SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Weekly Discovery

We SHARE to inspire and ignite ideas!

26 Feb – 1 Mar 2024

ARCHITECTURE

Designing For Happiness: Exploring The Connection Between Architecture and Mental Health

"While not entirely dependent on one another, the relationship between architecture and mental well-being is an important topic, as designers and architects can contribute to creating a more enjoyable environment for everyone. From strategies to enhance mental health in shared workspaces to the ways in which architecture can contribute to preventing cognitive decline, understanding the potential impact of environmental neurosciences and the ways they apply to architecture is an essential skill for our profession.

In celebration of World Mental Health Day, we have gathered a selection of editorial articles that delve into the intriguing interplay between architecture and mental health and a set of projects that showcase in a practical manner the solutions created in response to these challenges. The selection aims to provide insights into how the spaces we inhabit can affect us, from workspaces and homes to the centers dedicated to health and recuperation. Additionally, matters of psychology are discussed in relation to various typologies and at different scales, while the curated projects serve as case-studies for further exploration."

Source: Archdaily (24 Feb 2024)

ARCHITECTURE

5 Art Movements that Influenced Architecture

"As far as history goes back, art and architecture have always been interrelated disciplines. From the elaboration of the Baroque movement to the geometric framework of modernism, architects found inspiration from stylistic approaches, techniques, and concepts of historic art movements, and translated them into large-scale habitable structures. In this article, we explore 5 of many art movements that paved the way for modern-day architecture, looking into how architects borrowed from their characteristics and approaches to design to create their very own architectural compositions."

Source: Archdaily (17 Feb 2024)

CLIMATE

Air Pollution Hides Increases in Rainfall

"In a new study, researchers broke down how human-induced greenhouse gas and aerosol emissions influence rainfall in the United States.

Greenhouse gas emissions increase rainfall, while aerosols have a long-term drying effect as well as short-term impacts that vary with the seasons.

As aerosols decrease, their long-term drying effect will likely diminish, causing rainfall averages and extremes to rapidly increase."

Source: Berklylab (22 Feb 2024)

DESIGN

Scientists Develop Hybrid "Beef Rice" As Future Meat Alternative

"Scientists from South Korea's Yonsei University have invented what they believe to be a sustainable, high-protein food in the form of "beef rice", made by growing cow cells in grains of rice.

Tinged a pale pink from the cell culturing process, the hybrid food contains more protein and fat than standard rice while having a low carbon footprint, leading its creators to see it as a potential future meat alternative.

The beef rice was made by inserting muscle and fat stem cells from cows into grains of rice and leaving them to grow in a Petri dish.

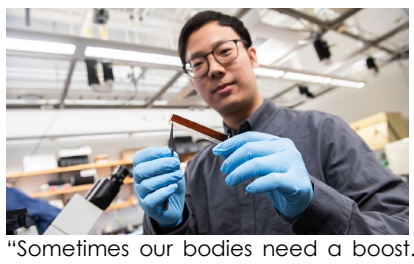
Because the rice grains are porous and have a rich internal structure, the cells can grow there in a similar way to how they would within an animal. A coating of gelatine – in this case, fish-derived – further helps the cells to attach to the rice.

Although beef rice might sound like a form of genetically modified food, there is no altering of DNA in the plants or animals. Instead, this process constitutes a type of cell-cultured or lab-grown meat but with the beef grown inside rice."

Source: Dezeen (22 Feb 2024)

HEALTH TECH

Uchicago Scientists Invent Ultra-Thin, Minimally-Invasive Pacemaker Controlled by Light



"Sometimes our bodies need a boost. Millions of Americans rely on pacemakers—small devices that regulate the electrical impulses of the heart in order to keep it beating smoothly. But to reduce complications, researchers would like to make these devices even smaller and less intrusive.

A team of researchers with the University of Chicago has developed a wireless device, powered by light, that can be implanted to regulate cardiovascular or neural activity in the body. The featherlight membranes, thinner than a human hair, can be inserted with minimally invasive surgery and contain no moving parts.

