

Weekly Discovery

We SHARE to inspire and ignite ideas!

18 Sep – 22 Sep 2023

5G
5G “Open” Standards Are in Play— Just How Open Are They? Open RAN Fight Affects Interoperability of Wireless Tech



“At a June meeting in Osaka, Japan, cellular-industry stakeholders gathered to propose solutions to a technical oddity with surprisingly far-reaching consequences. At stake was who calls the shots when it comes to defining interoperability: big-name vendors, smaller manufacturers of specialized components, cell-service providers, or a mixture across the entire industry.

The interoperability struggle has led to the Open RAN movement, whose supporters hope to disrupt the wireless-industry hierarchy and allow more companies to take more significant roles in network infrastructure...After initially resisting the Open RAN movement, large vendors are now actively engaged.

The Open RAN movement gained steam in 2018 with the formation of the O-RAN Alliance, based in Alfter, Germany. Which is not to say the entire industry was on board immediately. Indeed, the industry was initially divided into two camps by the issue.”

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

AI
AI Detects Eye Disease and Risk of Parkinson’s from Retinal Images

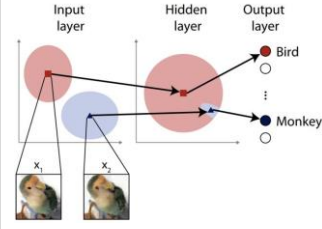


“Scientists have developed an artificial intelligence (AI) tool capable of diagnosing and predicting the risk of developing multiple health conditions — from ocular diseases to heart failure to Parkinson’s disease — all on the basis of people’s retinal images.

AI tools have been trained to detect disease using retinal images before, but what makes the new tool — called RETFound — special is that it was developed using a method known as self-supervised learning. That means that the researchers did not have to analyse each of the 1.6 million retinal images used for training and label them as ‘normal’ or ‘not normal’, for instance. Such procedures are time-consuming and expensive, and are needed during the development of most standard machine-learning models.”

Source: [Nature](#) (13 Sep 2023)

AI
Brain Inspires More Robust AI



“Most artificially intelligent systems are based on neural networks, algorithms inspired by biological neurons found in the brain. These networks can consist of multiple layers, with inputs coming in one side and outputs going out of the other. The outputs can be used to make automatic decisions, for example, in driverless cars. Attacks to mislead a neural network can involve exploiting vulnerabilities in the input layers, but typically only the initial input layer is considered when engineering a defense. For the first time, researchers augmented a neural network’s inner layers with a process involving random noise to improve its resilience.”

Source: [EurekAlert!](#) (16 Sep 2023)

ARCHITECTURE
Intersectional Design: Rethinking Architecture for the Future



“Design stems from nuance, empathy, and understanding. The best solutions address the needs, identities, and context of a client and place. A designer’s response needs to be informed by these different realities. Intersectional Design is a method of designing by thinking through how factors of identity (gender, race, sexuality, class, and many more) interact with one another. In understanding how these factors combine, we can more deeply understand the context of use and an individual user’s priorities.

Intersectionality is a term coined by Kimberlé Williams Crenshaw that recognizes individuals may face multiple and intersecting forms of structural discrimination. By incorporating different communities’ experiences with culture, policies, and design, we can create more inclusive and equitable environments.”

Source: [Archdaily](#), (17 Sep 2023)

CARBON EMISSIONS
What is the carbon footprint of a hospital bed?



“Healthcare is a critical and complex service sector with direct and indirect greenhouse gas (GHG) emissions amounting to 5%–10% of the national total in developed economies like Canada and the United States. Along with a growing, albeit sporadic, set of life cycle assessment (LCA) (and “carbon footprinting”) studies of specific medical products and procedures, there is growing interest in “environmental footprinting” of hospitals. In this article, we advance this rapidly evolving area through a comprehensive organizational LCA of a 40-bed hospital in British Columbia, Canada, in its 2019 fiscal year. Our results indicate that the total environmental footprint of the hospital includes, among other things, global warming potential of 3500–5000 t CO₂ eq. (with 95% confidence).”

Source: [EurekAlert!](#) (18 Sep 2023)

DESIGN
Singapore Design Week 2023 Will Explore How Design Can Improve Lives



“One of Asia’s most anticipated design festivals, Singapore Design Week aims to showcase Singapore’s “distinct brand of creativity”. This year marks the 20th anniversary of its organising body, DesignSingapore Council (Dsg). To mark this milestone, the 11-day festival will adopt the council’s motto, ‘Better by Design’, as its theme for 2023.

“Singapore design embodies a universal attitude – the desire to always seek to make lives better using design,” said festival director of SDW 2023, Madeleine Ho.

To highlight the ‘Better by Design’ theme, DesignSingapore Council commissioned local design curators to create a number of installations. Curators included co-founder and creative director of Black, Jackson Tan; co-founder and creative director of Kinetic Singapore, Pann Lim; and co-founders of Lekker Architects, Ong Ker Shing and Joshua Comaroff.”

Source: [Dezeen](#) (15 Sep 2023)

ENERGY
Enabling Renewable Energy with Battery Energy Storage Systems



“With the next phase of Paris Agreement goals rapidly approaching, governments and organizations everywhere are looking to increase the adoption of renewable-energy sources...”

These developments are propelling the market for battery energy storage systems (BESS).

All of this has created a significant opportunity. More than \$5 billion was invested in BESS in 2022, according to our analysis—almost a threefold increase from the previous year. We expect the global BESS market to reach between \$120 billion and \$150 billion by 2030, more than double its size today. But it’s still a fragmented market, with many providers wondering where and how to compete. Now is the time to figure out where the best opportunities will be in the rapidly accelerating BESS market and to start preparing for them. Here are some questions—and answers—to help BESS players formulate their strategies.”

