



Weekly Newsletter
TECHNOLOGY
SURVEILLANCE

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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 Speech pathology and autism – what’s the connection?

The diagnosis of autism has increased significantly, with estimates now sitting at around one in 70 Australians. But perhaps this increase is not for the reasons you think. Rather, it is our understanding of autism that has changed. While it’s true that the diagnosis of autism is increasing, that doesn’t necessarily mean the real prevalence of autism in the community has changed. Rather, it is our understanding of autism that has changed.



Credit: Charles Sturt University

Females with autism are also more likely to be able to imitate their peers to mimic neurotypical behaviours, have different play styles and are more able to read non-verbal communication cues than autistic males. It is often more common for autistic females to become aware of their differences later in adolescence while challenges for boys are more often apparent in early childhood. The communication of this information through social media platforms such as Facebook, Instagram and TikTok has given voice to autistic people, enabling them to share their experiences in a way that could not be done through traditional media and research.

For more information, visit the following link:

<https://news.csu.edu.au/opinion/speech-pathology-and-autism-whats-the-connection>

Reference

Charles Sturt University. (Aug 24, 2023). Speech pathology and autism – what’s the connection?. Recovered Aug 24, 2023, Charles Sturt University:
<https://news.csu.edu.au/opinion/speech-pathology-and-autism-whats-the-connection>

Information source: (Charles Sturt University, 2023)



1.2 Computational model paves the way for more efficient energy systems

Around 70% of the energy we use in everyday life is wasted in the form of heat, produced by engines, factories, and electrical devices. However, researchers from EPFL's School of Engineering have made a significant theoretical step forward that could boost sustainable energy generation. Computational work from the laboratory of Theory and Simulation of Materials (THEOS) has unraveled the fundamental theories behind one of the major technologies used to enhance the efficiency of thermoelectric conversion, paving the way for better material selection and faster, more cost-effective discovery processes.



EPFL researchers make theoretical breakthrough in thermoelectric material to better harness waste heat for sustainable energy.

Credit: Ecole Polytechnique Fédérale de Lausanne

Thermoelectric devices are a hot topic as they offer the promising potential to convert waste heat into sustainable electricity. When there is a temperature difference across a thermoelectric material, where one side is hotter than the other, it causes a flow of charges within the material, generating an electrical current that can be converted back into electrical energy. This technology is increasingly looked towards for enhancing the sustainability of various energy-intensive industries, from transportation to power plants and manufacturing.

For more information, visit the following link:

<https://news.epfl.ch/news/computational-model-paves-the-way-for-more-effic-2/>

Reference

David, M. (Aug 24, 2023). Computational model paves the way for more efficient energy systems. Recovered Aug 28, 2023, Ecole Polytechnique Fédérale de Lausanne:

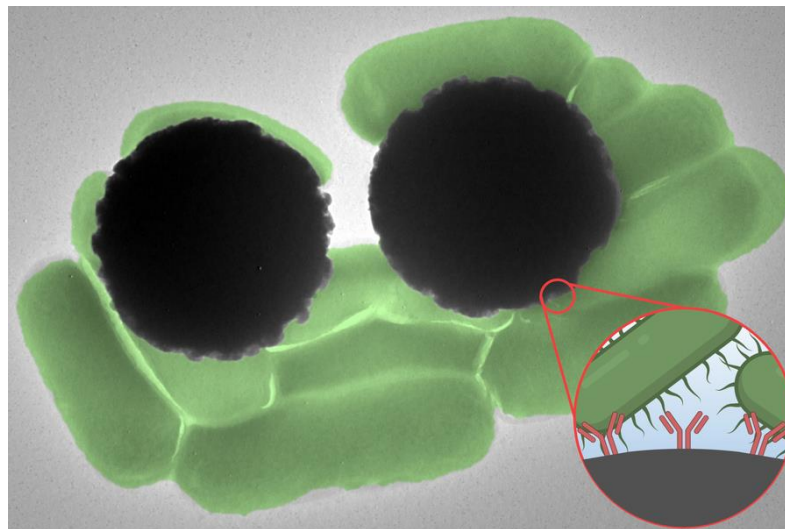
<https://news.epfl.ch/news/computational-model-paves-the-way-for-more-effic-2/>

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



1.3 Tiny magnetic beads produce an optical signal that could be used to quickly detect pathogens

MIT engineers have identified a new optical signature in a widely used class of magnetic beads, which could be used to quickly detect contaminants in a variety of diagnostic tests. For example, the team showed the signature could be used to detect signs of the food contaminant Salmonella.



*Dynabeads, which are antibody-coated superparamagnetic beads, served as a strong Raman reporter for the simultaneous capture and detection of pathogenic bacterium such as Salmonella. This image shows the Dynabeads (grey spheres) interacting with Salmonella bacterium (in green).
Credit: courtesy of the researchers, Massachusetts Institute of Technology*

The so-called Dynabeads are microscopic magnetic beads that can be coated with antibodies that bind to target molecules, such as a specific pathogen. Dynabeads are typically used in experiments in which they are mixed into solutions to capture molecules of interest. But from there, scientists have to take additional, time-consuming steps to confirm that the molecules are indeed present and bound to the beads. The MIT team found a faster way to confirm the presence of Dynabead-bound pathogens, using optics, specifically, Raman spectroscopy. This optical technique identifies specific molecules based on their “Raman signature,” or the unique way in which a molecule scatters light.

For more information, visit the following link:

<https://news.mit.edu/2023/tiny-magnetic-beads-quickly-detect-pathogens-0825>

Reference

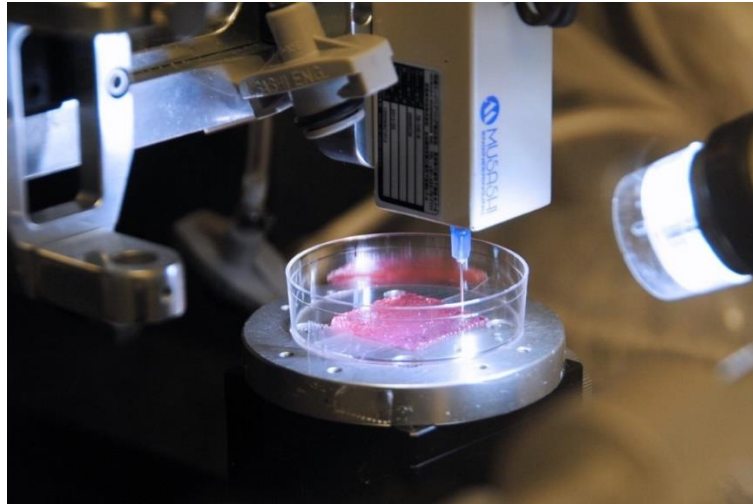
Chu, J. (Aug 24, 2023). Tiny magnetic beads produce an optical signal that could be used to quickly detect pathogens. Recovered Aug 28, 2023, Massachusetts Institute of Technology: <https://news.mit.edu/2023/tiny-magnetic-beads-quickly-detect-pathogens-0825>

Information source: (Massachusetts Institute of Technology, 2023)



1.4 Bioprinting technology to address critical health challenges in space

New research by The University of Manchester will enhance the power of bioprinting technology, opening doors to transform advances in medicine and addressing critical health challenges faced by astronauts during space missions. Bioprinting involves using specialised 3D printers to print living cells creating new skin, bone, tissue or organs for transplantation.



Credit: The University of Manchester

The technique has the potential to revolutionise medicine, and specifically in the realm of space travel, bioprinting could have a significant impact. Astronauts on extended space missions have an increased health risk due to the absence of gravity and exposure to radiation. This makes them susceptible to diseases such as osteoporosis caused by loss of bone density and can cause injuries, such as fractures, which currently can't be treated in space.

