



Weekly Newsletter
TECHNOLOGY
SURVEILLANCE

N° 20-2023

MAY 19TH, 2023





OBJECTIVE: *To provide weekly information about the latest global scientific and technological advancements, as well as the most innovative products and services entering the international market.*

I. NEWS

1.1 **Oxytocin therapy, important for social interaction and controlling emotions**

The hormone oxytocin is important for social interaction and to control emotions. A deficiency of this hormone has previously been assumed, for example, in people with autism, but has never been proven. Now, for the first time, researchers from the University of Basel and the University Hospital of Basel have succeeded in demonstrating a deficiency of oxytocin in patients with a deficiency of vasopressin caused by a disease of the pituitary gland.



The hormones oxytocin and vasopressin are produced in the same area of the brain and are also very similar in structure. This is why disorders that cause vasopressin deficiency could also affect the neurons that produce oxytocin. Credit: Adobe Stock, University of Basel

As expected, the increase in oxytocin in the healthy individuals after a dose of MDMA (3,4-methylenedioxy-N-methamphetamine), better known as ecstasy, caused pro-social behavior and an increase in empathy, combined with a reduction in anxiety symptoms. The patients with vasopressin deficiency, on the other hand, showed no changes in these areas. *“Oxytocin deficiency in people with vasopressin deficiency would at least partially explain this finding,”* says the endocrinologist Atila.

For more information, visit the following link:

<https://www.unibas.ch/en/News-Events/News/Uni-Research/Clinically-relevant-deficiency-of-oxytocin.html>

Reference

University of Basel (May 15, 2023). Clinically relevant deficiency of the “bonding hormone” oxytocin demonstrated. Recovered May 15, 2023, University of Basel: <https://www.unibas.ch/en/News-Events/News/Uni-Research/Clinically-relevant-deficiency-of-oxytocin.html>

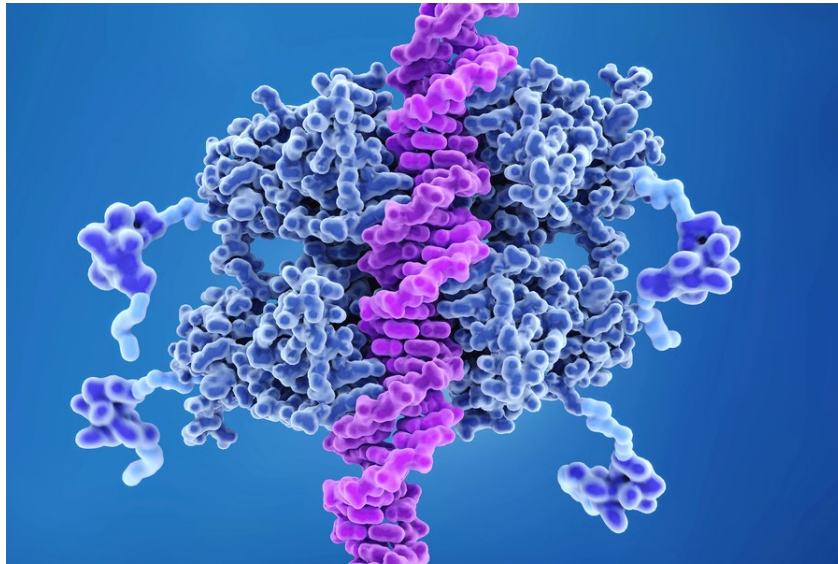


Information source: (University of Basel, 2023)



1.2 Gene-editing technique could speed up the study of cancer mutations

Massachusetts Institute of Technology (MIT) researchers have developed a way to easily engineer specific cancer-linked mutations into mouse models.



*p53 (blue) binds to DNA (pink) to help prevent cancer formation.
Credit: Shutterstock, Massachusetts Institute of Technology*

Using this technique, which is based on CRISPR genome-editing technology, the researchers have created models of several different mutations of the cancer-causing gene *Kras*, in different organs. They believe this technique could also be used for nearly any other type of cancer mutation that has been identified. Testing cancer drugs in mouse models is an important step in determining whether they are safe and effective enough to go into human clinical trials. Over the past 20 years, researchers have used genetic engineering to create mouse models by deleting tumor suppressor genes or activating cancer-promoting genes. However, this approach is labor-intensive and requires several months or even years to produce and analyze mice with a single cancer-linked mutation.

For more information, visit the following link:

<https://news.mit.edu/2023/gene-editing-technique-cancer-mutations-0511>

Reference

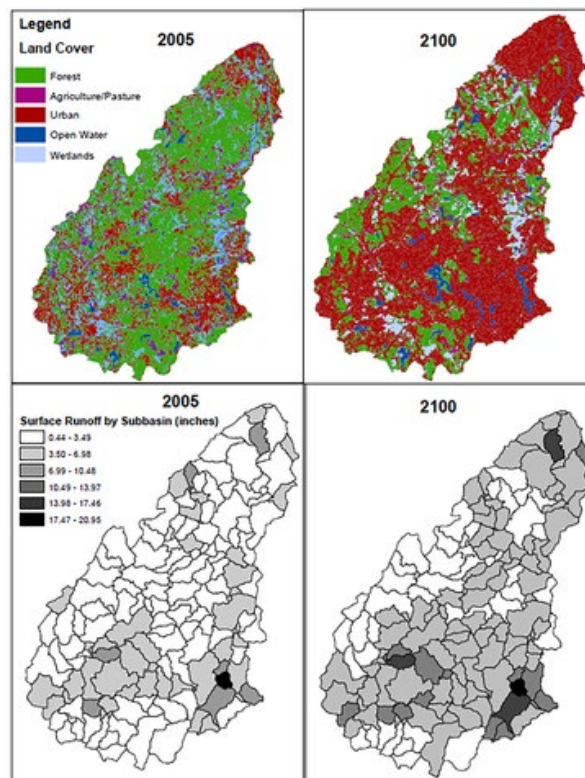
Trafton, A. (May 11, 2023). Gene-editing technique could speed up study of cancer mutations. Recovered May 12, 2023, Massachusetts Institute of Technology: <https://news.mit.edu/2023/gene-editing-technique-cancer-mutations-0511>

Information source: (Massachusetts Institute of Technology, 2023)



1.3 Hydrologic changes with changing land use patterns

To make the links between land use and hydrological effect visible, and to project these effects into the future, Randhir and his graduate student, Ammara Talib, focused on the Sudbury-Assabet and Concord watershed in eastern Massachusetts, an area that incorporates both rural areas and suburbs of Boston. The pair fed historical data describing the changing land-use into a model which projected the trends for the years 2035, 2065 and 2100. The team then fed the results of the land-use model into a hydrological model called the Hydrological Simulation Program-FORTRAN.



*Land-use change and runoff, 2005 and 2100
Credit: University of Massachusetts Amherst*

“We can plan for the future on the watershed scale,” says Randhir, by urban planning that implements best practices for sustainable and site-specific land-use measures. These can include creating rain gardens, using permeable pavement in large parking lots and employing vegetated swales to slow the runoff.

For more information, visit the following link:

<https://www.umass.edu/news/article/new-research-umass-amherst-links-changes-land-use-water-quality-and-quantity>

Reference

Miller, D. (May 11, 2023). New research from UMass Amherst links changes in land use to water quality and quantity. Recovered May 12, 2023, University of Massachusetts Amherst:



<https://www.umass.edu/news/article/new-research-umass-amherst-links-changes-land-use-water-quality-and-quantity>

Information source: (University of Massachusetts Amherst, 2023)



1.4 Obesity accelerates loss of immunity to COVID-19 vaccine

The University of Cambridge team – jointly led by Dr James Thaventhiran and Prof Sadaf Farooqi studied people with severe obesity attending the Obesity clinic at Addenbrooke’s Hospital in Cambridge, and compared the number and function of immune cells in their blood to those of people of normal weight. They studied people six months after their second vaccine dose and then looked at the response to a third 'booster' vaccine dose over time. The Cambridge researchers found that six months after a second vaccine dose, people with severe obesity had similar levels of antibodies to the COVID-19 virus as those with a normal weight.

But the ability of those antibodies to work efficiently to fight against the virus (known as “*neutralisation capacity*”) was reduced in people with obesity. 55% of individuals with severe obesity were found to have unquantifiable or undetectable “*neutralising capacity*” compared to 12% of people with normal BMI. The researchers found that antibodies produced by people with severe obesity were less effective at neutralising the SARS-CoV-2 virus, potentially because the antibodies were not able to bind to the virus with the same strength. When given a third (booster) dose of a COVID-19 vaccine, the ability of the antibodies to neutralise the virus was restored in both the normal weight and severely obese groups. But the researchers found that immunity again declined more rapidly in people with severe obesity, putting them at greater risk of infection with time.

For more information, visit the following link:

<https://www.cam.ac.uk/research/news/obesity-accelerates-loss-of-covid-19-vaccination-immunity-study-finds>

Reference

Almeroth-Williams, T. (May 11, 2023). Obesity accelerates loss of COVID-19 vaccination immunity, study finds. Recovered May 12, 2023, University of Cambridge: <https://www.cam.ac.uk/research/news/obesity-accelerates-loss-of-covid-19-vaccination-immunity-study-finds>

Information source: (University of Cambridge, 2023)



1.5 ReMotion Robot occupies physical space on behalf of a remote user

Cornell researchers have developed a robot called ReMotion that occupies physical space on a remote user's behalf, automatically mirroring the user's movements in real time and conveying key body language that is lost in standard virtual environments.



