SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Weekly Discovery

We SHARE to inspire and ignite ideas!

3 Jul – 7 Jul 2023

ARTIFICIAL INTELLIGENCE

Legal Challenges to Generative AI, Part I

"Generative artificial intelligence (AI) has captured considerable popular attention recently. ChatGPT and DALL-E have given members of the general public opportunities to use AI systems to generate text and image outputs for fun and a wide range of other purposes. Google and Meta have announced their intentions to launch similar AI systems soon.

Generative AI has also caught the attention of lawyers who question the legality of ingesting in-copyright works as training data and producing outputs derived from copyrighted training data."

Source: ACM (22 Jun 2023)

ARTIFICIAL INTELLIGENCE

Turning Old Maps Into 3D Digital Models of Lost Neighbourhoods

"Imagine strapping on a virtual reality headset and "walking" through a long-gone neighbourhood in your city – seeing the streets and buildings as they appeared decades ago.

That's a very real possibility now that researchers have developed a method to create 3D digital models of historic neighbourhoods using machine learning and historic Sanborn Fire Insurance maps.

But the digital models will be more than just a novelty – they will give researchers a resource to conduct studies that would have been nearly impossible before, such as estimating the economic loss caused by the demolition of historic neighbourhoods."

Source: OSU (28 Jun 2023)

CLIMATE

El Niño Is Here — How Bad Will It Be?

"Hot on the heels of a three-year La Niña global weather pattern, the planet seems to be headed into what could be a strong El Niño event with worldwide consequences.

This El Niño might turn out to be a moderate one. But some scientists fear it could be powerful, and meteorologists and emergency-preparedness officials are bracing for potential floods and droughts, and the possibility that planetary temperatures could reach record highs. The World Health Organisation has warned that the new El Niño could stoke the spread of mosquito-borne diseases such as Zika and chikungunya. Already an El Niño pattern of warm ocean waters has been implicated in Peru's severe outbreak of the viral disease dengue. "

Source: Nature (29 Jun 2023)

CODING

How Coders Can Survive—and Thrive—in a ChatGPT World

"Artificial intelligence, particularly generative AI powered by large language models (LLMs), could upend many coders' livelihoods. But some experts argue that AI won't replace human programmers—not immediately, at least.

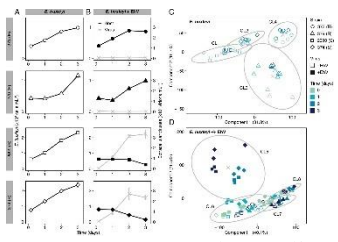
"You will have to worry about people who are using AI replacing you," says Tanishq Mathew Abraham, a Ph.D. candidate in biomedical engineering at the University of California, Davis and the CEO of medical AI research centre MedARC.

So how can software developers make themselves more useful and relevant in what appears to be a coming age of LLM-centred coding? Here are some tips and techniques for coders to survive and thrive in a generative AI world. "

Source: IEEE Spectrum (3 July 2023)

ENVIRONMENTAL SCIENCES

Lipid Biomarkers for Algal Resistance to Viral Infection in The Ocean



"Algal blooms, rapid proliferation events of marine microalgae, are of great importance to the marine food web and to the biogeochemical cycles of nutrients, such as carbon and sulphur. The extent and duration of these blooms are controlled by multiple environmental factors. Blooms of the coccolithophore Emiliania huxleyi are frequently terminated following viral infection. The annual formation of E. huxleyi blooms indicates the existence of resistant cells that survive viral infection and form the seed population for subsequent blooms, nevertheless, their occurrence has not been reported in natural blooms to date. Here, we identified lipid biomarkers for resistant E. huxleyi cells and applied them to detect resistant cells in an open-ocean bloom of E. huxleyi."

Source: PNAS (26 Jun 2023)

HEALTH

'Electronic Skin' From Bio-Friendly Materials Can Track Human Vital Signs with Ultrahigh Precision

"Currently much of the research on nanocomposite-based sensors is related to non-sustainable materials. This means that these devices contribute to plastic waste when they are no longer in use. A new study, published today in Advanced Functional Materials, shows for the first time that it is possible to combine molecular gastronomy concepts with biodegradable materials to create such devices that are not only environmentally friendly, but also have the potential to outperform the non-sustainable ones."

Source: QMUL (28 Jun 2023)

HEALTH

Is Exercise Actually Good for the Brain?

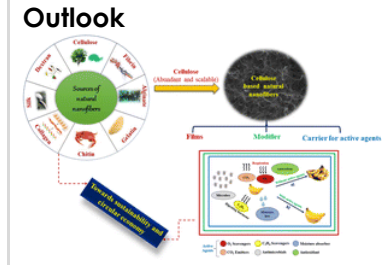
"There are plenty of reasons to get off your duff and exercise—but is improving your brain one of them? The U.S. Centres for Disease Control and Prevention touts exercise as a way to "boost brain health," while the World Health Organisation suggests that about 2 hours of moderate activity or 75 minutes of vigorous activity per week can help improve thinking and memory skills.

But new research reveals a more complex picture. One recent review of the literature suggests the studies tying exercise to brain health may have important limitations, including small sample sizes. Other studies suggest there is no one-size-fits-all approach to exercising as a way to boost cognition or prevent age-related cognitive decline. Still others indicate exercise may actually be harmful in people with certain medical conditions. Here's the latest on what we know."

