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AI

Space Lasers, AI Used by Geospatial Scientist to Measure Forest Biomass

"FAYETTEVILLE, Ark. — Satellite data used by archaeologists to find traces of ancient ruins hidden under dense forest canopies can also be used to improve the speed and accuracy to measure how much carbon is retained and released in forests.

Understanding this carbon cycle is key to climate change research, according to Hamdi Zurqani, an assistant professor of geospatial science for the Arkansas Forest Resources Center and the College of Forestry, Agriculture and Natural Resources at the University of Arkansas at Monticello. The center is headquartered at UAM and conducts research and extension activities through the Arkansas Agricultural Experiment Station and the Cooperative Extension Service, the University of Arkansas System Division of Agriculture's research and outreach arms.

"Forests are often called the lungs of our planet, and for good reason," Zurqani said. "They store roughly 80 percent of the world's terrestrial carbon and play a critical role in regulating Earth's climate."

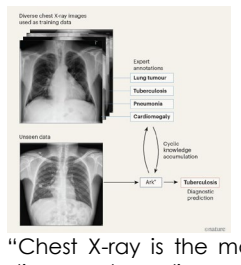
To measure a forest's carbon cycle, a calculation of forest aboveground biomass is needed. Though effective, traditional ground-based methods for estimating forest aboveground biomass are labor-intensive, time-consuming and limited in spatial coverage abilities, Zurqani said.

In a study recently published in Ecological Informatics, Zurqani shows how information from open-access satellites can be integrated on Google Earth Engine with artificial intelligence algorithms to quickly and accurately map large-scale forest aboveground biomass, even in remote areas where accessibility is often an issue."

Source: EurekAlert! (13 Jun 2025)

AI

An Open AI Model Could Help Medical Experts to Interpret Chest X-Rays



"Chest X-ray is the main imaging tool used to diagnose lung diseases because it is accessible, affordable and efficient. As a first-line modality in clinical practice, it is widely used to assess serious respiratory conditions such as COVID-19 complications, pneumonia, tuberculosis and lung cancer1. Its non-invasive nature, rapid image acquisition and low radiation levels make it an indispensable diagnostic tool1. However, the projection of multiple anatomical structures onto a single image presents challenges for accurate interpretation. Writing in Nature, Ma et al. introduce an artificial intelligence (AI) model designed to address the key challenges of interpreting chest X-rays.

AI models for clinical applications need to be robust, adaptable and capable of generalizing across contexts. Advances in machine learning over the past decade have aimed to enhance chest X-ray analysis, particularly through deep-learning approaches that excel at image generation, extracting and segmenting features from images and adapting to different data distributions. Furthermore, foundation models, which are trained on vast amounts of unlabelled data and are designed for diverse tasks in large-scale artificial neural networks, are reshaping medical-imaging AI. Unlike conventional models that focus on specific applications, these versatile systems require minimal extra training when switching to a new task, enabling broad adaptability. By integrating several data types — such as radiographic images, clinical notes and laboratory results — foundation models offer a comprehensive approach to medical diagnostics."

Source: Nature (11 Jun 2025)

AI

An Algorithm Reveals How Our Brain Is Motivated

"A small region of the brain, known as the ventral tegmental area (VTA), plays a key role in how we process rewards. It produces dopamine, a neuromodulator that helps predict future rewards based on contextual cues. A team from the universities of Geneva (UNIGE), Harvard, and McGill has shown that the VTA goes even further: it encodes not only the anticipated reward but also the precise moment it is expected. This discovery, made possible by a machine learning algorithm, highlights the value of combining artificial intelligence with neuroscience. The study is published in the journal Nature."

Source: unige (Jun 2025)

ARCHITECTURE

What are Metamaterials? Innovations in Architecture from Acoustic Invisibility to Seismic Protection

"The future of the architecture industry holds countless possibilities, as research in the domain progresses. One innovation is the ability for structures to be rendered acoustically invisible, absorb earthquake energy, or harvest electricity from the sounds around them. Qualities of this nature can help redefine the functionality and sustainability of buildings. Architects and scientists are at the forefront of this creation. What makes this possible are metamaterials that could offer alternative methods of designing good buildings.