*Mose Sakashita, a doctoral student in the field of information science, with the ReMotion robot.
Credit: University of Cornell*

The lean, nearly six-foot-tall ReMotion device itself is outfitted with a monitor for a head, omnidirectional wheels for feet and game-engine software for brains. It automatically mirrors the remote user's movements – thanks to another Cornell-made device, Neckface, which the remote user wears to track head and body movements. The motion data is then sent remotely to the ReMotion robot in real-time.

For more information, visit the following link:

<https://news.cornell.edu/stories/2023/05/i-robot-remote-proxy-collaborates-your-behalf>

Reference

DiPietro, L. (May 11, 2023). I, robot: Remote proxy collaborates on your behalf. Recovered May 12, 2023, Cornell University:

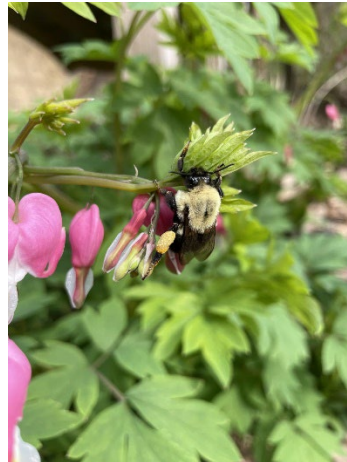
<https://news.cornell.edu/stories/2023/05/i-robot-remote-proxy-collaborates-your-behalf>

Information source: (Cornell University, 2023)



1.6 Pioneers in landscape transcriptomics study genes in nature

Interdisciplinary team in Penn State's College of Agricultural Sciences — in an initiative aimed at better understanding the implications of climate change for animal and plant life and agricultural systems — is focusing on an emerging field of study called landscape transcriptomics.



In the College of Agricultural Sciences a number of faculty, such as the entomologists studying bees, are using transcriptomics in their research already, and they are deeply interested in the conservation and natural resource management applications.

Credit: Heather Hines, The Pennsylvania State University

Jason Keagy, assistant research professor of wildlife behavioral ecology, explained that landscape transcriptomics studies how patterns of gene expression in living organisms relate to changes in environment - including habitat, weather, climate and contaminants — as well as the subsequent effects on the function of plants and animals. He explained that a transcriptome is the total of all the RNA molecules expressed from the genes of an organism, essentially a collection of all the gene readouts present in a cell. By looking at finer-scale gene expression differences over larger-scale environments, trends emerge that offer new insight into how life on Earth is adapting to change.

For more information, visit the following link:

<https://www.psu.edu/news/research/story/nature-messy-pioneers-landscape-transcriptomics-study-genes-wild>

Reference

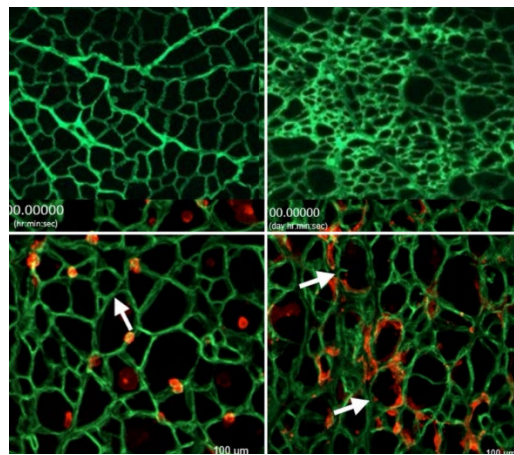
Mulhollem, J. (May 11, 2023). "Nature is messy": Pioneers in landscape transcriptomics study genes in the wild. Recovered May 12, 2023, The Pennsylvania State University: <https://www.psu.edu/news/research/story/nature-messy-pioneers-landscape-transcriptomics-study-genes-wild>

Information source: (The Pennsylvania State University, 2023)



1.7 Stem cell therapy has proven to be a challenge for Duchenn's muscular dystrophy

Stem cells travel along a collagen network to reach damaged muscle tissue and heal it. In Duchenne muscular dystrophy, stiff, scarred collagen prevents stem cells from reaching their target. A protein called sarcospan lessens this scarring and allows stem cells to do their job more successfully, pointing toward potential new treatments for the disorder.



Top, left: A healthy myoscaffold. Top right: A Duchenne muscular dystrophy scaffold. Bottom left: Stem cells (red) growing in a healthy myoscaffold (green). Bottom right: Stem cells growing in a Duchenne myoscaffold (green).

Credit: Rachelle Crosbie, University of California - Los Angeles

Group of researchers led by biochemists at UCLA show for the first time that scarring to the collagen framework that carries these healing cells causes muscles to gradually stop working in Duchenne muscular dystrophy. The discovery in mice illuminates one reason stem cell therapy has not been effective for the disorder: The cells simply can't get where they're needed most.

For more information, visit the following link:

<https://newsroom.ucla.edu/releases/stem-cells-and-muscle-breakdown-in-duchenne-ms>

Reference

Ober, H. (May 11, 2023). When stem cells can't roll on a bumpy road, muscles break down. Recovered May 12, 2023, University of California - Los Angeles: <https://newsroom.ucla.edu/releases/stem-cells-and-muscle-breakdown-in-duchenne-ms>

Information source: (University of California - Los Angeles, 2023)



1.8 Artificial Intelligence to discover new materials for advanced computation

Team of researchers led by Rensselaer Polytechnic Institute's Trevor David Rhone, assistant professor in the Department of Physics, Applied Physics, and Astronomy, has identified novel van der Waals (vdW) magnets using cutting-edge tools in artificial intelligence (AI). In particular, the team identified transition metal halide vdW materials with large magnetic moments that are predicted to be chemically stable using semi-supervised learning. These two-dimensional (2D) vdW magnets have potential applications in data storage, spintronics, and even quantum computing.

Rhone and team combined high-throughput density functional theory (DFT) calculations, to determine the vdW materials' properties, with AI to implement a form of machine learning called semi-supervised learning. Semi-supervised learning uses a combination of labeled and unlabeled data to identify patterns in data and make predictions. Semi-supervised learning mitigates a major challenge in machine learning – the scarcity of labeled data.

For more information, visit the following link:

<https://news.rpi.edu/content/2023/05/11/rensselaer-researcher-uses-artificial-intelligence-discover-new-materials>

Reference

Malatino, K. (May 11, 2023). Rensselaer researcher uses artificial intelligence to discover new materials for advanced computing. Recovered May 12, 2023, Rensselaer Polytechnic Institute:

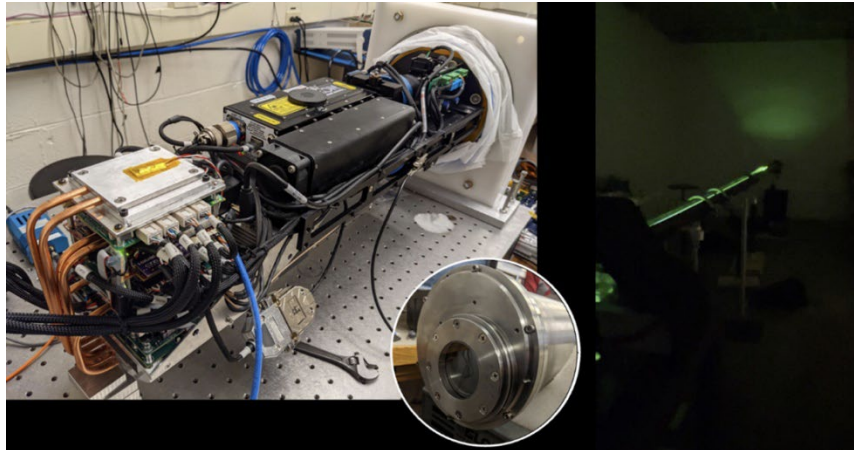
<https://news.rpi.edu/content/2023/05/11/rensselaer-researcher-uses-artificial-intelligence-discover-new-materials>

Information source: (Rensselaer Polytechnic Institute, 2023)



1.9 InVADER mission to test its robotic laser divebot in a deep-sea expedition

Team to test technologies for use in future planetary exploration while providing data to survey deep-sea ecosystems and minerals on Earth.