For more information, visit the following link:

<https://www.manchester.ac.uk/discover/news/manchester-research-to-boost-bioprinting-technology-to-address-critical-health-challenges-in-space/>

Reference

Marsh, J. (Aug 24, 2023). Manchester research to boost bioprinting technology to address critical health challenges in space. Recovered Aug 28, 2023, The University of Manchester:

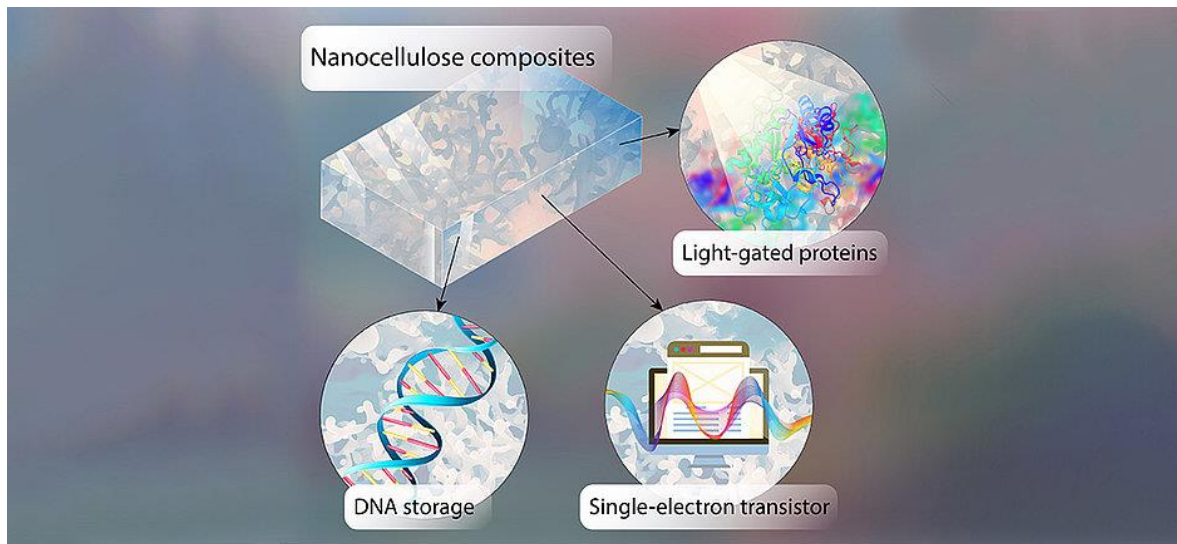
<https://www.manchester.ac.uk/discover/news/manchester-research-to-boost-bioprinting-technology-to-address-critical-health-challenges-in-space/>

Information source: (The University of Manchester, 2023)



1.5 DNA Chips as storage media of the future

The hereditary molecule DNA can store a great deal of information over long periods of time in a very small space. For a good ten years, scientists have therefore been pursuing the goal of developing DNA chips for computer technology, for example for the long-term archiving of data. Such chips would be superior to conventional silicon-based chips in terms of storage density, longevity, and sustainability.



Credit: Universität Würzburg

Four recurring basic building blocks are found in a DNA strand. A specific sequence of these blocks can be used to encode information, just as nature does. To build a DNA chip, the correspondingly coded DNA must be synthesised and stabilised. If this works well, the information is preserved for a very long time – researchers assume several thousand years. The information can be retrieved by automatically reading out and decoding the sequence of the four basic building blocks.

For more information, visit the following link:

<https://www.uni-wuerzburg.de/en/news-and-events/news/detail/news/dnachipsrev/>

Reference

Emmerich, R. (Aug 24 2023). DNA Chips as storage media of the future. Recovered Aug 28, 2023, Universität Würzburg:

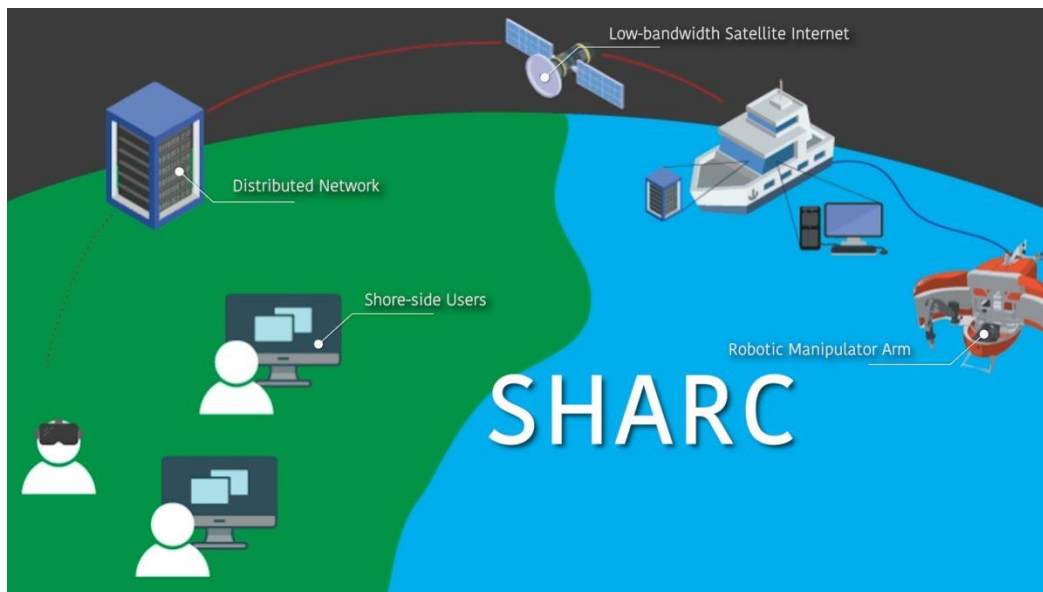
<https://www.uni-wuerzburg.de/en/news-and-events/news/detail/news/dnachipsrev/>

Information source: (Universität Würzburg, 2023)



1.6 Broader access to deep sea scientific exploration

The Shared Autonomy for Remote Collaboration (SHARC) framework “enables remote participants to conduct shipboard operations and control robotic manipulators” – such as on remotely operated vehicles (ROVs) – “using only a basic internet connection and consumer-grade hardware, regardless of their prior piloting experience,” according to a paper in Science Robotics, “Enhancing scientific exploration of the deep sea through shared autonomy in remote manipulation.” The framework has been developed by a research team from the Woods Hole Oceanographic Institution (WHOI), the Massachusetts Institute of Technology (MIT), and the Toyota Technological Institute at Chicago (TTIC).



Data from the robot is broadcasted across satellite internet to a shore-side server, which distributes it to users worldwide

Credit: ©Phung, Billings, Daniele, Walter, Woods Hole Oceanographic Institution

The SHARC framework enables real-time collaboration between multiple remote operators, who can issue goal-directed commands through simple speech and hand gestures while wearing virtual reality goggles in an intuitive three-dimensional workspace representation.

For more information, visit the following link:

<https://www.whoi.edu/press-room/news-release/new-framework-provides-broader-access-to-deep-sea-scientific-exploration/>

Reference

Woods Hole Oceanographic Institution. (Aug 24, 2023). New framework for oceanographic research provides potential for broader access to deep sea scientific exploration. Recovered Aug 28, 2023, Woods Hole Oceanographic Institution:

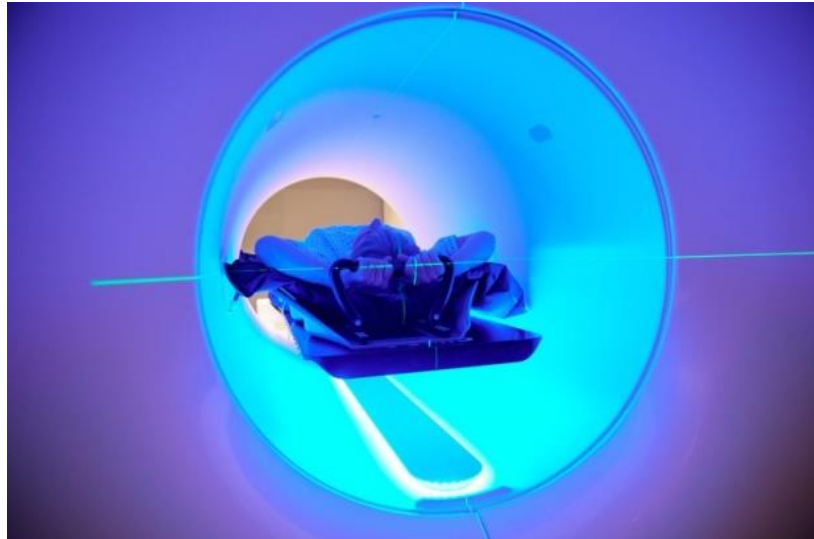
<https://www.whoi.edu/press-room/news-release/new-framework-provides-broader-access-to-deep-sea-scientific-exploration/>

Information source: (Woods Hole Oceanographic Institution, 2023)



1.7 Tumor-targeting radiation therapy machine

Radiation therapy is a key component of care for many types of cancers. But some tumors can be more difficult than others to treat. Cancers in the lungs, for example, move with each breath, while tumors that have metastasized to many places in the body can require repeated radiation sessions. Earlier this week, Stanford Medicine launched a new method of delivering radiation that uses signals from cancer-targeting molecules called tracers to target tumors in real time.