Metamaterials are synthetic composite materials with structures that exhibit properties not usually found in naturally occurring materials. Unlike traditional materials characterized by their chemical composition, metamaterials owe their unique properties to their internal structure. These engineered materials are designed at the microscopic level to manipulate waves, allowing them to be designed for desired reactions with vibrations, sound, or light waves.

Its most foreseeable application lies in acoustic control. Traditional soundproofing relies on thick and heavy materials that absorb sound waves. Acoustic metamaterials, on the other hand, can redirect sound waves entirely, effectively rendering a building "acoustically invisible." The materials can be developed to target precise frequencies to make them efficient at eliminating particular types of noise pollution."

Source: Archdaily (16 Jun 2025)

COMPUTING

Art Restoration Gets a High-Tech Makeover: Pixels Meet Paint, as a Digital "Mask" Conceals Damage on A 15th-Century Painting

"Masterpieces like The Mona Lisa or The Coronation of Napoleonare admired by tens of thousands of visitors to the Louvre each day. Yet, deep within the Paris museum's vaults lie thousands more works of art that—whether due to space limitations, conservation requirements, or scarce restoration resources—never make it onto the walls of the world's most famous art institution.

A new restoration technique that bridges digital innovation and traditional art care aims to change that.

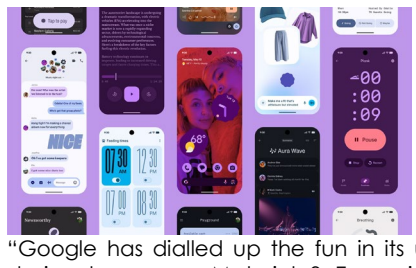
Instead of the painstaking manual inpainting methods traditionally required to repair and retouch damaged paintings, a mechanical engineer from MIT has harnessed advanced image processing and precision printing technologies to physically restore artworks through a thin, removable overlay—without directly altering the original canvas.

"What they're doing is phenomenally cool," says Julian Baumgartner, a fine-art conservator in Chicago with a popular YouTube channel where he shares art restoration techniques and insights. This kind of innovation "makes our lives easier, better, faster, cheaper," he says.

But it also raises a crucial ethical and philosophical question: By adopting such tools, does the art world risk losing the intangible human qualities—labor, passion, struggle—that connect us to an artwork's history and creation? A technological restoration may recreate an image perfectly. But without a human hand touching a paintbrush to bring about that transformation, it risks losing the essence of artistic expression, Baumgartner

DESIGN

Google Ushers In Age Of "Expressive" Interfaces with Material Design Update



"Google has dialled up the fun in its updated design language, Material 3 Expressive, after user testing found that people have an appetite for "wild and way-too-playful" interfaces, Google Design vice-president Vanessa Cho told Dezeen.

Released earlier this month, Material 3 Expressive is the fourth update to Google's Material Design system and aims to inspire emotion through an expanded use of colour, shape and animation.

Material Design both defines the personalisation options on Android and Wear OS and forms an open-source toolkit for developers working on their own app designs.

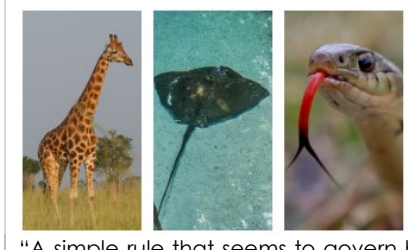
The update marks an evolution of 2021's Material Design 3, sometimes called Material You, which also emphasised personalisation and expressiveness. Cho explained that while that system had been positively received, three years of further development showed the design team that they could go bolder.

"In one of our studies, we asked participants to evaluate what we considered the outer limits — totally wild and way-too-playful designs," she said. "We were surprised when those were the participants' preferred screens."

The Google design team expanded on these results with a period of intensive research, conducting a total of 46 studies with over 18,000 participants."

ENVIRONMENTAL CHANGE

Life Clusters in Cores Then Spreads Out, Finds New Rule



"A simple rule that seems to govern how life is organised on Earth is described in a new study published today (Wednesday, 4 June) in Nature Ecology & Evolution.

