SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

Weekly Discovery

We SHARE to inspire and ignite ideas!

28 Apr - 2 May 2025

LinkedIn Learning Invest in Yourself

Did you know 1 cent doubled for 30 days = $5.368 Million

Similarly, your actions everyday can amount to much more!

Learn a new skill today with LinkedIn Learning and start investing in yourself !

Activate you free LinkedIn Learning Account and get started!

Featured Course

Speak with AI: Get the Most from ChatGPT Advanced Voice Mode **27m**

Click Here to Start Learning

3D MODELING

Cutting The Complexity from Digital Carpentry

"Many products in the modern world are in some way fabricated using computer numerical control (CNC) machines, which use computers to automate machine operations in manufacturing. While simple in concept, the ways to instruct these machines is in reality often complex. A team of researchers including those from the University of Tokyo devised a system to demonstrate how to mitigate some of this complexity. Draw2Cut allows users to draw desired designs directly onto material to be cut or milled. In this case, color-coded lines drawn with standard marker pens instruct the Draw2Cut system to mill designs into wood without any prior knowledge of CNC machines or their typical workflows.

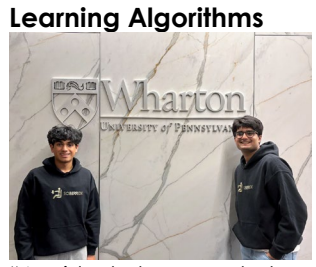
Various technologies can be said to democratize some skill or ability that was previously only accessible to those with time, money, luck, or all three. Ploughs, tractors, the printing press, the internet — the list goes on. In recent years, things like 3D printing were touted to bring bespoke high-quality manufacturing into the home. Though it's yet to be seen how realistic that is, it highlights the real desire many people have to express greater control over the things they desire. 3D printing is of course just one mode of digital fabrication, and in many more cases, fabricated items are still often made using more established techniques employing molds or CNC machines. Despite being well established, using CNC machines is far from trivial.

"Operating CNC milling machines can be difficult because it usually requires users to first create 3D models using computer-aided design (CAD) software," said Project Assistant Professor Maria Larsson at the University of Tokyo's User Interface Research Group. "Our latest research explores the idea that, in several situations, it would be nice if the user could just draw directly onto materials they want the CNC machine to mill and cut, without modeling anything in CAD. We were inspired by the way in which carpenters mark wood for cutting, and thought, why can't we do a similar system for personal fabrication?"

Source: EurekAlert! (25 Apr 2025)

AI

High Schoolers' AI-Enabled Device Deters Drunk Driving: Their Tech Uses Cameras, Sensors, And Machine Learning Algorithms



"Accidents happen, but not all of them are inevitable. Drunk driving is one of the deadliest and most preventable causes of roadway fatalities. In 2022 alone, more than 13,000 people died in alcohol-related vehicular crashes in the United States, accounting for nearly a third of all traffic deaths, according to the National Highway Traffic Safety Administration.

Now a group of high school students in North Carolina is taking action with SoberRide, an AI-enabled device they designed to prevent intoxicated people from driving.

Breathalyzer-based ignition interlocks are already in use; they require the driver to blow into a device, proving they are sober enough to drive. However, these interlocks are not foolproof because someone other than the driver could breathe into them, trying to outsmart the device.

SoberRide uses a combination of cameras, sensors, and machine-learning algorithms to detect signs of alcohol impairment in the driver—such as pupil dilation, bloodshot eyes, and the presence of ethanol used in alcoholic beverages—before allowing a vehicle to be put into drive.

"We've been training our neural network to classify intoxication, refining the system's ability to reliably sense whether someone is drunk or sober," says Swayam Shah, chief executive officer and cofounder of SoberRide. He's an 11th-grader at Enloe Magnet High School, in Raleigh.

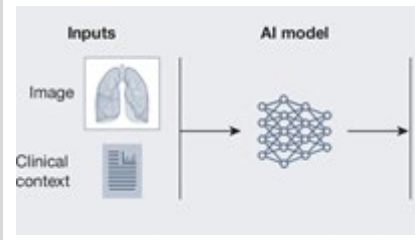
The SoberRide team presented its invention at the MIT Undergraduate Research Technology Conference in October, sponsored by groups like the IEEE University Partnership Program and IEEE Women in Engineering.

The students also showcased their technology at another IEEE-supported event: the International Conference on Artificial Intelligence, Robotics, and Communication, held in December in Xiamen, China."

