3D PRINTING

UW–Madison Researchers First To 3D-Print Functional Human Brain Tissue
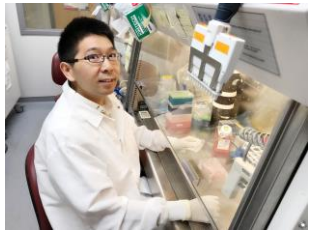
"A team of University of Wisconsin–Madison scientists has developed the first 3D-printed brain tissue that can grow and function like typical brain tissue.

It's an achievement with important implications for scientists studying the brain and working on treatments for a broad range of neurological and neurodevelopmental disorders, such as Alzheimer's and Parkinson's diseases.

"This could be a hugely powerful model to help us understand how brain cells and parts of the brain communicate in humans," says Su-Chun Zhang, professor of neuroscience and neurology at UW–Madison's Waisman Center. "It could change the way we look at stem cell biology, neuroscience and the pathogenesis of many neurological and psychiatric disorders.""

Source: WISC (1 Feb 2024)

AI

UVA IDs Heart Drug by Combining Machine Learning, Human Learning

"UVA scientists have developed a new approach to machine learning – a form of artificial intelligence – to identify drugs that help minimize harmful scarring after a heart attack or other injuries.

The new machine-learning tool has already found a promising candidate to help prevent harmful heart scarring in a way distinct from previous drugs. The UVA researchers say their cutting-edge computer model has the potential to predict and explain the effects of drugs for other diseases as well."

Source: UAVHEALTH (31 Jan 2024)

AI

This AI Learnt Language by Seeing the World Through a Baby's Eyes

"An artificial intelligence (AI) model has learnt to recognize words such as 'crib' and 'ball', by studying headcam recordings of a tiny fraction of a single baby's life.

The results suggest that AI can help us to understand how humans learn, says Wai Keen Vong, co-author of the study and a researcher in AI at New York University. This has previously been unclear, because other language-learning models such as ChatGPT learn on billions of data points, which is not comparable to the real-world experiences of an infant, says Vong. "We don't get given the internet when we're born."

The authors hope that the research, reported in Science on 1 February1, will feed into long-standing debates about how children learn language. The AI learnt only by building associations between the images and words it saw together; it was not programmed with any other prior knowledge about language. That challenges some cognitive-science theories that, to attach meaning to words, babies need some innate knowledge about how language works, says Vong.

The study is "a fascinating approach" to understanding early language acquisition in children, says Heather Bortfeld, a cognitive scientist at the University of California, Merced."

Source: Nature (1 Feb 2024)

ARCHITECTURE

Netherlands on the Drawing Board: Exploring the Past and Present Futures of Dutch Architecture and Planning

"Internationally, the Netherlands is recognized as a country willing to experiment at a large scale, to devise state-wide systems to protect its land and improve the quality of life for its citizens. Provocative proposals from architects and urban planners such as Gerrit Rietveld, Piet Blom, Rem Koolhaas, and the Office for Metropolitan Architecture (OMA), have had an international impact, as they often challenge traditional ways of practice.

Still, the country faces expected and unexpected challenges, from an acute housing shortage to raising concerns regarding climate change and shifting ideas of ecology. In the words of curator Suzanne Mulder, the country is "once again on the drawing board," as architects, urban planners, and designers are reopening conversations about the future by looking at past lessons. To come to their help, Rotterdam's Nieuwe Instituut is organizing the exhibition 'Designing the Netherlands: 100 Years of Past & Present Futures.'"

Source: Archdaily (2 Feb 2024)

ARCHITECTURE

Lessons from Relocating and Building New Capital Cities in the Global South

"The relocation of a capital city is a complex urban decision with various dimensions and consequences for both the old and new capital. It can be driven by political, economic, societal, and other factors, and has urban and architectural implications for residents. These include factors such as location, planning, building design, the purpose of the old capital, climatic conditions, and separating the political/administrative hubs from cultural and economic cities.