Stanford Medicine physicians are testing a machine that targets radiation based on real-time feedback from cancer cells.

Credit: Stanford Medicine

“This is the first radiation treatment machine in the world to combine radiotherapy with PET [positron emission tomography] technology,” said Michael Gensheimer, MD, clinical associate professor of radiation oncology. “It targets the cancer directly in areas where it is most active, tracking its movement and adjusting the radiation delivery several times a second.” Although more real-world testing needs to be done, the goal is that the technology will eventually make radiation treatment faster and more precise, improving patient comfort, minimizing side effects and killing cancer cells more efficiently.

For more information, visit the following link:

<https://med.stanford.edu/news/all-news/2023/08/biology-guided-radiation-cancer.html>

Reference

Conger, K. (Aug 24, 2023). Stanford Medicine first to try out novel tumor-targeting radiation therapy machine. Recovered Aug 29, 2023, Stanford Medicine:

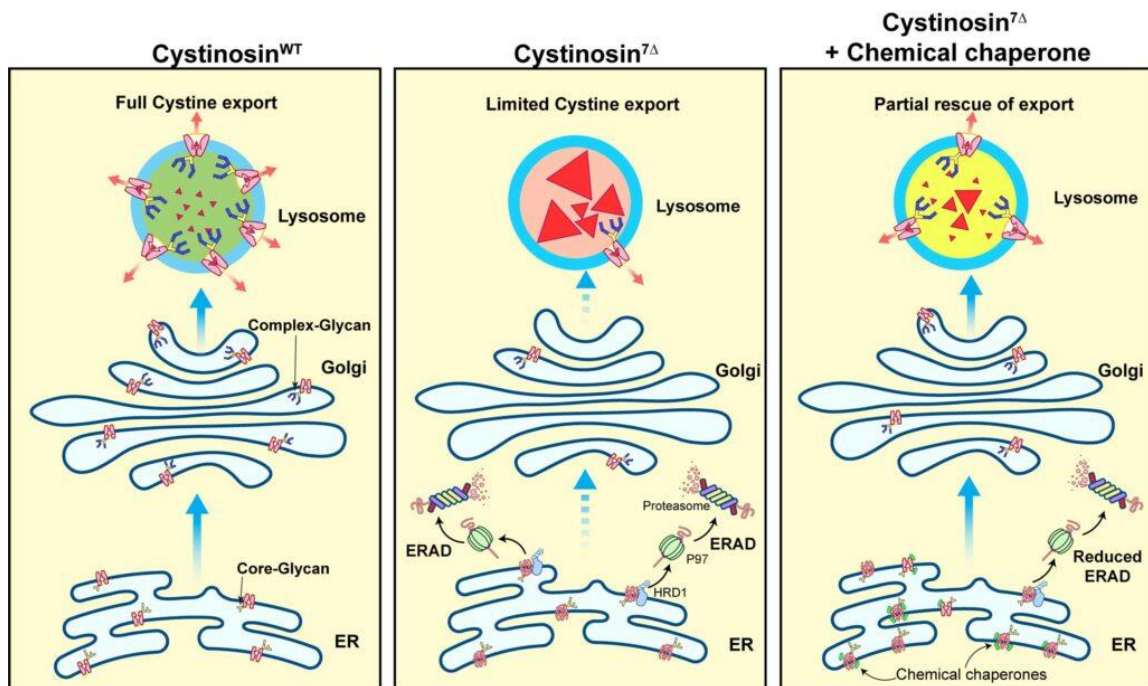
<https://med.stanford.edu/news/all-news/2023/08/biology-guided-radiation-cancer.html>

Information source: (Stanford Medicine, 2023)



1.8 Rare disease shares mechanism with cystic fibrosis

University of Michigan researchers have discovered that the same cellular mechanism involved in a form of cystic fibrosis is also implicated in a form of a rare disease called cystinosis. In cystinosis, a genetic disease, this allows cystine crystals to build up in the cell. This disrupts the cell, and eventually, tissues and ultimately organs, particularly the kidneys and the eyes.



Credit: U-M Ming Lab, University of Michigan

“If cystinosis not treated at an early age, some of the effects are irreversible and it could include impaired growth, kidney failure and neurological problems,” said Varsha Venkatarangan, graduate student in the U-M Department of Molecular, Cellular and Developmental Biology and lead author of the study. *“Typically, the symptoms of the disease are treated rather than the root problem. So we have been wondering what could be the possible cellular mechanism of this disease.”*

For more information, visit the following link:

<https://news.umich.edu/rare-disease-shares-mechanism-with-cystic-fibrosis/>

Reference

Sherburne, M. (Aug 28, 2023). Rare disease shares mechanism with cystic fibrosis. Recovered Aug 29, 2023, University of Michigan:

<https://news.umich.edu/rare-disease-shares-mechanism-with-cystic-fibrosis/>

Information source: (University of Michigan, 2023)



1.9 New dual-arm robot achieves bimanual tasks by learning from simulation

The new Bi-Touch system, designed by scientists at the University of Bristol and based at the Bristol Robotics Laboratory, allows robots to carry out manual tasks by sensing what to do from a digital helper. The findings, published in IEEE Robotics and Automation Letters, show how an AI agent interprets its environment through tactile and proprioceptive feedback, and then control the robots' behaviours, enabling precise sensing, gentle interaction, and effective object manipulation to accomplish robotic tasks.



*Dual arm robot holding crisp.
Credit: Yijiong Lin, University of Bristol*

This development could revolutionise industries such as fruit picking, domestic service, and eventually recreate touch in artificial limbs. Lead author Yijiong Lin from the Faculty of Engineering, explained: *“With our Bi-Touch system, we can easily train AI agents in a virtual world within a couple of hours to achieve bimanual tasks that are tailored towards the touch. And more importantly, we can directly apply these agents from the virtual world to the real world without further training.”*

For more information, visit the following link:

<https://www.bristol.ac.uk/news/2023/august/dual-arm-robot.html>

Reference

University of Bristol. (Aug 24, 2023). New dual-arm robot achieves bimanual tasks by learning from simulation. Recovered Aug 29, 2023, University of Bristol:

<https://www.bristol.ac.uk/news/2023/august/dual-arm-robot.html>

Information source: (University of Bristol, 2023)



1.10 Drone research advances wildfire monitoring

Zhaodan Kong, a professor in the Department of Mechanical and Aerospace Engineering at the University of California, Davis, whose research in artificial intelligence and autonomy includes unmanned aerial vehicles, or UAVs, believes an integrated system of technologies to detect fires before they get to a smoking point could be game changing, potentially preventing widespread wildfire damage.



*Kong's lab is building rotorcraft equipped with navigation systems, sensors and cameras.
Credit: University of California - Davis*

The detection would start on the ground with internet-connected sensors placed in strategic locations where wildfire events have occurred or are likely to occur (determined by CalFire). These palm-sized sensors, developed by Anthony Wexler, distinguished professor in the Department of Mechanical and Aerospace Engineering and director of the UC Davis Air Quality Research Center, measure temperature, humidity and wind speed to determine which areas could be at higher risk of a wildfire event.

For more information, visit the following link:

<https://www.ucdavis.edu/climate/news/new-drone-research-advances-wildfire-monitoring>

Reference

Heath, J. (Aug 28, 2023). New drone research advances wildfire monitoring. Recovered Aug 29, 2023, University of California - Davis:

<https://www.ucdavis.edu/climate/news/new-drone-research-advances-wildfire-monitoring>

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



1.11 “Smart” glasses skew power balance with nonwearers.

Currently, most work on AR glasses focuses primarily on the experience of the wearer. Researchers from the Cornell Ann S. Bowers College of Computing and Information Science and Brown University teamed up to explore how this technology affects interactions between the wearer and another person. Their explorations showed that, while the device generally made the wearer less anxious, things weren’t so rosy on the other side of the glasses.