Source: Science (30 Jun 2023)

MATERIALS

Cellulose-Based Natural Nanofibers for Fresh Produce Packaging: Current Status, Sustainability, And Future Outlook

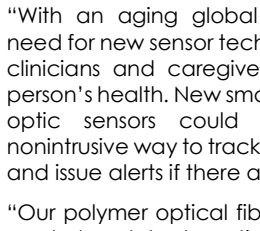


"In recent years, the packaging of fresh produce has attracted the attention of researchers. The development of eco-friendly and biodegradable packaging materials with exceptional mechanical and barrier properties has reached great heights in research and development. To minimise the use of synthetic materials, natural nanofibers serve as an alternative to synthetic food packaging materials. This article focuses on the derivation of natural nanofibers (NNFs) from various sources along with their different production routes in detail. An in-depth analysis was performed to obtain the desired properties of natural nanofiber-based food packaging materials and modifications using their active agents to extend the shelf life of fresh produce. The article also presents a comprehensive analysis of the life cycle assessment and sustainability of natural nanofibers along with an outlook on its future prospects. "

Source: RSC (16 Jun 2023)

OPTICS

Fiber Optic Smart Pants Offer a Low-Cost Way to Monitor Movements



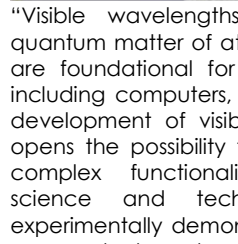
"With an aging global population comes a need for new sensor technologies that can help clinicians and caregivers remotely monitor a person's health. New smart pants based on fibre optic sensors could help by offering a nonintrusive way to track a person's movements and issue alerts if there are signs of distress.

"Our polymer optical fibre smart pants can be used to detect activities such as sitting, squatting, walking or kicking without inhibiting natural movements," said research team leader Arnaldo Leal-Junior from the Federal University of Espirito Santo in Brazil. "This approach avoids the privacy issues that come with image-based systems and could be useful for monitoring aging patients at home or measuring parameters such as range of motion in rehabilitation clinics. "

Source: OPTICA (27 Jun 2023)

QUANTUM TECHNOLOGY

Universal Visible Emitters in Nanoscale Integrated Photonics

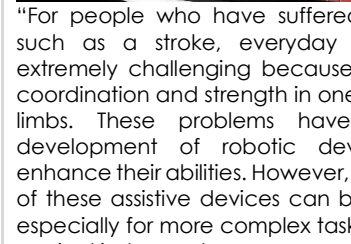


"Visible wavelengths of light control the quantum matter of atoms and molecules and are foundational for quantum technologies, including computers, sensors, and clocks. The development of visible integrated photonics opens the possibility for scalable circuits with complex functionalities, advancing both science and technology frontiers. We experimentally demonstrate an inverse design approach based on the superposition of guided mode sources, allowing the generation and complete control of free-space radiation directly from within a single 150 nm layer Ta2O5, showing low loss across visible and near-infrared spectra."

Source: OPTICA (30 Jun 2023)

ROBOTICS

Robotic Glove Lends A 'Hand' To Relearn Playing Piano After a Stroke



"For people who have suffered neurotrauma such as a stroke, everyday tasks can be extremely challenging because of decreased coordination and strength in one or both upper limbs. These problems have spurred the development of robotic devices to help enhance their abilities. However, the rigid nature of these assistive devices can be problematic, especially for more complex tasks like playing a musical instrument.

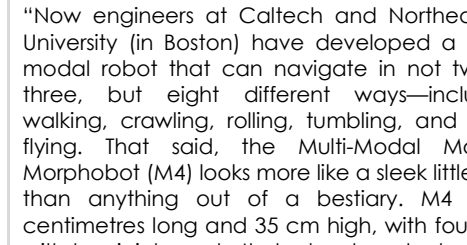
A first-of-its-kind robotic glove is lending a "hand" and providing hope to piano players who have suffered a disabling stroke. Developed by researchers from Florida Atlantic University's College of Engineering and Computer Science, the soft robotic hand exoskeleton uses artificial intelligence to improve hand dexterity.

Combining flexible tactile sensors, soft actuators and AI, this robotic glove is the first to "feel" the difference between correct and incorrect versions of the same song and to combine these features into a single hand exoskeleton."

Source: FAU (29 Jun 2023)

ROBOTICS

This Robot Has All the Moves—Eight, To Be Precise



"Now engineers at Caltech and Northeastern University (in Boston) have developed a multi-modal robot that can navigate in not two or three, but eight different ways—including walking, crawling, rolling, tumbling, and even flying. That said, the Multi-Modal Mobility Morphobot (M4) looks more like a sleek little cart than anything out of a bestiary. M4 is 70 centimetres long and 35 cm high, with four legs with two joints each. It also has two ducted fans at the ends of each leg, which can function as legs, propellor thrusters, or wheels. The robot is surprisingly light—around 6 kilograms—considering that includes its onboard computers, sensors, communication devices, joint actuators, propulsion motors, power electronics, and battery. It is capable of autonomous, self-contained operations."

Source: IEEE Spectrum (3 July 2023)