*The assembled Laser Divebot
Credit: APL/Impossible Sensing, SETI Institute*

Aims to advance technologies to explore, characterize and sample the seabed here on Earth. In particular, InVADER's Laser Divebot will find marine minerals and catalog biodiversity in the seabed faster and more affordably than ever. *"Our technology will revolutionize oceanography like digital photography disrupted film photography,"* said Pablo Sobron, SETI Institute research scientist and project lead. *"Scientists will no longer have to collect and ship samples to a lab and wait weeks for the results. InVADER will do it in just a few hours and with zero environmental impact. This approach will allow scientists to learn more about the ocean much faster, which is essential for protecting it."*

For more information, visit the following link:

<https://www.seti.org/press-release/invader-mission-test-its-robotic-laser-divebot-deep-sea-expedition>

Reference

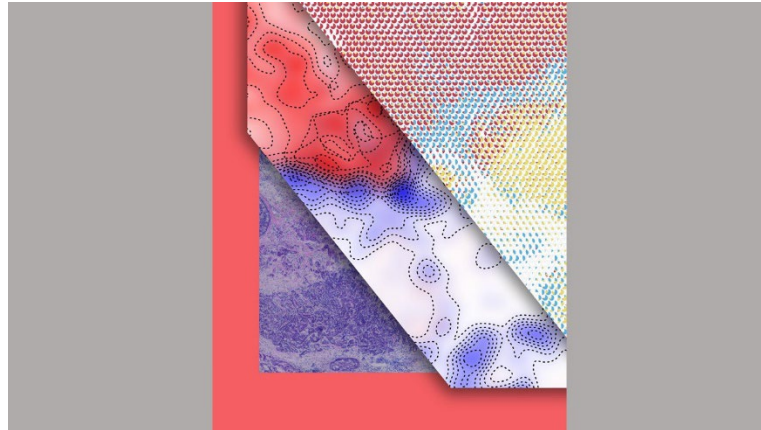
McDonald, R. (May 11, 2023). InVADER mission to test its robotic laser divebot on a deep-sea expedition. Recovered May 12, 2023, SETI Institute: <https://www.seti.org/press-release/invader-mission-test-its-robotic-laser-divebot-deep-sea-expedition>

Information source: (SETI Institute, 2023)



1.10 SpaceMarkers Novel AI Method Identifies Locations, Interactions Among Genes in And Around Tumors

SpaceMarkers, a new machine learning software developed by researchers at the Johns Hopkins Convergence Institute and the Johns Hopkins Kimmel Cancer Center, can identify molecular interactions among distinct types of cells in and around a tumor.



*Image of a breast cancer tissue sample overlaid with visual representations of spatially interacting patterns of tumor and immune activity obtained through latent space factorization of 10X Visium spatial transcriptomics
Credit: Atul Deshpande, The Johns Hopkins University*

SpaceMarkers harnesses the information available through spatial transcriptomics — a cutting edge technology advancing the ability to measure gene expression in tissue samples based on their location in cells. Understanding the molecular profile of individual cells and the impact of intercellular interactions in the tumor microenvironment (cells in and around tumors) is crucial to distinguish the determinants of tumor progression. SpaceMarkers works by identifying regions of high activity from individual cell types seen in spatial transcriptomic data, explains lead study author Atul Deshpande, Ph.D., M.S., a postdoctoral researcher in the Fertig Lab at The Johns Hopkins University.

For more information, visit the following link:

<https://www.hopkinsmedicine.org/news/newsroom/news-releases/spacemarkers-novel-ai-method-identifies-locations-interactions-among-genes-in-and-around-tumors>

Reference

Mone, A. (May 11, 2023). SpaceMarkers novel AI method identifies locations, interactions among genes in and around tumors. Recovered May 12, 2023, The Johns Hopkins University:

<https://www.hopkinsmedicine.org/news/newsroom/news-releases/spacemarkers-novel-ai-method-identifies-locations-interactions-among-genes-in-and-around-tumors>



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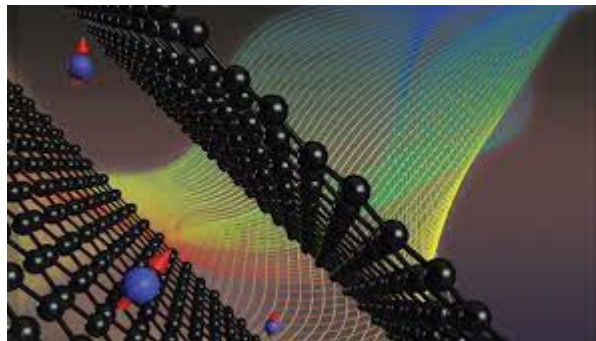


Information source: (The Johns Hopkins University, 2023)



1.11 Spin structure in 2D materials for the first time

In the study, the team — which also include scientists from the Center for Integrated Nanotechnologies at Sandia National Laboratories, and the University of Innsbruck — describe what they believe to be the first measurement showing direct interaction between electrons spinning in a 2D material and photons coming from microwave radiation. Called a coupling, the absorption of microwave photons by electrons establishes a novel experimental technique for directly studying the properties of how electrons spin in these 2D quantum materials — one that could serve as a foundation for developing computational and communicational technologies based on those materials, according to the researchers.



In the study, researchers describe what they believe to be the first measurement showing direct interaction between electrons spinning in a 2D material and photons coming from microwave radiation.

Credit: Jia Li, Brown University

“Spin structure is the most important part of a quantum phenomenon, but we’ve never really had a direct probe for it in these 2D materials,” said Jia Li, an assistant professor of physics at Brown and senior author of the research. “That challenge has prevented us from theoretically studying spin in these fascinating material for the last two decades. We can now use this method to study a lot of different systems that we could not study before.”

For more information, visit the following link:

<https://www.brown.edu/news/2023-05-11/2d-electronics>

Reference

Siliezar, J. (May 11, 2023). With new experimental method, researchers probe spin structure in 2D materials for first time. Recovered May 12, 2023, Brown University: <https://www.brown.edu/news/2023-05-11/2d-electronics>

Information source: (Brown University, 2023)



1.12 Bat protein called ASC2 to fight inflammation in humans

Protein that helps bats survive viral diseases might offer lessons for developing new anti-inflammatory treatments. By studying the unusual ability of bats to host viruses without significant illness, scientists at Duke-NUS Medical School have discovered a protein that could unlock new strategies for fighting inflammatory diseases in humans.

“Bats have attracted great attention as a likely reservoir of the SARS-CoV-2 virus responsible for the COVID-19 pandemic,” said Professor Wang Lin-Fa, from Duke-NUS’ Emerging Infectious Diseases (EID) Programme, the senior author of the study published in the journal *Cell*. *“But this unique ability to host yet survive viral infections could also have a very positive impact on human health if we can understand and exploit how they achieve this.”* The research is focused on multi-protein complexes called inflammasomes that are responsible for the overactive inflammation that causes serious symptoms in many diseases. Inflammasomes are also implicated in functional decline in ageing. The Duke-NUS team discovered that a bat protein called ASC2 has a powerful ability to inhibit inflammasomes, thereby limiting inflammation.

For more information, visit the following link:

https://www.duke-nus.edu.sg/allnews/bat-protein-asc2?utm_source=website&utm_medium=banner&utm_campaign=spotlight

Reference

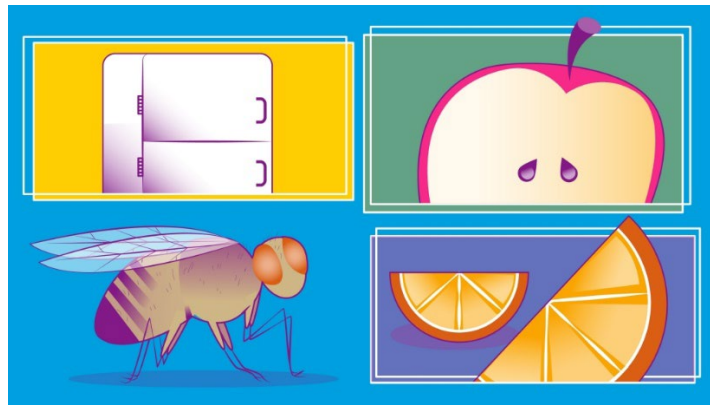
Graciano, F. (May 12, 2023). Learning from bats to fight inflammation in humans. Recovered May 15, 2023, Duke-NUS, a school of National University of Singapore: https://www.duke-nus.edu.sg/allnews/bat-protein-asc2?utm_source=website&utm_medium=banner&utm_campaign=spotlight

Information source: (National University of Singapore, 2023)



1.13 The feeling of hunger itself may slow aging in flies

Research examines changes in the brain that prompt the drive to seek food. From low-carb to intermittent fasting, surgery to Ozempic—people turn to a seemingly never ending array of diets, procedures and drugs to lose weight. While it has been long understood that limiting the amount of food eaten can promote healthy aging in a wide range of animals, including humans, a study from University of Michigan has revealed that the feeling of hunger itself may be enough to slow aging.



Credit: University of Michigan

Previous research has demonstrated that even the taste and smell of food can reverse the beneficial, life-extending effects of diet restriction, even without its consumption. These intriguing findings drove first author Kristy Weaver, Ph.D., principal investigator Scott Pletcher, Ph.D., and their colleagues to examine whether changes in the brain that prompt the drive to seek food could be behind longer life.