The research team led, by Umeå University and involving the University of Reading, believe this rule helps explain why species are spread the way they are across the planet. The discovery will help to understand life on Earth – including how ecosystems respond to global environmental changes.

The rule is simple: in every region on Earth, most species cluster together in small 'hotspot' areas, then gradually spread outward with fewer and fewer species able to survive farther away from these hotspots.

Rubén Bernardo-Madrid, lead author and researcher at Umeå University (Sweden), said: "In every bioregion, there is always a core area where most species live. From that core, species expand into surrounding areas, but only a subset manages to persist. It seems these cores provide optimal conditions for species survival and diversification, acting as a source from which biodiversity radiates outward."

This pattern highlights the disproportionate ecological role these small areas play in sustaining the biodiversity of entire bioregions. Jose Luis Tella, from the Estación Biológica de Doñana-CSIC (Spain), said: "Safeguarding these core zones is therefore essential, as they represent critical priorities for conservation strategies."

HEALTH TECH

First-Of-Its-Kind Technology Helps Man with ALS 'Speak' In Real Time

"Researchers at the University of California, Davis, have developed an investigational brain-computer interface that holds promise for restoring the ability to hold real-time conversations to people who have lost the ability to speak due to neurological conditions.

In a new study published in the scientific journal Nature, the researchers demonstrate how this new technology can instantaneously translate brain activity into voice as a person tries to speak — effectively creating a digital vocal tract with no detectable delay.

The system allowed the study participant, who has amyotrophic lateral sclerosis (ALS), to "speak" through a computer with his family in real time, change his intonation and "sing" simple melodies.

"Translating neural activity into text, which is how our previous speech brain-computer interface works, is akin to text messaging. It's a big improvement compared to standard assistive technologies, but it still leads to delayed conversation. By comparison, this new real-time voice synthesis is more like a voice call," said Sergey Stavisky, senior author of the paper and an assistant professor in the UC Davis Department of Neurological Surgery. Stavisky co-directs the UC Davis Neuroprosthetics Lab.

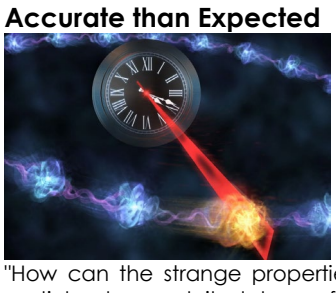
"With instantaneous voice synthesis, neuroprosthesis users will be able to be more included in a conversation. For example, they can interrupt, and people are less likely to interrupt them accidentally," Stavisky said."

says."

Source: Dezeen (12 Jun 2025)

QUANTUM CLOCK

Quantum Clocks can be More Accurate than Expected



"How can the strange properties of quantum particles be exploited to perform extremely accurate measurements? This question is at the heart of the research field of quantum metrology. One example is the atomic clock, which uses the quantum properties of atoms to measure time much more accurately than would be possible with conventional clocks.

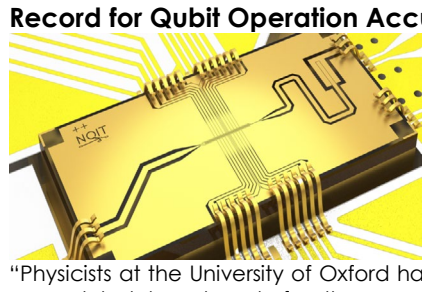
However, the fundamental laws of quantum physics always involve a certain degree of uncertainty. Some randomness or a certain amount of statistical noise has to be accepted. This results in fundamental limits to the accuracy that can be achieved. Until now, it seemed to be an immutable law that a clock twice as accurate requires at least twice as much energy. But now a team of researchers from TU Wien, Chalmers University of Technology, Sweden, and University of Malta have demonstrated that special tricks can be used to increase accuracy exponentially. The crucial point is using two different time scales – similar to how a clock has a second hand and a minute hand."

