral properties. By varying the orientation of meta-atoms within a lattice, scientists can control the resulting metasurface's interaction with polarized light.

"Our 'chiral design toolkit' is elegantly simple, and yet more powerful than previous approaches, which tried to control light through very complex meta-atom geometries. Instead, we leverage the interplay between the shape of the meta-atom and the symmetry of the metasurface lattice," explains Bionanophotonics Lab head Hatice Altug.
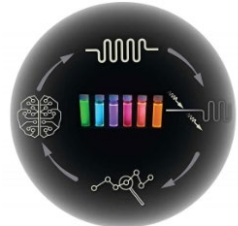
The innovation, which has potential applications in data encryption, biosensing, and quantum technologies, has been published in Nature Communications..."

Source: EPFL (16 Jul 2025)

AI & MATERIALS
This AI-Powered Lab Runs Itself—And Discovers New Materials 10x Faster

"A new leap in lab automation is shaking up how scientists discover materials. By switching from slow, traditional methods to real-time, dynamic chemical experiments, researchers have created a self-driving lab that collects 10 times more data, drastically accelerating progress. This new system not only saves time and resources but also paves the way for faster breakthroughs in clean energy, electronics, and sustainability—bringing us closer to a future where lab discoveries happen in days, not years."

Source: NC State Uni (22 Jun 2025)

ARCHITECTURE
### The Korean Hanok: Exploring Traditional Architecture's Environmental Principles

"Vernacular architecture often utilizes locally sourced materials and construction practices honed over centuries. This approach raises questions about its potential relevance for contemporary design challenges. The prevalence of high-rise developments globally, often relying on sealed envelopes and mechanical climate control, contrasts with historical architectural practices. Traditionally, regional architectures emerged from local communities, fostering distinct cultural identities and integrating passive systems for ventilation, cooling, and heating, often utilizing natural elements. The Hanok, traditional Korean houses, serve as a case study. Beyond their current role in tourism, they are also an example of how vernacular knowledge can provide passive climate-response strategies that align with the current principles of creating environmentally friendly buildings.

The construction of a Korean Hanok is done through a process where a wooden framework of columns, crossbeams, and other structural elements is assembled without the use of nails, with its walls using natural materials such as soil, stone, and lime. According to a publication from the Architecture and Urban Research Institute (AURI) of Korea, its roof is topped with wood panels as a finish in the interior and earth-baked tiles on the exterior, with a thick layer of roof filling soil in between to provide a thermal effect. Most of these houses are single-story buildings, usually facing south, with central courtyards to allow for better illumination and ventilation. At the same time, the Hanok typology can be subdivided into different layouts such as square, L-shape, U-shape, and straight, which vary according to the region. Houses in the north of Korea, for instance, tended to feature a double-house layout with a low ceiling, which was effective in maintaining interior warmth against the cold external air during the winter season, while those in the south featured a single-line layout designed for effective air circulation."

Source: Archdaily (20 Jul 2025)

BATTERY
Transfer Printing Technology for Lithium Protective Layers to Prevent Battery Explosions
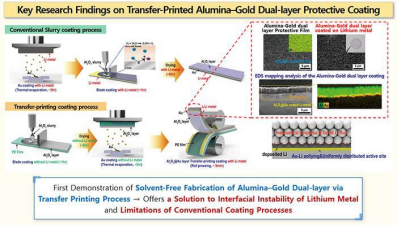
"A research team in South Korea has developed a breakthrough transfer printing technology that forms protective thin layers on lithium metal surfaces—an innovation poised to solve the long-standing dendrite issue plaguing next-generation lithium-metal batteries.

Dr. Jungdon Suk's team (Advanced Battery Research Center) at the Korea Research Institute of Chemical Technology (KRICT) has successfully transferred hybrid protective layers composed of solid polymers and ceramics onto lithium metal using a solvent-free process. Unlike conventional wet coating methods, this technique enables uniform coating over large areas without damaging the reactive lithium surface, marking a significant step toward commercial viability.

