



**Weekly Newsletter**  
**TECHNOLOGY**  
**SURVEILLANCE**

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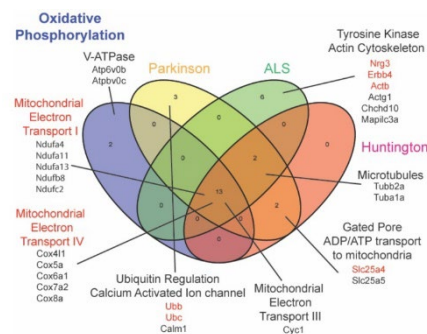


**OBJECTIVE:** To provide weekly information about the latest global scientific and technological advancements, as well as the most innovative products and services entering the international market.

## I. NEWS

### 1.1 Discover a novel inhibitory cortical neuron type that is implicated in neuropsychiatric conditions

A University of California, Irvine-led team of researchers working at the Center for Neural Circuit Mapping (CNCM) find links between brain disorders and dysfunction of newly identified inhibitory brain cell types.



*The gene expression profile of the newly discovered class of inhibitory neurons indicates strong associations with neurological and neuropsychiatric diseases and high energy use.*

*Credit: University of California Irvine*

A team of UCI scientists led by Xiangmin Xu, PhD, professor of anatomy and neurobiology and director for the Center for Neural Circuit Mapping at the UCI School of Medicine, found that a distinct new class of brain inhibitory neurons when functioning abnormally may contribute to neurological and psychiatric conditions, including autism and schizophrenia. "We've discovered a new class of inhibitory neurons in the brain that are implicated in several neuropsychiatric conditions," said Xu. "These neurons are characterized by their chemical signature of expressing calcium binding protein parvalbumin and the cholecystokinin (CCK) peptide."

For more information, visit the following link:

<https://medschool.uci.edu/news/uci-neuroscientists-discover-novel-inhibitory-cortical-neuron-type-implicated-neuropsychiatric>

Reference

Strombeck, M. (Jul 25, 2023). UCI neuroscientists discover a novel inhibitory cortical neuron type that is implicated in neuropsychiatric conditions. Recovered Jul 25, 2023, University of California Irvine:

<https://medschool.uci.edu/news/uci-neuroscientists-discover-novel-inhibitory-cortical-neuron-type-implicated-neuropsychiatric>



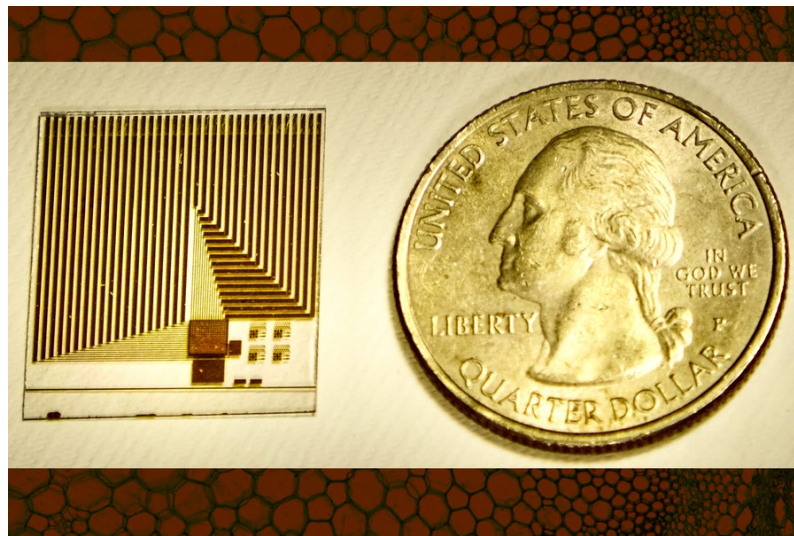
**Information source:** (University of California Irvine, 2023)





## 1.2 New sensor mimics cell membrane functions

In work that combines several new technologies, the researchers created a prototype sensor that can detect an immune molecule called CXCL12, down to tens or hundreds of parts per billion. This is an important first step to developing a system that could be used to perform routine screens for hard-to-diagnose cancers or metastatic tumors, or as a highly biomimetic electronic “nose,” the researchers say.



*An MIT-led team designed a sensor that may be deployed to screen patients for hard-to-diagnose cancers, or metastatic tumors. The device draws inspiration from the membrane that surrounds all cells.*

*Credit: Massachusetts Institute of Technology*

“Our hope is to develop a simple device that lets you do at-home testing, with high specificity and sensitivity. The earlier you detect cancer, the better the treatment, so early diagnostics for cancer is one important area we want to go in,” says Shuguang Zhang, a principal research scientist in MIT’s Media Lab. The device draws inspiration from the membrane that surrounds all cells. Within such membranes are thousands of receptor proteins that detect molecules in the environment. The MIT team modified some of these proteins so that they could survive outside the membrane, and anchored them in a layer of crystallized proteins atop an array of graphene transistors. When the target molecule is detected in a sample, these transistors relay the information to a computer or smartphone.

For more information, visit the following link:

<https://news.mit.edu/2023/new-sensor-mimics-cell-membrane-functions-0721>

### Reference

Trafton, A. (Jul 21, 2023). New sensor mimics cell membrane functions. Recovered Jul 21, 2023, Massachusetts Institute of Technology:  
<https://news.mit.edu/2023/new-sensor-mimics-cell-membrane-functions-0721>

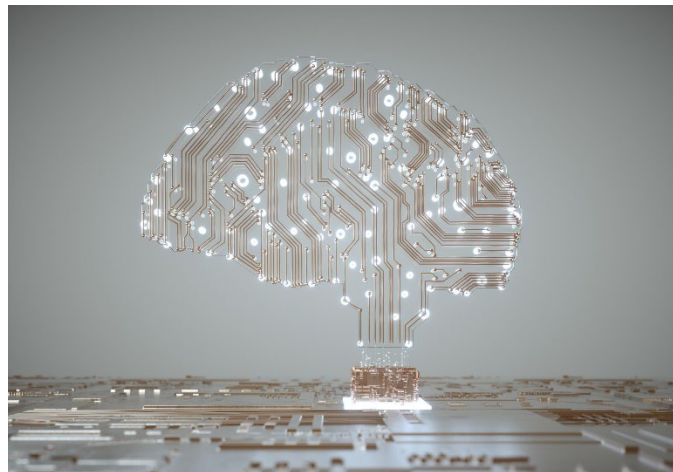


**Information source:** (Massachusetts Institute of Technology, 2023)



### 1.3 Future Artificial Intelligence algorithms have potential to learn like humans

Memories can be as tricky to hold onto for machines as they can be for humans. To help understand why artificial agents develop holes in their own cognitive processes, electrical engineers at The Ohio State University have analyzed how much a process called “continual learning” impacts their overall performance.



*Teaching advanced systems to learn like humans could help scientists better understand an AI's behavior.*

*Credit: The Ohio State University*

Continual learning is when a computer is trained to continuously learn a sequence of tasks, using its accumulated knowledge from old tasks to better learn new tasks. Yet one major hurdle scientists still need to overcome to achieve such heights is learning how to circumvent the machine learning equivalent of memory loss – a process which in AI agents is known as “catastrophic forgetting.” As artificial neural networks are trained on one new task after another, they tend to lose the information gained from those previous tasks, an issue that could become problematic as society comes to rely on AI systems more and more, said Ness Shroff, an Ohio Eminent Scholar and professor of computer science and engineering at The Ohio State University.

For more information, visit the following link:

<https://news.osu.edu/future-ai-algorithms-have-potential-to-learn-like-humans-say-researchers/>

#### Reference

Woodall, T. (Jul 20, 2023). Future AI algorithms have potential to learn like humans, say researchers. Recovered Jul 21, 2023, The Ohio State University:

<https://news.osu.edu/future-ai-algorithms-have-potential-to-learn-like-humans-say-researchers/>

**Information source:** (The Ohio State University, 2023)



#### 1.4 New wearable sensor sets record for solar power efficiency

Sweat, like blood, can tell us a lot about a person's health. And conveniently, it's a lot less invasive to collect. This is the premise behind the wearable sweat sensors developed by Wei Gao, assistant professor of medical engineering, Heritage Medical Research Institute Investigator, and Ronald and JoAnne Willens Scholar. Over the past five years, Gao has steadily added features to his wearables, making them capable of reading out levels of salts, sugars, uric acid, amino acids, and vitamins as well as more complex molecules like C-reactive protein that can provide timely assessment of certain health risks. Most recently, in collaboration with Martin Kaltenbrunner's group at Johannes Kepler University Linz in Austria, Gao has powered these wearable biosensors with a flexible solar cell.



*Mobile phone application that pairs with wearable sweat sensor via Bluetooth.  
Credit: Jihong Min, California Institute of Technology*

The solar cell used by Gao's lab is made of perovskite crystal, a material that shares the chemical structure first found in the mineral calcium titanium oxide. Perovskite has captured the attention of solar cell developers for several reasons: First, it is cheaper to manufacture than silicon (the primary material used in solar cells since the 1950s), which must be highly purified through multiple processes. Second, perovskite is as much as 1,000 times thinner than silicon solar cell layers, making them "quasi-2D" in Gao's terms. Third, perovskite can be tuned to the spectra of different lighting, from outdoor sunlight to various forms of indoor lighting. Finally, and most enticingly for pioneers of solar energy, perovskite solar cells achieve a higher power conversion efficiency (PCE) than silicon, which means they can convert a greater proportion of the light they receive into usable electricity.

