



Weekly Newsletter
TECHNOLOGY
SURVEILLANCE

N° 07-2023

FEBRUARY 17TH, 2023





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

I. NEWS

1.1 Harnessing electronic health record data for earlier autism detection

Signs of autism can hide in plain sight, but a Duke University School of Medicine study shows machine learning may help spot them. An autism screening tool could predict likelihood of autism within one month of birth using routine medical information found in a child's electronic health records (EHRs).

Researchers found nearly half of autistic children could be identified at 30 days by scanning EHRs for specific patterns of health care use, including visits for neurological and gastrointestinal issues and early autism-related conditions such as problems with sleep and vision. An estimated 1 in 44 children have autism spectrum disorder and health care providers often use the Checklist for Autism in Toddlers (M-CHAT) to reach the diagnosis. The EHR-based screening tool was comparable to the M-CHAT (Checklist for Autism in Toddlers) administered for children ages 18 to 24 months, and the tool's accuracy improved further by age 1. The study findings suggest that combining EHR information with caregiver surveys could improve the accuracy of early autism screening, enabling families to gain more timely access to early support and services.

For more information, visit the following link:

<https://medschool.duke.edu/news/harnessing-electronic-health-record-data-earlier-autism-detection>

Reference

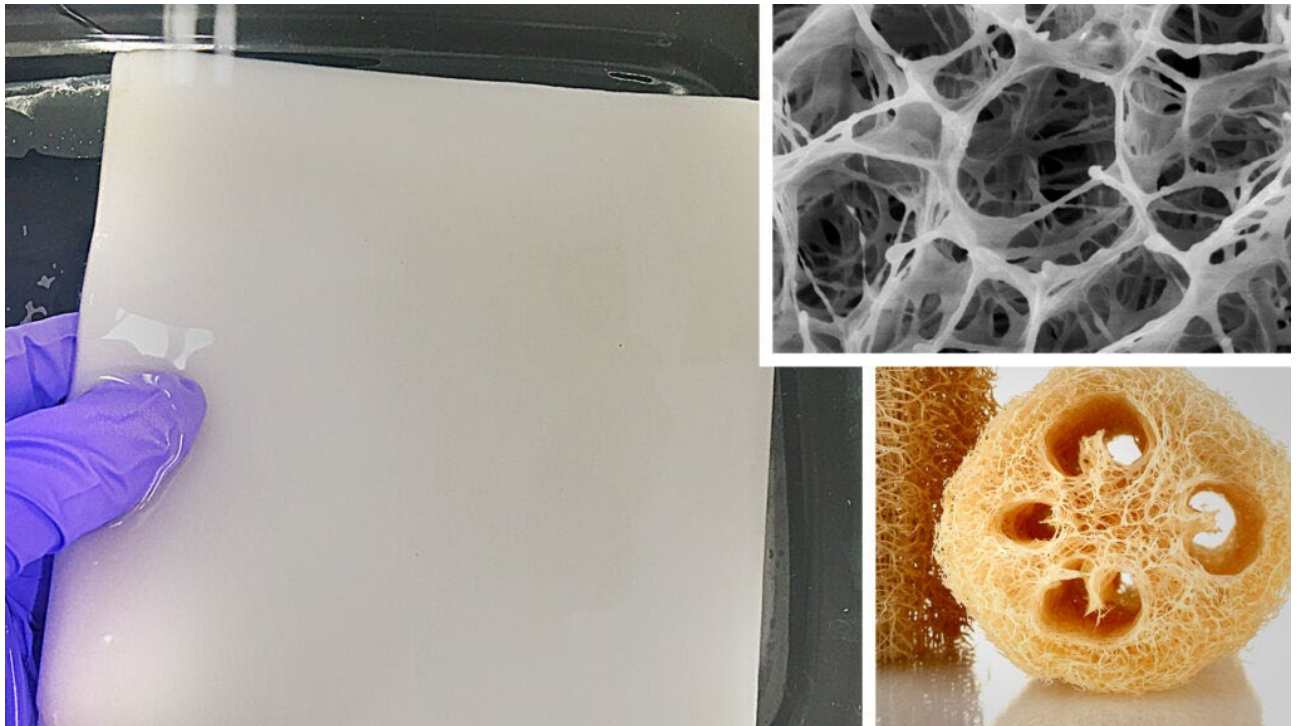
Kirkendoll, S. (February 13, 2023). Harnessing Electronic Health Record Data for Earlier Autism Detection. Recovered February 13, 2023, Duke University School of Medicine: <https://medschool.duke.edu/news/harnessing-electronic-health-record-data-earlier-autism-detection>

Information source: (Duke University School of Medicine, 2023)



1.2 Solar-powered gel filters enough clean water to meet daily needs

Researchers at Princeton University have developed the next generation of their solar absorber gel technology, a device that could be key to unlocking clean water access for people across the globe. The sponge-like gel is low-cost, easy-to-use, and requires only sunlight to filter pollutants such as heavy metals, oils, microplastics, and some bacteria from water, making it an alternative for off-grid water purification.



This hydrogel is comprised of a fibrous structure (top right, magnified) that resembles a loofah (bottom right).

Credit: stock.adobe.com

The device demonstrates an almost fourfold increase in filtration rate over the first-generation technology, which was developed in 2021. A square meter of the one-centimeter-thick material can produce over a gallon of water in as little as 10 minutes and could provide enough clean water to meet daily demand in many parts of the world.

For more information, visit the following link:

<https://engineering.princeton.edu/news/2023/02/08/solar-powered-gel-filters-enough-clean-water-meet-daily-needs>

Reference

Poore, C. (February 08, 2023). Solar-powered gel filters enough clean water to meet daily needs. Recovered February 10, 2023, Princeton University: <https://engineering.princeton.edu/news/2023/02/08/solar-powered-gel-filters-enough-clean-water-meet-daily-needs>



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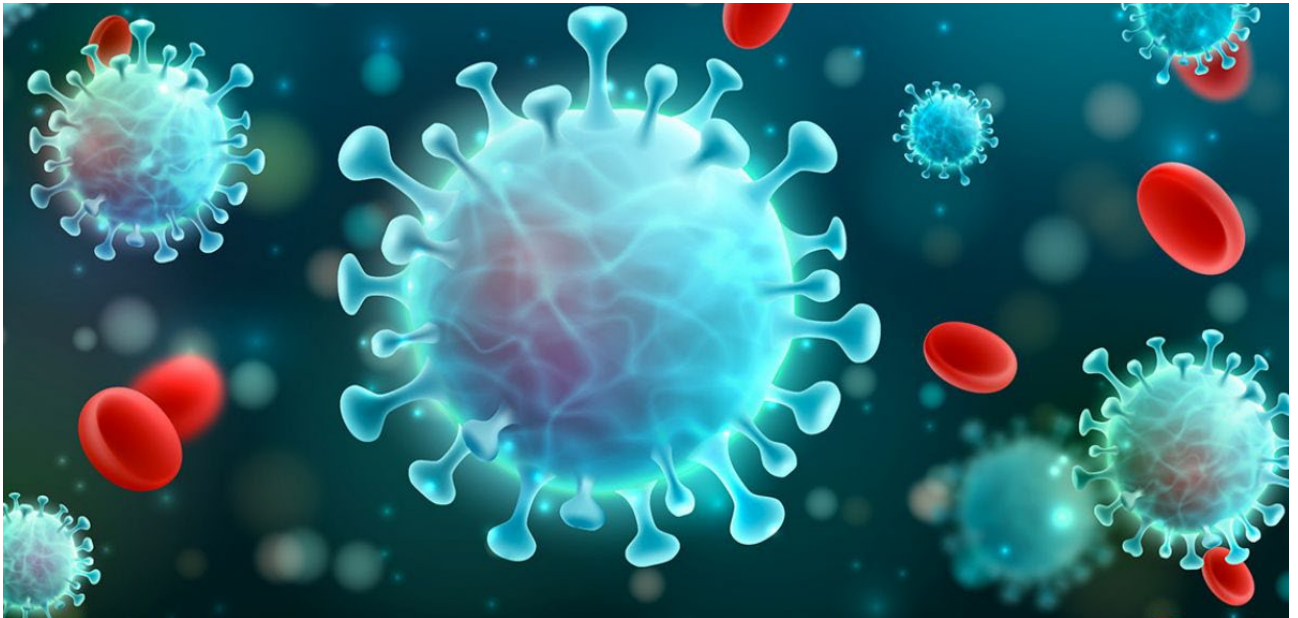


Information source: (Princeton University, 2023)



1.3 Scientists develop test that can identify respiratory viruses within five minutes

Scientists have developed a world-first diagnostic test, powered by artificial intelligence, that can identify known respiratory viruses within five minutes from just one nasal or throat swab. The new diagnostic test could replace current methods that are limited to testing for only one infection, such as a lateral flow test for COVID-19, or otherwise are either lab-based and time-consuming or fast and less accurate.



