Weekly Newsletter
TECHNOLOGY SURVEILLANCE

Nº 25-2023 JUN 23TH, 2023

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 Finding out you're autistic in later life can be a positive experience

Study – carried out by researchers at the University of Bath and King's College London – is the first to examine whether the age at which one becomes aware of being autistic is linked to their quality of life, after accounting for other crucial factors such as household income. The researchers asked 300 autistic adults to report the age at which they first learned they were autistic, as well as detailed information about their socio-demographic background such as current age, sex, ethnicity, relationship status, living status, education level, employment status, household income, and the presence of additional mental health conditions. Participants' level of autistic personality traits was also measured.

The results – published in the journal Autism – found that the relationship between the age at which one becomes aware of being autistic and the different areas of quality of life was not statistically linked after considering other factors. In fact, other factors were more strongly linked to quality of life: Autistic women reported a better quality of life than autistic men, and people who had additional mental health conditions (e.g., anxiety) reported a lower quality of life.

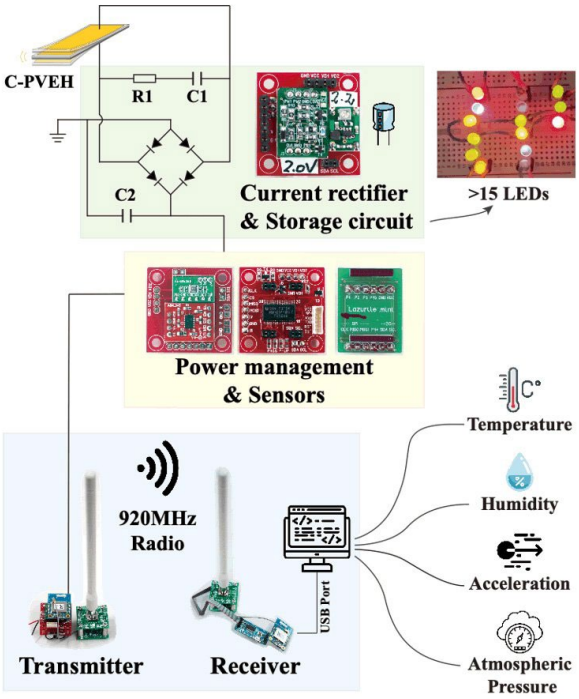
For more information, visit the following link:
https://www.bath.ac.uk/announcements/finding-out-youre-autistic-in-later-life-can-be-a-positive-experience/

Reference
Dunne, A. (Jun 15, 2023). Finding out you're autistic in later life can be a positive experience. Recovered Jun 16, 2023, University of Bath: https://www.bath.ac.uk/announcements/finding-out-youre-autistic-in-later-life-can-be-a-positive-experience/

Information source: (University of Bath, 2023)

1.2 Highly durable and sufficient power generation device

An international research group has engineered a new energy-generating device by combining piezoelectric composites with carbon fiber-reinforced polymer (CFRP), a commonly used material that is both light and strong. The new device transforms vibrations from the surrounding environment into electricity, providing an efficient and reliable means for self-powered sensors.



CFRP enhanced piezoelectric energy harvester and power storage circuit controlling the wireless communication-integrated circuit.
Credit: Tohoku University

The group fabricated the device using a combination of CFRP and potassium sodium niobate (KNN) nanoparticles mixed with epoxy resin. The CFRP served as both an electrode and a reinforcement substrate. The so-called C-PVEH device lived up to its expectations. Tests and simulations revealed that it could maintain high performance even after being bent more than 100,000 times. It proved capable of storing the generated electricity and powering LED lights. Additionally, it outperformed other KNN-based polymer composites in terms of energy output density.

For more information, visit the following link:
http://www.tohoku.ac.jp/en/press/energy_harvesting_via_vibrations.html

Reference

Fumio, N. (Jun 15, 2023). Energy harvesting via vibrations: researchers develop highly durable and efficient device. Recovered Jun 16, 2023, Tohoku University: http://www.tohoku.ac.jp/en/press/energy_harvesting_via_vibrations.html

Information source: (Tohoku University, 2023)

1.3 Contact lenses shed microplastics

Scientists are still grappling to understand the health and environmental impacts of microplastics, it is important to understand where they can appear and what systems they could impact. When measuring aquatic microplastic pollution, researchers generally filter plastic fragments from large amounts of sampled water. Then, they use a microscope and manually count the fragments, a method that is slow and not very consistent. More automated alternatives have been developed, but the techniques are still time consuming. Scientists wanted to develop an automated method that could quickly detect and count microplastic particles in small samples, such as contact lenses.

Contact lenses can shed microplastics, as revealed by a new detection method. Credit: American Chemical Society

In tests with standard amounts of microplastics, the team found that the new system's analyses were quicker and more accurate than when the samples were analyzed manually. In the absence of any simulated sunlight, no microplastics were detected. However, the researchers observed increasing amounts when the contact lenses were exposed to the equivalent of 90 days of sunlight. Lenses with shorter lifetimes showed the greatest amount of shed microplastics after this exposure. Based on their data in this small-scale study, the researchers estimate that more than 90,000 microplastic particles per year could be shed from some lenses if worn for 10 hours a day.

For more information, visit the following link:
https://www.acs.org/pressroom/presspacs/2023/june/contact-lenses-shed-microplastics.html

Reference
American Chemical Society. (Jun 15, 2023). Contact lenses shed microplastics. Recovered Jun 16, 2023, American Chemical Society:

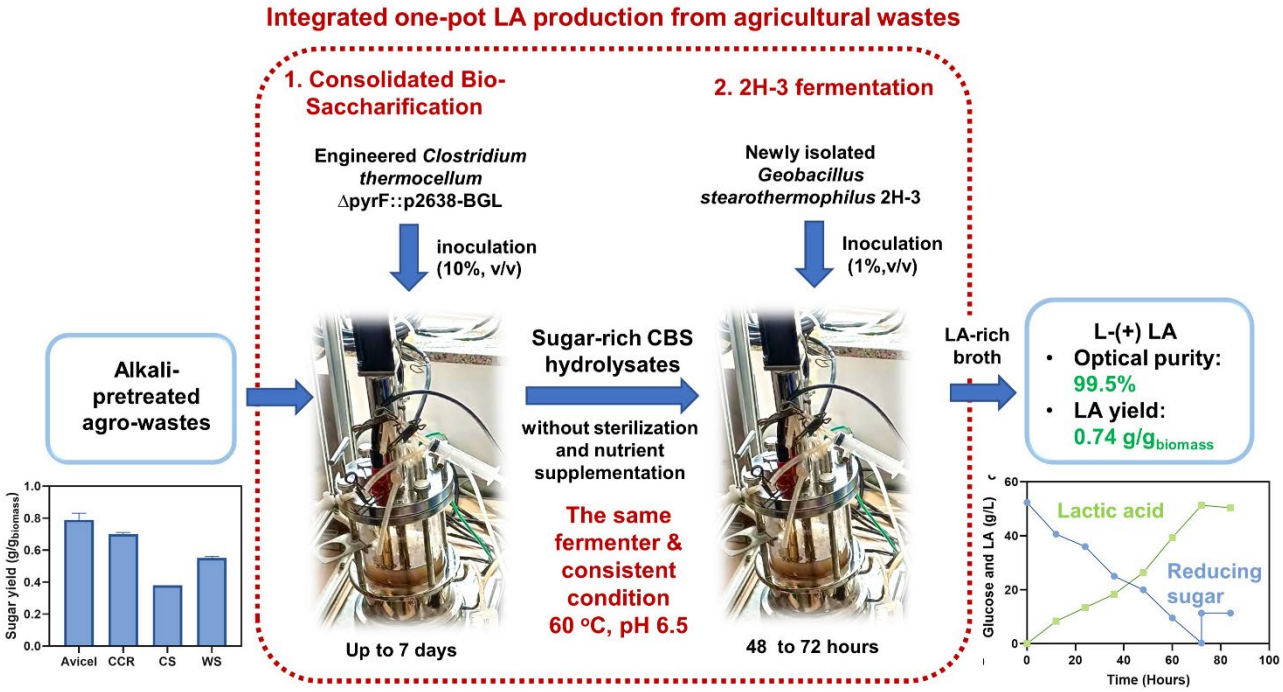
https://www.acs.org/pressroom/presspacs/2023/june/contact-lenses-shed-microplastics.html

Information source: (American Chemical Society, 2023)

1.4 Using agricultural waste materials to produce lactic acid

Lactic acid (LA) is an important chemical intermediate for a plethora of products, from medicine to cosmetics to degradable materials, and is the building block for biodegradable polylactic acid (PLA), a main component in compostable, recycled plastics.

