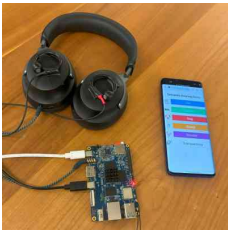


Weekly Discovery

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27 May – 31 May 2024

AI
AI-Powered Headphones Filter Only Unwanted Noise #ASA186



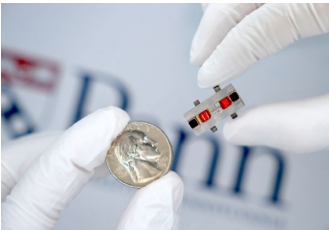
“Shyam Gollakota, from the University of Washington, is an expert in using AI tools for real-time audio processing. His team created a system for targeted speech hearing in noisy environments and developed AI-based headphones that selectively filter out specific sounds while preserving others. He will present his work Thursday, May 16, at 1:20 p.m. EDT as part of a joint meeting of the Acoustical Society of America and the Canadian Acoustical Association, running May 13-17 at the Shaw Centre located in downtown Ottawa, Ontario, Canada.

“Imagine you are in a park, admiring the sounds of chirping birds, but then you have the loud chatter of a nearby group of people who just can’t stop talking,” said Gollakota. “Now imagine if your headphones could grant you the ability to focus on the sounds of the birds while the rest of the noise just goes away. That is exactly what we set out to achieve with our system.

Gollakota and his team combined noise-canceling technology with a smartphone-based neural network trained to identify 20 different environmental sound categories. These include alarm clocks, crying babies, sirens, car horns, and birdsong. When a user selects one or more of these categories, the software identifies and plays those sounds through the headphones in real time while filtering out everything else.”

Source: [Acoustics Org](#) (20 May 2024)

AI
To 6G and Beyond: Penn Engineers Unlock the Next Generation of Wireless Communications



“To date, wireless communications have mostly used lower-frequency bands. “Right now we work from 600 MHz to 6 GHz,” says Olsson. “That’s 5G, 4G, 3G.” Wireless devices use different filters for different frequencies, with the effect that covering all frequencies or bands requires large numbers of filters that take up substantial space. (The typical smartphone includes upwards of 100 filters, to ensure that signals from different bands don’t interfere with one another.)

“The FR3 band is most likely to roll out for 6G or Next G,” says Olsson, referring to the next generation of cellular networks, “and right now the performance of small-filter and low-loss switch technologies in those bands is highly limited. Having a filter that could be tunable across those bands means not having to put in another 100+ filters in your phone with many different switches. A filter like the one we created is the most viable path to using the FR3 band.”

One complication posed by using higher-frequency bands is that many frequencies have already been reserved for satellites. “Elon Musk’s Starlink works in those bands,” notes Olsson. “The military—they’ve already been crowded out of many lower bands. They’re not going to give up radar frequencies that sit right in those bands, or their satellite communications.”

As a result, Olsson’s lab—in collaboration with colleagues Mark Allen, Alfred Fitler Moore Professor in ESE, and Firooz Aflatouni, Associate Professor in ESE, and their respective groups—designed the filter to be adjustable, so that engineers can use it to selectively filter different frequencies, rather than have to employ separate filters. “Being tunable is going to be really important,” Olsson continues, “because at these higher frequencies you may not always have a dedicated block of spectrum just for commercial use.”

Source: [UPenn](#) (24 May 2024)

AI
AI Poised to Usher in New Level of Concierge Services to The Public



“Concierge services built on artificial intelligence have the potential to improve how hotels and other service businesses interact with customers, a new paper suggests.

In the first work to introduce the concept, researchers have outlined the role an AI concierge, a technologically advanced assistant, may play in various areas of the service sector as well as the different forms such a helper might embody.

Their paper envisions a virtual caretaker that, by combining natural language processing, behavioral data and predictive analytics, would anticipate a customer’s needs, suggest certain actions, and automate routine tasks without having to be explicitly commanded to do so.

