

AI

AI Algorithms Can Determine How Well Newborns Nurse, Study Shows



"A modified pacifier and AI algorithms to analyze the data it produces could determine if newborns are learning the proper mechanics of nursing, a recent study shows.

Specifically, the researchers from the University of California San Diego measured if babies are generating enough suckling strength to breastfeed and whether they are suckling in a regular pattern based on eight independent parameters.

The results, published in the April 18 online edition of IEEE Journal of Translational Engineering in Health and Medicine, give researchers objective data that shows standard assessments can be improved and could potentially prevent surgical interventions.

Currently, to determine if an infant is feeding properly, clinicians rely on two measures. One is objective: is the baby gaining enough weight? The other is more subjective: clinicians put a finger in the baby's mouth and evaluate how well the baby is sucking on that finger.

"The method we developed with our clinical partners replaces this subjective assessment with objective data," said James Friend, a professor in the Department of Mechanical and Aerospace Engineering and the Department of Surgery at UC San Diego and one of the paper's senior authors.

The testing method has two components. One is a device made up of a simple pacifier, connected to a 36-inch-long tube connected in turn to a vacuum sensor and a chip that collects the data from the sensor. The device can connect to any laptop."

Source: [UCSD](#) (29 Apr 2024)

AI

Advancing The Safety Of AI-Driven Machinery Requires Closer Collaboration with Humans



"An ongoing research project at Tampere University aims to create adaptable safety systems for highly automated off-road mobile machinery to meet industry needs. Research has revealed critical gaps in compliance with legislation related to public safety when using mobile working machines controlled by artificial intelligence.

As the adoption of highly automated off-road machinery increases, so does the need for robust safety measures. Conventional safety processes often fail to consider the health and safety risks posed by systems controlled by artificial intelligence (AI).

Marea de Koning, a doctoral researcher specialising in automation at Tampere University, conducts research with the aim of ensuring public safety without compromising technological advancements by developing a safety framework specifically tailored for autonomous mobile machines operating in collaboration with humans. This framework intends to enable original equipment manufacturers (OEM), safety & system engineers, and industry stakeholders to create safety systems that comply with evolving legislation...

The research article presenting the findings titled [A Comprehensive Approach to Safety for Highly Automated Off-Road Machinery under Regulation 2023/1230](#) was published in the prestigious Journal of Safety Science. The article provides valuable insights for policymakers, engineers and safety professionals."

Source: [TUNI](#) (24 Apr 2024)

AI

Using AI To Improve Diagnosis of Rare Genetic Disorders



"Diagnosing rare Mendelian disorders is a labor-intensive task, even for experienced geneticists. Investigators at Baylor College of Medicine are trying to make the process more efficient using artificial intelligence. The team developed a machine learning system called AI-MARRVEL (AIM) to help prioritize potentially causative variants for Mendelian disorders. The study is published today in NEJM AI.

Researchers from the Baylor Genetics clinical diagnostic laboratory noted that AIM's module can contribute to predictions independent of clinical knowledge of the gene of interest, helping to advance the discovery of novel disease mechanisms. "The diagnostic rate for rare genetic disorders is only about 30%, and on average, it is six years from the time of symptom onset to diagnosis. There is an urgent need for new approaches to enhance the speed and accuracy of diagnosis," said co-corresponding author Dr. Pengfei Liu, associate professor of molecular and human genetics and associate clinical director at Baylor Genetics.

AIM is trained using a public database of known variants and genetic analysis called Model organism Aggregated Resources for Rare Variant Exploration (MARRVEL) previously developed by the Baylor team. The MARRVEL database includes more than 3.5 million variants from thousands of diagnosed cases. Researchers provide AIM with patients' exome sequence data and symptoms, and AIM provides a ranking of the most likely gene candidates causing the rare disease.

Researchers compared AIM's results to other algorithms used in recent benchmark papers. They tested the models using three data cohorts with established diagnoses from Baylor Genetics, the National Institutes of Health-funded Undiagnosed Diseases Network (UDN) and the Deciphering Developmental Disorders (DDD) project. AIM consistently ranked diagnosed genes as the No. 1 candidate in twice as many cases than all other benchmark methods using these real-world data sets."