For more information, visit the following link:

<https://www.michiganmedicine.org/health-lab/feeling-hunger-itself-may-slow-aging-flies>

Reference

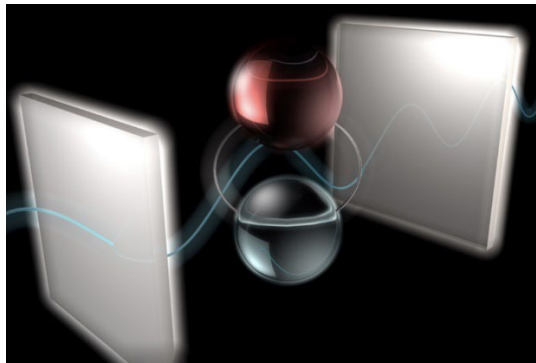
Malcom, K. (May 12, 2023). The feeling of hunger itself may slow aging in flies. Recovered May 15, 2023, University of Michigan: <https://www.michiganmedicine.org/health-lab/feeling-hunger-itself-may-slow-aging-flies>

Information source: (University of Michigan, 2023)



1.14 New ways for exotic quasiparticles to “relax”

Perovskite-based device that combines aspects of electronics and photonics may open doors to new kinds of computer chips or quantum qubits. New findings from a team of researchers at MIT and elsewhere could help pave the way for new kinds of devices that efficiently bridge the gap between matter and light. These might include computer chips that eliminate inefficiencies inherent in today’s versions, and qubits, the basic building blocks for quantum computers, that could operate at room temperature instead of the ultracold conditions needed by most such devices.



*By sandwiching bits of perovskite between two mirrors and stimulating them with laser beams, researchers were able to directly control the spin state of quasiparticles known as exciton-polariton pairs, which are hybrids of light and matter.
Credit: Massachusetts Institute of Technology*

By creating these perovskite sandwiches and stimulating them with laser beams, the researchers were able to directly control the momentum of certain “quasiparticles” within the system. Known as exciton-polariton pairs, these quasiparticles are hybrids of light and matter. Being able to control this property could ultimately make it possible to read and write data to devices based on this phenomenon.

For more information, visit the following link:

<https://news.mit.edu/2023/study-reveals-new-ways-exotic-quasiparticles-relax-0512>

Reference

Chandler, D. (May 12, 2023). Study reveals new ways for exotic quasiparticles to “relax”. Recovered May 15, 2023, Massachusetts Institute of Technology: <https://news.mit.edu/2023/study-reveals-new-ways-exotic-quasiparticles-relax-0512>

Information source: (Massachusetts Institute of Technology, 2023)



1.15 CRISPR-based rapid screening has potential to transform oral health

Imagine going to the dentist for a cleaning, giving a sample of your saliva, and coming out of the appointment with comprehensive information on your oral health – your risk for cavities and gum disease – and on systemic diseases like diabetes, heart disease, and cancer. This kind of diagnostic tool would revolutionize oral care, and provide early detection of disease without the pain, hassle, and cost of bloodwork.



Credit: The Forsyth Institute

Scientists from the Forsyth Institute are working to make this point-of-care diagnostic experience a reality. Their study, “*Rapid specific detection of oral bacteria using Cas13-based SHERLOCK*,” published today in the *Journal of Oral Microbiology*, demonstrates the CRISPR-based technology can be adapted to detect specific oral pathogens in around 30 minutes. The technology could potentially transform the field.

For more information, visit the following link:

<https://www.forsyth.org/news/crispr-based-rapid-detection/>

Reference

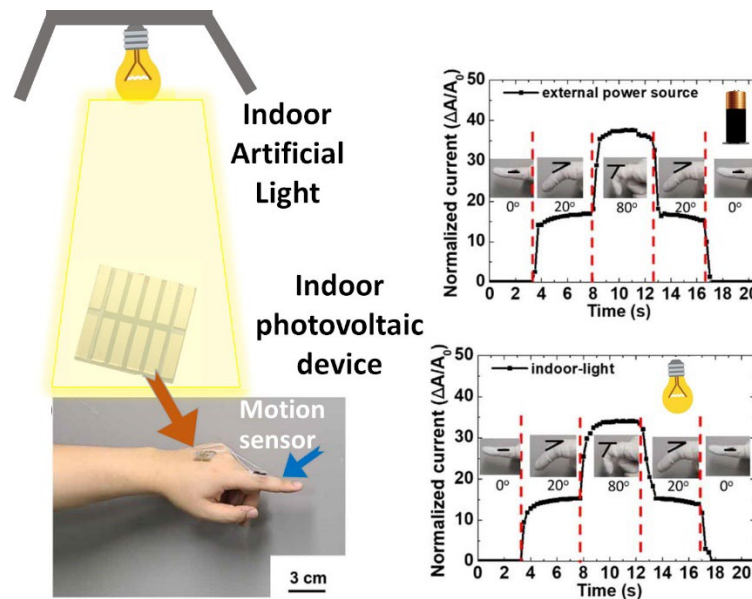
Sirko, J. (May 12, 2023). Forsyth’s application of CRISPR-based rapid detection technology has potential to transform oral health. Recovered May 15, 2023, The Forsyth Institute: <https://www.forsyth.org/news/crispr-based-rapid-detection/>

Information source: (The Forsyth Institute, 2023)



1.16 Indoor light energy for portable health sensors

Team from the University's Energy Harvesting Research Group at the School of Physics and Astronomy collaborated with colleagues at Kwangwoon University, Korea, on a study that shows how energy from ambient light sources such as white LED and fluorescent lamps can be harnessed through an indoor solar cell to self-power a motion sensor.



Credit: The University of St Andrews

The Internet of Wearable Things (IoWT) is a technology that has the potential to revolutionise the healthcare industry by automating telehealth treatments. Wireless sensors connected to wearable devices continuously monitor human activity and health factors, and collect data, giving clinicians remote access to their patients. Dr. Lethy Krishnan Jagadamma, who led the research for the University of St Andrews, said: *“Currently, wireless sensors are powered by batteries which often causes interruptions in data collection and patient monitoring due to the battery recharge required or battery replacement. Often the size and heaviness of the battery cause discomfort to patients. So there is a need to find an alternative source of powering the wireless sensors.”*

For more information, visit the following link:

<https://news.st-andrews.ac.uk/archive/university-of-st-andrews-researchers-make-indoor-light-energy-breakthrough-for-wearable-health-sensors/>

Reference

The University of St Andrews (May 15, 2023). Researchers make indoor light energy breakthrough for wearable health sensors. Recovered May 15, 2023, The University of St Andrews: <https://news.st-andrews.ac.uk/archive/university-of-st-andrews-researchers-make-indoor-light-energy-breakthrough-for-wearable-health-sensors/>

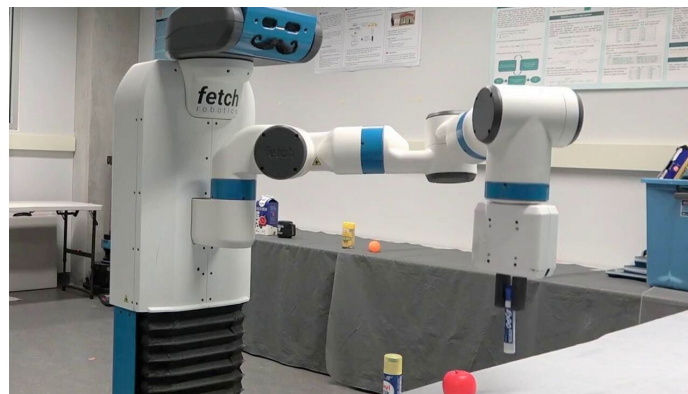


Information source: (The University of St Andrews, 2023)



1.17 Robots can help to find objects, through "artificial memory"

Engineers at the University of Waterloo have discovered a new way to program robots to help people with dementia locate medicine, glasses, phones and other objects they need but have lost. And while the initial focus is on assisting a specific group of people, the technology could someday be used by anyone who has searched high and low for something they've misplaced.



Credit: The University of Waterloo

"The long-term impact of this is really exciting," said Dr. Ali Ayub, a post-doctoral fellow in electrical and computer engineering. *"A user can be involved not just with a companion robot but a personalized companion robot that can give them more independence."* Ayub and three colleagues were struck by the rapidly rising number of people coping with dementia, a condition that restricts brain function, causing confusion, memory loss and disability. Many of these individuals repeatedly forget the location of everyday objects, which diminishes their quality of life and places additional burdens on caregivers.

For more information, visit the following link:

<https://uwaterloo.ca/news/media/cant-find-your-phone-theres-robot>

Reference

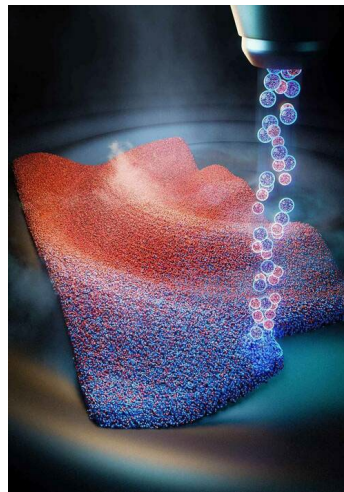
The University of Waterloo (May 15, 2023). Can't find your phone? There's a robot for that, Stanford-led research finds. Recovered May 15, 2023, The University of Waterloo: <https://uwaterloo.ca/news/media/cant-find-your-phone-theres-robot>

Information source: (The University of Waterloo, 2023)



1.18 New 3D printing method, "game changer" for the discovery and manufacture of new materials

The time-honored Edisonian trial-and-error process of discovery is slow and labor-intensive. This hampers the development of urgently needed new technologies for clean energy and environmental sustainability, as well as for electronics and biomedical devices. *"It usually takes 10 to 20 years to discover a new material,"* said Yanliang Zhang, associate professor of aerospace and mechanical engineering at the University of Notre Dame. *"I thought if we could shorten that time to less than a year — or even a few months — it would be a game changer for the discovery and manufacturing of new materials."*



Credit: University of Notre Dame

Now Zhang has done just that, creating a novel 3D printing method that produces materials in ways that conventional manufacturing can't match. The new process mixes multiple aerosolized nanomaterial inks in a single printing nozzle, varying the ink mixing ratio on the fly during the printing process. This method — called high-throughput combinatorial printing (HTCP) — controls both the printed materials' 3D architectures and local compositions and produces materials with gradient compositions and properties at microscale spatial resolution.

