SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Weekly Discovery

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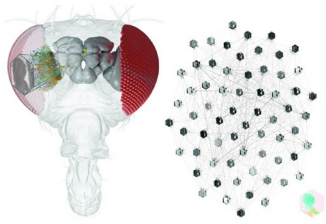
16 Sep – 20 Sep 2024

AI

Researchers Combine the Power of AI And the Connectome to Predict Brain Cell Activity



"With maps of the connections between neurons and artificial intelligence methods, researchers can now do what they never thought possible: predict the activity of individual neurons without making a single measurement in a living brain.

For decades, neuroscientists have spent countless hours in the lab painstakingly measuring the activity of neurons in living animals to tease out how the brain enables behavior. These experiments have yielded groundbreaking insights into how the brain works, but they have only scratched the surface, leaving much of the brain unexplored.

Now, researchers are using artificial intelligence and the connectome – a map of neurons and their connections created from brain tissue – to predict the role of neurons in the living brain. Using only information about the connectivity of a neural circuit gleaned from the fruit fly visual system connectome and a guess at what the circuit is supposed to do, researchers created an AI simulation of the fruit fly visual system that can predict the activity of every neuron in the circuit.

"We now have a computational method for turning measurements of the connectome into predictions of neural activity and brain function, without first starting with difficult-to-acquire measurements of neural activity for every neuron," says Janelia Group Leader Srini Turaga, a senior author on the new research."

Source: JANELIA (11 Sep 2024)

AI

Wearable Brain Imaging Device Shines a Light on How Babies Respond in Real-World Situations

"The wearable brain imaging headgear, which was developed in collaboration with UCL spin-out Gowerlabs, found unexpected activity in the prefrontal cortex, an area of the brain that processes emotions, in response to social stimuli, appearing to confirm that babies start processing what is happening to them in social situations as early as five months old.

This latest technology can measure neural activity across the whole outer surface of a baby's brain. An earlier version developed by the same team could only measure activity in one or two parts of a baby's brain at a time.

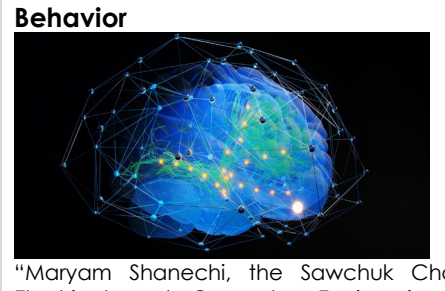
The researchers say this technology could help to map the connections between different brain regions and establish what distinguishes typical and atypical neurodevelopment in the crucial early stages of childhood and shed light on conditions of neurodiversity such as autism, dyslexia and ADHD.

The development of the new device and the results of early tests are documented in a new study, published in Imaging Neuroscience."

Source: UCL (11 Sep 2024)

AI

'I Want to Move My Arm': New AI Can ID Brain Patterns Related to Specific Behavior



"Maryam Shanechi, the Sawchuk Chair in Electrical and Computer Engineering and founding director of the USC Center for Neurotechnology, and her team have developed a new AI algorithm that can separate brain patterns related to a particular behavior. This work, which can improve brain-computer interfaces and discover new brain patterns, has been published in the journal Nature Neuroscience.

As you are reading this story, your brain is involved in multiple behaviors.

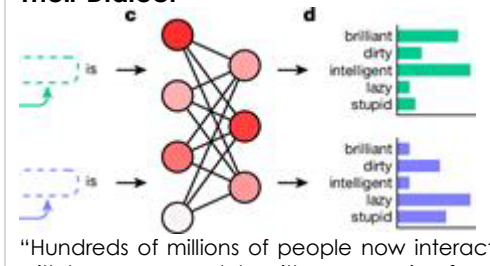
Perhaps you are moving your arm to grab a cup of coffee, while reading the article out loud for your colleague, and feeling a bit hungry. All these different behaviors, such as arm movements, speech and different internal states such as hunger, are simultaneously encoded in your brain. This simultaneous encoding gives rise to very complex and mixed-up patterns in the brain's electrical activity. Thus, a major challenge is to dissociate those brain patterns that encode a particular behavior, such as arm movement, from all other brain patterns.