With a high demand for PLA and lactic acid in general, finding a non-food carbon source for the LA synthesis process is a big step toward developing and implementing more sustainable practices.



Schematic representation of the integrated LA production process from agro-wastes
Credit: Lian, Y.; Eindhoven University of Technology

Researchers from the Qingdao Institute of Bioenergy and Bioprocess Technology (QIBEBT) of the Chinese Academy of Sciences and their collaborators are streamlining a way to use the abundant agro-waste products in non-food feedstocks to derive LA from lignocellulose, a complex structural network found in plant cell wall. Using consolidated bio-saccharification (CBS), they were able to take the raw material of lignocellulose and obtain LA through a fermentation process.

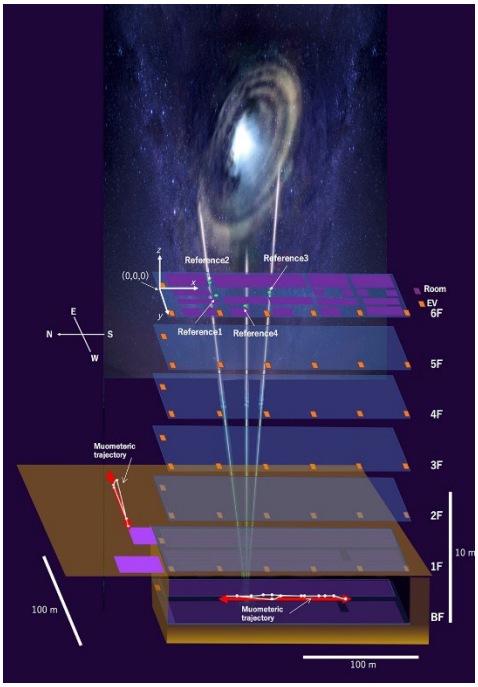
For more information, visit the following link:
https://english.cas.cn/newsroom/research_news/chem/202306/t20230615_331967.shtml

Reference
Fitzgerald, B. (Jun 16, 2023). Using agricultural waste materials to produce lactic acid. Recovered Jun 16, 2023, Chinese Academy of Sciences: https://english.cas.cn/newsroom/research_news/chem/202306/t20230615_331967.shtml

Information source: (Chinese Academy of Sciences, 2023)

1.5 New technology enables navigation in places that GPS cannot reach

Superfast, subatomic-sized particles called muons have been used to wirelessly navigate underground in a reportedly world first. By using muon-detecting ground stations synchronized with an underground muon-detecting receiver, researchers at the University of Tokyo were able to calculate the receiver's position in the basement of a six-story building. As GPS cannot penetrate rock or water, this new technology could be used in future search and rescue efforts, to monitor undersea volcanoes, and guide autonomous vehicles underground and underwater.



Navigating inside with muons. The red line in this image represents the path the "navigatee" walked, while the white line with dots shows the path recorded by MuWNS
Credit: Hiroyuki K.M. Tanaka, The University of Tokyo

GPS, the global positioning system, is a well-established navigation tool and offers an extensive list of positive applications, from safer air travel to real-time location mapping. However, it has some limitations. GPS signals are weaker at higher latitudes and can be jammed or spoofed (where a counterfeit signal replaces an authentic one). Signals can also be reflected off surfaces like walls, interfered with by trees, and can't pass through buildings, rock or water.

For more information, visit the following link:
https://www.u-tokyo.ac.jp/focus/en/press/z0508_00291.html

Reference

Tanaka, H. (Jun 16, 2023). New technology enables navigation in places that GPS cannot reach. Recovered Jun 16, 2023, The University of Tokyo:

https://www.u-tokyo.ac.jp/focus/en/press/z0508_00291.html

Information source: (The University of Tokyo, 2023)

1.6 Manufacture of unmanned aerial vehicles

A University of Texas at Arlington researcher is leading a project to bring automation to smaller composite manufacturing for unmanned aerial vehicles (UAVs) and urban air mobility (UAMs) vehicles.

Davidson, a UT Arlington assistant professor in the Department of Mechanical and Aerospace Engineering (MAE), said most composite manufacturing for larger aircraft is performed with automated robotic manufacturing. But similar automation is difficult on smaller UAV or UAM vehicles because of their complex shapes and high curvatures. Composite materials compose nearly half of larger modern commercial aircraft. For UAVs, this number goes up to nearly 90%, he said. *"When the UAVs and UAMs get smaller and with high curvatures, the composites face several challenges like shearing and wrinkling, which lead to poor structural performance and overdesign,"* Davidson said. *"On a larger scale, we can have robots do the work. We need to bring that to a smaller scale."*

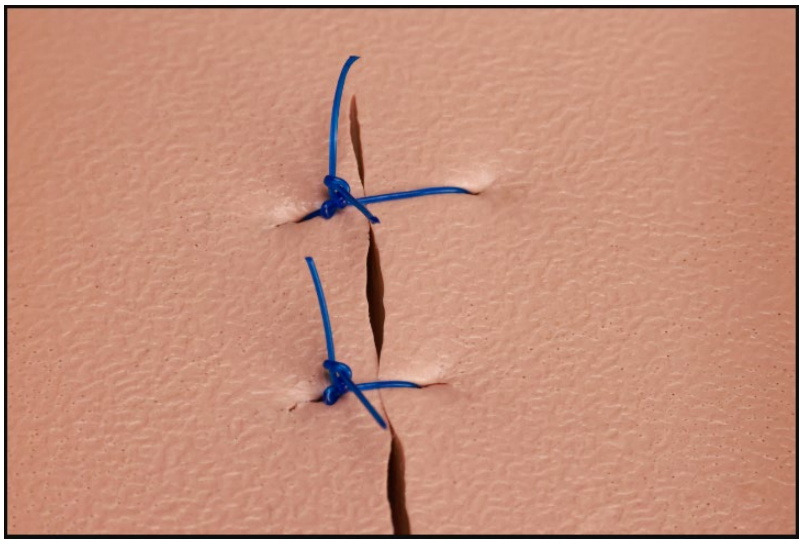
For more information, visit the following link:
https://www.uta.edu/news/news-releases/2023/06/15/davidson-uav-manufacturing

Reference
Booth, H. (Jun 16, 2023). Engineer looks to transform manufacturing of unmanned aerial vehicles. Recovered Jun 16, 2023, The University of Texas at Arlington: https://www.uta.edu/news/news-releases/2023/06/15/davidson-uav-manufacturing

Information source: (The University of Texas at Arlington, 2023)

1.7 Study reveals mechanics of the ideal surgical knot

Surgeons take an intuitive approach to knotting sutures. While simple square and granny sliding knots are often used in surgery, it takes years to master them so that they stay in place without loosening or breaking. Much mathematical research has been done on knot topology and geometry, but little is known about knot mechanics in the context of physical variables, like the material properties of knotted filaments.