For more information, visit the following link:

<https://news.nd.edu/news/novel-3d-printing-method-a-game-changer-for-discovery-manufacturing-of-new-materials/>

Reference

Cruise, K. (May 15, 2023). Novel 3D printing method a 'game changer' for discovery, manufacturing of new materials. Recovered May 15, 2023, University of Notre Dame: <https://news.nd.edu/news/novel-3d-printing-method-a-game-changer-for-discovery-manufacturing-of-new-materials/>

Information source: (University of Notre Dame, 2023)



1.19 Method for entering text in virtual spaces

To date, inputting text in virtual reality has been difficult. Now researchers from the Department of Mathematics and Computer Science at the University of Basel have discovered a way to make the process easier – by adapting the principle of the swipe keyboard for the Virtual Reality world.



*In virtual reality, users equipped with VR goggles see a swipe keyboard in front of them. Using the controller, they can connect the letters in a swipe gesture to form a word
Credit: Adobe Stock, University of Basel*

Until now, inputting text in virtual spaces – when searching for a digital exhibition or using a business application, for instance – meant typing in every single letter individually on a virtual keyboard. Longer texts are often more difficult to input, however, as compared with a traditional computer keyboard, there is no haptic feedback in virtual reality and the movements of a finger can't be captured with precision. Florian Spiess, a doctoral candidate at the Department of Mathematics and Computer Science, and his team led by Professor Heiko Schuldt have developed a new method for inputting text in virtual spaces. With the help of a swipe keyboard, words can be entered with an effortless swipe gesture. The results were presented by the researchers at the IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR).

For more information, visit the following link:

<https://www.unibas.ch/en/News-Events/News/Uni-Research/Type-or-swipe-Text-input-in-virtual-reality-.html>

Reference

Zielenski, A. (May 15, 2023). Type or swipe? Text input in virtual reality. Recovered May 16, 2023, University of Basel: <https://www.unibas.ch/en/News-Events/News/Uni-Research/Type-or-swipe-Text-input-in-virtual-reality-.html>

Information source: (University of Basel, 2023)



1.20 Priming method improves battery life and efficiency

Rice University engineers improve prelithiation, uncover lithium-trapping mechanism. Silicon anode batteries have the potential to revolutionize energy storage capabilities, which is key to meeting climate goals and unlocking the full potential of electric vehicles.



*Quan Nguyen (left), Sibani Lisa Biswal and collaborators developed a prelithiation technique that helps improve the performance of lithium-ion batteries with silicon anodes.
Credit: Jeff Fitlow, Rice University*

Scientists at Rice University's George R. Brown School of Engineering have developed a readily scalable method to optimize prelithiation, a process that helps mitigate lithium loss and improves battery life cycles by coating silicon anodes with stabilized lithium metal particles (SLMPs). The Rice lab of chemical and biomolecular engineer Sibani Lisa Biswal found that spray-coating the anodes with a mixture of the particles and a surfactant improves battery life by 22% to 44%. Battery cells with a greater amount of the coating initially achieved a higher stability and cycle life. However, there was a drawback: When cycled at full capacity, a larger amount of the particle coating led to more lithium trapping, causing the battery to fade more rapidly in subsequent cycles.

For more information, visit the following link:

<https://news.rice.edu/news/2023/new-priming-method-improves-battery-life-efficiency>

Reference

Cernea, S. (May 15, 2023). New priming method improves battery life, efficiency. Recovered May 16, 2023, Rice University: <https://news.rice.edu/news/2023/new-priming-method-improves-battery-life-efficiency>

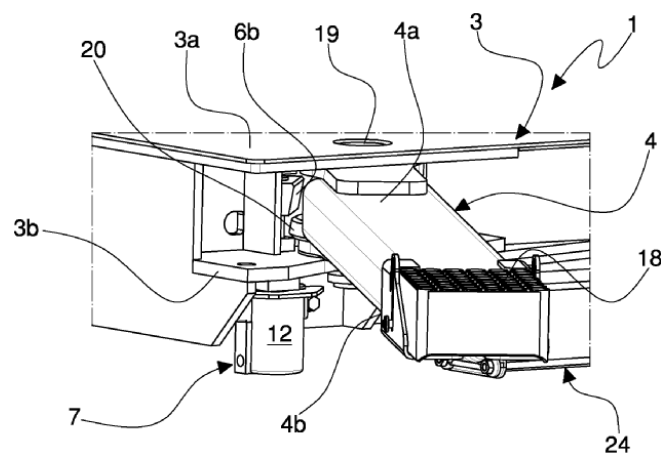
Information source: (Rice University, 2023)



2 PATENTS

2.1 Vehicle lift and its process

A vehicle lift comprising a movement system configured to be installed in a pit in the ground, a platform engaged with the movement system and movable entering to and exiting from the pit, at least one arm carried by the platform and configured for contacting a vehicle to be lifted.



*Perspective view of a lift according to aspects of the present invention installed in a pit.
Credit: Marinelli, M.; Ramponi, S.; Longhi, G. & Bui, S., WIPO IP Portal*

The arm is movable between an extended position and a retracted position. The lift comprises a stop movable relative to the platform between a grip position where it engages the arm and a release position where it disengages the arm. The lift comprises an actuator carried by the platform and active on the stop to move said stop between the grip position and the release position.

For more information, visit the following link:

https://patentscope.wipo.int/search/en/detail.jsf?docId=US397718225&_cid=P11-LHQCWS-91378-4

Reference

Marinelli, M.; Ramponi, S.; Longhi, G. & Bui, S. (May 11, 2023). Vehicle lift and process for lifting vehicles. Recovered May 11, 2023, WIPO IP Portal:

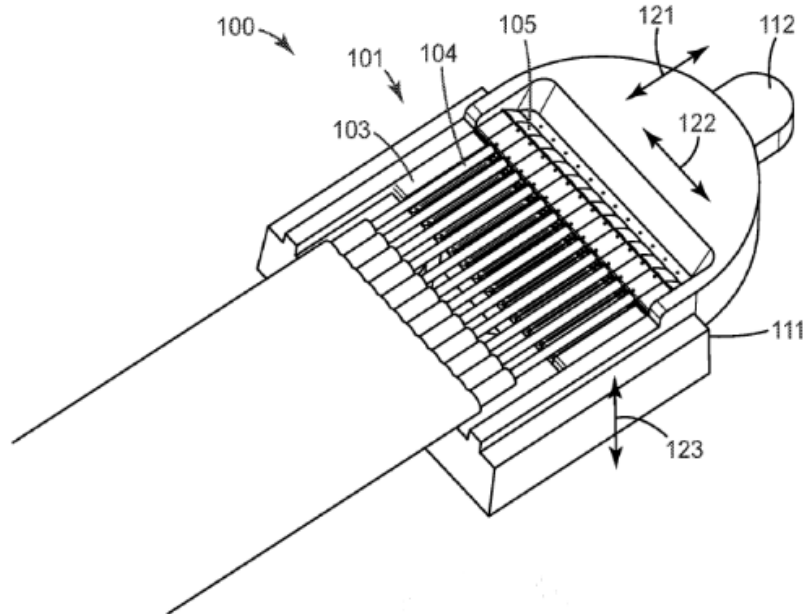
https://patentscope.wipo.int/search/en/detail.jsf?docId=US397718225&_cid=P11-LHQCWS-91378-4

Information source: (WIPO IP Portal, 2023)



2.2 Optical ferrules and molds

A unitary optical ferrule is molded to include one or more elements for receiving and securing one or more optical waveguides one or more elements for affecting one or more characteristics of light from the optical waveguide while propagating the light within the ferrule.



*Illustrates a first side of the optical ferrule in accordance with some embodiments;
Credit: Haase, M.; Mathews, A.; Smith, T. & Nelson, J., WIPO IP Portal*

The optical ferrule also includes one or more first alignment features and one or more second alignment features that, when the ferrule is mated with a mating ferrule, each controls alignment of the ferrule with the mating ferrule along three mechanical degrees of freedom. The surface of the optical ferrule can be divided along the thickness axis into a first section and an opposing second section, wherein the first section of the surface includes the receiving and securing elements, the light affecting elements, and the first alignment features and the second section of the surface includes the second alignment features.

