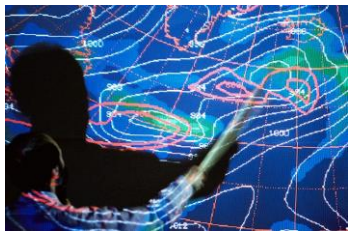


AI
Deepmind AI Accurately Forecasts Weather — On A Desktop Computer



"Artificial intelligence (AI) firm Google DeepMind has turned its hand to the intensive science of weather forecasting — and developed a machine-learning model that outperforms the best conventional tools, as well as other AI approaches, at the task.

The model, called GraphCast, can run on a desktop computer, and its predictions are more accurate than those of conventional models — and it makes them in minutes, rather than hours.

"GraphCast currently is leading the race amongst the AI models," says computer scientist Aditya Grover, at the University of California, Los Angeles.

Predicting the weather is a complex and energy-intensive task. The standard approach is numerical weather prediction (NWP), which uses mathematical models based on physical principles. These tools, known as physical models, are run on supercomputers and crunch weather data from buoys, satellites and weather stations worldwide. The calculations accurately map how heat, air and water vapour move through the atmosphere, but they are expensive to run."

Source: [Nature](#) (14 Nov 2023)

AI IN HEALTHCARE
New Framework for Using AI In Health Care Considers Medical Knowledge, Practices, Procedures, Values



"Health care organizations are looking to artificial intelligence (AI) tools to improve patient care, but their translation into clinical settings has been inconsistent, in part because evaluating AI in health care remains challenging. In a new article, researchers propose a framework for using AI that includes practical guidance for applying values and that incorporates not just the tool's properties but the systems surrounding its use.

The approach treats AI tools as "sociotechnical systems," and the authors' proposed framework seeks to advance the responsible integration of AI systems into health care.

Previous work in this area has been largely descriptive, explaining how AI systems interact with human systems.

The framework proposed by London and his colleagues is proactive, providing guidance to designers, funders, and users about how to ensure that AI systems can be integrated into workflows with the greatest potential to help patients. Their approach can also be used for regulation and institutional insights, as well as for appraising, evaluating, and using AI tools responsibly and ethically."

Read their article [here](#).

Source: [Science Daily](#) (27 Nov 2023)

ARCHITECTURE
Major Lessons of Contemporary School Design: 37 Learning Spaces from Around the World



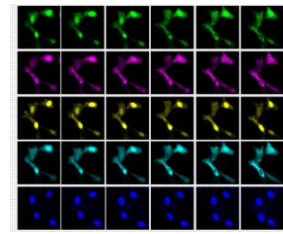
"The role of a school is to prepare children for life. But with life-changing faster than ever, schools need to change just as quickly. Recent additions to school curriculums reflect the complexities of modern life, with environmental crises, societal injustices, and the dangers of social media now major parts of the syllabus.

Although it's often said that long-term change begins at ground-level, change is never easy, wherever it starts. For example, a curriculum that responds to environmental issues is said to cause growing instances of eco-anxiety in children, one of a number of causes of another crisis, in children's mental health.

As what we educate children changes, educational environments change too. Not just with low-carbon buildings and outdoor teaching demonstrating sustainability, but with modern spaces that teach children how to navigate climate, social, and inclusivity issues, while also caring for themselves and their own mental health by learning how to talk, and listen, to others."

Source: [Archdaily](#) (15 Nov 2023)

BIOLOGICAL ENGINEERING
A New Way to See the Activity Inside a Living Cell



"Living cells are bombarded with many kinds of incoming molecular signal that influence their behavior. Being able to measure those signals and how cells respond to them through downstream molecular signaling networks could help scientists learn much more about how cells work, including what happens as they age or become diseased.

Right now, this kind of comprehensive study is not possible because current techniques for imaging cells are limited to just a handful of different molecule types within a cell at one time. However, MIT researchers have developed an alternative method that allows them to observe up to seven different molecules at a time, and potentially even more than that."

Read the paper, 'Temporally multiplexed imaging of dynamic signaling networks in living cells' [here](#).

Source: [MIT News](#) (28 Nov 2023)

DESIGN
Animal-Centric Interspecies Design Goes "Beyond Sustainability"



"A new design trend prioritises the needs of bugs and animals above human beings. Rima Sabina Aouf finds out if "interspecies design" is the next step in creating more sustainable spaces and objects.

