Weekly Newsletter
TECHNOLOGY SURVEILLANCE

Nº 21-2023

MAY 26TH, 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 M-CHAT-R/F, a tool for detecting autism is effective but has limitations

A new study by UC Davis MIND Institute researchers and others finds that an autism screening tool used widely in the U.S. and around the world is effective but has limitations. The findings highlight the need for providers to use their own judgment and be clear with parents about the limits of the tool, called the M-CHAT-R/F (Modified Checklist for Autism in Toddlers, Revised with Follow-Up). The M-CHAT-R/F is a tool commonly used by pediatricians to screen children for autism around the world. It includes a set of questions that providers ask parents or caregivers about their child's development, and usually takes about five minutes to administer. If the child receives a positive screening result, a provider usually recommends further evaluation.

"Although the M-CHAT-R/F has a clear role in autism screening, these results remind clinicians that a positive screen is not equivalent to an autism diagnosis," said lead author Aishworiya Ramkumar, assistant professor in the Department of Pediatrics at the National University of Singapore. Ramkumar is also a former ITPND (International Training Program in Neurodevelopmental Disabilities) fellow at the MIND Institute. *"When clinicians counsel parents and caregivers after a positive screening they must be clear that the child still needs to have a definitive assessment."*

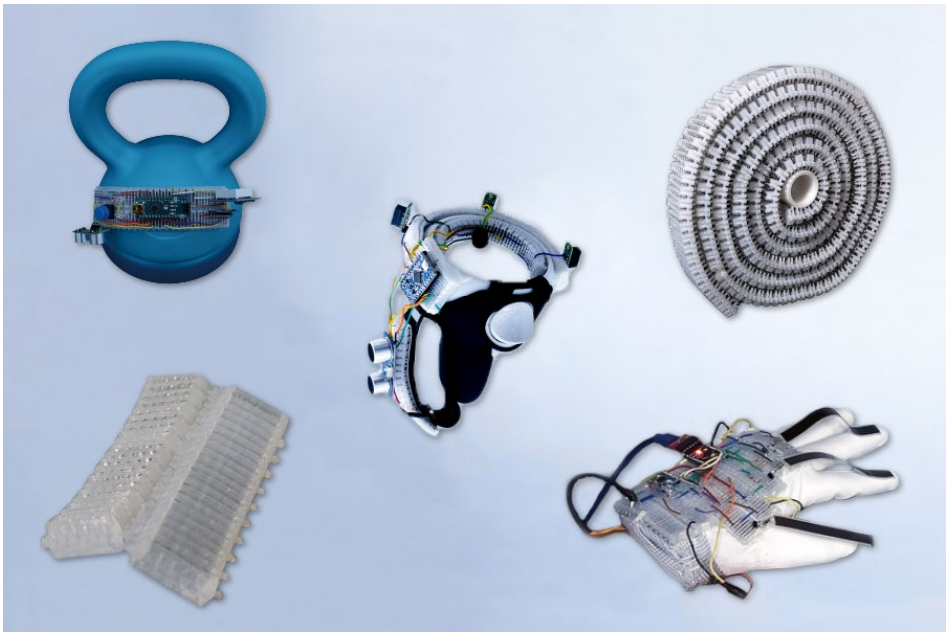
For more information, visit the following link:
https://health.ucdavis.edu/news/headlines/new-study-finds-common-autism-screening-tool-is-effective-but-has-limitations/2023/05

Reference
Russ, M. (May 19, 2023). New study finds common autism screening tool is effective but has limitations. Recovered May 19, 2023, University of California - Davis Health: https://health.ucdavis.edu/news/headlines/new-study-finds-common-autism-screening-tool-is-effective-but-has-limitations/2023/05

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

1.2 Toward more flexible and rapid prototyping of electronic devices

One trait is ideal across the board: flexibility. The same can now be said about prototyping electronic devices. While designers typically test out their designs on *"breadboards,"* or thin plastic boards that can hold together electronic components, they are often stiff and slow. With the rigidity of these electronic backbones in mind, Massachusetts Institute of Technology (MIT) researchers developed *"FlexBoard,"* a flexible breadboard that enables rapid prototyping of objects with interactive sensors, actuators, and displays on curved and deformable surfaces, such as a ball or clothes.



FlexBoard is an interaction prototyping platform that enables rapid prototyping with interactive components such as sensors, actuators, and displays on curved and deformable objects.
Credit: Alex Shipps, Massachusetts Institute of Technology

To illustrate the platform's versatility on different items, researchers tested it out on kettlebells, video game controllers, and gloves, finding that sensors and displays can attach to the electronic components within each of its hinges. The team added sensors and LEDs to the kettlebells, which successfully detected whether users were applying the correct form to their swing workouts. In turn, the display indicated red if done incorrectly, or green if executed properly, as well as the number of repetitions. In the future, the platform could improve fitness routines by providing that feedback.

For more information, visit the following link:
https://news.mit.edu/2023/toward-more-flexible-rapid-prototyping-electronic-devices-0518

Reference

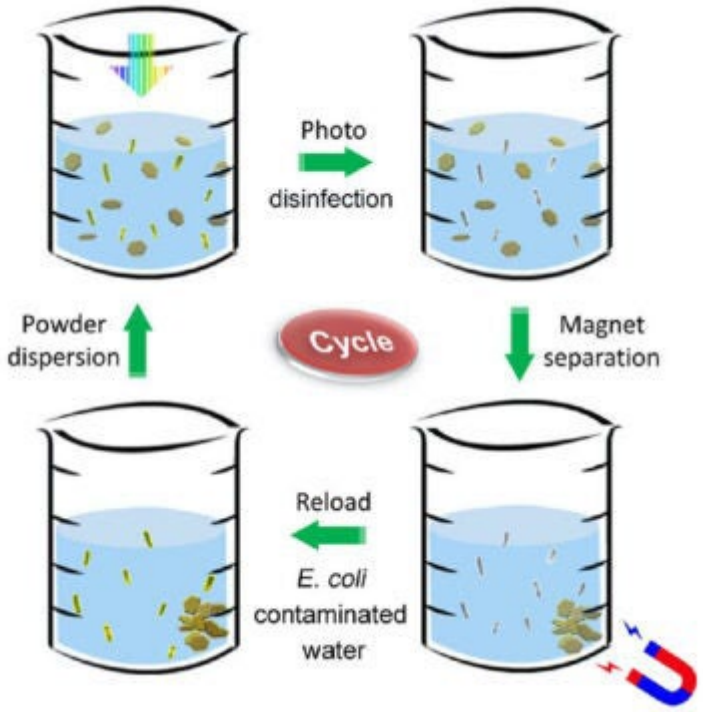
Shipps, A. (May 18, 2023). Toward more flexible and rapid prototyping of electronic devices. Recovered May 18, 2023, Massachusetts Institute of Technology:

https://news.mit.edu/2023/toward-more-flexible-rapid-prototyping-electronic-devices-0518

Information source: (Massachusetts Institute of Technology, 2023)

1.3 New nontoxic powder uses sunlight to quickly disinfect contaminated drinking water

Scientists at Stanford University and SLAC National Accelerator Laboratory have invented a low-cost, recyclable powder that kills thousands of waterborne bacteria per second when exposed to ordinary sunlight. The discovery of this ultrafast disinfectant could be a significant advance for nearly 30 percent of the world's population with no access to safe drinking water, according to the Stanford and SLAC team.



Disinfectant powder is stirred in bacteria-contaminated water (upper left). Mixture is exposed to sunlight, which rapidly kills all bacteria (upper right). A magnet collects the metallic powder after disinfection (lower right). The powder is then reloaded into another beaker of contaminated water, and the disinfection process is repeated (lower left)
Credit: Standford University

The new disinfectant developed at Stanford is a harmless metal powder that works by absorbing both UV and high-energy visible light from the sun. The powder consists of nano-sized flakes of aluminum oxide, molybdenum sulfide, copper and iron oxide. The non-toxic powder is also recyclable. In the study, the researchers used magnetism to collect the same powder 30 times to treat 30 different contaminated water samples.