Source: IEEE Spectrum (22 Apr 2025)

AI

Multimodal Generative AI For Medical Image Interpretation



"Accurately interpreting medical images and generating insightful narrative reports is indispensable for patient care but places heavy burdens on clinical experts. Advances in artificial intelligence (AI), especially in an area that we refer to as multimodal generative medical image interpretation (GenMI), create opportunities to automate parts of this complex process. In this Perspective, we synthesize progress and challenges in developing AI systems for generation of medical reports from images. We focus extensively on radiology as a domain with enormous reporting needs and research efforts. In addition to analysing the strengths and applications of new models for medical report generation, we advocate for a novel paradigm to deploy GenMI in a manner that empowers clinicians and their patients. Initial research suggests that GenMI could one day match human expert performance in generating reports across disciplines, such as radiology, pathology and dermatology. However, formidable obstacles remain in validating model accuracy, ensuring transparency and eliciting nuanced impressions. If carefully implemented, GenMI could meaningfully assist clinicians in improving quality of care, enhancing medical education, reducing workloads, expanding specialty access and providing real-time expertise. Overall, we highlight opportunities alongside key challenges for developing multimodal generative AI that complements human experts for reliable medical report writing."

Source: Nature (26 Mar 2025)

AI

When It Comes to Reading the Room, Humans Are Still Better Than AI

"Humans, it turns out, are better than current AI models at describing and interpreting social interactions in a moving scene—skills necessary for self-driving cars, assistive robots, and other technologies that rely on AI systems to navigate the real world.

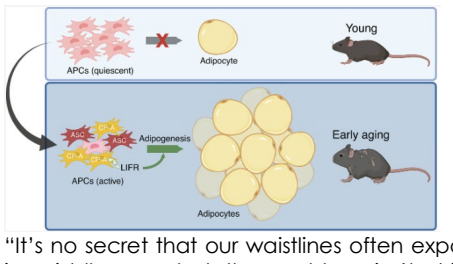
The research, led by scientists at Johns Hopkins University, finds that artificial intelligence systems fail at understanding social dynamics and context necessary for interacting with people and suggests the problem may be rooted in the infrastructure of AI systems.

"AI for a self-driving car, for example, would need to recognize the intentions, goals, and actions of human drivers and pedestrians. You would want it to know which way a pedestrian is about to start walking, or whether two people are in conversation versus about to cross the street," said lead author Leyla Isik, an assistant professor of cognitive science at Johns Hopkins. "Any time you want an AI to interact with humans, you want it to be able to recognize what people are doing. I think this sheds light on the fact that these systems can't right now."

Source: HUB (24 Apr 2025)

AGING

New Research Explains why our Waistlines Expand in Middle Age



"It's no secret that our waistlines often expand in middle-age, but the problem isn't strictly cosmetic. Belly fat accelerates aging and slows down metabolism, increasing our risk for developing diabetes, heart problems and other chronic diseases. Exactly how age transforms a six pack into a softer stomach, however, is murky.

Now preclinical research by City of Hope®, one of the largest and most advanced cancer research and treatment organizations in the United States and a leading research center for diabetes and other life-threatening illnesses, has uncovered the cellular culprit behind age-related abdominal fat, providing new insights into why our midsections widen with middle age. Published today in Science, the findings suggest a novel target for future therapies to prevent belly flab and extend our healthy lifespans.

"People often lose muscle and gain body fat as they age—even when their body weight remains the same," said Qiong (Annabel) Wang, Ph.D., the study's co-corresponding author and an associate professor of molecular and cellular endocrinology at City of Hope's Arthur Riggs Diabetes & Metabolism Research Institute, one of the world's foremost scientific organizations dedicated to

ARCHITECTURE

To Live Well in High-Density Cities: Connections of Urban Density and Public Health

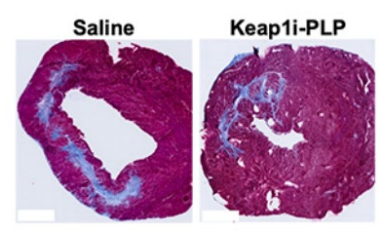
"As the global population continues to surge, cities become increasingly complex ecosystems, dense and bustling environments home to millions of people. Today, more than half of the world's population lives in cities, which is expected to grow dramatically in the coming decades. This rapid urbanization presents a complex set of challenges for the architects and planners tasked with creating spaces that can accommodate urban residents' lives.