For more information, visit the following link:

https://patentscope.wipo.int/search/en/detail.jsf?docId=US397716795&_cid=P11-LHQD1A-93801-1

Reference

Haase, M.; Mathews, A.; Smith, T. & Nelson, J. (May 11, 2023). Optical ferrules and optical ferrule molds. Recovered May 11, 2023, WIPO IP Portal:

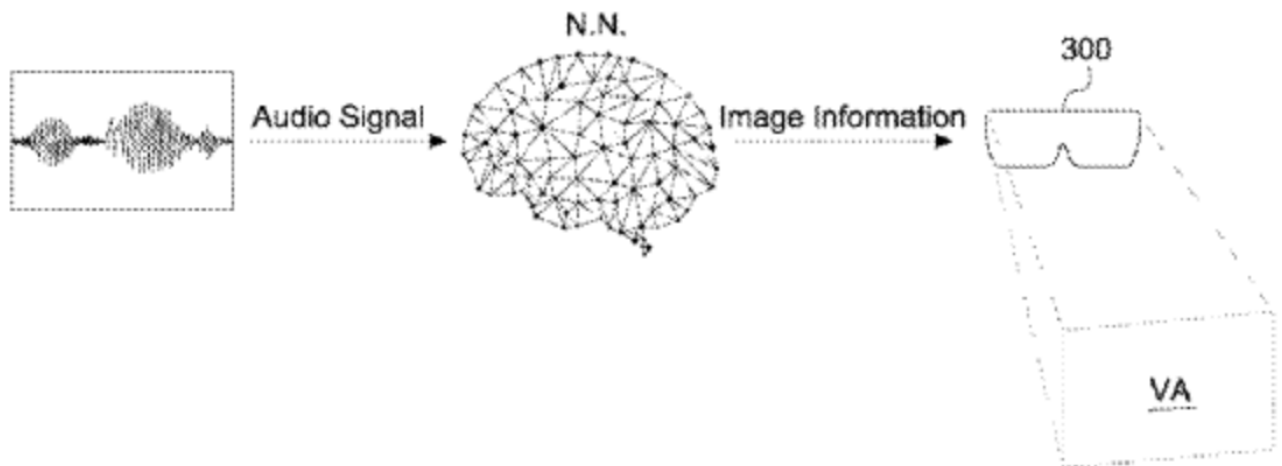
https://patentscope.wipo.int/search/en/detail.jsf?docId=US397716795&_cid=P11-LHQD1A-93801-1

Information source: (WIPO IP Portal, 2023)



2.3 Augmented Reality device performing audio recognition and control method therefor

Proposed is an Augmented Reality device capable of performing audio identification and a control method therefor. The augmented reality device comprises:



*Conceptual diagram illustrating system including augmented reality (AR) device.
Credit: Jeong, I.; Lim, H.; Han, Y; Lee, S.; Park, J. & Lee, D., WIPO IP Portal*

A see-through display which is formed to enable a user's eyes to see therethrough and thus outputs a virtual object; an audio input unit which receives an input of an audio signal generated within a preset distance from the display; and a control unit which controls operations of the see-through display to identify event information corresponding to the audio signal and to output image information of the virtual object corresponding to the identified event information.

For more information, visit the following link:

https://patentscope.wipo.int/search/en/detail.jsf?docId=US397717881&_cid=P11-LHQD1A-93801-1

Reference

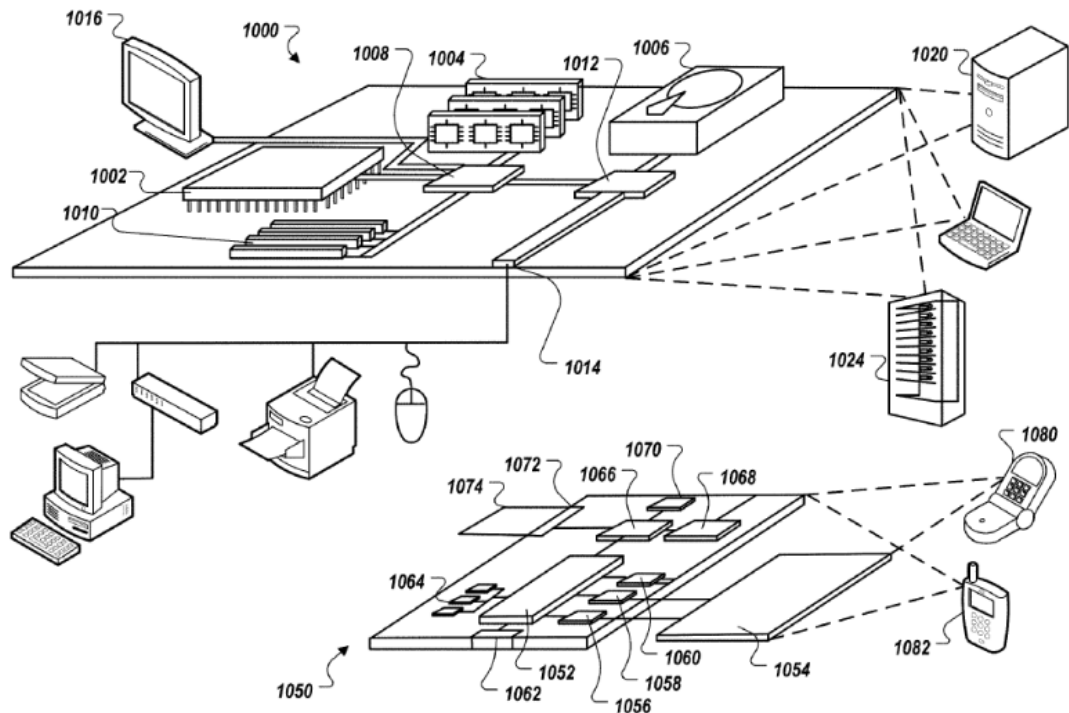
Jeong, I.; Lim, H.; Han, Y; Lee, S.; Park, J. & Lee, D. (May 11, 2023). Augmented reality device performing audio recognition and control method therefor. Recovered May 11, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/en/detail.jsf?docId=US397717881&_cid=P11-LHQD1A-93801-1

Information source: (WIPO IP Portal, 2023)



2.4 Systems and methods for personalized patient body modeling

Disclosed are systems and methods for diagnosing website quality. The method can include:



Is a schematic diagram that shows an example of a computing device and a mobile computing device.

Like reference symbols in the various drawings indicate like elements.

Credit: Kristoffersen, K.; Bonde, J. & Jensen, C., WIPO IP Portal

Analyzing, by a computing system, a website to determine a current value for a quality score of the website, identifying issues with the website, providing information to cause a client device to present: (i) a circle graphical element that indicates the current value, a first portion of the circle's circumference being a size that indicates the current value, and (ii) indications of categories of issues with the website that each include different sets of issues, receiving an indication that user input at the client device selected a user-selected category, determining a target value for the quality score that would result should all issues within the user-selected category be resolved, and providing information to cause the client device to add a target element at a location on the circle's circumference that represents the target value.

For more information, visit the following link:

https://patentscope.wipo.int/search/en/detail.jsf?docId=US397714590&_cid=P11-LHQD1A-93801-3

Reference

Kristoffersen, K.; Bonde, J. & Jensen, C. (May 11, 2023). Systems and methods for diagnosing quality issues in websites. Recovered May 11, 2023, WIPO IP Portal:



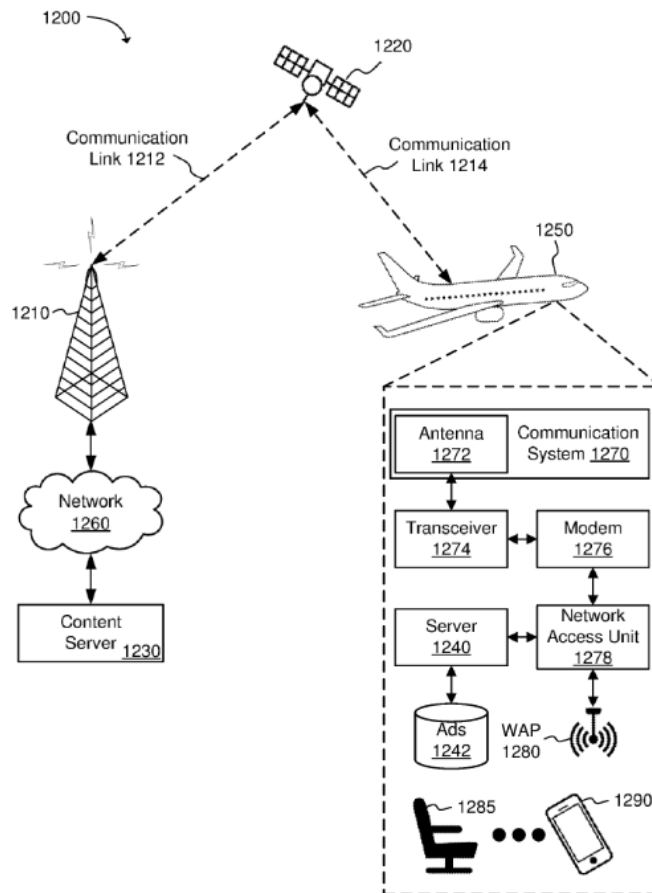
https://patentscope.wipo.int/search/en/detail.jsf?docId=US397714590&_cid=P11-LHQD1A-93801-3

Information source: (WIPO IP Portal, 2023)



2.5 Systems and methods for targeted ad delivery on mobile platforms

Technology is described for providing targeted electronic advertisements on an aircraft. A server onboard the aircraft may establish a connection with a client device onboard the aircraft.