Credit: University of Oxford

The paper demonstrates how machine learning can significantly improve the efficiency, accuracy and time taken to not only identify different types of viruses, but also differentiate between strains. Preliminary research demonstrated that the test could identify the COVID-19 virus in patient samples and further work determined that the test could be used to diagnose multiple respiratory infections, within five minutes and with over 97% accuracy.

For more information, visit the following link:

<https://www.ox.ac.uk/news/2023-02-09-oxford-scientists-develop-test-can-identify-respiratory-viruses-within-five-minutes>

Reference

University of Oxford. (February 09, 2023). Oxford scientists develop test that can identify respiratory viruses within five minutes. Recovered February 09, 2023, University of Oxford: <https://www.ox.ac.uk/news/2023-02-09-oxford-scientists-develop-test-can-identify-respiratory-viruses-within-five-minutes>

Information source: (University of Oxford, 2023)



1.4 Carbon emissions from fertilisers could be reduced by as much as 80% by 2050

The researchers, from the University of Cambridge, found that two-thirds of emissions from fertilisers take place after they are spread on fields, with one-third of emissions coming from production processes.



*Spraying fertiliser on wheat crop - North Yorkshire – England.
Credit: SteveAllenPhoto via Getty Images*

The researchers mapped the global flows of manure and synthetic fertilisers and their emissions for 2019, along all stages of the lifecycle, by reconciling the production and consumption of nitrogen fertilisers and regional emission factors across nine world regions. After completing their analysis, the researchers found that unlike many other products, the majority of emissions for fertilisers occur not during production, but during their use. The researchers listed and quantified the maximum theoretical impact of different mitigation methods – most of these are already known, but their maximum potential effect had not been quantified.

For more information, visit the following link:

<https://www.cam.ac.uk/research/news/carbon-emissions-from-fertilisers-could-be-reduced-by-as-much-as-80-by-2050>

Reference

Collins, S. (February 09, 2023). Carbon emissions from fertilisers could be reduced by as much as 80% by 2050. Recovered February 09, 2023, University of Cambridge: <https://www.cam.ac.uk/research/news/carbon-emissions-from-fertilisers-could-be-reduced-by-as-much-as-80-by-2050>



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Information source: (University of Cambridge, 2023)



1.5 New Artificial Intelligence tool identifies factors that predict the reproducibility of research

Published in the journal *Proceedings of the National Academy of Sciences (PNAS)*, the study explores the ability of a validated text-based machine learning model to predict the likelihood of successful replication for more than 14,100 psychology research articles published since 2000 across six top-tier journals.

Undertaken in partnership with the University of Notre Dame, France, and Northwestern University, US, the study identifies several factors that increased the likelihood of research replicability – that is, the likelihood that if a study is conducted a second time using the same methods, the results would be the same. The study also shows that an authors' cumulative publication number and citation impact were positively related to replication success. However, other proxies of research quality and rigour, such as an author's university prestige and a paper's citations, were found to be unrelated to replicability. *"Our results could help develop new strategies for testing a scientific literature's overall replicability, self-assessing research prior to journal submission – as well as training peer reviewers."*

For more information, visit the following link:

<https://www.ucl.ac.uk/news/2023/feb/new-ai-tool-identifies-factors-predict-reproducibility-research>

Reference

Lane, C. (February 09, 2023). New AI tool identifies factors that predict the reproducibility of research. Recovered February 09, 2023, University College London: <https://www.ucl.ac.uk/news/2023/feb/new-ai-tool-identifies-factors-predict-reproducibility-research>

Information source: (University College London, 2023)



1.6 Research reveals thermal instability of solar cells but offers a bright path forward

A new type of solar technology has seemed promising in recent years. Halide perovskite solar cells are both high performing and low cost for producing electrical energy – two necessary ingredients for any successful solar technology of the future. But new solar cell materials should also match the stability of silicon-based solar cells, which boast more than 25 years of reliability. Lead halide perovskite solar cells promise superior conversion of sunlight into electrical power. Currently, the most common strategy for coaxing high conversion efficiency out of these cells is to treat their surfaces with large positively charged ions known as cations.

To carry out the experiment, the team created a sample solar device using typical perovskite films. The device features eight independent solar cells, which enables the researchers to experiment and generate data based on each cell's performance. They investigated how the cells would perform, both with and without the cation surface treatment, and studied the cation-modified interfaces of each cell before and after prolonged thermal stress using synchrotron-based X-ray characterization techniques. The researchers learned that the surfaces of metal halide perovskite films treated with organic cations keep evolving in structure and composition under thermal stress. They saw that the resulting atomic-scale changes at the interface can cause a meaningful loss in power conversion efficiency in solar cells. In addition, they found that the speed of these changes depends on the type of cations used, suggesting that stable interfaces might be within reach with adequate engineering of the molecules.

For more information, visit the following link:

<https://research.gatech.edu/research-reveals-thermal-instability-solar-cells-offers-bright-path-forward>

Reference

Barzler, C. (February 09, 2023). Research Reveals Thermal Instability of Solar Cells but Offers a Bright Path Forward. Recovered February 10, 2023, Georgia Institute of Technology: <https://research.gatech.edu/research-reveals-thermal-instability-solar-cells-offers-bright-path-forward>

Information source: (Georgia Institute of Technology, 2023)



1.7 Machine Learning predicts biodiversity and resilience in the coral triangle

In the face of climate change, Annalisa Bracco, professor in the School of Earth and Atmospheric Sciences at Georgia Institute of Technology, and Lyuba Novi, a postdoctoral researcher, offer a new methodology that could revolutionize how conservationists monitor coral. The researchers applied machine learning tools to study how climate impacts connectivity and biodiversity in the Pacific Ocean's Coral Triangle — the most diverse and biologically complex marine ecosystem on the planet.



A school of planktivorous fish sheltering around a coral on a reef in the Solomon Islands in the Coral.

Credit: Mark Hay, Georgia Institute of Technology

“Biologists collect data in situ, which is extremely important,” Bracco said. “But it’s not possible to monitor enormous regions in situ for many years — that would require a constant presence of scuba divers. So, figuring out how different ocean regions and large marine ecosystems are connected over time, especially in terms of foundational species like coral, becomes important.”

For more information, visit the following link:

<https://research.gatech.edu/machine-learning-predicts-biodiversity-and-resilience-coral-triangle>

Reference

Barzler, C. (February 09, 2023). Machine Learning Predicts Biodiversity and Resilience in the Coral Triangle. Recovered February 10, 2023, Georgia Institute of Technology:



<https://research.gatech.edu/machine-learning-predicts-biodiversity-and-resilience-coral-triangle>

Information source: (Georgia Institute of Technology, 2023)



1.8 Tracking ocean microplastics from space

New information about an emerging technique that could track microplastics from space has been uncovered by researchers at the University of Michigan (U-M). It turns out that satellites are best at spotting soapy or oily residue, and microplastics appear to tag along with that residue. Microplastics—*tiny flecks that can ride ocean currents hundreds or thousands of miles from their point of entry*—can harm sea life and marine ecosystems, and they're extremely difficult to track and clean up. However, a 2021 discovery raised the hope that satellites could offer day-by-day timelines of where microplastics enter the water, how they move and where they tend to collect, for prevention and clean-up efforts.



Microplastic pellets float on the surface of water in the wind wave tank at the U-M Marine Hydrodynamics Laboratory as part of a study to determine how they affect measurements of surface roughness.

Credit: Robert Coelius, Michigan Engineering

Yulin Pan, U-M naval architecture and marine engineering assistant professor and corresponding author on the paper, says that this initial discovery will drive further research into how surfactants and microplastics interact in the ocean. “*We can see the relationship between surface roughness and the presence of microplastics and surfactants,*” Pan said. “*The goal now is to understand the precise relationship between the three variables.*”

For more information, visit the following link:

<https://news.umich.edu/tracking-ocean-microplastics-from-space/>

Reference

Cherry, G. (February 09, 2023). Tracking ocean microplastics from space. Recovered February 13, 2023, University of Michigan: <https://news.umich.edu/tracking-ocean-microplastics-from-space/>



Information source: (University of Michigan, 2023)



1.9 Scholars put their heads together to decode the neuroscience behind ChatGPT

ChatGPT, a new technology developed by OpenAI, is so uncannily adept at mimicking human communication that it will soon take over the world — and all the jobs in it. Or at least that's what the headlines would lead the world to believe. But if ChatGPT sounds like a human, does that mean it learns like one, too? And just how similar is the computer brain to a human brain?