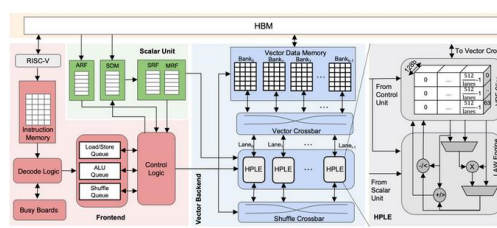
An exhibition designed to invite in animals, a garden optimised for the senses of pollinators rather than humans and architecture designed with nooks in which birds and insects can nestle form part of the novel approach.

"This is a subject that we have been more and more interested in," the co-founder of London design practice Blast Studio Paola Garnousset told Dezeen.

Blast Studio started out by making 3D-printed structures from waste coffee cups where mycelium – the filamentous part of fungus that has applications as an architectural and design material – could grow."

Source: [Dezeen](#) (23 Nov 2023)

ENCRYPTION
The Future of Fully Homomorphic Encryption



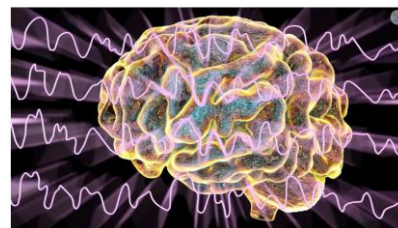
"In our digital age, where information flows seamlessly through the vast network of the internet, the importance of encrypted data cannot be overstated. As we share, communicate, and store an increasing amount of sensitive information online, the need to safeguard it from prying eyes and malicious actors becomes paramount. Encryption serves as the digital guardian, placing our data in a lockbox of algorithms that only those with the proper key can unlock.

Whether it's personal messages, health data, financial transactions, or confidential business communications, encryption plays a pivotal role in maintaining privacy and ensuring the integrity of our digital interactions. Typically, data encryption protects data in transit: it's locked in an encrypted "container" for transit over potentially unsecured networks, then unlocked at the other end, by the other party for analysis. But outsourcing to a third-party is inherently insecure.

But what if encryption didn't just exist in transit and sit unprotected on either end of the transmission? What if it was possible to do all of your computer work — from basic apps to complicated algorithms — fully encrypted, from beginning to end."

Source: [IEEE Spectrum](#) (1 Nov 2023)

HEALTHCARE
A Brain-Monitoring Device May One Day Take the Guesswork Out of Anesthesia

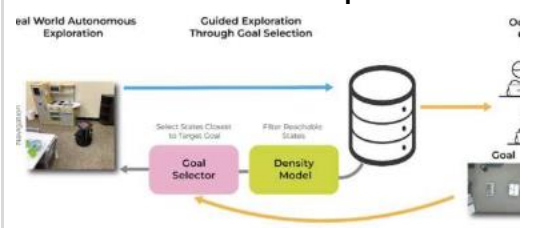


"An automated anesthesia delivery system could help doctors find the right drug dose. The new device monitored rhesus macaques' brain activity and supplied a common anesthetic called propofol in doses that were automatically adjusted every 20 seconds. Fluctuating doses ensured the animals received just enough drug — not too much or too little — to stay sedated for 125 minutes, researchers reported October 31 in PNAS Nexus. The study is a step toward devising and testing a system that would work for people.

Normally, an anesthetic dose is based on body measurements like weight and age. But that calculation is not a perfect science. There is no clear relationship between dose and likelihood that patients will be fully anesthetized with propofol and similar drugs, says Mintz, who was not involved with the new study. So anesthesiologists give amounts on the higher end of the spectrum to ensure their patients remain unconscious."

Source: [Science News](#) (22 Nov 2023)

MACHINE LEARNING
An Approach That Allows Robots to Learn in Changing Environments from Human Feedback and Exploration



"Researchers at University of Washington and Massachusetts Institute of Technology (MIT) recently introduced a new approach that allows robots to learn new skills while navigating changing environments.

Notably, the new approach proposed by Balsells and his colleagues only relies on human feedback to guide the robot in its learning, rather than to specifically demonstrate how to perform tasks. It thus does not require extensive datasets containing footage of demonstrations and can promote flexible learning with fewer human efforts.

Another idea that the team want to explore in their next studies is the use of big pre-trained models already trained for a bunch of robotics tasks (e.g., ChatGPT for robotics), adapting them to specific tasks in the real world using our method. This could allow anyone to easily and quickly teach robots to achieve new skills, without having to retrain them from scratch."

