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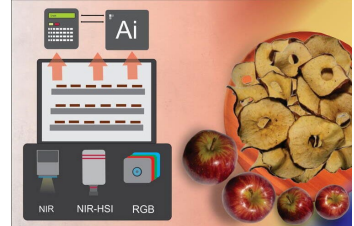


Featured Course

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AI Smart Food Drying Techniques with AI Enhance Product Quality and Efficiency



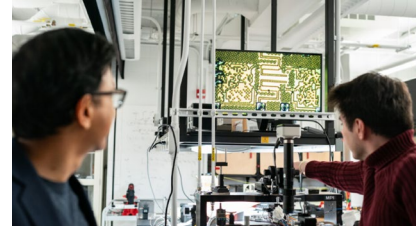
"Food drying is a common process for preserving many types of food, including fruits and meat; however, drying can alter the food's quality and nutritional value. In recent years, researchers have developed precision techniques that use optical sensors and AI to facilitate more efficient drying. A new study from the University of Illinois Urbana-Champaign discusses three emerging smart drying techniques, providing practical information for the food industry.

"With traditional drying systems, you need to remove samples to monitor the process. But with smart drying, or precision drying, you can continuously monitor the process in real time, enhancing accuracy and efficiency," said corresponding author Mohammed Kamruzzaman, assistant professor in the Department of Agricultural and Biological Engineering (ABE), part of the College of Agricultural, Consumer and Environmental Sciences and The Grainger College of Engineering at Illinois.

In the paper, the researchers review academic literature about different types of equipment that apply precision techniques to enhance smart drying capabilities in the food industry."

Source: [ACES](#) (7 Jan 2025)

AI AI Slashes Cost and Time for Chip Design, But That Is Not All



"Now, researchers at Princeton Engineering and the Indian Institute of Technology have harnessed artificial intelligence to take a key step toward slashing the time and cost of designing new wireless chips and discovering new functionalities to meet expanding demands for better wireless speed and performance. In an article published Dec. 30 in Nature Communications, the researchers describe their methodology, in which an AI creates complicated electromagnetic structures and associated circuits in microchips based on the design parameters. What used to take weeks of highly skilled work can now be accomplished in hours.

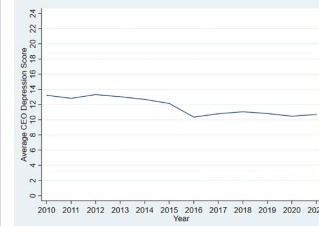
What is more, the AI behind the new system has produced strange new designs featuring unusual patterns of circuitry. Kaushik Sengupta, the lead researcher, said the designs were unintuitive and unlikely to be developed by a human mind. But they frequently offer marked improvements over even the best standard chips.

"We are coming up with structures that are complex and look random shaped and when connected with circuits, they create previously unachievable performance. Humans cannot really understand them, but they can work better," said Sengupta, a professor of electrical and computer engineering and co-director of NextG, Princeton's industry partnership program to develop next-generation communications.

These circuits can be engineered toward more energy efficient operation or to make them operable across an enormous frequency range that is not currently possible. Furthermore, the method synthesizes inherently complex structures in minutes, while conventional algorithms may take weeks. In some cases, the new methodology can create structures that are impossible to synthesize with current techniques."

Source: [Princeton](#) (6 Jan 2025)

AI Artificial Intelligence-Based Method Assesses Depression in Business Leaders



"Researchers have developed a novel method to assess depression in CEOs by using machine learning models (a type of artificial intelligence) to analyze vocal acoustic features from conference call recordings. This innovative approach, detailed in an article published in the Journal of Accounting Research, provides insights into a mental health issue that often remains hidden in high-pressure executive roles.

The researchers examined how CEO depression is related to career outcomes, compensation, and incentives. Their findings suggest that CEOs with higher levels of depression tend to receive larger compensation packages, and more of their compensation is linked to performance. Additionally, depression is associated with a stronger sensitivity of CEO departures to performance outcomes. Collectively, these findings suggest that CEOs with depression have a heightened responsiveness to negative feedback and a diminished sensitivity to positive feedback.

"Considering the widespread nature of depression among executives, additional studies are needed to understand contributing factors, how depression affects business decisions, and strategies for managing depression in leadership roles," said Nargess Golshan, PhD, an assistant professor at Indiana University Kelley School of Business."