Surgical knot tied on a suturing pad.
Credit: Alain Herzog, Ecole Polytechnique Fédérale de Lausanne

The team's findings could be a valuable tool for training surgeons, as they could allow the parameters of a secure knot to be translated into practical guidelines. While experience would remain important, the idea is that safe knot-tying could be taught using predictive models, rather than intuition gained only through years of practice. *"The lack of physics-based analysis has been a limitation,"* Guerid, plastic surgeon at EPFL, adds. *"Quantifiable data on knot mechanics could be integrated into training programs to assess the tensile strength of each knot, ensuring trainees acquire necessary skills for successful surgeries. The data could also facilitate development of robotic surgery via the programming of robotic systems."*

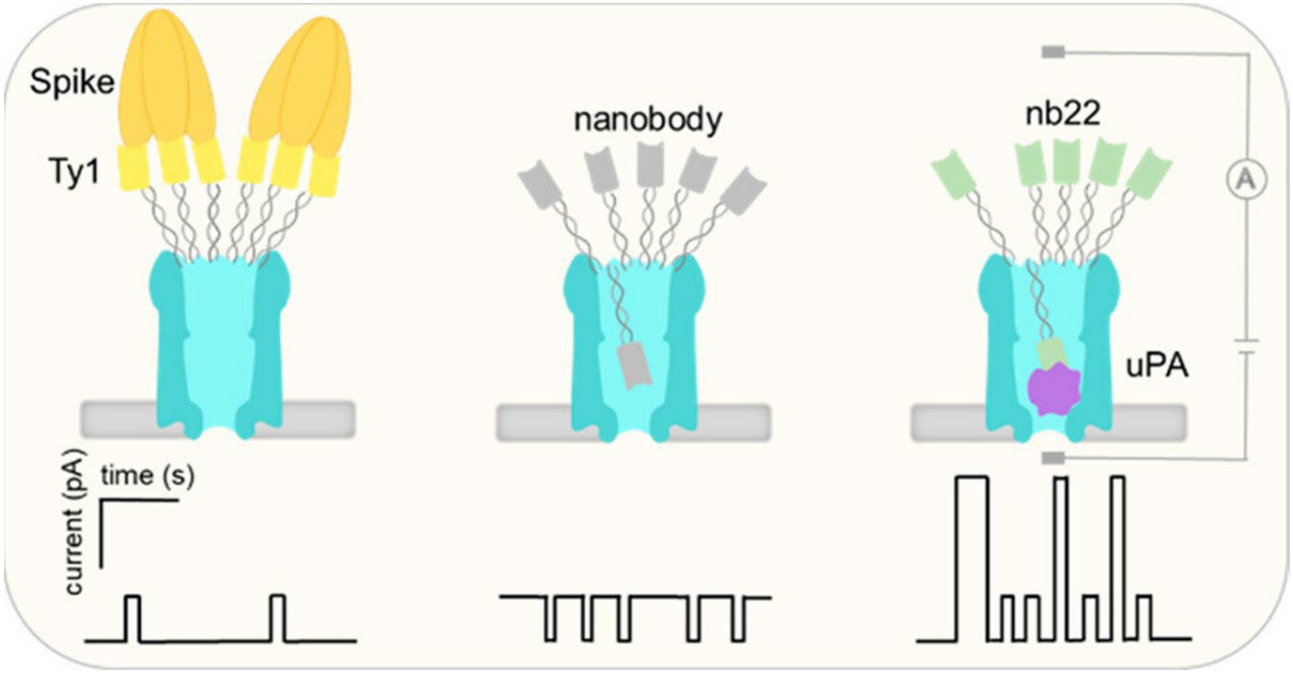
For more information, visit the following link:
https://actu.epfl.ch/news/study-reveals-mechanics-of-the-ideal-surgical-knot/

Reference
Luterbacher, C. (Jun 16, 2023). Study reveals mechanics of the ideal surgical knot. Recovered Jun 16, 2023, Ecole Polytechnique Fédérale de Lausanne: https://actu.epfl.ch/news/study-reveals-mechanics-of-the-ideal-surgical-knot/

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

1.8 Tiny nanopores can contribute to faster identification of diseases

Researchers from Aarhus University are behind a new method for detecting important proteins in, for example, a blood sample. By using tiny nanopores and nanobodies, they have identified markers that are indicators of COVID-19 and breast cancer, respectively, with impressive precision and sensitivity. With this technology, the future may hold fast and accurate disease diagnosis using a simple blood test. The discoveries could bring us closer to improved healthcare.



Jørgen Kjems and his collaborators have achieved a unique breakthrough in the development of tiny nanometer-sized pores, which may contribute to better opportunities to detect diseases at an earlier stage.
Credit: Aarhus University

In a collaboration with Groningen University, Professor Jørgen Kjems and his research group at Aarhus University have achieved a remarkable breakthrough in developing tiny nano-sized pores that can contribute to better possibilities for, among other things, detecting diseases at an earlier stage. Their work, recently published in the scientific journal ACS Nano, shows a new innovative method for finding specific proteins in complex biological fluids, such as blood, without having to label the proteins chemically. The research is an important milestone in nanopore technology, and could revolutionise medical diagnostics.

For more information, visit the following link:
https://mbg.au.dk/en/news-and-events/news-item/artikel/tiny-nanopores-can-contribute-to-faster-identification-of-diseases

Reference
Kjems, J. (Jun 16, 2023). Tiny nanopores can contribute to faster identification of diseases. Recovered Jun 16, 2023, Aarhus University: https://mbg.au.dk/en/news-and-events/news-item/artikel/tiny-nanopores-can-contribute-to-faster-identification-of-diseases

Information source: (Aarhus University, 2023)

1.9 Compounds show promise for inhibiting nerve growth implicated in back pain

The team found two compounds that substantially shortened the length of nerve fibers in cultures of rat-derived cells responsible for carrying sensory information, including pain signals, to the central nervous system. Rats whose discs were injected with the compounds, meanwhile, showed no weight loss or behavioral changes that would indicate side effects. Though the compounds did appear to modify the metabolism of cells derived from human discs, the cells remained viable, a preliminary but heartening sign of their compatibility with the compounds.

Whether the compounds can inhibit or even reverse nerve fiber growth in human discs, and reduce any pain driven by them, remains an open question. But if the compounds continue to show promise in animal trials, they could eventually find their way into human trials — a major step toward the elusive long-term treatment of low-back pain.

For more information, visit the following link:
https://news.unl.edu/newsrooms/today/article/compounds-show-promise-for-inhibiting-nerve-growth-implicated-in-back-pain/

Reference
Schrage, S. (Jun 15, 2023). Compounds show promise for inhibiting nerve growth implicated in back pain. Recovered Jun 19, 2023, University of Nebraska-Lincoln: https://news.unl.edu/newsrooms/today/article/compounds-show-promise-for-inhibiting-nerve-growth-implicated-in-back-pain/

Information source: (University of Nebraska-Lincoln, 2023)

1.10 Regular napping linked to larger brain volume

The study, published in the journal Sleep Health, analysed data from people aged 40 to 69 and found a causal link between habitual napping and larger total brain volume - a marker of good brain health linked to a lower risk of dementia and other diseases. Senior author Dr Victoria Garfield (MRC Unit for Lifelong Health & Ageing at UCL) said: *"Our findings suggest that, for some people, short daytime naps may be a part of the puzzle that could help preserve the health of the brain as we get older."*

Previous research has shown that napping has cognitive benefits, with people who have had a short nap performing better in cognitive tests in the hours afterwards than counterparts who did not nap. The new study aimed to establish if there was a causal relationship between daytime napping and brain health. Using a technique called Mendelian randomisation, they looked at 97 snippets of DNA thought to determine people's likelihood of habitual napping. They compared measures of brain health and cognition of people who are more genetically *"programmed"* to nap with counterparts who did not have these genetic variants, using data from 378,932 people from the UK Biobank study, and found that, overall, people predetermined to nap had a larger total brain volume.

For more information, visit the following link:
https://www.ucl.ac.uk/news/2023/jun/regular-napping-linked-larger-brain-volume

Reference
Greaves, M. (Jun 19, 2023). Regular napping linked to larger brain volume. Recovered Jun 19, 2023, University College London: https://www.ucl.ac.uk/news/2023/jun/regular-napping-linked-larger-brain-volume

Information source: (University College London, 2023)

1.11 Reclaimed water ready for crops

Plant materials that would otherwise become trash may be the key to solving two big problems: diminishing freshwater supplies for farms and diminishing effectiveness of antibiotics.

