# Weekly Newsletter
TECHNOLOGY SURVEILLANCE

CONCYTEC

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   Study uncovers age-related brain differences in autistic individuals

A new study led by UC Davis MIND Institute researchers confirms that brain development in people with autism differs from those with typical neurodevelopment, these differences are linked to genes involved in inflammation, immunity response and neural transmissions. They begin in childhood and evolve across the lifespan.
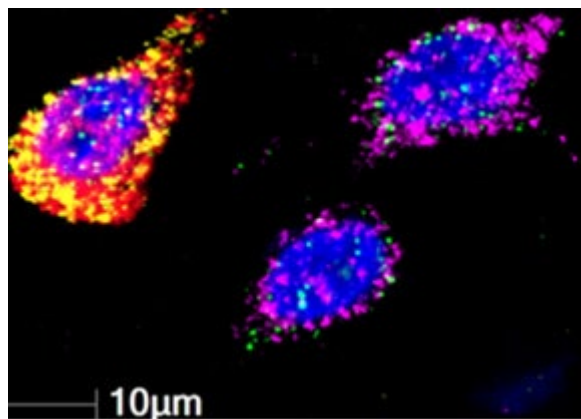
Excitatory neurons (vGLUT; tells neurons to fire) in red and yellow and inhibitory neurons (GABA; tells neurons to stop firing) in fuchsia.
Credit: Nadine A Yehya, UCDAVIS Health

About one in 44 children in the U.S. has autism. Autistic individuals may behave, communicate and learn in ways that are different from neurotypical people. As they age, they often have challenges with social communication and interaction. The researchers aimed to understand how neurons in the brain communicate and the interaction between age and autism. They studied the genetic differences in brain neurons in people with autism at different ages and compared them to those with neurotypical development. Earlier studies have shown that certain brain regions mark early excess, followed by reductions in volume, connectivity, and cell densities of neurons as people with autism age through adulthood.

For more information, visit the following link:
https://health.ucdavis.edu/news/headlines/uc-davis-study-uncovers-age-related-brain-differences-in-autistic-individuals/2023/03

Reference
Yehya, N. A. (March 03, 2023). UC Davis study uncovers age-related brain differences in autistic individuals. Recovered March 03, 2023, University of California Davis Healt:

https://health.ucdavis.edu/news/headlines/uc-davis-study-uncovers-age-related-brain-differences-in-autistic-individuals/2023/03

Information source: (University of California Davis Healt, 2023)

1.2   Integrating humans with Artificial Intelligence in structural design

Modern fabrication tools such as 3D printers can make structural materials in shapes that would have been difficult or impossible using conventional tools. Meanwhile, new generative design systems can take great advantage of this flexibility to create innovative designs for parts of a new building, car, or virtually any other device. But such *"black box"* automated systems often fall short of producing designs that are fully optimized for their purpose, such as providing the greatest strength in proportion to weight or minimizing the amount of material needed to support a given load. Fully manual design, on the other hand, is time-consuming and labor-intensive.
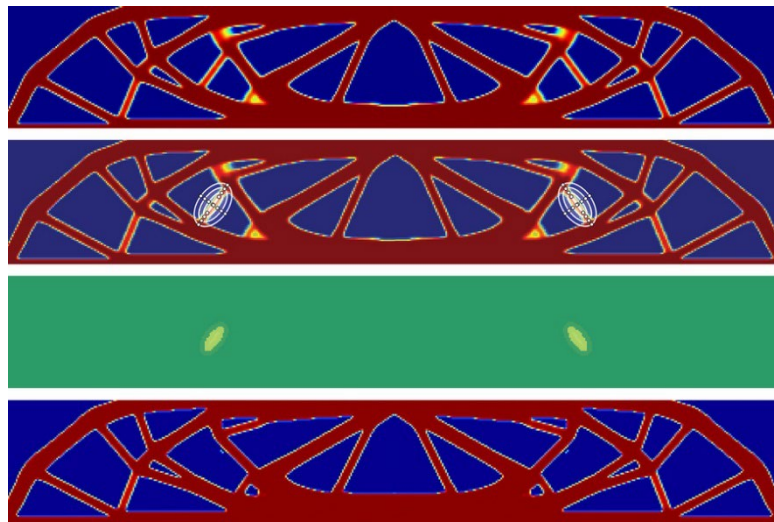
This sequence shows an example of the iterative design process in action. On top, you can see the AI-designed initial version of a support beam. In the second and third images, a human operator highlights two support segments as unnecessary. The bottom image shows how the AI system incorporates that input by eliminating those segments and strengthening others to compensate.
Credit: David L. Chandler, Massachusetts Institute of Technology News

Researchers have used an automated design system but stopped the process periodically to allow human engineers to evaluate the work in progress and make tweaks or adjustments before letting the computer resume its design process. Introducing a few of these iterations produced results that performed better than those designed by the automated system alone, and the process was completed more quickly compared to the fully manual approach.

For more information, visit the following link:
https://news.mit.edu/2023/integrating-humans-ai-structural-design-0302

Reference
Chandler, D. (March 02, 2023). Integrating humans with AI in structural design. Recovered March 03, 2023, Massachusetts Institute of Technology: https://news.mit.edu/2023/integrating-humans-ai-structural-design-0302

Information source: (Massachusetts Institute of Technology, 2023)

1.3   Robot provides unprecedented views below Antarctic ice shelf

High in a narrow, seawater-filled crevasse in the base of Antarctica's largest ice shelf, cameras on the remotely operated Icefin underwater vehicle relayed a sudden change in scenery. Walls of smooth, cloudy meteoric ice abruptly turned green and rougher in texture, transitioning to salty marine ice. Nearly 1,900 feet above, near where the surface of the Ross Ice Shelf meets Kamb Ice Stream, a U.S.-New Zealand research team recognized the shift as evidence of *"ice pumping"* – a process never before directly observed in an ice shelf crevasse, important to its stability.

The remotely operated Icefin underwater robot after completing a dive below the Ross Ice Shelf near Kamb Ice Stream in 2019.
Credit: James Dean, Cornell University

"We were looking at ice that had just melted less than 100 feet below, flowed up into the crevasse and then refrozen," said Justin Lawrence, visiting scholar at the Cornell Center for Astrophysics and Planetary Science in the College of Arts and Sciences (A&S). *"And then it just got weirder as we went higher up."* The Icefin robot's unprecedented look inside a crevasse, and observations revealing more than a century of geological processes beneath the ice shelf, are detailed in *"Crevasse Refreezing and Signatures of Retreat Observed at Kamb Ice Stream Grounding Zone."*

For more information, visit the following link:
https://news.cornell.edu/stories/2023/03/robot-provides-unprecedented-views-below-antarctic-ice-shelf

Reference
Dean, J. (March 02, 2023). Robot provides unprecedented views below Antarctic ice shelf. Recovered March 03, 2023, Cornell University: https://news.cornell.edu/stories/2023/03/robot-provides-unprecedented-views-below-antarctic-ice-shelf

Information source: (Cornell University, 2023)

1.4   Wooden seed carriers mimic the behavior of self-burying seed

Researchers from Penn Engineering have developed a seed carrier, fashioned from wood veneer, that could enable aerial seeding of difficult-to-access areas, and could be used for a variety of seeds or fertilizers.

Credit: Penn Engineering Today

How seeds implant themselves in soil can seem magical. Take some varieties of erodium, whose five-petalled flowers of purple, pink, or white look like geraniums. The seed of these plants is carried inside a thin, tightly wound stalk. During rain or high humidity, the corkscrew-like stalk unwinds and twists the seed into the soil, where it can take root and is safe from hungry birds and harsh environmental conditions. Inspired by erodium's magic, Shu Yang, Joseph Bordogna Professor and Chair of Materials Science and Engineering and professor in Chemical and Biomolecular Engineering at Penn Engineering, and a team of collaborators have engineered a biodegradable seed carrier referred to as *"E-seed."*

For more information, visit the following link:
https://penntoday.upenn.edu/news/engineered-magic-wooden-seed-carriers-mimic-behavior-self-burying-seed

Reference
Spice, B. (March 02, 2023). Engineered magic: Wooden seed carriers mimic the behavior of self-burying seed. Recovered March 03, 2023, University of Pennsylvania: https://penntoday.upenn.edu/news/engineered-magic-wooden-seed-carriers-mimic-behavior-self-burying-seed

Information source: (University of Pennsylvania, 2023)

1.5   Application recognizes suspected MPOX rashes using Artificial Intelligence

Researchers were able to devise an application that can determine which skin lesions are caused by MPOX with an accuracy of 90%.

