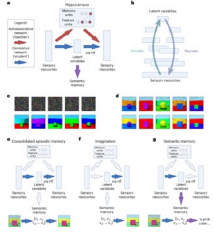


Weekly Discovery

We SHARE to inspire and ignite ideas!

22 Jan – 26 Jan 2024

AI Generative AI Helps to Explain Human Memory and Imagination



"Recent advances in generative AI help to explain how memories enable us to learn about the world, re-live old experiences and construct totally new experiences for imagination and planning, according to a new study by UCL researchers.

The study, published in *Nature Human Behaviour* and funded by Wellcome, uses an AI computational model – known as a generative neural network – to simulate how neural networks in the brain learn from and remember a series of events (each one represented by a simple scene).

The model featured networks representing the hippocampus and neocortex, to investigate how they interact. Both parts of the brain are known to work together during memory, imagination and planning.

Lead author, PhD student Eleanor Spens (UCL Institute of Cognitive Neuroscience), said: "Recent advances in the generative networks used in AI show how information can be extracted from experience so that we can both recollect a specific experience and also flexibly imagine what new experiences might be like."

Source: [EurekAlert!](#) (19 Jan 2024)

AI Marc Newson And Swarovski Optik Create AI Smart Binoculars



"Designed by Marc Newson and unveiled at this week's Consumer Electronics Show, Swarovski Optik's AX Visio binoculars are equipped with artificial intelligence so they can identify bird and animal species.

Swarovski Optik — the segment of the Swarovski group dedicated to sports optics such as binoculars and rifle scopes — said it considers AX Visio to be the world's first smart binoculars, capable of identifying some 9,000 species of birds and wildlife in real time.

It targets mainly birdwatchers but also hunters with the invention, which has an augmented reality display so users can see species information overlaid on the image in front of them, and don't need to look away to consult a book, phone or friend."

Source: [Dezeen](#) (12 Jan 2024)

AI Can We Really Trust AI?



"The University of Waterloo, in collaboration with the Perimeter Institute, hosted the TRuST Scholarly Network's Conversations on Artificial Intelligence (AI), a dynamic and engaging discussion that delved into the societal impact of AI. The event was also supported by the Waterloo AI Institute, which is dedicated to developing human-centered AI for social good, fostering trust with industry partners, and scaling responsible solutions to enhance lives.

With the growing influence and evolution of AI and big data, the event explored the ethical considerations surrounding these technologies and addressed concerns about confidence in and potential risks associated with these technologies — especially when used in research and innovation.

The Trust in Research Undertaken in Science and Technology (TRuST) scholarly network brings together researchers and practitioners from across disciplines to improve communication with the public and build trust in science and technology. TRuST aims to understand the lack of trust in science and technology and to support ethically earning and sustaining trust in these domains."

Source: [UWATERLOO](#) (18 Jan 2024)

ARCHITECTURE Architecture & UNESCO: Rethinking Preservation and Cultural Heritage



"Architecture has always centered on permanence and ephemerality. Defined by material conditions, how we build is closely tied to what we preserve and how we conceptualize the future. Furthering international cooperation in education, the arts, the sciences, and culture, UNESCO is an organization that continues to examine the relationship between history and growth, preservation, and change. As architecture, landscapes, and cities become threatened by the climate crisis and unrest, cultural context becomes paramount.

UNESCO is the United Nations Educational, Scientific and Cultural Organization. It seeks to build peace through international cooperation in Education, the Sciences, and Culture, and its programs contribute to the achievement of the Sustainable Development Goals defined in Agenda 2030, adopted by the UN General Assembly in 2015. As they state, "Peace must be founded upon dialogue and mutual understanding. Peace must be built upon the intellectual and moral solidarity of humanity." A World Heritage Site is a landmark or area with legal protection by an international convention administered by UNESCO. World Heritage Sites are designated for having cultural, historical, scientific, or other forms of significance. The following series of projects were built on or near UNESCO World Heritage Sites, each exploring what it means to advance awareness and understanding."