AR glasses superimpose virtual objects and text over the field of view to create a mixed-reality world for the user. Some designs are big and bulky, but as AR technology advances, smart glasses are becoming indistinguishable from regular glasses, raising concerns that a wearer could be secretly recording someone or even generating deepfakes with their likeness. They observed five pairs of individuals – a wearer and a nonwearer – as each pair discussed a desert survival activity. The wearer received Spectacles, an AR glasses prototype on loan from Snap Inc., the company behind Snapchat. The Spectacles look like avant-garde sunglasses and, for the study, came equipped with a video camera and five custom filters that transformed the nonwearer into a deer, cat, bear, clown or pig-bunny.

For more information, visit the following link:

<https://news.cornell.edu/stories/2023/08/smart-glasses-skew-power-balance-nonwearers>

Reference

Waldron, P. (Aug 28, 2023). “Smart” glasses skew power balance with nonwearers. Recovered Aug 29, 2023, Cornell University:

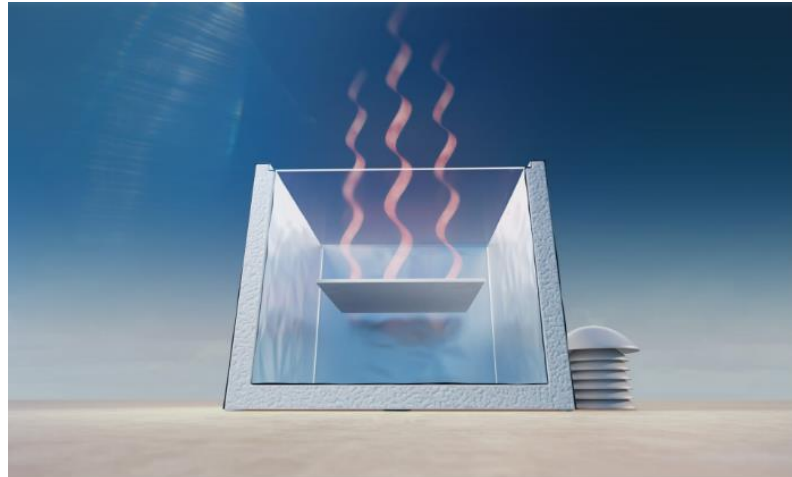
<https://news.cornell.edu/stories/2023/08/smart-glasses-skew-power-balance-nonwearers>

Information source: (Cornell University, 2023)



1.12 Sharing best practice for radiative cooling

In a world experiencing increased heat stress, a zero-carbon-emission cooling technology that consumes no electricity, operating instead by shedding heat directly into outer space, would be a groundbreaking advance. However, poor standardization and a lack of transparency is hampering this promising technology, known as radiative cooling.



Credit: King Abdullah University of Science and Technology

Best practice guidelines article, outlined by King Abdullah University of Science and Technology (KAUST) leading radiative-cooling researcher Qiaoqiang Gan, could help set the research field back on track. Radiative-cooling devices offer electricity-free cooling by radiating heat within a narrow wavelength range called the atmospheric transparent window. Within this window the heat is not reabsorbed by the atmosphere and instead escapes into space, which, at three degrees above absolute zero, acts as a vast heat sink and readily soaks up the emitted heat. “The technology is particularly attractive to address local cooling needs in Saudi Arabia,” Gan says.

For more information, visit the following link:

<https://super.kaust.edu.sa/news/2023/08/29/sharing-best-practice-for-radiative-cooling>

Reference

King Abdullah University of Science and Technology. (Aug 29, 2023). Sharing best practice for radiative cooling. Recovered Aug 29, 2023, King Abdullah University of Science and Technology: <https://super.kaust.edu.sa/news/2023/08/29/sharing-best-practice-for-radiative-cooling>

Information source: (King Abdullah University of Science and Technology, 2023)



1.13 Origami-inspired strain sensors for stretchable soft robotics

In the field of soft robotics, a comparable method has been used to track the deformation – or changes in shape – of soft components such as the muscles of a robotic arm. Cameras can gather the data that enables researchers to measure stretchability and recovery, crucial information for predicting and therefore controlling the motion of the robot. Here's the catch: this process rarely works outside the lab. If a robot is navigating the ocean, operating up in space, or enclosed within the human body, a set-up of multiple cameras isn't always practical.



*Origami-inspired strain sensors could change the way we interact with soft robots
Credit: University of Southern California*

Prompted by conversations with his colleagues in soft robotics, Zhao and his research group have developed a design for a new sensor using 3D electrodes inspired by the folding patterns used in origami, able measure a strain range of up to three times higher than a typical sensor. The sensors can be attached to soft bodies in motion – anything from the mechanical tendons of prosthetic leg, to the pulsating matter of human internal organs – for the purpose of tracking shape-change and proper functioning, no cameras required.

For more information, visit the following link:

<https://viterbischool.usc.edu/news/2023/08/origami-inspired-strain-sensors-for-stretchable-soft-robotics/>

Reference

Bathurst, M. (Aug 29, 2023). Origami-inspired strain sensors for stretchable soft robotics. Recovered Aug 29, 2023, University of Southern California:

<https://viterbischool.usc.edu/news/2023/08/origami-inspired-strain-sensors-for-stretchable-soft-robotics/>

Information source: (University of Southern California, 2023)



1.14 Team's new AI technology gives robot recognition skills a big lift

The University of Texas at Dallas (UTD) researchers' technology is designed to help robots detect a wide variety of objects found in environments such as homes and to generalize, or identify, similar versions of common items such as water bottles that come in varied brands, shapes or sizes.



The 4-foot-tall robot has a long mechanical arm with seven joints and a square "hand" with two fingers to grasp objects.

Credit: The University of Texas at Dallas

Inside Xiang's lab, assistant professor of computer science in the Erik Jonsson School of Engineering and Computer Science, is a storage bin full of toy packages of common foods, such as spaghetti, ketchup and carrots, which are used to train the lab robot, named Ramp. Ramp is a Fetch Robotics mobile manipulator robot that stands about 4 feet tall on a round mobile platform. Ramp has a long mechanical arm with seven joints. At the end is a square "hand" with two fingers to grasp objects.

For more information, visit the following link:

<https://news.utdallas.edu/science-technology/ai-robot-recognition-skills-progress-2023/>

Reference

Horner, K. (Aug 30, 2023). Team's new ai technology gives robot recognition skills a big lift. Recovered Aug 31, 2023, The University of Texas at Dallas:

<https://news.utdallas.edu/science-technology/ai-robot-recognition-skills-progress-2023/>

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



1.15 Autonomous robot for subsea oil and gas pipeline inspection

With an increasing number of severe accidents in the global oil and gas industry caused by damaged pipelines, University of Houston researchers are developing an autonomous robot to identify potential pipeline leaks and structural failures during subsea inspections. The transformative technology will make the inspection process far safer and more cost effective, while also protecting subsea environments from disaster.



*Rendering of the SmartTouch technology now in development.
Credit: University of Houston*

The SmartTouch technology now in development at UH consists of Remote Operated Vehicles (ROVs) equipped with multiple stress wave-based smart touch sensors, video cameras and scanning sonars that can swim along a subsea pipeline to inspect flange bolts – bolted connections have accelerated the rate of pipeline accidents that result in leakage, according to the Bureau of Safety and Environmental Enforcement (BSEE).

For more information, visit the following link:

<https://www.uh.edu/news-events/stories/2023/august-2023/08312023-pipeline-robot>

Reference

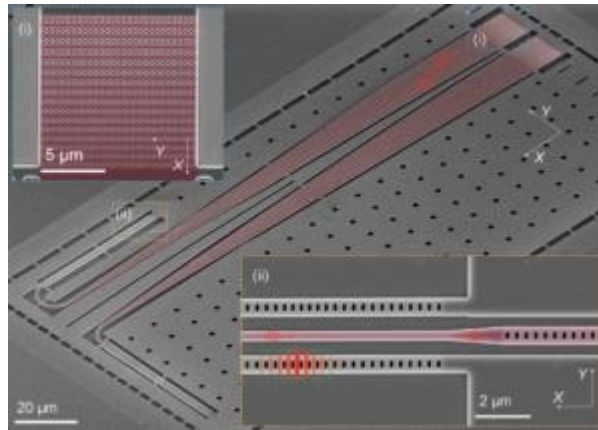
Stipes, C. (Aug 31, 2023). Autonomous robot for subsea oil and gas pipeline inspection being developed at UH. Recovered Aug 31, 2023, University of Houston:
<https://www.uh.edu/news-events/stories/2023/august-2023/08312023-pipeline-robot>

Information source: (University of Houston, 2023)



1.16 A new route to a quantum internet

The device has two parts: a calcium tungstate crystal doped with just a handful of erbium ions, and a nanoscopic piece of silicon etched into a J-shaped channel. Pulsed with a special laser, the ion emits light up through the crystal. But the silicon piece, a whisp of a semiconductor stuck onto the top of the crystal, catches and guides individual photons out into the fiber optic cable.