PoxApp analyzes photos of suspected MPOX lesions and, in less than five minutes, gives a risk score with recommendations.
Credit: Marina Demidiuk / Shutterstock.com, Stanford School of Medicine

A new Application developed by scientists at Stanford Medicine and other institutions can detect skin lesions caused by MPOX, previously known as monkeypox, in images with an accuracy of 90%, the researchers found in a study. To analyze images, the application uses a type of Artificial Intelligence that was trained and evaluated on a large data set of about 130,000 images of various skin conditions. The free, open-source application, called PoxApp, allows users to take pictures of skin lesions using their smartphones, answer a few questions and receive a risk score with recommendations, such as MPOX testing or post-exposure vaccination, in less than five minutes. *"It´s a quick, easy anonymous way to get a first assessment,"* said Alexander Thieme, MD, the lead developer of the application and a visiting scholar in the Department of Medicine from Charité – Universitatsmedizin Berlin and Berlin Institute of Health. *"We are hoping to increase the likelihood that someone sees a doctor due to their skin lesions rather than ignore it"*

For more information, visit the following link:
https://med.stanford.edu/news/all-news/2023/03/mpox-vaccination.html

Reference
Moskal, E. (March 02, 2023). App recognizes suspected mpox rashes using Artificial Intelligence. Recovered March 03, 2023, Stanford Medicine: https://med.stanford.edu/news/all-news/2023/03/mpox-vaccination.html

Information source: (Stanford Medicine, 2023)

1.6   Technology to monitor wildlife to boost preservation efforts

Everywhere you look, biodiversity is under threat. According to the World Wildlife Fund (WWF), wildlife populations have plummeted by 69% since 1970. Species extinction is unfolding at more than 1,000 times the natural rate. The percentages of species threatened with extinction are chilling: 40% for plants, 41% for amphibians, 27% for mammals and 13% for birds. While climate change and a growing demand for energy are unlikely to reverse this trend, technological progress and scientific research could help mitigate its effects.

Smart Microphone that can record animal sounds and, with the help of AI, recognize them.
Credit: ©Olivier Stähli, École Polytechnique Fédérale de Lausanne

To mark this occasion, we decided to spotlight École Polytechnique Fédérale de Lausanne (EPFL) research groups that are developing systems to identify, monitor and preserve wildlife. Humming high off the ground, drones have become a popular method for tracking and cataloging wildlife populations from afar. A case in point is in the Kuzikus Wildlife Reserve in Namibia, where Devis Tuia, EPFL's Environmental Computational Science and Earth Observation Laboratory, and his group recently kicked off the latest in a series of projects to refine the Artificial Intelligence-powered computer-vision software that autonomously extracts information from drone images.

For more information, visit the following link:
https://news.epfl.ch/news/scientists-monitor-wildlife-to-boost-preservation-/

Reference
Brouet, A. (March 02, 2023). Scientists monitor wildlife to boost preservation efforts. Recovered March 03, 2023, École Polytechnique Fédérale de Lausanne: https://news.epfl.ch/news/scientists-monitor-wildlife-to-boost-preservation-/

Information source: (Ecole Polytechnique Fédérale de Lausanne, 2023)

1.7   Researchers observe solar filament formation caused by oscillation magnetic reconnection

Researchers led by YAN Xiaoli from the Yunnan Observatories of the Chinese Academy of Sciences, in collaboration with Sun Xia and Liang Hongfei from Yunnan Normal University, have clearly observed the formation of an intermediate filament caused by small-scale oscillation magnetic reconnection.

Magnetic reconnection is a physical process of converting magnetic energy into kinetic and thermal energy, which can change the topology of magnetic field. Many observational evidences of magnetic reconnection have been reported, such as current sheets, bright cusp-shaped structures, plasma inflow/outflow, and so on. However, direct observations of magnetic reconnection leading to the formation of filament are still very rare. Using high-resolution data from the 1-meter New Vacuum Solar Telescope (NVST) at the Fuxian Lake Solar Observatory, the extreme ultraviolet (EUV) data from the Solar Dynamics Observatory (SDO) and the Global Oscillation Network Group (GONG) data. They found that the filament and the surrounding magnetic loops were in close proximity to each other, followed by magnetic reconnection between them.

For more information, visit the following link:
https://english.cas.cn/newsroom/research_news/phys/202303/t20230301_327787.shtml

Reference
Yuan, L. (March 02, 2023). Researchers observe solar filament formation caused by oscillation magnetic reconnection. Recovered March 03, 2023, Chinese Academy of Sciences:
https://english.cas.cn/newsroom/research_news/phys/202303/t20230301_327787.shtml

Information source: (Chinese Academy of Sciences, 2023)

1.8   Artificial Intelligence approach may help detect Alzheimer's disease from routine brain imaging tests

Although investigators have made strides in detecting signs of Alzheimer's disease using high-quality brain imaging tests collected as part of research studies, a team at Massachusetts General Hospital (MGH) recently developed an accurate method for detection that relies on routinely collected clinical brain images. The advance could lead to more accurate diagnoses.

Matthew Leming, PhD, a research fellow at MGH's Center for Systems Biology and an investigator at the Massachusetts Alzheimer's Disease Research Center, and his colleagues used deep learning—a type of Machine Learning and Artificial Intelligence that uses large amounts of data and complex algorithms to train models. In this case, the scientists developed a model for Alzheimer's disease detection based on data from brain Magnetic Resonance Images (MRIs) collected from patients with and without Alzheimer's disease who were seen at MGH before 2019. The model used an uncertainty metric to determine whether patient data were too different from what it had been trained on for it to be able to make a successful prediction.

For more information, visit the following link:
https://www.massgeneral.org/news/press-release/artificial-intelligence-may-help-detect-alzheimers-disease-from-routine-brain-tests

Reference
Chase, B. (March 02, 2023). Artificial Intelligence approach may help detect alzheimer's disease from routine brain imaging tests. Recovered March 03, 2023, Massachusetts General Hospital: https://www.massgeneral.org/news/press-release/artificial-intelligence-may-help-detect-alzheimers-disease-from-routine-brain-tests

Information source: (Massachusetts General Hospital, 2023)

1.9   Researchers propose a simple, inexpensive approach to fabricating carbon nanotube wiring on plastic films

The proposed method produces wiring suitable for developing all-carbon devices, including flexible sensors and energy conversion and storage devices. Researchers from Tokyo University of Science in Japan have developed an inexpensive method for fabricating Multi-Walled Carbon Nanotubes (MWNTs) on a plastic film. The proposed method is simple, can be applied under ambient conditions, reuses MWNTs, and produces flexible wires of tunable resistances without requiring additional steps.
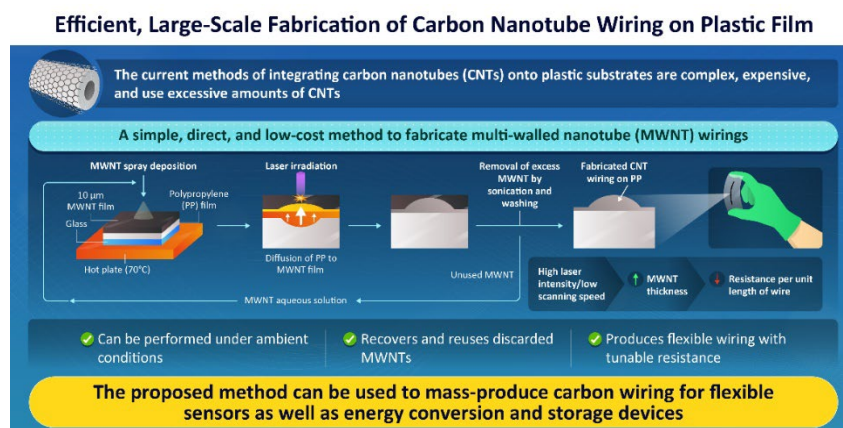
Credit: Tokyo University of Science

Carbon Nanotubes (CNTs) are cylindrical tube-like structures made of carbon atoms that display highly desirable physical properties like high strength, low weight, and excellent thermal and electrical conductivities. This makes them ideal materials for various applications, including reinforcement materials, energy storage and conversion devices, and electronics. More direct methods such as Laser-Induced Forward Transfer (LIFT) and Thermal Fusion (TF) have been developed as alternatives. In the LIFT method, a laser is used to directly transfer CNTs onto substrates, while in TF, CNTs are mixed with polymers that are then selectively removed by a laser to form CNT wires with varying resistance values. However, both these methods are expensive and have their unique problems. LIFT requires expensive pulsed lasers and preparation of CNTs with specific resistance values, while TF uses large amounts of CNTs that are not utilized and go to waste.