Pistachio shells and palm fronds transformed into biochar may be able to remove harmful chemicals from wastewater.
Credit: University of California - Riverside

Biochar is a charcoal-like substance made by burning organic material. Burning any organic matter, even wood chips, in limited-oxygen environments retains the mass of the burned substance. The remaining, charred substance is highly absorbent. *"It's like activated charcoal used in HEPA filters and HVAC systems. Biochar works on the same principal; it adsorbs chemicals present in reclaimed water and allows only clean water to pass through,"* Bhattacharjee said. Based on this principle, Daniel Ashworth, a soil scientist at the Salinity Laboratory, first built a bench-scale filtration system with biochar for the removal of antibiotics in synthetic wastewater. The results were very promising, with antibiotics removal efficiency of up to 98%.

For more information, visit the following link:
https://news.ucr.edu/articles/2023/06/19/sewage-sustenance-making-reclaimed-water-ready-crops

Reference

Bernstein, J. (Jun 19, 2023). Sewage to sustenance: making reclaimed water ready for crops. Recovered Jun 19, 2023, University of California - Riverside: https://news.ucr.edu/articles/2023/06/19/sewage-sustenance-making-reclaimed-water-ready-crops

Information source: (University of California - Riverside, 2023)

1.12 Rice that withstands some of the worst crop-destroying diseases

In an international collaboration led by researchers at Huazhong Agricultural University, China and University of California Davis, USA, researchers identified a rice variety that already had strong resistance to fungal and bacterial diseases but produced poor grain yields. They showed that this plant was mutated in the gene RBL1.

Credit: The University of Adelaide

"Using existing genome-editing technology, the team then generated 57 gene variants from this type of rice and tested their immunity against several strains of rice blast and bacterial blight. We found that one variant of RBL1 had broad-spectrum disease resistance but unlike other varieties, it was still able to produce large yields in small-scale field trials," said Associate Professor Mortimer, who is a researcher at the University's Waite Research Institute.

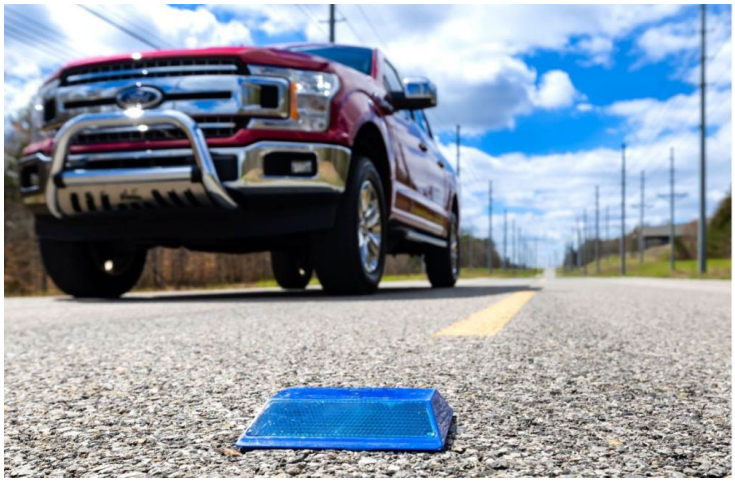
For more information, visit the following link:
https://www.adelaide.edu.au/newsroom/news/list/2023/06/14/new-discovery-set-to-boost-disease-resistant-rice

Reference
Stanley, J. (Jun 20, 2023). New discovery set to boost disease-resistant rice. Recovered Jun 20, 2023, The University of Adelaide: https://www.adelaide.edu.au/newsroom/news/list/2023/06/14/new-discovery-set-to-boost-disease-resistant-rice

Information source: (The University of Adelaide, 2023)

1.13 High-tech pavement markers support autonomous driving in tough conditions, remote areas

Self-driving electric vehicles still face steep hills on the road to reliability. Researchers from the Department of Energy's Oak Ridge National Laboratory and Western Michigan University are working together to drive solutions from outside the car: sensors and processing embedded in road infrastructure.



ORNL researchers have enabled standard raised pavement markers to transmit GPS information that helps autonomous driving features function better in remote areas or in bad weather.
Credit: Carlos Jones/ORNL, U.S. Dept. of Energy, Oak Ridge National Laboratory

Not only does the technology provide more accurate information about the driving environment, but it also shifts some of the processing load from the car's software onto infrastructure. This saves electric vehicle battery power, extending driving range to promote wider EV adoption. Compared with a leading camera and LiDAR-based autonomous driving technology, the chip-enabled pavement markers can reduce navigational power consumption by up to 90%, the authors reported in a technical paper.

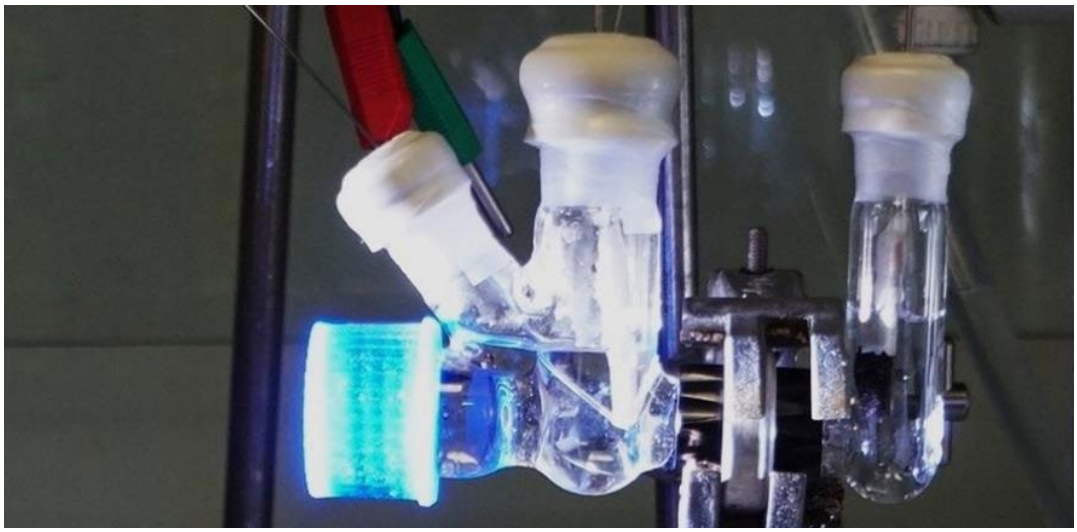
For more information, visit the following link:
https://www.ornl.gov/news/high-tech-pavement-markers-support-autonomous-driving-tough-conditions-remote-areas

Reference
Heather, D. (Jun 20, 2023). High-tech pavement markers support autonomous driving in tough conditions, remote areas. Recovered Jun 20, 2023, Oak Ridge National Laboratory: https://www.ornl.gov/news/high-tech-pavement-markers-support-autonomous-driving-tough-conditions-remote-areas

Information source: (Oak Ridge National Laboratory, 2023)

1.14 Clean, sustainable fuels made *"from thin air"* and plastic waste

The researchers, from the University of Cambridge, developed a solar-powered reactor that converts captured CO2 and plastic waste into sustainable fuels and other valuable chemical products. In tests, CO2 was converted into syngas, a key building block for sustainable liquid fuels, and plastic bottles were converted into glycolic acid, which is widely used in the cosmetics industry.



Credit: University of Cambridge

Unlike earlier tests of their solar fuels technology however, the team took CO2 from real-world sources – such as industrial exhaust or the air itself. The researchers were able to capture and concentrate the CO2 and convert it into sustainable fuel. Although improvements are needed before this technology can be used at an industrial scale, the results, represent another important step toward the production of clean fuels to power the economy, without the need for environmentally destructive oil and gas extraction.

For more information, visit the following link:
https://www.cam.ac.uk/research/news/clean-sustainable-fuels-made-from-thin-air-and-plastic-waste

Reference
Collins, S. (Jun 19, 2023). Clean, sustainable fuels made *"from thin air"* and plastic waste. Recovered Jun 19, 2023, University of Cambridge: https://www.cam.ac.uk/research/news/clean-sustainable-fuels-made-from-thin-air-and-plastic-waste

Information source: (University of Cambridge, 2023)

1.15 Starches common in processed grains can curb helpful gut bacteria

Early in the 20th century, researchers discovered a variant of corn containing more than 90% amylopectin and just a tiny fraction of amylose. That ratio results in so-called waxy starches that are better at thickening and stabilizing certain food products, to the point that plant breeders and food engineers often favor them. But a lack of amylose also yields lower levels of resistant starch: the difficult-to-digest variety that can feed the vast ecosystem, or microbiome, of bacteria and other microorganisms in the gut, some of which may help combat chronic diseases. Whether and exactly how waxy starches might modify the microbiome, though, are understudied questions with few answers.

