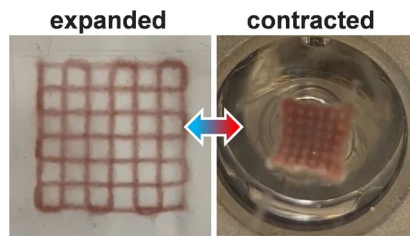


3D PRINTING  
**3D Printing of Light-Activated Hydrogel Actuators**



"An international team of researchers has embedded gold nanorods in hydrogels that can be processed through 3D printing to create structures that contract when exposed to light – and expand again when the light is removed. Because this expansion and contraction can be performed repeatedly, the 3D-printed structures can serve as remotely controlled actuators.

"We knew that you could 3D print hydrogels that would contract when heated," says Joe Tracy, co-corresponding author of a paper on the work and a professor of materials science and engineering at North Carolina State University. "And we knew that you could incorporate gold nanorods into hydrogels that would make them photoresponsive, meaning that they would contract in a reversible manner when exposed to light.

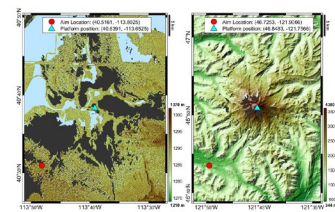
"We wanted to find a way to incorporate gold nanorods into hydrogels that would allow us to 3D print photoresponsive structures."

Hydrogels are polymer networks that contain water. Examples include everything from contact lenses to the absorbent material used in diapers. And, technically, the researchers didn't print a hydrogel with the 3D printer. Instead, they printed a solution that contains gold nanorods and all of the ingredients needed to create a hydrogel.

"And when this printed solution is exposed to light, the polymers in the solution form a cross-linked molecular structure," says Julian Thiele, co-corresponding author of the paper and chair of organic chemistry at Otto von Guericke University Magdeburg. "This turns the solution into a hydrogel, with the trapped gold nanorods distributed throughout the material."

Source: [NCSU](#) (22 Jul 2024)

AI  
**Revolutionizing The Abilities of Adaptive Radar With AI**



"The world around us is constantly being flash photographed by adaptive radar systems. From salt flats to mountains and everything in between, adaptive radar is used to detect, locate and track moving objects. Just because human eyes can't see these ultra-high frequency (UHF) ranges doesn't mean they're not taking pictures.

Although adaptive radar systems have been around since World War II, they've hit a fundamental performance wall in the past couple of decades. But with the help of modern AI approaches and lessons learned from computer vision, researchers at Duke University have broken through that wall, and they want to bring everyone else in the field along with them.

In a new paper published July 16 in the journal IET Radar, Sonar & Navigation, Duke engineers show that using convolutional neural networks (CNNs) — a type of AI that revolutionized computer vision — can greatly enhance modern adaptive radar systems. And in a move that parallels the impetus of the computer vision boom, they have released a large dataset of digital landscapes for other AI researchers to build on their work."

Source: [PRATI](#) (19 Jul 2024)

AI  
**Are AI-Chatbots Suitable for Hospitals?**



"Large language models may pass medical exams with flying colors but using them for diagnoses would currently be grossly negligent. Medical chatbots make hasty diagnoses, do not adhere to guidelines, and would put patients' lives at risk. This is the conclusion reached by a team from TUM. For the first time, they investigated systematically, whether this form of artificial intelligence (AI) would be suitable for everyday clinical practice. Despite the current shortcomings, the researchers see potential in the technology. They have published a method that can be used to test the reliability of future medical chatbots."

Source: [TUM](#) (22 Jul 2024)

AI  
**AI 'Deepfake' Faces Detected Using Astronomy Methods**



"Researchers are turning to techniques from astronomy to help spot computer-generated 'deepfake' images — which can look identical to genuine photographs at first glance.

By analysing images of faces using methods that are usually used to survey distant galaxies, astronomers can measure how a person's eyes reflect light, which can reveal telltale signs of image manipulation.

"It's not a silver bullet, because we do have false positives and false negatives," says Kevin Pimblet, director of the Centre of Excellence for Data Science, Artificial Intelligence and Modelling at the University of Hull, UK, who presented the research at the UK Royal Astronomical Society's National Astronomy Meeting on 15 July. "But this research provides a potential method, an important way forward, perhaps to add to the battery of tests that one can apply to try to figure out if an image is real or fake."