Credit: Corrie Pikul, Brown University

Pavlick and Serre offered complementary explanations of how ChatGPT functions relative to human brains, and what that reveals about what the technology can and can't do. For all the chatter around the new technology, the model isn't that complicated and it isn't even new, Pavlick said. At its most basic level, she explained, ChatGPT is a machine learning model designed to predict the next word in a sentence, and the next word, and so on. This type of predictive-learning model has been around for decades, said Pavlick, who specializes in natural language processing. Computer scientists have long tried to build models that exhibit this behavior and can talk with humans in natural language. To do so, a model needs access to a database of traditional computing components that allow it to “reason” overly complex ideas.

For more information, visit the following link:

<https://www.brown.edu/news/2023-02-09/neuroscience-chatbot>

Reference



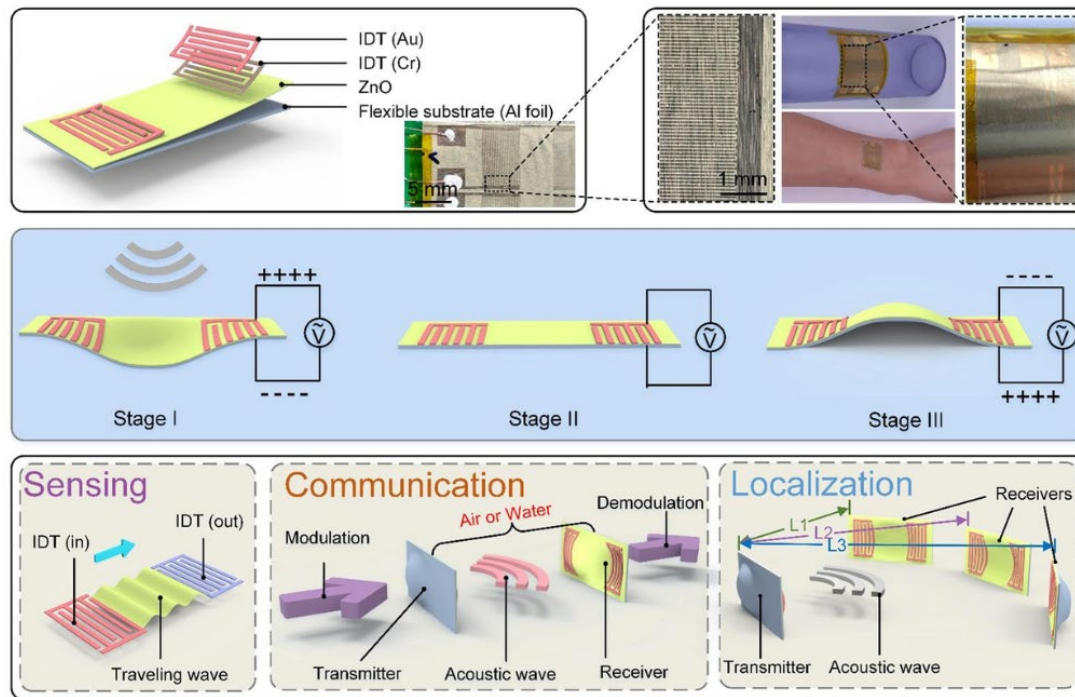
Pikul, C. (February 09, 2023). Brown scholars put their heads together to decode the neuroscience behind ChatGPT. Recovered February 13, 2023, Brown University: <https://www.brown.edu/news/2023-02-09/neuroscience-chatbot>

Information source: (Brown University, 2023)



1.10 Sensors built into wearable patches could signal the future

New research involving a Northumbria University Professor has developed a wearable sensor capable of wirelessly transmitting information via acoustic waves through air and water.



A graphic showing the principles of sensing and communication, acoustic ranging (identifying the distance), and positioning (finding locations) using the flexible acoustic wave device.

Credit: Northumbria University Newcastle

To find a solution, research teams led by Professor Fu and Professor Xie have worked together to identify surface materials which are flexible enough to withstand tiny vibrations capable of transmitting and receiving information, in order to develop their device as a wearable patch. They believe the design is multifunctional and could be used, for example, to wirelessly transmit information on a patient's heart rate during hospital treatment. The sensors have also proven effective in tests through water and could have practical applications including diagnosing the location of a maintenance issue, such as a blockage, from within a metal water pipe.

For more information, visit the following link:

<https://newsroom.northumbria.ac.uk/pressreleases/sensors-built-into-wearable-patches-could-signal-the-future-3232880>

Reference

Fu, R. (February 09, 2023). Sensors built into wearable patches could signal the future. Recovered February 14, 2023, Northumbria University:



<https://newsroom.northumbria.ac.uk/pressreleases/sensors-built-into-wearable-patches-could-signal-the-future-3232880>

Information source: (Northumbria University, 2023)



1.11 Helping companies deploy Artificial Intelligence models more responsibly

Companies today are incorporating artificial intelligence into every corner of their business. The trend is expected to continue until machine-learning models are incorporated into most of the products and services we interact with every day. Verta's platform helps companies deploy, monitor, and manage machine-learning models safely and at scale. Data scientists and engineers can use Verta's tools to track different versions of models, audit them for bias, test them before deployment, and monitor their performance in the real world.



The MIT spinout Verta helps companies create, deploy, and manage machine learning models safely, quickly, and at scale.

Credit: Courtesy of Verta, Massachusetts Institute of Technology

Also, Verta's platform helps companies deploy models more quickly, ensure they continue working as intended over time, and manage the models for compliance and governance. Data scientists can use Verta to track different versions of models and understand how they were built, answering questions like how data were used and which explainability or bias checks were run. They can also vet them by running them through deployment checklists and security scans.

For more information, visit the following link:

<https://news.mit.edu/2023/verta-helping-companies-deploy-ai-models-0210>

Reference



Winn, Z. (February 10, 2023). Helping companies deploy AI models more responsibly. Recovered February 10, 2023, Massachusetts Institute of Technology: <https://news.mit.edu/2023/verta-helping-companies-deploy-ai-models-0210>

Information source: (Massachusetts Institute of Technology, 2023)



1.12 Researcher engineers Artificial Intelligence- optimized, bioinspired materials

The CITRIS principal investigator and assistant professor of mechanical engineering takes inspiration from nature and uses machine learning to create more efficient materials. Gu's research in bioinspired materials began in graduate school at the Massachusetts Institute of Technology (MIT). *"Natural materials are really interesting because through billions of years of evolution, they become optimized for their environment and their needs,"* she said Gu. The team aims to reduce air drag on, and thus the fuel needs of, commercial airplanes by replicating the aerodynamic nature of mako shark skin. Though it may look smooth, shark skin is covered in microscopic scales shaped like teeth, called dermal denticles. These denticles cut through the water, helping the sharks swim faster.

Gu and her research team *"translate"* material structures into the binary code that computers can understand and then put them through an optimization algorithm to determine the best structure for given usage requirements, such as lower air drag or higher heat resistance, as well as manufacturing constraints, such as 3D-printer resolution. This machine learning technology is similar to how Artificial Intelligence can be trained to decipher whether an image shows a cat or a dog by detecting patterns in color and texture, except that it is now designing three-dimensional models by recognizing structural features.

For more information, visit the following link:

<https://citrisc.org/evolution-on-fast-forward-grace-gu-engineers-ai-optimized-bioinspired-materials/>

Reference

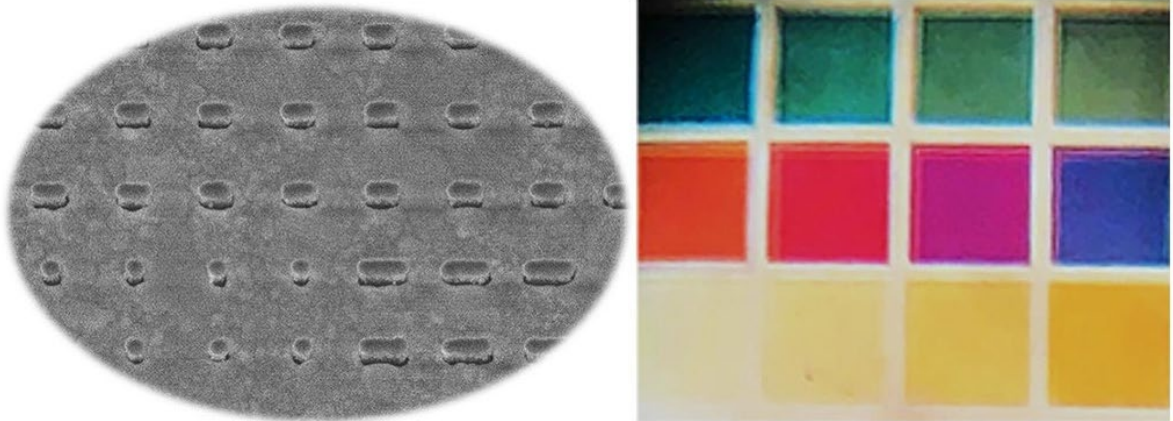
Vo, K. (February 10, 2023). Evolution on fast forward: Grace Gu engineers AI-optimized, bioinspired materials. Recovered February 13, 2023, CITRIS and the Banatao Institute: <https://citrisc.org/evolution-on-fast-forward-grace-gu-engineers-ai-optimized-bioinspired-materials/>

Information source: (CITRIS and the Banatao Institute, 2023)



1.13 Chromo-encryption method encodes secrets with color

In a new approach to security that unites technology and art, EPFL researchers have combined silver nanostructures with polarized light to yield a range of brilliant colors, which can be used to encode messages.



