

Weekly Discovery

We SHARE to inspire and ignite ideas!

20 Nov – 24 Nov 2023

3D PRINTING Scientists 3D-Print Hair Follicles in Lab-Grown Skin



"A team led by scientists at Rensselaer Polytechnic Institute has 3D-printed hair follicles in human skin tissue cultured in the lab. This marks the first-time researchers have used the technology to generate hair follicles, which play an important role in skin healing and function.

The finding, published in the journal "Science Advances," has potential applications in regenerative medicine and drug testing, though engineering skin grafts that grow hair are still several years away.

"Our work is a proof-of-concept that hair follicle structures can be created in a highly precise, reproducible way using 3D-bioprinting. This kind of automated process is needed to make future biomanufacturing of skin possible," said Pankaj Karande, Ph.D., an associate professor of chemical and biological engineering and a member of Rensselaer's Shirley Ann Jackson, Ph.D. Center for Biotechnology and Interdisciplinary Studies, who led the study.

"The reconstruction of hair follicles using human-derived cells has historically been a challenge. Some studies have shown that if these cells are cultured in a three-dimensional environment, they can potentially originate new hair follicles or hair shafts, and our study builds on this work," Karande said."

Source: [RENSSELAER](#) (15 Nov 2023)

AI AI Faces Look More Real Than Actual Human Faces



"In the study, more people thought AI-generated White faces were human than the faces of real people. The same wasn't true for images of people of colour.

The reason for the discrepancy is that AI algorithms are trained disproportionately on White faces, Dr Amy Dawel, the senior author of the paper, said.

"If White AI faces are consistently perceived as more realistic, this technology could have serious implications for people of colour by ultimately reinforcing racial biases online," Dr Dawel said.

"This problem is already apparent in current AI technologies that are being used to create professional-looking headshots. When used for people of colour, the AI is altering their skin and eye colour to those of White people."

One of the issues with AI 'hyper-realism' is that people often don't realise they're being fooled, the researchers found.

"Concerningly, people who thought that the AI faces were real most often were paradoxically the most confident their judgements were correct," Elizabeth Miller, study co-author and PhD candidate at ANU, said.

"This means people who are mistaking AI imposters for real people don't know they are being tricked."

The researchers were also able to discover why AI faces are fooling people."

Source: [ANU](#) (14 Nov 2023)

AI AI Writes Summaries of Preprints in Biorxiv Trial



"Earlier this month, Erik van Nimwegen and Pascal Grobecker, computational biologists at the University of Basel in Switzerland, posted a preprint¹ on the bioRxiv server describing a new tool for deciphering gene-expression patterns in individual cells. Van Nimwegen was excited by the work and crafted a long summary on the social media site X, formerly Twitter.

So he was surprised — and troubled — to read a competing precis produced by an artificial intelligence (AI) tool similar to ChatGPT. The summary stood alongside the preprint on bioRxiv. The first sentence was gibberish, van Nimwegen says, and it only got worse from there. "I'd rather have no summaries than this hash," he fumed on X.

The summary is part of a bioRxiv pilot, announced on 8 November, that uses text-generating neural networks called large language models (LLMs) to give an outline of all new preprints on the site. The service creates three short summaries aimed at different reading levels, from general to expert."

Source: [Nature](#) (14 Nov 2023)

ARCHITECTURE Sensory Design: Architecture for a Full Spectrum of Senses

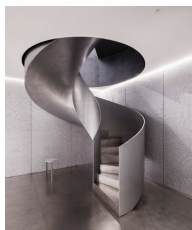


"A space is much more than just its appearance. Textures, smells, and sounds can strongly affect the user's experience. Based on this, sensory architecture can transform the interaction between people and the built environment into something even deeper.

A space that considers all of the senses can trigger feelings such as coziness, warmth, cleanliness, comfort, and surprise. In addition to room temperature, the texture of wood and warm colors can also provide an extra sense of comfort. While concrete is perceived as a cold material, you can counteract this impression by adding plants, contrasting colors, and other elements to the environment. There are endless possibilities, so we have listed some aspects that can be taken into account to help you think outside the box and make creative designs towards the user's well-being."

