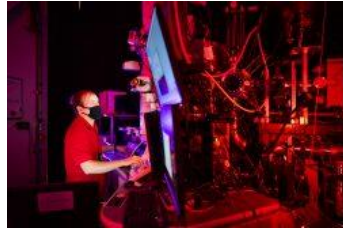


AI
Stunning Discovery: Metals Can Heal Themselves

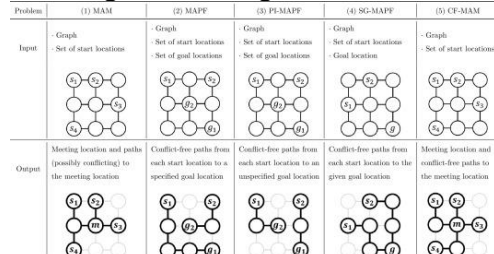


"Scientists for the first time have witnessed pieces of metal crack, then fuse back together without any human intervention, overturning fundamental scientific theories in the process. If the newly discovered phenomenon can be harnessed, it could usher in an engineering revolution — one in which self-healing engines, bridges and airplanes could reverse damage caused by wear and tear, making them safer and longer-lasting.

The research team from Sandia National Laboratories and Texas A&M University described their findings today in the journal Nature."

Source: [Sandia](#) (19 July 2023)

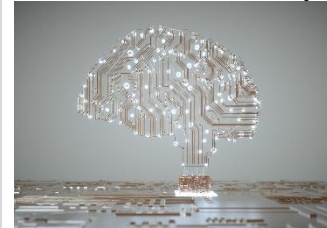
AI
Conflict-Tolerant and Conflict-Free Multi-Agent Meeting



"In the Multi-Agent Meeting problem (MAM), the task is to find the optimal meeting location for multiple agents, as well as a path for each agent to that location. Among all possible meeting locations, the optimal meeting location has the minimum cost according to a given cost function. Two cost functions are considered in this research: (1) the sum of all agents' paths' costs to the meeting location (SOC) and (2) the cost of the longest path among them (MKSP). MAM has many real-life applications, such as choosing a gathering point for multiple traveling agents (humans, cars, or robots)."

Source: [ScienceDirect](#) (13 Jun 2023)

AI
Future AI Algorithms Have Potential to Learn Like Humans, Say Researchers



"Memories can be as tricky to hold onto for machines as they can be for humans. To help understand why artificial agents develop holes in their own cognitive processes, electrical engineers at The Ohio State University have analyzed how much a process called "continual learning" impacts their overall performance.

Continual learning is when a computer is trained to continuously learn a sequence of tasks, using its accumulated knowledge from old tasks to better learn new tasks.

Yet one major hurdle scientists still need to overcome to achieve such heights is learning how to circumvent the machine learning equivalent of memory loss – a process which in AI agents is known as "catastrophic forgetting." As artificial neural networks are trained on one new task after another, they tend to lose the information gained from those previous tasks, an issue that could become problematic as society comes to rely on AI systems more and more, said Ness Shroff, an Ohio Eminent Scholar and professor of computer science and engineering at The Ohio State University.."

Source: [OSU](#) (20 Jul 2023)

ARCHITECTURE
Eight Projects with Integrated Cooling Techniques That Beat the Heat



"Health officials have "virtually" eliminated HIV transmission in parts of Sydney that were once the epicentre of the Australian AIDS epidemic, raising hopes of conquering a disease that has killed more than 40mn.

HIV diagnoses in inner Sydney plunged 88 per cent from the 2008-2012 average to just 11 cases last year, a decline on a scale never before recorded in a former AIDS hotspot.

The results are adding to evidence that existing prevention strategies, including testing and pre-exposure drugs, are highly effective when implemented correctly."

Source: [Dezeen](#) (25 Jul 2023)

CYBERSECURITY
Why Computer Security Advice Is More Confusing Than It Should Be

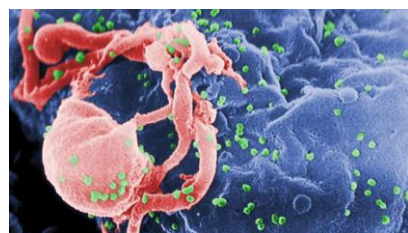


"If you find the computer security guidelines you get at work confusing and not very useful, you're not alone. A new study highlights a key problem with how these guidelines are created and outlines simple steps that would improve them – and probably make your computer safer.

At issue are the computer security guidelines that organizations like businesses and government agencies provide their employees. These guidelines are generally designed to help employees protect personal and employer data and minimize risks associated with threats such as malware and phishing scams."

