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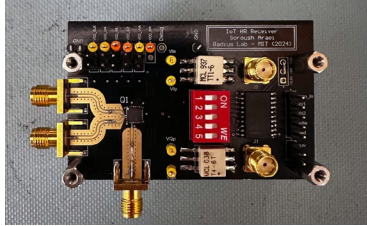
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5G
The Internet of Things Gets a 5G Update: MIT's clever chip design provides efficient frequency hopping



"A new chip component designed by MIT researchers promises to expand the reach of the Internet of Things into 5G. The discovery represents a broader push for 5G-based IoT tech—using the telecom standard's low latency, energy efficiency, and capacity for massive device connectivity. The new research also signals an important step toward applications that include smaller, low-power health monitors, smart cameras, and industrial sensors, for instance.

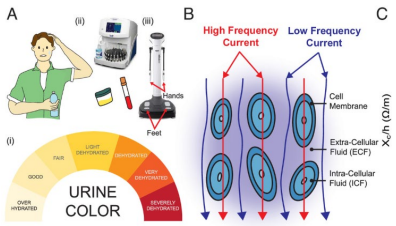
More broadly, the prospect of moving the IoT onto 5G means more things can connect more quickly with potentially greater data speeds and less battery drain. It also means trickier and more complicated circuits will need to be toiling away behind the data streams.

And doing all this using 5G standards rather than equivalent 4G/LTE or Wi-Fi networks arguably means IoT is expanding its range and scope. It's moving beyond relatively modest-sized IoT deployments to broader networks boasting the potential for hundreds of nodes or more.

To clarify, however, says Soroush Araei, a PhD candidate at MIT in electrical engineering and computer science, IoT-over-5G doesn't mean that every node in a network will suddenly be getting its own phone number."

Source: [IEEE Spectrum](#) (9 Jul 2025)

AI
Stay hydrated: New sensor knows when you need a drink



"With another hot Texas summer underway, the threat of dehydration always looms. Though this condition can range from inconvenient to life-threatening, it's tough to track.

Researchers from The University of Texas at Austin are working to change that with the invention of a new non-invasive, wearable sensor designed to measure a user's hydration levels continuously, in real time. Such a device could help a football player stay hydrated on a hot September afternoon, keep a firefighter battling a blaze from getting too dried out, or just let an office worker know when it's time to make a trip to fill their water bottle.

"Dehydration is a silent threat that affects millions of people every day," said Nanshu Lu, professor in the Cockrell School of Engineering's Department of Aerospace Engineering and Engineering Mechanics, who led the study published in the Proceedings of the National Academy of Sciences. "Our wearable sensor provides a simple, effective way to monitor hydration levels in real time, empowering individuals to take proactive steps to stay healthy and perform at their best."

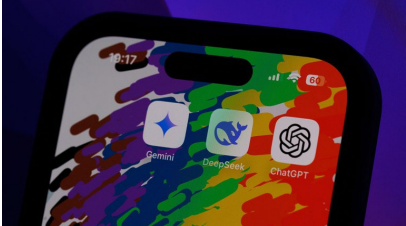
It uses bioimpedance, a technique that measures how electrical signals pass through the body, to track hydration levels. Using strategically placed electrodes, the sensor sends a small, safe electrical current through the arm.

How the electrical current flows through the body depends on the amount of water in the tissues. Water is a good conductor of electricity, so hydrated tissues allow the current to pass more easily, while dehydrated tissues resist the flow.

Data collected by the sensor is wirelessly transmitted to a smartphone, allowing users to monitor their hydration levels."

Source: [EurekAlert!](#) (14 Jul 2025)

AI
OpenAI's o3 tops new AI league table for answering scientific questions



"o3, an artificial intelligence (AI) model developed by the creators of ChatGPT, has been ranked the best AI tool for answering science questions in multiple fields, according to a benchmarking platform launched last week.