For more information, visit the following link:

<https://www.caltech.edu/about/news/-solar-powered-sweat-sensor>

#### Reference

Eller, C. (Jul 20, 2023). New wearable sensor sets record for solar power efficiency. Recovered Jul 21, 2023, California Institute of Technology:  
<https://www.caltech.edu/about/news/-solar-powered-sweat-sensor>





**Information source:** (California Institute of Technology, 2023)





## 1.5 Capture CO<sub>2</sub> with sieves and sponges

The team of students is working on a unique prototype that uses graphene membranes combined with a porous, sponge-like material to pull carbon from the atmosphere. The technology will soon be tested on an EPFL campus, with the captured CO<sub>2</sub> used to produce carbonated water.



*The team of students is working on a unique prototype that uses graphene membranes combined with a porous, sponge-like material.  
Credit: ©Alain Herzog, Ecole Polytechnique Fédérale de Lausanne*

The EPFL Carbon Team was created as part of the School's MAKE program. The 30-or-so students, representing all schools, have an ambitious goal: to build a machine that can remove CO<sub>2</sub> from the air and then to install their machine on an EPFL campus. The race to design carbon-capture technology is attracting huge interest, as evidenced by the more than 1,000 entrants who took part in XPRIZE Carbon Removal. But the EPFL student team is breaking new ground by combining two pioneering technologies developed at the School's Valais Wallis campus.

For more information, visit the following link:

<https://actu.epfl.ch/news/epfl-carbon-team-aims-to-capture-co2-with-sieves-a/>

### Reference

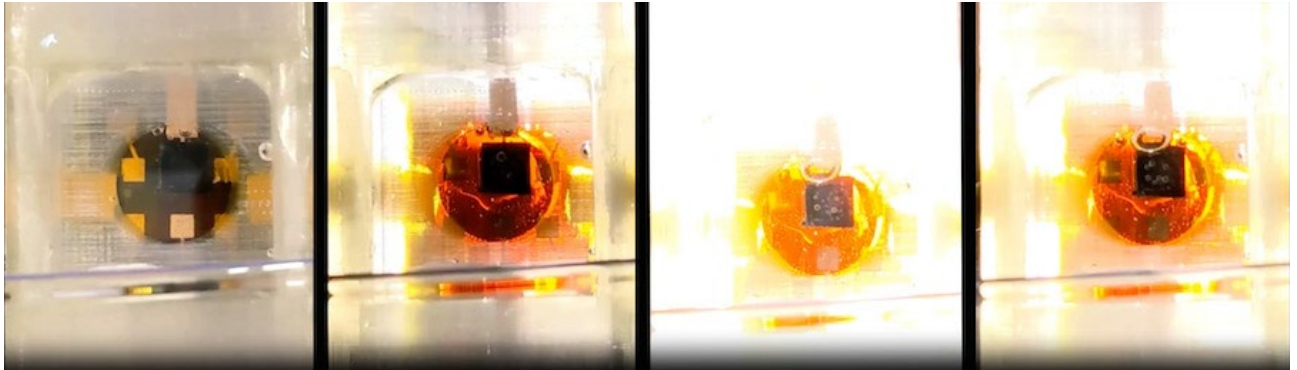
Muriel, A. (Jul 21, 2023). EPFL Carbon team aims to capture CO<sub>2</sub> with sieves and sponges. Recovered Jul 21, 2023, Ecole Polytechnique Fédérale de Lausanne:  
<https://actu.epfl.ch/news/epfl-carbon-team-aims-to-capture-co2-with-sieves-a/>

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



## 1.6 Device makes hydrogen from sunlight with record efficiency

Rice University engineers can turn sunlight into hydrogen with record-breaking efficiency thanks to a device that combines next-generation halide perovskite semiconductors with electrocatalysts in a single, durable, cost-effective and scalable device.



*Series of four still images from a sample video showing how a photoreactor from Rice University splits water molecules and generates hydrogen when stimulated by simulated sunlight.*

*Credit: courtesy of the Mohite lab, Rice University*

The new technology is a significant step forward for clean energy and could serve as a platform for a wide range of chemical reactions that use solar-harvested electricity to convert feedstocks into fuels. The lab of chemical and biomolecular engineer Aditya Mohite built the integrated photoreactor using an anticorrosion barrier that insulates the semiconductor from water without impeding the transfer of electrons. According to a study, the device achieved a 20.8% solar-to-hydrogen conversion efficiency. *“Using sunlight as an energy source to manufacture chemicals is one of the largest hurdles to a clean energy economy,”* said Austin Fehr, a chemical and biomolecular engineering doctoral student and one of the study’s lead authors. *“Our goal is to build economically feasible platforms that can generate solar-derived fuels. Here, we designed a system that absorbs light and completes electrochemical water-splitting chemistry on its surface.”*

For more information, visit the following link:

<https://news.rice.edu/news/2023/device-makes-hydrogen-sunlight-record-efficiency>

### Reference

Cernea, S. (Jul 20, 2023). Device makes hydrogen from sunlight with record efficiency.

Recovered Jul 21, 2023, Rice University:

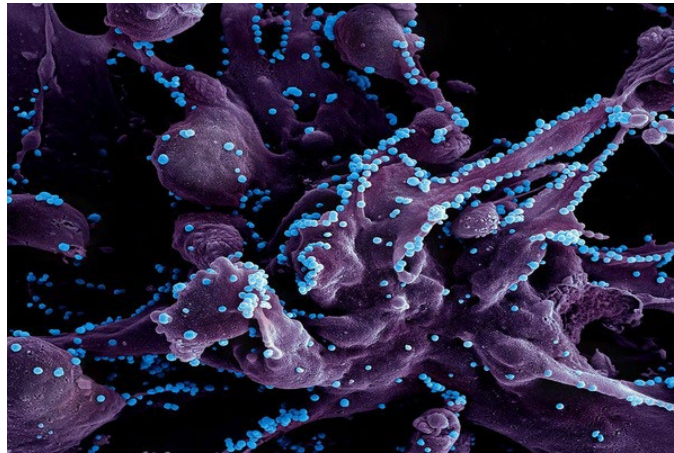
<https://news.rice.edu/news/2023/device-makes-hydrogen-sunlight-record-efficiency>

**Information source:** (Rice University, 2023)



## 1.7 Artificial Intelligence is leveling up the fight against infectious diseases

The discovery offers an alternative to current methods that generate greenhouse gas and require a great deal of energy. Photocatalysis, a process that can split hydrogen from water using only sunlight, has been explored for several decades, but has remained a more distant consideration because the catalyst materials enabling the process can only survive it for a day or two, which limits its long-term efficiency and, as a result, its commercial viability.



Credit: NIAID, University of Pennsylvania

Drexel's group, led by College of Engineering researchers Michel Barsoum, PhD, and Hussein O. Badr, PhD, in collaboration with scientists from the National Institute of Materials Physics in Bucharest, Romania, recently reported its discovery of photocatalytic titanium oxide-based, one-dimensional nanofilament material that can help sunlight glean hydrogen from water for months at a time. Their article "*Photo-stable, 1D-nanofilaments TiO<sub>2</sub>-based lepidocrocite for photocatalytic hydrogen production in water-methanol mixtures,*" published in the journal *Matter*, presents a sustainable and affordable path for creating hydrogen fuel, according to the authors.

For more information, visit the following link:

<https://blog.seas.upenn.edu/artificial-intelligence-is-leveling-up-the-fight-against-infectious-diseases/>

### Reference

Fischler, D. (Jul 20, 2023). Artificial Intelligence is leveling up the fight against infectious diseases. Recovered Jul 21, 2023, University of Pennsylvania: <https://blog.seas.upenn.edu/artificial-intelligence-is-leveling-up-the-fight-against-infectious-diseases/>

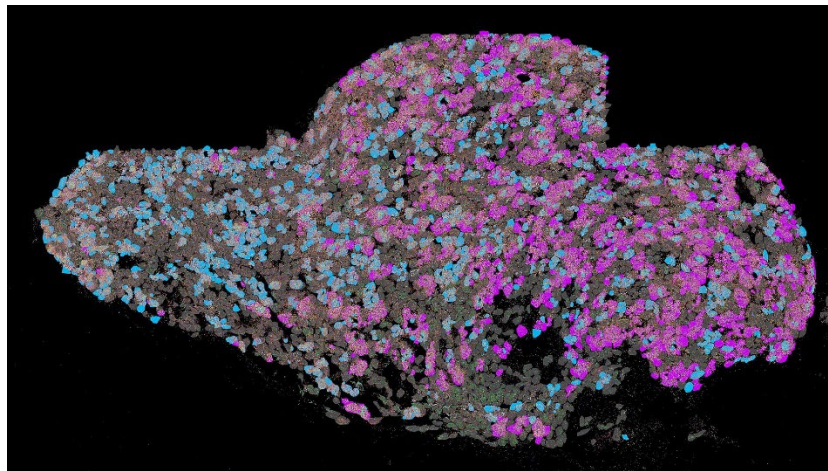
**Information source:** (University of Pennsylvania, 2023)





## 1.8 Cause of sleep disturbance in cardiac disease identified

Around one third of people with heart disease suffer from sleep problems. In a paper published in the journal Science, a team at the Technical University of Munich (TUM) shows that heart diseases affect the production of the sleep hormone melatonin in the pineal gland. The link between the two organs is a ganglion in the neck region. The study demonstrates a previously unknown role of ganglia and points to possible treatments.