Source: [BCM](#) (25 Apr 2024)

AI

New Study Reveals How AI Can Enhance Flexibility, Efficiency for Customer Service Centers



"New research involving Binghamton University's School of Management (SOM) explored that question. Using data from different contact center sites, researchers examined the impact of AI systems on a customer service organization's ability to shift across ambidexterity modes.

The key takeaway: it's a delicate balancing act; AI is a valuable asset, so long as it's used properly, though these organizations shouldn't rely on it exclusively to guide their strategies.

SOM Associate Professor Sumantra Sarkar, who helped conduct the research, said the study's goal was to understand better how organizations today might use AI to guide their transition from one ambidexterity mode to another because certain structures or approaches might be more beneficial from one month to the next.

Sumantra Sarkar, associate professor in Binghamton University's School of Management.

Sumantra Sarkar, associate professor in Binghamton University's School of Management.

"Customer service organizations often balance exploiting the latest technology to boost efficiency and, therefore, save money," Sarkar said. "This dichotomy is what ambidexterity is all about, exploring new technology to gain new insights and exploiting it to gain efficiency."

As part of the three-year study, researchers examined the practices of five contact center sites: two global banks, one national bank in a developing country, a telecommunication Fortune 500 company in South Asia and a global infrastructure vendor in telecommunications hardware."

Source: [Binghamton](#) (30 Apr 2024)

AI

Are Robots the Solution to the Crisis in Older-Person Care?



"An older man in a nursing home was given a robot that looked like a stuffed animal for companionship. He became attached to it and when he later fell ill and died, the nursing-home staff found him clutching his robot companion.

When the class was asked to offer impressions of the scenario they were split: either they thought it was beautiful that he wasn't alone in his last moments, or they felt it was tragic to die without a human connection.

Robots are an increasingly popular form of therapy for older people with dementia. It's been suggested that social robots, on which much of the research has been based, can improve people's moods, increase social interaction, reduce symptoms of dementia and give carers some much-needed relief.

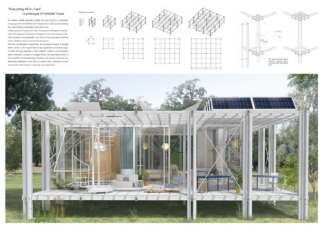
But some researchers are beginning to question if these devices are ready for widespread use with this population. The research proving robots' worth is sparse, and there are ethical concerns — especially around the idea that their use might reduce human contact in a population that is dearly in need of it.

"If we're going to invest resources in elder care, I want more staff in the facility so they don't die alone," Berridge says. Her grandmother passed away on her own in an understaffed nursing home during the COVID-19 pandemic. Berridge's grandmother didn't have the option of a robot companion, but Berridge would not have wanted that for her anyway. "There are so many other things I would choose for her before a robot," she says."

Source: [Nature](#) (25 Apr 2024)

ARCHITECTURE

How Can Modular Design Be Used to Revolutionize Housing Architecture?



"Housing is a diverse architectural typology whose configuration is determined not only by those who design it but also by the use of those who live in it. Therefore, homes are fundamentally adaptable structures that evolve in line with their time and users, undergoing constant changes manifested in the ways of living. The house conceived today will not be the same as the one built tomorrow, so it becomes necessary to maintain a critical and profound approach to the role it plays in the built environment.

In this sense, modular architecture has consistently presented itself as a dynamic design strategy that has revolutionized housing, developing versatile solutions for sustainable spaces and construction practices. Thus, modular housing has been fertile ground for exploring and deepening ways of inhabiting space and addressing human needs. From the prefabricated catalog houses of the 19th century to the post-World War II housing boom, its evolution reflects both past proposals and the exploration of new concepts for the future."

Source: [Archdaily](#) (25 Apr 2024)

ARCHITECTURE

Public Spaces and Their Key Role in Building Climate Resilience in the US.



