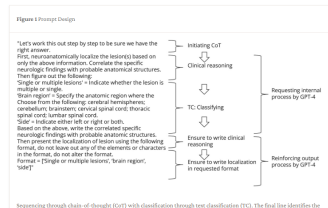


Weekly Discovery

We SHARE to inspire and ignite ideas!

1 Apr – 5 Apr 2024

AI
Could AI Play a Role in Locating Damage to The Brain After Stroke?



"Artificial intelligence (AI) may serve as a future tool for neurologists to help locate where in the brain a stroke occurred. In a new study, AI processed text from health histories and neurologic examinations to locate lesions in the brain. The study, which looked specifically at the large language model called generative pre-trained transformer 4 (GPT-4), is published in the March 27, 2024, online issue of *Neurology@Clinical Practice*, an official journal of the American Academy of Neurology.

A stroke can cause long-term disability or even death. Knowing where a stroke has occurred in the brain helps predict long-term effects such as problems with speech and language or a person's ability to move part of their body. It can also help determine the best treatment and a person's overall prognosis.

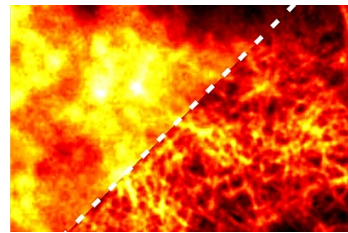
Damage to the brain tissue from a stroke is called a lesion. A neurologic exam can help locate lesions, when paired with review a person's health history. The exam involves symptom evaluation and thinking and memory tests. People with stroke often have brain scans to locate lesions.

"Not everyone with stroke has access to brain scans or neurologists, so we wanted to determine whether GPT-4 could accurately locate brain lesions after stroke based on a person's health history and a neurologic exam," said study author Jung-Hyun Lee, MD, of State University of New York (SUNY) Downstate Health Sciences University in Brooklyn and a member of the American Academy of Neurology.

The study used 46 published cases of people who had stroke. Researchers gathered text from participants' health histories and neurologic exams. The raw text was fed into GPT-4. Researchers asked it to answer three questions: whether a participant had one or more lesions; on which side of the brain lesions were located; and in which region of the brain the lesions were found. They repeated these questions for each participant three times. Results from GPT-4 were then compared to brain scans for each participant."

Source: [AAN](#) (27 Mar 2024)

AI
Artificial Intelligence Boosts Super-Resolution Microscopy

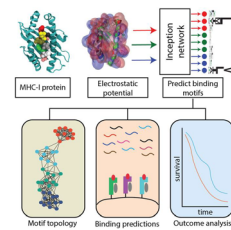


"New generative model calculates images more efficient than established approaches.

Generative artificial intelligence (AI) might be best known from text or image-creating applications like ChatGPT or Stable Diffusion. But its usefulness beyond that is being shown in more and more different scientific fields. In their recent work, to be presented at the upcoming International Conference on Learning Representations (ICLR), researchers from the [Center for Advanced Systems Understanding \(CASUS\)](#) at the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) in collaboration with colleagues from [Imperial College London](#) and [University College London](#) have provided a new open-source algorithm called Conditional Variational Diffusion Model (CVDM) (DOI: [10.48550/arXiv.2312.02246](#)). Based on generative AI, this model improves the quality of images by reconstructing them from randomness. In addition, the CVDM is computationally less expensive than established diffusion models – and it can be easily adapted for a variety of applications."

Source: [HZDE](#) (28 Mar 2024)

AI
Researchers Develop AI-Based Tool Paving the Way for Personalized Cancer Treatments



"In the ongoing fight against cancer, scientists around the globe are exploring innovative approaches to unlock the mysteries of the human immune system — the complex network of organs, cells and proteins that defends the body against disease.

A team led by Arizona State University scientists have developed an AI-based learning tool called HLA Inception that's uncovered new information about how an individual person's immune system responds to foreign cells.

Focusing on a group of proteins called Major Histocompatibility Complex-1 (MHC-1), the AI-based tool, in seconds, can classify the specific group of proteins unique for an individual and predict whether a person's immune defenses may recognize pieces of threatening viruses and cancers."

Source: [EurekAlert!](#) (29 Mar 2024)

AIR QUALITY
Blueprint For Mandating Indoor Air Quality for Public Buildings in Form of Standards



"A group of international experts led by QUT Professor Lidia Morawska has presented a blueprint for national indoor quality standards for public buildings, in an article in the prestigious journal *Science*.

International experts set out standards for monitoring three key indoor pollutants.

