

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 your free LinkedIn Learning Account and get started!](#)



Featured Course

Taking Great Photos with Your Phone **54m**

[Click Here to Start Learning](#)

3D PRINTING

Japanese Joinery And 3D-Printed Wood Waste Combine to Form the Warp Pavilion



"Modular tiles, 3D printed using sawdust leftover from CLT production, were joined together without additional fixings to create this pavilion showcased by Japanese firm Mitsubishi Jisho Design at Dubai Design Week.

The Warp is a teahouse pavilion developed by architects Kei Atsumi and Motoya Iizawa from Mitsubishi Jisho Design's Tokyo headquarters, along with Singapore-based Vibha Krishna Kumar from Mitsubishi Jisho Design Asia.

The project showcases a production system developed by the architecture firm called Regenerative Wood, which uses a filament made from wood waste mixed with bioplastic to 3D print building components and furniture.

The pavilion is constructed from approximately 900 panels, each with a different shape, that fit together using special joints based on traditional Japanese woodworking techniques."

Source: [Dezeen](#) (9 Dec 2024)

AI

More-Powerful AI Is Coming. Academia And Industry Must Oversee It — Together



"It is possible that we will have superintelligence in a few thousand days (!); it may take longer, but I'm confident we'll get there."

So wrote Sam Altman, the chief executive of OpenAI, a technology firm based in San Francisco, California, on 23 September. This was less than two weeks after the company behind ChatGPT released o1, its most advanced large language model (LLM) yet. Once confined to the realms of science fiction, the rise of LLMs in the past few years has renewed the relevance of the question of when we might create artificial general intelligence (AGI). Although it lacks a precise definition, AGI broadly refers to an AI system capable of human-level reasoning, generalization, planning and autonomy.

Policymakers everywhere have questions about AGI, including what its benefits and risks will be. These are not easy questions to answer, especially given that much of the work is happening in the private sector, in which studies are not always published openly. But what is clear is that AI companies are laser-focused on giving their systems the whole range of cognitive abilities enjoyed by humans. Companies developing AI models have a strong incentive to maintain the idea that AGI is nigh, to attract interest and therefore investment."

Source: [Nature](#) (6 Dec 2024)

AI

Researchers Reduce Bias in AI Models While Preserving or Improving Accuracy



"MIT researchers developed a new technique that identifies and removes specific points in a training dataset that contribute most to a model's failures on minority subgroups. By removing far fewer datapoints than other approaches, this technique maintains the overall accuracy of the model while improving its performance regarding underrepresented groups.

In addition, the technique can identify hidden sources of bias in a training dataset that lacks labels. Unlabeled data are far more prevalent than labeled data for many applications.

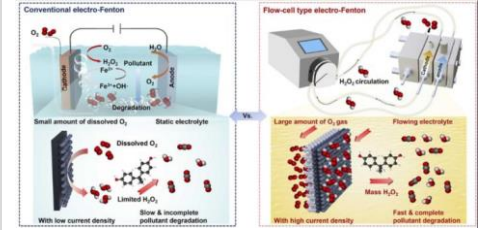
This method could also be combined with other approaches to improve the fairness of machine-learning models deployed in high-stakes situations. For example, it might someday help ensure underrepresented patients aren't misdiagnosed due to a biased AI model.

Read more in the paper '[Data Debiasing with Datamodels \(D3M\) improving subgroup Robustness via Data Selection](#)'"

Source: [MIT News](#) (11 Dec 2024)

APPLIED SCIENCES

Developing Wastewater Treatment Units That Treat Right Where It's Generated



"Conventional wastewater treatment involves the centralized collection of wastewater from sources through pipes to large-scale treatment plants, where it is treated in bulk. However, this is not feasible in small, decentralized areas such as rural areas. Simple treatment units installed at small non-point sources of pollution mainly focus on disinfection and turbidity improvement, and do not properly decompose the recalcitrant organic matter in wastewater. In addition, even if industrial wastewater is treated in-house, the treatment efficiency is low, and highly toxic wastewater often needs to be re-transported to a final treatment plant.

Dr. Sang Hoon Kim, Extreme Materials Research Center, Dr. Jong Min Kim, Materials Architecturing Research Center, and Dr. Sang Soo Han, Computation Science Research Center, all from the Korea Institute of Science and Technology (KIST), have developed an electrochemical device that can treat sewage and wastewater from pollution sites to the level of discharge. In particular, it can rapidly and completely decompose recalcitrant materials into inorganic substances and discharge them on its own."