*The superior cervical ganglion of a mouse: Here, neurons that control the heart muscle (pink) are in close proximity to those that control the pineal gland (blue).  
Credit: Karin Ziegler, Technical University of Munich*

The fact that melatonin levels can decrease in patients with diseases of the heart muscle, for example after a heart attack, has been known for some time. This has generally been seen as a further example of how a heart condition acts systemically on the entire body. A team working with Stefan Engelhardt, Professor of Pharmacology and Toxicology at TUM, and first author Dr. Karin Ziegler, has now shown that there is a direct cause behind sleep disturbances in people suffering from heart conditions.

For more information, visit the following link:

<https://www.tum.de/en/news-and-events/all-news/press-releases/details/ursache-fuer-schlafstoerungen-bei-herzschwaechen-gefunden>

### Reference

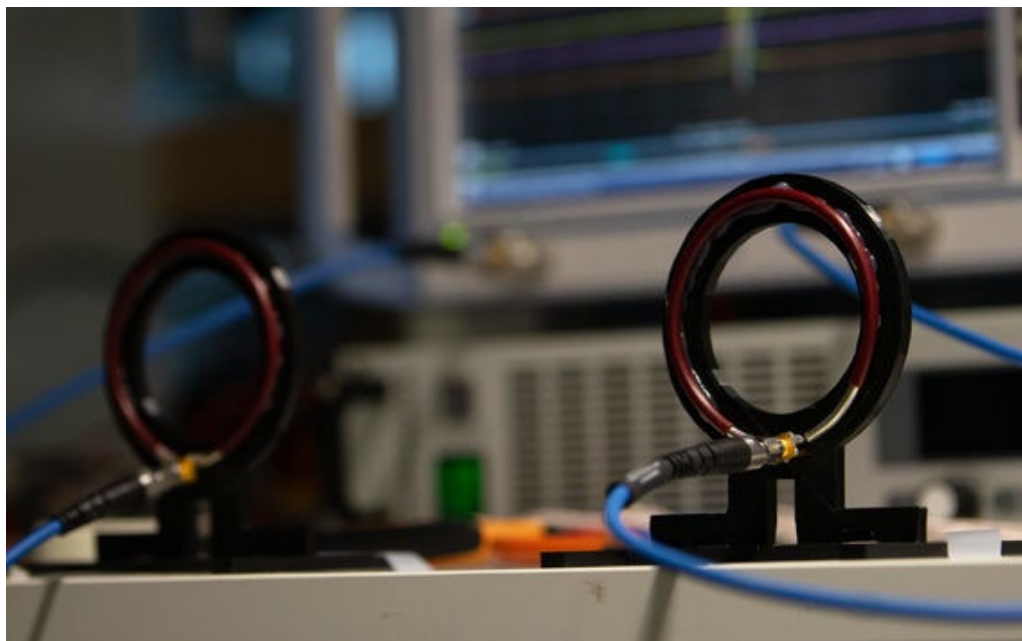
Hellmich, P. (Jul 21, 2023). Cause of sleep disturbance in cardiac disease identified. Recovered Jul 21, 2023, Technical University of Munich:  
<https://www.tum.de/en/news-and-events/all-news/press-releases/details/ursache-fuer-schlafstoerungen-bei-herzschwaechen-gefunden>

**Information source:** (Technical University of Munich, 2023)



## 1.9 Going the distance for better wireless charging

A better way to wirelessly charge over long distances has been developed at Aalto University. Engineers have optimized the way antennas transmitting and receiving power interact with each other, making use of the phenomenon of “*radiation suppression*”. The result is a better theoretical understanding of wireless power transfer compared to the conventional inductive approach, a significant advancement in the field.



*Two loop antennas (radius: 3.6 centimeters) can transfer power between each other from 18 centimeters.*

*Credit: Nam Ha-Van, Aalto University*

Charging over short distances, such as through induction pads, uses magnetic near fields to transfer power with high efficiency, but at longer distances the efficiency dramatically drops. New research shows that this high efficiency can be sustained over long distances by suppressing the radiation resistance of the loop antennas that are sending and receiving power.

For more information, visit the following link:

<https://www.aalto.fi/en/news/going-the-distance-for-better-wireless-charging>

### Reference

Alvarez, A. (Jul 21, 2023). Going the distance for better wireless charging. Recovered Jul 24, 2023, Aalto University:

<https://www.aalto.fi/en/news/going-the-distance-for-better-wireless-charging>

**Information source:** (Aalto University, 2023)



## 1.10 New catalyst could dramatically cut methane pollution from millions of engines

Researchers demonstrate a way to remove the potent greenhouse gas from the exhaust of engines that burn natural gas. While more research needs to be done, they said, the advance in single atom catalysis has the potential to lower exhaust emissions of methane, one of the worst greenhouse gases, which traps heat at about 25 times the rate of carbon dioxide.



*Credit: SLAC National Accelerator Laboratory*

Researchers from the Department of Energy's SLAC National Accelerator Laboratory and Washington State University showed that the catalyst removed methane from engine exhaust at both the lower temperatures where engines startup -and the higher temperatures where they operate most efficiently, but where catalysts often break down. *"It's almost a self-modulating process which miraculously overcomes the challenges that people have been fighting – low temperature inactivity and high temperature instability,"* said Yong Wang, Regents Professor in WSU's Gene and Linda Voiland School of Chemical Engineering and Bioengineering and one of four lead authors on the paper.

For more information, visit the following link:

<https://www6.slac.stanford.edu/news/2023-07-20-new-catalyst-could-dramatically-cut-methane-pollution-millions-engines>

### Reference

SLAC National Accelerator Laboratory. (Jul 20, 2023). New catalyst could dramatically cut methane pollution from millions of engines. Recovered Jul 24, 2023, SLAC National Accelerator Laboratory:

<https://www6.slac.stanford.edu/news/2023-07-20-new-catalyst-could-dramatically-cut-methane-pollution-millions-engines>

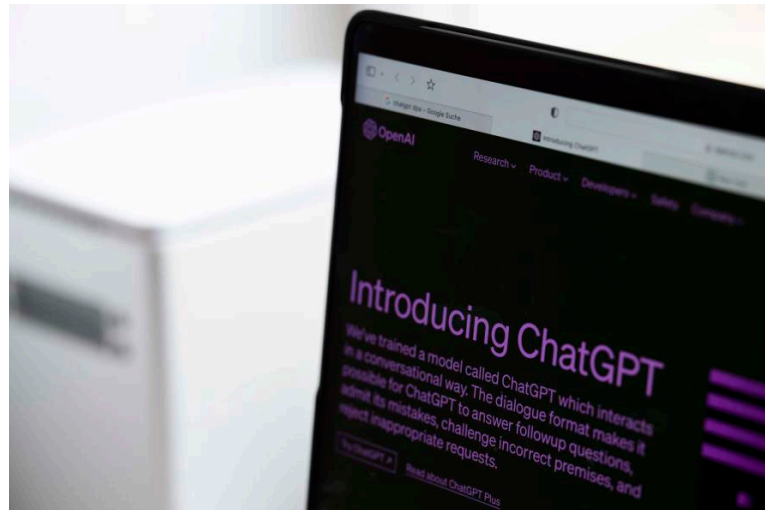
**Information source:** (SLAC National Accelerator Laboratory, 2023)





## 1.11 When it comes to jobs, Artificial Intelligence does not like parents

The research takes a close look at the different levels of gender bias in algorithms in hiring. They found that gender signals – much more subtle than a name – are ingested and used by AI, which becomes an increasingly pressing issue with powerful generative AI, like ChatGPT, on the rise.



*We found that ChatGPT ranked our parents lower in every single occupation.  
Credit: The University of Melbourne*

They find that gender is so deeply embedded in our society – how we talk, where we work, what we study – that it is near-impossible to gender-blind a CV from AI and humans. So, what does this mean? Well, even with our best intentions, the algorithm can pick up your gender. And algorithms that can pick up gender can use it to make predictions when it comes to the quality of an applicant. Here is where we need regulatory controls in response to this more nuanced understanding of AI's capacity to discriminate and ensure everyone understands AI is not neutral or fair. We all need to do our part to ensure AI that is fair and beneficial to everyone – including women and parents.