Credit: University of Nebraska–Lincoln

The team's proof-of-concept experiments reinforce the value of considering trade-offs between plant traits bred for food functionality — including the processing benefits of waxy starches — and their potential health-related consequences. Integrating techniques that can measure starch-microbiome dynamics into the development of crop lines and food products, the team said, could help plant breeders and food scientists better balance functional properties with nutritional.

For more information, visit the following link:
https://news.unl.edu/newsrooms/today/article/starches-common-in-processed-grains-can-curb-helpful-gut-bacteria/

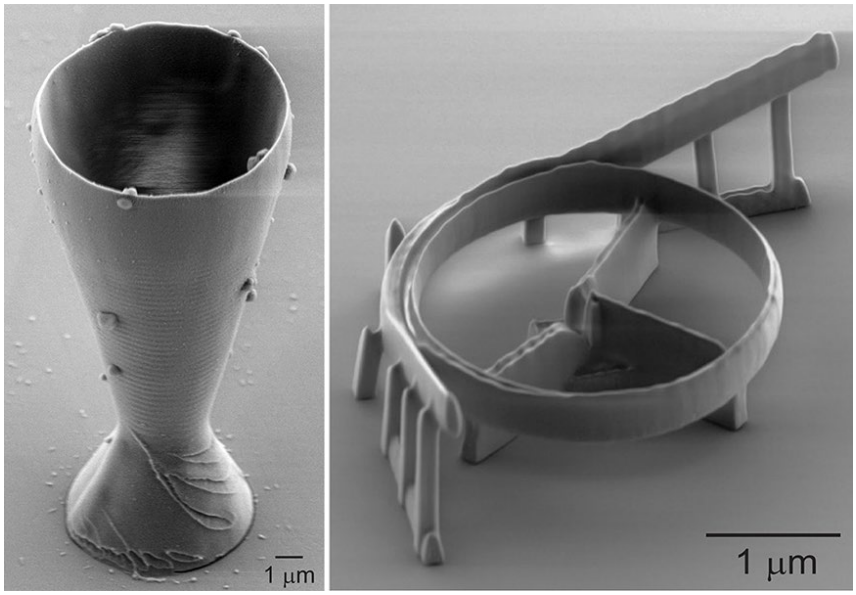
Reference

Schrage, S. (Jun 19, 2023). Starches common in processed grains can curb helpful gut bacteria. Recovered Jun 19, 2023, University of Nebraska–Lincoln: https://news.unl.edu/newsrooms/today/article/starches-common-in-processed-grains-can-curb-helpful-gut-bacteria/

Information source: (University of Nebraska–Lincoln, 2023)

1.16 Researchers 3D print world's smallest wineglass with new method

Researchers have 3D-printed the world's smallest wine glass—nearly indistinguishable with the naked eye—with a rim smaller than the width of a human hair. But the idea wasn't to cater to extremely light drinkers. Rather, the glass was printed to demonstrate a new simplified technique for creating silica glass structures for a range of applications from telecommunications to robotics.



The world's smallest 3D-printed wineglass (left) and an optical resonator for fiber optic telecommunications, photographed with scanning electron microscopy at KTH Royal Institute of Technology. The rim of the glass is smaller than the width of a human hair.
Credit: KTH Royal Institute of Technology

Developed at KTH Royal Institute of Technology in Stockholm, the new technique surmounts complications—such as the need for thermal treatment—when 3D-printing essential silica glass components, says KTH Professor Frank Niklaus. Niklaus says it can be used for customized lenses for medical machinery that perform minimally invasive surgery, micro-robots that navigate extreme environments, or filters and couplers for fiber optic networks, to name a few applications. One such fiber optic filter was produced in the study. The researchers show that the technique can print devices directly on the tip of an optical fiber as thin as a strand of a human hair.

For more information, visit the following link:
https://www.kth.se/en/om/nyheter/centrala-nyheter/researcher-3d-prints-world-s-smallest-wineglass-with-new-method-1.1263296

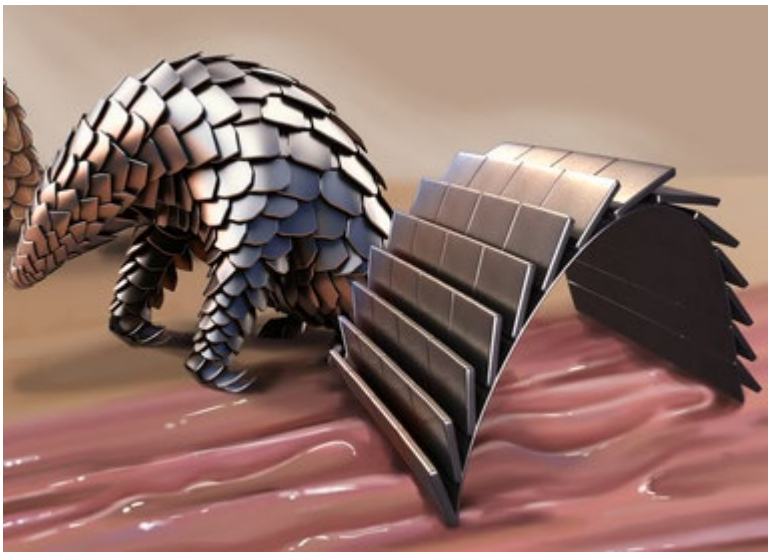
Reference
Callahan, D. (Jun 20, 2023). Researcher 3D prints world's smallest wineglass with new method. Recovered Jun 20, 2023, KTH Royal Institute of Technology:

https://www.kth.se/en/om/nyheter/centrala-nyheter/researcher-3d-prints-world-s-smallest-wineglass-with-new-method-1.1263296

Information source: (KTH Royal Institute of Technology, 2023)

1.17 Pangolin the inspiration for medical robot

Scientists at the Max Planck Institute for Intelligent Systems in Stuttgart have developed a magnetically controlled soft medical robot with a unique, flexible structure inspired by the body of a pangolin. The robot is freely movable despite built-in hard metal components. Thus, depending on the magnetic field, it can adapt its shape to be able to move and can emit heat when needed, allowing for functionalities such as selective cargo transportation and release as well as mitigation of bleeding.



Credit: Max Planck Institute for Intelligent Systems

When the robot is exposed to a low-frequency magnetic field, the researchers can roll up the robot and move it back and forth as they wish. The metal elements stick out like the animal's scales, without hurting any surrounding tissue. Once it is rolled up, the robot can transport particles such as medicines. The vision is that such a small machine will one day travel through our digestive system, for example.