Credit: Celia Luterbacher, École Polytechnique Fédérale de Lausanne

Olivier Martin, head of the Nanophotonics and Metrology Lab EPFL's School of Engineering, in collaboration with the Center of MicroNanoTechnology They found that when polarized light was shone through the nanostructures from certain directions, a range of vivid and easily-identifiable colors was reflected back. These different colors could be assigned numbers, which could then be used to represent letters using the electronic communication standard code ASCII (American Standard Code for Information Interchange). To encode a secret message, the researchers applied a quaternary code using the digits 0, 1, 2 and 3 (as opposed to the more commonly used binary code 0 and 1). The result was a series of four-digit strings composed of different color combinations that could be used to spell out a message, and the method of chromo-encryption was born.

For more information, visit the following link:

<https://news.epfl.ch/news/chromo-encryption-method-encodes-secrets-with-colo/>

Reference

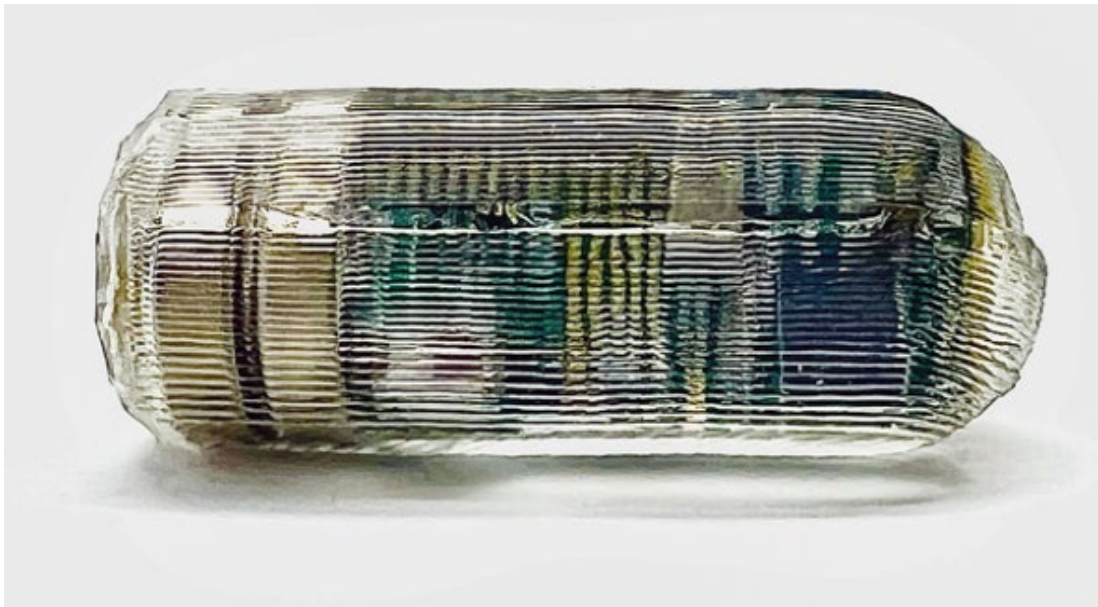
Luterbacher, C. (February 13, 2023). Chromo-encryption method encodes secrets with color. Recovered February 13, 2023, Ecole Polytechnique Fédérale de Lausanne: <https://news.epfl.ch/news/chromo-encryption-method-encodes-secrets-with-colo/>

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



1.14 Ingestible sensor could help doctors pinpoint GI difficulties

Engineers at MIT and Caltech have demonstrated an ingestible sensor whose location can be monitored as it moves through the digestive tract, an advance that could help doctors more easily diagnose gastrointestinal motility disorders such as constipation, gastroesophageal reflux disease, and gastroparesis. The tiny sensor works by detecting a magnetic field produced by an electromagnetic coil located outside the body. The strength of the field varies with distance from the coil, so the sensor's position can be calculated based on its measurement of the magnetic field.



MIT engineers have shown that they can use magnetic fields to track the location of this ingestible sensor within the GI tract.

Credit: Courtesy of the researchers, Massachusetts Institute of Technology

In the new study, the researchers showed that they could use this technology to track the sensor as it moved through the digestive tract of large animals. Such a device could offer an alternative to more invasive procedures, such as endoscopy, that are currently used to diagnose motility disorders. *“Many people around the world suffer from GI dysmotility or poor motility, and having the ability to monitor GI motility without having to go into a hospital is important to really understand what is happening to a patient,”* says Giovanni Traverso, an associate professor of mechanical engineering at MIT and a gastroenterologist at Brigham and Women’s Hospital.

For more information, visit the following link:

<https://news.mit.edu/2023/ingestible-sensor-could-help-doctors-pinpoint-gi-difficulties-0213>

Reference

Trafton, A. (February 13, 2023). Ingestible sensor could help doctors pinpoint GI difficulties. Recovered February 13, 2023, Massachusetts Institute of Technology:



<https://news.mit.edu/2023/ingestible-sensor-could-help-doctors-pinpoint-gi-difficulties-0213>

Information source: (Massachusetts Institute of Technology, 2023)



1.15 Deep Multi-magnification similarity learning helps histopathological diagnosis

Magnification-based learning networks, which usually combine information at different magnifications, have attracted considerable attention for their ability to improve performance in histopathological classification. A research team led by Dr. QIN Wenjian from the Shenzhen Institute of Advanced Technology (SIAT) of the Chinese Academy of Sciences, together with Prof. LUO Weiren's team from Shenzhen Third People's Hospital and Prof. Nazar Mustafa Zaki's team from United Arab Emirates University, proposed a novel deep multi-magnification similarity learning (DSML) approach to improve performance in histopathological classification.

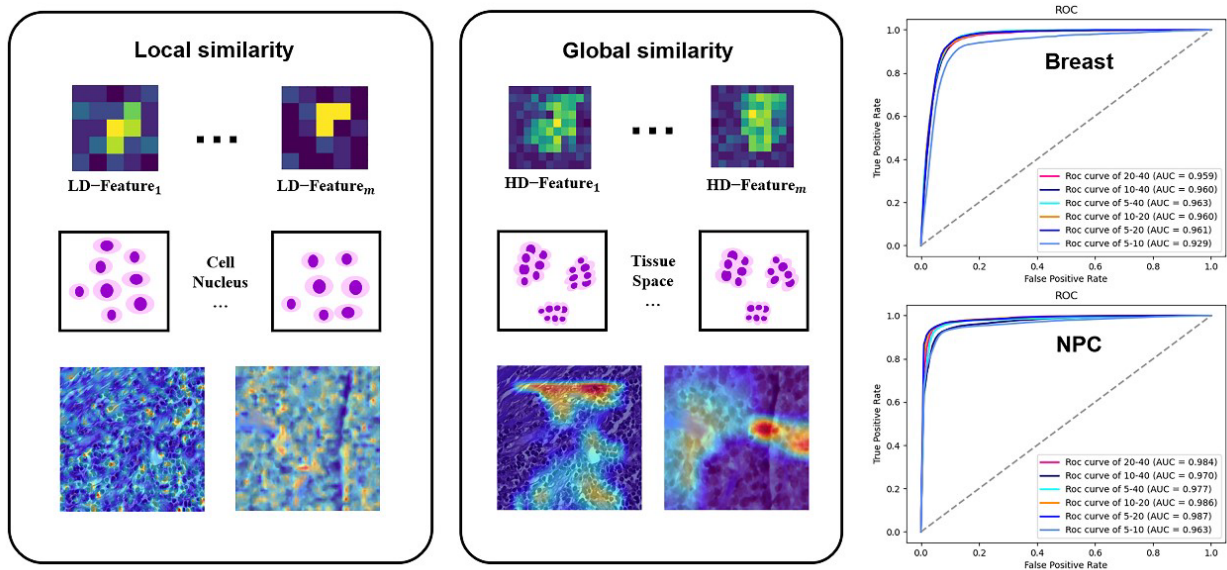


Illustration of features learning and results of multi-magnification pathological image computing method proposed by the research team.

