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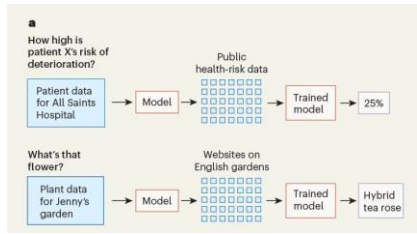
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AI The AI Tool That Can Interpret Any Spreadsheet Instantly



"Artificial intelligence is already used extensively to infer outcomes from tables of data, but this typically involves creating a model for each task. A one-size-fits-all model just made the process substantially easier.

Say you run a hospital and you want to estimate which patients have the highest risk of deterioration so that your staff can prioritize their care. You create a spreadsheet in which there is a row for each patient, and columns for relevant attributes, such as age or blood-oxygen level. The final column records whether the person deteriorated during their stay. You can then fit a mathematical model to these data to estimate an incoming patient's deterioration risk. This is a classic example of tabular machine learning, a technique that uses tables of data to make inferences. This usually involves developing — and training — a bespoke model for each task. Writing in Nature, Hollmann et al. report a model that can perform tabular machine learning on any data set without being trained specifically to do so."

Source: [Nature](#) (8 Jan 2025)

ARCHITECTURE Straw, Earth and Bamboo: Innovative Use of Natural Materials In 2024 Projects from The Global South



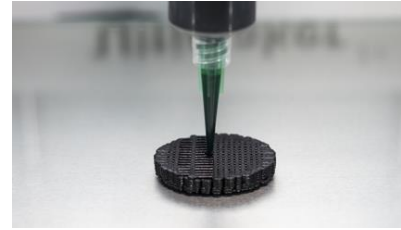
"Sustainability has been a central theme in architectural discussions for years, encompassing not only the profession's role in combating climate change and transitioning to low-carbon economies but also preserving cultural heritage and celebrating vernacular traditions. In 2024, a wave of projects and studies stood out for their innovative use of natural materials, particularly in the Global South. These initiatives skilfully blend creativity and technology with renewable resources, demonstrating how architecture can deliver high-quality spaces that align with contemporary demands for sustainability and environmental responsibility.

In many regions of Asia, Africa, and Latin America, natural materials such as bamboo, earth, wood, and straw play a crucial role in construction, crafts, agriculture, and energy production, seamlessly adapting to local climates and needs. For example, the Berber houses of Morocco, built from earth, demonstrate the versatility and efficiency of these materials in both hot and cold climates. Beyond their practical applications, these resources carry profound cultural significance, reinforcing the identity and autonomy of the communities that use them.

However, challenges persist. In 2024, the extraction and use of natural materials are increasingly strained by deforestation, overexploitation of resources, and rapid urbanization. Many communities that produce these materials face barriers such as limited access to technologies and investments that could improve the efficiency and sustainability of their practices. Strengthening public policies to support sustainable resource management and recognizing the value of traditional knowledge are critical steps. Equally important is addressing social biases about natural building materials' durability and maintenance needs, as seen in ongoing discussions about practices in India."

Source: [Archdaily](#) (8 Jan 2025)

BATTERY The Biobattery That Needs to Be Fed



"Fungi are a source of fascination. This kingdom of life — more closely related to animals than to plants — encompasses an enormous variety. Everything can be found here: from edible mushrooms to molds, from single-celled life to the largest organism on Earth, from disease-causing pathogens to superheroes that produce medicines. Now, Empa researchers have coaxed another ability out of fungi: generating electricity.

As part of a three-year research project, supported by the Gebert R f Stiftung as part of their Microbials funding program, researchers from Empa's Cellulose and Wood Materials laboratory have developed a functioning fungal battery. The living cells do not produce a whole lot of electricity — but enough to power a temperature sensor for several days, for example. Such sensors are used in agriculture or in environmental research. The biggest advantage of the fungal battery: Unlike conventional batteries, it is not only completely non-toxic but also biodegradable."

Source: [Empa](#) (9 Jan 2025)

CLIMATE CHANGE Floods, Droughts, Then Fires: Hydroclimate Whiplash Is Speeding Up Globally



"After years of severe drought, dozens of atmospheric rivers deluged California with record-breaking precipitation in the winter of 2022-23, burying mountain towns in snow, flooding valleys with rain and snow melt, and setting off hundreds of landslides.

Following a second extremely wet winter in southern parts of the state, resulting in abundant grass and brush, 2024 brought a record-hot summer and now a record-dry start to the 2025 rainy season, along with tinder-dry vegetation that has since burned in a series of damaging wildfires.

This is just the most recent example of the kind of "hydroclimate whiplash" — rapid swings between intensely wet and dangerously dry weather — that is increasing worldwide, according to a paper published today in Nature Reviews.

"The evidence shows that hydroclimate whiplash has already increased due to global warming, and further warming will bring about even larger increases," said lead author Daniel Swain, a climate scientist with UCLA and UC Agriculture and Natural Resources. "This whiplash sequence in California has increased fire risk twofold: first, by greatly increasing the growth of flammable grass and brush in the months leading up to fire season, and then by drying it out to exceptionally high levels with the extreme dryness and warmth that followed."