Source: [Archdaily](#) (19 Nov 2023)

ARCHITECTURE Built to Last: Stainless Steel's Contributions to Architecture



"Shortly before the First World War, Harry Brearley (1871-1948), who had been working as a metalworker since he was 12 years old, developed the first stainless steel. Seeking to solve the problem of wear on the inner walls of British army weapons, he ended up obtaining a corrosion resistant metal alloy, and added chrome to the cast iron. The invention found applications in almost all industrial sectors including for the production of cutlery, health equipment, kitchens, automotive parts, and more, replacing traditional materials such as carbon steel, copper, and even aluminum. In civil construction, this was no different, and stainless steel was soon incorporated into buildings."

Source: [Archdaily](#) (21 Nov 2023)

DESIGN Ten Designs and Buildings That Reduce the Impact of Environmental Hazards



"To conclude our Designing for Disaster series, we round up 10 design and architecture projects that aim to prevent, manage or aid recovery from natural-hazard events.

Running on Dezeen for the past two weeks, our series has explored the different approaches being taken to deal with severe earthquakes and worsening extreme weather events around the world.

Here we collect 10 interesting projects aimed at averting disaster, including a remote wildfire sensor, an artificial coral reef and earthquake-resistant bamboo housing."

Source: [Dezeen](#) (16 Nov 2023)

ETHERNET Ethernet is Still Going Strong After 50 Years



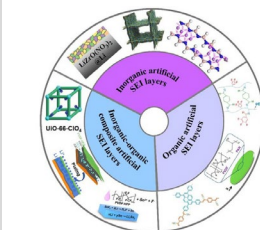
"Ethernet's development began in 1973, when Charles P. Thacker—who was working on the design of the Alto computer—envisioned a network that would allow Altos to communicate with each other, as well as with laser printers and with PARC's gateway to the ARPANET. PARC researcher Robert M. Metcalfe, an IEEE Fellow, took on the challenge of creating the technology. Metcalfe soon was joined by computer scientist David Boggs.

Metcalfe and Boggs had two criteria: The network had to be fast enough to support their laser printer, and it had to connect hundreds of computers within the same building.

The Ethernet design was inspired by the Additive Links On-line Hawaii Area network (ALOHAnet), a radio-based system at the University of Hawai'i. Computers transmitted packets, prefaced by the addresses of the recipients, over a shared channel as soon as they had information to send. If two messages collided, the computers that had sent them would wait a random interval and try again."

Source: [EurekaAlert!](#) (16 Nov 2023)

MATERIAL SCIENCE Lithium-Ion Batteries Are No Longer the Gold Standard in Battery Tech



"The use of lithium metal as the anode for batteries is one of the smarter options with better energy density than other materials. However, the interface between the electrode and electrolyte has quite a few issues that can be addressed for a safer and more functional outcome in the future.

The researchers are keen on replacing the graphite anode with lithium metal anode to construct a battery system with higher energy density. However, the Li metal anode is unstable and readily reacting with electrolyte to form a solid-electrolyte interphase (SEI). Unfortunately, the natural SEI is brittle and fragile, resulting in poor lifespan and performance. Here, researchers have looked into a substitute for nature SEI, which could effectively mitigate the side reactions within the battery system. The answer is ASEI: artificial solid electrolyte interphase. ASEI corrects some of the issues plaguing the bare lithium metal anode to make a safer, more reliable, and even more powerful source of power that can be used with more confidence in electric vehicles and other similar applications."

Source: [EurekaAlert!](#) (16 Nov 2023)

ROBOTICS Robot Hand with Working Tendons Printed in One Go



"A skeletal robotic hand with working ligaments and tendons can now be 3D-printed in one run. The creepy accomplishment was made possible by a new approach to additive manufacturing that can print both rigid and elastic materials at the same time in high resolution.