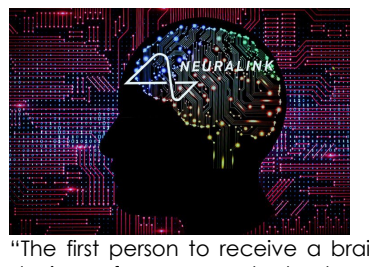
Published Feb. 21 in Nature, the results could help reduce complications in heart surgery and offer new horizons for future devices.

"The early experiments have been very successful, and we're really hopeful about the future for this translational technology," said Pengju Li, a graduate student at the University of Chicago Pritzker School of Molecular Engineering and first author on the paper."

Source: UCHICAGO (21 Feb 2024)

NEUROTECHNOLOGY

Neuralink Brain Chip: Advance Sparks Safety and Secrecy Concerns



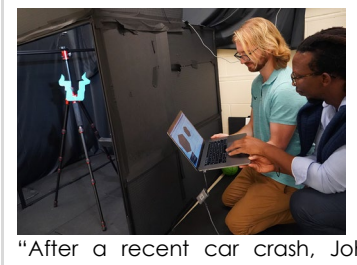
"The first person to receive a brain-monitoring device from neurotechnology company Neuralink can control a computer cursor with their mind, Elon Musk, the firm's founder, revealed this week. But researchers say that this is not a major feat — and they are concerned about the secrecy around the device's safety and performance.

The company is "only sharing the bits that they want us to know about", says Sameer Sheth, a neurosurgeon specializing in implanted neurotechnology at Baylor College of Medicine in Houston, Texas. "There's a lot of concern in the community about that."

Source: Nature (23 Feb 2024)

OPTICS

Science Fiction Meets Reality, USF Researchers Develop Technique to Overcome Obstructed Views



"After a recent car crash, John Murray-Bruce wished he could have seen the other car coming. The crash reaffirmed the USF assistant professor of computer science and engineering's mission to create a technology that could do just that: See around obstacles and ultimately expand one's line of vision.

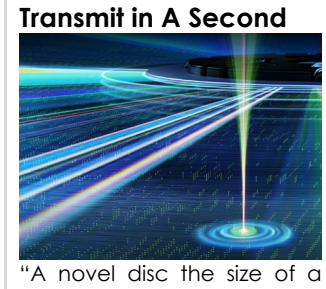
Using a single photograph, Murray-Bruce and his doctoral student, Robinson Czajkowski, created an algorithm that computes highly accurate, full-color three-dimensional reconstructions of areas behind obstacles – a concept that can not only help prevent car crashes, but help law enforcement experts in hostage situations, search-and-rescue and strategic military efforts.

"We're turning ordinary surfaces into mirrors to reveal regions, objects and rooms that are outside our line of vision," Murray-Bruce said. "We live in a 3D world, so obtaining a more complete 3D picture of a scenario can be critical in a number of situations and applications."

Source: USF (20 Feb 2024)

OPTICS

DVD's New Cousin Can Store More Than a Petabit Containing More Data Than the Entire Internet Can Transmit in A Second



"A novel disc the size of a DVD can hold more than 1 million gigabits—roughly as much as is transmitted per second over the entire world's Internet—by storing data in three dimensions as opposed to two, a new study finds.

Optical discs such as CDs and DVDs encode data using a series of microscopic pits. These pits, and the islands between them, together represent the 0s and 1s of binary code that computers use to symbolize information. CD, DVD, and Blu-ray players use lasers to read the data encoded in these discs.

Although optical discs are low in cost and highly durable, they are limited by the amount of data they can hold, which is usually stored in a single layer. Previously, scientists investigated encoding data on optical discs in many layers in three dimensions to boost their capacity. However, a key barrier that prior research faced was how the optics used to read and write this data were limited to roughly the size of the wavelengths of light they used.

Now scientists in China have developed a way to encode data on 100 layers in optical discs. In addition, the data is recorded using spots as small as 54 nanometers wide, roughly a tenth of the size of the wavelengths of visible light used to read and write the data."

Source: IEEE Spectrum (23 Feb 2024)

ROBOT

How To Build Your Own Robot Friend: Making AI Education More Accessible

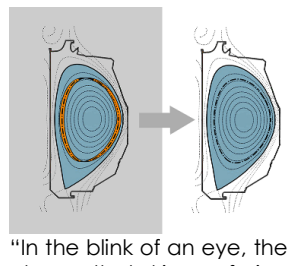
"From smart virtual assistants and self-driving cars to digital health and fraud prevention systems, AI technology is transforming almost every aspect of our daily lives—and education is no different. For all its promise, the rise of AI, like any new technology, raises some pressing ethical and equity questions.