Credit: QIN Wenjian, Chinese Academy of Sciences

The researchers designed different network backbones and magnification combinations to verify the effectiveness of DMSL on a clinical nasopharyngeal carcinoma and a public breast cancer BCSS2021 dataset. They also investigated its ability to interpret. The results showed that it performed better in classification with a higher value of area under curve, accuracy, and F-score than other comparable methods.

For more information, visit the following link:

https://english.cas.cn/newsroom/research_news/infotech/202302/t20230210_326982.shtml

Reference

Xiaomin, Z. (February 10, 2023). Deep Multi-magnification Similarity Learning Helps Histopathological Diagnosis. Recovered February 14, 2023, Chinese Academy of Sciences:



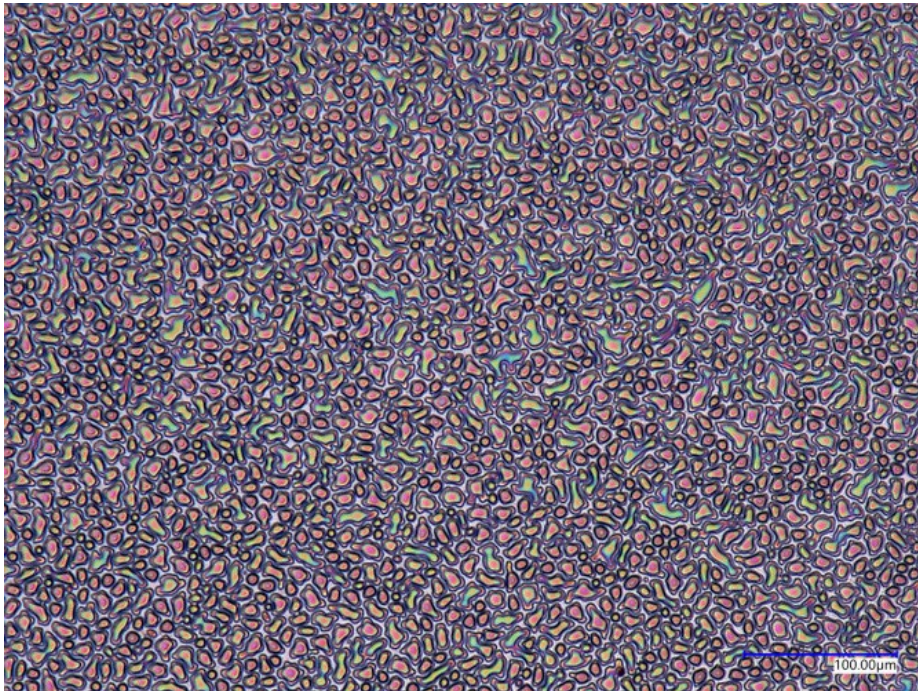
https://english.cas.cn/newsroom/research_news/infotech/202302/t20230210_326982.shtml

Information source: (Chinese Academy Of Sciences, 2023)



1.16 “Magic” solvent creates stronger thin films

Chemical vapor deposition (CVD) is a common process used to make defect-free inorganic nanolayer materials in semiconductor manufacturing and in the production of computer microchips. Because the process requires materials to be heated at 1,000s of degrees, organic polymers do not fare well. Yang’s lab studies how vapor-deposited polymers interact with bacterial pathogens and how bacteria, in turn, colonize polymeric coatings, from the paint used in ship hulls to the coating for biomedical devices. Researchers sought to develop a different approach to diversify CVD polymers by borrowing a concept from conventional solutions synthesis: the use of a “magic” solvent, i.e., an inert vapor molecule, that isn’t incorporated into the final material, but instead interacts with a precursor in a way that produces new material properties at room temperature.



This micrograph image shows an initiated chemical vapor deposition coating made by doctoral student Pengyu Chen.

Credit: Jose-Luis Olivares, Massachusetts Institute of Technology

The researchers brought the resulting thin film to Baker’s lab, which used nanoindentation testing to study it and found that the solvation mechanism had strengthened the material. The solvent also caused the polymer coating to grow faster and change its morphology.

For more information, visit the following link:

<https://news.cornell.edu/stories/2023/02/magic-solvent-creates-stronger-thin-films>

Reference



Nutt, D. (February 13, 2023). 'Magic' solvent creates stronger thin films. Recovered February 13, 2023, de Cornell University: <https://news.cornell.edu/stories/2023/02/magic-solvent-creates-stronger-thin-films>

Information source: (Cornell University, 2023)



1.17 Mechanical engineering meets electromagnetics to enable future technology

Researchers create compliant mechanism-enabled, reconfigurable antenna. Electrical engineers in the Penn State College of Engineering combined electromagnetics with a compliant mechanism, which is the same mechanical engineering concept behind binder clips or a bow and arrow.



*Researchers illustrated and designed a circular, iris-shaped patch antenna prototype using commercial electromagnetic simulation software.
Credit: Jeff Xu, Pennsylvania State University*

The compliant mechanism-enabled designs supersede existing origami design technologies, named after the Japanese art of paper folding, which are reconfigurable but do not have the same advantages in robustness, long term reliability and high-power handling capability. The team illustrated and designed a circular, iris-shaped patch antenna prototype using commercial electromagnetic simulation software. They then 3D printed it and tested it for fatigue failures as well as frequency and radiation pattern fidelity in Penn State's anechoic chamber, a room insulated with electromagnetic wave-absorbing material that prevents signals from interfering with antenna testing.

For more information, visit the following link:

<https://www.psu.edu/news/engineering/story/mechanical-engineering-meets-electromagnetics-enable-future-technology/>

Reference

Lucas, M. R. (February 13, 2023). Mechanical engineering meets electromagnetics to enable future technology. Recovered February 14, 2023, The Pennsylvania State



University: <https://www.psu.edu/news/engineering/story/mechanical-engineering-meets-electromagnetics-enable-future-technology/>

Information source: (Pennsylvania State University, 2023)



1.18 Artificial Intelligence offers insight into conversations using physiology alone.

Could an app let you know if a first date is just not that into you? Engineers at the University of Cincinnati say the technology might not be far off. They trained a computer — using data from wearable technology that measures respiration, heart rates and perspiration — to identify the type of conversation two people were having based on their physiological responses alone. Researchers studied a phenomenon in which people’s heart rates, respiration and other autonomic nervous system responses become synchronized when they talk or collaborate. Known as physiological synchrony, this effect is stronger when two people engage deeply in a conversation or cooperate closely on a task. *“Physiological synchrony shows up even when people are talking over Zoom,”* said study co-author Vesna Novak, an associate professor of electrical engineering in UC’s College of Engineering and Applied Science.



University of Cincinnati engineering students demonstrate how they taught a computer to distinguish types of conversations based only on physiological.
Credit: Andrew Higley, University of Cincinnati

Studies have shown that physiological synchrony can predict how well two people will work together to accomplish a task. The degree of synchrony also correlates with how much empathy a patient perceives in a therapist or the level of engagement students feel with their teachers.

For more information, visit the following link:

<https://www.uc.edu/news/articles/2023/02/this-computer-can-tell-if-you-should-smash-or-pass.html>

Reference



Miller, M. (February 13, 2023). AI developed by UC engineers offers insight into conversations using physiology alone. Recovered February 14, 2023, University of Cincinnati: <https://www.uc.edu/news/articles/2023/02/this-computer-can-tell-if-you-should-smash-or-pass.html>

Information source: (University of Cincinnati, 2023)



1.19 Artificial Intelligence tool guides users away from vitriol

To help identify when tense online debates are inching toward irredeemable meltdown, Cornell researchers have developed an artificial intelligence tool that can track these conversations in real-time, detect when tensions are escalating and nudge users away from using incendiary language. Detailed in two recently published papers that examine Artificial Intelligence effectiveness in moderating online discussions, the research shows promising signs that conversational forecasting methods within the field of natural language processing could prove useful in helping both moderators and users proactively lessen vitriol and maintain healthy, productive debate forums.

The tool, named ConvoWizard, is a browser extension powered by a deep neural network. That network was trained on mountains of language-based data pulled from the subreddit Change My View, a forum that prioritizes good faith debates on potentially heated subjects related to politics, economics and culture. When participating Change My View users enable ConvoWizard, the tool can inform them when their conversation is starting to get tense. It can also inform users, in real-time as they are writing their replies, whether their comment is likely to escalate tension. The study suggests that Artificial Intelligence - powered feedback can be effective in guiding the user toward language that elevates constructive debate, researchers said.