For more information, visit the following link:
https://www.tus.ac.jp/en/mediarelations/archive/20230228_1238.html

Reference
Tokyo University of Science. (March 02, 2023). TUS researchers propose a simple, inexpensive approach to fabricating carbon nanotube wiring on plastic films. Recovered March 06, 2023, Tokyo University of Science: https://www.tus.ac.jp/en/mediarelations/archive/20230228_1238.html

Information source: (Tokyo University of Science, 2023)

1.10 Scientists push the boundaries of manipulating light at the submicroscopic level

A team of researchers led by the University of Southampton has shown light can be moved within a distance which is smaller than its own wavelength – a level of unprecedented precision.
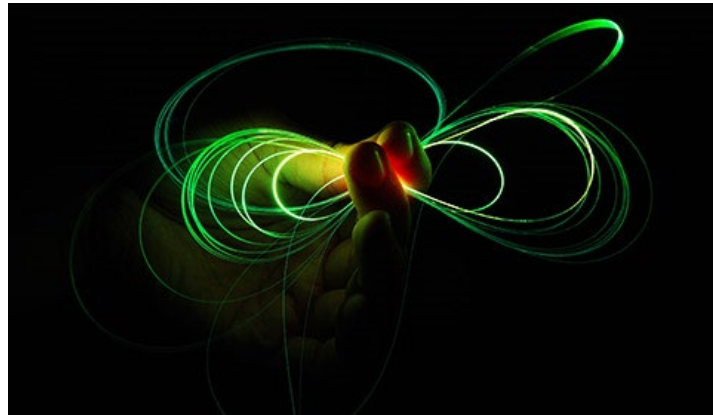
Credit: University of Southampton

Scientists from Southampton, together with the universities of Dortmund and Regensburg in Germany, have demonstrated that a beam of light can not only be confined to a spot which is 50 times smaller than its own wavelength, but that also – in a first of its kind – the spot can be moved by miniscule amounts at the point where the light is confined. Confining and controlling light on ever smaller volumes is one of the defining challenges in modern photonics; the science behind the generation, detection and manipulation of light. How tightly the light is confined determines the limits for the observability of nanoparticles, as well as the intensity and the precision of light-based devices. The research collaboration was led by Professor Simone De Liberato, leader of the Quantum Theory and Technology group in the School of Physics and Astronomy at Southampton. He says: *"We believe our novel approach to actively control confined electromagnetic fields could have high-impact consequences across multiple nanophotonic applications."*

For more information, visit the following link:
https://www.southampton.ac.uk/news/2023/03/manipulating-light.page

Reference
University of Southampton. (March 02, 2023). Scientists push the boundaries of manipulating light at the submicroscopic level. Recovered March 06, 2023, University of Southampton: https://www.southampton.ac.uk/news/2023/03/manipulating-light.page

Information source: (University of Southampton, 2023)

1.11   Biologists uncover key to preserve genome integrity, enhancing the understanding of cancer development

A research team led by Dr Gary Ying Wai CHAN from the School of Biological Sciences at The University of Hong Kong (HKU), has uncovered a new mechanism that ensures correct DNA segregation in cell division, where improper cell division will lead to the development of cancer. The team's findings, published in the journal *Cell Reports*, focus on the roles of two proteins, RIF1 and Protein Phosphatase 1 (PP1), in resolving ultrafine DNA bridges. These bridges are formed when sister chromatids are connected by DNA joint molecules during mitosis. If these DNA bridges cannot be resolved or removed properly, they will eventually break and cause DNA damage in the daughter cells, which can lead to the development of cancer cells.
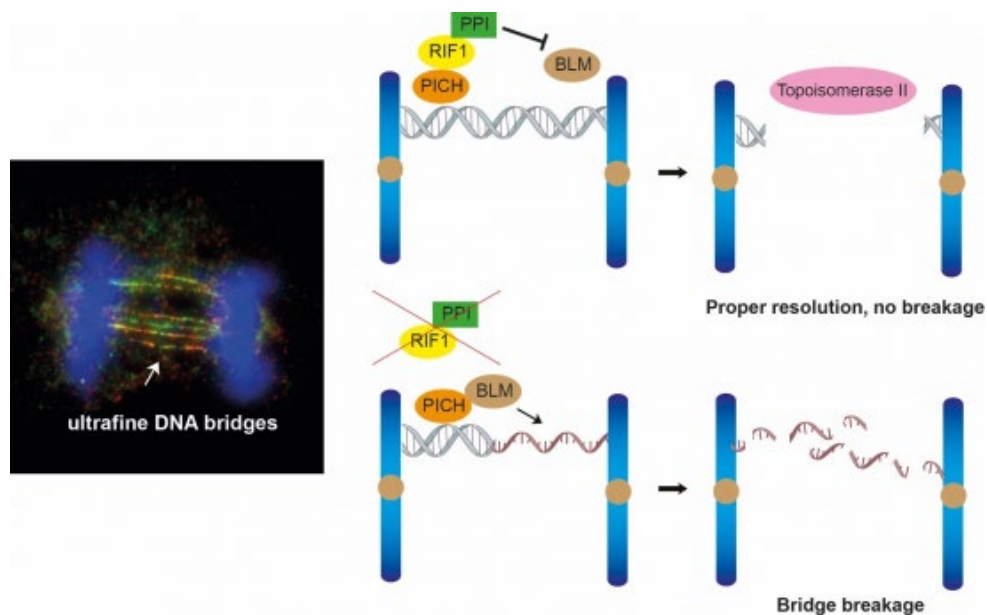
Study reveals RIF1-PP1 prevents BLM from unwinding the ultrafine DNA bridges.
Credit: Dr. Gary Ying Wai CHAN

A human life begins with a single cell – the fertilised egg. This single cell needs to replicate and divide into approximately 37 trillion cells. The process by which a cell replicates its DNA then equally segregates into two identical cells is known as mitosis, which is a vital process for growth and replacing worn out cells. However, equal segregation of DNA is one of the most challenging tasks in mitosis.

For more information, visit the following link:
https://hku.hk/press/news_detail_25882.html

Reference
University of Hong Kong. (March 02, 2023). Targeting DNA bridges: HKU biologists uncover key to preserve genome integrity enhancing the understanding of cancer development. Recovered March 06, 2023, University of Hong Kong: https://hku.hk/press/news_detail_25882.html

Information source: (The University of Hong Kong, 2023)