In light of the ongoing urban discourse, countries like Egypt are constructing a new capital city to alleviate population and urban stress on Cairo. Similarly, Indonesia is planning a new capital in response to challenges faced by Jakarta, such as pollution, traffic congestion, and rising sea levels. It is valuable to examine other countries in the global south that have relocated their capital cities, noting the architectural and urban lessons learned from their experiences."

Source: Archdaily (1 Feb 2024)

BUILDING MANAGEMENT

Bringing Together Real-world Sensors and VR to Improve Building Maintenance

"A new system that brings together real-world sensing and virtual reality would make it easier for building maintenance personnel to identify and fix issues in commercial buildings that are in operation. The system was developed by computer scientists at the University of California San Diego and Carnegie Mellon University.

The system, dubbed BRICK, consists of a handheld device equipped with a suite of sensors to monitor room temperature, CO2 and airflow. It is also equipped with a virtual reality environment that has access to the sensor data and metadata in a specific building while being connected to the building's electronic control system.

When an issue is reported in a specific location, a building manager can go on-site with the device and quickly scan the space with the Lidar tool on their smartphone, creating a virtual reality version of the space. The scanning can also occur ahead of time. Once they open this mixed reality recreation of the space on a smartphone or laptop, building managers can locate sensors, as well as the data gathered from the handheld device, overlaid onto that mixed reality environment.

The goal is to allow building managers to quickly identify issues by inspecting hardware and gathering and logging relevant data."

Source: USCD (6 Feb 2024)

CLIMATE TECH

Cool(Ing) Ideas for Tropical Data Centers: Singapore Tests Sustainable Server Rooms, With Slimmer Power And Water Budgets

"Tropical climates could make racks of hot-running data servers even hotter. But researchers in Singapore are now testing ways to cool this trend, sustainably.

The National University of Singapore in Queenstown (NUS), Nanyang Technological University, Singapore (NTUS), together with Singapore's National Research Foundation and Infocomm Media Development Authority, as well as 20 IT companies, have collaborated to establish the industry's first data center testbed for tropical climates. Dubbed the Sustainable Tropical Data Centre Testbed (STDCT), the research facility occupies a floor area of 770 square meters in NUS and officially opened its door for business in November, although the idea was conceived in 2021.

"Data centers are crucial to Singapore's digital economy," says Associate Professor Poh Seng Lee, associate professor of mechanical engineering at NUS. "They are the backbone of data processing and storage, enabling a wide range of digital services.""

Source: IEEE Spectrum (4 Feb 2024)

DESIGN

Ten Design and Communication Projects by Linnaeus University

"Dezeen School Shows: a project exploring the sustainable benefits of eating insects instead of traditional meat is included in this school show by Linnaeus University in Sweden.

Also included is a scheme that promotes the mending of clothing and a series of pieces that explore and celebrate the role of craft in sustainable culture."

Source: Dezeen (1 Feb 2024)

GENE EDITING

### Gene-Editing Offers Hope for People with Hereditary Disorder

"A group of patients with a hereditary disorder have had their lives transformed by a single treatment of a breakthrough gene-editing therapy, according to the lead researcher.

The patients from New Zealand, the Netherlands and the UK have hereditary angioedema, a genetic disorder characterised by severe, painful and unpredictable swelling attacks. These interfere with daily life and can affect airways and prove fatal.