For more information, visit the following link:

<https://news.cornell.edu/stories/2023/02/regret-being-hostile-online-ai-tool-guides-users-away-vitriol>

Reference

DiPietro, L. (February 14, 2023). Regret being hostile online? AI tool guides users away from vitriol. Recovered February 14, 2023, Cornell University: <https://news.cornell.edu/stories/2023/02/regret-being-hostile-online-ai-tool-guides-users-away-vitriol>

Information source: (Cornell University, 2023)



1.20 Smart necklace to help you stop smoking

A necklace that could help you stop smoking is now on the horizon. Northwestern Medicine researchers have developed a smart neck-worn device resembling a lapis blue pendant that detects a user's smoking much more reliably than previous systems. It does so by capturing heat signatures from thermal sensors.

The necklace, called SmokeMon, completely maintains a smoker's privacy, only tracking heat, not visuals — which is a critical factor for people to feel comfortable wearing it. *"Now we can begin to test the effectiveness of this device in improving the success rate of smoking cessation programs by preventing relapse in smokers who are planning to quit,"* Alshurafa said. *"We will be able to test whether real-time feedback and interventions can be more effective than usual care."* Existing devices that track smoking topography must be attached to the cigarette, which changes how a person smokes and makes the data less reliable. Some researchers have investigated non-obtrusive ways to measure smoking behavior, including the use of wrist-worn inertial measurement unit sensors in smartwatches. However, such approaches are often confounded by non-smoking hand-to-mouth gestures and consequently, generate many false positives. Another option, wearable video cameras, creates privacy and stigma concerns, limiting the applicability of camera-based approaches in natural settings.

For more information, visit the following link:

<https://news.northwestern.edu/stories/2023/02/smart-necklace-to-help-you-stop-smoking/?fj=1>

Reference

Paul, M. (February 14, 2023). Smart necklace to help you stop smoking. Recovered February 14, 2023, Northwestern University: <https://news.northwestern.edu/stories/2023/02/smart-necklace-to-help-you-stop-smoking/?fj=1>

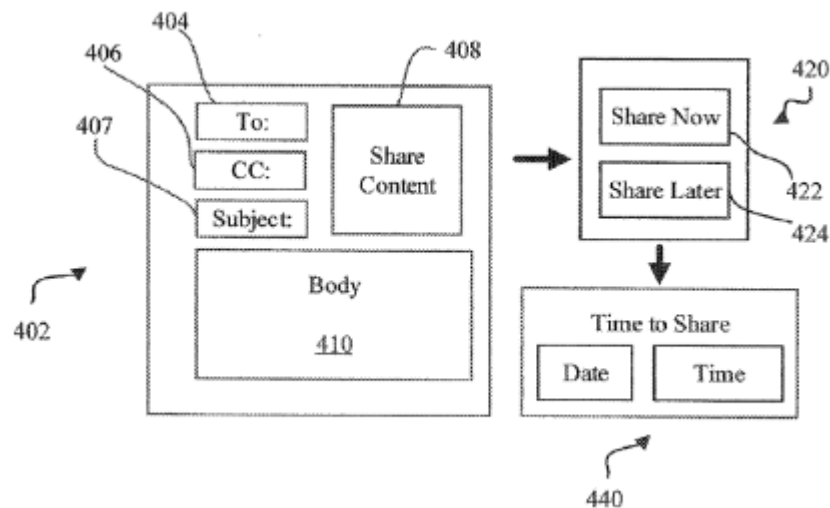
Information source: (Northwestern University, 2023)



II. PATENTS

2.1. Social media content scheduling using Artificial Intelligence

An electronic communications method for social media content scheduling using artificial intelligence includes generating social media content for posting to a social media application, receiving, from the artificial intelligence, an input for posting the social media content at a later time, and instructing the social media content to be posted at the later time.



Is schematic diagram of user interfaces of an electronic communication application having flexible sharing options.

Credit: Nicholas Kim Beaulieu, WIPO IP Portal

Disclosed herein are electronic devices and processes for enabling flexible sharing of electronic communications. Electronic devices and processes commonly do not provide options for when generated content is shared. For instance, in other approaches, an e-mail is written and is immediately sent by selecting a send button.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US391542340&_cid=P21-LE61P0-21386-1

Reference

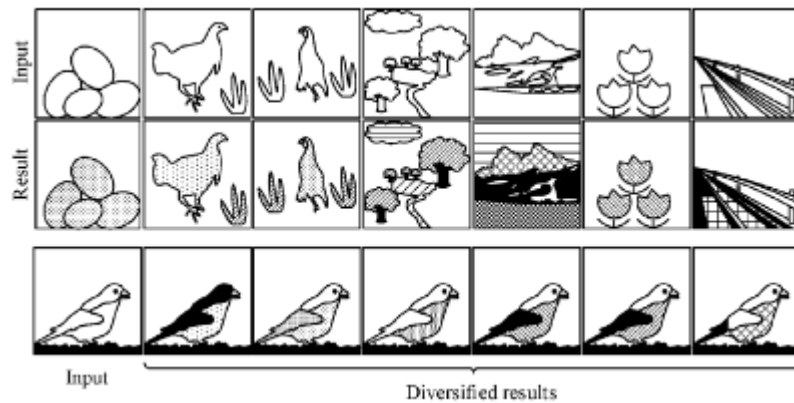
Beaulieu, N. K. (February 09, 2023). Social media content scheduling using Artificial Intelligence. Recovered February 09, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=US391542340&_cid=P21-LE61P0-21386-1

Information source: (WIPO IP Portal, 2023)



2.2. Image coloring method and apparatus based on Artificial Intelligence

The present disclosure relates to image processing technologies, and more particularly, to an image coloring method and apparatus based on artificial intelligence, electronic device, computer readable storage medium and computer program product.



*Is a schematic diagram of an architecture of a coloring system 10 based on artificial intelligence according to an embodiment of the present disclosure
Credit: Wu, Y., Li, Y., Wang, X., Zhang, H., Zhao, X., & Shan, Y., WIPO IP Portal*

An image coloring method includes: acquiring first color a priori information about an image-to-be-colored; transforming the first color a priori information to obtain second color a priori information aligned with the image-to-be-colored; down sampling the image-to-be-colored to obtain a first image feature; performing modulation coloring processing on the first image feature based on the second color a priori information to obtain a second image feature; and up sampling the second image feature based on the second color a priori information to obtain a first colored image, where the first colored image is aligned with the image-to-be-colored.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US391537684&_cid=P21-LE61P0-21386-1

Reference

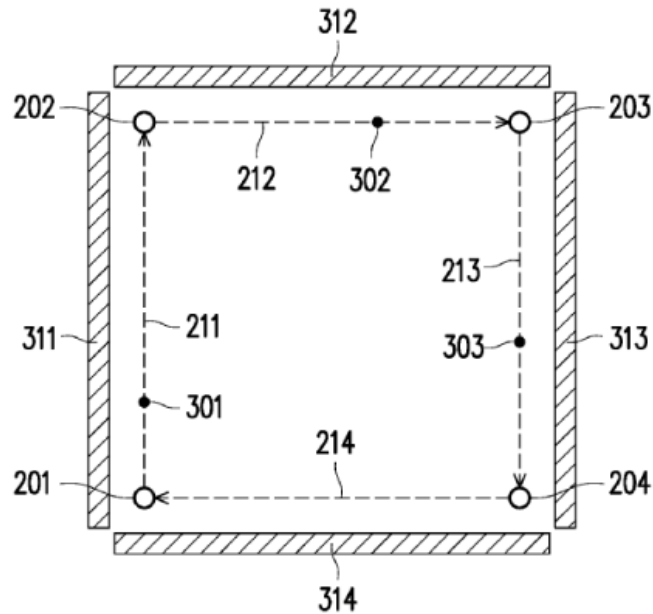
Wu, Y., Li, Y., Wang, X., Zhang, H., Zhao, X., & Shan, Y. (February 09, 2023). Image coloring method and apparatus based on Artificial Intelligence, electronic device, and computer readable storage medium. Recovered February 09, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=US391537684&_cid=P21-LE61P0-21386-1

Information source: (WIPO IP Portal, 2023)



2.3. Map establishment method and map establishment system

The disclosure relates to a virtual map establishment technique, and in particular relates to a map establishment method and a map establishment system.



Is a schematic diagram of a map establishment system obtaining information of obstacles located at target.

