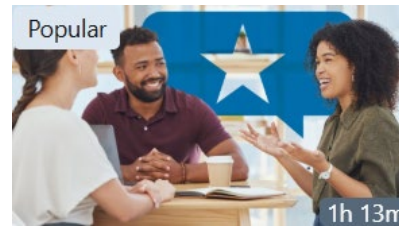**Linked in Learning** **Invest in Yourself**

Did you know 1 cent doubled for 30 days = $5.368 Million

Similarly, your actions everyday can amount to much more!

Learn a new skill today with **LinkedIn Learning**
and start investing in yourself !

Activate you free LinkedIn Learning Account and get started!

Popular

Featured Course
Communicating with Confidence 1h 13m
Click Here to Start Learning

AI
AI Headphones Create A 'Sound Bubble,' Quieting All Sounds More Than A Few Feet Away

"Imagine this: You're at an office job, wearing noise-canceling headphones to dampen the ambient chatter. A co-worker arrives at your desk and asks a question, but rather than needing to remove the headphones and say, "What?", you hear the question clearly. Meanwhile the water-cooler chat across the room remains muted. Or imagine being in a busy restaurant and hearing everyone at your table, but reducing the other speakers and noise in the restaurant.

A team led by researchers at the University of Washington has created a headphone prototype that allows listeners to create just such a "sound bubble." The team's artificial intelligence algorithms combined with a headphone prototype allow the wearer to hear people speaking within a bubble with a programmable radius of 3 to 6 feet. Voices and sounds outside the bubble are quieted an average of 49 decibels (approximately the difference between a vacuum and rustling leaves), even if the distant sounds are louder than those inside the bubble.

The team published its findings Nov. 14 in Nature Electronics. The code for the proof-of-concept device is available for others to build on. The researchers are creating a startup to commercialize this technology."

Source: WASHINGTON (14 Nov 2024)

AI
Invisible Touch: Stevens Is Giving AI The Ability to Feel and Measure Surfaces

"…Researchers in Stevens' leading-edge Center for Quantum Science and Engineering (CQSE) have just demonstrated a method of giving AI the ability to feel.

Sua, working with CQSE Director Yuping Huang and doctoral candidates Daniel Tafone and Luke McEvoy '22 M.S. '23, devised a quantum-lab setup that combines a photon-firing scanning laser with new algorithmic AI models trained to tell the differences among various surfaces as they are imaged with those lasers.

"This is a marriage of AI and quantum," explains Tafone.

In their system, reported this month in the journal Applied Optics [Vol. 63, No. 30], a specially created beam of light is pulsed in short blasts at a surface to "feel" it. Reflected, back-scattered photons return from the target object carrying speckle noise, a random type of flaw that occurs in imagery.

Speckle noise is normally considered detrimental to clear, accurate imaging. However, the Stevens group's system takes a different approach: it detects and processes these noise artifacts using an AI that has been carefully trained to interpret their characteristics as valuable data. This allows the system to accurately discern the topography of the object.

"We use the variation in photon counts over different illumination points across the surface," says Tafone.

The team used 31 industrial sandpapers with surfaces of varying roughness, ranging from 1 to 100 microns thick, as experimental targets. (For comparison, an average human hair is about 100 microns thick.) Mode-locked lasers generated light pulses aimed at the samples.

Those pulses passed through transceivers, encountered the sandpapers, then rebounded back through the system for analysis by the team's learning model.

During early tests, the group's method averaged a root-mean-square error (RMSE) of about 8 microns; after working with multiple samples and averaging results across them, its accuracy improved significantly to within 4 microns, comparable to the best industrial profilometer devices currently used.

"Interestingly, our system worked best for the finest-grained surfaces, such as diamond lapping film and aluminum oxide," notes Tafone.

The new method could be useful for a variety of applications, he adds."

Source: STEVENS (5 Nov 2024)

AI
Can AI Improve Plant-Based Meats?

"Cutting back on animal protein in our diets can save on resources and greenhouse gas emissions. But convincing meat-loving consumers to switch up their menu is a challenge. Looking at this problem from a mechanical engineering angle, Stanford engineers are pioneering a new approach to food texture testing that could pave the way for faux filets that fool even committed carnivores.

In a new paper in Science of Food, the team demonstrated that a combination of mechanical testing and machine learning can describe food texture with striking similarity to human taste testers. Such a method could speed up the development of new and better plant-based meats. The team also found that some plant-based products are already nailing the texture of the meats they're mimicking.