Source: [UCLA](#) (9 Jan 2025)

CLIMATE CHANGE Storing Carbon in Buildings Could Help Address Climate Change



"Construction materials such as concrete and plastic have the potential to lock away billions of tons of carbon dioxide, according to a new study by civil engineers and earth systems scientists at the University of California, Davis and Stanford University. The study, published Jan. 10 in Science, shows that combined with steps to decarbonize the economy, storing CO2 in buildings could help the world achieve goals for reducing greenhouse gas emissions.

"The potential is pretty large," said Elisabeth Van Roijen, who led the study as a graduate student at UC Davis.

The goal of carbon sequestration is to take carbon dioxide, either from where it is being produced or from the atmosphere, convert it into a stable form and store it away from the atmosphere where it cannot contribute to climate change. Proposed schemes have involved, for example, injecting carbon underground or storing it in the deep ocean. These approaches pose both practical challenges and environmental risks."

DESIGN Mechanical Bike Turns Into E-Bike "In A Number of Seconds" With CLIP Device



"CLIP is a portable e-motor device that allows users to alternate between a regular mechanical bike and an electric bike without any tools.

Founded in 2018 by Som Ray and Clem De Alcal  in Brooklyn, New York, CLIP aims to overcome the constraints of e-bikes and existing e-bike conversion kits.

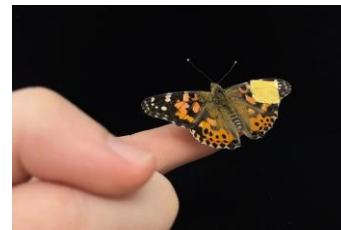
According to the company, CLIP is the "world's first no tools plug and play solution to upgrade a regular bike into an e-bike".

Unlike existing e-bike conversion kits, the format doesn't require the user to make any alterations to their bike before attaching it.

"The idea was born from my own need — while living in Brooklyn I bought a bike to commute to work, but it became a pain because of a long uphill gradient," CLIP co-founder Som Ray told Dezeen.

"An obvious solution was to get an e-bike, but I'd already invested in my own bike and loved it, and an e-bike is a whole magnitude more expensive," he said."

MED TECH UC Irvine, Columbia University Researchers Invent Soft, Bioelectronic Sensor Implant

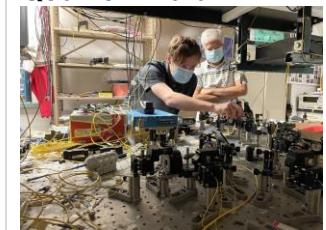


"Researchers at the University of California, Irvine and New York's Columbia University have embedded transistors in a soft, conformable material to create a biocompatible sensor implant that monitors neurological functions through successive phases of a patient's development.

In a paper published recently in Nature Communications, the UC Irvine scientists describe their construction of complementary, internal, ion-gated, organic electrochemical transistors that are more amenable chemically, biologically and electronically to living tissues than rigid, silicon-based technologies. The medical device based on these transistors can function in sensitive parts of the body and conform to organ structures even as they grow.

"Advanced electronics have been in development for several decades now, so there is a large repository of available circuit designs. The problem is that most of these transistor and amplifier technologies are not compatible with our physiology," said co-author Dion Khodagholy, Henry Samueli Faculty Excellence Professor in UC Irvine's Department of Electrical Engineering and Computer Science. "For our innovation, we used organic polymer materials that are inherently closer to us biologically, and we designed it to interact with ions, because the language of the brain and body is ionic, not electronic."

QUANTUM DATA Can Qubits Teleport Through Today's Internet Lines? New Fiber Optic Tech Mingles Regular Gigabits with Quantum Data



"For decades, researchers have tried to squeeze quantum signals alongside classical signals in fiber optic cables. Quantum bits, however, are based on delicate quantum states of individual particles, which can be disrupted by thermal noise and other factors.

Last month, Northwestern University engineers sent a pair of entangled photons more than 30 kilometers through a fiber that was also carrying a 400 gigabits-per-second classical signal. The entangled states then enabled a quantum data transfer process called teleportation. Quantum teleportation involves transmitting the quantum state of one particle onto another particle at a distant location, effectively allowing the quantum information (a.k.a. the quantum bits or qubits) to be "teleported" across space.

Despite the sci-fi connotation of the word teleportation, there's nothing mystical or other-worldly about it, either. Other than very delicately shunting around extremely fragile neutral atom quantum computers or superconducting circuits, teleportation is one of the main ways quantum information can be physically moved through space.

"There is lots of new demand for quantum computing," says co-author Prem Kumar, professor of electrical and computer engineering at Northwestern University in Evanston, Ill. "But designers are realizing that scaling this up will be limited by internal communication."