Source: [TechXplore](#) (28 Nov 2023)

MACHINE LEARNING
How AI Could Help Optimize Nutrient Consistency in Donated Human Breast Milk



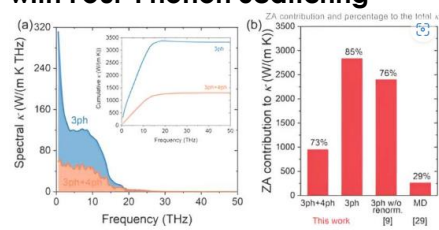
"A team of University of Toronto Engineering researchers, led by Professor Timothy Chan, is leveraging machine learning to optimize the macronutrient content of pooled human donor milk recipes.

The researchers introduce their data-driven optimization model in a new paper published in Manufacturing and Systems Operations Management.

Chan and his team worked with Mount Sinai Hospital's Rogers Hixon Ontario Human Milk Bank — which provides donor milk to preterm and sick babies who are hospitalized across Ontario — as well as Dr. Debbie O'Connor, a professor at the Temerty Faculty of Medicine.

"For a variety of reasons, many hospitalized infants do not have a full supply of mother's milk. In this instance human donor milk can be lifesaving particularly as it helps to protect preterm infants from necrotizing enterocolitis, a

NANOMATERIALS
Is Graphene the Best Heat Conductor? Researchers Investigate with Four-Phonon Scattering



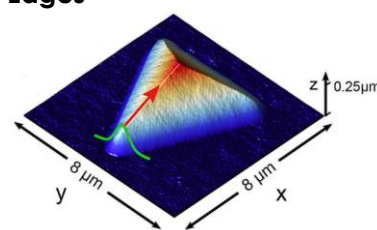
"Graphene, a material which consists of a single layer of carbon atoms, has been celebrated by many as the "next big thing" in material science. But according to Purdue University researchers, its thermal properties may not be as revolutionary as previously thought.

"Previously, the material thought to have the highest thermal conductivity was diamond," said Zherui Han, a Ph.D. student in Ruan's lab. "That's the material that can transfer the most heat the quickest. But when graphene came out, mainstream studies showed it to be much better than diamond."

Ruan's team has predicted the thermal conductivity of graphene at room temperature to be 1,300 W/ (m K)—not only less than diamond but also less than the raw graphite material that graphene is made from.

The disparity between their work and previous work comes down to a phenomenon called

NANOTECHNOLOGY
Next-Gen Computing: Hard-To-Move Quasiparticles Glide Up Pyramid Edges



"A new kind of "wire" for moving excitons, developed at the University of Michigan, could help enable a new class of devices, perhaps including room temperature quantum computers.

What's more, the team observed a dramatic violation of Einstein's relation, used to describe how particles spread out in space, and leveraged it to move excitons in much smaller packages than previously possible.

The team has applied for patent protection with the assistance of U-M Innovation Partnerships and is seeking partners to bring the technology to market."

SMART WATCH
New Watch Motor Seeks to Outsmart the Smartwatch



"Could the analog quartz wristwatch, a mainstay of the timepiece market for more than half a century, be headed finally for a high-tech makeover? A French startup, SilMach, in Besançon, France, is betting big that it is. The company has used silicon microelectromechanical systems (MEMS) to produce an entirely new wristwatch motor for analog watches that's half the size and roughly three times as efficient in comparison with the standard stepper motor now used in wristwatches.

Really? Analog watches? Now? In the age of the smartwatch?

Time for a reality check: Quartz analog wristwatches actually accounted for close to three-quarters of the market for conventional wristwatches in recent years, according to data compiled by the research firm GfK. And that overall market was valued at US \$66 billion this

life-threatening bowel disease," says Dr. Sharon Unger, a neonatologist and the medical director of the Rogers Hixon Ontario Human Milk Bank."

Source: [EurekaAlert!](#) (21 Nov 2023)

four-phonon scattering. Phonons are how heat transfer scientists describe the movement of heat in solids on a quantum-mechanical level. Until recently, researchers could only understand three-phonon scattering to predict the transfer of heat through solids."

Source: [Phys Org](#) (28 Nov 2023)

year—slightly larger than the global market for smartwatches, by some estimates."

Source: [Phys Org](#) (28 Nov 2023)

Source: [IEEE Spectrum](#) (17 Nov 2023)

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