Weekly Discovery
We SHARE to inspire and ignite ideas!

5 May - 9 May 2025

LinkedIn Learning **Invest in Yourself**

Did you know 1 cent doubled for 30 days = $5.368 Million

Similarly, your actions everyday can amount to much more!

Learn a new skill today with LinkedIn Learning
and start investing in yourself !

Activate you free LinkedIn Learning Account and get started!

Featured Course
Facilitating a Collaborative Strategic Planning Session **36m**
Click Here to Start Learning

AI
Text-to-video AI blossoms with new metamorphic video capabilities

"While text-to-video artificial intelligence models like OpenAI's Sora are rapidly metamorphosing in front of our eyes, they have struggled to produce metamorphic videos. Simulating a tree sprouting or a flower blooming is harder for AI systems than generating other types of videos because it requires the knowledge of the physical world and can vary widely…

Computer scientists at the University of Rochester, Peking University, University of California, Santa Cruz, and National University of Singapore developed a new AI text-to-video model that learns real-world physics knowledge from time-lapse videos. The team outlines their model, MagicTime, in a paper published in IEEE Transactions on Pattern Analysis and Machine Intelligence.

"Artificial intelligence has been developed to try to understand the real world and to simulate the activities and events that take place," says Jinfa Huang, a PhD student supervised by Professor Jiebo Luo from Rochester's Department of Computer Science, both of whom are among the paper's authors. "MagicTime is a step toward AI that can better simulate the physical, chemical, biological, or social properties of the world around us."

Previous models generated videos that typically have limited motion and poor variations. To train AI models to more effectively mimic metamorphic processes, the researchers developed a high-quality dataset of more than 2,000 time-lapse videos with detailed captions.."

Source: Rochester (3 May 2025)

AI
Harnessing Artificial Intelligence for High-Impact Science

"At the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab), we're engineering and deploying sophisticated artificial intelligence tools that make scientific research faster and more efficient. Rapidly advancing AI techniques are also enabling entirely new fields of research that were impossible to conduct with conventional computing.

From particle physics to electronics, our teams are using advanced AI in a variety of subjects to ensure U.S. science and technology remain at the forefront worldwide. These seven projects serve as examples of the broad impact of our expertise."

Source: lbl (29 Apr 2025)

AI
How Archetype AI Turns Sensor Data into Breakthrough Solutions

"You may not realize it but sensors are all around us- from everyday items like smartphones and dishwashers, to possibly thousands within a factory . Sensors today measure things like temperature, vibration, humidity, pressure, sound, and proximity to objects then get delivered to systems designed to enhance safety and efficiency.

A startup called Archetype AI seeks to help analyze all of the sensor data to provide deeper insights into the physical world. The startup developed a new type of AI model called Newton that not only interprets data from sensor signals but also empowers developers with actionable insights, helping them build innovative solutions and products. Users simply ask open-ended questions in natural language, similar to how we interact with traditional AI tools based on text or images.

With Archetype AI, people can communicate with their homes, cars, or even manufacturing plants to solve problems quickly and easily.

For example, construction companies are using Archetype to help measure productivity and reduce injuries at job sites. Some tech companies have deployed it to develop communication systems for smart home devices, and industrial firms are using Archetype to predict maintenance issues for critical equipment. Archetype hopes to provide an AI solution that goes beyond a single chat-bot or text generation – to using AI to address problems in the physical world.."

Source: comcast (4 May 2025)

AI
Artificial Intelligence Tools Make Education Materials More Patient Friendly
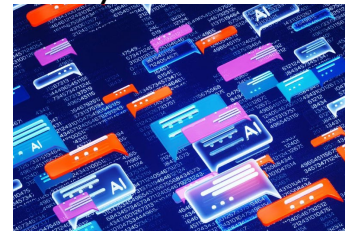
"Artificial intelligence (AI) tools significantly improve the readability of online patient education materials (PEMs), making them more accessible, a new study shows.