Illustrates a satellite communication system according to an example of the present technology.

Credit: O'Brien, U.; O'Sullivan, N. & Murray, F., WIPO IP Portal

The server may identify a user profile associated with a user of the client device. The user profile may include itinerary information for the user of the client device. The server may select a targeted electronic advertisement based in part on the itinerary information. The targeted electronic advertisement may be selected from a data store of electronic advertisements. The targeted electronic advertisement may be sent to the client device to be displayed using a graphical user interface on the client device.

For more information, visit the following link:

https://patentscope.wipo.int/search/en/detail.jsf?docId=US397713334&_cid=P11-LHQDAE-99136-1

Reference



O'Brien, U.; O'Sullivan, N. & Murray, F. (May 11, 2023). Systems and methods for delivery of targeted advertisements onboard mobile platforms. Recovered May 11, 2023, WIPO IP Portal:

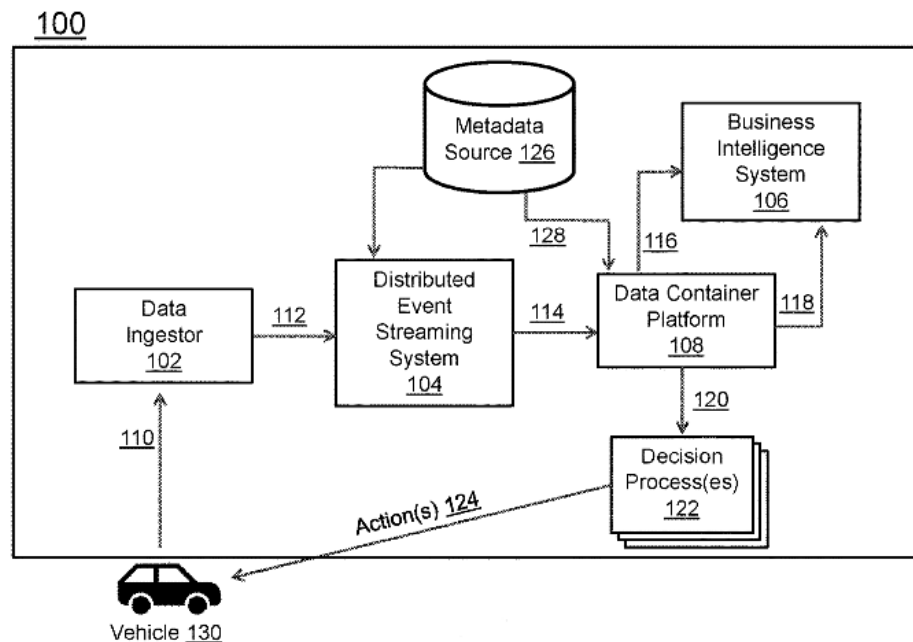
https://patentscope.wipo.int/search/en/detail.jsf?docId=US397713334&_cid=P11-LHQDAE-99136-1

Information source: (WIPO IP Portal, 2023)



2.6 Large-scale collaboration of software applications for vehicle data analysis and response

Approaches, techniques, and mechanisms are disclosed for large scale vehicle data collaborative analysis.



Illustrative view of various aspects of example system in which the techniques described herein can be practiced.

Credit: Mai, D.; Nzeya, E. & Patil, S., Espacenet Patent Search

According to one embodiment, a large amount of data streams is received from a multitude of vehicles. A distributed event streaming system is applied to parse the data streams based on an attribute, such as time sensitive data, location-specific data, or vehicle maintenance, operational, or fault-prevention data. A data container platform instance hosts applications that receive the parsed data streams. Output of an application is transformed into data streams having a common topic. Other applications may access the data streams by topic. Upon receiving an indication that an application has processed a data stream by topic, a decision point may be reached and executed by an external application, triggering an action on a vehicle from the multitude of vehicles.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086229922/publication/US2023143923A1?q=artificial%20intelligence>

Reference

Mai, D.; Nzeya, E. & Patil, S. (May 11, 2023). Large scale collaboration of computing applications for vehicle data analysis and response. Recovered May 11, 2023, Espacenet Patent Search:



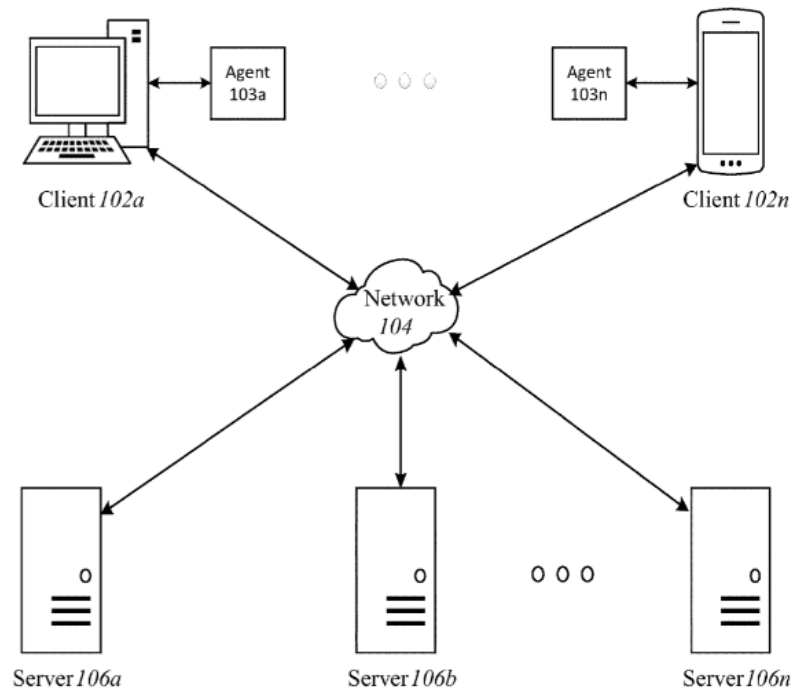
<https://worldwide.espacenet.com/patent/search/family/086229922/publication/US2023143923A1?q=artificial%20intelligence>

Information source: (Espacenet Patent Search, 2023)



2.7 Systems and methods for managed videoconferencing

The present disclosure provides systems and methods for managed video conferencing. A system can include a media server comprising a processor, a network interface in communication with a plurality of client devices, and a memory storing a cryptographic key shared with an access control server.



Block diagram depicts an embodiment of a network environment comprising a client device in communication with a server device.

Credit: Asgekar, A. & Agarwal, A., Espacenet Patent Search

The system can receive, from a first client device via the network interface, metadata of a video conferencing session and a token, the token provided to the first client device by the access control server responsive to successful registration of the first client device for the video conferencing session. The system can calculate a hash of the metadata with the cryptographic key. The system can compare the calculated hash to the token. The system can, responsive to the calculated hash matching the token, provide at least one media stream of the video conferencing session to the first client device. Such a stream may be provided to the first client device regardless of what other devices are configured to receive the stream or receive other streams within the system.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086229855/publication/US2023143579A1?q=machine%20learning>

Reference

Asgekar, A. & Agarwal, A. (May 11, 2023). Observation of parallel video collaboration sessions. Recovered May 11, 2023, Espacenet Patent Search:



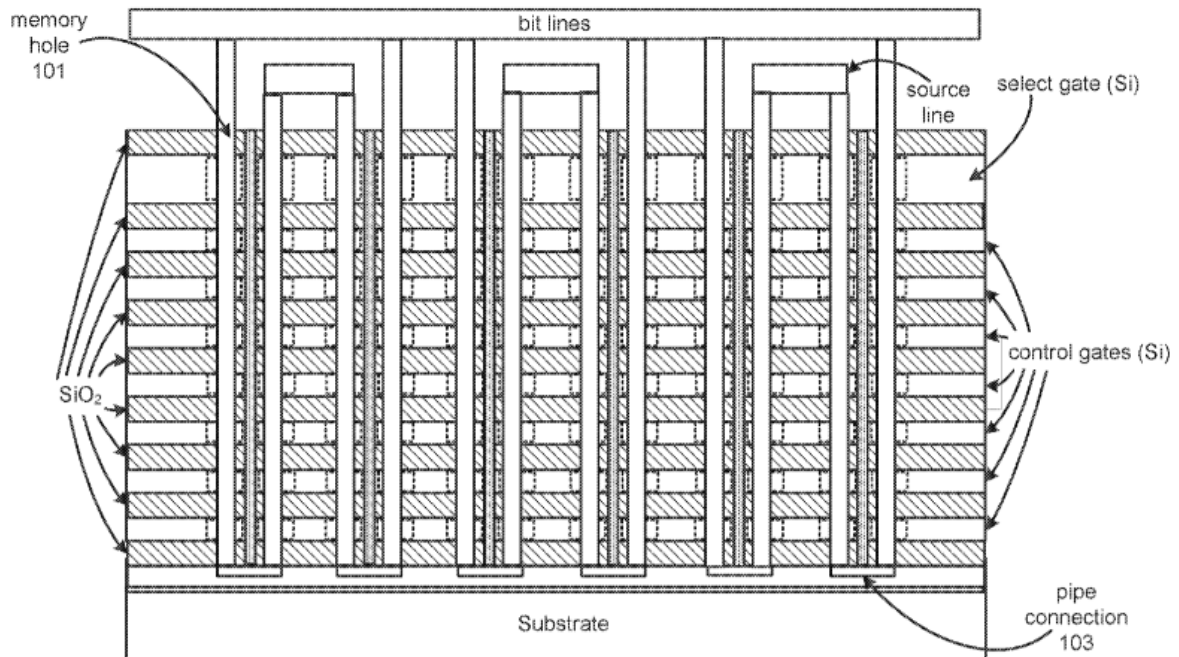
<https://worldwide.espacenet.com/patent/search/family/086229855/publication/US2023143579A1?q=machine%20learning>