Source: tuwien (10 Jun 2025)

Source: Dezeen (28 May 2025)

QUANTUM PHYSICS

Oxford Physicists Set New World Record for Qubit Operation Accuracy



"Physicists at the University of Oxford have set a new global benchmark for the accuracy of controlling a single quantum bit, achieving the lowest-ever error rate for a quantum logic operation—just 0.000015%, or one error in 6.7 million operations. This record-breaking result represents nearly an order of magnitude improvement over the previous benchmark, set by the same research group a decade ago…

To put the result in perspective: a person is more likely to be struck by lightning in a given year (1 in 1.2 million) than for one of Oxford's quantum logic gates to make a mistake.

To perform useful calculations on a quantum computer, millions of operations will need to be run across many qubits. This means that if the error rate is too high, the final result of the calculation will be meaningless. Although error correction can be used to fix mistakes, this comes at the cost of requiring many more qubits. By reducing the error, the new method reduces the number of qubits required and consequently the cost and size of the quantum computer itself.

Co-lead author Molly Smith (Graduate Student, Department of Physics, University of Oxford), said: 'By drastically reducing the chance of error, this work significantly reduces the infrastructure required for error correction, opening the way for future quantum computers to be smaller, faster, and more efficient. Precise control of qubits will also be useful for other quantum technologies such as clocks and quantum sensors.'

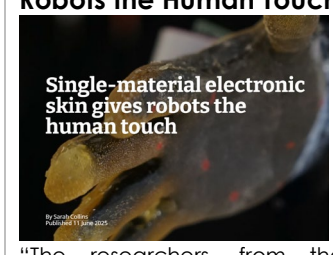
This unprecedented level of precision was achieved using a trapped calcium ion as the qubit (quantum bit). These are a natural choice to store quantum information due to their long lifetime and their robustness. Unlike the conventional approach, which uses lasers, the Oxford team controlled the quantum state of the calcium ions using electronic (microwave) signals."

Source: Oxford (10 Jun 2025)

Source: Reading (4 Jun 2025)

ROBOTICS

Single-Material Electronic Skin Gives Robots the Human Touch



"The researchers, from the University of Cambridge and University College London (UCL), developed the flexible, conductive skin, which is easy to fabricate and can be melted down and formed into a wide range of complex shapes. The technology senses and processes a range of physical inputs, allowing robots to interact with the physical world in a more meaningful way.

Unlike other solutions for robotic touch, which typically work via sensors embedded in small areas and require different sensors to detect different types of touch, the entirety of the electronic skin developed by the Cambridge and UCL researchers is a sensor, bringing it closer to our own sensor system: our skin.

Although the robotic skin is not as sensitive as human skin, it can detect signals from over 860,000 tiny pathways in the material, enabling it to recognise different types of touch and pressure – like the tap of a finger, a hot or cold surface, damage caused by cutting or stabbing, or multiple points being touched at once – in a single material.

The researchers used a combination of physical tests and machine learning techniques to help the robotic skin 'learn' which of these pathways matter most, so it can sense different types of contact more efficiently."

Source: Cambridge (11 Jun 2025)

Source: ucdavis (11 Jun 2025)

TRANSPORTATION

Anti-Distraction Systems Shut Down Smartphone Use

"As mobile phone use continues to be a leading cause of vehicle accidents, a range of technologies has emerged designed to combat distracted driving. From mobile apps to hardware-integrated systems, these tools aim to limit phone use behind the wheel. But a closer look reveals significant differences in how effectively they prevent distractions—especially in fleet vehicles.

While apps like AT&T's DriveMode and Apple's built-in Do Not Disturb While Driving offer basic protections, they rely heavily on driver cooperation. Many can be bypassed with a swipe or a second phone, limiting their effectiveness when liability and safety are paramount.

"We think technologies that reduce visual-manual interaction with phones are obviously a good thing," Ian Reagan, a senior research scientist at the Insurance Institute for Highway Safety told IEEE Spectrum. "But most are opt-in. We'd like to see them as opt-out by default."

Now, a new generation of anti-distraction technology is shifting from soft nudges to hard enforcement. And for companies managing fleets of drivers, the stakes—and the solutions—are getting more serious."

Source: IEEE Spectrum (11 Jun 2025)

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