1.12   U-M experts can discuss Artificial Intelligence chatbots, their reach, impact, concerns, potential

As ChatGPT hits three months in operation, its reach and uses continue to widen along with a range of efforts and research to grasp and anticipate the upside and downside of using Artificial Intelligence to do what humans would normally do. University of Michigan experts are available to discuss ChatGPT's role in scientific research, education, computer science, engineering and business along with ethical implications.
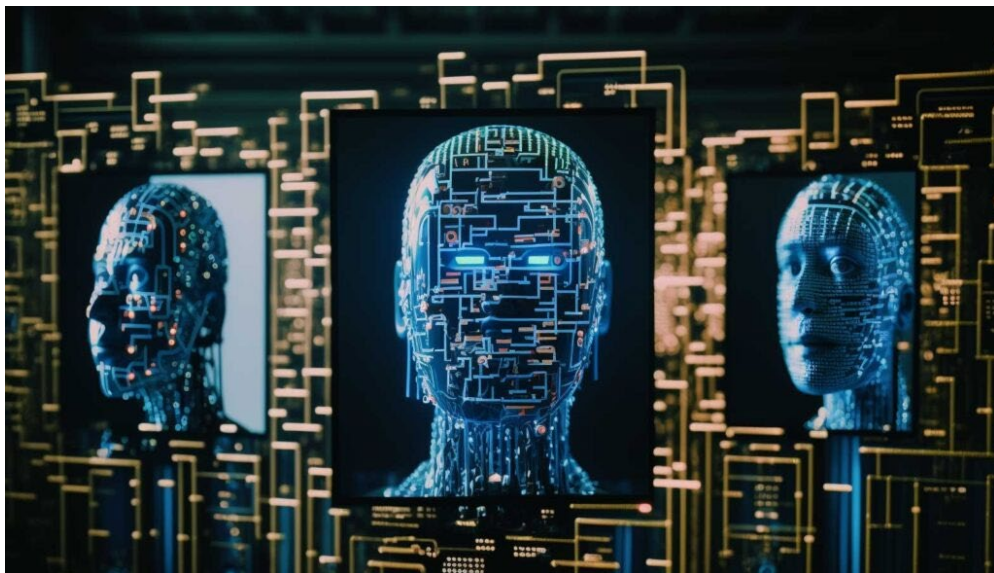
Credit: Kim North Shine, University of Michigan

Timothy Cernak is an assistant professor of medicinal chemistry at the College of Pharmacy and assistant professor of chemistry at the College of Literature, Science and the Arts. His lab team has previously used other forms of Artificial Intelligence to streamline time-consuming, repetitive tasks. Recently, they plugged ChatGPT into their own software, called phactor, which is used to drive chemistry experiments using robots. Their first attempt using ChatGPT and phactor together ended up giving a highly productive reaction, with a chemical product delivered in 84% yield. The addition of ChatGPT to chemistry labs like Cernak's holds promise for streamlined, time-saving yet reliable scientific research.

For more information, visit the following link:
https://news.umich.edu/chatgpt-u-m-experts-can-discuss-ai-chatbots-their-reach-impact-concerns-potential/

Reference
Shine, K. (March 03, 2023). ChatGPT: U-M experts can discuss AI chatbots, their reach, impact, concerns, potential. Recovered March 06, 2023, University of Michigan:

https://news.umich.edu/chatgpt-u-m-experts-can-discuss-ai-chatbots-their-reach-impact-concerns-potential/

Information source: (The University of Manchester, 2023)

1.13   Application resulted in better dietary habits and less screen time in young children

With the help of a multi-language smartphone application, parents in Sweden were able to give their young children better dietary habits and less screen time, a study by researchers from Karolinska Institutet published in the *International Journal of Behavioral Nutrition and Physical Activity* reports. Overweight and obesity in children is a growing problem in the world. In Sweden, 11 per cent of four-year-olds are overweight. The corresponding figure for six to nine-year-olds is 21 per cent. In socioeconomically deprived areas, childhood overweight is even more widespread.

Credit: Getty, Karolinska Institutet

"One important and unique aspect of the study is that the app is available in many languages, including Swedish, Somali, Arabic and English, to reach as many families as possible," says the study's author Marie Löf, professor at the Department of Biosciences and Nutrition, Karolinska Institutet. To test their newly designed smartphone application, MINISTOP 2.0, the researchers recruited a total of 552 families with a child between the ages of thirty months and three years from 19 child healthcare centres around Sweden. 24% of the children in the study had two foreign-born parents, corresponding to the national percentage. Half of the children were randomly assigned to a control group that received standard care, half to the intervention group that used the application.

For more information, visit the following link:
https://news.ki.se/app-resulted-in-better-dietary-habits-and-less-screen-time-in-young-children

Reference
Björklund, A. (March 03, 2023). App resulted in better dietary habits and less screen time in young children. Recovered March 06, 2023, Karolinska Institutet:

https://news.ki.se/app-resulted-in-better-dietary-habits-and-less-screen-time-in-young-children

Information source: (Karolinska Institutet, 2023)

1.14   Virtual reality art show envisions as digital artifacts

You put on a virtual reality headset and are immersed in a three-dimensional, 360-degree scene, invited to grapple with our embodiment in the digital world. In one installation called *"My Data Body,"* the viewer sits alongside the magnetic resonance scanned body of artist Marilène Oliver, surrounded by a flurry of social media posts, biometric details and personal identification numbers.
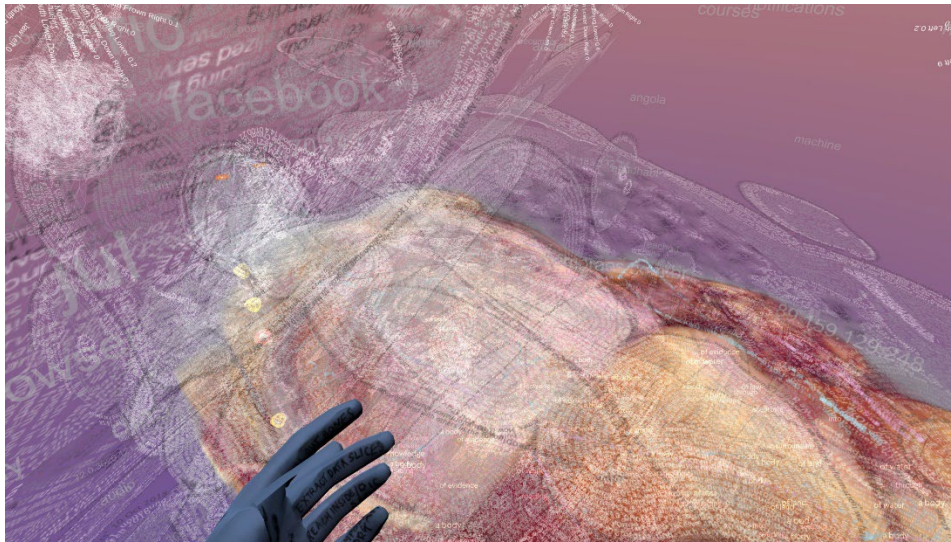
The body electronic: "Know Thyself as a Virtual Reality" immerses viewers in artworks incorporating personal data such as medical scans and social media posts.
Credit: My Data Body

Hand controls allow the viewer to pull out organs as the accompanying soundscape, created by music professor Scott Smallwood and composer Stephan Moore to communicate the *"sonification of data,"* responds to the movement. Poetry by J.R. Carpenter completes the experience. *"We wanted to create a series of artworks that provoke thought about this virtual world we're inhabiting,"* says Oliver, University of Alberta professor and co-curator of Know Thyself as a Virtual Reality along with colleague Lianne McTavish from the Department of Art and Design.

For more information, visit the following link:
https://www.ualberta.ca/folio/2023/03/virtual-reality-art-show-envisions-our-selves-as-digital-artifacts.html

Reference
McMaster, G. (March 03, 2023). Virtual reality art show envisions our selves as digital artifacts Recovered March 06, 2023, University of Alberta: https://www.ualberta.ca/folio/2023/03/virtual-reality-art-show-envisions-our-selves-as-digital-artifacts.html

Information source: (University of Alberta, 2023)

1.15 Scientists develop high-sensitivity strain-temperature dual-mode sensor

Researchers led by Prof. LI Runwei at the Ningbo Institute of Materials Technology and Engineering (NIMTE) of the Chinese Academy of Sciences (CAS) have developed a strain-temperature dual-mode sensor with high stimuli discriminability and resolution, enabling real-time sensing of strain and temperature stimuli without cross-talk by a single sensor.
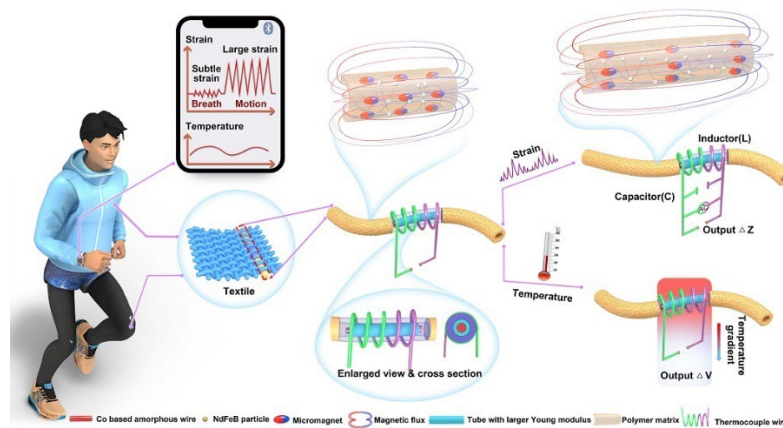
The strain-temperature dual-mode sensor with high stimuli resolution and discrimination.
Credit: M NIMTE

Co-based amorphous wire has excellent soft magnetic properties and Giant Magnetic Impedance effect, which can realize highly sensitive detection of magnetic fields, and thus has been recognized as an ideal material for the development of flexible multifunctional sensors. Based on the Co-based amorphous wire as a sensitive material, the researchers designed a dual-mode sensor with a tubular heterogeneous structure, realizing the monitoring and real-time discrimination of strain and temperature. The sensor developed consists of a thermocouple coiled wound around a strain-to-magnetic induction conversion unit, and a Co-based amorphous wire with a high permeability. By tailoring the mechanical modulus of the components of the strain-to-magnetic induction conversion unit, the strain sensitivity of the sensor can be adjusted.

