

Weekly Discovery

We SHARE to inspire and ignite ideas!

31 Jul – 4 Aug 2023

AI GenAI: Giga\$\$, TeraWatt-Hours, and GigaTons of CO2



"For more than a decade, we have speculated about the impact of artificial intelligence (AI)/machine learning (ML) on the environmental sustainability of computing (see ACM2). It has become clear that AI's carbon emissions (scope 2), lifecycle carbon (scope 3), and other negative environmental impacts are growing explosively. Generative AI capabilities and applications exemplified and popularised in ChatGPT, DALL-E 2, Stable Diffusion, and Copilot, are the drivers."

Source: [ACM](#) (1 Aug 2023)

AI 'Workplace AI Revolution Isn't Happening Yet,' Survey Shows



"The UK risks a growing divide between organisations who have invested in new, artificial intelligence-enabled digital technologies and those who haven't, new research suggests."

Only 36% of UK employers have invested in AI-enabled technologies like industrial robots, chat bots, smart assistants, and cloud computing over the past five years, according to a nationally representative survey from the Digital Futures at Work Research Centre (Digit). The survey was carried out between November 2021 and June 2022, with a second wave now underway."

Source: [LEEDS](#) (4 Jul 2023)

ARCHITECTURE The Ground Is Deforming, And Buildings Aren't Ready



"There is a "silent hazard" lurking underneath our major global cities, and our buildings were not designed to handle it."

A new Northwestern University study has, for the first time, linked underground climate change to the shifting ground beneath urban areas. As the ground heats up, it also deforms. This phenomenon causes building foundations and the surrounding ground to move excessively (due to expansions and contractions) and even crack, which ultimately affects structures' long-term operational performance and durability. Researchers also report that past building damage may have been caused by such rising temperatures and expect these issues to continue for years to come."

Source: [NORTHWESTERN](#) (11 Jul 2023)

GENETIC ENGINEERING 'Virgin Birth' Genetically Engineered into Female Animals for The First Time



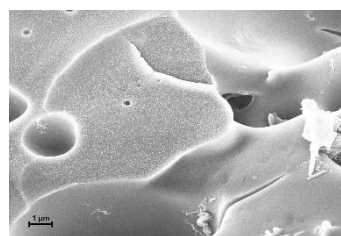
"For the first time, scientists have used genetic engineering to trigger 'virgin birth' in female animals that normally need a male partner to reproduce."

Previously, scientists have generated young mice and frogs with no genetic input from a male parent. But those offspring were made by tinkering with egg cells in laboratory dishes rather than by giving female animals the capacity for virgin birth, also known as parthenogenesis.

Earlier research identified candidate genes for parthenogenesis, says study co-author Alexis Sperling, a developmental biologist at the University of Cambridge, UK. But her team, she says, not only pinpointed such genes but also confirmed their function by activating them in another species."

Source: [Nature](#) (28 Jul 2023)

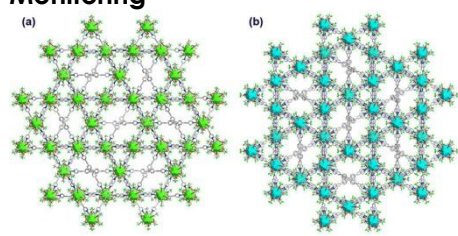
MATERIALS Self-Healing Plastic Becomes Biodegradable



"Konstanz chemists develop mineral plastics with numerous positive properties from sustainable basic building blocks and, together with biologists, demonstrate the material's excellent microbiological degradability."

Source: [Uni Konstanz](#) (27 Jul 2023)

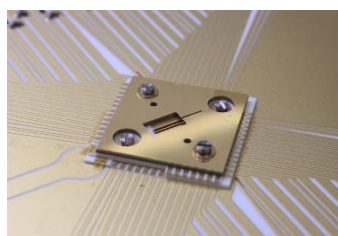
MATERIALS Towards Silver Cluster-Assembled Materials for Environmental Monitoring



"Silver cluster-assembled materials (SCAMs) are emerging light-emitting materials with molecular designability and unique properties. However, due to their dissimilar structural architecture in different solvents, their widespread application remains limited. Now, researchers from Tokyo University of Science in Japan have developed two new SCAMs that exhibit excellent fluorescence and high sensitivity to Fe³⁺ ions in aqueous solutions, indicating their potential for environmental monitoring and assessment."

Source: [TUS](#) (27 Jul 2023)

QUANTUM PHYSICS Two Atoms Vibrate Like a Laser



"Phonon lasers replace the light excitations (photons) that are used in a standard laser with vibrational excitations of matter (phonons). Researchers have now coaxed two ions into forming a phonon laser containing fewer than 10 phonons, placing it firmly in the quantum regime [1], whereas previous phonon lasers had at least 10,000 phonons. The researchers plan to use this quantum phonon laser as a tool to investigate the role of dissipation in the behaviour of quantum systems."