There is a direct and profound connection between the urban environment and the health of its inhabitants. In the context of planning for urban living, health extends beyond physical well-being; it includes mental resilience, social connections, and environmental factors, all of which influence daily life. Health issues can be amplified in high-density cities through poor air quality, high stress levels, social isolation, or limited access to green space.

This is why a "healthy city" is no longer a luxury, it is a necessity. Through thoughtful and innovative design, high-density cities and cities that are quickly densifying need to meet the basic needs of their residents and actively, intentionally promote a higher quality of life. Creating health-centered urban spaces is integral to the future of urban planning. The

HEALTH TECH

This Injected Protein-like Polymer Helps Tissues Heal After a Heart Attack



"Researchers have developed a new therapy that can be injected intravenously right after a heart attack to promote healing and prevent heart failure.

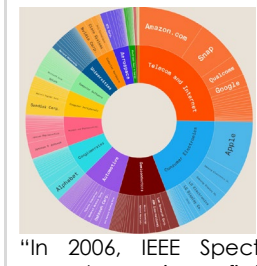
The therapy both prompts the immune system to encourage tissue repair and promotes survival of heart muscle cells after a heart attack. Researchers tested the therapy in rats and showed that it is effective up to five weeks after injection.

The research team, led by bioengineers at the University of California San Diego and chemists at Northwestern University, published their findings in the April 25 issue of the journal Advanced Materials.

"Preventing heart failure after a heart attack is still a major unmet clinical need," said Karen Christman, one of the study's corresponding authors and a professor in the Shu Chien-Gene Lay Department of Bioengineering at the UC San Diego Jacobs School of Engineering. "The goal of this therapy is to intervene very soon after someone suffers a heart attack to keep them from ultimately going into heart failure."

PATENT

These Companies Were the Patent Powerhouses of 2024



"In 2006, IEEE Spectrumranked patenting powerhouses in our first annual patent survey. The survey, conducted by the research firm 1790 Analytics, examined the number and influence of U.S. patents generated by more than 1,000 organizations. Semiconductor manufacturer Micron Technology came out on top at the time, with IBM, Hewlett-Packard, Intel, and Broadcom rounding out the top five.

Nearly 20 years later, every company on the top 10 list has been usurped. Once mighty companies have fallen in the ranks, others have come and gone, and the top spots are largely filled by today's Big Tech companies. In place of semiconductors and computer systems, the top categories in this year's scorecard are all about Internet services—the category labeled "Telecom and Internet"—and consumer electronics.

Digging into the data reveals Amazon's might, the hidden power of subsidiaries, and which countries are producing U.S. patents—it's not just the United States. You can explore it all for yourself in the interactive graphic below. Simply click on a category to see which companies produced the most powerful patent portfolios in 2024.

The rankings are based on Pipeline Power, a

investigating the biology and treatment of diabetes. "We discovered aging triggers the arrival of a new type of adult stem cell and enhances the body's massive production of new fat cells, especially around the belly."

Source: cityofhope (25 Apr 2025)

challenge is clear: Cities with high residential densities must be built to sustain and enhance their residents' physical, mental, and social well-being."

Source: Archdaily (26 Apr 2025)

Source: UCSD (25 Apr 2025)

metric calculated by 1790 Analytics that combines several elements of an organization's patent portfolio into one number. In addition to the number of patents granted in a given year, this metric takes into account four variables representing the quality and impact of those patents. (More details on the calculations are below in the Methodology section.)"

Source: IEEE Spectrum (23 Apr 2025)

ROBOTICS

"Biohybrid" Robots Controlled by Mushrooms Move in Response to Light

"Cornell researchers have developed a pair of small robots powered by mycelium designed for use in agriculture and space exploration.

The researchers, led by Anand Mishra, a professor at Cornell Engineering, discovered a way to grow mycelium into the electronics of a robot.

They then powered the robots by harnessing the fungi's innate electrical signals.

The resulting "biohybrid" robot can sense and respond to the environment better than a fully synthetic counterpart.

"You could say that mycelium bridges the natural ecosystem and the engineering world, serving as a living interface that connects biology with technology," Mishra told Dezeen.

Mycelium has several advantages, according to Mishra. It is "remarkably resilient" and can survive in some of the harshest conditions on the planet, including the Arctic, saline waters, and even radioactive settings.

Unlike synthetic robots, mycelium can also naturally respond to a variety of environmental cues, like light.

The team has built two robots: a soft robot that can walk like a spider, and a wheeled bot that can roll.

Both robots can sense soil chemistry in crops, decide when to add more fertiliser, and broadly speaking, gather environmental data to better understand agricultural ecosystems to help predict crop yield.