For more information, visit the following link:
https://english.cas.cn/newsroom/research_news/phys/202303/t20230303_327827.shtml

Reference
Nannan, Z. (March 03, 2023). Scientists Develop High-sensitivity strain-temperature dual-mode sensor. Recovered March 06, 2023, Chinese Academy of Sciences: https://english.cas.cn/newsroom/research_news/phys/202303/t20230303_327827.shtml

Information source: (Chinese Academy of Sciences, 2023)

1.16 Researchers test smart surfaces to improve wireless communication and localization

It's happened to anyone with a cell phone—dropped calls or dead air because suddenly there is no service available. Or worse, the location pin drops on the navigation application. Researchers at UBC Okanagan are looking at ways to improve cell phone connectivity and localization abilities by examining *"smart"* surfaces that can bounce signals from a tower to customers to improve the link. A smart surface involves installing reflective elements on windows or panels on buildings in dense urban environments.

UBCO researchers are testing reconfigurable intelligent surfaces—smart surfaces—that can serve as reflectors to improve cell service with existing wireless networks. Credit: The University of British Columbia

The goal, said Dr. Anas Chaaban, is to improve wireless services for millions of Canadians. Currently, he said, there are more than 12,000 wireless antenna towers. And yet, a lack of cell service is a common problem. *"The increasing use of mobile technologies across the world is necessitating research that unlocks potential new approaches within our existing infrastructure,"* said Dr. Chaaban, an Assistant Professor at UBC Okanagan's School of Engineering. *"Even though cellphone towers line the rooftops of major cities, and handle the data and phone traffic of millions of Canadians each day, there are still gaps in service."*

For more information, visit the following link:
https://apsc.ubc.ca/news/2023/researchers-test-smart-surfaces-to-improve-wireless-communication-and-localization

Reference
University of British Columbia. (March 03, 2023). Researchers test smart surfaces to improve wireless communication and localization. Recovered March 06, 2023, The

University of British Columbia: https://apsc.ubc.ca/news/2023/researchers-test-smart-surfaces-to-improve-wireless-communication-and-localization

Information source: (The University of British Columbia, 2023)

1.17   To better predict food crisis outbreaks

Machine-learning model analyzes articles' content and frequency to make precise predictions on where next hunger scourge will occur. A team of researchers has developed a Machine Learning model that draws from the contents of news articles to effectively predict locations that face risks of food insecurity. The model, which could be used to help prioritize the allocation of emergency food assistance across vulnerable regions, marks an improvement existing measurement.

Credit: Marccophoto/Getty Images, New York University

"Our approach could drastically improve the prediction of food crisis outbreaks up to 12 months ahead of time using both real-time news streams and a predictive model that is simple to interpret," says Samuel Fraiberger, a visiting researcher at New York University's Courant Institute of Mathematical Sciences, a data scientist at the World Bank, and an author of the study.

For more information, visit the following link:
https://www.nyu.edu/about/news-publications/news/2023/march/news-you-can-use-to-better-predict-food-crisis-outbreaks.html

Reference
Devitt, J. (March 03, 2023). News you can use—to better predict food crisis outbreaks. Recovered March 07, 2023, New York University: https://www.nyu.edu/about/news-publications/news/2023/march/news-you-can-use-to-better-predict-food-crisis-outbreaks.html

Information source: (New York University, 2023)

1.18 Artificial Intelligence used to predict future flares of ulcerative colitis activity

Ulcerative colitis assessment could be improved after new research shows that an Artificial Intelligence (AI) model could predict flare-ups and complications after reading biopsies. In a new paper published in *Gastroenterology*, researchers supported by the National Institute for Health and Care Research Birmingham Biomedical Research Centre have trialled an AI diagnostic tool that can read digitised biopsies taken during colonoscopy.

Credit: Dr Marietta Iacucci, University of Birmingham

The Computer-Aided Diagnostic model was able to predict the risk of flare-ups for ulcerative colitis, which is a relapsing-remitting condition and makes the prognosis for the disease uncertain. In the trial, the model was able to predict patients at risk of a flare in the disease as well as humans. The system was trained on existing digitised biopsies and was able to detect activity related to ulcerative colitis with 89% accuracy for positive results. It was also able to identify markers of inflammation activity and healing in the same area as biopsies were taken with 80% accuracy, similar to human pathologists.

For more information, visit the following link:
https://www.birmingham.ac.uk/news/2023/ai-used-to-predict-future-flares-of-ulcerative-colitis-activity

Reference
Iacucci, M. (March 03, 2023). AI used to predict future flares of ulcerative colitis activity. Recovered March 07, 2023, University of Birmingham: https://www.birmingham.ac.uk/news/2023/ai-used-to-predict-future-flares-of-ulcerative-colitis-activity

Information source: (University of Birmingham, 2023)

1.19   Wheeled robot measures leaf angles to help breed better corn plants

Researchers from North Carolina State University and Iowa State University have demonstrated an automated technology capable of accurately measuring the angle of leaves on corn plants in the field. This technology makes data collection on leaf angles significantly more efficient than conventional techniques, providing plant breeders with useful data more quickly. *"The angle of a plant's leaves, relative to its stem, is important because the leaf angle affects how efficient the plant is at performing photosynthesis,"* says Lirong Xiang, first author of a paper on the work and an assistant professor of biological and agricultural engineering at NC State. *"For example, in corn, you want leaves at the top that are relatively vertical, but leaves further down the stalk that are more horizontal. This allows the plant to harvest more sunlight. Researchers who focus on plant breeding monitor this sort of plant architecture, because it informs their work."*

This image shows the autonomous robot, with multiple tiers of PhenoStereo cameras, that are part of the AngleNet system.
Credit: Lirong Xiang and Matt Shipman, NC State University

The new technology – called AngleNet – has two key components: the hardware and the software. The hardware, in this case, is a robotic device that is mounted on wheels. The device is steered manually, and is narrow enough to navigate between crop rows that are spaced 30 inches apart –the standard width used by farmers. The device itself consists of four tiers of cameras, each of which is set to a different height to capture a different level of leaves on the surrounding plants. Each tier includes two cameras, allowing it to capture a stereoscopic view of the leaves and enable 3D modeling of plants.