"Social infrastructure encompasses the resources and services that allow the creation of communal bonds and social connections. Within the built environment, it manifests through public spaces like parks, libraries, and community centers alongside threshold spaces such as public transportation stops.

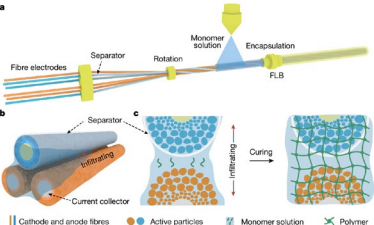
These public social spaces play a crucial role in strengthening communities and, in turn, their ability to respond to catastrophic climate-related events. They can provide physical shelter to the populations most vulnerable to these events and foster resilient networks of people who can more quickly recover. Given the escalating frequency of extreme weather events in the United States due to climate change and its social infrastructure inadequacies, examining public spaces as a critical tool for climate resilience becomes vital.

When an extreme weather event occurs, the degree of its impact on human life hinges on a multitude of factors. According to the Urban Land Institute's research "Ten Principles for Building Resilience," the risk entailed by a climate hazard is not just the event in isolation but rather a complex interplay of the event's severity, the population it affects, and the underlying socioeconomic dynamics at play. For example, a flood's risk depends on how many people it affects and the underlying socioeconomic stresses that make these people more vulnerable. As the United States grapples with escalating occurrences of heatwaves, floods, and storms, the brunt of these events will fall disproportionately on the most economically disadvantaged and marginalized segments of its population."

Source: [Archdaily](#) (24 Apr 2024)

BATTERY

High-Performance Fibre Battery with Polymer Gel Electrolyte



"Replacement of liquid electrolytes with polymer gel electrolytes is recognized as a general and effective way of solving safety problems and achieving high flexibility in wearable batteries. However, the poor interface between polymer gel electrolyte and electrode, caused by insufficient wetting, produces much poorer electrochemical properties, especially during the deformation of the battery. Here we report a strategy for designing channel structures in electrodes to incorporate polymer gel electrolytes and to form intimate and stable interfaces for high-performance wearable batteries. As a demonstration, multiple electrode fibres were rotated together to form aligned channels, while the surface of each electrode fibre was designed with networked channels. The monomer solution was effectively infiltrated first along the aligned channels and then into the networked channels. The monomers were then polymerized to produce a gel electrolyte and form intimate and stable interfaces with the electrodes. The resulting fibre lithium-ion battery (FLB) showed high electrochemical performances (for example, an energy density of about 128 Wh kg⁻¹). This strategy also enabled the production of FLBs with a high rate of 3,600 m h⁻¹ per winding unit. The continuous FLBs were woven into a 50 cm × 30 cm textile to provide an output capacity of 2,975 mAh. The FLB textiles worked safely under extreme conditions, such as temperatures of -40 °C and 80 °C and a vacuum of -0.08 MPa. The FLBs show promise for applications in firefighting and space exploration."

Source: [Nature](#) (24 Apr 2024)

COMPUTER VISION

Computer Vision Researcher Develops Privacy Software for

DESIGN

Paris 2024 Olympic Village Features Street Lamps Made from Salvaged

HEALTHCARE

"Seeing The Invisible": New Tech Enables Deep Tissue Imaging During

ROBOT

Will Human Soldiers Ever Trust Their Robot Comrades?