How can we ensure that such a powerful tool can be accessed by all students regardless of background?

Inspired by this call to action, USC researchers have created a low-cost, accessible learning kit to help college and high school students build their own "robot friend." Students can personalize the robot's "body," program the

ROBOT

Engineers Use AI To Wrangle Fusion Power for The Grid

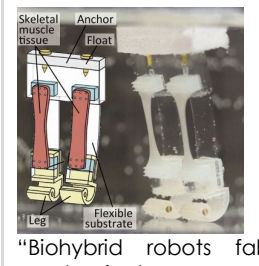


"In the blink of an eye, the unruly, superheated plasma that drives a fusion reaction can lose its stability and escape the strong magnetic fields confining it within the donut-shaped fusion reactor. These getaways frequently spell the end of the reaction, posing a core challenge to developing fusion as a non-polluting, virtually limitless energy source.

But a Princeton-led team composed of engineers, physicists, and data scientists from the University and the U.S. Department of Energy's Princeton Plasma Physics Laboratory (PPPL) have harnessed the power of artificial intelligence to predict — and then avoid — the formation of a specific plasma problem in real

ROBOTICS

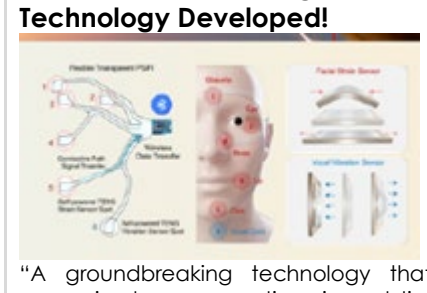
Biohybrid Bipedal Robot Powered by Skeletal Muscle Tissue



"Biohybrid robots fabricated by integrating mechanical components with biological materials have recently attracted attention for the development of robots having advanced biomaterial functions. Rapid progress in biohybrid robots, in which the skeletal muscle tissue is formed on a flexible substrate, has enabled various types of robot locomotion powered by muscle tissue. Conventional biohybrid robots can perform straight-line motions or large turning movements; however, they have difficulty with delicate turning movements. With an emphasis on small-turning human bipedal movements, we have developed a biohybrid robot with two legs and cultured skeletal muscle tissue for driving. The robot achieved forward and stop motions and

WERABLES

World's First Real-Time Wearable Human Emotion Recognition Technology Developed!



"A groundbreaking technology that can recognize human emotions in real time has been developed by Professor Jiyun Kim and his research team in the Department of Material Science and Engineering at UNIST. This innovative technology is poised to revolutionize various industries, including next-generation wearable systems that provide services based on emotions.

Understanding and accurately extracting emotional information has long been a challenge due to the abstract and ambiguous nature of human affects such as emotions, moods, and feelings. To address this, the research team has developed a multi-modal human emotion recognition

robot to mimic their head posture, and learn about AI ethics and fairness in an engaging, accessible way."

Source: Eurekalert! (22 Feb 2024)

time.

In experiments at the DIII-D National Fusion Facility in San Diego, the researchers demonstrated their model, trained only on past experimental data, could forecast potential plasma instabilities known as tearing mode instabilities up to 300 milliseconds in advance. While that leaves no more than enough time for a slow blink in humans, it was plenty of time for the AI controller to change certain operating parameters to avoid what would have developed into a tear within the plasma's magnetic field lines, upsetting its equilibrium and opening the door for a reaction-ending escape."

Source: PRINCETON (21 Feb 2024)

more fine-tuned turning motions than conventional biohybrid robots. We believe that the results provide valuable insights into the development of soft robots driven by muscle tissue and may contribute to the elucidation of biological locomotion mechanisms through a constructive approach by further mimicking the human gait mechanism."

Source: SCIENCEDIRECT (26 Jan 2024)

system that combines verbal and non-verbal expression data to efficiently utilize comprehensive emotional information."

Source: UNIST (31 Jan 2024)