Source: [EurekAlert!](#) (8 Jan 2025)

ARCHITECTURE An Urban Living Machine for The Common Good: Municipal Services Buildings In Hong Kong



"In Delirious New York, Rem Koolhaas vividly discusses the Downtown Athletic Club, a striking example of how an unassuming building exterior can conceal a vibrant mix of distinct, self-contained programs. Inside the uniform facade of this skyscraper, a private athletic club hosts an eclectic range of facilities—boxing gyms next to oyster bars and interior golf ranges below swimming pools—all segregated yet highly accessible. The Downtown Athletic Club epitomized the dynamism of New York's skyscrapers at the time, showcasing the thrill of capitalism through a selective, inward-focused world of leisure and privilege for the selected. This "machine of programs" operated independently of the external city as an isolated ecosystem within its walls. Yet, one might ask: could a similar model, designed for public use, create a more inclusive, lively community and neighborhood experience? This will activate the building within, instead of only serving the selected elites, and influence and transform the urban fabric and shapes around the building. In Hong Kong, a distant parallel can be drawn with the Municipal Services Buildings (MSBs)—publicly-funded structures that serve the community by integrating diverse functions within a singular vast building mass, much like the Downtown Athletic Club."

Source: [Archdaily](#) (5 Jan 2025)

ARCHITECTURE Should We Prototype Architecture More?



"Prototyping is an essential element in sectors such as automotive design and technology, where iterative development enables testing, refining, and innovating. It involves creating initial models or early versions to validate concepts and fine-tune solutions before moving on to final production. This stage is crucial for identifying flaws, optimizing designs, and reducing risks, saving time and resources in the final implementation. In architecture, however, prototyping remains an underused tool. Despite the unique challenges inherent in architectural projects—whether programmatic, climatic, or related to site conditions—the benefits of prototyping can be profound. It offers architects the opportunity to experiment with new materials, validate construction methods, and test spatial configurations in a tangible, measurable way. As a result, it not only reduces uncertainties in the creative process but also drives bold and efficient solutions, fostering a more robust balance between aesthetics, functionality, and feasibility."

Source: [Archdaily](#) (7 Jan 2025)

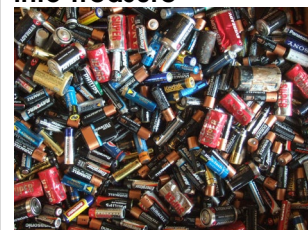
DESIGN The Top 10 Chairs Of 2024



"For the latest instalment of our 2024 review, we've compiled the most popular chairs published on Dezeen Showroom over the course of the year, including a chair referencing the design of houses in Thailand."

Source: [Dezeen](#) (29 Dec 2024)

ENERGY Green Battery Discovery Turns Trash into Treasure

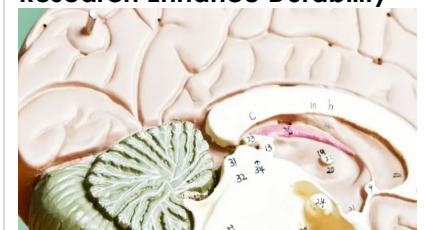


"This study examines how much fossil carbon is stored in long-lasting products, such as buildings and infrastructure, using data from 2011 and extending it to cover the years 1995–2019. Over these 25 years, 8.4 billion tons of fossil carbon have accumulated, with approximately 0.4 billion tons added each year, with a huge potential for further contribution to anthropogenic greenhouse gas emissions. A significant portion ends up in landfills, where it can take several hundred years to break down. This presents both challenges and opportunities for managing carbon and achieving climate goals. On one hand, durable goods and infrastructure act as temporary carbon storage. On the other hand, without proper management, much of this carbon will eventually be released into the atmosphere or biosphere.

Enhancing recycling rates and product lifetimes can lower demand for virgin fossil carbon, while better waste management can limit carbon leakage from landfills, preventing long-term environmental harm. These actions are crucial for meeting climate goals and building a more sustainable, circular economy."