Source: [Archdaily](#) (13 Jan 2024)

BATTERY Next-Generation Batteries Could Go Organic, Cobalt-Free for Long-Lasting Power



"In the switch to "greener" energy sources, the demand for rechargeable lithium-ion batteries is surging. However, their cathodes typically contain cobalt — a metal whose extraction has high environmental and societal costs. Now, researchers in ACS Central Science report evaluating an earth-abundant, carbon-based cathode material that could replace cobalt and other scarce and toxic metals without sacrificing lithium-ion battery performance.

Today, lithium-ion batteries power everything from cell phones to laptops to electric vehicles. One of the limiting factors for realizing a global shift to energy produced by renewable sources — particularly for the transition from gasoline-powered cars to electric vehicles — is the scarcity and mining difficulty of the metals, such as cobalt, nickel and magnesium, used in rechargeable battery cathode manufacturing. Previous researchers have developed cathodes from more abundant and lower cost carbon-containing materials, including organosulfur and carbonyl compounds, but those prototypes couldn't match the energy output and stability of traditional lithium-ion batteries."

Source: [ACS](#) (18 Jan 2024)

DESIGN Twelve Modernist Furniture Designs By 20th-Century Architects



"Pieces by Le Corbusier, Charlotte Perriand, and Charles and Ray Eames are included in this roundup of modernist furniture designed by architects working in the 20th century.

Many of the architects whose work is featured below turned their hand to furniture design after training in architecture.

For some, it was a career change, while others treated it as an addition to their architecture work, opting to design some of the furnishings for the homes they were building.

After making an impact on 20th-century design, some of the furniture pieces are still in production and recognisable today, while others have influenced contemporary designers and manufacturers to reinterpret them for modern-day customers."

Source: [Dezeen](#) (17 Jan 2024)

ENERGY Using Idle Trucks to Power the Grid with Clean Energy



"University of Waterloo researchers are tapping into idled electric vehicles to act as mobile generators and help power overworked and aging electricity grids.

After analyzing energy demand on Alberta's power grid during rush hour, the research proposes an innovative way to replenish electrical grids with power generated from fuel cells in trucks.

"Canada's power grids need to be upgraded," said Dr. XiaoYu Wu, lead researcher and a professor in Waterloo's Department of Mechanical and Mechatronics Engineering.

"But the price of Alberta's power grid is much higher than other provinces. Most power is supplied by fossil fuels which results in high carbon emissions. The need to rapidly adjust generators to meet fluctuating demand is one of the reasons that the grid price is unstable and volatile. This creates the potential for clean energy storage to flatten the demand and price of electricity."

The team's research builds on vehicle-to-grid technology which employs special chargers to push unused energy from electric vehicle (EV) batteries back to the power grid for storage. This electricity in-storage can support the grid during weather-related outages or to reduce the demand during peak periods.

The research proposes paying drivers of fuel cell powered trucks to rest during rush hour and while resting, to plug into a hydrogen refueling station or pipeline and use their trucks' idle fuel cells as generators to provide electricity to the grid. The result is less vehicle traffic on highways, reduced energy use at peak times and cleaner way to store energy."

Source: [UWATERLOO](#) (15 Jan 2024)

FLEXIBLE ELECTRONICS Liquid RAM Flexes for Wearables, Robots, Implants

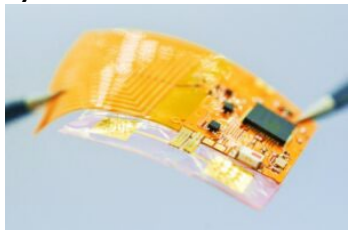


"While organic thin-film transistors built on flexible plastic have been around long enough for people to start discussing a Moore's Law for bendable ICs, memory devices for these flexible electronics have been a bit more elusive. Now researchers from Tsinghua University in China have developed a fully flexible resistive random access memory device, dubbed FlexRAM, that offers another approach: a liquid one.

In research described in the journal *Advanced Materials*, the researchers have used a gallium-based liquid metal to achieve FlexRAM's data writing and reading process. In an example of biomimicry, the gallium-based liquid metal (GLM) droplets undergo oxidation and reduction mechanisms while in a solution environment that mimic the hyperpolarization and depolarization of neurons."