For more information, visit the following link:

<https://pursuit.unimelb.edu.au/articles/when-it-comes-to-jobs-ai-does-not-like-parents>

### Reference

Ferrmann, L.; Njoto, S.; Cheong, M. & Ruppner, L. (Jul 23, 2023). When it comes to jobs, Artificial Intelligence does not like parents. Recovered Jul 24, 2023, The University of Melbourne:

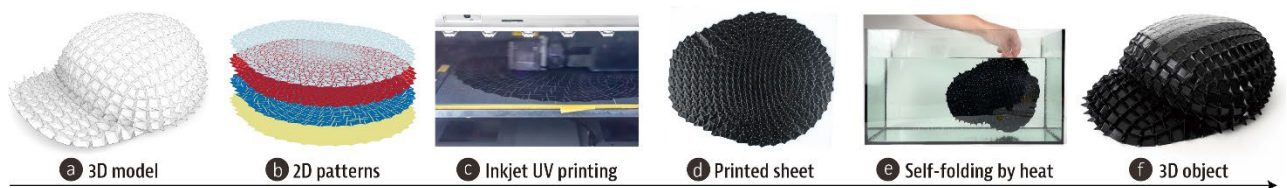
<https://pursuit.unimelb.edu.au/articles/when-it-comes-to-jobs-ai-does-not-like-parents>

**Information source:** (The University of Melbourne, 2023)



## 1.12 A whole new dimension for 3D printing

3D printing of complex objects typically takes a long time due to the printing process necessarily laying down a large number of 2D layers to build up the object. The process usually wastes a lot of material required to support the unfinished object. Some novel ways to make flat materials self-fold into 3D shapes exist, but have shortcomings. For the first time, researchers combined 2D printing, origami, and chemistry to create a method of rapid 3D object fabrication without creating any waste material. These shapes self-fold in seconds.



*4D printing process. Specially created software turns an input 3D model into a 2D pattern that can then be printed. The prints can then be submersed in hot water to self-fold into the final 3D object. ©2023 Narumi et al. CC-BY-ND.*

*Credit: ©2023 Narumi et al. CC-BY-ND, The University of Tokyo*

For some time, 3D printing has been used to prototype products and is now seeing more use in the fabrication of commercial items, including even parts for jet engines. But every method of 3D fabrication comes with limitations, such as the long time taken to complete prints or the wastage of vestigial materials in printing. 4D printing is a concept that aims to mitigate these issues using a minimal amount of materials, selected for having certain special properties, allowing them to self-fold into complex 3D shapes under the right conditions. It's called 4D printing, as the process of self-folding necessarily makes use of time, which is often said to be the 4th dimension. Ironically, a new method of rapid 4D printing begins in the 2D realm.

For more information, visit the following link:

[https://www.u-tokyo.ac.jp/focus/en/press/z0508\\_00295.html](https://www.u-tokyo.ac.jp/focus/en/press/z0508_00295.html)

### Reference

Igarashi, T.; Kawahara Y. & Narumi, K. (Jul 24, 2023). A whole new dimension for 3D printing. Recovered Jul 24, 2023, The University of Tokyo:  
[https://www.u-tokyo.ac.jp/focus/en/press/z0508\\_00295.html](https://www.u-tokyo.ac.jp/focus/en/press/z0508_00295.html)

**Information source:** (The University of Tokyo, 2023)



### 1.13 Renewable solar energy can help purify water, the environment

Using electrochemistry to separate different particles within a solution (also known as electrochemical separation) is an energy-efficient strategy for environmental and water remediation: the process of purifying contaminated water. But while electrochemistry uses less energy than other, similar methods, the electric energy is largely derived from nonrenewable sources like fossil fuels.

Chemists at the University of Illinois Urbana-Champaign have demonstrated that water remediation can be powered in part — and perhaps even exclusively — by renewable energy sources. Through a semiconductor, their method integrates solar energy into an electrochemical separation process powered by a redox reaction, which manipulates ions' electric charge to separate them from a solution like water. Using this system, the researchers successfully separated and removed dilute arsenate — a derivative of arsenic, which is a major waste component from steel and mining industries — from wastewater.

For more information, visit the following link:

<https://beckman.illinois.edu/about/news/article/2023/07/24/renewable-solar-energy-can-help-purify-water-the-environment>

#### Reference

Kurtzweil, J. (Jul 24, 2023). Renewable solar energy can help purify water, the environment. Recovered Jul 24, 2023, University of Illinois:  
<https://beckman.illinois.edu/about/news/article/2023/07/24/renewable-solar-energy-can-help-purify-water-the-environment>

**Information source:** (University of Illinois, 2023)





## 1.14 New membrane filtering technology could help address water scarcity issues

Researchers at University of Colorado Boulder have developed a new membrane water filtration system based around air bubbles that can help address water scarcity issues around the world.

Membrane filters generally use pressure to force water through a sieve to separate out unwanted particles and contaminants. The new membrane system is unique in that it uses a tiny layer of air bubbles to distill the water rather than sieve it. This change makes the system more permeable and better at removing unwanted impurities than the common reverse osmosis systems working today. Straub said his team's membrane could be used in advanced water treatment systems and other applications. *"These can be utilized to purify water to a very high degree when it comes to desalination of seawater and in wastewater reuse efforts,"* Straub said. *"We also have ongoing work with NASA to use these membranes to recycle water during space exploration and research missions."*

For more information, visit the following link:

<https://www.colorado.edu/engineering/new-membrane-filtering-technology-cu-boulder-could-help-address-water-scarcity-issues>

### Reference

Rhoten, J. (Jul 21, 2023). New membrane filtering technology at CU Boulder could help address water scarcity issues. Recovered Jul 24, 2023, University of Colorado Boulder: <https://www.colorado.edu/engineering/new-membrane-filtering-technology-cu-boulder-could-help-address-water-scarcity-issues>

**Information source:** (University of Colorado Boulder, 2023)



### 1.15 Create open-source platform

Just a few years ago, Berkeley engineers showed us how they could easily turn images into a 3D navigable scene using a technology called Neural Radiance Fields, or NeRF. Now, another team of Berkeley researchers has created a development framework to help speed up NeRF projects and make this technology more accessible to others.

Led by Angjoo Kanazawa, assistant professor of electrical engineering and computer sciences, the researchers have developed Nerfstudio, a Python framework that provides plug-and-play components for implementing NeRF-based methods, making it easier to collaborate and incorporate NeRF into projects. *“Advancements in NeRF have contributed to its growing popularity and use in applications such as computer vision, robotics, visual effects and gaming. But support for development has been lagging,”* said Kanazawa. *“The Nerfstudio framework is intended to simplify the development of custom NeRF methods, the processing of real-world data and interacting with reconstructions.”*

For more information, visit the following link:

<https://engineering.berkeley.edu/news/2023/07/researchers-create-open-source-platform-for-neural-radiance-field-development/>

#### Reference

Ellery, M. (Jul 25, 2023). Researchers create open-source platform for Neural Radiance Field development. Recovered Jul 25, 2023, University of California - Berkeley: <https://engineering.berkeley.edu/news/2023/07/researchers-create-open-source-platform-for-neural-radiance-field-development/>

**Information source:** (University of California - Berkeley, 2023)



## 1.16 New chatbots are hitting the market; an Artificial Intelligence expert explains their differences

New Artificial Intelligence chatbots are being made available to the public, researchers and practitioners. With Google, Meta and Microsoft releasing language models (and with a few minor ones out on the market), the Artificial Intelligence (AI) space is heating up, and people are commoditizing it. AI will eventually make its way into daily use across a variety of goods and services. Victor Benjamin, an assistant professor of information systems at the W. P. Carey School of Business, is an expert in the AI field.

Large language models have two key differences from one another: one, their computational architecture, and two, the data on which they learned. Regarding computational architecture, we are talking about the math and logic driving the system. All our AI today is rooted in math, and we are finding new ways to push math forward into letting us create machines that can somewhat navigate aspects of the real world and help us do things. That's all AI is. The math for AI often converges into a subset of techniques that receive most of the attention, and different teams working on AI may try out different tweaks or mathematical tricks to try and further improve their AI. So ChatGPT competitors may use similar math and computational architecture but still possess some differences and twists that produce unique outcomes.

For more information, visit the following link:

<https://news.asu.edu/20230725-solutions-new-chatbots-are-hitting-market-asu-ai-expert-explains-their-differences>

### Reference

Terrill, M. (Jul 25, 2023). New chatbots are hitting the market; an ASU AI expert explains their differences. Recovered Jul 25, 2023, Arizona State University:

<https://news.asu.edu/20230725-solutions-new-chatbots-are-hitting-market-asu-ai-expert-explains-their-differences>

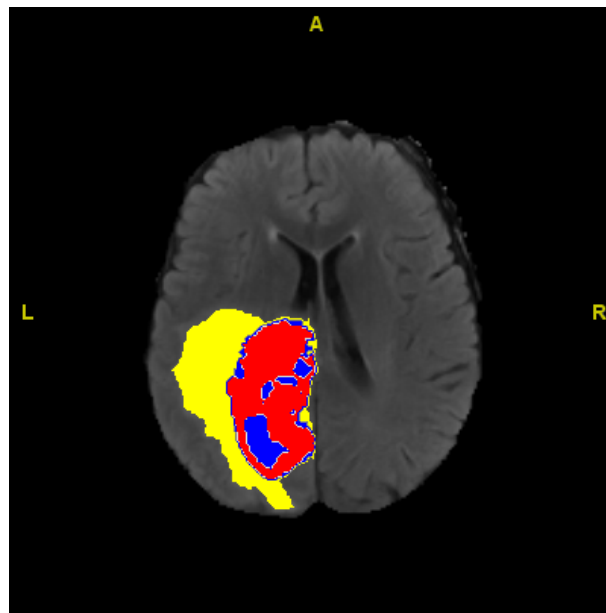
**Information source:** (Arizona State University, 2023)





### 1.17 New research shows Artificial Intelligence can ask another AI for a second opinion on medical scans

Researchers at Monash University have designed a new co-training AI algorithm for medical imaging that can effectively mimic the process of seeking a second opinion.