For more information, visit the following link:
https://news.ncsu.edu/2023/03/leaf-measuring-robot/

Reference
Shipman, M. (March 06, 2023). Wheeled robot measures leaf angles to help breed better corn plants. Recovered March 07, 2023, North Carolina State University: https://news.ncsu.edu/2023/03/leaf-measuring-robot/

Information source: (North Carolina State University, 2023)

1.20   *3D-snapshots of nanoparticles*

Eidgenössische Technische Hochschule Zürich (ETH) researchers have managed to take three-dimensional pictures of single nanoparticles using extremely short and strong X-ray pulses. In the future this technique could even be used to make 3D-movies of dynamical processes at the nanoscale.
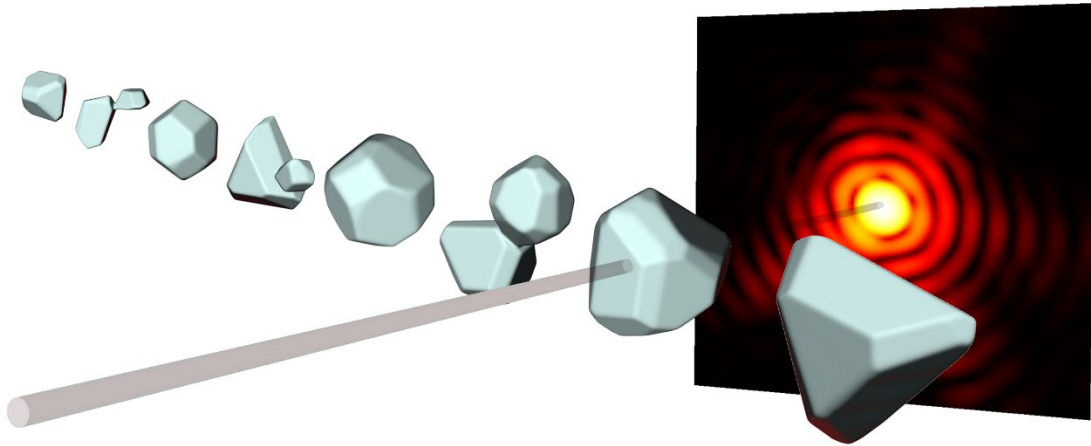
From the diffraction patterns (red) of X-ray pulses (grey), with which nanoparticles are bombarded, researchers at ETH can calculate three-dimensional images.
Credit: ETH Zürich / Daniela Rupp

Daniela Rupp has been assistant professor at ETH Zurich since 2019, where she leads the research group *"Nanostructures and ultra-fast X-ray science."* Together with her team she tries to better understand the interaction between very intense X-ray pulses and matter. As a model system they use nanoparticles, which they also investigate at the Paul Scherrer Institute. *"For the future there are great opportunities at the new Maloja instrument, on which we were the first user group to external pagemake measurements at the beginning of last yearcall_made. Right now our team there is activating the attosecond mode, with which we can even observe the dynamics of electrons,"* says Rupp.

For more information, visit the following link:
https://ethz.ch/en/news-and-events/eth-news/news/2023/03/3d-snapshots-of-nanoparticles.html

Reference
Morsch, O. (March 03, 2023). 3D-snapshots of nanoparticles. Recovered March 07, 2023, Eidgenössische Technische Hochschule Zúrich: https://ethz.ch/en/news-and-events/eth-news/news/2023/03/3d-snapshots-of-nanoparticles.html

Information source: (Eidgenössische Technische Hochschule Zúrich, 2023)

2   PATENTS

2.1   Methods and apparatus for quantifying requirements in construction of a building

Artificial Intelligence (AI) systems quantify requirements for construction of a building by receiving two-dimensional representations (e.g., physical or electronic documents) and mimicking the perception, learning, problem-solving, and decision-making formerly performed by human workers.
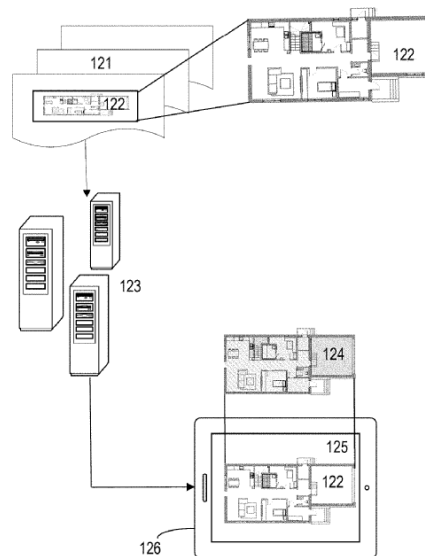
Illustrates a high-level diagram of components included in a system that uses AI to generate an interactive user interface.
Credit: Patrick E. Murphy and Johnny Maghzal, WIPO IP Portal

AI analysis may be repeated for multiple two-dimensional representations, each two-dimensional reference including a change to a design of a building to be constructed. The AI processes denote and track changes made in the sequence of two-dimensional references, and extrapolate changes to materials and labor that relate to the changes in design of the building to be constructed.

For more information, visit the following link:
https://patentscope.wipo.int/search/en/detail.jsf?docId=US393001461&_cid=P22-LEX8ZD-92218-1

Reference
Murphy, P. E., & Maghzal, J. (March 02, 2023). Methods and apparatus for quantifying requirements in construction of a building. Recovered March 02, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/en/detail.jsf?docId=US393001461&_cid=P22-LEX8ZD-92218-1

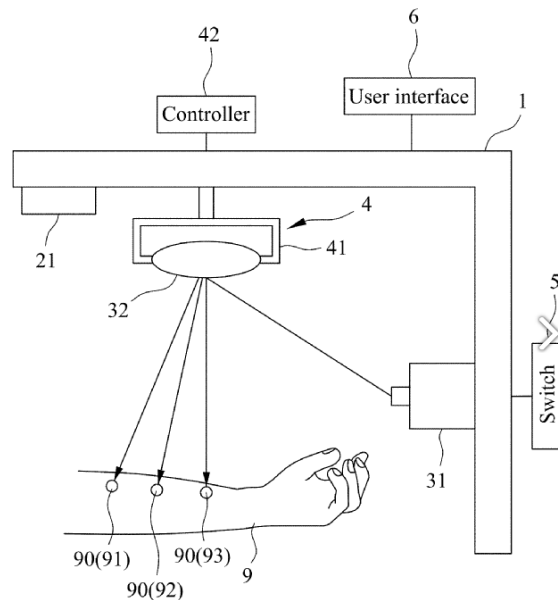**Information source:** (WIPO IP Portal, 2023)

Information source: (WIPO IP Portal, 2023)

2.2   System for performing laser acupuncture

A system includes a frame, and an image processing unit, a laser unit and an adjusting unit that are mounted on the frame. The image processing unit includes an image capturing device and a processor.

Is a schematic diagram illustrating performing laser acupuncture by using the system according to the embodiment of the disclosure.
Credit: Chih-Yu Wang, Kun-Chan Lan, Che-Chang Kuo and Shu-Chen Chang, WIPO IP Portal

The image capturing device captures an image of a body part. The processor generates a control signal based on the image. The laser unit includes a light source and an optical component. The light source emits a laser beam. The adjusting unit is connected to the processor, and interconnects the optical component and the frame. The adjusting unit receives the control signal, and orients, based on the control signal, the optical component to direct the laser beam to acupuncture points on the body part individually.

For more information, visit the following link:
https://patentscope.wipo.int/search/en/detail.jsf?docId=US392996896&_cid=P22-LEX9P9-02038-1

Reference
Wang, C., Lan, K., Kuo, C., & Chang, S. (March 02, 2023). System for performing laser acupuncture. Recovered March 02, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/en/detail.jsf?docId=US392996896&_cid=P22-LEX9P9-02038-1

Information source: (WIPO IP Portal, 2022)

2.3   Real-Time space reservation using augmented reality

A method, computer system, and a computer program product for real-time space reservation using Augmented Reality (AR) is provided. The present invention may include, receiving, by an AR device, a visual input of a user environment.
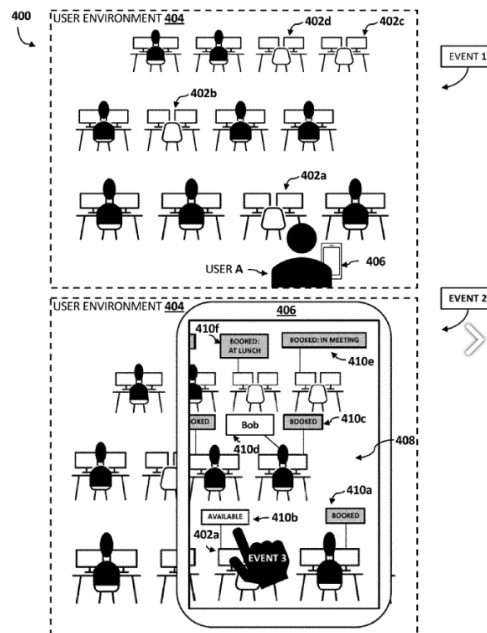
Is a block diagram illustrating an exemplary AR-based reservation process according to at least one embodiment.
Credit: Vincent Wase, Sal M. Rosato and Michael Domitrovits, WIPO IP Portal

The present invention may include, correlating, by the AR device, the received visual input with reservation data associated with the user environment. The present invention may include, displaying, by the AR device, an augmented view of the user environment including at least one reservation status linked to a corresponding space in the user environment. The present invention may include, receiving, by the AR device, a reservation request based on the augmented view of the user environment.