Source: [EurekaAlert!](#) (9 Dec 2024)

ARCHITECTURE

The Science of Design: How Neuroscience Can Help Architects Shape the Built Environment



"In recent years, the integration of neuroscience and architecture has revolutionized our understanding of how built environments influence human well-being, behavior, and cognition. This interdisciplinary field, known as neuroarchitecture, explores the connections between spatial design, brain function, and psychology, offering insights into creating environments that promote health, creativity, and emotional resilience.

In that context, we begin this round-up with 3 articles talking about how architecture relates to the subconscious mind. The first one was written by Ann Sussman, who, along with Justin B. Hollander, has written 2 books on the subject: Cognitive Architecture and Urban Experience + Design. They suggest that once you "see" how we look at buildings, you'll never look at architecture the same way again. The other categories deal with how architects use this knowledge to design with a more human-centered approach, foster equitable access to green spaces, and create architecture for therapeutic benefits. These are just examples in which designers leverage neuroscience to craft spaces that resonate with human needs."

Source: [Archdaily](#) (5 Dec 2024)

DRONES

Drones With Legs Can Walk, Hop, And Jump into The Air: Birds Use Their Legs for All Kinds of Clever Things, And Now Drones Can Too



"On the shores of Lake Geneva in Switzerland, École Polytechnique Fédérale de Lausanne is home to many roboticists. It's also home to many birds, which spend the majority of their time doing bird things. With a few exceptions, those bird things aren't actually flying: Flying is a lot of work, and many birds have figured out that they can instead just walk around on the ground, where all the food tends to be, and not tire themselves out by having to get airborne over and over again.

"Whenever I encountered crows on the EPFL campus, I would observe how they walked, hopped over or jumped on obstacles, and jumped for take-offs," says Won Dong Shin, a doctoral student at EPFL's Laboratory of Intelligent Systems. "What I consistently observed was that they always jumped to initiate flight, even in situations where they could have used only their wings."

Shin is first author on a paper published today in Nature that explores both why birds jump to take off, and how that can be beneficially applied to fixed-wing drones, which otherwise need things like runways or catapults to get themselves off the ground. Shin's RAVEN (Robotic Avian-inspired Vehicle for multiple ENvironments) drone, with its bird-inspired legs, can do jumping takeoffs just like crows do, and can use those same legs to get around on the ground pretty well, too."

Source: [IEEE Spectrum](#) (4 Dec 2024)

EMBODIED AI

Why Embodied Intelligence Is the Next Frontier of AI



"World Labs, an embodied intelligence startup co-founded by AI scientist and Stanford Professor Fei-Fei Li, has introduced a 3D worlds generator that redefines how AI processes and utilizes spatial information. This tool can create intricate 3D environments from minimal input, such as a single 2D image, by predicting the spatial and visual relationships within the scene. It infers what lies beyond the frame and generates immersive environments.

The potential applications of 3D world generation span diverse industries. It has the potential to transform gaming development, animation, film, and entertainment by creating dynamic, imaginative, and convincing environments with reduced manual effort.

As embodied intelligence progresses, its deployment must be guided by thoughtful regulations. Just as cloning is prohibited to safeguard ethical boundaries, robotics will require limits to ensure accessibility, safety, and sustainability. With tools like 3D world generation leading the charge, embodied intelligence has the potential to revolutionize industries, enhance lives, and expand human possibilities. However, ethical concerns persist. The future depends not just on what machines can do but on how society chooses to use them."

Source: [Forbes](#) (8 Dec 2024)

FIBER OPTIC CABLES

Protecting Undersea Internet Cables Is a Tech Nightmare: A Recent, Alleged Baltic Sea Sabotage Highlights the System's Fragility



"When the lights went out on the BCS East-West Interlink fiber optic cable connecting Lithuania and Sweden on 17 November, the biggest question wasn't when internet service would be restored. (That'd come another 10 or so days later.) The outage—alongside a cable failure the next day of an undersea line connecting Finland and Germany—soon became a whodunit, as German, Swedish, and Finnish officials variously hinted that the damage to the lines could constitute acts of "sabotage" or "hybrid warfare." Suspicion soon centered around Russia or China—especially given the presence of a Chinese-flagged cargo vessel in the area during both incidents.