Source: [Nature](#) (22 July 2024)

ARCHITECTURE  
**Passive Design and Urban Heat Islands: Strategies from The United Arab Emirates and India**



"As temperatures rise globally, the impacts of urban heat islands—once considered an invisible threat—are becoming increasingly pronounced and ever more dangerous. Despite this mounting threat, however, the public realm which constitutes about 30% of cities offers immense potential to provide respite from scorching heat and introduce new opportunities to improve urban resilience efforts. As global temperatures rise, cities in regions like the United Arab Emirates and India are facing unprecedented challenges in maintaining livable urban spaces.

Tropical climates present significant challenges for urban environments, with extreme temperatures making outdoor spaces often uninhabitable for large portions of the year. The impacts of the urban heat island effect further exacerbate these conditions in cities and densely populated areas especially, intensifying the difference in thermal stress in urban settings compared to surrounding rural and suburban environments. This phenomenon, paired with the growing climate crisis, is becoming an increasingly formidable challenge in hot cities and tropical climates, where urban neighborhoods can feel up to 10-20 degrees C hotter than the surrounding countryside. Passive design strategies, which utilize natural elements and architectural features to maintain comfort without relying on energy-intensive systems, are becoming increasingly crucial to mitigate urban heat."

Source: [Archdaily](#) (22 Jul 2024)

DESIGN  
**Six Industrial Design Projects by Students at University of Illinois Chicago**



"Dezeen School Shows: a vehicle powered by electricity intended for use in urban areas is included in Dezeen's latest school show by students at the University of Illinois Chicago.

Also included is a project exploring the psychological effects of food packaging and a jacket suitable for various weather conditions."

Source: [Dezeen](#) (21 Jul 2024)

HEALTHCARE  
**Organs On Demand? UVA Prints Its First Voxel Building Blocks**



"A research team at the University of Virginia School of Engineering and Applied Science has developed what it believes could be the template for the first building blocks for human-compatible organs printed on demand.

Liheng Cai, an assistant professor of materials science and engineering and chemical engineering, and his Ph.D. student, Jinchang Zhu, have made biomaterials with controlled mechanical properties matching those of various human tissues.

"That's a big leap compared to existing bioprinting technologies," Zhu said.

They published the results Saturday in Nature Communications.

Their unique bioprinting method is called digital assembly of spherical particles. The DASP technique deposits particles of biomaterial in a supporting matrix, both of which are water-based, to build 3D structures that provide a suitable environment for the cells to grow. The assembly process is how "voxels," the 3D version of pixels, construct 3D objects.

"Our new hydrogel particles represent the first functional voxel we have ever made," Zhu said. "With precise control over mechanical properties, this voxel may serve as one of the basic building blocks for our future printing constructs.

"For example, with this level of control, we could print organoids, which are 3D cell-based models that function as human tissue, to study disease progression in the search for cures."

Source: [UOV](#) (19 Jul 2024)

PRODUCTIVITY  
**The Science of Procrastination**



"Why did I not do this when I still had the time?" – Whether it is filing taxes, meeting a deadline at work, or cleaning the apartment before a family visit, most of us have already wondered why we tend to put off certain tasks, even in the face of unpleasant consequences. Why do we make decisions that are harmful to us – against our better knowledge? This is precisely the conundrum of procrastination. Procrastination, the deliberate but ultimately detrimental delaying of tasks, is not only hampering productivity, but has also been linked to a host of mental health issues. So it is certainly worth asking why this much talked-about phenomenon has such a grip on us – and what it actually is.

"Procrastination is an umbrella term for different behaviors," says computational neuroscientist Sahiti Chebolu from the Max Planck Institute for Biological Cybernetics. "If we want to understand it, we need to differentiate between its various types." One common pattern is that we defect on our own decisions: we might, for example, set aside an evening for the tax return, but when the time has come we watch a movie instead. Something else is going on when we do not commit to a time in the first place: we might be waiting for the right conditions. The possible patterns of procrastination are myriad: from starting late to abandoning a task halfway through, Chebolu classified them all and identified possible explanations for each: misjudging the time needed or protecting the ego from prospective failure are just two of them."

Source: [MGP](#) (13 Jul 2024)

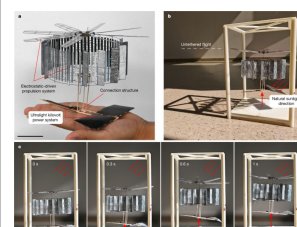
PRODCUCTIVITY  
**Does The Type of Workstation You Use Make a Difference in Your Health and Productivity?**



SEMICONDUCTORS  
**A 1D Wire Could Shrink 2D Transistors: A Unique Feature of the 2D Semiconductor Molybdenum Disulfide Led to An Ultranarrow Electrode**



SOLAR ENERGY  
**Sunlight-Powered Sustained Flight of An Ultralight Micro Aerial Vehicle**



VR  
**Virtual Reality Training for Physicians Aims to Heal Disparities in Black Maternal Health Care**



"It might be an exaggeration to claim that "sitting is the new smoking," but significant research indicates that people who are sedentary face more health challenges than their active counterparts.