Led by researchers at NYU Langone Health, the study focused on the readability of PEMs available on the websites of the American Heart Association (AHA), American Cancer Society (ACS), and American Stroke Association (ASA). According to the researchers, these materials help patients make decisions about their healthcare but often exceed the recommended reading level of grade 6, making them difficult for many patients to understand.

For the study, researchers evaluated the capabilities of three large language models (LLMs)—ChatGPT, Gemini, and Claude—to optimize the readability of PEMs without compromising accuracy. These generative AI tools are designed to simplify complex texts by predicting the next word in a sentence based on extensive internet data. This next-word prediction gives such models the ability to rewrite any article in simpler language as directed.

Published online April 10 in the Journal of Medical Internet Research, the study involved 60 randomly selected PEMs from the AHA, ACS, and ASA websites. Researchers prompted the LLMs to simplify the reading level of the materials. Results showed that the original readability scores were significantly above the recommended level of grade 6, with mean grade-level scores of 10.7, 10, and 9.6, respectively."

Source: nyulangone (26 Mar 2025)

ARCHITECTURE
### BAT Studio unveils garden room with walls that move back and forth
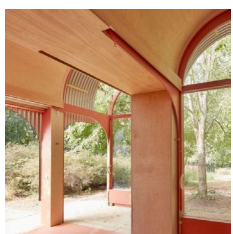
"Architecture practice BAT Studio has completed The Blooming Shed in north London, which has a facade that opens and closes like a set of drawers.

BAT Studio designed and built the flexible structure in the community garden of Chase Farm Hospital in Enfield for storage, workshops and events.

The dynamic facade comprises three glazed arches, each mounted on a set of giant drawer runners. This allows them to move back and forth independently, opening and closing different sections of the interior."

BATTERY
UCLA Breakthrough Extends Fuel Cell Lifespan Beyond 200,000 Hours, Paving the Way for Clean Long-Haul Trucking
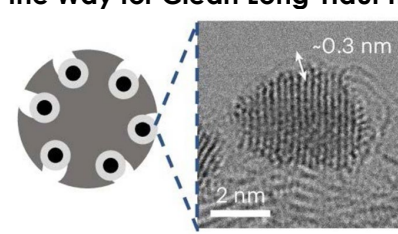
"For trucks and heavy-duty vehicles that must travel long distances without frequent, time-consuming charging stops, batteries often fall short. Hydrogen fuel cells — which can be refueled as quickly as traditional gasoline — offer a cleaner, more efficient alternative.

Now, researchers at UCLA have made a breakthrough that could dramatically extend the lifespan of these fuel cells, making them a more viable clean energy source that can help bring sustainable, long-haul trucking closer to reality.

Led by Yu Huang, a professor of materials science and engineering at the UCLA Samueli School of Engineering, the research team has developed a new catalyst design capable of pushing the projected fuel cell catalyst lifespans to 200,000 hours, which is nearly seven times the U.S. Department of Energy's target for 2050. Published in Nature Nanotechnology, the research marks a significant step toward the widespread adoption of fuel cell technology in heavy-duty vehicles, such as long-haul tractor trailers."

OPTCS
Squeezing on a Chip

"…history shows that lab-scale systems can often become chip-based devices. Four decades of research have yielded ever-greater levels of squeezing from big lumps of nonlinear crystal, but scientists have also begun to manipulate quantum noise using integrated photonics. Although performance has been modest to date, Benjamin Lawrie of Oak Ridge National Laboratory, USA, reckons that several groups are on the "precipice" of producing compact, high-quality squeezing sources—potentially enabling sensors with unprecedented precision, new probes of fundamental physics and universal quantum computers.

Indeed, physicist Xu Yi, University of Virginia, USA, argues that chip-based sources should not only need less power than bulk systems but might also better deal with squeezing's Achilles' heel—optical loss. "People think that when things get smaller, performance gets worse, but that is not always true," he says. "If we think of transistors in a phone, smaller is actually better. And the same can be true of squeezed light."