*Thompson's team designed a nanoscopic silicon waveguide to capture the photons emitted by the erbium ion and send them as high-fidelity signals over the fiber optic cable.
Credit: Princeton University*

Ideally, this photon would be encoded with information from the ion, Thompson said. Or more specifically, from a quantum property of the ion called spin. In a quantum repeater, collecting and interfering the signals from distant nodes would create entanglement between their spins, allowing end-to-end transmission of quantum states despite losses along the way.

For more information, visit the following link:

<https://engineering.princeton.edu/news/2023/08/30/simpler-way-connect-quantum-computers>

Reference

Lyon, S. (Aug 30, 2023). A new route to a quantum internet. Recovered Aug 31, 2023, Princeton University: <https://engineering.princeton.edu/news/2023/08/30/simpler-way-connect-quantum-computers>

Information source: (Princeton University, 2023)



1.17 Hog-cooling technology

Patented cooling pads developed by animal science experts keep boars and sows cooler, improve their feed intake and milk output, and increase piglet wean weight. The pads are 2-foot-by-4-foot aluminum tread plates on top of copper pipes that circulate water. Sensors in the pads determine if the hog is too hot and circulate new water to keep the pad cool. The technology was designed by researchers in Purdue University's Department of Agricultural and Biological Engineering and Department of Animal Sciences.



*Rendering of a hog cooling pad designed at Purdue University that will be manufactured and sold by IHT Group of Winnipeg, Manitoba.
Credit: ITH Group, Purdue University*

“The Purdue-developed IHT active swine cooling pads will represent a paradigm shift in hog production, increasing both operational efficiency and animal welfare,” Stwalley said. “We are refining the pads and their materials, currently testing stainless steel pipes versus copper pipes to continue optimizing their performance.”

For more information, visit the following link:

<https://www.purdue.edu/newsroom/releases/2023/Q3/iht-group-to-manufacture-sell-hog-cooling-technology-developed-at-purdue.html>

Reference

Martin, S. (Aug 30, 2023). IHT Group to manufacture, sell hog-cooling technology developed at Purdue. Recovered Aug 31, 2023, Purdue University:

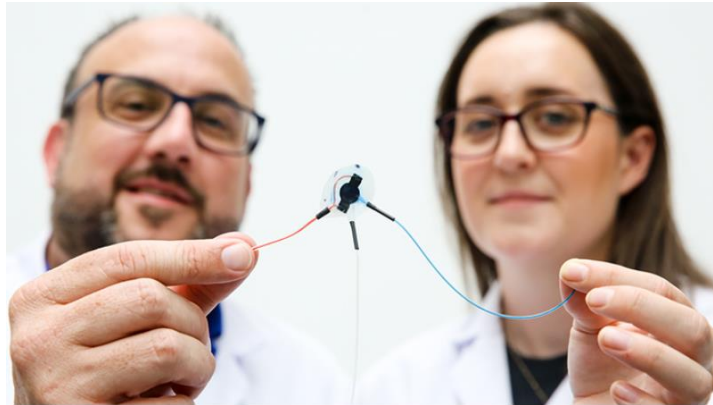
<https://www.purdue.edu/newsroom/releases/2023/Q3/iht-group-to-manufacture-sell-hog-cooling-technology-developed-at-purdue.html>

Information source: (Purdue University, 2023)



1.18 AI enabled soft robotic implant monitors scar tissue to self-adapt for personalised drug treatment

Research teams at University of Galway and Massachusetts Institute of Technology (MIT) have detailed a new breakthrough in medical device technology that could lead to intelligent, long-lasting, tailored treatment for patients thanks to soft robotics and artificial intelligence.



*Professor Garry Duffy and Dr Rachel Beatty show the soft robotic implant developed by University of Galway and MIT.
Credit: Martina Regan, University of Galway*

The transatlantic partnership has created a smart implantable device that can administer a drug - while also sensing when the body is beginning to reject it - and use AI to change its shape of the device to maintain drug dosage, simultaneously bypassing scar tissue build up and maintaining treatment. Implantable medical device technologies offer promise to unlock advanced therapeutic interventions in healthcare, such as insulin release to treat diabetes, but a major issue holding back such devices is the patient's reaction to a foreign body.

For more information, visit the following link:

<https://www.universityofgalway.ie/about-us/news-and-events/news-archive/2023/august/ai-enabled-soft-robotic-implant-monitors-scar-tissue-to-self-adapt-for-personalised-drug-treatment-1.html>

Reference

University of Galway (Aug 30, 2023). AI enabled soft robotic implant monitors scar tissue to self-adapt for personalised drug treatment. Recovered Aug 31, 2023, University of Galway:

<https://www.universityofgalway.ie/about-us/news-and-events/news-archive/2023/august/ai-enabled-soft-robotic-implant-monitors-scar-tissue-to-self-adapt-for-personalised-drug-treatment-1.html>

Information source: (University of Galway, 2023)



1.19 New “droplet battery” could pave the way for miniature bio-integrated devices

Researchers from the University of Oxford’s Department of Chemistry have developed a miniature power source capable of altering the activity of cultured human nerve cells. Inspired by how electric eels generate electricity, the device uses internal ion gradients to generate energy.



Enlarged version of the droplet power source, for visualisation. 500 nL volume droplets were encapsulated in a flexible and compressible organogel.

Credit: Yujia Zhang, University of Oxford

The miniaturized soft power source is produced by depositing a chain of five nanolitre-sized droplets of a conductive hydrogel (a 3D network of polymer chains containing a large quantity of absorbed water). Each droplet has a different composition so that a salt concentration gradient is created across the chain. The droplets are separated from their neighbours by lipid bilayers, which provide mechanical support while preventing ions from flowing between the droplets.

For more information, visit the following link:

<https://www.ox.ac.uk/news/2023-08-31-new-droplet-battery-could-pave-way-miniature-bio-integrated-devices>

Reference

University of Oxford. (Aug 31, 2023). New “droplet battery” could pave the way for miniature bio-integrated devices. Recovered Aug 31, 2023, University of Oxford:

<https://www.ox.ac.uk/news/2023-08-31-new-droplet-battery-could-pave-way-miniature-bio-integrated-devices>

Information source: (University of Oxford, 2023)



1.20 A system to keep cloud-based gamers in sync

Scientists from MIT and Microsoft Research took a unique approach to synchronizing streams transmitted to two devices. Their system, called Ekho, adds inaudible white noise sequences to the game audio streamed from the cloud server. Then it listens for those sequences in the audio recorded by the player's controller. Ekho uses the mismatch between these noise sequences to continuously measure and compensate for the interstream delay.



They used this technique to synchronize audio and video streams in cloud gaming, but it could also be more broadly applied in AR/VR applications.

Credit: Jose-Luis Olivares, Massachusetts Institute of Technology

In real cloud gaming sessions, the researchers showed that Ekho is highly reliable. The system can keep streams synchronized to within less than 10 milliseconds of each other, most of the time. Other synchronization methods resulted in consistent delays of more than 50 milliseconds. And while Ekho was designed for cloud gaming, this technique could be used more broadly to synchronize media streams traveling to different devices, such as in training situations that utilize multiple augmented or virtual reality headsets. .