Though such a skilled assistant is still years away, Stephanie Liu, lead author of the paper and an associate professor of hospitality management at The Ohio State University, and her colleagues drew insight from several contemporary fields, including service management, psychology, human-computer interaction and ethics research, to detail what opportunities and challenges might arise from having an AI concierge manage human encounters.

“The traditional service industry uses concierges for high-end clients, meaning that only a few people have access to them,” Liu said. “Now with the assistance of AI technology, everybody can have access to a concierge providing superior experiences.”

On that premise, the benefits of incorporating AI into customer service are twofold: It would allow companies to offer around-the-clock availability and consistency in their operations as well as improve how individuals engage with professional service organizations, she said.

Moreover, as the younger workforce gravitates to more tech-oriented jobs and global travel becomes more common, generative AI could be an apt solution to deal with the escalating demands of evolving hospitality trends, said Liu.

“The development of AI technology for hotels, restaurants, health care, retail and tourism has a lot of potential,” she said.

Source: [OSU](#) (23 May 2024)

AI
Artificial Intelligence Could Help Cure Loneliness, Says Expert



“Artificial Intelligence (AI) technology could offer companionship to lonely people amid an international epidemic of loneliness, says a robotics expert.

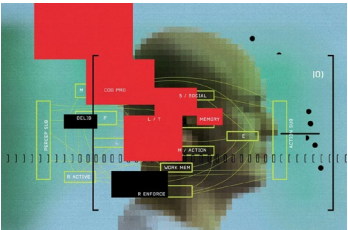
Tony Prescott, a professor of cognitive robotics at the University of Sheffield, argues in his new book The Psychology of Artificial Intelligence that ‘relationships with AIs could support people’ with forms of social interaction.

Loneliness has been found to seriously impair human health, and Professor Prescott makes a case that advances in AI technology could offer a partial solution.

He argues that people can spiral into loneliness, becoming increasingly disconnected as their confidence plummets, and that AI might help people to ‘break the cycle’ by giving them a way to practice and improve their social skills.”

Source: [Eurekalert!](#) (27 May 2024)

AI
AI Outperforms Humans in Theory of Mind Tests



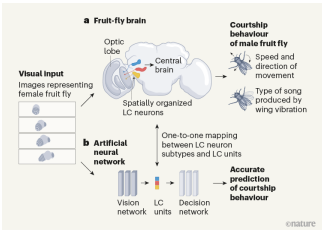
“Theory of mind—the ability to understand other people’s mental states—is what makes the social world of humans go around. It’s what helps you decide what to say in a tense situation, guess what drivers in other cars are about to do, and empathize with a character in a movie. And according to a new study, the large language models (LLM) that power ChatGPT and the like are surprisingly good at mimicking this quintessentially human trait.

“Before running the study, we were all convinced that large language models would not pass these tests, especially tests that evaluate subtle abilities to evaluate mental states,” says study coauthor Cristina Becchio, a professor of cognitive neuroscience at the University Medical Center Hamburg-Eppendorf in Germany. The results, which she calls “unexpected and surprising,” were published today—somewhat ironically, in the journal Nature Human Behavior.

The results don’t have everyone convinced that we’ve entered a new era of machines that think like we do, however. Two experts who reviewed the findings advised taking them “with a grain of salt” and cautioned about drawing conclusions on a topic that can create “hype and panic in the public.” Another outside expert warned of the dangers of anthropomorphizing software programs.”

Source: [IEEE Spectrum](#) (20 May 2024)

AI
AI Networks Reveal How Flies Find a Mate

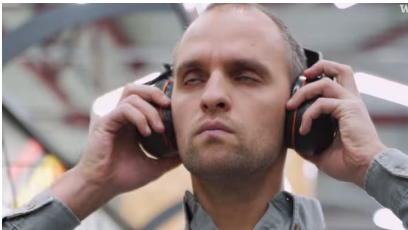


“Artificial neural networks that model the visual system of a male fruit fly can accurately predict the insect’s behaviour in response to seeing a potential mate — paving the way for the building of more complex models of brain circuits.