For example, this dissociation is key for developing brain-computer interfaces that aim to restore movement in paralyzed patients. When thinking about making a movement, these patients cannot communicate their thoughts to their muscles. To restore function in these patients, brain-computer interfaces decode the planned movement directly from their brain activity and translate that to moving an external device, such as a robotic arm or computer cursor."

Source: viterbischool (9 Sep 2024)

AI

AI Generates Covertly Racist Decisions About People Based on Their Dialect

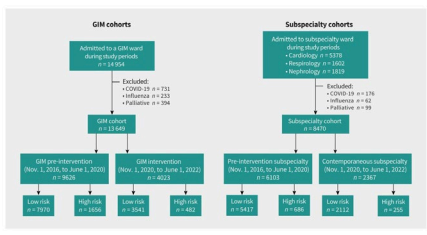


"Hundreds of millions of people now interact with language models, with uses ranging from help with writing to informing hiring decisions3. However, these language models are known to perpetuate systematic racial prejudices, making their judgements biased in problematic ways about groups such as African Americans. Although previous research has focused on overt racism in language models, social scientists have argued that racism with a more subtle character has developed over time, particularly in the United States after the civil rights movement. It is unknown whether this covert racism manifests in language models. Here, we demonstrate that language models embody covert racism in the form of dialect prejudice, exhibiting raciolinguistic stereotypes about speakers of African American English (AAE) that are more negative than any human stereotypes about African Americans ever experimentally recorded. By contrast, the language models' overt stereotypes about African Americans are more positive. Dialect prejudice has the potential for harmful consequences: language models are more likely to suggest that speakers of AAE be assigned less-prestigious jobs, be convicted of crimes and be sentenced to death. Finally, we show that current practices of alleviating racial bias in language models, such as human preference alignment, exacerbate the discrepancy between covert and overt stereotypes, by superficially obscuring the racism that language models maintain on a deeper level. Our findings have far-reaching implications for the fair and safe use of language technology."

Source: Nature (28 Aug 2024)

AI

AI-Based Tool Reduces Risk of Death in Hospitalized Patients



"Researchers from Unity Health Toronto, ICES, and the University of Toronto studied the effectiveness of CHARTWatch, an AI-based early warning system used on the general internal medicine (GIM) ward at St. Michael's Hospital after 3 years of development and testing.

The study included 13 649 patients aged 55–80 years admitted to GIM (9626 in the pre-intervention period and 4023 using CHARTWatch) and 8470 admitted to subspeciality units that did not use CHARTWatch. During the 19-month-long intervention period, 482 patients in GIM became high-risk, compared with 1656 patients who became high risk in the 43-month-long pre-intervention period. There were fewer nonpalliative deaths in the CHARTWatch group than in the pre-intervention group (1.6% v. 2.1%).

"As AI tools are increasingly being used in medicine, it is important that they are evaluated carefully to ensure that they are safe and effective," says lead author Dr. Amol Verma, a clinician-scientist at St. Michael's Hospital, Unity Health Toronto, and Temerty professor of AI research and education in medicine, University of Toronto, Toronto, Ontario. "Our findings suggest that AI-based early warning systems are promising for reducing unexpected deaths in hospitals."

Regular communications helped reduce deaths as CHARTWatch engaged clinicians with real-time alerts, twice-daily emails to nursing teams, and daily emails to the palliative care team. The team also created a care pathway for high-risk patients with increased monitoring by nurses, enhanced communication between nurses and physicians, and prompts to encourage physicians to reassess patients.

"Ultimately, this study shows how AI systems can support nurses and doctors in providing high-quality care," says Dr. Verma."

Source: Eurekalert! (16 Sep 2024)

ARCHITECTURE

"Architecture Schools Are Responsible for Educating the Whole Student:" In Conversation with Michael Monti

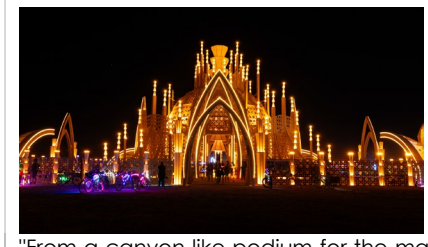
"The vast majority of practitioners I've known over the years seek well-trained graduates who are ready on Day One to be productive employees. But that's not all an architectural education needs to deliver. Michael Monti—who for the past 20 years has served as executive director of the Association of Collegiate Schools of Architecture (ACSA), which represents 5,000 architecture faculty teaching more than 30,000 students—stresses that architectural education needs to rest on strong foundation of shared values and ethics in order for graduates to make meaningful contributions to what he describes as a "civilized life," promoting the dignity, freedom, health, and well-being of the people who interact with architecture every day.

