Weekly Discovery
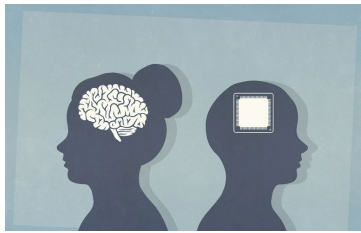## We SHARE to inspire and ignite ideas!

23 Sep – 27 Sep 2024

AI
Do AI Models Produce More Original Ideas Than Researchers?

"An ideas generator powered by artificial intelligence (AI) came up with more original research ideas than did 50 scientists working independently, according to a preprint posted on arXiv this month1.

The human and AI-generated ideas were evaluated by reviewers, who were not told who or what had created each idea. The reviewers scored AI-generated concepts as more exciting than those written by humans, although the AI's suggestions scored slightly lower on feasibility.

But scientists note the study, which has not been peer-reviewed, has limitations. It focused on one area of research and required human participants to come up with ideas on the fly, which probably hindered their ability to produce their best concepts."

Source: Nature (20 Sep 2024)

AI
Korean Research Team Proposes AI-Powered Approach to Establishing A 'Carbon-Neutral Energy City'

"A joint research team from the Renewable Energy System Laboratory and the Energy ICT Research Department at the Korea Institute of Energy Research (KIER) has developed key technologies to realize "Urban Electrification" using artificial intelligence (AI).

Urban electrification aims to reduce the use of fossil fuels and introduce renewable energy sources, such as building-integrated solar technology, to transform urban energy systems. While this concept is relatively unfamiliar in the Republic of Korea, it is being promoted as a key strategy in the U.S. and Europe for achieving carbon neutrality and creating sustainable urban environments.

In traditional urban models, energy supply can be easily adjusted using fossil fuels to meet electricity demand. However, in electrified cities, the high dependence on renewable energy leads to greater variability in energy supply due to weather changes. This causes mismatches in electricity demand across buildings and makes the stable operation of the power grid more challenging.

In particular, Low-Probability High-Impact Events (LPHI), such as sudden cold snaps or extreme heat waves, can cause a sharp increase in energy demand while limiting energy production. These events pose a significant threat to the stability of the urban power grid, potentially leading to large-scale blackouts.

The research team developed an energy management algorithm based on AI analysis to address power grid stability issues and implemented it into a system. The demonstration of the developed system showed an 18% reduction in electricity costs compared to conventional methods."

Source: Eurekalert! (20 Sep 2024)

AI
How Can We Make the Best Possible Use of Large Language Models for A Smarter and More Inclusive Society?

"Large language models (LLMs) have developed rapidly in recent years and are becoming an integral part of our everyday lives through applications like ChatGPT. An article recently published in Nature Human Behaviour explains the opportunities and risks that arise from the use of LLMs for our ability to collectively deliberate, make decisions, and solve problems. Led by researchers from Copenhagen Business School and the Max Planck Institute for Human Development in Berlin, the interdisciplinary team of 28 scientists provides recommendations for researchers and policymakers to ensure LLMs are developed to complement rather than detract from human collective intelligence."

Source: MPIB (20 Sep 2024)

ARCHITECTURE
Green Therapy: How Does Nature Contribute to Healing Hospitalized Patients?

"Connection with nature has become increasingly important in architectural theory and practice in recent years, especially after the COVID-19 pandemic, which emphasized the role of natural environments in healing. During this time, many scientific studies highlighted the positive effects of green spaces on human well-being, whether in workplaces, homes, or urban areas. With these proven benefits, it is clear that incorporating natural elements into hospital designs is crucial, creating spaces that provide vital support for patients facing physical or mental challenges.

Although the topic is gaining more attention today, the idea that nature aids patient recovery is not new to medicine. Throughout history, various cultures have recognized the link between green spaces and healing—from the Taoist Chinese, who created gardens and greenhouses for their believed health benefits, to the therapeutic gardens of European monasteries in the Middle Ages. However, as technology advanced, the connection between nature and healing gradually lost prominence, and gardens in hospital settings became less valued. With the rise of scientific studies confirming the therapeutic benefits of nature, hospitals are now reintegrating green spaces into their designs, reviving this crucial relationship for patient well-being."

Source: Archdaily (22 Sep 2024)

ARCHITECTURE
Rafael Viñoly Architects Creates "Unconventional" Skyscraper In New York City

"US architecture studio Rafael Viñoly Architects has created a residential skyscraper in Downtown Manhattan using an "unconventional approach".