Surveillance Videos  “Computer vision can be a valuable tool for anyone tasked with analyzing hours of footage because it can speed up the process of identifying individuals. For example, law enforcement may use it to perform a search for individuals with a simple query, such as “Locate anyone wearing a red scarf over the past 48 hours.” With video surveillance becoming more and more ubiquitous, UCF Center for Research in Computer Vision (CRCV) Assistant Professor Yogesh Rawat, and his collaborators Mubarak Shah and Chen Chen, are working to address privacy issues with advanced software installed on video cameras. Their work is supported by \$200,000 in funding from the U.S. National Science Foundation's Accelerating Research Translation (NSF ART) program. “Automation allows us to watch a lot of footage, which is not possible by humans,” Rawat says. “Surveillance is important for society, but there are always privacy concerns. This development will enable surveillance with privacy preservation.” His video monitoring software protects the privacy of those recorded by obscuring select elements, such as faces or clothing, both in recordings and in real time. Rawat explains that his software adds perturbations to the RGB pixels in the video feed – the red, green and blue colors of light – so that human eyes are unable to recognize them.” Source: UCF (24 Apr 2024)	Building Materials  "Ahead of this summer's Olympic Games in Paris, design offices Concepto and Studio 5.5 have installed 350 street lights made from salvaged scaffolding poles and lampposts in the athletes' village. The lighting project is part of a scheme overseen by the Olympic Games delivery authority Solideo with the aim to reduce carbon emissions by 47 per cent compared to a conventional project. Landscape architecture firm Agence TER, which was responsible for master planning the public areas, collaborated with Studio 5.5 to create a low-carbon materials charter for these spaces that includes lighting and street furniture. Putting this sustainable design agenda into practice, the street lighting was designed to be manufactured using decommissioned lampposts and components sourced from building sites. "We had to persuade policymakers and local authorities that these reused lampposts represented future aesthetics and strong sustainable development policies," Studio 5.5 co-founder and partner Anthony Lebossé told Dezeen." Source: Dezeen (25 Apr 2024)	Surgery  "Now, in a new study, a team of researchers, led by Professor Hiroshi Takemura from Tokyo University of Science (TUS)... has recently developed the world's first rigid endoscope system capable of HSI from visible to OTN wavelengths. Their findings were published in Volume 32, Issue 9 of Optics Express on April 17, 2024. At the core of this innovative system lies a supercontinuum (SC) light source and an acoustic-opto tunable filter (AOTF) that can emit specific wavelengths. Prof. Takemura explains, "An SC light source can output intense coherent white light, whereas an AOTF can extract light containing a specific wavelength. This combination offers easy light transmission to the light guide and the ability to electrically switch between a broad range of wavelengths within a millisecond." The team verified the optical performance and classification ability of the system, demonstrating its capability to perform HSI in the range of 490-1600 nm, enabling visible as well as NIR-HSI. Additionally, the results highlighted several advantages, such as the low light power of extracted wavelengths, enabling non-destructive imaging, and downsizing capability. Moreover, a more continuous NIR spectrum can be obtained compared to that of conventional rigid-scope-type devices." Source: TUS (26 Apr 2024)	 "The blistering late-afternoon wind ripped across Camp Taji, a sprawling U.S. military base just north of Baghdad. In a desolate corner of the outpost, where the feared Iraqi Republican Guard had once manufactured mustard gas, nerve agents, and other chemical weapons, a group of American soldiers and Marines were solemnly gathered around an open grave, dripping sweat in the 114-degree heat. They were paying their final respects to Boomer, a fallen comrade who had been an indispensable part of their team for years. Just days earlier, he had been blown apart by a roadside bomb. As a bugle mournfully sounded the last few notes of "Taps," a soldier raised his rifle and fired a long series of volleys—a 21-gun salute. The troops, which included members of an elite army unit specializing in explosive ordnance disposal (EOD), had decorated Boomer posthumously with a Bronze Star and a Purple Heart. With the help of human operators, the diminutive remote-controlled robot had protected American military personnel from harm by finding and disarming hidden explosives. Boomer was a Multi-function Agile Remote-Controlled robot, or MARCbot, manufactured by a Silicon Valley company called Exponent. Weighing in at just over 30 pounds, MARCbots look like a cross between a Hollywood camera dolly and an oversized Tonka truck. Despite their toylike appearance, the devices often leave a lasting impression on those who work with them. In an online discussion about EOD support robots, one soldier wrote, "Those little bastards can develop a personality, and they save so many lives." An infantryman responded by admitting, "We liked those EOD robots. I can't blame you for giving your guy a proper burial, he helped keep a lot of people safe and did a job that most people wouldn't want to do." Source: IEEE Spectrum (27 Apr 2024)
---	---	---	---

To view past Weekly Alerts [CLICK HERE](#)
For more articles or in-depth research, contact us at library@sutd.edu.sg
A SUTD Library Service©2024