For more information, visit the following link:

<https://news.mit.edu/2023/system-ekho-cloud-gaming-sync-0831>

Reference

Zewe, A. (Aug 31, 2023). A system to keep cloud-based gamers in sync. Recovered Aug 31, 2023, Massachusetts Institute of Technology:

<https://news.mit.edu/2023/system-ekho-cloud-gaming-sync-0831>

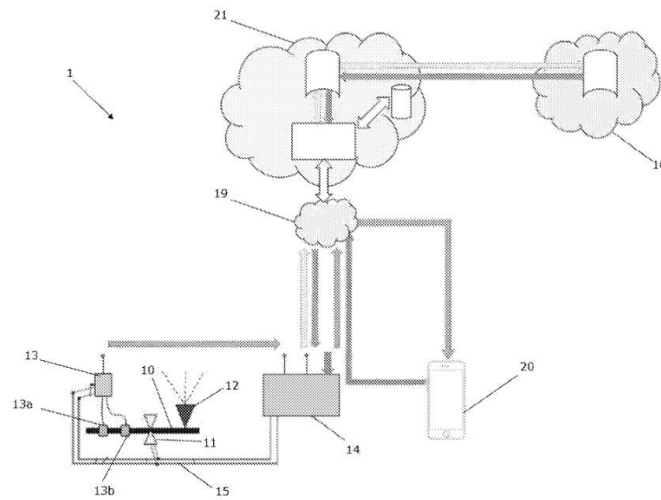
Information source: (Massachusetts Institute of Technology, 2023)



II. PATENTS

2.1. Irrigation system and method for controlling and managing irrigation

The invention relates to an irrigation system that allows, in real time and automatically, water flow to be measured and alerts to be issued regarding anomalies in the normal operation of the system, such as the detection of water leakage and/or the non-operation of a system component, thus optimising consumption and facilitating the user experience, wherein the irrigation system comprises: at least one water supply means, to supply water to the irrigation system; at least one pipe, connected by one end to the water supply and which passes through the surface to be irrigated.



Shows a scheme of operation of the irrigation system in a branch line, in accordance with a preferred configuration of the invention.

Credit: Quevedo, R. & Quevedo, I., WIPO IP Portal

At least one valve, disposed in the at least one pipe to control the water flow therethrough; at least one sprinkler, connected to at least one outlet of the at least one pipe; at least one flowmeter, to measure the water flow; at least one control means, to control the operation of the irrigation system; at least one cable, connected to the at least one control means, to power the at least one valve; and at least one climate data storage means, which transmits at least one item of evapotranspiration data regarding the geographical area of operation of the irrigation system to the at least one control means. The invention also relates to a method for controlling and managing irrigation.

For more information, visit the following link:

<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023155024>

Reference

Quevedo, R. & Quevedo, I. (Aug 24, 2023). Irrigation system and method for controlling and managing irrigation. Recovered Aug 25, 2023, WIPO IP Portal:

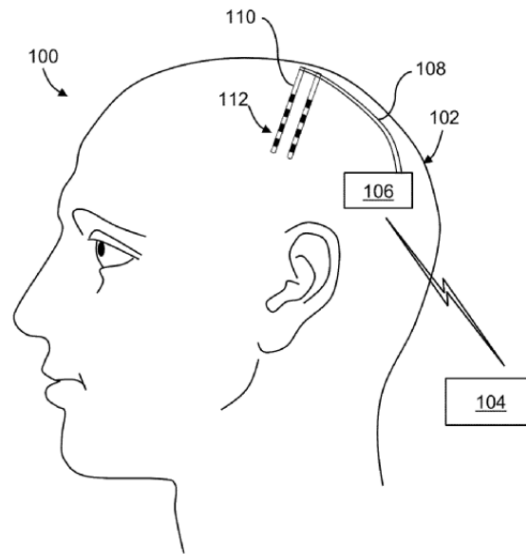
<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023155024>

Information source: (WIPO IP Portal, 2023)



2.2. Therapeutic electrode location prediction visualization using Machine Learning

Systems and methods for programming an implantable medical device comprising a simulated environment with at least one lead having a plurality of electrodes, computing hardware of at least one processor and a memory operably coupled to the at least one processor, and instructions that, when executed on the computing hardware, cause the computing hardware to implement a training sub-system configured to conduct a brain sense survey using the simulated environment.



Is a schematic illustrating an example deep brain stimulation (DBS) system configured to deliver electrical stimulation therapy to a tissue site within a brain of a patient, according to an embodiment.

Credit: Case, M.; Panken, E.; Molina, R.; Dassbach, P. & Holt, A., WIPO IP Portal

Develop at least one Machine Learning model based on the brain sense survey, apply the at least one Machine Learning model to in-vivo patient data to determine at least one predicted electrode from the plurality of electrodes relative to an oscillatory source, visualize the at least one predicted electrode, and program a medical device based on the at least one predicted electrode.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US405662922&_cid=P20-LLWQG8-03098-1

Reference

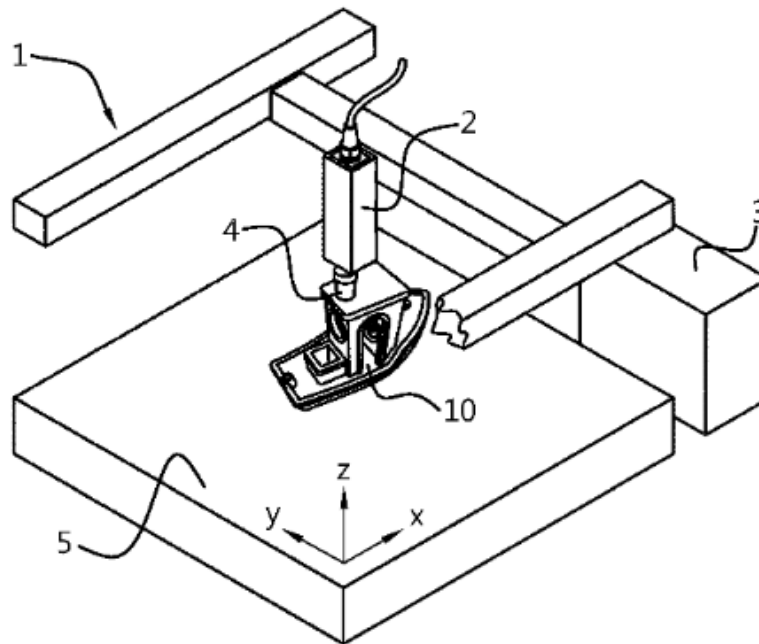
Case, M.; Panken, E.; Molina, R.; Dassbach, P. & Holt, A (Aug 24, 2023). Therapeutic electrode location prediction visualization using Machine Learning. Recovered Aug 25, 2023, WIPO IP Portal:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US405662922&_cid=P20-LLWQG8-03098-1

Information source: (WIPO IP Portal, 2023)

2.3. Extrusion based additive manufacturing

An additive manufacturing method for wherein tracks of modelling material are deposited in slices by means of a printhead inside a heatable build room. A semicrystalline modelling material is deposited through a nozzle of the printhead on a build base or on the tracks of a previously deposited slice, whereby a body is formed by depositing the modelling material slice by slice. The crystallinity (%) of the modelling material of said previously deposited slice is above a remaining crystallinity threshold.



*Illustrates schematically a 3D printer of an extrusion based additive manufacturing apparatus.
Credit: Kuiper, M.; Koopmans, N.; De Vries, J.; Comelli, C.; Ghita, O. & Davies, R., WIPO IP Portal*

The crystallinity, at least at a region where a new track is deposited by the printhead on said previously deposited slice, and within a time range of 0-5 sec. after the new track is deposited, is controlled such that said crystallinity by default is going below said remaining crystallinity threshold and such that it selectively is maintained above said remaining crystallinity threshold. Alternatively, the crystallinity, at least at a region where a new track is deposited by the printhead on said previously deposited slice, and within a time range of 0-5 sec. after the new track is deposited, is controlled such that said crystallinity is by default remains above said remaining crystallinity threshold and such that it selectively goes below said remaining crystallinity threshold.