SciArena, developed by the Allen Institute for Artificial Intelligence (AI2) in Seattle, Washington, ranked 23 large language models (LLMs) according to their answers to scientific questions. The quality of the answers was voted on by 102 researchers. o3, created by OpenAI in San Francisco, California, was ranked the best at answering questions on natural sciences, health care, engineering, and humanities and social science, after more than 13,000 votes.

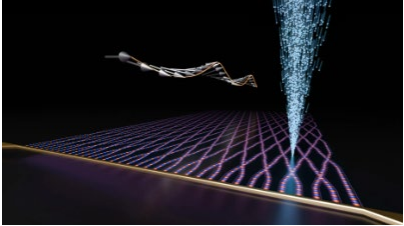
DeepSeek-R1, built by DeepSeek in Hangzhou, China, came second on natural-sciences questions and fourth on engineering. Google's Gemini-2.5-Pro ranked third in natural sciences and fifth in engineering and health care.

Users' preference for o3 might stem from the model's tendency to give a lot of detail on the literature it cites and to produce technically nuanced responses, says Arman Cohan, a research scientist at AI2. But explaining why models' performance varies is challenging because most are proprietary. Differences in training data and what the model has been optimized for, among other things, could partially explain it, he says.

SciArena is the latest platform developed to evaluate how AI models perform on certain tasks — and one of the first to rank performance on scientific tasks using crowdsourced feedback. "SciArena is a positive effort that motivates a careful evaluation of LLM-assisted literature tasks," says Rahul Shome, a robotics and AI researcher at the Australian National University in Canberra."

Source: [Nature](#) (10 Jul 2025)

AI
This magnetic breakthrough could make AI 10x more efficient



"The rapid rise in AI applications has placed increasingly heavy demands on our energy infrastructure. All the more reason to find energy-saving solutions for AI hardware. One promising idea is the use of so-called spin waves to process information. A team from the Universities of Münster and Heidelberg (Germany) led by physicist Prof. Rudolf Bratschkisch (Münster) has now developed a new way to produce waveguides in which the spin waves can propagate particularly far. They have thus created the largest spin waveguide network to date. Furthermore, the group succeeded in specifically controlling the properties of the spin wave transmitted in the waveguide. For example, they were able to precisely alter the wavelength and reflection of the spin wave at a certain interface. The study was published in the scientific journal Nature Materials."

Source: [Uni of Münster](#) (10 Jul 2025)

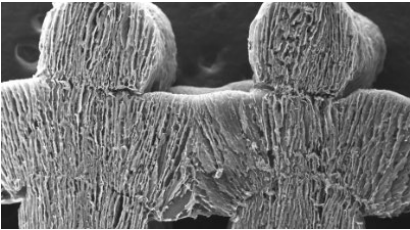
ARCHITECTURE
Swimmable Cities International Movement Advocates for the Right to Swim in Urban Waterways



"Swimmable Cities is an alliance of 153 signatory organizations across 59 cities in 22 countries, supporting the global movement for swimmable urban waterways. In the context of increasing urbanization, climate change, and biodiversity loss, the initiative aims to reclaim rivers and harbors as public spaces for communities to enjoy and benefit from bathing. It advocates for urban waterways to be made safe, healthy, and accessible for both swimmers and wildlife, calling for cross-border collaboration to develop improvement strategies and collect data to evaluate "swimmability." This call becomes especially relevant amid rising global temperatures and growing inequalities in access to public infrastructure in major cities. The movement's 10-point charter begins with the affirmation of "the right to swim," celebrating urban swimming culture and recognizing the historical significance of water.