For more information, visit the following link:
https://news.stanford.edu/2023/05/18/new-technology-uses-ordinary-sunlight-disinfect-drinking-water/

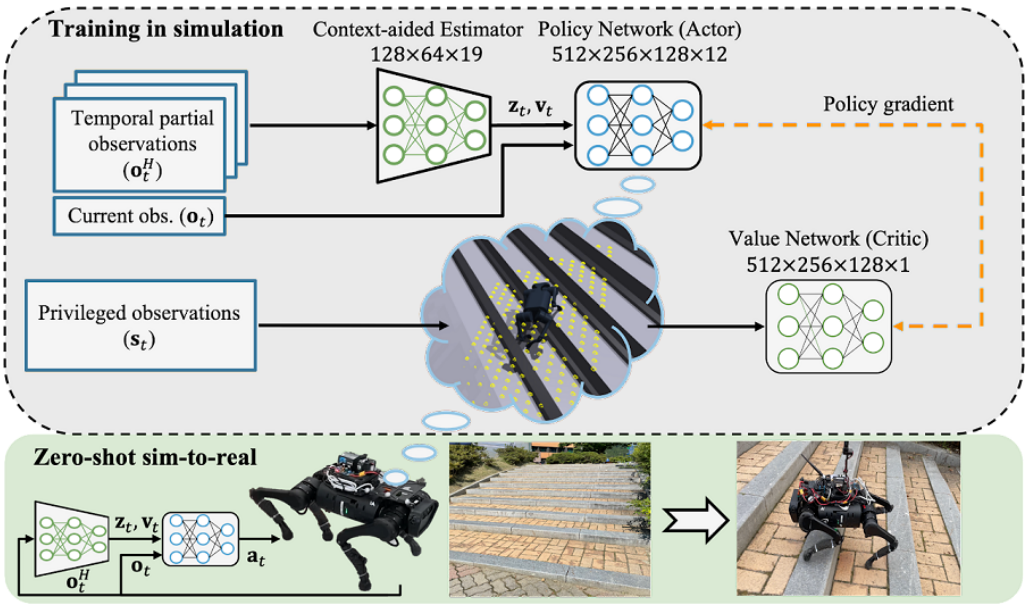
Reference

Shwartz, M. (May 18, 2023). New nontoxic powder uses sunlight to quickly disinfect contaminated drinking water. Recovered May 18, 2023, Stanford University: https://news.stanford.edu/2023/05/18/new-technology-uses-ordinary-sunlight-disinfect-drinking-water/

Information source: (Stanford University, 2023)

1.4 *"DreamWaQer"*, a quadrupedal robot that can walk in the dark

The KAIST research team developed *"DreamWaQ"* technology, which was named so as it enables walking robots to move about even in the dark, just as a person can walk without visual help fresh out of bed and going to the bathroom in the dark. With this technology installed atop any legged robots, it will be possible to create various types of *"DreamWaQers"*. Existing walking robot controllers are based on kinematics and/or dynamics models. This is expressed as a model-based control method. In particular, on atypical environments like the open, uneven fields, it is necessary to obtain the feature information of the terrain more quickly in order to maintain stability as it walks. However, it has been shown to depend heavily on the cognitive ability to survey the surrounding environment.



Overview of DreamWaQ, a controller developed by this research team. This network consists of an estimator network that learns implicit and explicit estimates together, a policy network that acts as a controller, and a value network that provides guides to the policies during training. Credit: Korea Advanced Institute of Science and Technology

DreamWaQ, the controller developed by the research team, is largely composed of a context estimation network that estimates the ground and robot information and a policy network that computes control commands. The context-aided estimator network estimates the ground information implicitly and the robot's status explicitly through inertial information and joint information. This information is fed into the policy network to be used to generate optimal control commands. Both networks are learned together in the simulation.

For more information, visit the following link:
https://news.kaist.ac.kr/newsen/html/news/?mode=V&mng_no=28930

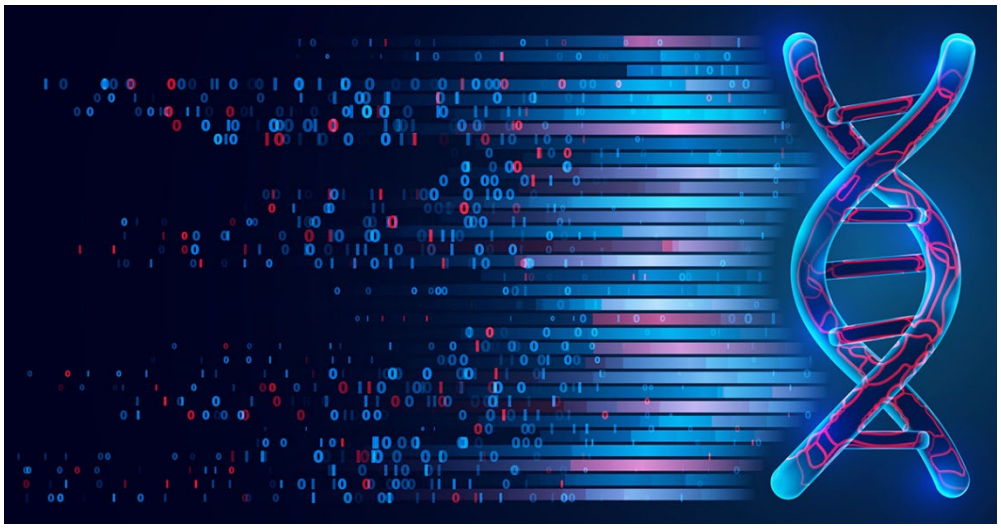
Reference

Korea Advanced Institute of Science and Technology. (May 18, 2023). KAIST debuts *"DreamWaQer"* - a quadrupedal robot that can walk in the dark. Recovered May 18, 2023, Korea Advanced Institute of Science and Technology: https://news.kaist.ac.kr/newsen/html/news/?mode=V&mng_no=28930

Information source: (Korea Advanced Institute of Science and Technology, 2023)

1.5 Artificial intelligence catalyzes gene activation research and uncovers rare DNA Sequences

Artificial intelligence (AI) has exploded across our news feeds, with ChatGPT and related AI technologies becoming the focus of broad public scrutiny. Beyond popular chatbots, biologists are finding ways to leverage AI to probe the core functions of our genes. Previously, University of California San Diego researchers who investigate DNA sequences that switch genes on used artificial intelligence to identify an enigmatic puzzle piece tied to gene activation, a fundamental process involved in growth, development and disease. Using machine learning, a type of artificial intelligence, School of Biological Sciences Professor James T. Kadonaga and his colleagues discovered the downstream core promoter region (DPR), a *"gateway"* DNA activation code that's involved in the operation of up to a third of our genes.



Credit: iStock/Nobi_Prizue, University of California - San Diego

The rare sequences identified by the machine learning system serve as a successful demonstration and set the stage for other uses of machine learning and other AI technologies in biology. *"In everyday life, people are finding new applications for AI tools such as ChatGPT. Here, we've demonstrated the use of AI for the design of customized DNA elements in gene activation. This method should have practical applications in biotechnology and biomedical research,"* said Kadonaga. *"More broadly, biologists are probably at the very beginning of tapping into the power of AI technology."*

For more information, visit the following link:
https://today.ucsd.edu/story/artificial-intelligence-catalyzes-gene-activation-research-and-uncovers-rare-dna-sequences

Reference

Aguilera, M. (May 18, 2023 Artificial intelligence catalyzes gene activation research and uncovers rare DNA Sequences. Recovered May 18, 2023, University of California - San Diego:

https://today.ucsd.edu/story/artificial-intelligence-catalyzes-gene-activation-research-and-uncovers-rare-dna-sequences

Information source: (University of California - San Diego, 2023)

1.6 Solvent-free process to make better, cheaper lithium-ion battery electrodes

A team led by Worcester Polytechnic Institute (WPI) researcher Yan Wang has developed a solvent-free process to manufacture lithium-ion battery electrodes that are greener, cheaper, and charge faster than electrodes currently on the market, an advance that could improve the manufacturing of batteries for electric vehicles. In the journal Joule, the group reported on a dry-print manufacturing process that avoids the toxic solvents and the long drying times needed when manufacturing electrodes with slurries and conventional production methods.

Wang, who is the WPI William B. Smith Dean's Professor in the Department of Mechanical and Materials Engineering, said the new process could be scaled up and reduce electrode manufacturing costs by up to 15 percent, while also producing electrodes that can charge faster than conventionally produced electrodes. *"Current lithium-ion batteries charge too slowly, and manufacturers typically use flammable, toxic, and expensive solvents that increase the time and cost of production,"* Wang said. *"Our solvent-free manufacturing process addresses those disadvantages by producing electrodes that charge to 78 percent of capacity in 20 minutes, all without the need for solvents, slurries, and long production times."* Commercial lithium-ion battery electrodes are typically made by mixing active materials, conductive additives, polymers, and organic solvents to create a slurry that is pasted onto a metal substrate, dried in an oven, and cut into pieces for use in batteries. The solvents are recovered through distillation.