For more information, visit the following link:

<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023156387>

Reference

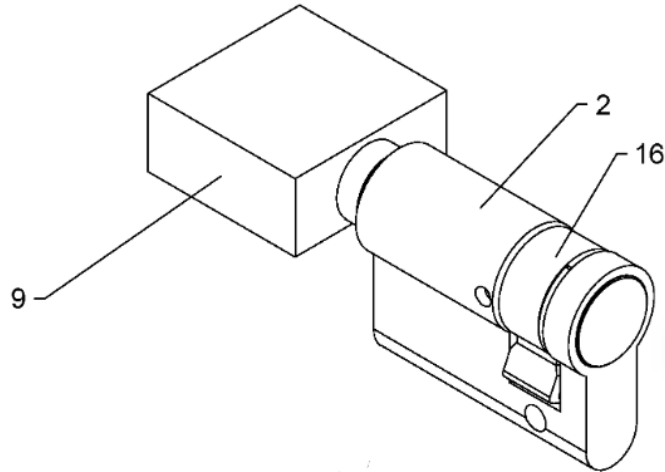
Kuiper, M.; Koopmans, N.; De Vries, J.; Comelli, C.; Ghita, O. & Davies, R. (Aug 24, 2023). Extrusion based additive manufacturing. Recovered Aug 25, 2023, WIPO IP Portal:
<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023156387>

Information source: (WIPO IP Portal, 2023)



2.4. Electronic locking cylinder

The present invention refers to an electronic cylinder that can be actuated by an electronic key, wherein said electronic cylinder comprises a stator body, a rotor, a motor that can be actuated by the electronic key, a clutch mechanism configured to lock and unlock the rotation of the rotor with respect to the stator body by means of the actuation of the motor.



*Shows a perspective view of the electronic cylinder inserted by an electronic key.
Credit: Muñoz, A. & Lecaroz, J., WIPO IP Portal*

And a system for detecting rotation of the rotor with respect to the stator body, said system being configured to deactivate the motor when the rotor rotates with respect to the stator body. In a preferred embodiment, the clutch mechanism comprises two locking balls which are elements that move radially inside the cylinder, to lock and unlock the rotation of the rotor with respect to the stator body.

For more information, visit the following link:

<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023156697>

Reference

Muñoz, A. & Lecaroz, J. (Aug 24, 2023). Electronic locking cylinder. Recovered Aug 25, 2023, WIPO IP Portal:

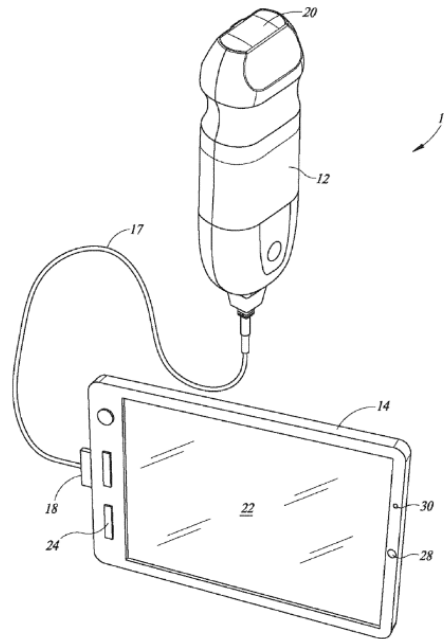
<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023156697>

Information source: (WIPO IP Portal, 2023)



2.5. Determining heart rate based on a sequence of ultrasound images

A facility for determining a heart rate of a person is described. The facility receives ultrasound data collected from the person at each of a number of times during a period of time, such as a sequence of B-mode images, or an M-mode image.



*Is a block diagram showing some of the components typically incorporated in at least some of the computer systems and other devices on which the facility operates.
Credit: Zhang, F., WIPO IP Portal*

For each of these times, the facility compresses the ultrasound data relating to the time to obtain a single-value representation of that ultrasound data; adds the obtained single-value representation to a time-ordered buffer of single-value representation of ultrasound data from earlier times; and processes the buffer to determine a heart rate of the person, such as by performing procedural peak-finding or applying a Machine Learning model to predict heart rate.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US405663544&_cid=P20-LLZ98W-66396-10

Reference

Zhang, F. (Aug 24, 2023). Determining heart rate based on a sequence of ultrasound images. Recovered Aug 25, 2023, WIPO IP Portal:

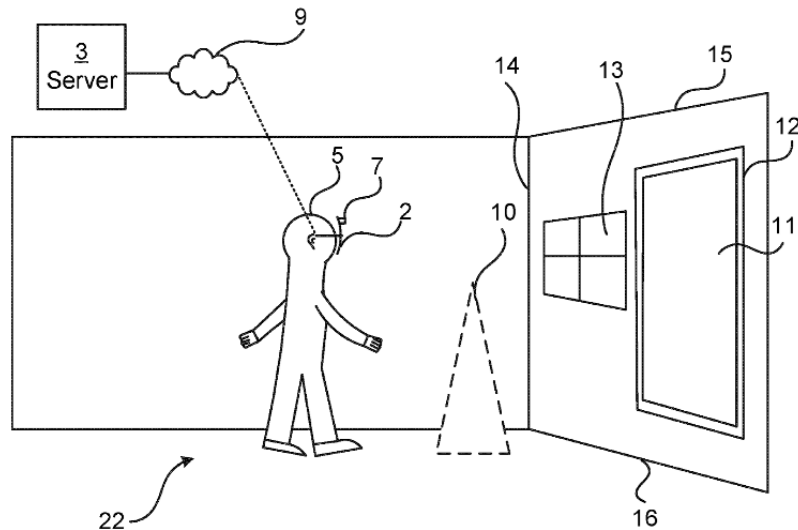
https://patentscope.wipo.int/search/es/detail.jsf?docId=US405663544&_cid=P20-LLZ98W-66396-10

Information source: (WIPO IP Portal, 2023)



2.6. 3D reconstruction

It is provided a method for performing 3D reconstruction. The method comprises: obtaining sensor data; determining a pose estimate; estimating a pose error; comparing the pose error against an error threshold; performing a device 3D reconstruction when the pose error is determined to be smaller than the error threshold.



*Schematically diagram illustrating an environment in which embodiments presented herein can be applied.
Credit: Araújo, J.; Mateus, A.; Hernandez, A.; Gomez, C. & Carbó, P., Espacenet Patent Search*

Resulting in updates to a device 3D model; sending a 3D reconstruction request to the server to perform a central 3D reconstruction, when the pose error is determined to be greater than the error threshold, wherein the 3D reconstruction request comprises data based on the sensor data; receiving a result of a central 3D reconstruction from the server; and performing a 3D model fusion of a device 3D model in the mobile device and the result of the central 3D reconstruction, wherein the device 3D model, at least partly, is a result of previous device 3D reconstruction.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/080785228/publication/WO2023155983A1?q=3d>

Reference

Araújo, J.; Mateus, A.; Hernandez, A.; Gomez, C. & Carbó, P. (Aug 24, 2023). 3D reconstruction. Recovered Aug 25, 2023, Espacenet Patent Search:

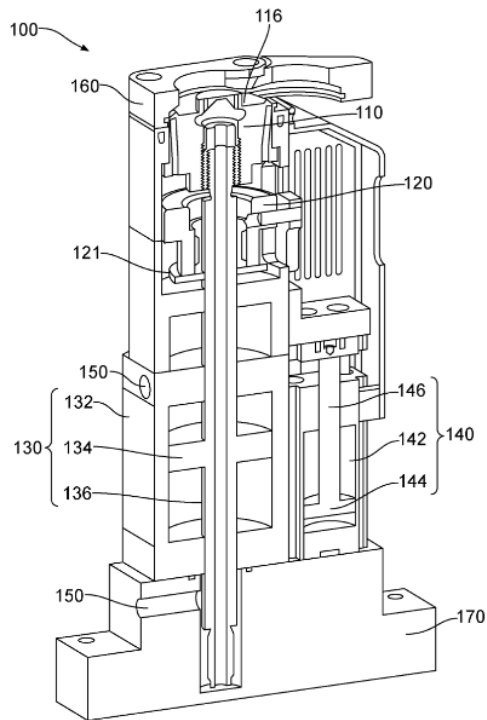
<https://worldwide.espacenet.com/patent/search/family/080785228/publication/WO2023155983A1?q=3d>

Information source: (Espacenet Patent Search, 2023)



2.7. Heat treatment of 3D printed parts

The present invention relates to a device for surface treatment of 3D printed parts for bioprocessing equipment. The device comprises a resurfacing tool comprising a contact surface, wherein the contact surface comprises a negative shape of a surface to be treated of a 3D printed part.