Credit: Jun-Ying Li, Espacenet Patent Search

The map establishment method includes: detecting a physical motion performed by a user and generating motion sensing data by at least one motion sensor; obtaining spatial dimension information, in multiple directions, of a target place where the user is located and information of an obstacle in the target place by a deep learning model according to the motion sensing data; and generating map data according to the spatial dimension information and the information of the obstacle, wherein the map data reflects a contour of the target place where the user is located and a distribution status of at least one obstacle in the target place.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US391535509&_cid=P21-LE61RP-22101-1

Reference

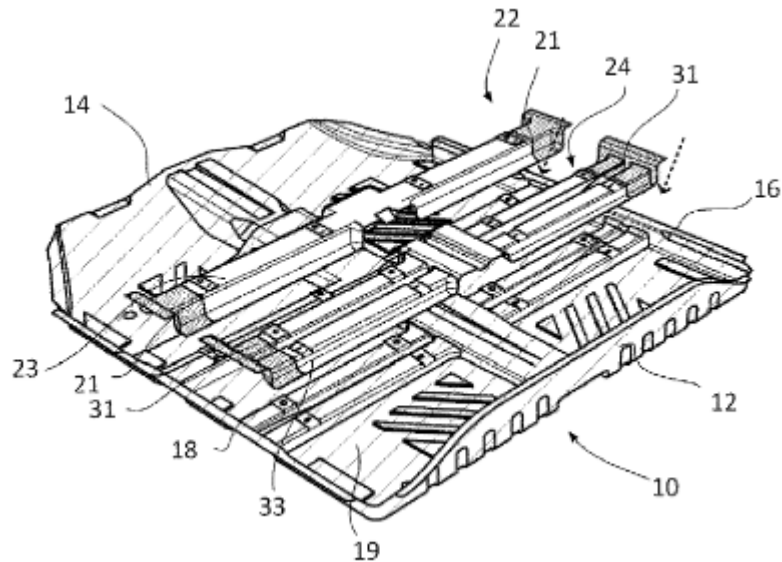
Li, J.-Y. (February 09, 2023). MAP ESTABLISHMENT METHOD AND MAP ESTABLISHMENT SYSTEM. Recovered February 09, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=US391535509&_cid=P21-LE61RP-22101-1

Information source: (WIPO IP Portal, 2023)



2.4. Methods for forming a floor panel for a vehicle

The present disclosure relates to methods for forming a floor panel for a vehicle framework, comprising: providing a main blank made of a press-hardenable steel, providing one or more first patch blanks and welding the first patch blanks to the main blank to form a patchwork blank.



Schematically illustrates a perspective view of an example of a vehicle floor panel according to the present disclosure.

Credit: Marquez, S., Agirre, A., Barelli, V., Giraud, Q., Lopategi, U., & Lopera, V., WIPO IP Portal

The methods further comprise pressing the patchwork blank to form the floor panel, wherein the first patch blanks are arranged along a part of the main blank to form a first seat cross member, and wherein left and right portions of the first patch blanks in an area of the main blank to form an area of the floor panel to be attached to a rocker are made of a steel that is more ductile than the steel of the main blank, wherein a central portion of the first patch blanks between the left and right portions is made of a press-hardenable steel. The present disclosure further relates to floor panels for vehicle frameworks made from a single integral piece.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023012056&_cid=P21-LDZ33A-40354-1

Reference

Marquez Duran, S., Agirre Mentxaka, A., Barelli, V., Giraud Poyet, Q., Lopategi Sanz, U., & Lopera Cano, V. (February 09, 2023). Floor panels for a vehicle and methods. Recovered February 09, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023012056&_cid=P21-LDZ33A-40354-1



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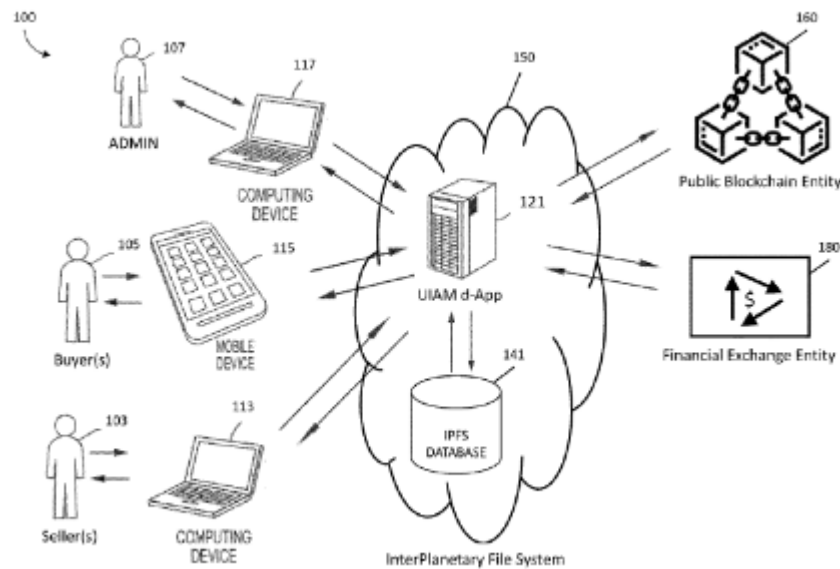


Information source: (WIPO IP Portal, 2023)



2.5. Software, methods, and systems for Blockchain-recorded transactions of real-world assets

A method of offering Unique Identity Asset Marker (UIAM)-linked assets for sale is provided.



High-level diagram illustrating exemplary UIAM systems in accordance with exemplary embodiments.

Credit: Marks, J., WIPO IP Portal

The method may include receiving, from a verified seller, a request to mint a Parent UIAM token and at least one Child UIAM token; a total number of UIAM-linked assets for sale and financial terms for such sales; a public-facing description of the at UIAM-linked assets for sale; and proprietary data pertaining to the UIAM-linked assets for sale. The method may further include compiling a Parent UIAM, minting a Parent UIAM token, minting one Child UIAM token for each of the UIAM-linked assets for sale, and assigning ownership of the tokens to the verified seller. The method may further include loading the proprietary data into a database, recording a permission structure for accessing the proprietary data in the blockchain, configuring the public-facing description for public viewing, and offering each Child UIAM token and its associated UIAM-linked asset for sale.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US391539276&_cid=P21-LE62VA-33099-1

Reference

Caleb, J. (February 09, 2023). Apparatus and methods for proactive communication. Software, methods, and systems for blockchain-recorded transactions of real-world assets. Recovered February 09, 2023, WIPO IP Portal: <https://worldwide.espacenet.com/patent/search/family/085152606/publication/US2023>



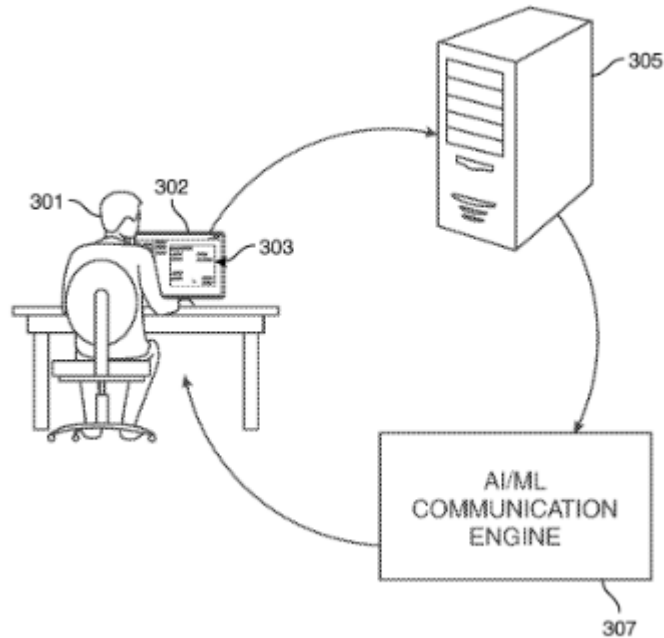
040231A1?q=artificial%20intelligence

Information source: (WIPO IP Portal, 2023)



2.6. Apparatus and methods for proactive communication

Apparatus and methods for proactively and preemptively communicating with a user interacting with a software application are provided.