Information source: (Espacenet Patent Search, 2023)



2.8 Modeling and prediction system with Auto Machine Learning in the production of memory devices

To provide more test data during the manufacture of non-volatile memories and other integrated circuits, machine learning is used to generate virtual test values. Virtual test results are interpolated for one set of tests for devices on which the test is not performed based on correlations with other sets of tests.



Drawing of three-dimensional nonvolatile memory device of the BiCS type.

Credit: Sendoda, T.; Ikawa, Y.; Asam, N.; Samura, K. & Higashitani, M., Espacenet Patent Search

In one example, machine learning determines a correlation study between bad block values determined at die sort and photo-limited yield (PLY) values determined inline during processing. The correlation can be applied to interpolate virtual inline PLY data for all of the memory dies, allowing for more rapid feedback on the processing parameters for manufacturing the memory dies and making the manufacturing process more efficient and accurate. In another set of embodiments, the machine learning is used to extrapolate limited metrology (e.g., critical dimension) test data to all of the memory die through interpolated virtual metrology data values.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086229783/publication/US2023142936A1?q=deep%20learning>

Reference

Sendoda, T.; Ikawa, Y.; Asam, N.; Samura, K. & Higashitani, M. (May 11, 2023). Modelling and prediction system with auto machine learning in the production of memory devices. Recovered May 11, 2023, Espacenet Patent Search:



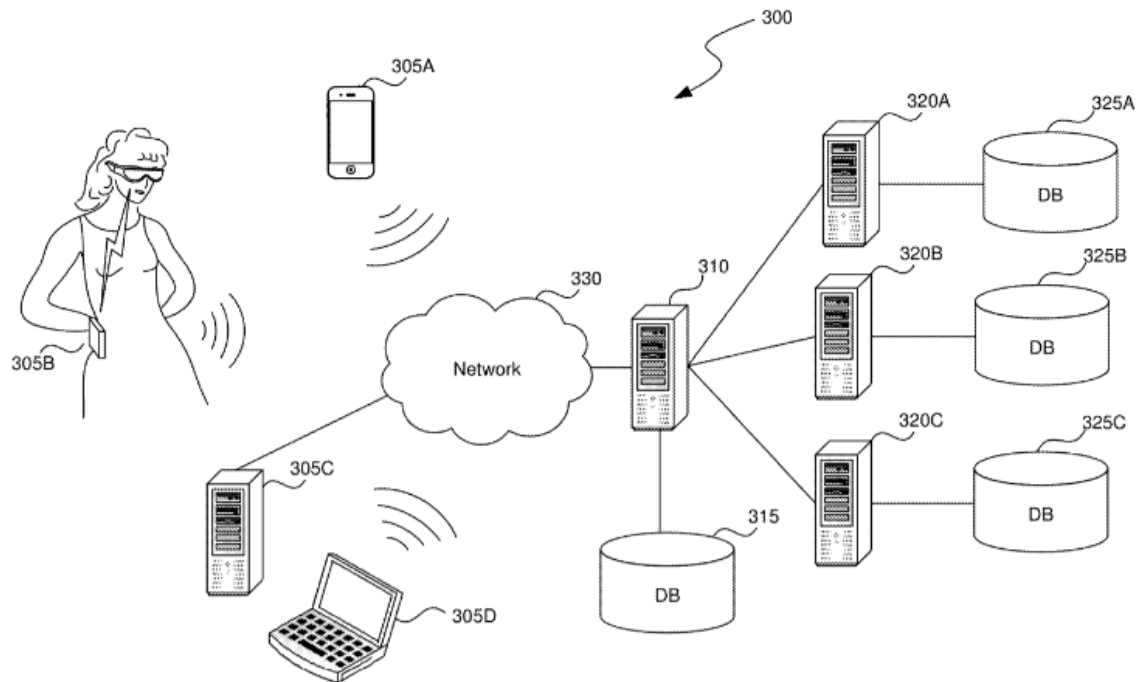
<https://worldwide.espacenet.com/patent/search/family/086229783/publication/US2023142936A1?q=deep%20learning>

Information source: (Espacenet Patent Search, 2023)



2.9 Methods and systems for creating artificial reality environments

Methods and systems described herein are directed to creating an artificial reality environment having elements automatically created from source images. In response to a creation system receiving the source images, the system can employ a multi-layered comparative analysis to obtain virtual object representations of objects depicted in the source images.



*Block diagram illustrating an overview of an environment in which some implementations of the present technology may operate.
Credit: Chan, C., Espacenet Patent Search*

A first set of the virtual objects can be selected from a library by matching identifiers for the depicted objects with tags on virtual objects in the library. A second set of virtual objects can be objects for which no candidate first virtual objects was adequately matched in the library, prompting the creation of a virtual object by generating depth data and skinning a resulting 3D mesh based on the source images. Having determined the virtual objects, the system can compile them into the artificial reality environment according to relative locations determined from the source images.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086229152/publication/US2023144893A1?q=virtual>

Reference

Chan, C. (May 11, 2023). Automatic artificial reality world creation. Recovered May 11, 2023, Espacenet Patent Search:

<https://worldwide.espacenet.com/patent/search/family/086229152/publication/US2023144893A1?q=virtual>

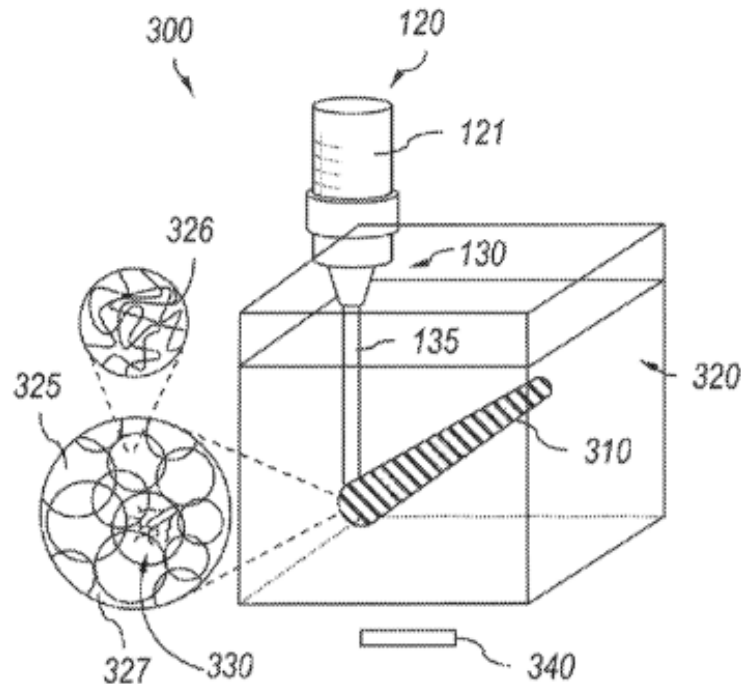


Information source: (Espacenet Patent Search, 2023)



2.10 Method for 3D printing of live engineered materials

Disclosed is a method to 3D print materials with defined bacterial communities into controlled, complex 3D structures, and compositions.



Schematic diagram of an example system.

Credit: Datta, S.; Priestley, R.; Xu, X. & Bahía, R., Espacenet Patent Search

The technique includes first providing an ink composition that includes a pre-polymer composition and a microorganism, where the pre-polymer composition includes a polymerizable monomer, a cross-linking agent, the photoinitiator, and a solvent. The technique also includes 3D printing a pattern in a hydrogel support matrix using the ink composition where the hydrogel support matrix is in a container. The technique may also include forming a 3D printed engineered living material by curing the 3D printed pattern.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086242072/publication/WO2023081329A1?q=3D>

Reference

Datta, S.; Priestley, R.; Xu, X. & Bahía, R. (May 11, 2023). 3D-printing engineered living materials. Recovered May 11, 2023, Espacenet Patent Search:

<https://worldwide.espacenet.com/patent/search/family/086242072/publication/WO2023081329A1?q=3D>

Information source: (Espacenet Patent Search, 2023)