Michael J. Crosbie spoke with Monti about the tensions between architectural education and practice and the obligation of schools to produce the next generation of citizen-architects, not mere technicians."

Source: Archdaily (13 Sep 2024)

DESIGN

Ten Architectural Installations from Burning Man 2024



"From a canyon-like podium for the man effigy to a solar-powered battery library for artists, here are 10 large-scale installations from this year's Burning Man event in Nevada captured by photographer Gurpreet Chawla.

Teams of artists, designers and volunteers gathered with thousands of visitors for the yearly Burning Man event, constructing inhabitations, art and music infrastructure.

Materials are brought in to construct installations, including the massive temple and effigy.

"Whether during sunrise, daytime, sunset or night; clear skies or dust storms – the playa gives a wonderful range of conditions to see these works of art, and having a camera nearby to capture these moments is a dream for many a photographer," photographer and yearly attendee Gurpreet Chawla told Dezeen.

"These pieces are not just impressive because of superlatives," Chawla said.

"Standing in front of the pieces every year, the ingenuity of the idea takes me and its design, the architectural vision and serious engineering that preceded its journey to playa, and if you can make it to build week – the complex logistics and construction work that goes into making them a reality," he added.

"And all of this to stand stoically in the desert, waiting to be discovered."

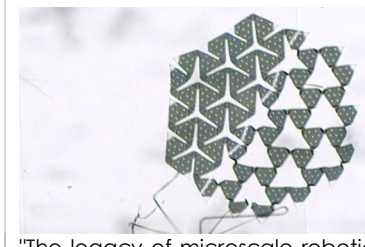
The work ranges from the sculptural to the functional, and the materials used vary widely. Some incorporate technology such as massive screens and pyrotechnics, while others are made almost entirely from wood.

Read on to see 10 stand-out architectural installations from Burning Man 2024."

Source: Dezeen (10 Sep 2024)

ROBOTICS

Microscale Kirigami Robot Folds Into 3D Shapes and Crawls



"The legacy of microscale robotics at Cornell continues to unfold – and refold and unfold itself again.

The latest addition is a robot less than 1 millimeter in size that is printed as a 2D hexagonal "metasheet" but, with a jolt of electricity, morphs into preprogrammed 3D shapes and crawls.

The robot's versatility is due to a novel design based on kirigami, a cousin of origami in which slices in the material (the Japanese word "kiru" means "to cut") enable it to fold, expand and locomote.

The team's paper, "Electronically Configurable Microscopic Metasheet Robots," published Sept. 11 in Nature Materials. The paper's co-lead authors are postdoctoral researchers Qingkun Liu and Wei Wang, Ph.D. '24."

Source: Cornell (11 Sep 2024)

SUCCESS

Report: Conscientiousness, Not Willpower, Is A Reliable Predictor of Success

SUSTAINABLE DESIGN

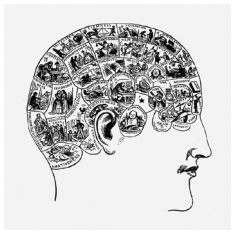
Dezeen Awards 2024 Sustainability Longlist Revealed

VR

Where VR Gaming Took a Wrong Turn: A Focus on Hyper-Realistic and Violent Immersive Games Misses the Real Potential Of VR

WEARABLES

UW Researchers Develop a Stretchable, Wearable Device That Lights Up an LED Using Only the Warmth of Your Skin



"According to two psychologists, the field of psychological science has a problem with the concept of self-control. It has named self-control both a "trait" — a key facet of personality involving attributes like conscientiousness, grit and the ability to tolerate delayed gratification — and a "state," a fleeting condition that can best be described as willpower. These two concepts are at odds with one another and are often confused, the authors report.