Lithium-metal batteries are a next-generation energy storage system that replace graphite with lithium metal as the anode. Offering ten times the theoretical capacity of conventional lithium-ion batteries, lithium-metal anodes are a key material in solid-state and lithium-sulfur batteries, which demand high energy density. However, the risk of dendrite formation during charge/discharge cycles raises safety concerns, including short-circuiting and fire hazards, while also limiting battery lifespan. Moreover, traditional wet-coating processes, which rely on organic solvents, introduce impurities and surface damage that"

DESIGN
Bike-Friendly Future City Concept with Wider Streets Wins Sketchup Design Sprint Challenge

"Raphaël Craverio has won SketchUp's Design Sprint Challenge 2025 with his design for a city where pedestrians and bikes pass underneath buildings, as announced in a video produced for Trimble and Dezeen by content creator Mr Chuck.

Craverio, an architecture student at LISAA Paris, won the competition with a model depicting a cross section of a building that extends over a street occupied by colourfully demarcated bike lanes and foot traffic.

The design illustrates a plan to accommodate growing populations in cities by widening sidewalks to extend underneath residential buildings.

The model also features a shared rooftop garden on which residents can grow their own food.

Wooden slats on the roofs either open to let sunlight in or close to block it, according to the time of day and season.

Trees and plants have been introduced on each storey to provide shade in the summer."

DESIGN
Milú Brunell Creates Soli Garden Light to Be Powered by Soil

"Mexican designer Milú Brunell has designed Soli, a prototype for a soil-powered lamp that can be planted in the ground.

Soli was informed by the shape of a sunflower – the top can be rotated manually to echo the flower's ability to spin and face the sun. And like a sunflower, Soli needs healthy soil to function.

"I wanted to design something that felt like it belonged in nature," said industrial designer Milú Brunell, who recently graduated from Savannah College of Art and Design."

HEALTH
Common Sugar Substitute Shown to Impair Brain Cells, Boost Stroke Risk

"From low-carb ice cream to keto protein bars to "sugar-free" soda, the decades-old sweetener erythritol is everywhere.

But new University of Colorado Boulder research shows the popular sugar substitute and specialty food additive comes with serious downsides, impacting brain cells in numerous ways that can boost risk of stroke.

The study was published in the Journal of Applied Physiology.

"Our study adds to the evidence suggesting that non-nutritive sweeteners that have generally been purported to be safe, may not come without negative health consequences," said senior author Christopher DeSouza, professor of integrative physiology and director of the Integrative Vascular Biology Lab.

First approved by the Food and Drug Administration in 2001, erythritol is a sugar alcohol, often produced by fermenting corn, and found in hundreds of products made by various brands. It has almost no calories, is about 80% as sweet as table sugar, and has negligible impact on insulin levels, making it a favorite for people trying to lose weight, keep their blood sugar in check or avoid carbohydrates.

But recent research has begun to shed light on its risks."

complicate large-scale production and commercialization.

To overcome these challenges, the research team developed two types of protective layers: a dual-layer composed of alumina (Al_2O_3) and gold (Au), and a hybrid layer combining ceramic (Al-LLZO) and polymer components. These protective layers were subsequently laminated onto lithium metal using a roll-based trasnfer printing technique, marking the first demonstration of this method in this field. This technique forms the protective layer on a separate substrate and then transfers it to lithium using pressure, eliminating the need for solvents and minimizing lithium damage while improving uniformity and process reproducibility."

One recent Cleveland Clinc study involving 4,000 people in the U.S. and Europe found that men and women with higher circulating levels of erythritol were significantly more likely to have a heart attack or stroke within the next three years."

HEALTH TECH

Music Therapy Embedded in The Life of Dementia Inpatient Care to Help Prevent and Manage Distress: A Feasibility Study to Inform a Future Trial

"Results: The MELODIC intervention was acceptable with high levels of treatment adherence. The research methods were feasible with recruitment targets met (including 28 patients, 13 family members, 48 staff members) and all requested data collected with high levels of data completeness. Quantitative data showed no increase in distress symptoms or reported safety incidents during the intervention period. Interventionist diaries and qualitative data supported intervention refinement.