Source: [Mckinsey](#) (2 Aug 2023)

ENERGY
MIT Looks Ahead to Hydrogen’s Aviation Future Challenges Include Refueling Logistics, Safety, and H2 Production

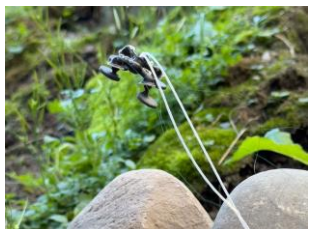


“As investment in hydrogen-powered flight expands, airports and air carriers today are realizing that it’s not enough to retrofit or design new planes for hydrogen power. So while researchers and companies large and small invest in the zero-carbon future of the field, others are beginning to study what supplies and infrastructure on the ground would also be needed to make hydrogen aviation a reality.

“Hydrogen may be a good thing, but you gotta look at it from the full system level, right?,” asks Professor R. John Hansman, an aeronautics and astronautics professor at MIT and director of the university’s International Center for Air Transportation. “Because it won’t work unless you have all the pieces to make it work as an operating system. There’s a lot of technology that would have to be developed.”

Source: [IEEE Spectrum](#) (17 Sep 2023)

MATERIALS SCIENCE
This Insect-sized Robot Can Carry 22 Times Its Own Weight



“An insect-sized robot powered by tiny explosions can crawl, leap and carry a load many times its own weight.

The robot, developed by materials engineer Robert Shepherd at Cornell University in Ithaca, New York, his PhD student Cameron Aubin and their colleagues, is powered by tiny actuators. “The actuator kind of looks like a drum. It’s a hollow cylinder with an elastomeric silicone rubber on the top,” says Aubin.

The researchers used four actuators to drive the robot’s feet. To make the robot jump or crawl, a stream of methane and oxygen is fed into each foot and sparked with electricity from a battery. The resulting reaction between the gases to form water and carbon dioxide releases energy as a small explosion, causing the rubber layer to deform. “That acts sort of like a piston,” Aubin says.”

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

PROGRAMMING
The Top Programming Languages 2023: Python and SQL are in Top, but Old Languages Shouldn’t Be Forgotten

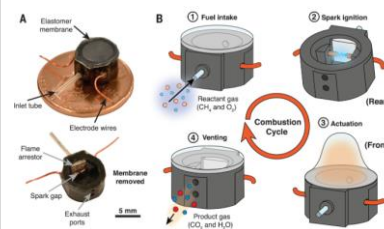


“Welcome to IEEE Spectrum’s 10th annual rankings of the Top Programming Languages. While the way we put the TPL together has evolved over the past decade, the basics remain the same: to combine multiple metrics of popularity into a set of rankings that reflect the varying needs of different readers.

This year, Python doesn’t just remain No. 1 in our general “Spectrum” ranking—which is weighted to reflect the interests of the typical IEEE member—but it widens its lead. Python’s increased dominance appears to be largely at the expense of smaller, more specialized, languages. It has become the jack-of-all-trades language—and the master of some, such as AI, where powerful and extensive libraries make it ubiquitous. And although Moore’s Law is winding down for high-end computing, low-end microcontrollers are still benefiting from performance gains, which means there’s now enough computing power available on a US \$0.70 CPU to make Python a contender in embedded development, despite the overhead of an interpreter.”

Source: [IEEE Spectrum](#) (29 Aug 2023)

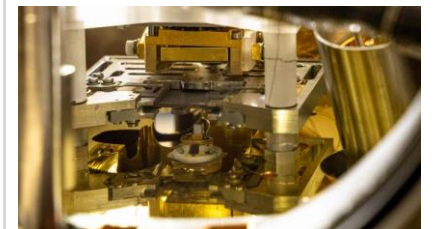
ROBOTS
Powerful, Soft Combustion Actuators for Insect-Scale Robots



“Insects perform feats of strength and endurance that belie their small stature. Insect-scale robots—although subject to the same scaling laws—demonstrate reduced performance because existing microactuator technologies are driven by low-energy density power sources and produce small forces and/or displacements. The use of high-energy density chemical fuels to power small, soft actuators represents a possible solution. We demonstrate a 325-milligram soft combustion microactuator that can achieve displacements of 140%, operate at frequencies >100 hertz, and generate forces >9.5 newtons. With these actuators, we powered an insect-scale quadrupedal robot, which demonstrated a variety of gait patterns, directional control, and a payload capacity 22 times its body weight. These features enabled locomotion through uneven terrain and over obstacles.”

Source: [SCIENCE](#) (14 Sep 2023)

SEMICON
Scientists Uncovered Mystery of Important Material for Semiconductors at The Surface



“A team of scientists with the Department of Energy’s Oak Ridge National Laboratory has investigated the behavior of hafnium oxide, or hafnia, because of its potential for use in novel semiconductor applications.

Materials such as hafnia exhibit ferroelectricity, which means that they are capable of extended data storage even when power is disconnected and that they might be used in the development of new, so-called nonvolatile memory technologies. Innovative nonvolatile memory applications will pave the way for the creation of bigger and faster computer systems by alleviating the heat generated from the continual transfer of data to short-term memory.

The scientists explored whether the atmosphere plays a role in hafnia’s ability to change its internal electric charge arrangement when an external electric field is applied. The goal was to explain the range of unusual phenomena that have been obtained in hafnia research. The team’s findings were recently published in Nature Materials.”

Source: [EurekAlert!](#) (14 Sep 2023)