From the perspective of a male fruit fly, rotting fruit represents an opportunity. There, he can find and court a potential mate by chasing her, extending his wings and vibrating them to produce a fine-tuned ‘love’ song. Importantly, this courtship ritual depends on the male suitor receiving visual feedback from the female of interest — but how does the male’s eye instruct his brain during this courtship dance? Across species, visual systems transform patterns of light into features that are meaningful to an animal’s behaviour: for example, a looming shadow can trigger certain groups of neurons known as feature detectors, which drive fast and reliable predator avoidance. Feature detectors can also be combined to discern more complex visual patterns. Writing in Nature, Cowley et al. combine a machine-learning tool called an artificial neural network with genetics to explore how the male fly uses feature detectors to coordinate its movements with those of its dance partner.”

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

AI
AI Headphones Let Wearer Listen to A Single Person in A Crowd, By Looking at Them Just Once



“University of Washington team has developed an artificial intelligence system that lets a user wearing headphones look at a person speaking for three to five seconds to “enroll” them. The system, called “Target Speech Hearing,” then cancels all other sounds in the environment and plays just the enrolled speaker’s voice in real time even as the listener moves around in noisy places and no longer faces the speaker.

The team presented its findings May 14 in Honolulu at the ACM CHI Conference on Human Factors in Computing Systems. The code for the proof-of-concept device is available for others to build on. The system is not commercially available.

“We tend to think of AI now as web-based chatbots that answer questions,” said senior author Shyam Gollakota, a UW professor in the Paul G. Allen School of Computer Science & Engineering. “But in this project, we develop AI to modify the auditory perception of anyone wearing headphones, given their preferences. With our devices you can now hear a single speaker clearly even if you are in a noisy environment with lots of other people talking.”

To use the system, a person wearing off-the-shelf headphones fitted with microphones taps a button while directing their head at someone talking. The sound waves from that speaker’s voice then should reach the microphones on both sides of the headset simultaneously; there’s a 16-degree margin of error. The headphones send that signal to an on-board embedded computer, where the team’s machine learning software learns the desired speaker’s vocal patterns. The system latches onto that speaker’s voice and continues to play it back to the listener, even as the pair moves around. The system’s ability to focus on the enrolled voice improves as the speaker keeps talking, giving the system more training data.”

Source: [Washington](#) (23 May 2024)

ARCHITECTURE
Maximizing Dilapidated Infrastructure: The Potential of Repurposing Abandoned Buildings into Social Housing

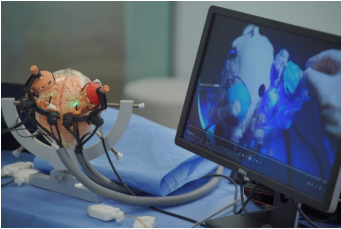
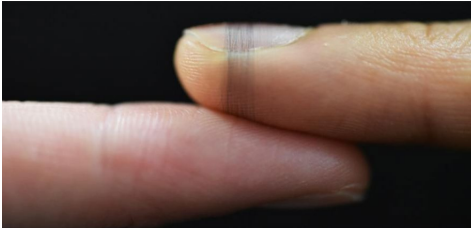


“The world has changed, and accepting this fact is no longer a matter of choice but survival. Our rainfall patterns, periods of drought, average temperatures, sea levels—everything is in constant flux. The denialist stance of many countries, including Brazil, has led to catastrophic situations like the one we are facing now.

The floods that devastated the southern region of the country in recent days cannot be considered isolated incidents. Due to global warming, climate events like this will become increasingly frequent. In other words, unfortunately, we cannot prevent them from happening, but we can—and must—make our cities more resilient to these situations.

A total of 336 municipalities in the state of Rio Grande do Sul are currently declared disaster areas, with the tragedy claiming over 80 lives thus far. More than one million properties are without electricity. Families, stranded for a week without access to clean water, food, or medicine, are now being rescued. Volunteers from across the country are mobilizing to the south, bringing boats and kayaks to aid in search and rescue efforts for people and animals. Fundraising campaigns for money, clothing, and food are being widely promoted. It’s difficult for any Brazilian to remain uninformed about this situation.”