The outages underscore how much of the global communications and financial system hinges on a few hundred cables of bundled glass fibers that are strung across ocean floors around the world, each cable about the same diameter as a garden hose. And, says Bryan Clark, a senior fellow at the Washington, D.C.-based Hudson Institute, defending undersea fiber optic cables from damage and sabotage is increasingly challenging. The technology to do so is nowhere near bulletproof, he says, yet the steep cost of failing to protect them is too high to consider simply writing them off. (NATO is currently investigating future internet backup routes through satellites in the case of undersea cable failures. But that technology is only in a preliminary, proof-of-concept stage and may be many years from real-world relevance.)"

Source: [IEEE Spectrum](#) (5 Dec 2024)

MATERIAL SCIENCE

New 3D X-Ray Imaging Transforms Material Science

NANOMATERIALS

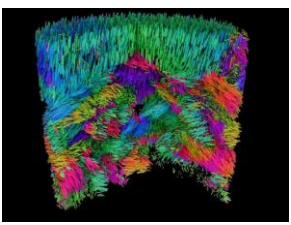
New Methods Generate and Supercharge Magnetism of 2D Materials

PHYSICS

Breaking Physics: Inside The Strange World of Quantum Metals

QUANTUM PHYSICS

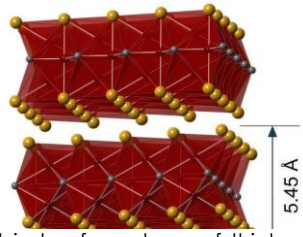
Researchers Develop Spintronics Platform for Energy-Efficient Generative AI



"A cutting-edge X-ray method reveals the 3D orientation of nanoscale material structures, offering fresh insights into their functionality."

Researchers at the Swiss Light Source (SLS) have developed a groundbreaking technique called X-ray linear dichroic orientation tomography (XL-DOT). This method reveals the three-dimensional arrangement of a material's structural building blocks at the nanoscale. Its first application focused on a polycrystalline catalyst, enabling scientists to visualize crystal grains, grain boundaries, and defects—critical features that influence catalyst performance. Beyond catalysis, XL-DOT offers unprecedented insights into the structure of various functional materials used in information technology, energy storage, and biomedical applications."

Source: [SciTech Daily](#) (11 Dec 2024)



"At just a few atoms of thickness, 2D materials offer revolutionary possibilities for new technologies that are microscopically sized but have the same capabilities as existing machines."

Florida State University researchers have unlocked a new method for producing one class of 2D material and for supercharging its magnetic properties.

Read the paper [here](#)."

Source: [Phys.Org](#) (11 Dec 2024)

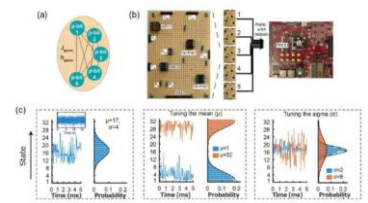


"A recent study led by Rice University physicist sheds light on the mysterious behavior of quantum critical metals — materials that break the usual rules of physics at low temperatures. The research explores quantum critical points (QCPs), where materials hover between two distinct states, such as being magnetic or nonmagnetic. These findings help explain the unique properties of these metals and offer new insights into high-temperature superconductors, which conduct electricity without resistance at relatively high temperatures."

At the heart of the study is quantum criticality, a state where materials become extremely sensitive to quantum fluctuations — tiny disruptions that change how electrons behave. While most metals follow well-established physical laws, quantum critical metals defy these expectations, displaying unusual and collective behaviors that have puzzled scientists for decades.

Read the paper, published in [Nature Physics](#)."

Source: [SciTech Daily](#) (11 Dec 2024)



"Researchers at Tohoku University and the University of California, Santa Barbara, have developed new computing hardware that utilizes a Gaussian probabilistic bit made from a stochastic spintronics device. This innovation is expected to provide an energy-efficient platform for power-hungry generative AI."

Source: [Phys.Org](#) (11 Dec 2024)

To view past Weekly Alerts [CLICK HERE](#)
 For more articles or in-depth research, contact us at library@sutd.edu.sg
 A SUTD Library Service©2024