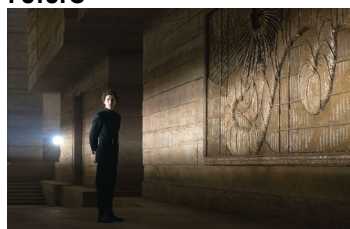
Adequate ventilation for number of occupants and activities must be considered.

Carbon dioxide and PM2.5 particles and carbon monoxide are three pollutants requiring monitoring to assess healthy ventilation levels.

The experts addressed setting standards for three key indoor pollutants – carbon dioxide (CO2), carbon monoxide (CO), PM2.5 which are particles so small they can lodge deep in the lungs and enter the bloodstream - and ventilation rate."

Source: [QUT](#) (29 Mar 2024)

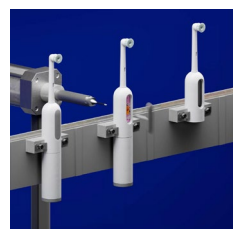
ARCHITECTURE
The Architecture of Dune: Leveraging the Past to Create a Myth of the Future



"Imagine a world thousands of years into the future, one where humanity has conquered planets from galaxies away, only to default to a neofeudalistic social order in a constant power struggle, all built upon an intricate tapestry of cultures and religions and set in a harsh yet vivid landscape that becomes a character in and of itself. This was the challenge faced by director Denis Villeneuve and production designer Patrice Vermette in creating the cinematic adaptation of Frank Herbert's 1965 novel. The two *Dune* movies, released in 2021 and 2024, were conceived as a whole and therefore share a coherent style and cinematic expression. Beyond aesthetics, the environment and architecture of *Dune* present a lived-in, believable world, one that anchors the action and characters, silently offering invaluable insights into the values and mythology of each civilization."

Source: [Archdaily](#) (28 Mar 2024)

DESIGN
Ten Wearable Technology Products Designed to Enhance Our Bodies



"British design studio Seymourpowell has put cheap electronic goods under the spotlight with Un-Made, a project imagining four possible ways to design for quick disassembly and recycling.

As part of the project, Seymourpowell devised four automated disassembly mechanism concepts using an electric toothbrush as an example for their animated graphics.

Each of the mechanisms could be built into a product during manufacturing and then activated in a factory at the end of the item's life."

Source: [Dezeen](#) (5 Mar 2024)

DESIGN
Tech Designers "Forgot New Ideas" After iPhone Says Nothing's Adam Bates



"London-based start-up Nothing is trying to upend the consumer-tech industry. In this interview, the company's design director, Adam Bates, discusses how.

Since being founded by Chinese-Swedish entrepreneur Carl Pei three years ago, nothing has moved at breakneck speed, releasing three wireless earbuds and two smartphones – with a third set to launch next month.

Counting iPod designer Tony Fadell and Reddit CEO Steve Huffman among an illustrious list of investors, the company's stated aim is to "make tech fun again".

"We're a bit bored."

Having joined Nothing as design director in early 2022 after spending 14 years at Dyson, Bates is tasked with ensuring that the brand's products deliver on that ambition.

"I think it's in a lot of our bones that there are some things that aren't right about these products," said Bates, referring to the current offering of smartphones from mainstream brands.

"And also that we're a bit bored," he added.

Bates suggests that the current state of monotony within the smartphone industry can be traced back to 2007 and the seismic launch of the original Apple iPhone."

Source: [Dezeen](#) (20 Feb 2024)

MED TECH
New Software Enables Blind and Low-Vision Users to Create Interactive, Accessible Charts



"A growing number of tools enable users to make online data representations, like charts, that are accessible for people who are blind or have low vision. However, most tools require an existing visual chart that can then be converted into an accessible format.

This creates barriers that prevent blind and low-vision users from building their own custom data representations, and it can limit their ability to explore and analyze important information.

A team of researchers from MIT and University College London (UCL) wants to change the way people think about accessible data representations.

They created a software system called Umwelt (which means "environment" in German) that can enable blind and low-vision users to build customized, multimodal data representations without needing an initial visual chart.

Umwelt, an authoring environment designed for screen-reader users, incorporates an editor that allows someone to upload a dataset and create a customized representation, such as a scatterplot, that can include three modalities: visualization, textual description, and sonification. Sonification involves converting data into nonspeech audio.

The system, which can represent a variety of data types, includes a viewer that enables a blind or low-vision user to interactively explore a data representation, seamlessly switching between each modality to interact with data in a different way."

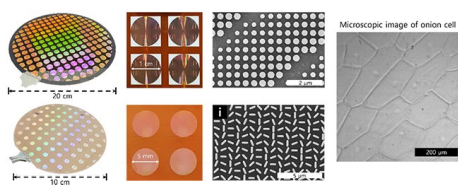
Source: [MIT](#) (27 Mar 2024)

METALENS
Can Metalens be Commercialized at a Fraction of the Cost?