*AI-annotated medical image showing enhanced tumour, tumour core and edema regions.  
Credit: Monash University*

The research addressed the limited availability of human annotated, or labelled, medical images by using an adversarial, or competitive, learning approach against unlabelled data. This research, by Monash University faculties of Engineering and IT, will advance the field of medical image analysis for radiologists and other health experts. PhD candidate Himashi Peiris of the Faculty of Engineering, said the research design had set out to create a competition between the two components of a "dual-view" AI system.

For more information, visit the following link:

<https://www.monash.edu/news/articles/new-research-shows-ai-can-ask-another-ai-for-a-second-opinion-on-medical-scans>

#### Reference

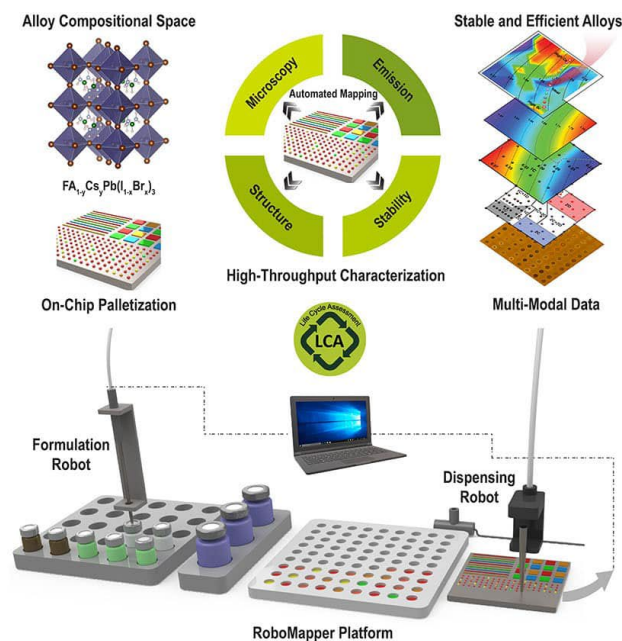
Monash University. (Jul 25, 2023). New research shows AI can ask another AI for a second opinion on medical scans. Recovered Jul 25, 2023, Monash University: <https://www.monash.edu/news/articles/new-research-shows-ai-can-ask-another-ai-for-a-second-opinion-on-medical-scans>

**Information source:** (Monash University, 2023)



### 1.18 New robot boosts solar energy research

Researchers have created a robot capable of conducting experiments more efficiently and sustainably to develop a range of new semiconductor materials with desirable attributes. The researchers have already demonstrated that the new technology, called RoboMapper, can rapidly identify new perovskite materials with improved stability and solar cell efficiency.



*Credit: North Carolina State University*

“RoboMapper allows us to conduct materials testing more quickly, while also reducing both cost and energy overhead – making the entire process more sustainable,” says Aram Amassian, corresponding author of a paper on the work and a professor of materials science and engineering at North Carolina State University. Conventional materials research requires a researcher to prepare a sample and then go through multiple steps to test each sample using different instruments. This involves placing, aligning and calibrating samples as needed to collect the data. Think of it as an assembly line that is both time consuming and requires a lot of electricity to power the relevant instruments.

For more information, visit the following link:  
<https://news.ncsu.edu/2023/07/robomapper/>

#### Reference

Amassian, A. & Shipman, M. (Jul 25 2023). New robot boosts solar energy research. Recovered Jul 25, 2023, North Carolina State University:  
<https://news.ncsu.edu/2023/07/robomapper/>



**Information source:** (North Carolina State University, 2023)





### 1.19 With a new app, smart devices can have GPS underwater

A team at the University of Washington has developed the first underwater 3D-positioning app for smart devices. When at least three divers are within about 98 feet (30 meters) of each other, their devices' existing speakers and microphones contact each other, and the app tracks each user's location relative to the leader. This range can extend with more divers, if each is within 98 feet of another diver.



*The underwater GPS app runs on a smartwatch.  
Credit: University of Washington*

*“Mobile devices today can work nearly anywhere on Earth. You can be in a forest or on a plane and still get internet connectivity,”* said lead author Tuochoa Chen, a UW doctoral student in the Paul G. Allen School of Computer Science & Engineering. *“But the one place where we still hadn’t made mobile devices work was underwater. It’s kind of the final frontier.”*

For more information, visit the following link:

<https://www.washington.edu/news/2023/07/24/with-a-new-app-smart-devices-can-have-gps-underwater/>

#### Reference

Milne, S. (Jul 24, 2023). With a new app, smart devices can have GPS underwater. Recovered Jul 25, 2023, University of Washington: <https://www.washington.edu/news/2023/07/24/with-a-new-app-smart-devices-can-have-gps-underwater/>

**Information source:** (University of Washington, 2023)



## 1.20 New algorithm maps safest routes for city drivers

Most navigation apps can show you the fastest possible route to your destination and some can even suggest an eco-friendly route calculated to produce the least amount of carbon emissions.

But what if they could also map the safest route with the lowest possible risk of a crash?. A new algorithm developed by UBC researchers could make this a reality. Led by Dr. Tarek Sayed, professor in the UBC department of civil engineering, and PhD student Tarek Ghoul, the group developed a new approach which identifies the safest possible route in an urban network using real-time crash risk data, and can be incorporated into navigation apps such as Google Maps. To conduct their research, the team used data from 10 drones hovering over downtown Athens, Greece, over multiple days and recording factors including vehicle position, speed and acceleration. They used this information to identify near-misses between vehicles and then predicted the risk of crashes in real-time.

For more information, visit the following link:

<https://news.ubc.ca/2023/07/25/new-algorithm-maps-safest-routes-for-city-drivers/>

Reference

Corpuz, L. (Jul 25, 2023). New algorithm maps safest routes for city drivers. Recovered Jul 25, 2023, The University of British Columbia:

<https://news.ubc.ca/2023/07/25/new-algorithm-maps-safest-routes-for-city-drivers/>

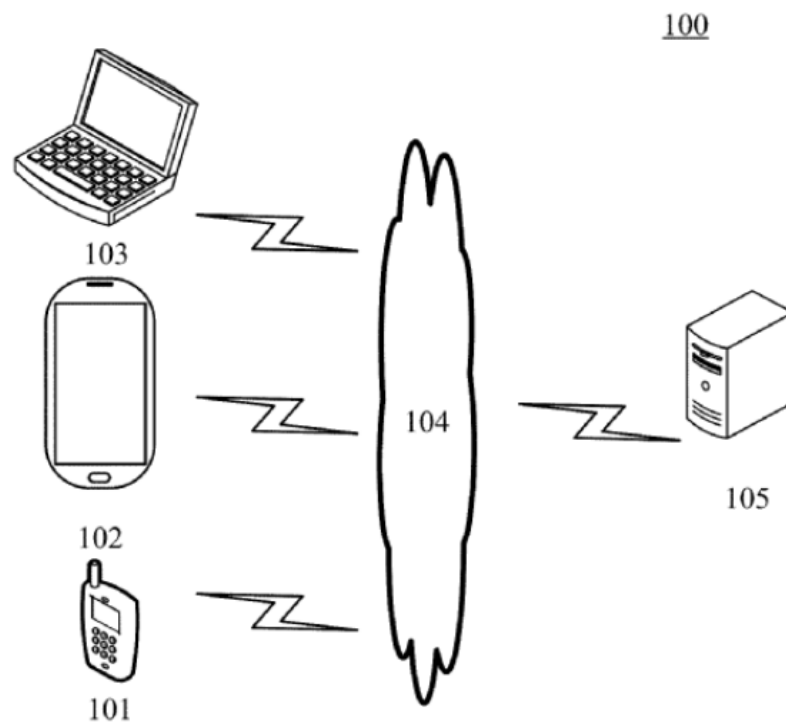
**Information source:** (The University of British Columbia, 2023)



## II. PATENTS

### 2.1. Method and apparatus for constructing organizational collaboration network

The present disclosure provides a method and apparatus for constructing an organizational collaboration network, and relates to the field of Artificial Intelligence, and particularly to the field of big data analysis.