Source: [NCSU](#) (25 Jul 2023)

DISEASE CONTROL AND PREVENTION
Sydney Almost Eliminates HIV Transmission in Global First



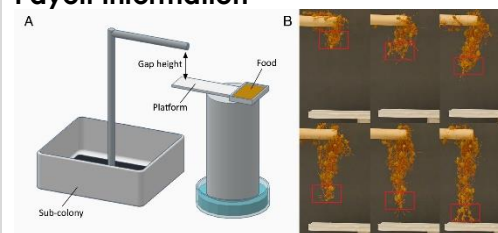
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Source: [FT](#) (24 Jul 2023)

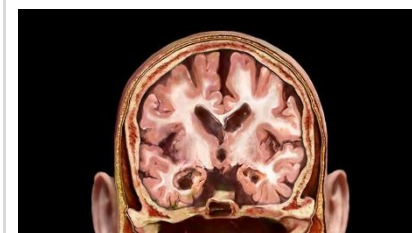
ECOLOGY
A Simple Mechanism for Collective Decision-Making in The Absence of Payoff Information



"Weaver ants link their bodies together to form chains over gaps and reach unexplored territories. The decision to join or leave a chain is made by individuals, but has cost implications at the colony level, as longer chains sequester more ants, which cannot perform other tasks. Furthermore, the payoff of a chain remains unknown until it is complete, and the new area is explored. We demonstrate that individual ants modulate the time they spend in the chain based on their proximity to the ground and that this local behavioural rule caps the colony-level investment into chains. Our theoretical model offers insights into collective decision-making in the absence of payoff information and could prove useful in the engineering of multiagent systems."

Source: [PNAS](#) (10 Jul 2023)

HEALTH
Dementia Risk Linked to Blood-Protein Imbalance in Middle Age



"A study that followed thousands of people over 25 years has identified proteins linked to the development of dementia if their levels are unbalanced during middle age.

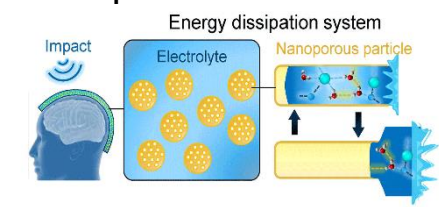
The findings, published in Science Translational Medicine on 19 July, could contribute to the development of new diagnostic tests, or even treatments, for dementia-causing diseases.

Most of the proteins have functions unrelated to the brain.

"We're seeing so much involvement of the peripheral biology decades before the typical onset of dementia," says study author Keenan Walker, a neuroscientist at the US National Institute on Aging in Bethesda, Maryland."

Source: [Nature](#) (21 Jul 2023)

MATERIALS
A Breakthrough in Material Design Will Help Football Players, Car Occupants, and Hospital Patients



"The discovery that football players were unknowingly acquiring permanent brain damage as they racked up head hits throughout their professional careers created a rush to design better head protection. One of these inventions is nanofoam, the material on the inside of football helmets.

Thanks to mechanical and aerospace engineering associate professor BAOXING XU at the University of Virginia and his research team, nanofoam just received a big upgrade and protective sports equipment could, too. This newly invented design integrates nanofoam with "non-wetting ionized liquid," a form of water that Xu and his research team now know blends perfectly with nanofoam to create a liquid cushion. This versatile and responsive material will give better protection to athletes and is promising for use in protecting car occupants and aiding hospital patients using wearable medical devices. "

Source: [University of Virginia](#) (14 Jul 2023)

PARTICLE-PHYSICS
Nothing Strange About This Pentaquark's 'Strangeness'



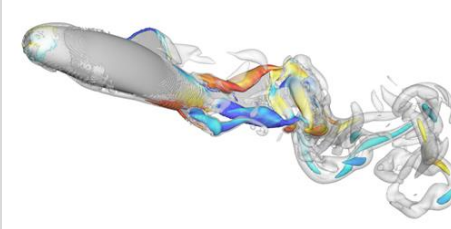
"Physicists have announced the discovery of a new type of pentaquark!.

Most ordinary matter is made up of three-quark particles —protons and neutrons. The five-particle pentaquarks and their four-quark cousins, the tetraquarks, are not known to exist in nature, and decay immediately after being created.

The LHCb detector, part of the Large Hadron Collider (LHC) at CERN, the European particle-physics laboratory near Geneva, Switzerland, has previously discovered several tetras- and pentaquarks. But the new particle, also observed by the LHCb, is the first pentaquark to contain a 'strange' quark — a slightly heavier relative of the 'up' and 'down' quarks that form protons and neutrons. "

Source: [Nature](#) (21 Jul 2023)

PHYSICS
Fish Are Boosted by Cooperating Fin Currents



"As fish wriggle, they create a complex push-pull pattern in the water that propels them forward. Many studies have shown how the motion of a fish's tail forms a vortex around its leading edge that provides thrust; however, it has been difficult to capture how the water flow around other parts of the fish interacts with this vortex to impact the overall propulsion. Jiacheng Guo at the University of Virginia and colleagues recently demonstrated how different fins create currents that can constructively interact to improve swimming efficiency"

Source: [APS](#) (21 Jul 2023)

SUSTAINABILITY
Device Makes Hydrogen from Sunlight with Record Efficiency



"Rice University engineers can turn sunlight into hydrogen with record-breaking efficiency thanks to a device that combines next-generation halide perovskite semiconductors with electrocatalysts in a single, durable, cost-effective, and scalable device.

The new technology is a significant step forward for clean energy and could serve as a platform for a wide range of chemical reactions that use solar-harvested electricity to convert feedstocks into fuels."

Source: [RICE](#) (20 Jul 2023)