"We also believe this technology could have exciting applications in space exploration, where sustainable, self-sensing, and adaptive systems are especially valuable," said Mishra, who is also a research associate at Cornell's Organic Robotics Lab.

In a recent study, the researchers made the robots move and change their gait by shining UV light on their "head". They are now exploring other inputs.

Since fungi are living organisms, they naturally respond to a variety of environmental cues to survive and adapt," said Mishra."

Source: Dezeen (24 Apr 2025)

ROBOTICS

Engineering A Robot That Can Jump 10 Feet High – Without Legs

"Inspired by the movements of a tiny parasitic worm, Georgia Tech engineers have created a 5-inch soft robot that can jump as high as a basketball hoop.

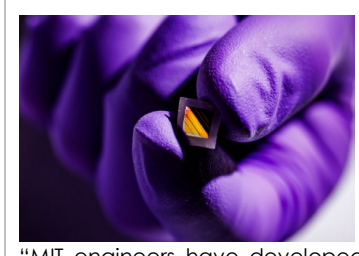
Their device, a silicone rod with a carbon-fiber spine, can leap 10 feet high even though it doesn't have legs. The researchers made it after watching high-speed video of nematodes pinching themselves into odd shapes to fling themselves forward and backward.

The researchers described the soft robot April 23 in Science Robotics. They said their findings could help develop robots capable of jumping across various terrain, at different heights, in multiple directions."

Source: COE (23 Apr 2025)

SENSORS

New Electronic "Skin" Could Enable Lightweight Night-Vision Glasses



"MIT engineers have developed a technique to grow and peel ultrathin "skins" of electronic material. The method could pave the way for new classes of electronic devices, such as ultrathin wearable sensors, flexible transistors and computing elements, and highly sensitive and compact imaging devices.

As a demonstration, the team fabricated a thin membrane of pyroelectric material — a class of heat-sensing material that produces an electric current in response to changes in temperature. The thinner the pyroelectric material, the better it is at sensing subtle thermal variations.

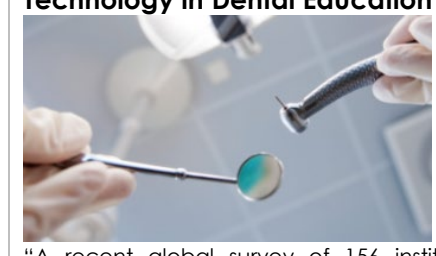
With their new method, the team fabricated the thinnest pyroelectric membrane yet, measuring 10 nanometers thick, and demonstrated that the film is highly sensitive to heat and radiation across the far-infrared spectrum.

The newly developed film could enable lighter, more portable, and highly accurate far-infrared (IR) sensing devices, with potential applications for night-vision eyewear and autonomous driving in foggy conditions. Current state-of-the-art far-IR sensors require bulky cooling elements. In contrast, the new pyroelectric thin film requires no cooling and is sensitive to much smaller changes in temperature. The researchers are exploring ways to incorporate the film into lighter, higher-precision night-vision glasses."

Source: MIT (23 Apr 2025)

VR

Global Survey Highlights the Challenges Of VR-Haptic Technology in Dental Education



"A recent global survey of 156 institutions reveals strong interest in VR-haptic technology for dental training, yet significant barriers impede widespread adoption. The study was led by the University of Eastern Finland and published in Frontiers in Dental Medicine.

Combining virtual reality with force feedback, VR-haptic technology is becoming more and more common in dental education where it complements traditional preclinical hand skill training methods. The aim of the present study was to understand dental educators' perceptions and needs regarding the acceptability and application of VR-haptics in dental education, as well as to gather suggestions for system improvements.

Over a third of 387 respondents (35%) cited technical limitations in current systems, such as insufficient haptic precision and restricted procedural options, which undermine skill transfer to real patient care. Financial constraints were another major hurdle, with 28% of institutions struggling to afford devices, leading to shortages and limited student access.

Resistance to change also persists: 24% noted low acceptance among educators and students, driven by disruptions to traditional teaching methods. Additionally, 13% highlighted time-intensive curriculum adaptations and training requirements as critical obstacles.

To address these challenges, the authors recommend further hardware and software development, seeking cost-reduction innovations, and providing targeted faculty training to demonstrate VR-haptics' educational benefits. They point out that future success hinges on multidisciplinary collaboration—particularly among restorative dentistry, prosthodontics, and endodontics—to develop realistic, discipline-specific training scenarios."

Source: UEF (25 Apr 2025)