

Weekly Discovery

We SHARE to inspire and ignite ideas!

2 Oct – 6 Oct 2023

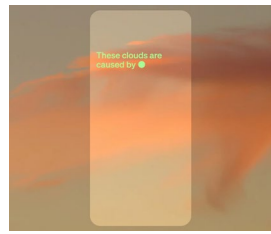
ACCOUSTICS
UW Team's Shape-Changing Smart Speaker Lets Users Mute Different Areas of a Room



"A team led by researchers at the University of Washington has developed a shape-changing smart speaker, which uses self-deploying microphones to divide rooms into speech zones and track the positions of individual speakers. With the help of the team's deep-learning algorithms, the system lets users mute certain areas or separate simultaneous conversations, even if two adjacent people have similar voices. Like a fleet of Roombas, each about an inch in diameter, the microphones automatically deploy from, and then return to, a charging station. This allows the system to be moved between environments and set up automatically. In a conference room meeting, for instance, such a system might be deployed instead of a central microphone, allowing better control of in-room audio."

Source: [Washington](#) (21 Sep 2023)

AI
ChatGPT's New Upgrade Teases AI's Multimodal Future



"ChatGPT isn't just a chatbot anymore.

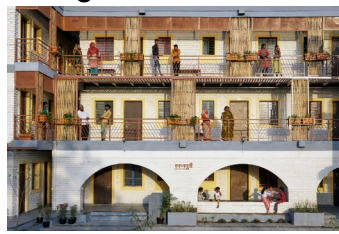
OpenAI's latest upgrade grants ChatGPT powerful new abilities that go beyond text. It can tell bedtime stories in its own AI voice, identify objects in photos, and respond to audio recordings. These capabilities represent the next big thing in AI: multimodal models.

"Multimodal is the next generation of these large models, where it can process not just text, but also images, audio, video, and even other modalities," says Linxi "Jim" Fan, senior AI research scientist at Nvidia.

ChatGPT's upgrade is a noteworthy example of a multimodal AI system. Instead of using a single AI model designed to work with a single form of input, like a large language model (LLM) or speech-to-voice model, multiple models work together to create a more cohesive AI tool."

Source: [IEEE Spectrum](#) (1 Oct 2023)

ARCHITECTURE
World Architecture Day 2023: Fostering Resilient Communities Through Architecture

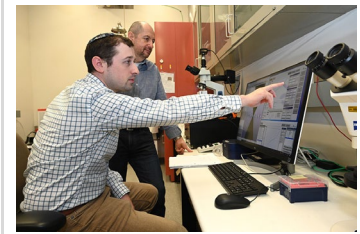


"As has become customary in recent years, on the first Monday of October, we celebrate both World Architecture Day and World Habitat Day, serving as a reminder to the global community of its collective responsibility for the well-being of the built environment. This edition, like its predecessors, sheds light on the realm of architecture and the challenges faced by our cities, introducing new themes, contemplating the state of our urban areas, and proposing constructive strategies.

Since urban economies have encountered significant difficulties this year, the UN's World Habitat Day focuses on "Resilient Urban Economies: cities as drivers of growth and recovery." Launching Urban October, this event seeks to bring together diverse urban stakeholders to deliberate on policies to help cities recover after the dual economic impacts caused by the COVID-19 pandemic and conflicts worldwide."

Source: [Archdaily](#) (2 Oct 2023)

MATERIALS
Strength Is in This Glass's DNA



"Working on the nanoscale gives researchers a lot of insight and control when fabricating and characterizing materials. In larger scale manufacturing, as well as in nature, many materials have the capacity for flaws and impurities that can disrupt their complex structure. This creates several weak points that can easily break under stress. This is common with most glass, which is why it is thought of as such a delicate material.

Scientists at the Columbia University, University of Connecticut, and the U.S. Department of Energy's (DOE) Brookhaven National Laboratory were able to fabricate a pure form of glass and coat specialized pieces of DNA with it to create a material that was not only stronger than steel, but incredibly lightweight. Materials that possess both of these qualities are uncommon, and further research could lead to novel engineering and defines applications. The results were published in Cell Reports Physical Science."

Source: [BNL](#) (27 Sep 2023)

PANDEMIC
To Prepare for Next Pandemic, Pitt Researchers Tackle Bird Flu



"Researchers from the University of Pittsburgh and the National Institutes of Health (NIH) Vaccine Research Center have developed an improved way to test potential vaccines against bird flu. The report was published this week in the journal iScience.

Concerning reports about avian flu outbreaks at poultry facilities across the country and abroad highlight the increasingly urgent need for a safe and effective vaccine that could thwart a possible spread of the virus from human to human. To be ready to safely and efficiently test promising vaccine candidates, researchers developed an animal model that more closely mimics the typical symptoms of human infection than any such model so far. This proactive work minimizes the steps needed to quickly validate and deploy a new vaccine in a crisis.

"The COVID-19 pandemic got people to realize that it is not enough to respond to a pandemic when it happens. We really need to make sure that we are ready before it is here," said co-senior author Doug Reed, Ph.D., associate professor of immunology at Pitt's Center for Vaccine Research."

Source: [UPMC](#) (29 Sep 2023)

RENEWABLE ENERGY
Researchers Develop Renewable and Biodegradable Power Sources Using Bacteria



"Four international researchers have explored ways to develop energy sources that are both renewable and compostable using bacteria and biomaterials.