Source: [EurekAlert!](#) (9 Jan 2025)

RECYCLING

From Microplastics to Macro-Impact: KTU Expert Explains Plastic Recycling Challenges



"The use of plastic in Europe has skyrocketed over the past decade. Recent statistics reveal that in 2021, each person in the European Union (EU) generated an average of 36 kg of plastic packaging waste. Of the more than 16 million tonnes of plastic packaging generated that year, only 6.5 million tonnes were recycled. Plastic recycling remains a serious problem. Inadequate recycling not only increases the amount of waste left in landfills, incineration plants and nature but also contributes to the formation of microplastics, which threaten both ecosystems and human health.

According to Torkelis, to improve the situation, the waste management process cannot be addressed from only one side. It is a multidimensional problem, and therefore, the approach to it must be broad and systemic.

"Focusing solely on improving recycling technologies or finding new methods without considering economic, environment and legal aspects would be a mistake. This approach won't just fail to solve the problem, it could also lead to shortfalls when considering other aspects," says Torkelis."

To better understand how external factors influence plastic packaging recycling, KTU researchers conducted a macro-environmental analysis that examined six key areas: political, economical, social, technological, ecological, and legal factors."

Source: [KTU](#) (13 Jan 2025)

Source: [Dezeen](#) (8 Jan 2025)

ROBOTICS

Using Robots in Nursing Homes Linked to Higher Employee Retention, Better Patient Care



"Facing high employee turnover and an aging population, nursing homes have increasingly turned to robots to complete a variety of care tasks, but few researchers have explored how these technologies impact workers and the quality of care.

A new study from a University of Notre Dame expert on the future of work finds that robot use is associated with increased employment and employee retention, improved productivity and a higher quality of care. The research has important implications for the workplace and the long-term care industry.

Yong Suk Lee, associate professor of technology, economy and global affairs at Notre Dame's Keough School of Global Affairs, was the lead author for the study, published in Labour Economics. Most studies of robots in the workplace have focused on manufacturing and the industrial sector, but Lee's research broke new ground by analyzing long-term care — and by looking at the different types of robots used in this setting. Researchers drew on surveys of Japanese nursing homes taken in 2020 and 2022.

"Our research focused on Japan because it is a super-aging society that provides a good example of what the future could entail elsewhere — a declining population, a growing share of senior citizens and a declining share of working-age people," Lee said. "We need to be ready for this new reality."

In 2022, for instance, more than 57 million U.S. residents were 65 or older, according to the National Council on Aging. The Census Bureau forecasts that by 2050, this number will grow to 88.5 million."

Source: [ND](#) (8 Jan 2025)

In standard bioelectronics, complementary transistors have been composed of different materials to account for different polarities of signals, which, in addition to being unyielding and cumbersome, present the risk of toxicity when implanted in sensitive areas. The team of researchers from UC Irvine and Columbia University worked around this problem by creating its transistors in an asymmetric fashion that enables them to be operated using a single, biocompatible material."

Source: [Nature](#) (14 Jan 2025)

ROBOTICS

The Top 7 Robotics Stories Of 2024



"2024 was the best year ever for robotics, which I'm pretty sure is not something that I've ever said before. But that's the great thing about robotics—it's always new, and it's always exciting. What may be different about this year is the real sense that not only is AI going to change everything about robots, but that it will somehow make robots useful and practical and commercially viable. Is that true? Nobody knows yet! But it means that 2025 might actually be the best year ever for robotics, if you've ever wanted a robot to help you out at home or at work."

Source: [IEEE Spectrum](#) (29 Dec 2024)

In other words, as the number of qubits in quantum computers scales up, communication between all the qubits—not all of which are necessarily contained within the same physical computer or even in the same building or location—becomes increasingly critical. Therefore, transmitting qubits over existing long-distance fiber optic lines becomes important in the quest to scale up quantum computing."

Source: [IEEE Spectrum](#) (8 Jan 2025)

SOLAR

Floating Solar Panels Could Support US Energy Goals



"Federal reservoirs could help meet the country's solar energy needs, according to a new study published in Solar Energy.

For the study, Evan Rosenlieb and Marie Rivers, geospatial scientists at the U.S. Department of Energy National Renewable Energy Laboratory (NREL), as well as Aaron Levine, a senior legal and regulatory analyst at NREL, quantified for the first time exactly how much energy could be generated from floating solar panel projects installed on federally owned or regulated reservoirs (Developers can find specific details for each reservoir on the website AquaPV.)

And the potential is surprisingly large: Reservoirs could host enough floating solar panels to generate up to 1,476 terawatt hours, or enough energy to power approximately 100 million homes a year.

"That's a technical potential," Rosenlieb said, meaning the maximum amount of energy that could be generated if each reservoir held as many floating solar panels as possible. "We know we're not going to be able to develop all of this. But even if you could develop 10% of what we identified, that would go a long way."

Levine and Rosenlieb have yet to consider how human and wildlife activities might impact floating solar energy development on specific reservoirs. But they plan to address this limitation in future work.

This study provides far more accurate data on floating solar power's potential in the United States. And that accuracy could help developers more easily plan projects on U.S. reservoirs and help researchers better assess how these technologies fit into the country's broader energy goals."

Source: [NREL](#) (14 Jan 2025)

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