"We were surprised to find that today's plant-based products can reproduce the whole texture spectrum of animal meats," said Ellen Kuhl, professor of mechanical engineering and senior author of the study. Meat substitutes have come a long way from when tofu was the only option, she added.

Industrial animal agriculture contributes to climate change, pollution, habitat loss, and antibiotic resistance. That burden on the planet can be eased by swapping animal proteins for plant proteins in diets. One study estimated that plant-based meats, on average, have half the environmental impact as animal meat. But many meat eaters are reluctant to change; only about a third of Americans in one survey indicated they were "very likely" or "extremely likely" to buy plant-based alternatives."

Source: Eurekalert! (15 Nov 2024)

ARCHITECTURE
Climate-Responsive Temporary Pavilions: Exploring 4 Ephemeral Structures Across Europe


"Pavilions offer architects a unique opportunity to experiment, serving as compact spaces that push the boundaries of design and spatial concepts. Free from many conventional functional constraints, these structures allow for artistic expression and the testing of new technologies. Pavilions often act as living laboratories of architecture, positioned in public or cultural contexts. They transform their surroundings into interactive, memorable experiences, providing a stage for architects to showcase their most innovative ideas. In recent years, climate responsiveness has emerged as a crucial focus in pavilion design. By using temporary structures as a testing ground for more sustainable practices, architects can experiment with alternative materials and environmentally conscious approaches that address the climate crisis.

These pavilions demonstrate how design can mitigate climate challenges, employing recyclable, low-impact, or adaptive materials to promote eco-conscious living. Through these innovations, pavilions illustrate how architecture can adapt to and reflect changing environmental needs, providing a blueprint for future sustainable building practices. Whether it is a floating forest pavilion aiming to engage biodiversity through its flora and fauna, or a timber facade in Germany experimenting with natural ventilation, pavilions can potentially become a testing ground for climate responsiveness and correction."

Source: Archdaily (17 Nov 2024)

DESIGN
Five Dubai Design Week Pavilions Translating Arab Vernacular Through Sustainable Materials
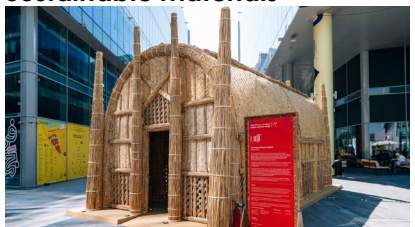
"A shelter for Gaza and a traditional Ahwari reed house are among the pavilions at this year's Dubai Design Week, which explored using natural and circular materials to expresses their context.

The festival's landmark 10th edition featured work by more than a thousand designers from over 50 countries including more or less "every single country in the Arab world", according to Dubai Design Week director Natasha Carella.

"I think it's really important for people here to tell their own stories through design, rather than waiting for somebody to tell it for them and to move away from certain stereotypes as well," she said.

"It was quite common before to import a lot of things, even the manufacturing offering," she added. "And that has completely changed over the last 10 years very quickly."

DESIGN
### Anti-Hair Loss Helmet for Chemo Patients Wins 2024 James Dyson Award

"A scalp-cooling wearable for cancer patients and an "autorotating" weather sensor shaped like a maple seed have been announced as the international winners of the 2024 James Dyson Award.

The Athena helmet was named this year's global Medical winner while the AirXeed Radiosonde was crowned Sustainability winner, with both projects receiving £30,000 in funding for further research and development.

The Athena wearable uses scalp cooling to reduce hair loss in chemotherapy patients and was developed by University of Limerick graduate Olivia Humphreys after witnessing her mother's painful battle with cancer.

Featuring a battery-powered design, the device uses a thermal control module to cool a reservoir of water stored in a small portable tank, which is circulated around the scalp through soft tubing fixed to the inside of a

DEVICES
Robotic Shorts Support People When Walking
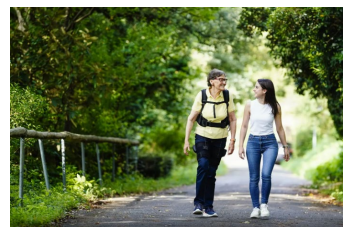
"According to the researchers' analyses, when a young person walks 500 metres up a hill with the aid of the robotic trousers, the expended energy – known as the metabolic cost – is reduced by 18% as compared to unaided walking. For an older person walking 400 metres on level ground, it is reduced by more than 10%. This is comparable to the effects of a reduction in body weight of ten or six kilograms. The researchers have also come up with a suitable name for their robotic shorts: WalkON.