Conclusion: In a highly complex setting caring for some of the most vulnerable patients in the NHS it was possible to co-design and deliver a novel music therapy intervention. The research methods were feasible and acceptable. This protocolised intervention should be tested for clinical effectiveness in a controlled trial."

MATERIALS

Adding Up Feynman Diagrams to Make Predictions About Real Materials

Electron-phonon diagrams with four phonons (shown as wavy lines) interacting with electrons, evaluated using Diagrammatic Monte Carlo. Loop diagrams like the one shown here are used to compute electrical conductivity as a function of temperature (T=1/beta). The open diagram contributes to higher-order scattering of an electron with momentum k1 and the corresponding formation of a polaron.

"Caltech scientists have found a fast and efficient way to add up large numbers of Feynman diagrams, the simple drawings physicists use to represent particle interactions. The new method has already enabled the researchers to solve a longstanding problem in the materials science and physics worlds known as the polaron problem, giving scientists and engineers a way to predict how electrons will flow in certain materials, both conventional and quantum."

TECHNOLOGY

Google Tapped Billions of Mobile Phones to Detect Quakes Worldwide — And Send Alerts

"Technology giant Google harnessed motion sensors on more than two billion mobile phones between 2021 and 2024 to detect earthquakes, and then sent automated warnings to millions of people in 98 countries. In an analysis of the data, released in Science today1, Google's scientists say that the technology captured more than 11,000 quakes and performed on a par with standard seismometers. Earthquake researchers who were not involved with the experiment are impressed by the system's performance, but argue that public officials would need access to more information about the proprietary technology before relying on it.

Over the past few decades, earthquake alert systems using standard seismometers have been deployed in locations including Mexico, Japan and the US west coast. But in 2020, Google announced that it would build a crowd-sourced system to detect tremors at their earliest stages by tracking the collective shaking of Android phones. The results from the first three years of operation, released today, show that the technology works and has improved over time. On average, thousands of people are killed by earthquakes each year, and with the mobile-based alert system in place, the number of people who now have access to earthquake alerts has increased tenfold since 2019, says Google.

"It's very impressive: most countries don't have an earthquake early-warning system, and this can help provide that service," says Allen Husker, a seismologist at the California Institute of Technology in Pasadena. But, Husker says, he would feel better if Google would provide independent scientists with more access to the data and algorithms."

TRANSPORTATION

Faster, Safer Cars Come into Focus with New Optical Network Tech High-Bandwidth In-Vehicle Networks Reach 10 Gb/S

"Madrid-based fabless semiconductor company KD and Fremont, Calif.–based embedded camera maker Leopard Imaging have launched a significant upgrade to cameras for vehicle vision systems. It's the first system for automotive applications with an Ethernet networking backbone to break the 10-gigabit-per-second transmission speed barrier.

10 Gb/s is 10,000 times as fast as the widely used 1-megabit-per-second Controller Area Network (CAN) protocol, marking a shift from legacy in-vehicle networks like CAN, the 20-kilobit-per-second Local Interconnect Network (LIN) protocol, and even 1-Gb/s Ethernet to a high-speed backbone capable of supporting autonomous systems, centralized computing, and next-gen infotainment—all at once and with low latency.

Pablo Blázquez, KD's business development manager, says the company's technology—originally proven in data centers—now meets even stricter automotive standards for durability. Unlike data centers, which are air-conditioned rooms with few if any disturbances, vehicles (and any optical transceivers installed on them) must stand up to harsh conditions including high heat and bitter cold, unrelenting vibration, and physical wear and tear. Standards such as IEEE 802.3cz require a 15-year minimum lifetime for automotive optical transceivers, while those in data centers get swapped out every few years as part of regular maintenance protocols."

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