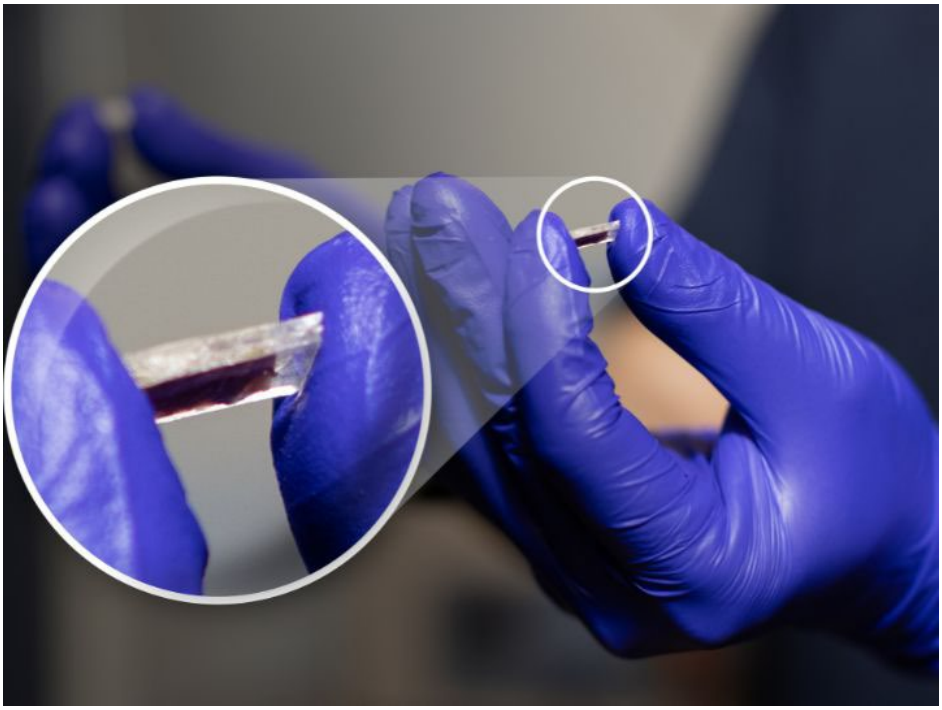
For more information, visit the following link:
https://www.wpi.edu/news/researchers-led-wpis-yan-wang-develop-solvent-free-process-make-better-cheaper-lithium-ion-battery

Reference
Wamback, C. (May 18, 2023). Researchers led by WPI's Yan Wang develop solvent-free process to make better, cheaper lithium-ion battery electrodes. Recovered May 18, 2023, Worcester Polytechnic Institute:
https://www.wpi.edu/news/researchers-led-wpis-yan-wang-develop-solvent-free-process-make-better-cheaper-lithium-ion-battery

Information source: (Worcester Polytechnic Institute, 2023)

1.7 Sensors that operate at high temperatures and in extreme environments

Extreme environments in several critical industries – aerospace, energy, transportation and defense – require sensors to measure and monitor numerous factors under harsh conditions to ensure human safety and integrity of mechanical systems. In the petrochemical industry, for example, pipeline pressures must be monitored at climates ranging from hot desert heat to near arctic cold. Various nuclear reactors operate at a range of 300-1000 degrees Celsius, while deep geothermal wells hold temperatures up to 600 degrees Celsius.



Close-up photo of the new piezoelectric sensor developed by University of Houston researchers. It can potentially work in extreme environments. Credit: University of Houston

Team of University of Houston researchers has developed a new sensor that was proven to work in temperatures as high as 900 degrees Celsius or 1,650 degrees Fahrenheit, which is the temperature mafic volcanic lava, the hottest type of lava on Earth, erupts. *"Highly sensitive, reliable and durable sensors that can tolerate such extreme environments are necessary for the efficiency, maintenance and integrity of these applications,"* said Jae-Hyun Ryou, associate professor of mechanical engineering at University of Houston

For more information, visit the following link:
https://uh.edu/news-events/stories/2023/may-2023/05182023-extreme-environment-sensors.php

Reference

Khan, R (May 18, 2023). UH researchers develop sensors that operate at high temperatures and in extreme environments. Recovered May 19, 2023, University of Houston: https://uh.edu/news-events/stories/2023/may-2023/05182023-extreme-environment-sensors.php

Information source: (University of Houston, 2023)

1.8 Driving on sunshine: clean, usable liquid fuels made from solar power

The researchers, from the University of Cambridge, harnessed the power of photosynthesis to convert CO2, water and sunlight into multicarbon fuels – ethanol and propanol – in a single step. These fuels have a high energy density and can be easily stored or transported. Unlike fossil fuels, these solar fuels produce net-zero carbon emissions and are completely renewable, and unlike most bioethanol, they do not divert any agricultural land away from food production. While the technology is still at laboratory scale, the researchers say their *"artificial leaves"* are an important step in the transition away from a fossil fuel-based economy. The results are reported in the journal Nature Energy.

Credit: University of Cambridge

To date, these artificial leaves have only been able to make simple chemicals, such as syngas, a mixture of hydrogen and carbon monoxide that is used to produce fuels, pharmaceuticals, plastics and fertilisers. But to make the technology more practical, it would need to be able to produce more complex chemicals directly in a single solar-powered step. Now, the artificial leaf can directly produce clean ethanol and propanol without the need for the intermediary step of producing syngas.

For more information, visit the following link:
https://www.cam.ac.uk/research/news/driving-on-sunshine-clean-usable-liquid-fuels-made-from-solar-power

Reference
Collins, S. (May 18, 2023). Driving on sunshine: clean, usable liquid fuels made from solar power. Recovered May 19, 2023, University of Cambridge: https://www.cam.ac.uk/research/news/driving-on-sunshine-clean-usable-liquid-fuels-made-from-solar-power

Information source: (University of Cambridge, 2023)

1.9 Researchers use novel approach to teach robot to navigate over obstacles

Quadrupedal robots may be able to step directly over obstacles in their paths thanks to the efforts of a trio of Georgia Tech Ph.D. students. When it comes to robotic locomotion and navigation, Naoki Yokoyama says most four-legged robots are trained to regain their footing if an obstacle causes them to stumble. Working toward a larger effort to develop a housekeeping robot, Yokoyama and his collaborators — Simar Kareer and Joanne Truong — set out to train their robot to walk over clutter it might encounter in a home.*"The main motivation of the project is getting low-level control over the legs of the robot that also incorporates visual input,"* said Yokoyama, a Ph.D. student within the School of Electrical and Computer Engineering. *"We envisioned a controller that could be deployed in an indoor setting with a lot of clutter, such as shoes or toys on the ground of a messy home. Whereas blind locomotive controllers tend to be more reactive — if they step on something, they'll make sure they don't fall over — we wanted ours to use visual input to avoid stepping on the obstacle altogether."*

The visual navigation policy teaches the robot through goal-achieving motivation. It gives the robot an objective of navigating from one place to another while avoiding any obstacles. The robot receives a score based on how successfully it completes its task. If it stumbles over an obstacle, it is penalized. The visual navigation policy teaches the robot through goal-achieving motivation. It gives the robot an objective of navigating from one place to another while avoiding any obstacles. The robot receives a score based on how successfully it completes its task. If it stumbles over an obstacle, it is penalized. *"We gave it an environment that had very few obstacles, and then slightly more and slightly more,"* Kareer said. *"This gradual approach is helpful to its learning. When you just toss it into an environment with a million obstacles, it fails a lot. But if you show it one or two obstacles and say, "try to learn these," it's much more stable."*

For more information, visit the following link:
https://research.gatech.edu/researchers-use-novel-approach-teach-robot-navigate-over-obstacles

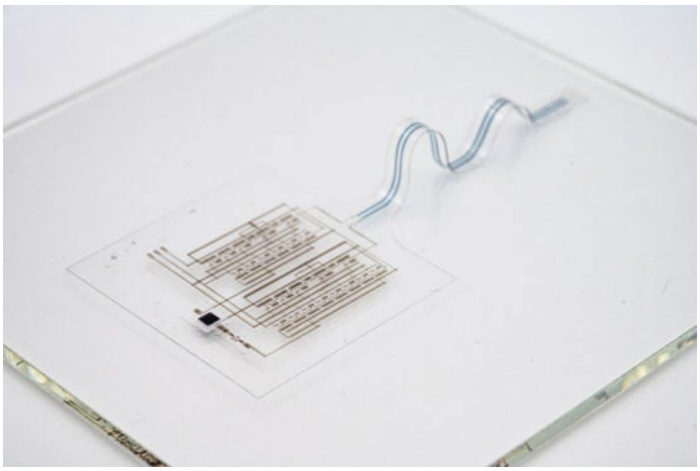
Reference

Deen, N. (May 18, 2023). Researchers use novel approach to teach robot to navigate over obstacles. Recovered May 19, 2023, Georgia Institute of Technology: https://research.gatech.edu/researchers-use-novel-approach-teach-robot-navigate-over-obstacles

Information source: (Georgia Institute of Technology, 2023)

1.10 Soft *"e-skin"* generates nerve-like impulses that talk to the brain

Artificial skin will be critical to new-age prosthetic limbs that not only restore movement and functions, like grasping, but also provide sensory feedback (proprioception) that helps the user control the device with precision. Not only that but the sensory-skin material itself must stretch and return without fail, time and time again, all while never losing its nerve-like electrical characteristics.