Dissipation—energy leaking into or out of a system in the form of heat—is often seen as a nuisance in physics, for example, when it takes the form of air resistance and reduces the fuel efficiency of a car or an airplane. But quantum systems also exhibit dissipation, and its effects in the quantum realm are not fully understood. Jonathan Home of the Swiss Federal Institute of Technology (ETH) in Zurich and his colleagues wanted to investigate how two separate sources of dissipation can interact to affect the behaviour of a quantum system. "A laser is the simplest quantum system we could think of" that allows such experiments, Home says."

Source: [APS](#) (28 Jul 2023)

ROBOTICS Robotic Hand Rotates Objects Using Touch, Not Vision



"Inspired by the effortless way humans handle objects without seeing them, a team led by engineers at the University of California San Diego has developed a new approach that enables a robotic hand to rotate objects solely through touch, without relying on vision."

Using their technique, the researchers built a robotic hand that can smoothly rotate a wide array of objects, from small toys, cans, and even fruits and vegetables, without bruising or squishing them. The robotic hand accomplished these tasks using only information based on touch."

Source: [UCSD](#) (25 Jul 2023)

TECH POLICY Cryptography May Offer a Solution to The Massive AI-Labeling Problem



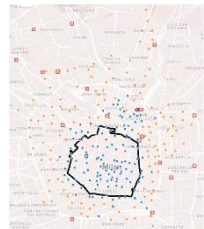
"The White House wants big AI companies to disclose when content has been created using artificial intelligence, and very soon the EU will require some tech platforms to label their AI-generated images, audio, and video with "prominent markings" disclosing their synthetic origins."

There's a big problem, though: identifying material that was created by artificial intelligence is a massive technical challenge. The best options currently available—detection tools powered by AI, and watermarking—are inconsistent, impermanent, and sometimes inaccurate. (In fact, just this week OpenAI shuttered its own AI-detecting tool because of high error rates.)

But another approach has been attracting attention lately: C2PA. Launched two years ago, it's an open-source internet protocol that relies on cryptography to encode details about the origins of a piece of content, or what technologists refer to as "provenance" information."

Source: [MIT Technology Review](#) (28 Jul 2023)

URBAN ROAD PRICING The Impact of Urban Road Pricing on The Use of Bike Sharing



"We empirically analyse the effect of road pricing on the use of bike sharing. We exploit two sudden policy changes in Milan's congestion pricing scheme resulting in a shift from priced to unpriced road use: a temporary suspension of the scheme in 2012, and a durable reduction in its application schedule. We find that the sudden removal of road pricing decreases bike-sharing use by about 5%. The policy impact occurs through the increase of road traffic congestion, which makes cycling less safe and pleasant. The reduction in the schedule leads to an 8% decline in bike-sharing use in the affected time window. Our findings indicate that policies inducing drivers to internalise the external costs of car use also promote the uptake of non-polluting transport modes. This widens the spectrum of benefits that need to be considered in the design and implementation of road pricing policies."

Source: [ScienceDirect](#) (23 Jun 2023)

VR Consumers More Likely to Use Virtual Apparel Try-On Software If Interactive

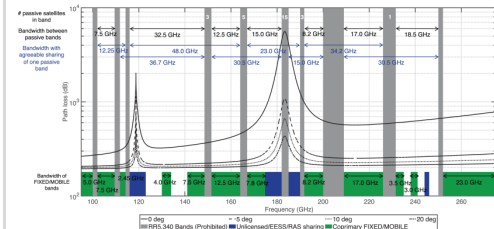


"While more and more people are shopping online, purchasing clothes on the internet poses a unique challenge: What if it doesn't fit? The apparel industry's latest solution is virtual try-on sessions that allow consumers to share photos or measurements of themselves to create a similar-sized avatar."

While some consumers have significant concerns about the new technology, especially young people, new research from the University of Missouri found that qualities such as the perceived ease of using the technology significantly diminishes privacy concerns."

Source: [University of Missouri](#) (28 Jun 2023)

6G MOBILE COMMUNICATION Coexistence and Spectrum Sharing Above 100 GHz



"The electromagnetic spectrum plays a fundamental role in the development of the digital society. It enables wireless communications (either between humans or machines) and sensing (for example, for Earth exploration, radio astronomy, imaging, and radars). While each of these uses' benefits from a larger bandwidth, the spectrum is a finite resource. This introduces competing interests among the different stakeholders of the spectrum, which have led—so far—to rigid policies and spectrum allocations. Recently, the spectrum crunch in the sub-6-GHz bands has prompted communication technologies to move to higher carrier frequencies, where future sixth generation (6G) wireless networks can exploit theoretically very large bandwidths. However, the spectrum above 100 GHz features several narrow, yet numerous sub bands that are exclusively allocated for passive sensing applications, e.g., for climate and weather monitoring. This prevents the allocation of large contiguous bands to active users of the spectrum, either being communications (which need tens of gigahertz of bandwidth to target terabit-per-second links) or radars."

Source: [IEEE](#) (20 Jul 2023)