For more information, visit the following link:
https://patentscope.wipo.int/search/en/detail.jsf?docId=US393003426&_cid=P22-LEXA45-07832-2

Reference
Wase, V.; Rosato, S. & Domitrovits, M. (March 02, 2023). Real-time space reservation using augmented reality. Recovered March 02, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/en/detail.jsf?docId=US393003426&_cid=P22-LEXA45-07832-2

Information source: (WIPO IP Portal, 2023)

2.4   Communication channels with both shared and independent resources

Techniques are disclosed relating to merging virtual communication channels in a portion of a computing system. In some embodiments, a communication fabric routes first and second classes of traffic with different quality-of-service parameters, using a first virtual channel for the first class and a second virtual channel for the second class.
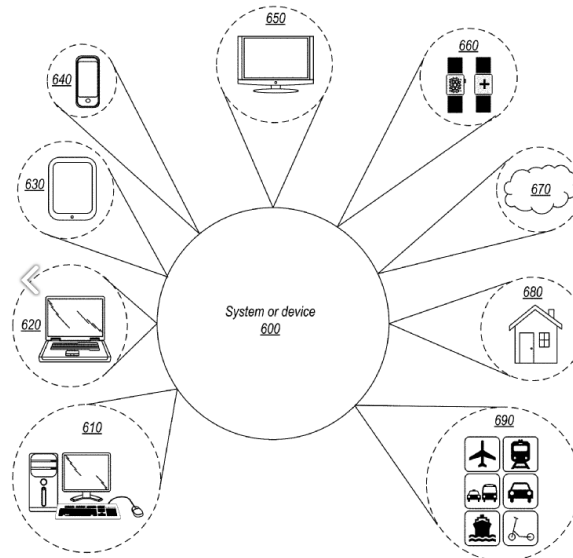
Is a diagram illustrating example applications of disclosed systems and devices, according to some embodiments.
Credit: Rohit K. Gupta, Gregory S. Mathews, Harshavardhan Kaushikkar, Jeonghee Shin and Rohit Nataraja., WIPO IP Portal

In some embodiments, a memory controller communicates, via the fabric, using a merged virtual channel configured to handle traffic from both the first virtual channel and the second virtual channel. In some embodiments, the system limits the rate at which an agent is allowed to transmit requests of the second class of traffic, but requests by the agent for the first class of traffic are not rate limited. Disclosed techniques may improve independence of virtual channels, relative to sharing the same channel in an entire system, without unduly increasing complexity.

For more information, visit the following link:
https://patentscope.wipo.int/search/en/detail.jsf?docId=US393000217&_cid=P22-LEXA45-07832-6

Reference
Gupta, R.; Mathews, G.; Kaushikkar, H.; Shin, J. & Natarajan, R. (March 02, 2023). Communication channels with both shared and independent resources. Recovered March 02, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/en/detail.jsf?docId=US393000217&_cid=P22-LEXA45-07832-6

Information source: (WIPO IP Portal, 2023)

2.5 Systems and methods for detecting the location of objects using a Network of Internet of Things (IOT) devices

Systems and methods are disclosed for detecting the location of objects using a Network of Internet of Things (IOT) sensors *("tracking devices")*. The tracking devices may be capable of determining location information (for example, through GPS signals) and may communicate this information to a central server.
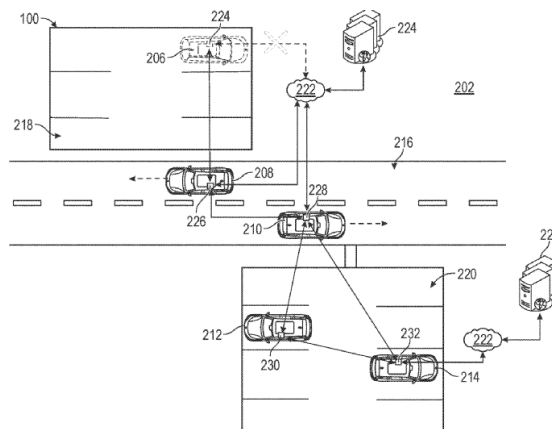
depicts an example use case, in accordance with one or more example embodiments of the disclosure.
Credit: Peyton Riley, WIPO IP Portal

However, in some cases, a tracking device may be unable to communicate with the central server using a long-range communication network. The tracking device may also be unable to ascertain its own location. In such situations, other tracking devices may communicate with the tracking device over short-range signals, determine the location of the tracking device, and relay this information to the central server.

For more information, visit the following link:
https://patentscope.wipo.int/search/en/detail.jsf?docId=US393004027&_cid=P22-LEXB52-21077-1

Reference
Riley, P. (March 02, 2023). Systems and methods for detecting the location of objects using a network of Internet of Things (IOT) devices. Recovered March 02, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/en/detail.jsf?docId=US393004027&_cid=P22-LEXB52-21077-1

Information source: (WIPO IP Portal, 2023)

2.6 Auto discovery protocol and virtual grouping of Machine Learning models

A computer executes a discovery protocol, where the discovery protocol identifies each of the Machine Learning models and groups the Machine Learning models into one or more virtual groups based on criteria, and where the auto discovery program is injected to each of the Machine Learning models.
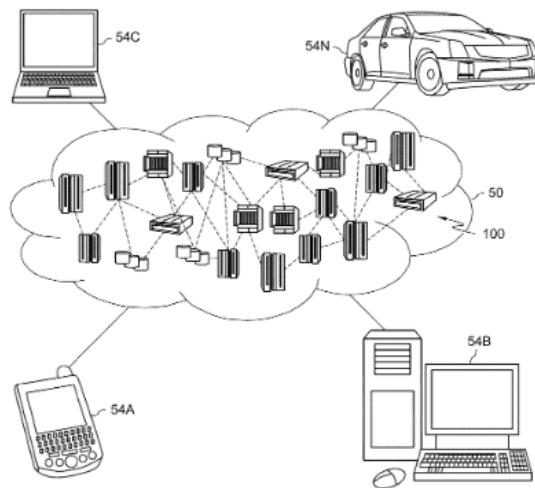
Depicts a cloud computing environment according to an embodiment of the present invention.
Credit: Trim Craig, Abrahams Faried, Sivakumar Gandhi, Patel Kushal and Patel Sarvesh, Espacenet Patent Search

The computer identifies an input to a Machine Learning model, where the input comprises a plurality of features that processed by the Machine Learning model. Based on determining a distance of the input is above an acceptable threshold the computer identifies an alternative Machine Learning model from the Machine Learning models, and transfers the input to the alternative Machine Learning model.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/085286345/publication/US2023063113A1?q=machine%20learning

Reference
Trim, C.; Abrahams, F.; Sivakumar, G.; Patel, K. & Patel, S. (March 02, 2023). Auto discovery protocol and virtual grouping of Machine Learning models. Recovered March 02, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/085286345/publication/US2023063113A1?q=machine%20learning

Information source: (Espacenet Patent Search, 2023)

2.7   Management of resource access in a Blockchain

A plurality of different types of resource access events are identified.
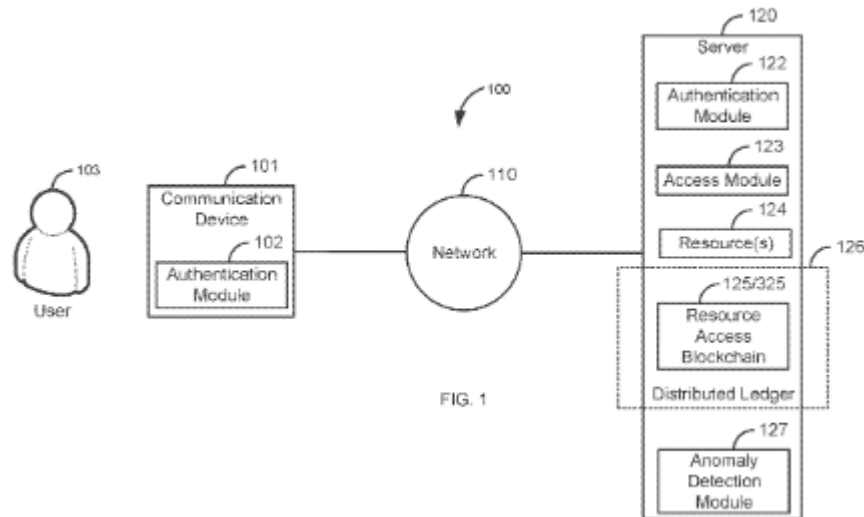
Is a block diagram of a first illustrative system for management of resource access in a Blockchain.
Credit: Grover Douglas Max, Espacenet Patent Search