The three layers of the e-skin contain networks of organic nanostructures that transmit electrical signals even when stretched. They can be designed to sense pressure, temperature, strain, and chemicals.
Credit: Jiancheng Lai and Weichen Wang of Bao Research Group, Stanford University

The team invented a tri-layer dielectric structure that helped increase the mobility of electrical charge carriers by 30 times compared to a single-layer dielectrics, allowing the circuits to operate at low voltage. Interestingly, one of the layers in the tri-layer is nitrile, the same rubber that is used in surgical gloves. The majority of e-skin is made of many layers of skin-like materials. Integrated in each layer are networks of organic nanostructures that transmit electrical signals even when stretched. These networks can be engineered to sense pressure, temperature, strain, and chemicals.

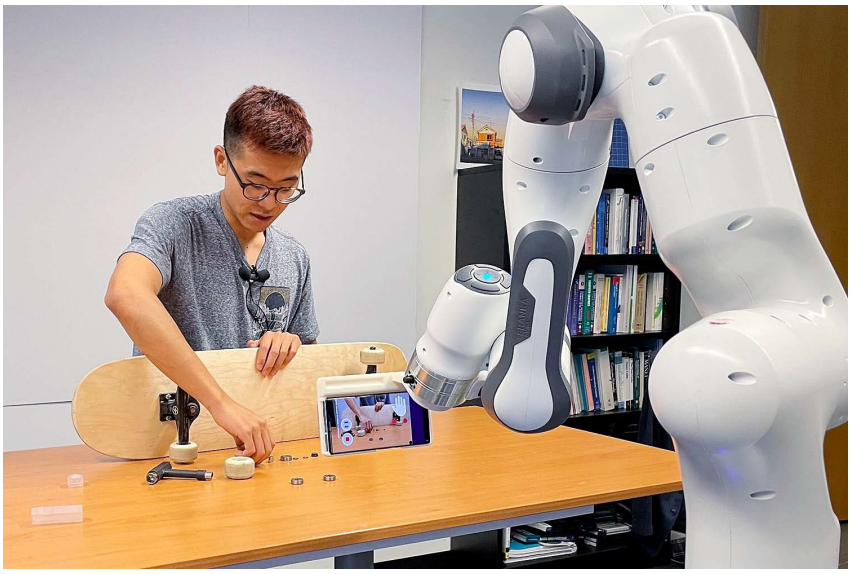
For more information, visit the following link:
https://news.stanford.edu/2023/05/18/soft-e-skin-talks-brain/

Reference
Myers, A. (May 18, 2023). Soft *"e-skin"* generates nerve-like impulses that talk to the brain. Recovered May 19, 2023, Stanford University: https://news.stanford.edu/2023/05/18/soft-e-skin-talks-brain/

Information source: (Stanford University, 2023)

1.11 Researchers develop interactive *"Stargazer"* camera robot that can help film tutorial videos

A group of computer scientists from the University of Toronto (U of T) wants to make it easier to film how-to videos. The team of researchers have developed Stargazer, an interactive camera robot that helps university instructors and other content creators create engaging tutorial videos demonstrating physical skills.



A study participant uses the interactive camera robot Stargazer to record a how-to video on skateboard maintenance.
Credit: Jia Li, University of Toronto

For those without access to a cameraperson, Stargazer can capture dynamic instructional videos and address the constraints of working with static cameras. *"The robot is there to help humans, but not to replace humans,"* explains lead researcher Jiannan Li, a PhD candidate in U of T's department of computer science in the Faculty of Arts & Science. Using the robot, they were able to produce videos demonstrating physical tasks on a diverse range of subjects, from skateboard maintenance to interactive sculpture-making and setting up virtual-reality headsets, while relying on the robot for subject tracking, camera framing and camera angle combinations.

For more information, visit the following link:
https://www.utoronto.ca/news/researchers-develop-interactive-stargazer-camera-robot-can-help-film-tutorial-videos

Reference

Hewitt, K. (May 18, 2023). Researchers develop interactive *"Stargazer"* camera robot that can help film tutorial videos. Recovered May 19, 2023, University of Toronto: https://www.utoronto.ca/news/researchers-develop-interactive-stargazer-camera-robot-can-help-film-tutorial-videos

Information source: (University of Toronto, 2023)

1.12 Sonura supports newborn development by sequestering disruptive noise

Machines beeping and whirring in a rhythmic chorus, the droning hum of medical equipment, and the bustles of busy health care providers are the familiar sounds of an extended stay at a hospital. This cacophony can create a sense of urgency for medical professionals as they move about with focused determination, closely monitoring their patients, but for infants in neonatal intensive care units (NICU) this constant noise can be overwhelming and developmentally detrimental.

Prototype of the Sonura Beanie
Credit: Courtesy of the Sonura team, University of Pennsylvania

Device filters out harmful noises for NICU infants while supporting cognitive and socioemotional development by allowing parents to send voice messages to their newborns. Magro, bioengineering graduate from the School of Engineering and Applied Science, says that the Sonura Beanie is equipped with an active filtration system to block out high-frequency environmental noise but allows low-frequency voices and bodily sounds to pass through, with the benefit of more closely mimicking the uterine environment. *"This has been shown to be integral to fostering linguistic development for infants,"* she says.

For more information, visit the following link:
https://penntoday.upenn.edu/news/safe-and-sound-sonura-supports-newborn-development-sequestering-disruptive-noise

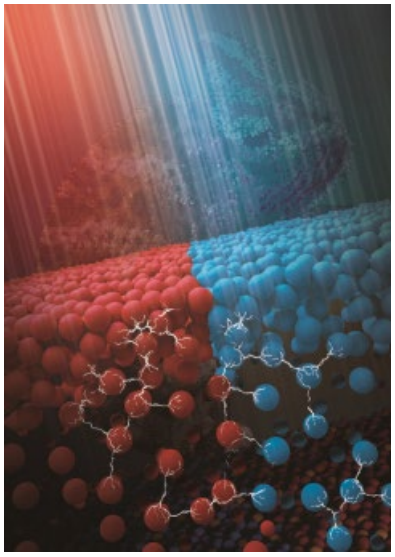
Reference

Magubane, N. (May 18, 2023). Safe and sound: Sonura supports newborn development by sequestering disruptive noise. Recovered May 19, 2023, University of Pennsylvania: https://penntoday.upenn.edu/news/safe-and-sound-sonura-supports-newborn-development-sequestering-disruptive-noise

Information source: (University of Pennsylvania, 2023)

1.13 Physical chemists develop photochromic active colloids shedding light on the development of new smart active materials

A research team led by Dr Jinyao TANG from the Department of Chemistry at The University of Hong Kong (HKU), develops a novel wavelength-selective intelligent colloid system to achieve light-controlled multi-dimensional phase segregation in collaboration with scientists from Hong Kong University of Science and Technology and Xiamen University. The team forms dynamic photochromic nanoclusters by mixing cyan, magenta and yellow microbeads, achieving photochromism on a macro scale. This macroscopic photochromism relies on light-induced vertical phase stratification in the active microbeads mixture, resulting in the enrichment of coloured microbeads corresponding to the incident spectrum.



Novel ink composed of colourful microbeads adapts to the appearance of received light by light-driven separation.
Credit: The University of Hong Kong

Unlike existing colour-changing materials, this new photochromic colloidal swarm relies on rearranging existing pigments rather than generating new chromophores in situ and is, therefore, more reliable and programmable. Their findings provide a simple method for applications such as electronic ink, displays, and active optical camouflage, representing a major breakthrough in the field of active matter. The research result is recently published in the prestigious academic journal Nature.

For more information, visit the following link:
https://hku.hk/press/news_detail_26118.html

Reference

Chan, C. (May 18, 2023). Physical chemists develop photochromic active colloids shedding light on the development of new smart active materials. Recovered May 19, 2023, The University of Hong Kong: https://hku.hk/press/news_detail_26118.html

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

1.14 Microplastics are harming gut health

Scientists have been worried about the potential harms of microplastics for years. These small plastic particles less than 5 mm in length have been found everywhere because of plastic pollution – from the Earth's deep oceans to remote regions in Antarctica, and even the seafood we eat. But, are microplastics really harmful?

An international team of scientists, including researchers from McGill University, have found evidence that microplastics in the digestive tract of seabirds altered the microbiome of the gut – increasing the presence of pathogens and antibiotic-resistant microbes, while decreasing the beneficial bacteria found in the intestines. *"Our findings reflect the circumstances of animals in the wild. Since humans also uptake microplastics from the environment and through food, this study should act as a warning for us,"* say the authors. *"The gut microbiome encompasses all the microbes in the gastrointestinal tract, which help control the digestion of food, immune system, central nervous system, and other bodily processes. It's a key indicator of health and well-being,"* says Julia Baak, co-author of the study and a PhD Candidate in the Department of Natural Resource Sciences at McGill University.