Source: [Northwestern](#) (7 Jan 2025)

HEALTHCARE Advancements In Neural Implant Research Enhance Durability



"Neural implants contain integrated circuits (ICs) — commonly called chips — built on silicon. These implants need to be small and flexible to mimic circumstances inside the human body. However, the environment within the body is corrosive, which raises concerns about the durability of implantable silicon ICs. A team of researchers from the Bioelectronics Section led by Dr. Vasiliki (Vasso) Giagka, address this challenge by studying the degradation mechanisms of silicon ICs in the body and by coating them with soft PDMS elastomers to form body-fluid barriers that offer long-term protection to implantable chips. These findings not only enhance the longevity of implantable ICs but also significantly broaden their applications in the biomedical field. The paper on this project is published in the prestigious journal Nature Communications."

Source: [TUDELFT](#) (18 Dec 2024)

ROBOTICS Switchbot Introduces Modular Mobile Home Robot

SCIENCE Science In 2025: What To Expect This Year

SWARM ROBOTICS Advanced Technology to Control Cyborg Insect Swarms

WEARABLE DEVICES Advanced Wearable Robot Eases Heavy Lifting and Other Injury-Causing Tasks for Workers

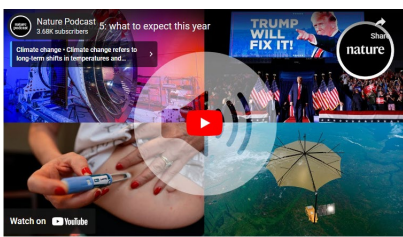


“Earlier this year, we reviewed the SwitchBot S10, a vacuuming and wet mopping robot that uses a water-integrated docking system to autonomously manage both clean and dirty water for you. It's a pretty clever solution, and we appreciated that SwitchBot was willing to try something a little different.

At CES this week, SwitchBot introduced the K20+ Pro, a little autonomous vacuum that can integrate with a bunch of different accessories by pulling them around on a backpack cart of sorts. The K20+ Pro is SwitchBot's latest effort to explore what's possible with mobile home robots.

What we're looking at here is a "mini" robotic vacuum (it's about 25 centimeters in diameter) that does everything a robotic vacuum does nowadays: It uses lidar to make a map of your house so that you can direct it where to go, it's got a dock to empty itself and recharge, and so on. The mini robotic vacuum is attached to a wheeled platform that SwitchBot is calling a "FusionPlatform" that sits on top of the robot like a hat. The vacuum docks to this platform, and then the platform will go wherever the robot goes. This entire system (robot, dock, and platform) is the "K20+ Pro multitasking household robot."

Source: [IEEE Spectrum](#) (5 Jan 2025)



“A new wave of obesity drugs, a multitude of space missions and concern over climate-action policies — we run through what to look out for over the next 12 months.”

Source: [Nature](#) (1 Jan 2025)



“Scientists from NTU Singapore, Osaka University, and Hiroshima University have developed an advanced swarm navigation algorithm for cyborg insects that prevents them from becoming stuck while navigating challenging terrain.

Published in Nature Communications, the new algorithm represents a significant advance in swarm robotics. It could pave the way for applications in disaster relief, search-and-rescue missions, and infrastructure inspection.

Cyborg insects are real insects equipped with tiny electronic devices on their backs - consisting of various sensors like optical and infrared cameras, a battery, and an antenna for communication - that allow their movements to be remotely controlled for specific tasks.

The control of a single cyborg insect was first demonstrated by Professor Hirotaka Sato from NTU Singapore's School of Mechanical and Aerospace Engineering in 2008. However, a single insect is insufficient for operations such as search-and-rescue missions, where earthquake survivors are spread out and there is an optimal 72-hour window for locating them.”

Source: [NTU](#) (6 Jan 2025)



“In research published in Advanced Intelligence Systems, scientists have developed an innovative, soft, wearable robot to help workers avoid job-related injuries while lifting, lowering, and carrying objects.

While many available wearable robots are limited to supporting a single degree of freedom of the body (meaning the body can only move in one direction at a given joint), the new robot, called WeaRo, operates through multiple degrees of freedom, allowing for complex movements.

In tests, WeaRo effectively reduced the muscle activation levels of lumbar, biceps, and triceps muscles by a maximum of 18.2%, 29.1%, and 27.0%, respectively, without constraining users' movements. With batteries, WeaRo weighs under 11.5 pounds (5.2 kg).

“The significance of this study lies in developing a comprehensive methodology that encompasses movement analysis, wearable robot design, and effectiveness validation to reduce work-related injuries,” said corresponding author Dongjun Shin, PhD, of Yonsei University, in the Republic of Korea.”

Source: [EurekaAlert!](#) (8 Jan 2025)

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