*Shows a cross-sectional view of device in accordance with a first embodiment of the present invention.
Credit: Alriksson, J.; Dargy, S. & Wineström, M., Espacenet Patent Search*

The device also comprises a heating device operable to heat the resurfacing tool to a temperature above the melting temperature of a material of the 3D printed part. The device also comprises an actuator operable to move the resurfacing tool such that the resurfacing tool can be releasably pressed against the surface to be treated to melt said surface to form a molten layer of said material at said surface. The device further comprises a cooling device operable to cool the resurfacing tool to thereby re-solidify the molten layer of said material at said surface to form a treated surface.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/080934504/publication/WO2023156477A1?q=3d>

Reference

Alriksson, J.; Dargy, S. & Wineström, M. (Aug 24, 2023). Heat treatment of 3D printed parts. Recovered Aug 25, 2023, Espacenet Patent Search:

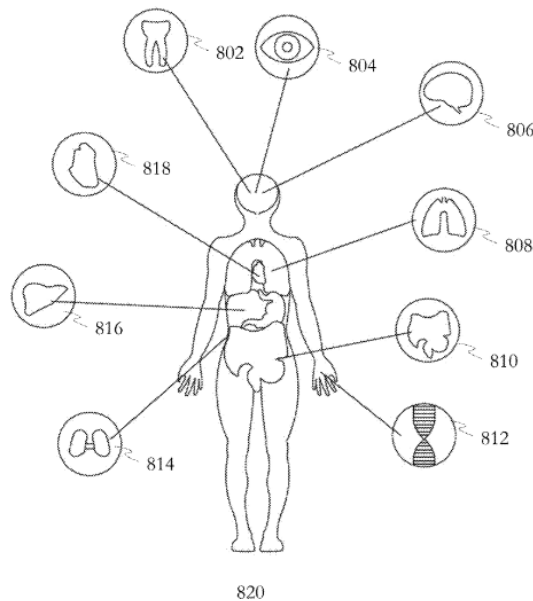
<https://worldwide.espacenet.com/patent/search/family/080934504/publication/WO2023156477A1?q=3d>

Information source: (Espacenet Patent Search, 2023)



2.8. Systems, method, and apparatus for providing personalized medical data

A device disclosed herein may be used for providing personal medical data. The device may comprise a memory and/or a processor. The processor may be configured to perform a number of actions. A graphic of a human body may be displayed. A user input associated with a location on the graphic of a human body may be received from a user.



*Depicts an example user interface that may include a customizable avatar for providing personalized medical data
Credit: Kostense, S. & Wildenhaus, K, Espacenet Patent Search*

An organ context may be determined based on the location on the graphic of the human body. A biomarker related to the organ context may be determined. Contextualized health data that indicates a significance of the biomarker in relation to the organ context may be generated. In response to the user input, the device may display the contextualized health data, a recommended action, and an indication of an amount of time that the user's life may be extended by the user performing the recommended action.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/087573277/publication/US2023263482A1?q=artificial%20intelligence>

Reference

Kostense, S. & Wildenhaus, K. (Aug 24, 2023). Systems, method, and apparatus for providing personalized medical data. Recovered Aug 25, 2023, Espacenet Patent Search:

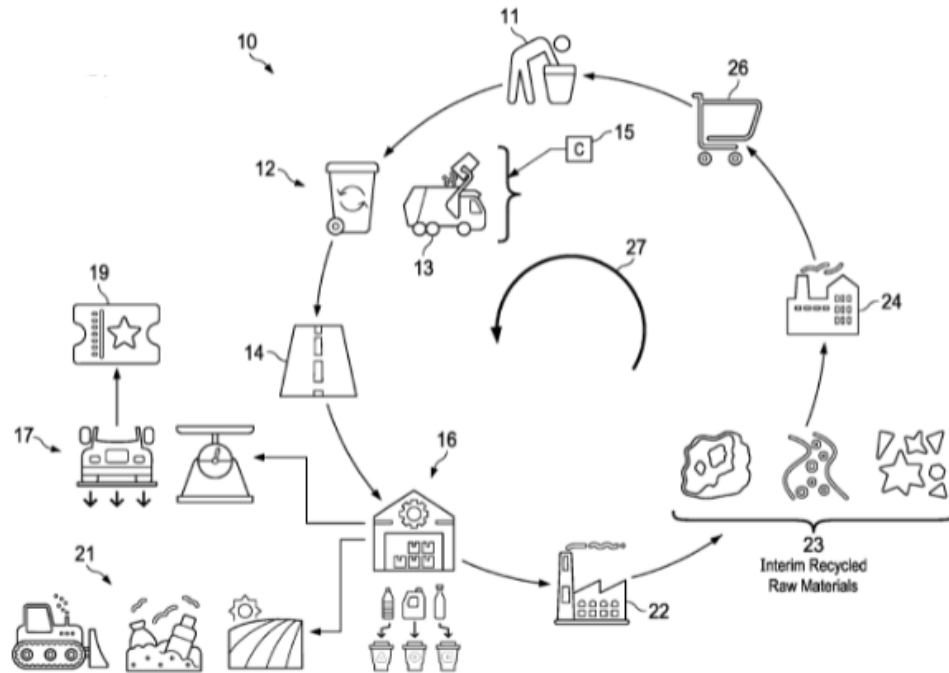
<https://worldwide.espacenet.com/patent/search/family/087573277/publication/US2023263482A1?q=artificial%20intelligence>

Information source: (Espacenet Patent Search, 2023)



2.9. Process for creating a tradable nonfungible token for recyclable materials

A process is disclosed for establishing ownership and value in collected recyclables. Collected solid waste is transported to a collection facility and weighed at entry and an amount of deposited recyclables determined and attributed to each customer serviced in the collection jurisdiction.



*Is an iconographic depiction of a current, standard recycling program for processing municipal solid waste..
Credit: Russell, C., Espacenet Patent Search*

A digital file is created representing the attributed amount of recyclables for each customer, and a worker utilizes a third-party tokenization service to convert the digital file into a nonfungible token or NFT, thereby establishing value for the NFT. The tokenization provider then mints and records the nonfungible token on a targeted Blockchain using smart contracts, such as for example on the Ethereum Blockchain, and sends a confirmation to the waste collection contractor. The waste collection contractor then transfers the NFT to the customer so that the customer may freely trade the NFT on the open market. The process promotes a sustainable recycling program for the public.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/087578909/publication/WO2023158421A1?q=Blockchain>

Reference

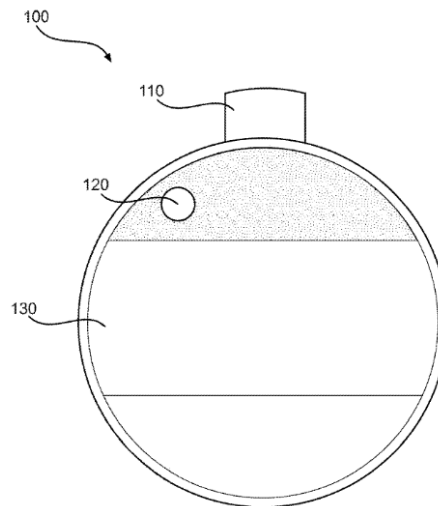
Russell, C. (Aug 24, 2023). Process for creating a tradable nonfungible token for recyclable materials. Recovered Aug 28, 2023, Espacenet Patent Search:
<https://worldwide.espacenet.com/patent/search/family/087578909/publication/WO2023158421A1?q=Blockchain>

Information source: (Espacenet Patent Search, 2023)



2.10. Augmented reality device and methods of use

Computer-implemented methods of operating an augmented reality device can involve capturing camera images, processing the camera images, and displaying virtual display images. The camera images can be captured automatically using a camera disposed within an augmented reality device worn by a user. The camera images can be processed automatically using a processor located within the augmented reality device.



Illustrates in front elevation view an example augmented reality device according to one embodiment of the present disclosure.

Credit: Tavangar, B. & Nakarja, R., Espacenet Patent Search

The virtual display images can be displayed automatically to the user within the augmented reality device while the user is looking through the augmented reality device and simultaneously viewing real objects through the augmented reality device. The virtual display images can be based on the processed camera images. Additional steps can include accepting a first user input, storing camera image(s) on a memory located within the augmented reality device based on the first input, accepting a second user input, and displaying stored image(s) to the user based on the second input.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/087574194/publication/US2023266586A1?q=machine%20learning>

Reference

Tavangar, B. & Nakarja, R. (Aug 24, 2023). Augmented reality device and methods of use. Recovered Aug 28, 2023, Espacenet Patent Search:

<https://worldwide.espacenet.com/patent/search/family/087574194/publication/US2023266586A1?q=machine%20learning>

Information source: (Espacenet Patent Search, 2023)