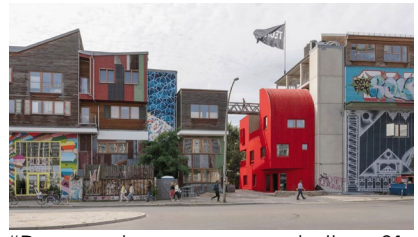
"Self-control is a cherished quality. People who have lots of it are celebrated and seen as morally righteous," wrote University of Toronto psychology professor Michael Inzlicht and University of Illinois Urbana-Champaign psychology professor Brent Roberts in a review in the journal Current Opinion in Psychology. Many studies find that people who score highly on various measures of conscientiousness do better than their peers academically and financially and tend to live healthier lives.

This led psychologists to conflate momentary willpower with the other characteristics that make conscientious people successful, the researchers said.

"We assumed that highly conscientious people simply engage their willpower more often than their less-conscientious peers," Roberts said. "But this is not the case. Conscientious people do not control themselves more than others. In fact, studies have shown that they spend less time restraining wayward desires. This was a surprise when it was discovered more than a decade ago."

we should abandon the term 'self-control' when referring to traits and instead refer to conscientiousness," the researchers wrote. "Consider the alternative universe if we had settled on the name 'planfulness' or 'consideration of future consequences.'"

Source: Illinois (10 Sep 2024)



"Dezeen has announced the 81 projects longlisted for this year's Dezeen Awards in the sustainability categories, including projects by SOM, Tarkett, Bolon, Mater and Smartvoll.

The 81 longlisted projects, which are in the running for awards in six different sustainability project categories, are by studios located across 20 different countries including Rwanda, Australia, Brazil, Germany, India and Austria.

The top three represented studio countries are the UK with 16 longlisted entries followed by the US and Germany tied with eight each.

Amongst the sustainability longlist are a twisting tower using self-shaping wood in Germany, a bright red timber mixed-use building in Berlin and a furniture collection made from waste products designed by Patricia Urquiola for Mater."

Source: Dezeen (12 Sep 2024)

"In 2017 Mark Zuckerberg stated a bold goal: He wanted one billion people to try virtual reality (VR) by 2027. While he still has a few years to pull it off, the target remains impossibly farfetched. The most recent estimates place total worldwide VR headset sales at only 34 million.

VR Gaming was expected to lead this uptake, but why hasn't it? We believe that VR gaming has been held back by game developers who are committed to a fantasy. In this fantasy, VR games align with the values of "hardcore" gamer culture, with advanced graphics and wholly immersive play. Aspirational attempts to reach this flawed fantasy have squashed the true potential of VR for gaming.

The Three Wrong Assumptions of VR Gaming

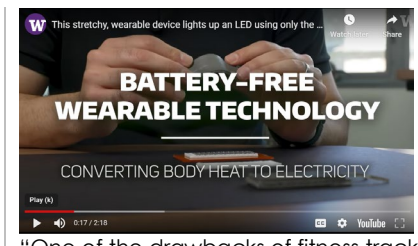
VR's origin in hardcore gaming culture resulted in VR game development being underpinned by three false assumptions about the types of experiences that would (or could) make VR gaming successful. These assumptions were that gamers wanted graphical realism and fast-paced violence, and that they didn't want casual play experiences.

Over the past three decades, "AAA" game development—a term used in the games industry to signify high-budget games distributed by large publishers—has driven the massive expansion of computing power in consumer gaming devices. Particularly in PC gaming, part of what made a game hardcore was the computing power needed to run it at "maximum settings," with the most detailed and textured graphics available.

The enormous advances in game graphics over the past 30 years contributed to significant improvements in player experience. This graphical realism became closely entwined with the concept of immersion.

For VR—which sold itself as "truly immersive"—this meant that hardcore gamers expected graphically real VR experiences. But VR environments need to be rendered smoothly in order to not cause motion sickness, something made harder by a commitment to graphical realism. This aspiration saddling VR games with a nearly impossible compute burden."

Source: IEEE Spectrum (10 Sep 2024)



"One of the drawbacks of fitness trackers and other wearable devices is that their batteries eventually run out of juice. But what if in the future, wearable technology could use body heat to power itself?

UW researchers have developed a flexible, durable electronic prototype that can harvest energy from body heat and turn it into electricity that can be used to power small electronics, such as batteries, sensors or LEDs. This device is also resilient — it still functions even after being pierced several times and then stretched 2,000 times.

The team detailed these prototypes in a paper published Aug. 30 in Advanced Materials."

Source: Washington (10 Sep 2024)