*Is a diagram of an exemplary system architecture in which an embodiment of the present disclosure may be applied.*

*Credit: Wang, P.; Dong, Z.; Zhu, H.; Song, X.; Wang, J. & Zhang, J., WIPO IP Portal*

A specific implementation includes: acquiring collaborative data between at least one pair of organizations; calculating at least one collaboration index between each pair of organizations according to the collaborative data; calculating, for each pair of organizations, a degree of closeness between the pair of organizations according to a weighted sum of the at least one collaboration index between the pair of organizations; and using each organization as a node, a relationship between each pair of organizations as an edge, and the degree of closeness between each pair of organizations as a weight of the edge, to construct the organizational collaboration network.

For more information, visit the following link:

[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826325&\\_cid=P12-LKHBSJ-54943-2](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826325&_cid=P12-LKHBSJ-54943-2)





#### Reference

Wang, P.; Dong, Z.; Zhu, H.; Song, X.; Wang, J. & Zhang, J. (Jul 20, 2023). Method and apparatus for constructing organizational collaboration network. Recovered Jul 20, 2023, WIPO IP Portal:

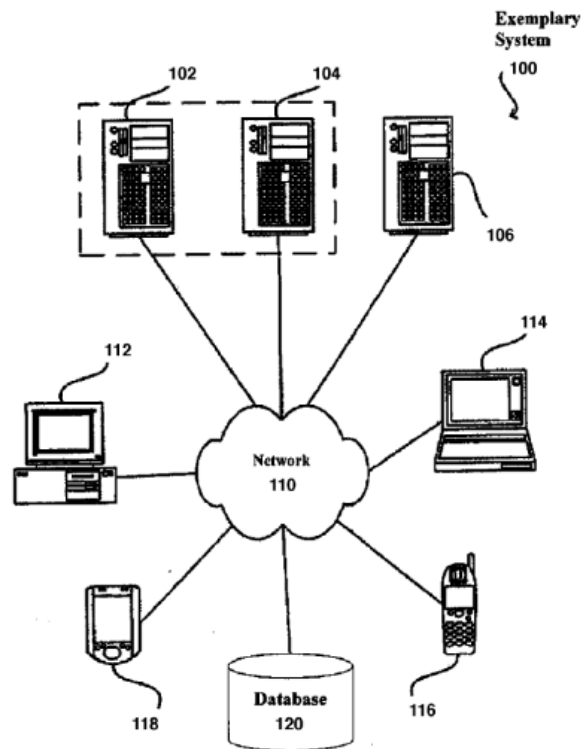
[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826325&\\_cid=P12-LKHBSJ-54943-2](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826325&_cid=P12-LKHBSJ-54943-2)

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



## 2.2. System and method for a decentralized innovation platform

The present invention is a system and method for an information, network, financing, commercialization, and monetization platform that promotes global innovation discovery, commercialization and adoption by individuals, small, and medium sized innovators.



*Is an illustration depicting an exemplary operating environment including one or more user computers, computing devices, or processing devices, which can be used to operate a client, such as a dedicated application, web browser is shown.*

*Credit: Lawson, E., WIPO IP Portal*

A first metal layer disposed over the isolation layer; a second metal layer disposed over the first metal layer; a first level including a plurality of transistors, the first level disposed over the second metal layer, where the isolation layer includes an oxide to oxide bond surface, where the plurality of transistors include a second single crystal silicon region; and a third metal layer disposed over the first level, where a typical first thickness of the third metal layer is at least 50% greater than a typical second thickness of the second metal layer.

For more information, visit the following link:

[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826489&\\_cid=P12-LKHBSJ-54943-3](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826489&_cid=P12-LKHBSJ-54943-3)

### Reference

Lawson, E. (Jul 20, 2023). System and method for a decentralized innovation platform. Recovered Jul 20, 2023, WIPO IP Portal:



[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826489&\\_cid=P12-LKHBSJ-54943-3](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826489&_cid=P12-LKHBSJ-54943-3)

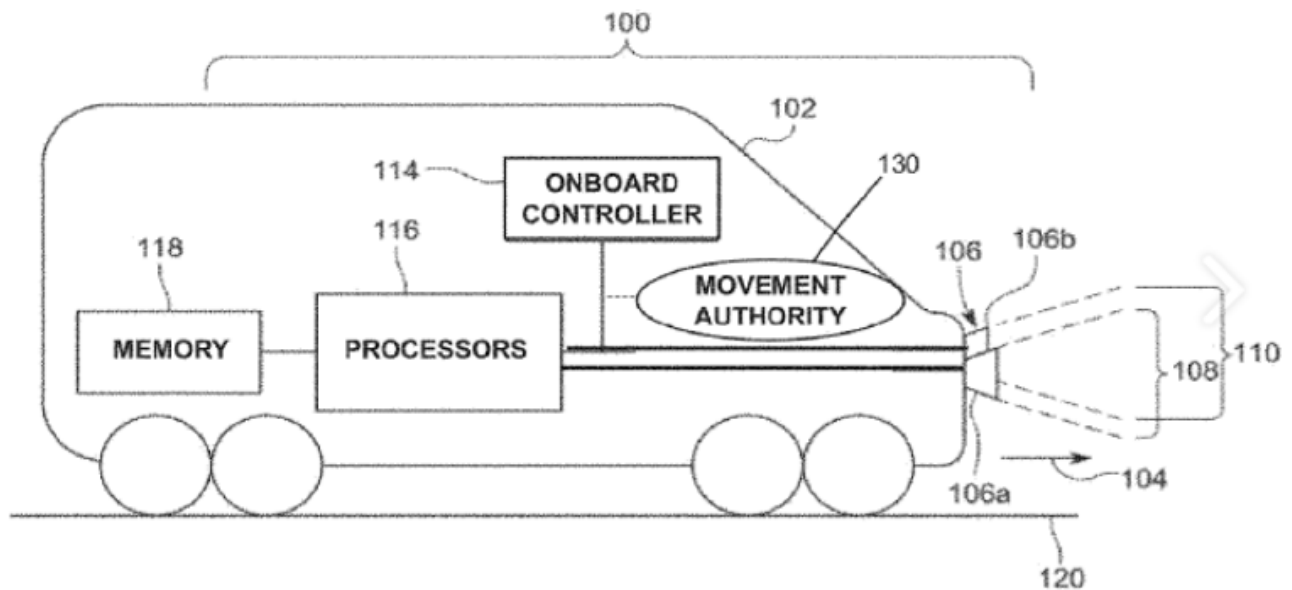
**Information source:** (WIPO IP Portal, 2023)





### 2.3. Vehicle speed management systems and methods

A method is provided that may include obtaining image data from vision sensors disposed onboard a vehicle. The method may include determining a stopping distance of the vehicle based at least in part on the image data using an Artificial Intelligence (AI) neural network having artificial neurons arranged in layers and connected with each other by connections.



*Illustrates an example of a system for managing a speed of a vehicle in accordance with one or more embodiments described herein;  
Credit: Vrba, M. & Kernwein, J., WIPO IP Portal*

A moving speed and a speed limit of the vehicle may be determined using the AI neural network. The method may control movement of the vehicle using the AI neural network by enforcing movement authorities preventing unwarranted movement of the vehicle based on a difference between the moving speed and the speed limit. The method may include receiving feedback regarding the stopping distance and the speed limit calculated by the artificial neurons and training the AI neural network by changing connections between the artificial neurons based on the feedback received.

For more information, visit the following link:

[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402823178&\\_cid=P12-LKHBSJ-54943-4](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402823178&_cid=P12-LKHBSJ-54943-4)

Reference

Vrba, M. & Kernwein, J. (Jul 20, 2023). Vehicle speed management systems and methods. Recovered Jul 20, 2023, WIPO IP Portal:

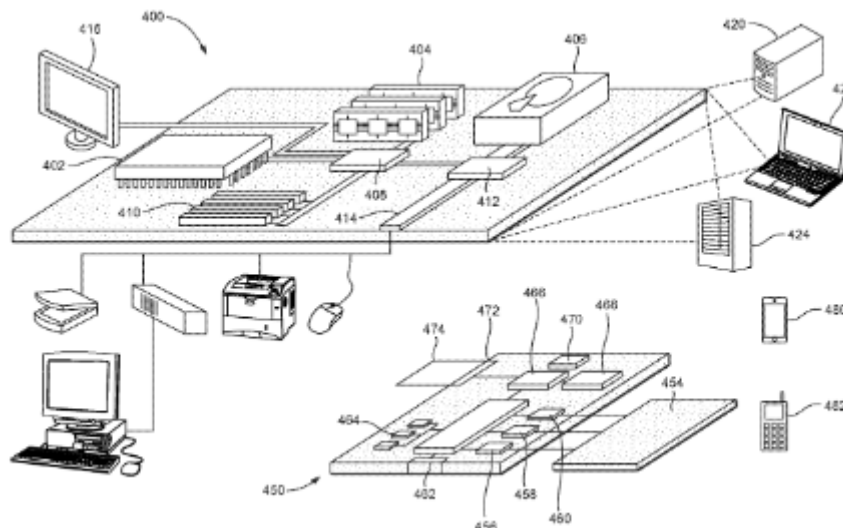
[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402823178&\\_cid=P12-LKHBSJ-54943-4](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402823178&_cid=P12-LKHBSJ-54943-4)

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



## 2.4. Method and system for virtual intelligence user interaction

A method and apparatus to generate and update virtual personification using Artificial Intelligence comprising a system configured to perform the following. Receive data associated with a person such as text files, audio files, image files, and video files.