Now researchers from the University of Auckland, Amsterdam University Medical Center and Cambridge University Hospitals have successfully treated more than ten

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SUPERCONDUCTORS

Tracking Unconventional Superconductivity
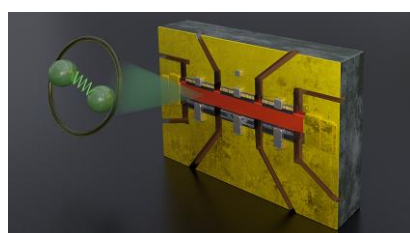
"At low enough temperatures, certain metals lose their electrical resistance and they conduct electricity without loss. This effect of superconductivity is known for more than hundred years and is well understood for so-called conventional superconductors. More recent, however, are unconventional superconductors, for which it is unclear yet how they work. A team from the Helmholtz-Zentrum Dresden-Rossendorf (HZDR), together with colleagues from the French research institution CEA (Commissariat à l'énergie atomique et aux énergies alternatives), from Tohoku University in Japan, and the Max Planck Institute for Chemical Physics of Solids in Dresden, has now


SUSTAINABLE DEVELOPMENT

A Sleeker Facial Recognition Technology Tested on Michelangelo's David
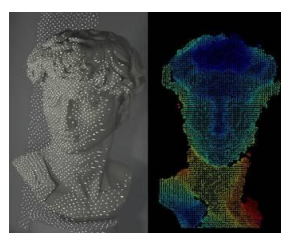
"Many people are familiar with facial recognition systems that unlock smartphones and game systems or allow access to our bank accounts online. But the current technology can require boxy projectors and lenses. Now, researchers report in ACS' Nano Letters a sleeker 3D surface imaging system with flatter, simplified optics. In proof-of-concept demonstrations, the new system recognized the face of Michelangelo's David just as well as an existing smartphone system.

3D surface imaging is a common tool used in smartphone facial recognition, as well as in computer vision and autonomous driving. These systems typically consist of a dot projector that

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SUSTAINABLE DEVELOPMENT

Smarter Eco-Cities and Their Leading-Edge Artificial Intelligence of Things Solutions for Environmental Sustainability: A Comprehensive Systematic Review
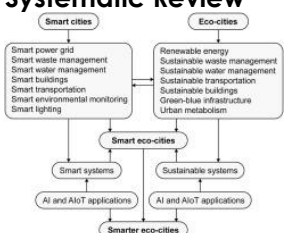
"The recent advancements made in the realms of Artificial Intelligence (AI) and Artificial Intelligence of Things (AIoT) have unveiled transformative prospects and opportunities to enhance and optimize the environmental performance and efficiency of smart cities. These strides have, in turn, impacted smart eco-cities, catalyzing ongoing improvements and driving solutions to address complex environmental challenges. This aligns with the visionary concept of smarter eco-cities, an emerging paradigm of urbanism characterized by the seamless integration of advanced technologies and environmental strategies.

patients with the CRISPR/Cas9 therapy, with interim results just published in a leading journal.'"

Source: UNI OF AUCKLAND (1 Feb 2024)

gained new insights. The researchers report their recent findings in the journal Nature Communications (DOI: 10.1038/s41467-023-44183-1). They could explain why a new material remains superconducting even at extremely high magnetic fields – a property that is missing in conventional superconductors, with the potential to enable previously unconceivable technological applications."

Source: HZDR (31 Jan 2024)

contains multiple components: a laser, lenses, a light guide and a diffractive optical element (DOE). The DOE is a special kind of lens that breaks the laser beam into an array of about 32,000 infrared dots. So, when a person looks at a locked screen, the facial recognition system projects an array of dots onto most of their face, and the device's camera reads the pattern created to confirm the identity. However, dot projector systems are relatively large for small devices such as smartphones. So, Yu-Heng Hong, Hao-Chung Kuo, Yao-Wei Huang and colleagues set out to develop a more compact facial recognition system that would be nearly flat and require less energy to operate."

Source: ACS (2 Feb 2024)

However, there remains a significant gap in thoroughly understanding this new paradigm and the intricate spectrum of its multifaceted underlying dimensions. To bridge this gap, this study provides a comprehensive systematic review of the burgeoning landscape of smarter eco-cities and their leading-edge AI and AIoT solutions for environmental sustainability."

Source: ScienceDirect (3 Nov 2023)

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