Named Electric Skin, the aim of the project was to create a flexible battery with characteristics similar to a living membrane or "human skin".

The researchers – Nada Elkarashi, Catherine Euale, Sequoia Fischer and Paige Perillat-Piratoine – focused on protein nanowires or pili, which are hair-like structures typically found on the cell surface of bacteria, which aid bacteria in movement and adherence to surfaces.

Pili became a focus for the project after learning that the nanowires can produce up to 0.5 volts of electricity across a seven-micrometre-thick-film."

Source: [Dezeen](#) (2 Oct 2023)

RESEARCH DATA
Replication Games: How to Make Reproducibility Research More Systematic



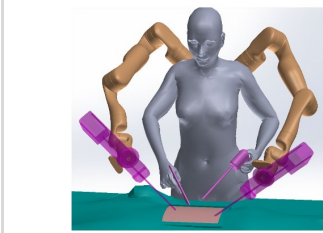
"In October last year, one of us (A.B.) decided to run an ad hoc workshop at a research centre in Oslo, to try to replicate papers from economics journals. Instead of the handful of locals who were expected to attend, 70 people from across Europe signed up. The message was clear: researchers want to replicate studies.

Replication is sorely needed. In areas of the social sciences, such as economics, philosophy and psychology, some studies suggest that between 35% and 70% of published results cannot be replicated when tested with new data. Often, researchers cannot even reproduce results when using the same data and code as the original paper, because key information is missing.

Yet most journals will not publish a replication unless it refutes an impactful paper. In economics, less than 1% of papers published in the top 50 journals between 2010 and 2020 were some types of replication. That suggests that many studies with errors are going undetected."

Source: [Nature](#) (26 Sep 2023)

ROBOTICS
One-Hour Training Is All You Need to Control a Third Robotic Arm



"A new study by researchers at Queen Mary University of London, Imperial College London and The University of Melbourne has found that people can learn to use supernumerary robotic arms as effectively as working with a partner in just one hour of training.

The study, published in the journal IEEE Open Journal of Engineering in Medicine and Biology, investigated the potential of supernumerary robotic arms to help people perform tasks that require more than two hands. The idea of human augmentation with additional artificial limbs has long been in science fiction, like in Doctor Octopus in The Amazing Spider-Man (1963).

"Many tasks in daily life, such as opening a door while carrying a big package, require more than two hands," said Dr Ekaterina Ivanova, lead author of the study from Queen Mary University of London. "Supernumerary robotic arms have been proposed as a way to allow people to do these tasks more easily, but until now, it was not clear how easy they would be to use."

Source: [QMUL](#) (26 Sep 2023)

SENSORS
'Impossible' Millimeter Wave Sensor Has Wide Potential



"researchers at the University of California, Davis, have developed a proof-of-concept sensor that may usher in a new era for millimeter wave radars. In fact, they call its design a "mission impossible" made possible.

Millimeter wave radars send fast-moving electromagnetic waves to targets to analyze their movement, position and speed from the waves bounced back. The benefits of millimeter waves are their natural sensitivity to small-scale movements and their ability to focus on and sense data from microscopic objects.

The new sensor uses an innovative millimeter wave radar design to detect vibrations a thousand times smaller, and changes in a target's position one hundred times smaller, than a strand of human hair, making it better or on par with the world's most accurate sensors. Yet unlike its peers, this one is the size of a sesame seed, is cheap to produce and features a long battery life."

Source: [UCDAVIS](#) (2 Oct 2023)

SOLAR POWER
DARPA Hopes to Beam Power Across 200 Kilometers



"Instead of using wires to deliver power, the Defense Advanced Research Projects Agency (DARPA), part of the U.S. Department of Defense, wants to wirelessly beam power over hundreds of kilometers. In September, the agency announced that it has chosen three groups to design the aerial relays required for such an endeavor.

Anyone familiar with both laser beams and solar cells might imagine how power beaming might work: A laser can shine its beam at a distant solar array, which can convert that light to electricity.

DARPA's aim is not to bring electricity to homes but to deliver energy to places where it would prove difficult, expensive, or dangerous to reach with grid infrastructure or fuel or battery shipments."

Source: [IEEE Spectrum](#) (2 Oct 2023)

SUSTAINABILITY
Investigating The Role of Greener Plastics for Japan's Carbon Neutral Goals



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Source: [Kyushu](#) (26 Sep 2023)

TECHNOLOGY AND DESIGN
MyPowerbank Hacks London's Santander Bikes So Homeless People Can Charge Their Phones



"Central Saint Martins graduate Luke Talbot has created a portable charger that can be hooked up to rental bikes to allow people experiencing homelessness to charge their phones for free.

On display as part of the Design Transforms exhibition at CSM during London Design Festival, MyPowerbank was designed to slot onto the chain of any Santander bicycle – rentable bikes provided by Transport for London – parked in one of the 800 docking stations across the capital.

Talbot's product takes advantage of the fact that, without having to pay to take out one of these bikes, their chain will still move when pedalling backwards. This can power up the tiny pedal-powered generator contained in the portable charger.

The electricity generated in the process is then stored in MyPowerbank's internal batteries, with around 25 minutes of pedalling equating to one full phone charge."

Source: [Dezeen](#) (29 Sep 2023)