The Swimmable Cities collective was launched in the lead-up to the Paris Olympic Games in July 2024, where Olympic athletes participated in a marathon swimming event in the Seine. A year after a much-discussed trial swim raised questions about the river's health and safety, the City of Paris inaugurated three official public bathing spots along the Seine, open from July 5 to August 31, 2025. The initiative is part of the Paris Plages program and follows a major river-cleaning effort, demonstrating "the City of Paris' desire to reconcile residents with their river, in line with the ecological ambition

DASALINATION
This sun-powered sponge pulls drinking water straight from the ocean



"In a leap toward sustainable desalination, researchers have created a solar-powered sponge-like aerogel that turns seawater into drinkable water using just sunlight and a plastic cover. Unlike previous materials, this new 3D-printed aerogel maintains its efficiency at larger sizes, solving a key scalability issue. In outdoor tests, it produced clean water directly from the ocean without any electricity, pointing to a future of low-cost, energy-free freshwater production."

DESIGN
Infinite Machine creates two-person electric vehicle built for bike lanes



"New York-based startup Infinite Machine has unveiled the Olto minimalist e-bike that looks like a scooter but doesn't require a motorcycle license, according to the brand.

The \$3,495 e-bike is the follow-up to the brand's debut vehicle, the P1 – a futuristic \$10,000 electric scooter that required a motorcycle license to ride, according to New York standards.

Unlike P1, Olto was designed to be accessible to anyone. It can seat two passengers, features convertible footrests that double as pedals, and even includes a reverse function, which is unusual for e-bikes.

It has a 30 mph (48 kmh) top speed and has a 40-mile (64 kilometer) range based on its "hot-swappable" under-the-seat battery, which drives power to the rear 750w engine.

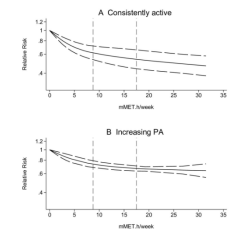
The body was built using extruded, weatherproofed aluminum.

"Our goal was to capture the magic of the P1 – its performance, technology, and design – in a package that was bike-lane friendly and easy for anyone to use," said [Infinite Machine](#) co-founder and chief engineer Eddie Cohen.

While major cities look to reduce car dependency and reclaim public space, micromobility vehicles like e-bikes, scooters, and mopeds have become essential tools for urban dwellers.

With more protected bike lanes, congestion

HEALTH
Physical activity trajectories and accumulation over adulthood and their associations with all-cause and cause-specific mortality: a systematic review and meta-analysis



"This review provides the first and currently largest meta-analysis of quantitative estimates of risk reduction for different mortality outcomes based on different PA patterns.

Repeated PA measurements enable more diverse approaches to model PA accumulation over time and allow for more accurate effects estimates for health outcomes compared with single PA measurements.

Being consistently active is associated with around 30–40% risk reduction in all-cause mortality, while increasing PA is associated with 20–25% lower risk of all-cause mortality.

Binary categorisations of PA possibly conceal the benefits of decreasing PA from high to low, whereas using ≥3 PA categories may provide greater insight for future research.

In consistent and increasing PA patterns, the most substantial risk reduction occurred below the PA guidelines, while limited additional benefits were seen above the guidelines, particularly in increasing patterns."