Squeezing the circle

Enhancing the performance of sensitive detectors involves either increasing their signal or reducing noise. For small detectors deployed in the field with limited energy available, achieving the former may be difficult. Indeed, even the mammoth LIGO detectors can only tolerate so much laser power before their mirrors are bent out of

---

MED TECH
The future of brain activity monitoring may look like a strand of hair
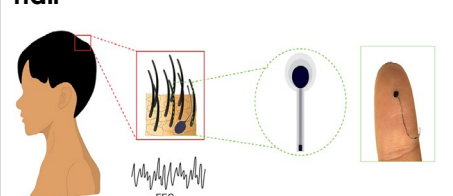

"The future of electroencephalography (EEG) monitoring may soon look like a strand of hair. In place of the traditional metal electrodes, a web of wires and sticky adhesives, a team of researchers from Penn State created a hairlike device for long-term, non-invasive monitoring of the brain's electrical activity. The lightweight and flexible electrode attaches directly to the scalp and delivers stable, high-quality recordings of the brain's signals.

EEG is critical for diagnosing and assessing neurological conditions like epilepsy and brain injuries. In some cases, clinicians need to monitor brain waves for longer periods of time, for example, to evaluate seizures, sleep disorders and conditions that affect the blood vessels and blood flow in the brain.

The researchers described the new electrodes, which were shown to maintain stable performance for over 24 hours of continuous wear, in a study published in the journal npc biomedical innovations. This technology holds promise for use in consumer health and wellness products, in addition to clinical health care application, according to the researchers."

shape.

MATERIALS

'Wood You Believe It?' FAU Engineers Fortify Wood with Nano-Iron
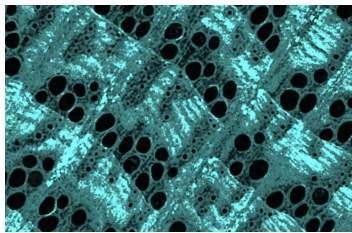
"Researchers from the College of Engineering and Computer Science at Florida Atlantic University, and collaborators from the University of Miami and Oak Ridge National Laboratory, wanted to find out if adding extremely hard minerals at the nanoscale could make the walls of wood cells stronger – without making the wood heavy, expensive or bad for the environment. Few studies have investigated how treated wood performs at different scales, and none have successfully strengthened entire pieces of wood by incorporating inorganic minerals directly into the cell walls.

The research team focused on a special type of hardwood known as ring-porous wood, which comes from broad-leaf trees like oak, maple, cherry and walnut. These trees feature large, ring-shaped vessels in the wood that transport water from the roots to the leaves. For the study, researchers used red oak, a common hardwood in North America, and introduced an iron compound into the wood through a simple chemical reaction. By mixing ferric nitrate with potassium hydroxide, they created ferrihydrite, an iron oxide mineral commonly found in soil and water.

Results of the study, published in the journal ACS Applied Materials and Interfaces, revealed that a simple, cost-effective chemical method using a safe mineral called nanocrystalline iron oxyhydroxide can strengthen the tiny cell walls within wood while adding only a small amount of extra weight. Although the internal structure became more durable, the wood's overall behavior – such as how it bends or breaks – remained largely unchanged. This is likely because the treatment weakened the connections between individual wood cells, affecting how the material holds together on a larger scale.

The findings suggest that, with the right chemical treatment, it's possible to enhance the strength of wood and other plant-based materials without increasing their weight or harming the environment. These bio-based materials could one day replace traditional construction materials like steel and concrete in applications such as tall buildings, bridges, furniture and flooring.."

CLIMATE CHANGE

Geoengineering technique could cool planet using existing aircraft

"Previously, most research has assumed that the technique, known as stratospheric aerosol injection, would be deployed in the tropics and so would require specially designed aircraft capable of flying at altitudes of 20km or more to inject the particles.