For more information, visit the following link:
https://www.mcgill.ca/newsroom/channels/news/microplastics-are-harming-gut-health-348329

Reference
Cardenas, S. (May 18, 2023). Microplastics are harming gut health. Recovered May 19, 2023, McGill University: https://www.mcgill.ca/newsroom/channels/news/microplastics-are-harming-gut-health-348329

Information source: (McGill University, 2023)

1.15 Artificial Intelligence helps place drones in remote areas for faster emergency response

For residents of rural and underserved areas, access to emergency medical care can be a matter of life and death. With limited access to health care services and long ambulance wait times due to distance, these communities face challenges that can significantly affect their health and well-being. In the case of cardiac arrest, when every minute counts, finding solutions to improve response times is critical to saving lives. USC researchers are exploring the use of Artificial Intelligence (AI)-powered decision-making to deploy life-saving equipment in data-scarce settings like rural neighborhoods to enable faster emergency response times, improve the design of emergency response systems and potentially save lives.

A recent study shows the potential for AI to help emergency responders make informed and efficient decisions in settings where data is limited.
Credit: Photo/Ian Usher via Unsplash, University of Southern California

Results from a recent study show the potential for AI to help emergency responders make informed and efficient decisions in settings where data is limited. *"We often hear about big data and its potential, but in many cases, data is still scarce, especially in settings where data collection is expensive or limited by privacy concerns,"* Gupta, an associate professor of data sciences and operations at USC Marshall, said. *"There are also cases where collection events are rare, which can make it challenging to design systems and make informed decisions. With AI tools, we can address these challenges and make better decisions even in data-limited settings."*

For more information, visit the following link:
https://news.usc.edu/208069/ai-drones-emergency-response/

Reference

Raffio, N. (May 18, 2023). AI helps place drones in remote areas for faster emergency response. Recovered May 19, 2023, University of Southern California: https://news.usc.edu/208069/ai-drones-emergency-response/

Information source: (University of Southern California, 2023)

1.16 Would you trust an AI doctor? New research shows patients are split

A University of Arizona Health Sciences-led study found that more than 50% of people don't fully trust Artificial Intelligence (AI)-powered medical advice, but many put faith in AI if it's monitored and guided by human touch. Research team found that most patients aren't convinced the diagnoses provided by AI are as trustworthy of those delivered by human medical professionals.

"While many patients appear resistant to the use of AI, accuracy of information, nudges and a listening patient experience may help increase acceptance," Dr. Slepian, professor of medicine at the University of Arizona College of Medicine – Tucson, said of the study's other primary finding: that a human touch can help clinical practices use AI to their advantage and earn patients' trust. *"To ensure that the benefits of AI are secured in clinical practice, future research on best methods of physician incorporation and patient decision making is required."* Overall, participants were almost evenly split, with more than 52% choosing human doctors as a preference versus approximately 47% choosing an AI diagnostic method. If study participants were prompted that their primary care physicians felt AI was superior and helpful as an adjunct to diagnosis or otherwise nudged to consider AI as good, the acceptance of AI by study participants on re-questioning increased. This signaled the significance of the human physician in guiding a patient's decision.

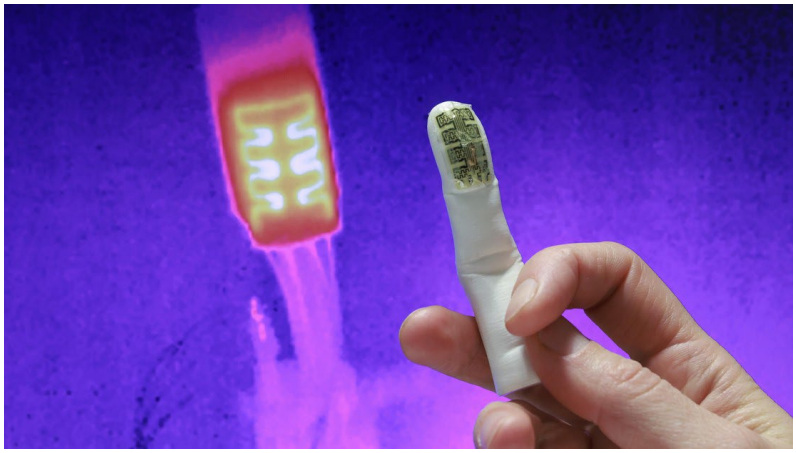
For more information, visit the following link:
https://news.arizona.edu/story/would-you-trust-ai-doctor-new-research-shows-patients-are-split

Reference
Villarreal, P. (May 19, 2023). Would you trust an AI doctor? New research shows patients are split. Recovered May 22, 2023, The University of Arizona: https://news.arizona.edu/story/would-you-trust-ai-doctor-new-research-shows-patients-are-split

Information source: (The University of Arizona, 2023)

1.17 Amputees feel warmth in their missing hand

An unexpected discovery about temperature feedback has led to new bionic technology that allows amputees to sense the temperature of objects -– both hot and cold – directly in the phantom hand. The technology opens up new avenues for non-invasive prosthetics.



Credit: Ecole Polytechnique Fédérale de Lausanne

Researchers Silvestro Micera and Solaiman Shokur have been keen on incorporating new sensory feedback into prosthetic limbs for providing more realistic touch to amputees, and their latest study focuses on temperature. They stumbled upon a discovery about temperature feedback that far exceeds their expectations.
If you place something hot or cold on the forearm of an intact individual, that person will feel the object's temperature locally, directly on their forearm. They can feel if an object is hot or cold, and can tell if they are touching copper, plastic or glass. In a collaboration between Ecole Polytechnique Fédérale de Lausanne, Sant'Anna School of Advanced Studies (SSSA) and Centro Protesi Inail, the technology was successfully tested in 17 out of 27 patients.

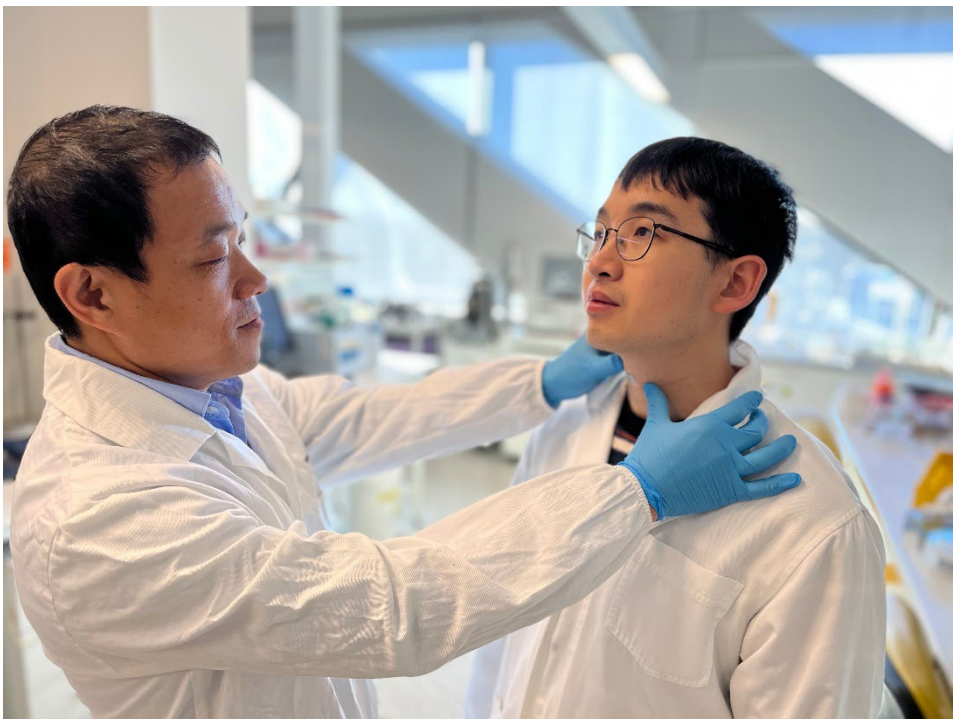
For more information, visit the following link:
https://news.epfl.ch/news/amputees-feel-warmth-in-their-missing-hand/

Reference
Ecole Polytechnique Fédérale de Lausanne (May 19, 2023). Amputees feel warmth in their missing hand. Recovered May 22, 2023, Ecole Polytechnique Fédérale de Lausanne: https://news.epfl.ch/news/amputees-feel-warmth-in-their-missing-hand/

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

1.18 Artificial Intelligence powers second-skin-like wearable tech

A new ultra-thin skinpatch with nanotechnology able to monitor 11 human health signals has been developed by researchers at Monash University. Researchers from the Faculty of Engineering and Faculty of Information Technology combined nanotechnology and artificial intelligence to bring machines one step closer to communicating with the human body.



Professor Wenlong Cheng places the wearable 'skin' biosensor on Dr. Shu Gong's neck
Credit: University of Monash

Using specialised algorithms, personalised Artificial Intelligence (AI) technology can now disentangle multiple body signals, understand them and make a decision on what to do next. Worn on the neck, lead researcher Professor Wenlong Cheng said the ultra-thin wearable patch has three layers, measuring speech, neck movement and touch. It also measures breathing and heart rates. *"Emerging soft electronics have the potential to serve as second-skin-like wearable patches for monitoring human health vitals, designing perception robotics and bridging interactions between natural and artificial intelligence,"* Professor Cheng said.