The Greenwich rises 912 feet (278 meters) over 88 storeys and is located in Downtown Manhattan, two blocks south of the World Trade Center complex.

It contains 272 residences, ranging from studios to three-bedrooms and amenities including a lounge, pool and projection room distributed on its 16th and top three levels.

The skyscraper is composed of a glass tower with curved corners which sits upon an eight-storey base. The upper glass volume is bisected by opaque "hexagonal mechanical floors", which act as structural windbreaks and break up the building visually."

Source: Dezeen (19 Sep 2024)

CHEMISTRY
Synthetic Mini-Motor with Enormous Power Developed
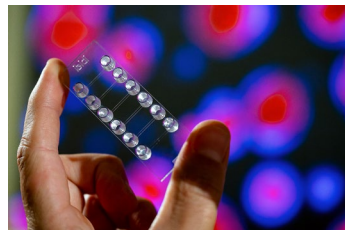
"Researchers at the Technical University of Munich (TUM) have developed an artificial motor at the supramolecular level that can develop impressive power. This wind-up motor is a tiny ribbon made of special molecules. When energy is applied, this ribbon aligns itself, moves like a small fin and can thus push objects. For the first time, the energy for this comes from a chemical fuel.

Until now, the conversion of chemical energy into rotational energy on a supramolecular level, i.e. for small objects consisting of more than one molecule, was only known from biology. Primitive bacteria, known as archaea, use the chemical fuel ATP to rotate their tiny fin-like locomotion organs, the flagella, and thus move around. Synthetic replicas of this process have not existed until now. In the future, the new development could be used in nanorobots that swim through blood vessels to detect tumor cells, for example."

Source: TUM (17 Sep 2024)

DESIGN
Dezeen Awards 2024 Interiors Longlist Revealed

"Dezeen has announced the 140 projects longlisted for this year's Dezeen Awards in the interior categories, including interiors by White Arkitekter, Note Design Studio, Linehouse, Gensler, India Mahdavi and 2LG Studio.

The 140 longlisted projects, which are in the running for awards in nine different interior project categories, are by studios located across 32 different countries, including Colombia, Finland, Mexico, Kazakhstan, Thailand and Hong Kong.

The top six project city locations are London with 22 longlisted entries, followed by Tokyo with nine, Shanghai and New York tied with seven, Barcelona with six and Paris with five.

This year's interior longlists include a hair salon utilising curved shapes and copper-toned surfaces in Barcelona, a wooden pavilion for fragrance brand Xinú in Mexico and a light-filled bookshop with a timber roof in China.

Other longlisted projects are a scenography exhibition in Melbourne, a restaurant featuring aluminium seating in Portugal and a renovated office building into a 196-room hotel in Vienna."

Source: Dezeen (10 Sep 2024)

ROBOTICS
Hexagonal Electrohydraulic Modules Shape-Shift into Versatile Robots
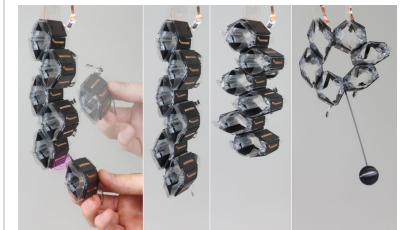
"Researchers at the Max Planck Institute for Intelligent Systems combined soft artificial muscles with a rigid, magnetic exoskeleton to create building blocks for fast-moving reconfigurable robots.

Scientists at MPI-IS have developed electrically driven robotic components, called HEXEL modules, which can snap together into high-speed reconfigurable robots.

Magnets embedded along the outside of the modules allow them to electrically and mechanically connect to other modules, forming robots with diverse shapes and capabilities.

HEXEL modules are a promising technology for use in resource-limited environments, such as on space or rescue missions, and can be used to construct versatile robots from redundant parts, altogether promoting a sustainable robot design."

Source: MPG (18 Sep 2024)

ROBOTICS
Finally, A Flying Car(T): The Palletrone Is a Robotic Hovercart for Moving Stuff Anywhere
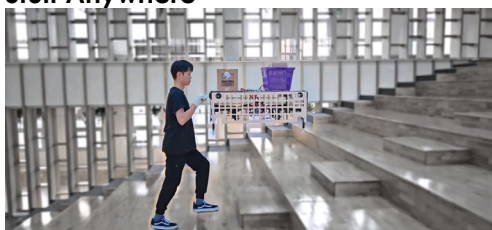
"Where's your flying car? I'm sorry to say that I have no idea. But here's something that is somewhat similar, in that it flies, transports things, and has "car" in the name: it's a flying cart, called the Palletrone (pallet+drone), designed for human-robot interaction-based aerial cargo transportation.