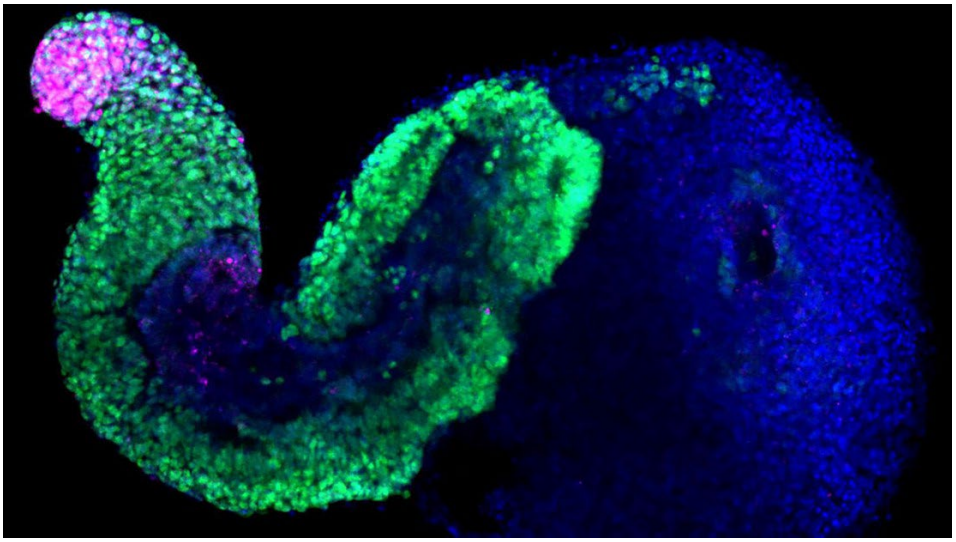
For more information, visit the following link:
https://is.mpg.de/news/pangolin-the-inspiration-for-medical-robot

Reference
Max Planck Institute for intelligent systems (Jun 20, 2023). Pangolin the inspiration for medical robot. Recovered Jun 20, 2023, Max Planck Institute for intelligent systems: https://is.mpg.de/news/pangolin-the-inspiration-for-medical-robot

Information source: (Max Planck Institute for intelligent systems, 2023)

1.18 Embryoids shed light on a complex genetic mechanism

Researchers from EPFL and the University of Geneva (UNIGE) have gained new insights into a mechanism regulating the early-stage development of mouse embryos. Instead of using an animal model, the team carried out their research on pseudo-embryos grown in the lab from stem cells.



Credit: Ecole Polytechnique Fédérale de Lausanne

At EPFL, research groups are increasingly embracing so-called alternative methods such as organoids – multicellular micro-tissues grown from stem cells that imitate the structure and function of some human organs. These methods are revolutionizing basic research, which aims to build a precise picture of how particular mechanisms function. But they're less useful in drug development research, where scientists aim to understand how a molecule affects a given system. In cases like these, animal models still have an indispensable role to play.

For more information, visit the following link:
https://actu.epfl.ch/news/embryoids-shed-light-on-a-complex-genetic-mechanis/

Reference
Carlier, R. (Jun 20, 2023). Embryoids shed light on a complex genetic mechanism. Recovered Jun 20, 2023, Ecole Polytechnique Fédérale de Lausanne: https://actu.epfl.ch/news/embryoids-shed-light-on-a-complex-genetic-mechanis/

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

1.19 Expand ability of robots to learn from videos

New work from Carnegie Mellon University has enabled robots to learn household chores by watching videos of people performing everyday tasks in their homes.

A team from CMU's Robotics Institute used affordances to teach robots how to interact with objects.
Credit: Carnegie Mellon University

The research could help improve the utility of robots in the home, allowing them to assist people with tasks like cooking and cleaning. Two robots successfully learned 12 tasks including opening a drawer, oven door and lid; taking a pot off the stove; and picking up a telephone, vegetable or can of soup. *"The robot can learn where and how humans interact with different objects through watching videos,"* said Deepak Pathak, an assistant professor in the Robotics Institute at CMU's School of Computer Science. *"From this knowledge, we can train a model that enables two robots to complete similar tasks in varied environments."*

For more information, visit the following link:
https://www.cs.cmu.edu/news/2023/VRB_robot_tasks

Reference

Aupperlee, A. (Jun 20, 2023). CMU Researchers expand ability of robots to learn from videos. Recovered Jun 20, 2023, Carnegie Mellon University: https://www.cs.cmu.edu/news/2023/VRB_robot_tasks

Information source: (Carnegie Mellon University, 2023)

1.20 Lack of simulations hampering driverless vehicle revolution

Algorithms that accurately reflect the behaviour of road users - vital for the safe roll out of driverless vehicles - are still not available, warn scientists.

Credit: University of Leeds

During computer tests, the model accurately reproduced various well-known but not previously understood behaviours of pedestrians and drivers in common road scenarios. The model also predicted how real-life human subjects would behave when facing interactive situations in a virtual reality simulator. Professor Markkula said: *"These findings suggest that everyday road user behaviour relies on a number of complex underlying cognitive mechanisms, which may be part of the reason why it has been more difficult than expected to create self-driving vehicles."*

For more information, visit the following link:
https://www.leeds.ac.uk/main-index/news/article/5322/lack-of-simulations-hampering-driverless-vehicle-revolution

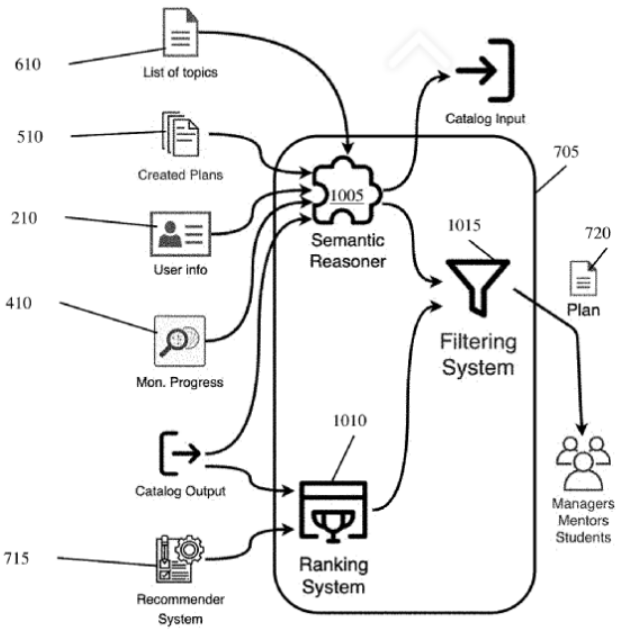
Reference
Lewis, D. (Jun 20, 2023). Lack of simulations hampering driverless vehicle revolution. Recovered Jun 20, 2023, University of Leeds: https://www.leeds.ac.uk/main-index/news/article/5322/lack-of-simulations-hampering-driverless-vehicle-revolution

Information source: (University of Leeds, 2023)

2 PATENTS

2.1 Artificial intelligence system for generation of personalized study plans

A system for providing study plans to a user includes a topic catalog storing multiple topics and multiple keywords associated with each topic. The system also includes a plan generator configured to receive multiple sample study plans, each sample study plan having one or more resources, each resource having one or more portions, and each portion being assigned a duration.



Conceptually illustrates some components of the plan generator 705 in some embodiments. Credit: Basilio, C.; Dias, R. & Zanona, S., WIPO IP Portal

The plan generator uses the sample study plans and the topic catalog to train a topic model to identify which topics are associated with each resource, resulting in a trained topic model. The plan generator receives a profile of a student from a user, the profile having one or more selected topics the student desires to study and further having multiple preferences associated with the student. The plan generator uses the trained topic model and the profile to identify a subset of the resources that are associated with the selected topics, generates a customized study plan for the student using the subset of identified resources and the preferences, and provides the customized study plan to the user.

For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US399578272&_cid=P22-LJ4DER-74687-1

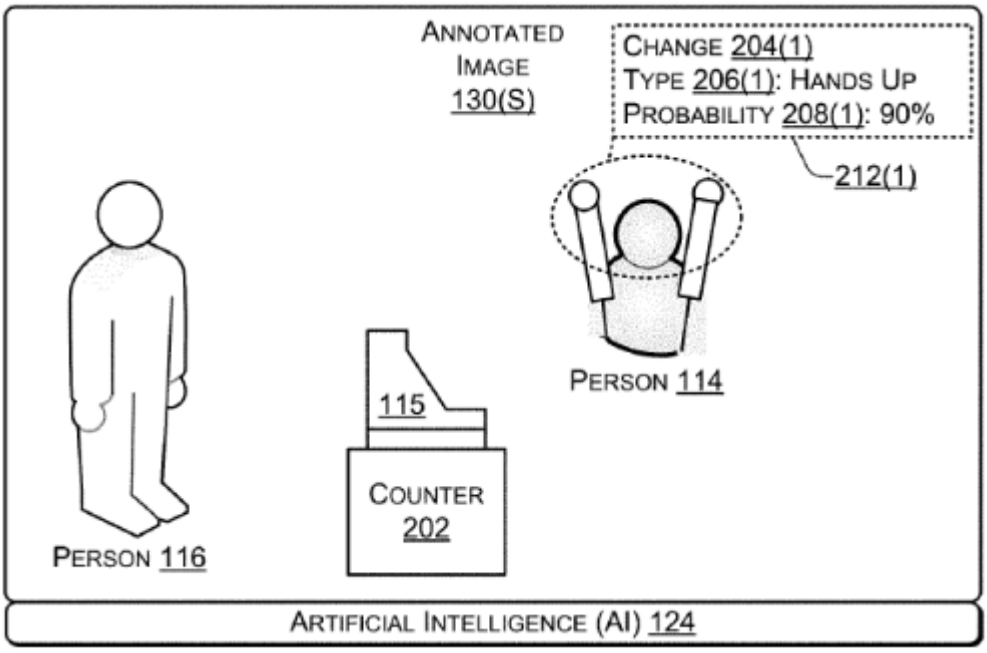
Reference

Basilio, C.; Dias, R. & Zanona, S. (Jun 15, 2023). Artificial intelligence system for generation of personalized study plans. Recovered Jun 15, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=US399578272&_cid=P22-LJ4DER-74687-1