*Is a block diagram of an exemplary computing device, mobile device, or server, such as one of the devices described above, according to one exemplary embodiment.*

*Credit: Kaplan, J., WIPO IP Portal*

Render a virtual personification of the person and output the virtual personification to a user, such as on a display screen. Then, receiving and interpreting a user input to generate a user request, and then updating the virtual personification. The update may include generating an audio output using the text files and the audio files of the person and/or generating a video output using the image files and the video files of the person. The audio output and the video output is presented to the user by the virtual personification and it has not previously occurred by the person or thing represented by the virtual personification.

For more information, visit the following link:

[https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023137078&\\_cid=P11-LKR52J-96779-1](https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023137078&_cid=P11-LKR52J-96779-1)

### Reference

Kaplan, J. (Jul 20, 2023). Method and system for virtual intelligence user interaction. Recovered Jul 20, 2023, WIPO IP Portal:

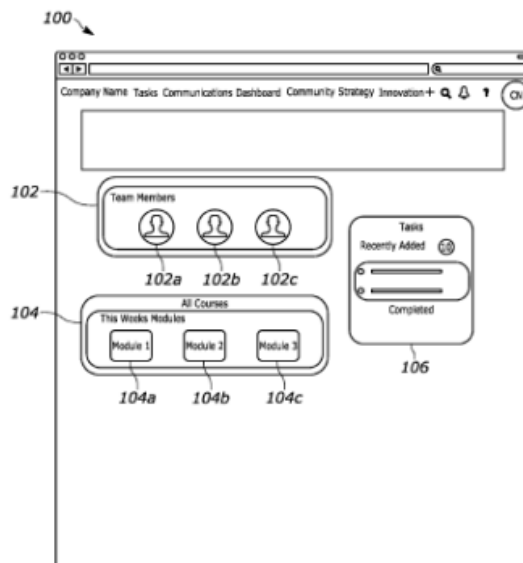
[https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023137078&\\_cid=P11-LKR52J-96779-1](https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023137078&_cid=P11-LKR52J-96779-1)

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



## 2.5. Strategic innovation and strategic management software

The present invention comprises a novel innovation and strategic management software application consisting of an automated method and system for receiving business information and data from a user describing the business products, services and strategy and finances to translate to generated systems, processes and enhanced outcomes.



*Depicts a screen shot perspective view of the elements that comprise the main page embodiments and some of its functionalities of the present invention.*

*Credit: Mía, M., WIPO IP Portal*

Utilizing Artificial Intelligence and machine learning for language processing, automated systems render business innovation and strategy models, position business, products and services and performs the management of these. Management of services and processes are communicated through the software application. Communication of project status, tasks and performance are indicated alongside other communications such as audio, visual/video text, and data intelligence which are transferable between internal and external users or team members in the application. Curated education, customized analytics, and insights promote a robust system for information retrieval for users of the application that together provide enhanced competitive competencies.

For more information, visit the following link:

[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826298&\\_cid=P12-LKIFAK-63830-1](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826298&_cid=P12-LKIFAK-63830-1)

Reference

Mía, M. (Jul 20, 2023). Strategic innovation and strategic management software. Recovered Jul 20, 2023, WIPO IP Portal:



[https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826298&\\_cid=P12-LKIFAK-63830-1](https://patentscope.wipo.int/search/es/detail.jsf?docId=US402826298&_cid=P12-LKIFAK-63830-1)

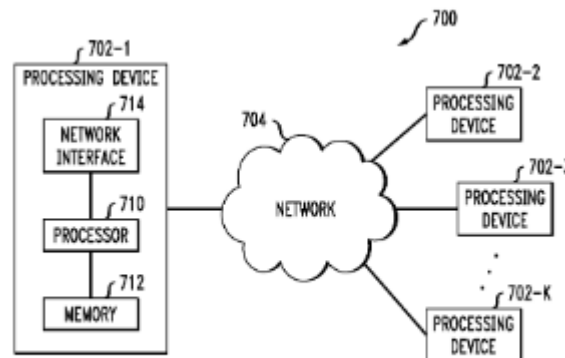
**Information source:** (WIPO IP Portal, 2023)





## 2.6. Automatically prioritizing supply chain-related demand using Artificial Intelligence techniques

Methods, apparatus, and processor-readable storage media for automatically prioritizing supply chain-related demand using Artificial Intelligence techniques are provided herein.



*Show examples of processing platforms that may be utilized to implement at least a portion of an information processing system in illustrative embodiments.*

*Credit: Kumar, D.; Sahoo, S.; Mohanty, B. & Dinh, H., Espacenet Patent Search*

An example computer-implemented method includes processing supply-chain related data using a first set of Artificial Intelligence techniques trained based at least in part on historical demand availability data; processing supply-chain related data using a second set of Artificial Intelligence techniques trained based at least in part on historical supply availability data; processing supply-chain related data using a third set of Artificial Intelligence techniques trained based at least in part on historical production availability data; prioritizing multiple orders within a supply chain environment by processing, using a fourth set of Artificial Intelligence techniques, results from the first set of Artificial Intelligence techniques, the second set of Artificial Intelligence techniques, and the third set of Artificial Intelligence techniques; and performing one or more automated actions based on the prioritization of the multiple orders.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/087162165/publication/US2023230028A1?q=artificial%20intelligence>

### Reference

Kumar, D.; Sahoo, S.; Mohanty, B. & Dinh, H. (Jul 20, 2023). Automatically prioritizing supply chain-related demand using Artificial Intelligence techniques. Recovered Jul 20, 2023, Espacenet Patent Search:

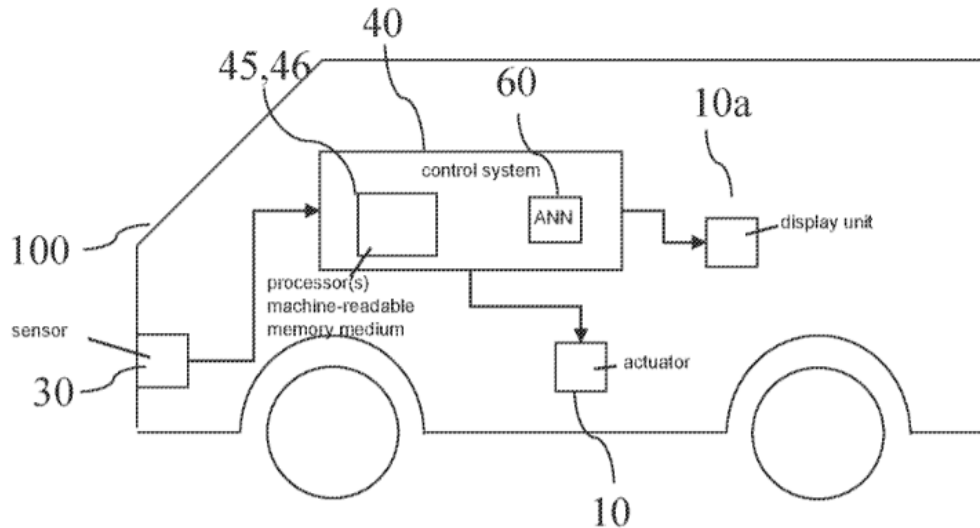
<https://worldwide.espacenet.com/patent/search/family/087162165/publication/US2023230028A1?q=artificial%20intelligence>

**Information source:** (Espacenet Patent Search, 2023)



## 2.7. Method and device for continual machine learning of a sequence of different tasks

A method for parameterizing a function, which outputs an ideal parameterization of a machine learning system for a large number of different data sets.



*Illustrates an aircraft manufacturing and service method, according to some example implementations;*

*Credit: Elsken, T., Espacenet Patent Search*

A first training of a machine learning system is carried out in succession on multiple training data sets, the individual optimized parameterizations of the machine learning system being stored for each of the training data sets. A second training of the machine learning system simultaneously on all data sets then follows, the optimal parameterization of the machine learning system being stored. An optimization of the parameterization of the function thereupon follows in such a way that, given an optimal parameterization of the first training, the function outputs the associated optimal parameterization of the second training.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086990446/publication/US2023229969A1?q=machine%20learning>

### Reference

Elsken, T. (Jul 20, 2023). Method and device for continual machine learning of a sequence of different tasks. Recovered Jul 20, 2023, Espacenet Patent Search:

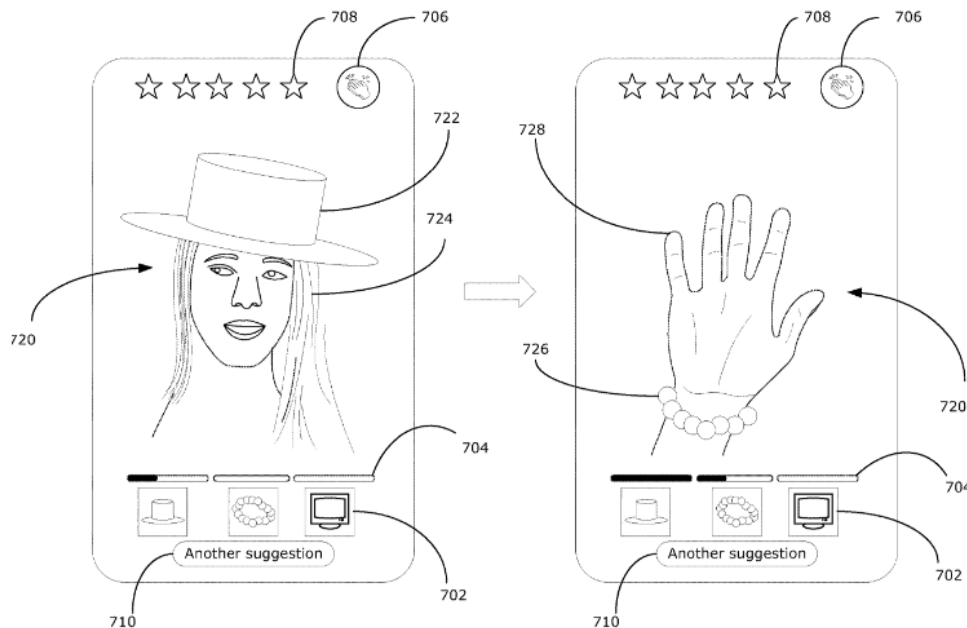
<https://worldwide.espacenet.com/patent/search/family/086990446/publication/US2023229969A1?q=machine%20learning>

**Information source:** (Espacenet Patent Search, 2023)



## 2.8. Systems and methods for generating customized augmented reality video

Methods and systems are disclosed for generating an augmented reality (AR) video. A set of products is obtained, where each product is associated with a respective virtual model and a respective object class.



*Illustrates an example interface for viewing an AR a video, in accordance with examples of the present disclosure.*

*Credit: Debreczeni, A.; Letkeman, B. & Maschmeyer, R, Espacenet Patent Search*

An AR video segment is generated for each product in the set of products. In a real-world video segment, a real-world object belonging to a relevant object class that is relevant to the object class of the given product is detected. A render of the virtual model associated with the given product is overlaid in the real-world video segment to obtain the AR video segment. The render of the virtual model is overlaid relative to the detected real-world object belonging to the relevant object class. A continuous AR video is generated from the AR video segments and outputted to be viewable by a user device.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/087162179/publication/US2023230152A1?q=reality%20virtual>

### Reference

Debreczeni, A.; Letkeman, B. & Maschmeyer, R. (Jul 20, 2023). Systems and methods for generating customized augmented reality video. Recovered Jul 20, 2023, Espacenet Patent Search:

<https://worldwide.espacenet.com/patent/search/family/087162179/publication/US2023230152A1?q=reality%20virtual>



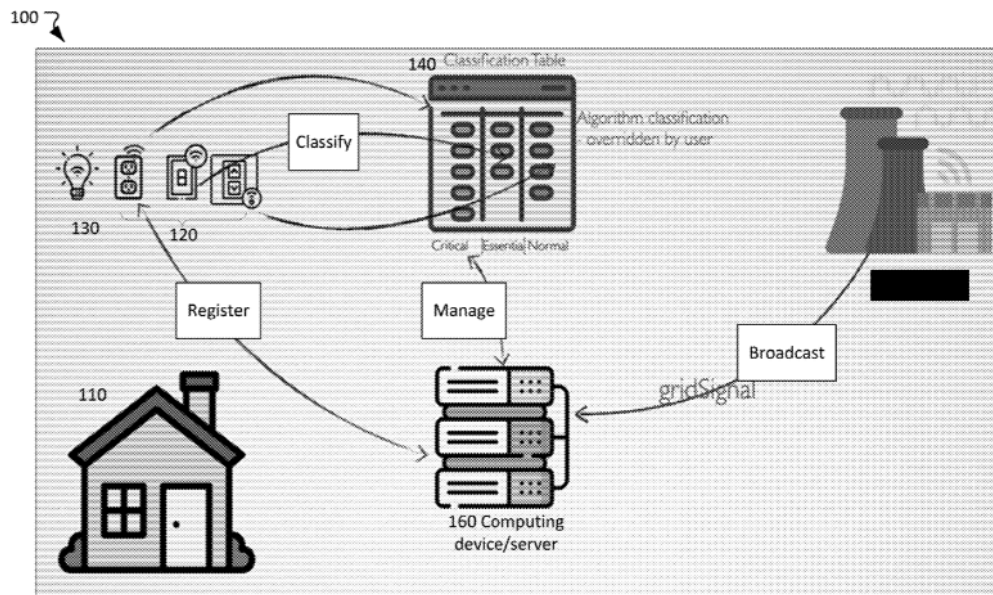
**Information source:** (Espacenet Patent Search, 2023)





## 2.9. Method and system for AI-powered smart homes and offices

AI-assisted Connected Home systems for improving power efficiency at homes and offices are described.



*Illustrates an exemplary network environment associated with an Internet-of-Things (IoT) system for improving energy efficiency in accordance with some embodiments.  
Credit: Sinha, N., Espacenet Patent Search*

The system may perform operations including: receiving, from each of a plurality of power receptacles, power usage information of an electrical device attached to the power receptacle; determining, for each of the plurality of power receptacles, a plurality of power usage metrics of the power receptacle based on the power usage information; feeding the plurality of power usage metrics into a machine learning model to obtain a priority of the electrical device attached to the power receptacle, wherein the priority is one of a plurality of pre-configured priorities; obtaining a power management signal; and transmitting a plurality of control signals to the plurality of power receptacles based on the power management signal and respective priorities of the plurality of electrical devices attached to the plurality of power receptacles.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/087162107/publication/US2023229959A1?q=internet%20of%20things>

### Reference

Sinha, N. (Jul 20, 2023). Method and system for AI-powered smart homes and offices. Recovered Jul 21, 2023, Espacenet Patent Search:  
<https://worldwide.espacenet.com/patent/search/family/087162107/publication/US2023229959A1?q=internet%20of%20things>

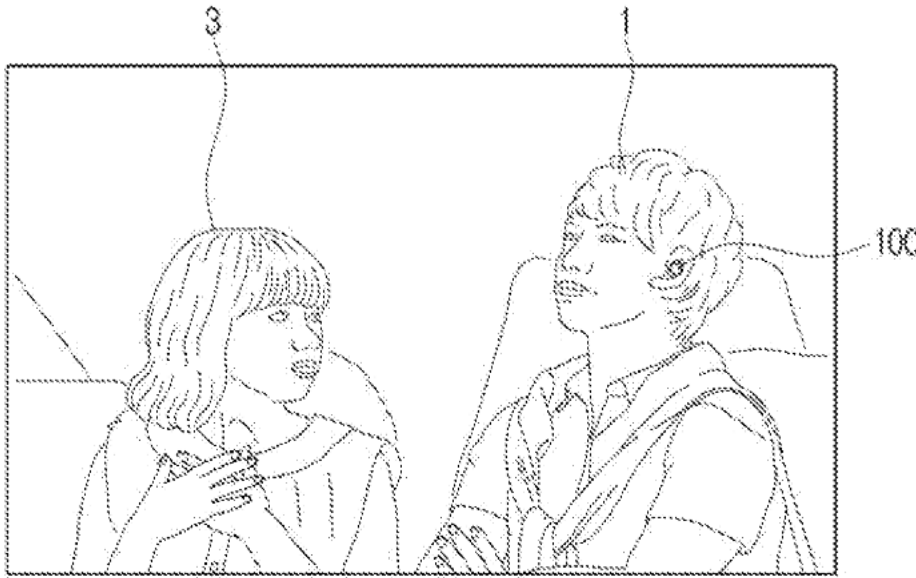


**Information source:** (Espacenet Patent Search, 2023)



## 2.10. Electronic apparatus and control method thereof

An electronic apparatus includes an inner microphone provided on a first surface of the electronic apparatus; an outer microphone disposed on a second surface opposite the first surface.



*Is a diagram illustrating use of an electronic apparatus according to an embodiment.  
Credit: Choi, S.; Min, K. & Park, S., Espacenet Patent Search*

And a processor configured to: receive a voice signal of a counterpart and a voice signal of a wearer of the electronic apparatus that are input through the inner microphone and the outer microphone, based on a size of the voice signal of the wearer input through the inner microphone being greater than or equal to a predetermined threshold, remove the voice signal of the wearer input through the outer microphone based on the voice signal of the wearer input through the inner microphone, and amplify the voice signal of the counterpart input through the outer microphone and from which the voice signal of the wearer is removed and output the amplified voice signal, wherein the size of the voice signal of the wearer input through the inner microphone is greater than a size of the voice signal of the wearer input through the outer microphone.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/087162307/publication/US2023230569A1?q=artificial%20intelligence>

### Reference

Choi, S.; Min, K. & Park, S. (Jul 20, 2023). Electronic apparatus and control method thereof. Recovered Jul 21, 2023, Espacenet Patent Search:

<https://worldwide.espacenet.com/patent/search/family/087162307/publication/US2023230569A1?q=artificial%20intelligence>



**Information source:** (Espacenet Patent Search, 2023)