<p>of the Paris 2024 Games." In the context of increasingly hot summers in the Northern Hemisphere, the spirit of the Swimmable Cities movement is reflected in this project as well as in others worldwide, including New York City's first river-based water-filtering pool at Pier 35."</p> <p>Source: Archdaily (14 Jul 2025)</p>	<p>pricing, and car-free zones on the rise, compact vehicles could help cities transition toward cleaner, more flexible, transportation systems."</p> <p>Source: ACS (3 Jul 2025)</p>	<p>Source: Dezeen (9 Jul 2025)</p>	<p>Source: BMJ (2 Jul 2025)</p>
<p>MONDAY BLUES HKU research reveals “Anxious Monday” effect: chronic stress hormone surge linked to start of week in older adults</p>  <p>“A research study led by Professor Tarani Chandola from the Department of Sociology, Faculty of Social Sciences at the University of Hong Kong (HKU) has revealed that Mondays uniquely drive long-term biological stress, regardless of working status, with implications for heart health.</p> <p>The research has identified a striking biological phenomenon: older adults who feel anxious on Mondays exhibit significantly higher long-term stress hormone levels, up to two months later. This “Anxious Monday” effect, observed in both working and retirees, points to a deep-rooted link between the start of the week and dysregulation of the body's stress response system, a known driver of cardiovascular disease (CVD). Published in the Journal of Affective Disorders, the study analysed data from over 3,500 older adults participating in the English Longitudinal Study of Ageing (ELSA).”</p> <p>Source: HKU (22 Jun 2025)</p>	<p>OPTICS New research expands laser technology</p>  <p>"In a first for the field, researchers from The Grainger College of Engineering at the University of Illinois Urbana-Champaign have reported a photopumped lasing from a buried dielectric photonic-crystal surface-emitting laser emitting at room temperature and an eye-safe wavelength. Their findings, published in IEEE Photonics Journal, improve upon current laser design and open new avenues for defense applications....</p> <p>PCSELS are a newer field of semiconductor lasers that use a photonic crystal layer to produce a laser beam with highly desirable characteristics such as high brightness and narrow, round spot sizes. This type of laser is useful for defense applications such as LiDAR, a remote sensing technology used in battlefield mapping, navigation, and target tracking. With funding from the Air Force Research Laboratory, Choquette's group wanted to examine this new technology and make their own advancements in the growing field.</p> <p>"We believe PCSELS will be extremely important in the future," said Erin Rafferty, a graduate student in electrical and computer engineering and the lead author of the paper. "They just haven't reached industrial maturity yet, and we wanted to contribute to that."</p> <p>Source: Uni of Illinois (11 Jul 2025)</p>	<p>URBAN PLANNING A new perspective on designing urban low-altitude logistics networks subhead: Balancing cost, safety, and noise through co-evolutionary multi-objective optimization</p>  <p>“As cities worldwide begin embracing low-altitude logistics to support rapid, flexible deliveries by drones, urban planners face an increasingly difficult challenge: how to design an aerial delivery network that balances cost efficiency, safety, and noise impact.</p> <p>A research team from Beihang University has developed a new framework that tackles this challenge head-on. Their study presents a multi-layered, hub-and-spoke logistics network design optimized using a dual-population co-evolutionary algorithm. This method not only improves route planning and facility placement but also explicitly accounts for noise constraints — a key concern for residents living near hospitals, schools, and housing complexes.</p> <p>The team published their work in Acta Aeronautica et Astronautica Sinica on March 12, 2025.</p> <p>“Noise is often the neglected factor in low-altitude logistics,” said Dr. Yumeng Li, the corresponding author and associate professor at Beihang University. “But as drone delivery scales up, the public's tolerance for frequent overflights will be tested. Our approach takes noise considerations into the core of the logistics network's design.”</p> <p>A key innovation is the adoption of a multi-layered hub-and-spoke network structure, where nodes (takeoff/landing points and delivery centers) are mapped onto different altitude levels, and links represent horizontal drone flight paths. The model incorporates population-density-based risk zoning and classifies noise-sensitive facilities such as residential areas as constraints.”</p> <p>Source: EurekAlert! (7 Jul 2025)</p>	<p>QUANTUM ENTANGLEMENT Breakthrough battery lets physicists reverse entanglement—and rewrite quantum law</p>  <p>“Researchers prove entanglement can be made perfectly reversible when assisted by an entanglement battery, establishing a thermodynamics-style second law for quantum information and opening doors to more efficient quantum devices.</p> <p>Just over 200 years after French engineer and physicist Sadi Carnot formulated the second law of thermodynamics, an international team of researchers has unveiled an analogous law for the quantum world. This second law of entanglement manipulation proves that, just like heat or energy in an idealized thermodynamics regime, entanglement can be reversibly manipulated, a statement which until now had been heavily contested. The new research - released on July 2, 2025 in Physical Review Letters - deepens understanding of entanglement's basic properties and provides critical fundamental insight into how to efficiently manipulate entanglement and other quantum phenomena in practice.”</p> <p>Source: Uni of Warsaw (7 Jul 2025)</p>