When doctoral student Enrica Tricomi transitions from standing to walking, two thin, artificial tendons extending from the thigh to a waist belt pull upwards at the same time and relieve the hip flexors of some of their load. A measuring device attached to the tendons determines the hip angle and velocity. The device sends a signal to the motors precisely at the transition to the swing phase of walking.

ENGINEERING
Space Weather Mapped by Millions of Smartphones
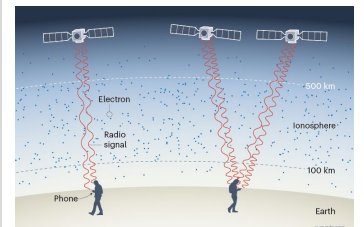
"In February 2022, a solar storm caused the loss of 38 Starlink satellites when electrical currents in space increased the density of Earth's upper atmosphere, slowing the satellites down and ultimately causing them to come out of orbit. This event highlights how crucial it is to monitor and predict the state of Earth's ionosphere — the region of the upper atmosphere in which some atoms and molecules are ionized by solar radiation and by energetic particles. Space weather can also obstruct telecommunications, disrupt the precise positioning services needed for navigation and induce harmful currents in power lines. Writing in Nature, Smith et al. report a global sensor network that could help to solve these problems. If you have a smartphone, you might already be part of their solution.

Navigation satellites transmit signals that are picked up by receivers on Earth. By

Most notably, architects from across the region including the United Arab Emirates, Saudi Arabia, Iraq and Palestine, showed experimental pavilions exploring how local design languages and materials could be used to create more sustainable architecture sensitive to its context.

"We're always looking to the future for new materials that are supposedly sustainable when there's all these ancient techniques that have been there for thousands of years that people don't even really know about," Carella told Dezeen.

The five examples below combine vernacular expressions and regional ingredients like palm fronds and reeds with modern innovations like mycelium and parametric design. Read on for more."

Source: Dezeen (12 Nov 2024)

---

headpiece.

Athena provides a "patient-controlled" solution through its portable design that enables its use outside of hospitals and, according to Humphreys, reduces the time patients have to spend on wards.

The device is offered at a twentieth of the price compared to existing technology, making it an affordable alternative to current scalp-cooling therapies."

Source: Dezeen (13 Nov 2024)

Regardless of whether an older person or a sporty teenager is wearing the robotic shorts: "The system recognises how fast or slowly the person is moving, adapts to the respective weight of the legs and provides individual support accordingly," explains the researcher. Her smart robotic shorts do not require any pre-settings and can be put on, ready to use, in just a few minutes: truly plug-and-play."

Source: TUM (13 Nov 2024)

---

measuring the difference between the time a signal is received and the time it was broadcast, the distance from the receiver to the satellite can be estimated. Combining data from several satellites enables the location of the receiver to be determined (Fig. 1). However, the electromagnetic waves that encode the signals are affected by ionospheric electrons, which can slow down radio pulses. During the daytime, this disruption typically delays transmission by up to 150 nanoseconds — a duration that is directly proportional to the total number of electrons between the receiver and the satellite. Transmitting signals at two or more frequencies allows the ionospheric electron content to be estimated. This can be used to improve the accuracy of position measurements — but it also contains valuable scientific information."

Source: Nature (13 Nov 2024)

ENVIRONMENT
Fossil Fuel CO2 Emissions Increase Again In 2024

"Global carbon emissions from fossil fuels have reached a record high in 2024, according to new research by the Global Carbon Project science team.

The 2024 Global Carbon Budget projects fossil carbon dioxide (CO_2) emissions of 37.4 billion tonnes, up 0.8% from 2023.

Despite the urgent need to cut emissions to slow climate change, the researchers say there is still "no sign" that the world has reached a peak in fossil CO2 emissions.

With projected emissions from land-use change (such as deforestation) of 4.2 billion tonnes, total CO2 emissions are projected to be 41.6 billion tonnes in 2024, up from 40.6 billion tonnes last year.

Over the last 10 years, fossil CO2 emissions have risen while land-use change CO2 emissions have declined on average – leaving overall emissions roughly level over that period.

This year, both fossil and land-use change CO2 emissions are set to rise, with drought conditions exacerbating emissions from deforestation and forest degradation fires during the El Niño climate event of 2023-2024.

With over 40 billion tonnes released each year at present, the level of CO2 in the atmosphere continues to rise – driving increasingly dangerous global warming."