For example, a resource access event may be an administration event where a user is given certain access rights to view/modify a resource, such as, a database record. A plurality of blocks are generated, where each block is associated with an individual one of the plurality of different types of resource access events. The plurality of blocks are added to a first resource access Blockchain. The Blockchain can be used to track the various types of resource access events.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/085286498/publication/US2023063043A1?q=blockchain

Reference
Grover, D. (March 02, 2023). Management of resource access in a Blockchain. Recovered March 02, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/085286498/publication/US2023063043A1?q=blockchain

Information source: (Espacenet Patent Search, 2023)

2.8   Root cause analysis for deterministic Machine Learning model

Techniques for identifying a root cause of an operational result of a deterministic Machine Learning model are disclosed.
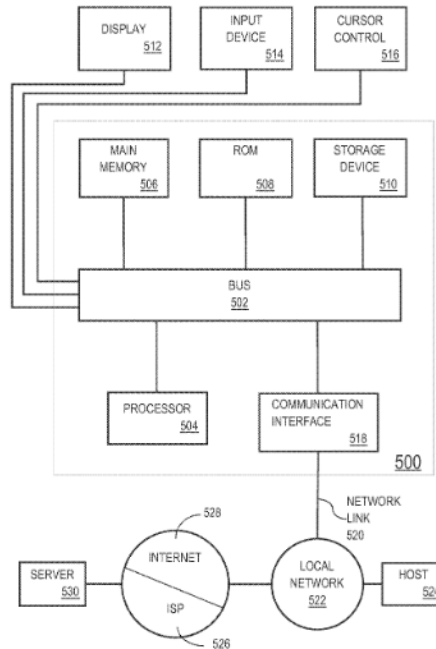
Shows a block diagram that illustrates a computer system in accordance with one or more embodiments.
Credit: ROHRKEMPER, J., SONDEREGGER, R., CHYSTIAKOVA A., BACLAWSKI K., GAWLICK D., GROSS K., LIU Z. & WANG G., Espacenet Patent Search

A system applies a deterministic Machine Learning model to a set of data to generate an operational result, such as a prediction of a *"fault"* or *"no-fault"* in the system. The set of data includes signals from multiple different data sources, such as sensors. The system applies an abductive model, generated based on the deterministic Machine Learning model, to the operational result. The abductive model identifies a particular set of data sources that is associated with the root cause of the operational result. The system generates a human-understandable explanation for the operational result based on the identified root cause.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/078333279/publication/US2023061280A1?q=machine%20learning

Reference
Rohrkemper, J.; Sonderegger, R.; Chystiakova, A.; Baclawski, K.; Gawlick, D.; Gross, K.; Liu, Z. & Wang, G. (March 02, 2023). Root cause analysis for deterministic Machine Learning model. Recovered March 02, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/078333279/publication/US2023061280A1?q=machine%20learning

Information source: (Espacenet Patent Search, 2023)

2.9   Device for performing multi-detection analysis on sample using Deep Learning-Based decoding of encoded magnetic particles

The present invention relates to a device for performing multi-detection analysis on a sample using deep learning-based decoding of encoded magnetic particles, and a method therefor.
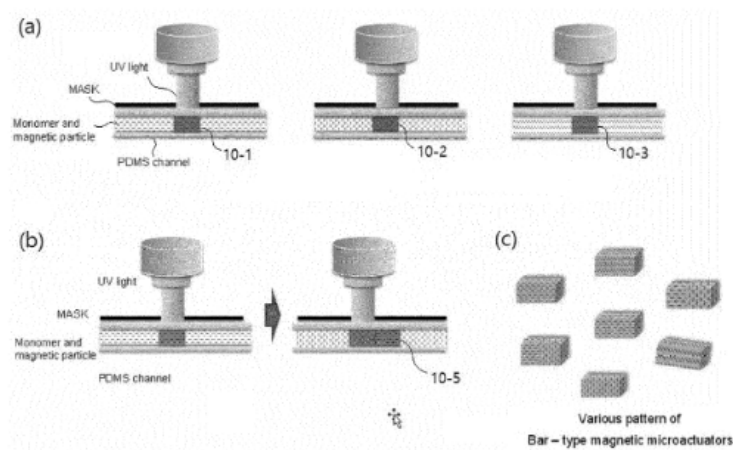
Credit: Hahn Young, Baek, M., Jung Ho Young and Park Subin, Espacenet Patent Search

According to the present invention, a method for performing multi-detection analysis on a biological sample comprises the steps of: preparing a plurality of encoded magnetic particles encoded as different types and introducing the encoded magnetic particles into a sample to be analyzed; acquiring an image of the sample in a state in which the sample is exposed to a rotating magnetic field; inputting a time-series image included in the image into a pre-trained deep learning algorithm and analyzing the rotation pattern characteristics of each of the encoded magnetic particles in the image over time through the Deep Learning algorithm so as to classify each of the encoded magnetic particles; and performing multi-detection on a plurality of types of target materials in the sample on the basis of the classification results of each of the encoded magnetic particles in the image. According to the present invention, multiple types of target materials can be simultaneously detected in a biological sample from an image by analyzing the rotation pattern characteristics of encoded magnetic particles.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/085323303/publication/WO2023027408A1?q=deep%20learning

Reference
Hahn, Y.; Baek, M.; Jung, H. & Park, S. (March 02, 2023). Device for performing multi-detection analysis on sample using deep learning-based decoding of encoded magnetic particles, and method therefor. Recovered March 02, 2023, Espacenet Patent Search:

https://worldwide.espacenet.com/patent/search/family/085323303/publication/WO2023027408A1?q=deep%20learning

Information source: (Espacenet Patent Search, 2023)

2.10   Protecting solar panels from damage due to overheating

A method includes determining a plurality of performance metrics for a plurality of sub-models forming a first Machine Learning (ML) model and clustering the plurality of sub-models based on the plurality of performance metrics to produce a plurality of clusters of sub-models.
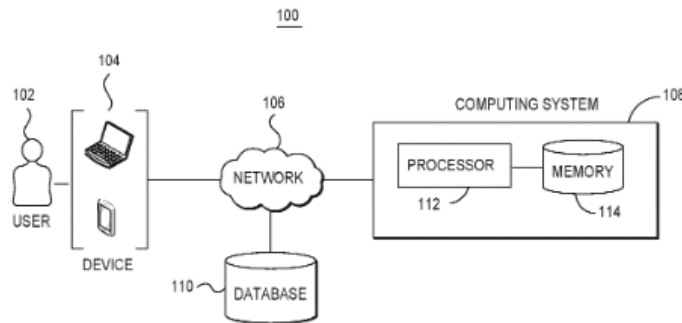
Illustrates an example system.
Credit: Bo Song, Yu Dong Hai and Wang Jun, Espacenet Patent Search

The method also includes removing, from the first ML model, sub-models assigned to a first cluster of the plurality of clusters to produce a second ML model formed by the sub-models remaining in the first ML model and in response to determining that a performance of the second ML model is below a performance threshold, adding a subset of the removed sub-models to the second ML model to produce a third ML model. The method further includes, in response to determining that a performance of the third ML model meets the performance threshold, selecting the third ML model to be applied.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/085287803/publication/US2023061971A1?q=machine%20learning

Reference
Bo, S.; Yu, D. & Wang, K. (March 02, 2023). Machine learning model compression. Recovered March 02, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/085287803/publication/US2023061971A1?q=machine%20learning

Information source: (Espacenet Patent Search, 2023)