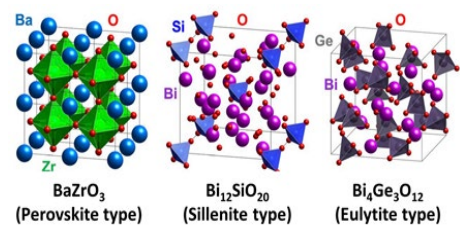
Source: [IEEE Spectrum](#) (21 Jan 2024)

HEALTHCARE Wireless Drug Patch Shows Promise as Chronic Disease Treatment Delivery System



"University of North Carolina at Chapel Hill scientists created a new drug delivery system, called the Spatiotemporal On-Demand Patch (SOP), which can receive commands wirelessly from a smartphone or computer to schedule and trigger the release of drugs from individual microneedles. The patch's thin, soft platform resembles a Band-Aid and was designed to enhance user comfort and convenience, since

MACHINE LEARNING Machine Learning Method Speeds Up Discovery of Green Energy Materials



"Researchers at Kyushu University, in collaboration with Osaka University and the Fine Ceramics Center, have developed a framework that uses machine learning to speed up the discovery of materials for green energy technology. Using the new approach, the researchers identified and successfully synthesized two new candidate materials for use in solid oxide fuel cells – devices that can

ROBOTS Mini-Robots Modeled on Insects May Be Smallest, Lightest, Fastest Ever Developed



"Two insect-like robots, a mini-bug and a water strider, developed at Washington State University, are the smallest, lightest and fastest fully functional micro-robots ever known to be created.

Such miniature robots could someday be used for work in areas such as artificial pollination, search and rescue, environmental monitoring,

ROBOTS This Robot Grows Like a Vine — And Could Help Navigate Disaster Zones



"Researchers have demonstrated a robot that grows like a vine in response to stimuli such as light and pressure. The machine — named FiloBot — has a head that prints its own body by melting and extruding plastic, which then solidifies as it cools. The robot's head is connected to a base by a thin hose, through which it receives a fresh supply of plastic from a

wearability is a crucial factor for chronically ill patients.

The research team, led by Juan Song, PhD, professor of pharmacology at the UNC School of Medicine, and Wubin Bai, PhD, assistant professor of applied physical sciences at the UNC College of Arts and Sciences, tested the SOP in a mouse model, using melatonin in the microneedles to improve sleep.

This research, published in the journal Nature Communications, opens the door to researching this wirelessly controlled patch to deliver on-demand treatments for neurodegenerative disorders, including Alzheimer's disease. To that end, the UNC School of Medicine and UNC Health funded a \$25,000 pilot project to test the SOP in a mouse model of Alzheimer's disease."

Source: [UNC HEALTH](#) (17 Jan 2024)

generate energy using fuels like hydrogen, which don't emit carbon dioxide. Their findings, which were reported in the journal, Advanced Energy Materials, could also be used to accelerate the search for other innovative materials beyond the energy sector."

Source: [KYUSHU](#) (18 Jan 2024)

micro-fabrication or robotic-assisted surgery. Reporting on their work in the proceedings of the IEEE Robotics and Automation Society's International Conference on Intelligent Robots and Systems, the mini-bug weighs in at eight milligrams while the water strider weighs 55 milligrams. Both can move at about six millimeters a second.

"That is fast compared to other micro-robots at this scale although it still lags behind their biological relatives," said Conor Trygstad, a PhD student in the School of Mechanical and Materials Engineering and lead author on the work. An ant typically weighs up to five milligrams and can move at almost a meter per second.

The key to the tiny robots is their tiny actuators that make the robots move. Trygstad used a new fabrication technique to miniaturize the actuator down to less than a milligram, the smallest ever known to have been made."

Source: [WSU](#) (18 Jan 2024)

spool. FiloBot's growth rate is slow — its body elongates by just a few millimetres each minute.

Plant-like robots could one day find applications in search-and-rescue missions, or other situations in which they must navigate unpredictable environments, says Emanuela Del Dottore, a roboticist at the Italian Institute of Technology in Genoa. The robot's slow growth could be an advantage, she adds — in a collapsed building it might help to avoid disturbing unstable wreckage, for example. The technology could also form the basis of self-building infrastructure.

"We are fascinated by the multiple different features of plants that enable them to conquer very challenging and mutable environment," Del Dottore says. She and her colleagues describe the robot in a paper published on 17 January in Science Robotics."

Source: [Nature](#) (18 Jan 2024)

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