Source: EXETER (12 Nov 2024)

MATERIALS
Deep Learning Streamlines Identification Of 2D Materials

"Researchers have developed a deep learning-based approach that significantly streamlines the accurate identification and classification of two-dimensional (2D) materials through Raman spectroscopy. In comparison, traditional Raman analysis methods are slow and require manual subjective interpretation. This new method will speed up the development and analysis of 2D materials, which are used in a variety of applications such as electronics and medical technologies.

"Sometimes, we only have a few samples of the 2D material we want to study, or limited resources for taking multiple measurements," says Yaping Qi, the lead researcher (Tohoku University), "As a result, the spectral data tends to be limited and unevenly distributed. We looked towards a generative model that would enhance such datasets. It essentially fills in the blanks for us."

The spectral data from seven different 2D materials and three distinct stacked combinations were put into the learning model. The team of researchers introduced an innovative data augmentation framework using Denoising Diffusion Probabilistic Models (DDPM) to generate additional synthetic data and address these challenges. For this type of model, noise is added to the original data to enhance the dataset, and then the model learns to work backwards and remove this noise to generate novel output that is consistent with the original data distribution.

By pairing this augmented dataset with a four-layer Convolutional Neural Network (CNN), the research team achieved a classification accuracy of 98.8% on the original dataset, and notably, 100% accuracy with the augmented data. This automated approach not only enhances classification performance but also reduces the need for manual intervention, improving the efficiency and scalability of Raman spectroscopy for 2D material identification."

Source: TOHOKU (14 Nov 2024)

SENSORS
Sensitive Ceramics

"Most people think of coffee cups, bathroom tiles or flower pots when they hear the word "ceramic". Not so Frank Clemens. For the research group leader in Empa's Laboratory for High-Performance Ceramics, ceramics can conduct electricity, be intelligent, and even feel. Together with his team, Clemens is developing soft sensor materials based on ceramics. Such sensors can "feel" temperature, strain, pressure or humidity, for instance, which makes them interesting for use in medicine, but also in the field of soft robotics.

Soft ceramics – how is that supposed to work? Materials scientists like Clemens define ceramics as an inorganic, non-metallic material that is produced from a collection of loose particles in a high-temperature process known as sintering. The composition of ceramics can vary – and their properties change as a result. But earthenware and porcelain are nowhere to be seen in Clemens' lab. The researchers work with materials such as potassium sodium niobate and zinc oxide, but also with carbon particles.

None of these materials are soft. In order to fashion them into flexible sensors, the researchers embed ceramic particles in stretchable plastics. "We work with so-called highly filled systems," says Clemens. "We take a matrix made of a thermoplastic and fill it with as many ceramic particles as possible without compromising the elasticity of the matrix." If this highly filled matrix is then stretched, compressed or exposed to temperature fluctuations, the distance between the ceramic particles changes, and with it the electrical conductivity of the sensor. It's not necessary to fill the entire matrix with ceramic, emphasizes Clemens: Using 3D printing, the researchers can also embed the ceramic sensors as a kind of "nerves" in flexible components."

Source: EMPA (14 Nov 2024)

SUSTAINABILITY
Servers Get a Second Life for Sustainability: As Data Centers Proliferate, Researchers Look for Ways to Limit Environmental Impact

"Servers consume a lot of energy in data centers, but it's easy to forget their carbon footprints begin before they're ever placed on racks inside air-conditioned mega-warehouses. After all, it takes energy to extract minerals and manufacture them into things like processors, motherboards and memory modules.

These "embodied" carbon emissions are a target of research by computer scientists at Carnegie Mellon University, Microsoft, and the University of Washington, who created and tested prototype servers they call GreenSKUs designed to run in the Azure cloud service environment. (SKU refers to a stock keeping unit, which is how the hardware world sometimes refers to physical products.) In a paper presented at the Annual International Symposium on Computer Architecture in June and July, the researchers describe a method for identifying older components that can be re-used in servers without affecting operations.

That's important, because there's currently a lot of components taken out of commission when they've still got some life in them, says Ashkitha Sriraman, a computer science professor at Carnegie Mellon who was involved in the research. "Very frequently, if one component goes bad or is not efficient, the entire server goes waste," she says.

To optimize the refurbished servers further, the researchers are looking to software. In a paper presented on 3 November at the HotInfra conference, the researchers discussed their ongoing efforts to add a software layer that plans which compute tasks to run on the GreenSKUs versus standard Azure servers based on performance needs."

Source: IEEE Spectrum (14 Nov 2024)