Source: [Archdaily](#) (18 May 2024)

3D Radar Reveals Defects Within Bridges  Many people around the world cross bridges on a daily basis without a second thought—but behind the scenes, engineers are conducting a battery of tests to ensure bridge safety. To support these efforts, one group of researchers in China has created a new radar device that can penetrate the concrete of bridges to create 3D images of its interior. The new tech, which was able to reconstruct detailed internal images of real-world bridges, is described in a study published 9 May in IEEE Sensors Journal. Currently, there are several bridge-inspection techniques for assessing and monitoring the condition of bridge structures, including visual inspection, ultrasonic testing, infrared thermography, aerial inspection, and radar. Radar is an especially good method for noninvasive testing of bridges, whereby electromagnetic signals are directed toward them. "These pulses penetrate the surface and bounce back when they encounter changes in material density, like defects or voids in the reinforced concrete of a bridge," explains Xinghua Shi, a senior engineer at the China Research Institute of Radiowave Propagation and Ph.D. candidate at Xi'an Jiaotong University." Source: IEEE Spectrum (22 May 2024)	HKU Engineering Team Enhances Stereotactic Neurosurgery Precision Using MRI-Guided Multi-Stage Robotic Positioner  "A research team led by Professor Ka-Wai Kwok from the Department of Mechanical Engineering at the University of Hong Kong (HKU) has developed an interactive multi-stage robotic positioner specifically designed for magnetic resonance imaging (MRI)-guided stereotactic neurosurgery. This groundbreaking technology represents a key breakthrough in MRI-guided stereotactic neurosurgery, allowing for precise interventions. The system is capable of assisting with interventions involving cannula/needle targeting including deep brain stimulation (DBS), for the treatment of movement disorders like Parkinson's disease. It also facilitates a wide range of therapeutic applications such as biopsy, drug delivery, ablation, and catheter placement within deep brain regions." Source: HKU (22 May 2024)	Imperceptible Sensors Made From 'Electronic Spider Silk' Can Be Printed Directly on Human Skin  "Researchers have developed a method to make adaptive and eco-friendly sensors that can be directly and imperceptibly printed onto a wide range of biological surfaces, whether that's a finger or a flower petal. The method, developed by researchers from the University of Cambridge, takes its inspiration from spider silk, which can conform and stick to a range of surfaces. These 'spider silks' also incorporate bioelectronics, so that different sensing capabilities can be added to the 'web'. The fibres, at least 50 times smaller than a human hair, are so lightweight that the researchers printed them directly onto the fluffy seedhead of a dandelion without collapsing its structure. When printed on human skin, the fibre sensors conform to the skin and expose the sweat pores, so the wearer doesn't detect their presence. Tests of the fibres printed onto a human finger suggest they could be used as continuous health monitors. This low-waste and low-emission method for augmenting living structures could be used in a range of fields, from healthcare and virtual reality, to electronic textiles and environmental monitoring. The results are reported in the journal Nature Electronics." Source: CAMBRIDGE (24 May 2024)	"Cutting Out Sustainability in The Face of Economic Downturn Is Short-Term And Misguided"  "It now feels as though we've reached a tipping point in the design and lifestyle industries. Global unrest and economic uncertainty are causing financial and strategic jitters; brands and corporations are shifting away from focus and investment around sustainability. Examples include the recent closing of Ikea's innovation agency Space 10 and Nike's gutting of its sustainability teams. H&M's sustainability-focused CEO recently stepped down. And there are more fundamental problems too. Weighed down by internal politics, time-poor, and tasked with producing scary amounts of stuff around "seasonal" calendars, many designers have become merely specifiers. As the director of a design futures agency whose focus is supporting brands in moving towards a more sustainable future, I am experiencing some deeply worrying conversations with our clients. Senior decision makers and budget holders are starting to say things like "sustainability just doesn't sell" and "we are coming from the perspective of the brand, not the perspective of the planet". Milan design week was particularly disappointing in its apparent shift away from sustainable principles, as Dezeen editorial director Max Fraser has already pointed out." Source: Dezeen (24 May 2024)
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