Information source: (WIPO IP Portal, 2023)

2.2 Using Artificial Intelligence to analyze sensor data to detect potential change(s) for risk and threat assessment and identification

In some aspects, a server receives a video stream from a security system and processes a frame from the video stream to create a processed frame. The server analyzes the processed frame using artificial intelligence and determines that the processed frame includes a change to a surface area of an object and determines details associated with the change.



Illustrate images of an interior of a building, according to some embodiments. Credit: Merchant, S., WIPO IP Portal

The server determines that the change satisfies one or more thresholds, such as a change threshold and a time threshold. The server adds annotations to the processed frame to create an annotated frame. The annotations include the change and at least a portion of the details associated with the change to the surface area of the object. The server sends, to a designated recipient, a notification that includes a link to view the annotated frame.

For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US399579227&_cid=P22-LJ3C88-01000-1

Reference

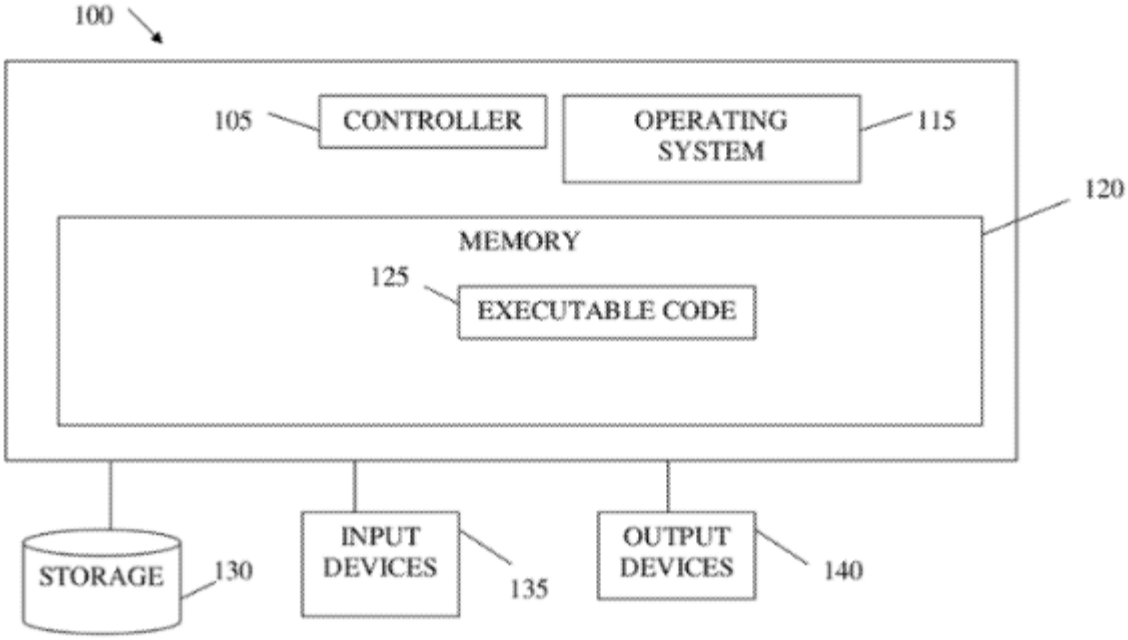
Merchant, S. (Jun 15, 2023). Using artificial intelligence to analyze sensor data to detect potential change(s) for risk and threat assessment and identification. Recovered Jun 15, 2023, WIPO IP Portal:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US399579227&_cid=P22-LJ3C88-01000-1

Information source: (WIPO IP Portal, 2023)

2.3 Smart platform for IoT devices

Methods and systems for managing a plurality of Internet of Things (IoT) devices deployed with respect to a building are disclosed.



Is a high-level block diagram of an exemplary computing device according to some embodiments of the present invention
Credit: Shnaiderman, E. & Shnaiderman, A., WIPO IP Portal

A system includes: a computer processor; a monitoring unit to store at least one rule, and monitor, based on data received from at least one IoT device of the plurality of IoT devices, at least one environment in respect of the building; a building management unit to connect to a building management system of the building; an artificial intelligence unit to receive data from at least one of the monitoring unit and/or the building management unit and process the received data to produce at least one actionable insight with respect to the building; and a control unit to implement at least one action in response to at least one actionable insight.

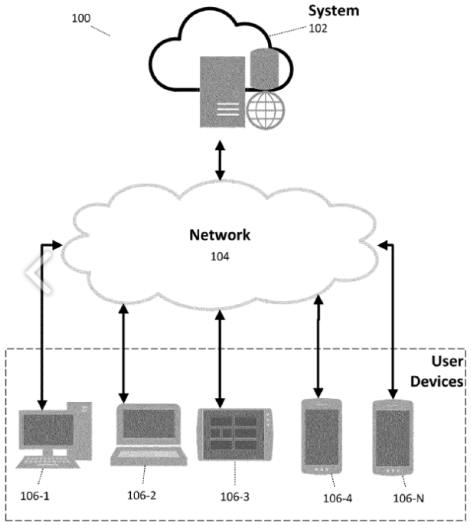
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023105519&_cid=P22-LJ4DER-74687-1

Reference
Shnaiderman, E. & Shnaiderman, A. (Jun 15, 2023). Smart platform for IoT devices. Recovered Jun 15, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023105519&_cid=P22-LJ4DER-74687-1

Information source: (WIPO IP Portal, 2023)

2.4 Computer-implemented system and method of facilitating artificial intelligence based lending strategies and business revenue management

A system and method of facilitating lending strategies and business revenue management are disclosed. Lagging and forward-looking data from internal and vendor sources are processed and classified based on regulatory compliance and historical data performance testing.



Is a diagram of a network implementation of a system of facilitating lending strategies and business revenue management, according to example embodiments.
Credit: Masson, F., WIPO IP Portal

Automated lending strategies are developed on the outcome and learning of an artificial intelligence/Machine Learning engine to optimize the lending business revenue and provide a roadmap to reach the user-defined business revenue target. Automated lending strategies are finalized based on strategy performance and any optional manual changes entered through the user interface. Strategies are combined to assess the global impact on business revenue. Several sets of automated lending strategies which anticipate future trends may be developed based on business, supervisory, or custom economic scenarios. After user review, a lending strategy set may be implemented directly into the business operating systems through APIs or by following a strategy specifications document.