ROBOTICS
Robot, Can You Say 'Cheese'?

SMARTPHONES
Rollable OLED's Moment Is Near: Experts Think Flexible Phones "Could Come Up Quick."

WEARABLES
The Wearable Electronic Patch That's Impervious to Sweat

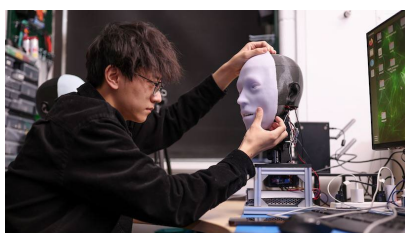


Water-scale manufacturing of a near-infrared metasurfaces and a high-resolution image of onion epidermis captured using this technology

"Metalenses, nano-artificial structures capable of manipulating light, offer a technology that can significantly reduce the size and thickness of traditional optical components. Particularly effective in the near-infrared region, this technology holds great promise for various applications such as LiDAR which is called the 'eyes of the self-driving car,' miniature drones, and blood vessel detectors. Despite its potential, the current technology requires tens of millions of won even for fabricating a metalens the size of a fingernail, posing a challenge for commercialization. Fortunately, a recent breakthrough shows promise of reducing its production cost by one thousandth of the price."

A collaborative research team... has proposed two innovative methods for mass-producing metalenses and manufacturing them on large surfaces. Their research featured in 'Laser & Photonics Reviews', an international journal in optics and applied physics."

Source: [POSTECH](#) (27 Mar 2024)



"What would you do if you walked up to a robot with a human-like head and it smiled at you first? You'd likely smile back and perhaps feel the two of you were genuinely interacting. But how does a robot know how to do this? Or a better question, how does it know to get you to smile back?"

While we're getting accustomed to robots that are adept at verbal communication, thanks in part to advancements in large language models like ChatGPT, their nonverbal communication skills, especially facial expressions, have lagged far behind. Designing a robot that can not only make a wide range of facial expressions but also know when to use them has been a daunting task.

Tackling the challenge

The Creative Machines Lab at Columbia Engineering has been working on this challenge for more than five years. In a new study published today in Science Robotics, the group unveils Emo, a robot that anticipates facial expressions and executes them simultaneously with a human. It has even learned to predict a forthcoming smile about 840 milliseconds before the person smiles, and to co-express the smile simultaneously with the person."

Source: [COLUMBIA](#) (27 Mar 2024)

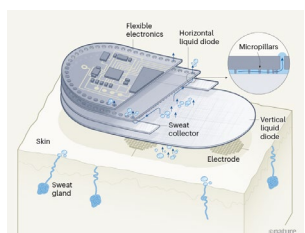


"Smartphones have a scaling problem. Specifically, the radio-frequency (RF) filters that every phone—and every wireless device in general—uses to extract information from isolated wireless signals are too big, too flat, and too numerous. And without these filters, wireless communications simply wouldn't work at all."

"They are literally the entire backbone of wireless systems," says Roozbeh Tabrizian, a researcher at the University of Florida in Gainesville.

So Tabrizian and other researchers at the University of Florida have now developed an alternative three-dimensional RF filter that can save space in smartphones and IoT devices. If these 3D filters one day replace bulky stacks of 2D filters, it would leave more room for other components, such as batteries. They could also make it easier to push wireless communications into terahertz frequencies, an important spectrum range being researched for 6G cellular technologies."

Source: [IEEE Spectrum](#) (30 Mar 2024)



"Human skin is a remarkable organ that can regulate body temperature by secreting sweat that then evaporates. Sweat-wicking fabrics can draw trapped moisture away from the skin, preventing irritation, but it is complicated to incorporate such materials into wearable electronic patches that contain sensors and circuits for biometric or environmental monitoring. These smart patches must be small and soft, but they also need to resist sweat, which can make the patch peel off and lead to signal loss. Sweat can also seep into the electronics, causing short circuits and corrosion. Although the softness of these patches continues to improve, as does their ability to conform to the wearer's skin^{1,2}, the challenges of perspiration persist. Writing in Nature, Zhang et al.³ report a flexible device that can discharge sweat rapidly and strategically, ensuring comfort and signal stability during prolonged wear."

Source: [Nature](#) (27 Mar 2024)

To view past Weekly Alerts [CLICK HERE](#)
 For more articles or in-depth research, contact us at library@sutd.edu.sg
 A SUTD Library Service©2024