The new work is the result of a collaboration between researchers at ETH Zurich in Switzerland and a Massachusetts Institute of Technology spin-out called Inkbit, based in Medford, Mass. The group has devised a new 3D inkjet-printing technique capable of using a wider range of materials than previous devices.

In a new paper in Nature, the group has shown for the first time that the technology can be used to print complex moving devices made of multiple materials in a single print job. These include a bio-inspired robotic hand, a six-

ROBOTICS New Robotic System Assesses Mobility After Stroke

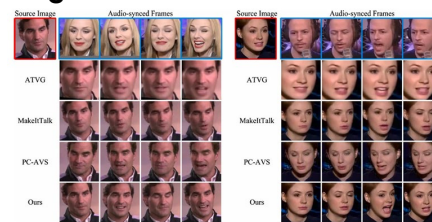


"Annually, more than 15 million people worldwide experience a stroke, with three-quarters grappling with issues such as arm and hand impairment, weakness and paralysis. Despite the old adage to "Use it or lose it," for stroke survivors, this can be easier said than done.

Breaking this habit, known as "arm nonuse" or "learned nonuse," can improve strength and prevent injury. But determining how much a patient utilizes their weaker arm outside clinical settings is challenging. In a classic case of observer's paradox, necessitating covert measurements for natural behavior.

Now, USC researchers have developed a novel robotic system designed to collect precise data on how stroke survivors use their arms spontaneously. The pioneering method, outlined in a paper published in the November

ROBOTICS Realistic Talking Faces Created from Only an Audio Clip and A Person's Photo Using NTU Singapore Computer Program

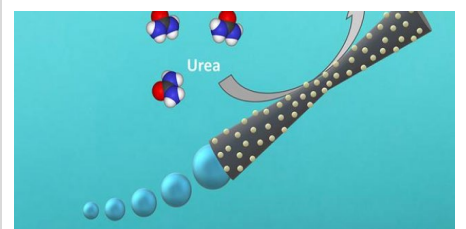


"A team of researchers from Nanyang Technological University, Singapore (NTU Singapore) has developed a computer program that creates realistic videos that reflect the facial expressions and head movements of the person speaking, only requiring an audio clip and a face photo.

Diverse yet Realistic Facial Animations, or DIRFA, is an artificial intelligence-based program that takes audio and a photo and produces a 3D video showing the person demonstrating realistic and consistent facial animations synchronised with the spoken audio (see videos).

The NTU-developed program improves on existing approaches (see Figure 1), which struggle with pose variations and emotional control.

WATER TREATMENT New Water Treatment Method Can Generate Green Energy



"Researchers from ICIQ in Spain have designed micromotors that move around on their own to purify wastewater. The process creates ammonia, which can serve as a green energy source. Now, an AI method developed at the University of Gothenburg will be used to tune the motors to achieve the best possible results..."

Micromotors have emerged as a promising tool for environmental remediation, largely due to their ability to autonomously navigate and perform specific tasks on a microscale. The micromotor is comprised of a tube made of silicon and manganese dioxide in which chemical reactions cause the release of bubbles from one end. These bubbles act as a motor that sets the tube in motion.

Researchers from the Institute of Chemical Research of Catalonia (ICIQ) have built a micromotor covered with the chemical

legged robot with a grabber, and a pump modeled on the heart."

Source: [IEEE Spectrum](#) (15 Nov 2023)

15 issue of Science Robotics, uses a robotic arm to track 3D spatial information."

Source: [USC](#) (15 Nov 2023)

To accomplish this, the team trained DIRFA on over one million audiovisual clips from over 6,000 people derived from an open-source database called The VoxCeleb2 Dataset to predict cues from speech and associate them with facial expressions and head movements."

Source: [NTU](#) (16 Nov 2023)

compound laccase, which accelerates the conversion of urea found in polluted water into ammonia when it comes into contact with the motor."

Source: [GU](#) (14 Nov 2023)

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