Office workers who spend most of their eight-hour workdays seated, for example, more often experience symptoms such as daytime exhaustion, hypertension and musculoskeletal discomfort than those who are less sedentary. Although devices such as standing desks have been found to alleviate physical symptoms and increase worker productivity, questions remain regarding the best use of the primary types of workstations—stand-biased, sit-stand or traditional—for increasing workers' physical activity and preventing health problems.

To answer these questions, a team of researchers from the Texas A&M University School of Public Health measured the computer usage and activity levels of 61 office workers for 10 days to evaluate any discomfort and develop possible remedies...

"What makes our research unique is our use of computer utilization as a possible indicator of, and proxy for, work productivity in all three workstation types," Aguilar said.

For the study, which was conducted from 2019 to 2020, the team monitored 79 full-time, adult office workers at a major university. Participants were placed in three study groups according to the type of workstation they used (stand-biased, sit-stand or traditional), with those using traditional seated workstations serving as the control group.

Stand-biased workstations were defined as having a fixed work surface at approximately standing elbow height in conjunction with a drafting stool or chair with an extended cylinder. Sit-stand workstations were defined as desktop units and those with a fully height-adjustable work surface paired with a traditional office chair."

Source: [Vital Record](#) (12 July 2024)

"Researchers have created tiny transistors by using some of the world's thinnest wires as gate electrodes—the crucial parts that turn transistors on and off.

Rather than using silicon or metal, the researchers fashioned this gate from molybdenum disulfide—a semiconductor that could take over from silicon in coming decades. When two misaligned shards of MoS<sub>2</sub> come together, their borderline becomes a wire just 0.4 nanometers thick, far smaller than even the smallest parts of the transistors in today's most advanced CPUs. The researchers, mostly based at the Institute of Basic Science, in Daejeon, South Korea, integrated this wire as a key component of an ultrasmall transistor.

Their work marks the first time that anyone has co-opted these borderlines to create transistors. Their method probably will not enter commercial production anytime soon, but the feat could encourage researchers to further explore such wires and create more practical transistors in the years to come."

Source: [IEEE Spectrum](#) (22 Jul 2024)

"Limited flight duration is a considerable obstacle to the widespread application of micro aerial vehicles (MAVs), especially for ultralightweight MAVs weighing less than 10 g, which, in general, have a flight endurance of no more than 10 min (refs.). Sunlight power is a potential alternative to improve the endurance of ultralight MAVs, but owing to the restricted payload capacity of the vehicle and low lift-to-power efficiency of traditional propulsion systems, previous studies have not achieved untethered sustained flight of MAVs fully powered by natural sunlight. Here, to address these challenges, we introduce the CoulombFly, an electrostatic flyer consisting of an electrostatic-driven propulsion system with a high lift-to-power efficiency of 30.7 g W<sup>-1</sup> and an ultralight kilovolt power system with a low power consumption of 0.568 W, to realize solar-powered sustained flight of an MAV under natural sunlight conditions (920 W m<sup>-2</sup>). The vehicle's total mass is only 4.21 g, within 1/600 of the existing lightest sunlight-powered aerial vehicle."

Source: [Nature](#) (17 Jul 2024)

"CHAMPAIGN, Ill. — During a checkup with her obstetrician, Marilyn Hayes tells him about overwhelming exhaustion and possible symptoms of postpartum depression, such as feeling unsafe. Hayes, a Black woman, grows increasingly frustrated as her white, male physician, Dr. Richard Flynn, dismisses her symptoms and ignores her wishes when she refuses medication. Hayes becomes visibly uncomfortable when Flynn touches her without permission and makes comments steeped in Black stereotypes, such as assuming that she's unmarried and the baby's father is uninvolved with her and their infant.

While Hayes and Flynn are fictional characters depicted in a virtual reality video, Hayes' experiences are similar to those of many Black women and women of color when they interact with clinicians and their staff members, studies have found. Hayes' checkup with Flynn is the first in a series of three virtual reality training modules being developed to heighten physicians' awareness of implicit bias in patient care and cultural competency skills."

Source: [EurekAlert!](#) (22 Jul 2024)

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