*Shows an illustrative diagram in accordance with principles of the disclosure.
Credit: Burgess, P., Marcus, D., Gillis, T., Farris, T., & Wanpen N., Espacenet Patent Search*

The apparatus and methods may include an artificial intelligence/machine learning communication engine monitoring and tracking a user's interactions. The apparatus and methods may include the communication engine determining if the user requires further training, if the interaction is fraudulent, and pre-empting requests for information the user may commence. The apparatus and methods may include the communication engine creating and displaying training materials for the user to complete, revoking access if fraud is present, and proactively providing information before the user requests the information.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/085152606/publication/US2023040231A1?q=artificial%20intelligence>

Reference

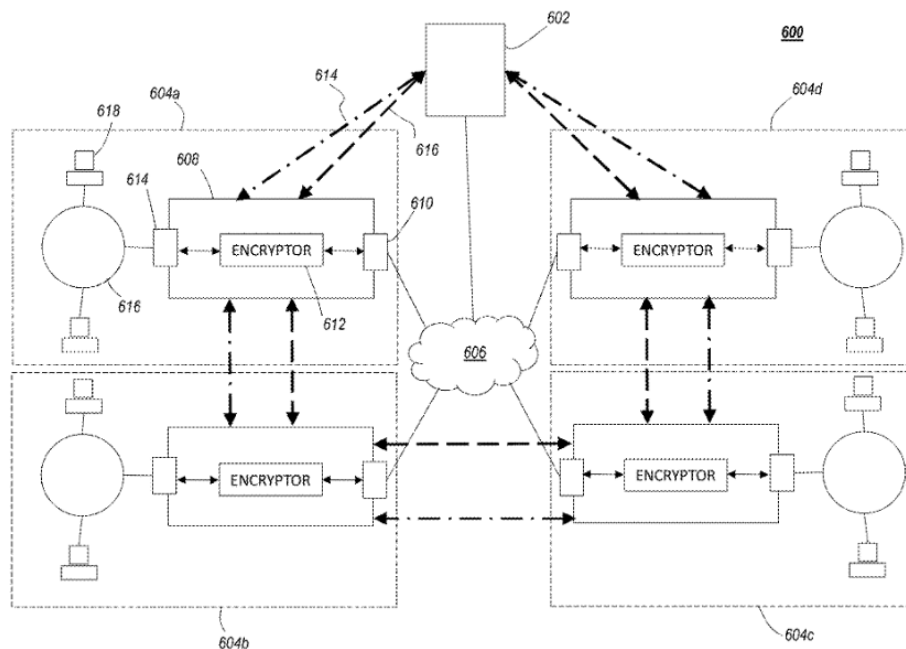
Burgess, P., Marcus, D. M., Gillis, T., Farris, T., & Wanpen, N. (February 09, 2023). Apparatus and methods for proactive communication. Recovered February 10, 2023, Espacenet Patent Search: <https://worldwide.espacenet.com/patent/search/family/085152606/publication/US2023040231A1?q=artificial%20intelligence>

Information source: (Espacenet Patent Search, 2023)



2.7. Autonomous distributed wide area network having control plane and order management on a Blockchain

An autonomous distributed wide area network (AD-WAN) includes several nodes, where each node connects a local area network to an open wide area network, and provides tunnels over the open wide area network to other nodes in the AD-WAN so that computing resources behind each node can communicate as if they were located on a common intranet.



Shows a network diagram of an automated and automatically provisioned AD-WAN, in accordance with some embodiments.

Credit: Valenzuela, P., & Martinez, J., Espacenet Patent Search

Each node has a blockchain wallet and receives updates to a private permissioned blockchain ledger for that AD-WAN. The updates are provided by a control node. Set up, and subsequent change to the AD-WAN are commenced via a customer portal which provides order information to the control node, where the control node processes the order information and generates a blockchain update that informs the affected nodes in the AD-WAN as to what changes are to be made. As a result, the blockchain provides both control plane and order management operation of the AD-WAN.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/085153510/publication/US2023040377A1?q=BLOCKCHAIN>

Reference

Valenzuela, P., & Martinez, C. J. (February 09, 2023). Autonomous distributed wide area network having control plane and order management on a Blockchain. Recovered February 10, 2023, Espacenet Patent Search:



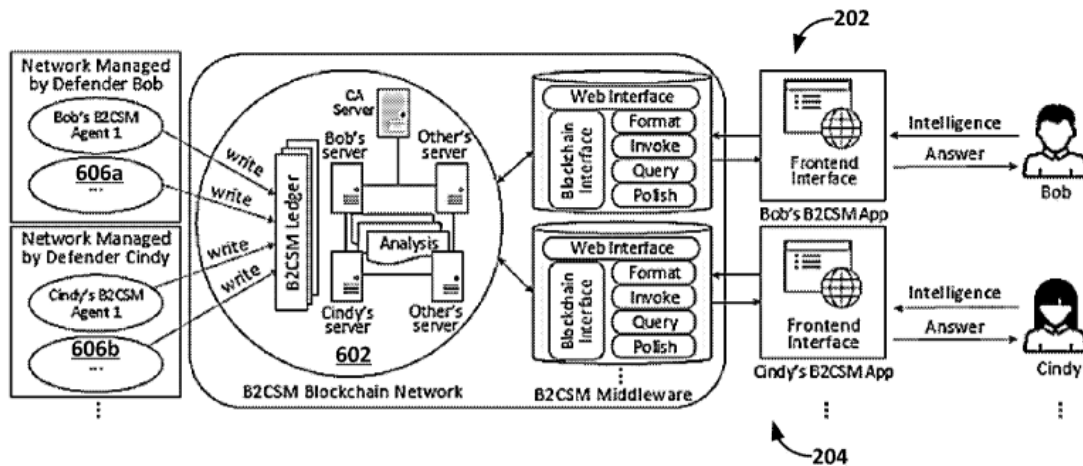
<https://worldwide.espacenet.com/patent/search/family/085153510/publication/US2023040377A1?q=BLOCKCHAIN>

Information source: (Espacenet Patent Search, 2023)



2.8. Method and system for Blockchain-based cyber security management

The present disclosure includes blockchain-based cyber security management systems and related methods.



Illustrates a B2CSM architecture in accordance with various embodiments of the present disclosure.

Credit: Xu, S., He, S., Ficke, E., Pritom, A., Chen, H., Tang, Q., Chen, Q., Pendleton, M., & Njilla, L., Espacenet Patent Search

One such method comprises obtaining cyber intelligence input data from a cyber defender computing device, wherein the cyber defender computing device manages network security of a network, wherein the cyber intelligence input data identifies a cyber attacker or a victim of a cyber-attack on the network; executing one or more Cyber Security Management (CSM) functions with the cyber intelligence input data received from the cyber defender computing device and cyber data stored in the blockchain ledger, wherein the cyber data stored in the blockchain ledger provides details on a cyber-attack on a network that is managed by another cyber defender computing device; and outputting an alert to the cyber defender computing device with a potential cyber attacker or potential victim of the cyber-attack on the network managed by the cyber defender computing device.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/085153175/publication/US2023042816A1?q=BLOCKCHAIN>

Reference

Xu, S., He, S., Ficke, E., Pritom, M. M., Chen, H., Tang, Q., Njilla, L. (February 09, 2023). Method and system for Blockchain-based cyber security management. Recovered February 10, 2023, Espacenet Patent Search: <https://worldwide.espacenet.com/patent/search/family/085153175/publication/US2023042816A1?q=BLOCKCHAIN>

Information source: (Espacenet Patent Search, 2023)



2.9. System and method for real-time design and development of internet-of-things products

The various embodiments of the present invention provide a system and a method for enabling a digital platform that enables users to design and develop Internet-of-Things (IoT) products in real-time.

The embodiments also provide a digital platform that enables the complete lifecycle management of designing, developing, and delivering IoT products. The invention comprises a product development engine that enables users or product developers to create an IoT product in real-time based on their exact requirements. The product development engine is configured to utilize Artificial Intelligence and Machine Learning for enabling users with the appropriate parts and components for designing an IoT product in real-time. The invention also comprises an ecommerce module that enables users to place orders for the manufacturing and delivery of an IoT product designed using the product development engine. The ecommerce module also comprises an IoT marketplace that is configured to provide a digital marketplace for users.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/085155363/publication/WO2023012832A1?q=IOT>

Reference

Mohapatra, R. (February 09, 2023). System and method for real-time design and development of internet-of-things products. Recovered February 10, 2023, de Espacenet Patent Search: <https://worldwide.espacenet.com/patent/search/family/085155363/publication/WO2023012832A1?q=IOT>

Information source: (Espacenet Patent Search, 2023)



2.10. 3D Calling affordances

A 3D calling system can provide 3D calls in various modes according to transitions and can provide affordances (i.e., visual or auditory cues) to improve 3D call image capturing.

The 3D calling system of a recipient in a 3D call can display a hologram (from images captured by an external capture device (ECD)) or avatar of a sending call participant in a variety of ways, such as by making them "*world-locked*," "*ECD-locked*," or "*body-locked*." The selection of a 3D call mode can be based on factors such as whether an ECD is active, whether the ECD is in motion, and user selections. In various cases, the 3D calling system can trigger various affordances to improve the quality of the images captured by the sender's ECD, such as a displayed virtual object and/or an auditory cue, either signaling to the user that a current ECD configuration is non-optimal and/or providing instructions for an improved ECD configuration.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/083319304/publication/WO2023014902A1?q=3D>

Reference

Hoover, P. A., Ma, J., Yang, F.-Y., & Murillo, O. (February 09, 2023). 3D calling affordances. Recovered February 10, 2023, Espacenet Patent Search: <https://worldwide.espacenet.com/patent/search/family/083319304/publication/WO2023014902A1?q=3D>

Information source: (Espacenet Patent Search, 2023)