For more information, visit the following link:
https://www.monash.edu/news/articles/artificial-intelligence-powers-second-skin-like-wearable-tech

Reference

Wylde, L. (May 19, 2023). Artificial Intelligence powers second-skin-like wearable tech. Recovered May 22, 2023, University of Monash:

https://www.monash.edu/news/articles/artificial-intelligence-powers-second-skin-like-wearable-tech

Information source: (University of Monash, 2023)

1.19 Historic stone buildings and bridges could be preserved by new engineering technique

University of Sheffield researchers have developed a new method for assessing the safety of stone and brick constructions. New technique could help to preserve historic structures - from medieval cathedrals and Victorian railway viaducts to smaller constructions - so they can be used for future generations.

Credit: University of Sheffield

Engineers have been using a centuries-old method for assessing the safety of stone and brick masonry, but University of Sheffield engineers have now built on the technique, initially developed by a famous scientist in the 1600s, to make it more accurate and reliable. Researchers have developed open source software that, with further development, will allow practicing engineers and architects to assess the safety of stone and brick masonry constructions using the new technique.

For more information, visit the following link:
https://www.sheffield.ac.uk/news/historic-stone-buildings-and-bridges-could-be-preserved-new-engineering-technique

Reference
Barton, S. (May 22, 2023). Historic stone buildings and bridges could be preserved by new engineering technique. Recovered May 22, 2023, The University of Sheffield: https://www.sheffield.ac.uk/news/historic-stone-buildings-and-bridges-could-be-preserved-new-engineering-technique

Information source: (The University of Sheffield, 2023)

1.20 Build the next generation TSUBAME4.0 supercomputer for artificial intelligence, scientific research, and innovation

Tokyo Institute of Technology (Tokyo Tech) Global Scientific Information and Computing Center (GSIC) and Hewlett Packard Enterprise announced to build its next-generation supercomputer, TSUBAME4.0, to accelerate AI-driven scientific discovery in medicine, materials science, climate research, and turbulence in urban environments.

Rendering of TSUBAME4.0 supercomputer.
Credit: Tokyo Institute of Technology

Tokyo Tech is one of the world's leading universities in science and technology. With the TSUBAME4.0 supercomputer, users will have the ability to train more AI models and run applications in computational science and analytics, simultaneously, to augment research efforts and improve productivity. TSUBAME4.0, which will be fully operational in spring of 2024, will deliver 20 times more accelerated compute performance than its predecessor to accelerate AI-driven cutting-edge research and convergence science.

For more information, visit the following link:
https://www.titech.ac.jp/english/news/2023/066783

Reference
Tokyo Institute of Technology (May 22, 2023). Tokyo tech and HPE collaborate to build the next generation TSUBAME4.0 supercomputer for artificial intelligence, scientific research, and innovation. Recovered May 22, 2023, Tokyo Institute of Technology: https://www.titech.ac.jp/english/news/2023/066783

Information source: (Tokyo Institute of Technology, 2023)

2 PATENTS

2.1 Artificial Intelligence-based human resource management

It is the time to analyze, propose, do and control human resources management (HRM) tasks completely automatically, using artificial intelligence means (AI-Based), to watch, to manage and to control HRM issues using related data, measures and metrics. This system, HAMED HRD, is a comprehensive one to do these and to help all the people around the world disregarding of their race, religion, wealth, etc. It also could be useful for those that are in distant places without accessing to specialists (e.g. human resources managers), those who live in poor areas or those who travel to distant places without accessing to any specialist.

The benefit of HAMED HRD is to help businesses while doing HRM in order to see if related HRM activities are being done desirably, efficiently, and effectively, and if the HRM tasks are optimized well enough and are profitable. HAMED HRD can also monitor damages/inefficiencies in the processes, methods, programs, plans, instruments, devices, facilities and so on (if any) and the environmental conditions in which the HRM activities are being done. HAMED HRD can be used for all kind of businesses. Providing that HAMED HRD will be used globally, needed processes, methods, programs, plans, instruments, devices, facilities and so on can be monitored around the world and some useful information (like specific resources in the case of needs in different areas) can be obtained and managed. Thereby, HAMED HRD can estimate required future needs like human resources and other facilities to handle different situations before they actually would be happened.

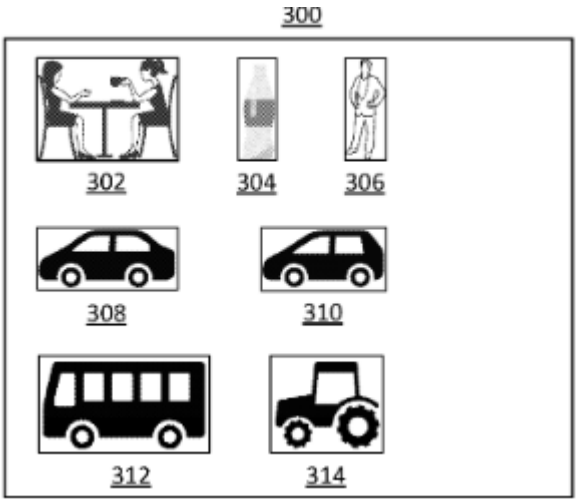
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023084286&_cid=P12-LI0BIY-89309-1

Reference
Bagheri, H. (May 19, 2023). AI-based human resource management. Recovered May 19, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023084286&_cid=P12-LI0BIY-89309-1

Information source: (WIPO IP Portal, 2023)

2.2 Facilitating generation and usage of visual content

Systems, methods and non-transitory computer readable media for attributing generated visual content to training examples are provided. A first visual content generated using a generative model may be received. The generative model may be associated with a plurality of training examples. Each training example may be associated with a visual content.



Illustrations of exemplary visual contents.
Credit: Adato, Y.; Taig, E.; Yerushalmi, D.; Gutflaish, E.; Fingerman, B.; Gad-Shriki, S. & Achituv, R., WIPO IP Portal

Properties of the first visual content may be determined. Each visual content associated with a training example may be analyzed to determine properties of the visual content. The properties of the first visual content and the properties of the visual contents associated with the plurality of training examples may be used to attribute the first visual content to a subgroup of the plurality of training examples. The visual contents associated with the training examples of the subgroup may be associated with a source. A data-record associated with the source may be updated based on the attribution.

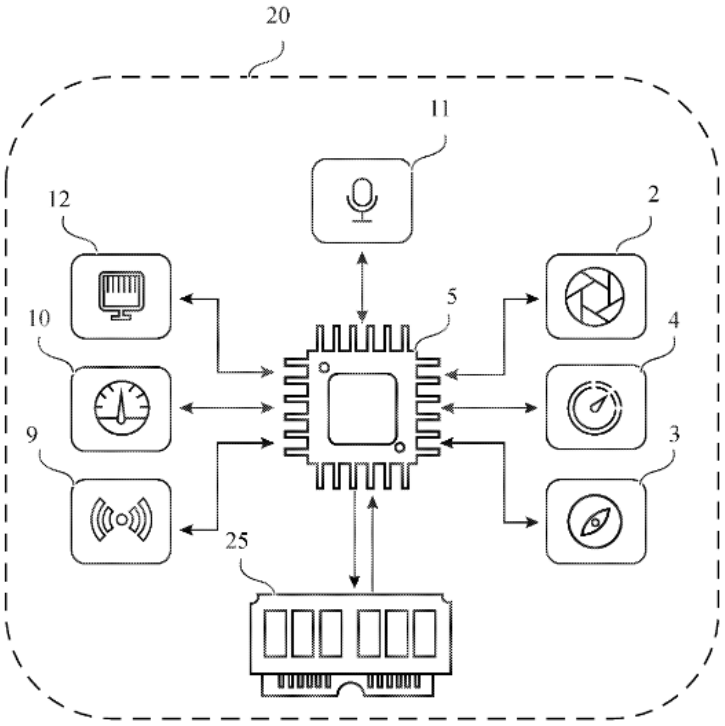
For more information, visit the following link:
https://patentscope.wipo.int/search/en/detail.jsf?docId=US397716795&_cid=P11-LHQD1A-93801-1

Reference
Adato, Y.; Taig, E.; Yerushalmi, D.; Gutflaish, E.; Fingerman, B.; Gad-Shriki, S. & Achituv, R. (May 19, 2023). Facilitating generation and usage of visual content. Recovered May 19, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/en/detail.jsf?docId=US397716795&_cid=P11-LHQD1A-93801-1

Information source: (WIPO IP Portal, 2023)

2.3 Nutritional monitoring device

The purpose of the present invention is to solve problems in the technical field by providing a device for the nutritional monitoring of foods ingested by a user.