The way this thing works is fairly straightforward. The Palletrone will try to keep its roll and pitch at zero, to make sure that there's a flat and stable platform for your preciouses, even if you"

SENSORY SYSTEMS
Polyu Scientist Awarded 2024 Falling Walls Winner for Energy-Efficient Innovations in Sensory AI Systems

"Prof Yang CHAI, Associate Dean (Research) of the Faculty of Science and Professor of the Department of Applied Physics at The Hong Kong Polytechnic University (PolyU), has been bestowed as the top ten winners of the prestigious Falling Walls Science Breakthroughs Award. This is a recognition of his groundbreaking research on sensory artificial intelligence (AI), which has paved the way for more energy-efficient, low-latency, and memory-optimised intelligent systems, enhancing for diverse applications such as mobile devices, IoT"

SENSORY SYSTEMS
Autonomous Vehicles Could Understand Their Passengers Better with ChatGPT, Research Shows

"Imagine simply telling your vehicle, "I'm in a hurry," and it automatically takes you on the most efficient route to where you need to be.

Purdue University engineers have found that an autonomous vehicle (AV) can do this with the help of ChatGPT or other chatbots made possible by artificial intelligence algorithms called large language models.

The study, to be presented Sept. 25 at the 27th IEEE International Conference on Intelligent Transportation Systems, may be among the first"

SUSTAINABILITY
Demand-Side Actions Could Help Construction Sector Deliver on Net-Zero Targets

"Using state-of-the-art energy efficiency technologies to renovate existing properties and construct new ones could enable Europe's construction sector to almost eliminate its carbon emissions by 2060, a new study suggests.

Published in the journal Renewable and Sustainable Energy Reviews, the research is the first to fully assess the potential for energy demand reduction across the construction sectors of the United Kingdom and all"

don't load those preciouses onto the drone evenly. Once loaded up, the drone relies on you to tell it where to go and what to do, using its IMU to respond to the slightest touch and translating those forces into control over the Palletrone's horizontal, vertical, and yaw trajectories. This is particularly tricky to do, because the system has to be able to differentiate between the force exerted by cargo, and the force exerted by a human, since if the IMU senses a force moving the drone downward, it could be either. But professor Seung Jae Lee tells us that they developed "a simple but effective method to distinguish between them."

sensors and edge computing.

Overcoming crucial barriers in power consumption, latency and memory within sensory AI systems, Prof CHAI's innovations unleash the potential of sensory AI across diverse industries and domains. Furthermore, the in-sensor computing strategy has sparked progress in improving decision-making and situational awareness, strengthening privacy and security, and transforming intelligent automation."

experiments testing how well a real AV can use large language models to interpret commands from a passenger and drive accordingly.

Ziran Wang, an assistant professor in Purdue's Lyles School of Civil and Construction Engineering who led the study, believes that for vehicles to be fully autonomous one day, they'll need to understand everything that their passengers command, even when the command is implied. A taxi driver, for example, would know what you need when you say that you're in a hurry without you having to specify the route the driver should take to avoid traffic.

Although today's AVs come with features that allow you to communicate with them, they need you to be clearer than would be necessary if you were talking to a human. In contrast, large language models can interpret and give responses in a more humanlike way because they are trained to draw relationships from huge amounts of text data and keep learning over time.

"The conventional systems in our vehicles have a user interface design where you have to press buttons to convey what you want, or an audio recognition system that requires you to be very explicit when you speak so that your vehicle can understand you," Wang said. "But the power of large language models is that they can more naturally understand all kinds of things you say. I don't think any other existing system can do that."

European Union member states.

It highlights that 75% of Europe's building stock is currently classed as energy inefficient, with total floor space also projected to increase by more than 20% over the next three decades.

In spite of this, employing a combination of technologies including solar energy and heat pumps within both residential and non-residential properties could reduce the total energy used to heat and cool buildings by up to 97%.

With growing concerns over energy security, particularly in light of recent geopolitical events, the researchers say that harnessing such technologies could significantly reduce energy costs as well as enhancing people's health and quality of life.

More broadly, they say, transitioning towards a net-zero building sector offers substantial potential to mitigate the impacts of climate change and play a pivotal role in meeting the targets set out in the Paris Agreement and other global climate goals."

Source: IEEE Spectrum (21 Sep 2024) Source: Eurekalert! (20 Sep 2024) Source: Purdue (16 Sep 2024) Source: Plymouth (20 Sep 2024)