For the new study, published in the journal Earth's Future, scientists ran simulations of different aerosol injection strategies and concluded that adding particles 13km above the polar regions could meaningfully cool the planet, albeit much less effectively than at higher altitudes closer to the equator. Commercial jets such as the Boeing 777F could reach this altitude.

Lead author Alistair Duffey, a PhD student at UCL's Department of Earth Sciences, said: "Solar geoengineering comes with serious risks and much more research is needed to understand its impacts. However, our study suggests that it is easier to cool the planet with this particular intervention than we thought. This has implications for how quickly stratospheric aerosol injection could be started and by who.

"There are downsides to this polar low-altitude strategy. At this lower altitude, stratospheric aerosol injection is about one third as effective. That means that we would need to use three times the amount of aerosol to have the same effect on global temperature, increasing side effects such as acid rain. The strategy would also be less effective at cooling the tropics, where the direct vulnerability to warming is highest..""

ROBOTICS

Researchers Develop a Novel Vote-Based Model for More Accurate Hand-Held Object Pose Estimation
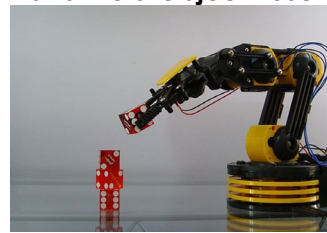
"Many robotic applications rely on robotic arms or hands to handle different types of objects. Estimating the pose of such hand-held objects is an important yet challenging task in robotics, computer vision and even in augmented reality (AR) applications. A promising direction is to utilize multi-modal data, such as color (RGB) and depth (D) images. With the increasing availability of 3D sensors, many machine learning approaches have emerged to leverage this technique.

However, existing approaches still face two main challenges. First, they face accuracy drops when hands occlude the objects held, obscuring critical features required for pose estimation. Additionally, hand-object interactions introduce non-rigid transformations, which further complicate the issue. This happens when hands change the shape or structure of the held object, such as when squeezing a soft ball, distorting the object's perceived shape. Second, most current techniques extract features from separate RGB and RGB-D backbones, which are then fused at the feature level. Since these two backbones handle inherently different modalities, this fusion can result in representation distribution shifts, meaning features learned from RGB images may misalign with those extracted from RGB-D inputs, affecting pose estimation. Furthermore, during fine-tuning, dense interactions between the two backbones cause performance disruptions and limit the benefits of incorporating RGB features.

To address these issues, a research team led by Associate Professor Phan Xuan Tan from the Innovative Global Program, College of Engineering at Shibaura Institute of Technology, Japan, along with Dr. Dinh-Cuong Hoang and other researchers from FPT University, Vietnam, developed an innovative deep-neural network specifically designed for pose estimation using RGB-D images. "The key innovation of our deep learning framework lies in a vote-based fusion mechanism, which effectively integrates both 2D (RGB) and 3D (depth) keypoints, while addressing hand-induced occlusions and the difficulties of fusing multimodal data. Additionally, it decouples the learning process and incorporates a self-attention-based hand-object interaction model, resulting in substantial improvements," explains Dr. Tan. Their study was made available online on February 17, 2025, and will be published in Volume 120 of the Alexandria Engineering Journal in May 2025..""

VR

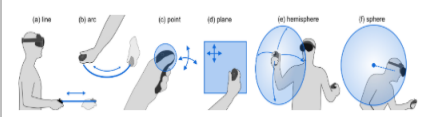## Making virtual reality more accessible

Diagram of motion primitives, geometric representations of movements in VR applications. (University of Waterloo)

"A team of researchers from the University of Waterloo have created a method that makes virtual reality (VR) more accessible to people with mobility limitations.

VR games like Beat Saber and Space Pirate Trainer usually require large and dramatic movements, such as raising one's arms above the head or quickly side-stepping, which can be difficult or impossible for people who use wheelchairs or have limited mobility. To decrease these barriers, the researchers created MotionBlocks, a tool that lets users customize the game's controls to fit the movements they can do."