Corresponds to a preferred embodiment of the device according to the present disclosure. Credit: Ardila, M.; Buriticá, C.; Montagut, Y.; Rincón, A. & Villa, S., WIPO IP Portal

The device comprises: an image sensor configured to capture at least one image of food ingestion by the user; a position sensor configured to obtain an item of position data regarding the food monitoring device; a real-time clock configured to generate a real-time base; and a processing unit connected to the image sensor, to the position sensor and to the real-time clock. The image sensor captures at least one image of the foods ingested by the user, on the basis of a command from the processing unit, and the processing unit generates a report recording the food ingestion, based on the image captured by the image sensor.

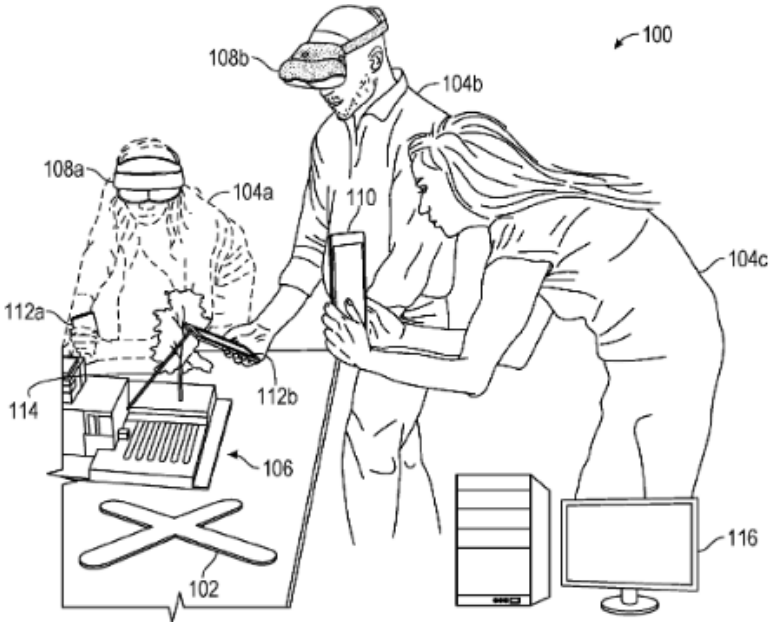
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023084424&_cid=P12-LI0C42-01978-1

Reference
Ardila, M.; Buriticá, C.; Montagut, Y.; Rincón, A. & Villa, S. (May 19, 2023). Nutritional monitoring device. Recovered May 19, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023084424&_cid=P12-LI0C42-01978-1

Information source: (WIPO IP Portal, 2023)

2.4 Augmented reality collaboration system with annotation capability

In general, one aspect disclosed features a system comprising: a first user device configured to display virtual content, the first user device comprising one or more displays.



Illustrates an augmented reality collaboration system featuring a physical holopad according to some embodiments of the disclosed technology.
Credit: Tyurin, A. & Wright, Jr., WIPO IP Portal

One or more hardware processors; and a non-transitory machine-readable storage medium encoded with instructions executable by the one or more hardware processors to: generate a first image depicting virtual content in a virtual location corresponding to a physical location in a physical environment of the first user device, display the first image in the one or more displays of the first user device, enable a user of the first user device to create media and associate that media with the virtual content in the first image in the form of an annotation, and store the annotation and virtual content, and make it available for access by a plurality of additional user devices.

For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023086752&_cid=P12-LI0C69-03288-1

Reference
Tyurin, A. & Wright, Jr. (May 19, 2023). Augmented reality collaboration system with annotation capability. Recovered May 19, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023086752&_cid=P12-LI0C69-03288-1

Information source: (WIPO IP Portal, 2023)

2.5 Computer-implemented method for automatic training of early disease detection algorithms using diagnostic images

The present invention relates to a computer-implemented method for automatic training of algorithms that enable early detection of diseases using diagnostic images, wherein said process is deployed in the cloud and is based on the provision of a graphical interface accessed via the Internet, wherein the doctor or healthcare professional enters the dataset to be trained, such as diagnostic videos or images, in a specific format, preferably a compressed format, with their respective annotations in a plain text file that includes the final diagnosis given by the specialist, the coordinates of the lesions within the image and information on symptoms relevant to the patient's diagnosis.

Once the data are received, a server designed for training algorithms initiates the experimentation using convolutional neural networks, testing multiple architectures and varying hyper-parameters to obtain the best algorithm automatically and after hundreds of attempts. In this way, the process of the invention conducts hundreds of experiments with multiple algorithm configurations and selects the computer vision algorithm for the use case with greater precision.

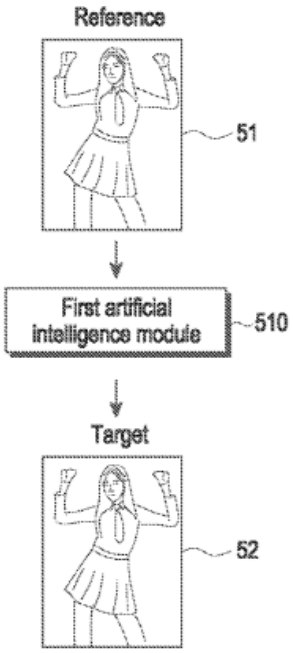
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023084276&_cid=P12-LI0BV5-96737-1

Reference
Munera, N.; Gómez, J.; González, Á.; Velásquez, L. & López, D. (May 18, 2023). Computer-implemented method for automatic training of early disease detection algorithms using diagnostic. Recovered May 18, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023084276&_cid=P12-LI0BV5-96737-1

Information source: (WIPO IP Portal, 2023)

2.6 Electronic device for obtaining image at user-intended moment and method for controlling the same

The disclosure relates to an artificial intelligence (AI) system that simulates a function, such as cognition and judgment, of a human brain using a machine learning algorithm, such as deep learning, and an application thereof.



Illustrates an operation of training an artificial intelligence module to obtain a target image at a user-intended moment of an electronic device according to an embodiment. Credit: Choi, S., Espacenet Patent Search

According to an embodiment, an electronic device may include a touchscreen, a camera, a memory, and a processor, wherein the processor may receive information about an image capturing situation from a user, may obtain a target image based on the information about the image capturing situation using a first artificial intelligence module stored in the memory, may obtain feature information included in the target image using a second artificial intelligence module stored in the memory, may store the feature information in the memory, and may store an image related to the feature information in the memory based on obtaining the image related to the feature information through the camera.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086229922/publication/US20231143923A1?q=artificial%20intelligence

Reference

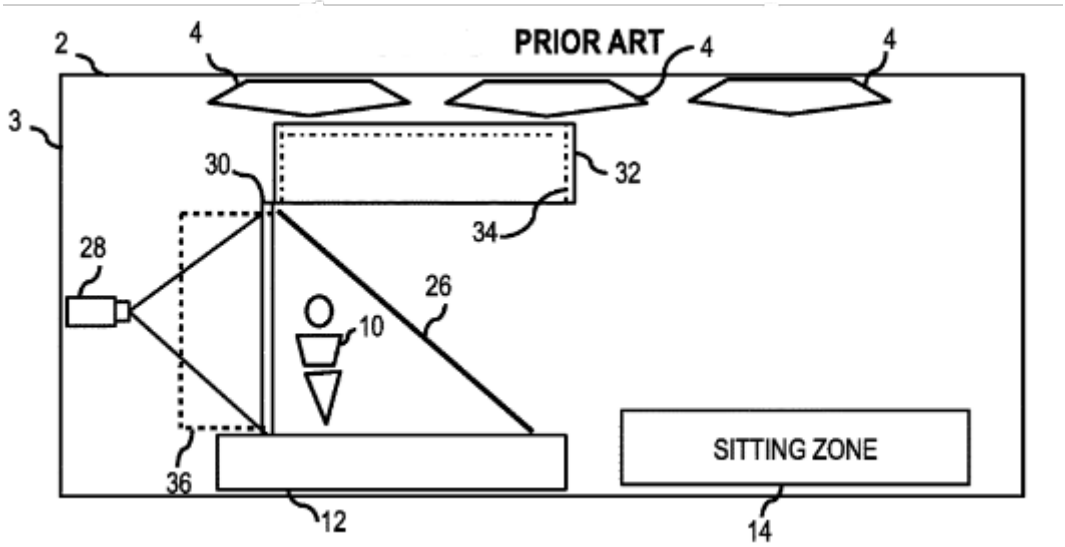
Choi, S. (May 18, 2023). Electronic device for obtaining image at user-intended moment and method for controlling the same. Recovered May 18, 2023, Espacenet Patent Search:

https://worldwide.espacenet.com/patent/search/family/086229922/publication/US20231
43923A1?q=artificial%20intelligence

Information source: (Espacenet Patent Search, 2023)

2.7 Communication stage and presentation systems

Enterprise communication display systems enable life-like images for videoconferencing and entertainment productions. Life-like images appear in a 3D environment where imaged people are visible through the use of specially configured see-through displays.