For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US399578909&_cid=P22-LJ4DER-74687-1

Reference

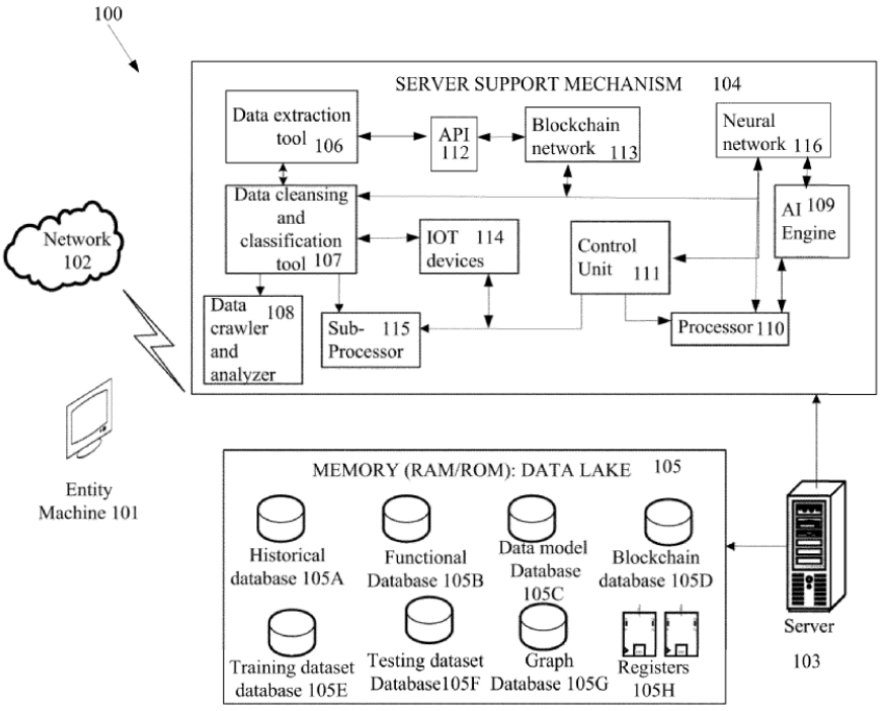
Masson, F. (Jun 15, 2023). Computer-implemented system and method of facilitating artificial intelligence based lending strategies and business revenue management. Recovered Jun 15, 2023, WIPO IP Portal:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US399578909&_cid=P22-LJ4DER-74687-1

Information source: (WIPO IP Portal, 2023)

2.5 Artificial intelligence based data processing in enterprise application

The present invention provides an artificial intelligence-based data processing system and method for enterprise application.



Is a view of a data processing system of an enterprise application in accordance with an embodiment of the invention.
Credit: Makhija, S.; Maruthi, N.; Matawala, H. & Singh, S., WIPO IP Portal

The data processing system and method are configured to receive an input data for executing a task at a server, identify and fetch one or more outliers from a data network based on the task to be executed, process the one or more outliers by at least one outlier data model trained on a historical outlier dataset to identify one or more glitches in execution of the task and in response to the recommended action, determine by at least one path identifier data model, at least one path for execution of an action.

For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US399578560&_cid=P22-LJ4DER-74687-1

Reference
Makhija, S.; Maruthi, N.; Matawala, H. & Singh, S. (Jun 15, 2023). System and method for integrated control of 3D visualization through a surgical robotic system. Recovered Jun 15, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US399578560&_cid=P22-LJ4DER-74687-1

Information source: (WIPO IP Portal, 2023)

2.6 System and method for tracking a region of interest

A home security device may include one or more sensors and a camera for capturing image data. The home security device may also include processors and a non-transitory computer-readable memory.

The home security device may perform operations including detecting a trigger by the camera and/or the sensors and receiving image data representing a field of view. The field of view may include a suspected object of interest. The operations may include identifying a region of interest containing the suspected object of interest. The operations may include determining that the suspected object of interest is an object of interest based on output from an artificial intelligence model. The operations may also include providing a first video stream representing the field of view and second video stream representing the region of interest for presentation at the computing device substantially simultaneously.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086694122/publication/US20231088682A1?q=artificial%20intelligence

Reference
Tang, L. & Morgan, B. (Jun 15, 2023). Computing apparatus and method for performing reinforcement learning using multimodal artificial intelligence agent. Recovered Jun 08, 2023, Espacenet Patent Search:
https://worldwide.espacenet.com/patent/search/family/086694122/publication/US20231088682A1?q=artificial%20intelligence

Information source: (Espacenet Patent Search, 2023)

2.7 Virtual reality object tag presentation

The present invention relates to virtual reality systems, and more specifically to the tagging, sharing, and presenting of tags associated with virtual reality objects. According to an embodiment of the present invention, a computer-implemented method is described. According to the computer-implemented method, user-specific tags are generated for a virtual reality (VR) object displayed within a VR environment. The user-specific tags are generated based on an interaction of a first user with the VR object. Role-based access rights are assigned to the user-specific tags and a role of a second user accessing the VR environment is determined. Based on a comparison of the role of the second user and the role-based access rights, the user-specific tags are presented to the second user alongside the VR object.

The present specification describes a computer-implemented method. According to the method, user-specific tags are generated for a virtual reality (VR) object displayed within a VR environment. The user-specific tags are generated based on an interaction of a first user with the VR object. Role-based access rights are assigned to the user-specific tags. A role of a second user accessing the VR environment is determined and the user-specific tags are presented to the second user, alongside the VR object, based on a comparison of the role of the second user and the role-based access rights.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086694764/publication/US2023186660A1?q=virtual%20reality

Reference
Valecha, V.; Ghosh, P.; Yadav, S. & Maitra, A. (Jun 15, 2023). Virtual reality object tag presentation. Recovered Jun 15, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/086694764/publication/US2023186660A1?q=virtual%20reality

Information source: (Espacenet Patent Search, 2023)

2.8 Systems and methods for designing targeted marketing campaigns

A computer-implemented method is provided for identifying potential individuals to contact in a campaign of interest. The method includes receiving campaign data including description about the campaign of interest and information about the potential individuals to contact for the campaign of interest and selecting a plurality of trained Machine Learning models from a library of trained Machine Learning models based on the campaign data.

The library of trained Machine Learning models is created from data of historical campaigns administered, and each of the selected plurality of trained models corresponds to a historical campaign that is within a similarity threshold from the campaign of interest. The method also includes scoring a pool of existing customers using the select plurality of trained Machine Learning models and identifying the potential individuals to contact in the campaign of interest by ranking the existing customers by their corresponding propensity scores.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086694650/publication/US2023186346A1?q=machine%20learning

Reference
Perge, J. & Mosaliganti, K. (Jun 15, 2023). Systems and methods for designing targeted marketing campaigns. Recovered Jun 15, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/086694650/publication/US2023186346A1?q=machine%20learning

Information source: (Espacenet Patent Search, 2023)

2.9 System and method for blocking screenshots and screen recordings of premium user-generated content

Methods, systems, and apparatus for blocking screenshots and screen recordings of content are disclosed. A first media content frame is received from a first computer device. It is determined that one or more user interface elements are present in the first media content frame.

The user interface elements are extracted from the first media content frame. The user interface elements are converted to video. The video is encrypted to prevent screenshot capture of the one or more user interface elements present in the first media content frame by a second computer device lacking a decryption key when the video is played on a digital screen of the second computer device. A second media content frame is generated including the first media content frame overlaid by the video. The second media content frame is transmitted to the second computer device for the second media content frame to be played.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086694459/publication/US2023185884A1?q=deep%20learning

Reference
Ryan, N. & Mort, L. (Jun 15, 2023). System and method for blocking screenshots and screen recordings of premium user-generated content. Recovered Jun 15, 2023, Espacenet Patent Search:
https://worldwide.espacenet.com/patent/search/family/086694459/publication/US2023185884A1?q=deep%20learning

Information source: (Espacenet Patent Search, 2023)

2.10 Dynamic virtual reality shopping shelf interface

A computer implemented method for providing virtual reality shopping provides generating, by a virtual reality (VR) engine, a VR user interface (UI) and a VR session within a VR device.

A list of discounted items being discounted based on proximity to an expiration or best by use date is received from the computing device of an institution item source. A VR image of virtual items on virtual shelves in the VR UI is displayed. The virtual items are dynamically displayed in different positions between a first VR session and a second VR session. Virtual representations of the discounted items being discounted are displayed in positions of priority on the virtual shelves, relative to other virtual items on the virtual shelves.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086694682/publication/US2023186375A1?q=artificial%20intelligence

Reference
Sakuma, K. & Rakshit, S. (Jun 15, 2023). Dynamic virtual reality shopping shelf interface. Recovered Jun 16, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/086694682/publication/US2023186375A1?q=artificial%20intelligence

Information source: (Espacenet Patent Search, 2023)