Illustrates a prior art diagram of a hotel ballroom with a reflected room depth illusion using an inclined optic
Credit: Mcnelley, S.; Machtig, J., Espacenet Patent Search

Various sportsbook venues with presentational displays showing life-size images of people is revealed including venues that serve multiple purposes. Further, a black void illusion is described and is applicable to numerous displays including event and live theater stages and movie theaters. Numerous inventive features are described enabling and advancing the black void illusion. Virtual stage lighting is disclosed for simulating stage lights and coordination of virtual stage lights with real stage lights for live and recorded performances.

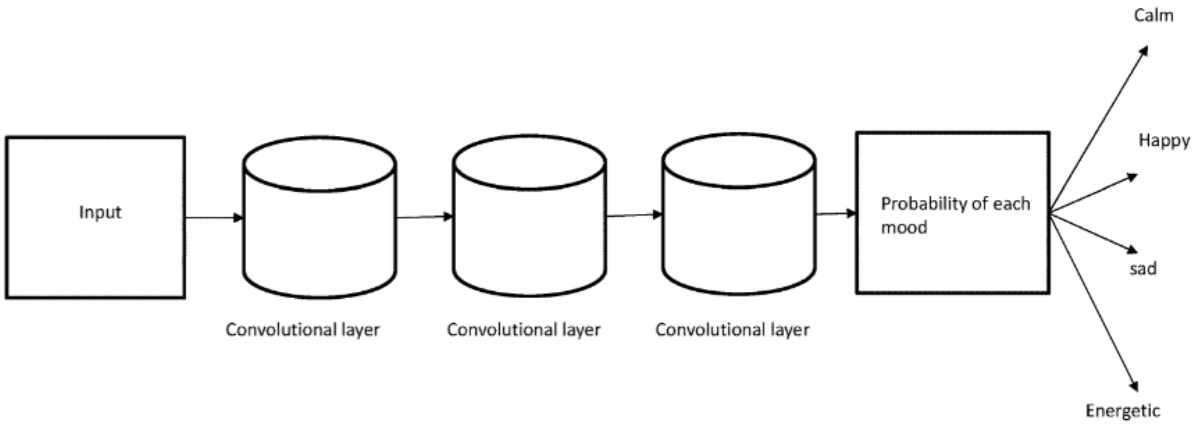
For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086323984/publication/US2023154290A1?q=3D

Reference
Mcnelley, S.; Machtig, J. (May 18, 2023). Communication stage and presentation systems. Recovered May 18, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/086323984/publication/US2023154290A1?q=3D

Information source: (Espacenet Patent Search, 2023)

2.8 Music recommendation system by facial emotion using Deep Learning

The system comprises an input device for collecting sound and sound information or extracting sound information from a music sample; a pre-processor for pre-processing the informational collection to generate an input information test set for a characterization model.



Drawing of three-dimensional nonvolatile memory device of the BiCS type. Credit: Navimipour, N.; Ahmadpour, S.; Bhoi, B.; Pradhan, M.; Senapati, R; Abhilashi, L.; Singh, P.; Singh, R.; Singh, P. & Sarkar, B., Espacenet Patent Search

Wherein the pre-processor utilizes fine-grained division and different techniques to preprocess the example informational collection; a central processor for combining sound feeling data and further developing arrangement speed, such that review makes fine-grained division for genuine music informational collection and results the inclination results by casting a ballot direction, which is configured to promote precision of music feeling grouping; a vocal division device for dividing vocal of the complicated structure of genuine music sound, and voice and foundation sound are incorporated together; and a reviewing device for reviewing the vocal detachment of music and reviewing the grouping impact of vocal and foundation sound individually, which incredibly builds the convergence of sound elements.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086323582/publication/US20231533350A1?q=deep%20learning

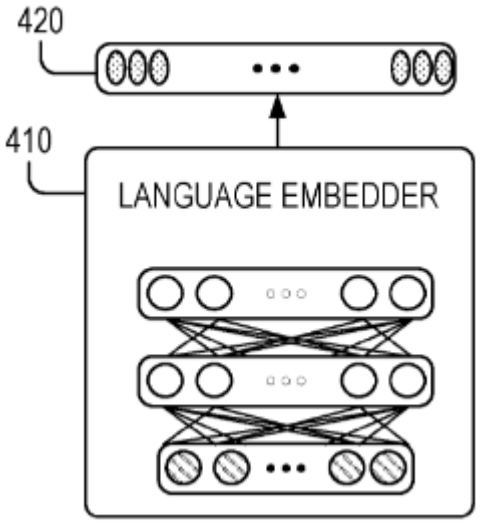
Reference

Navimipour, N.; Ahmadpour, S.; Bhoi, B.; Pradhan, M.; Senapati, R; Abhilashi, L.; Singh, P.; Singh, R.; Singh, P. & Sarkar, B. (May 18, 2023). Music recommendation system by facial emotion using Deep Learning. Recovered May 18, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/086323504/publication/US20231533340A1?q=machine%20learning

Information source: (Espacenet Patent Search, 2023)

2.9 Machine Learning for multi-channel interaction workflows

Interactions between organizations occur through multiple channels such as textual communication (e.g., emails) and voice communication (e.g., telephone conversations). All such interaction data collated together constitutes a large amount of unstructured data.



Block diagram of an example neural network, suitable for generating language embeddings for natural languages.
Credit: K, P.; Ramanathan, S. & Bajaj, P., Espacenet Patent Search

A framework is provided for collating the unstructured interaction data and creating a machine-legible structure from it using machine learning models. The machine learning models may generate a variety of generic as well as business-context-relevant insights, with the usage and application of custom-built machine learning model pipelines that generate an overall business insight record that can then be published back into a customer relationship management (CRM) system. Multiple data types are used for the interactions. For example, a voice call may be recorded and stored as an audio file, whereas an email may be stored as a text file. Multiple such formats may also be used to store interaction data.

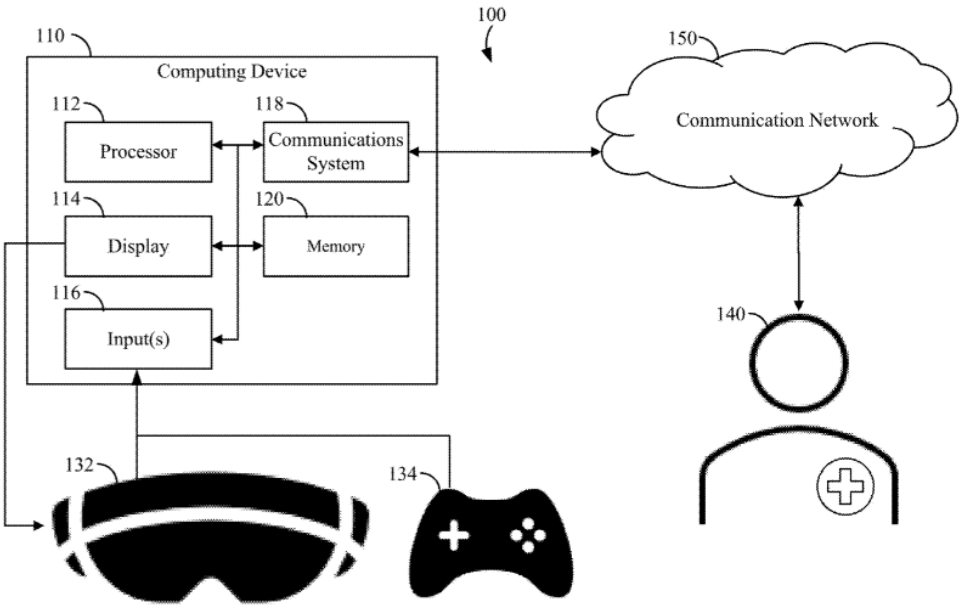
For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086323504/publication/US20231533340A1?q=machine%20learning

Reference
K, P.; Ramanathan, S. & Bajaj, P. (May 18, 2023). Machine Learning for multi-channel interaction workflows. Recovered May 18, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/086323504/publication/US20231533340A1?q=machine%20learning

Information source: (Espacenet Patent Search, 2023)

2.10 Methods and systems for dynamic ocular training using therapeutic games

Methods and systems for dynamically prescribing therapeutic games for treatment of ocular disorder are disclosed.



Block diagram conceptually illustrating a system for therapeutic games according to some embodiments.
Credit: Walker, M.; Fu, M., Espacenet Patent Search

The methods and systems include: performing an eye position calibration technique in a virtual reality environment to calibrate the virtual reality environment to a user; performing an eye movement measurement to produce a diagnosis result; selecting a virtual reality therapeutic game based on the diagnosis result; performing the virtual reality therapeutic game to receive a game user input in the virtual reality therapeutic game; and dynamically adjusting difficulty of the virtual reality therapeutic game based on the game user input. Other aspects, embodiments, and features are also claimed and described.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/086324787/publication/US2023149248A1?q=virtual%20reality

Reference
Walker, M.; Fu, M. (May 18, 2023). Methods and systems for dynamic ocular training using therapeutic games. Recovered May 18, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/086324787/publication/US2023149248A1?q=virtual%20reality

Information source: (Espacenet Patent Search, 2023)