



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 Biomarkers may hold key to precision mental health diagnosis, care

Currently, mental health conditions are grouped according to subjective behavioral and clinical assessments and self-reported questionnaires, says Zhang. The result is that within a single diagnostic category such as autism, the range of symptoms can be vast.



Credit: Douglas Benedict/Academic Image, Lehigh University

“Some patients show very different—or heterogenous—symptoms compared with other patients within that autism category,” he says. “At the same time, across categories like autism, attention-deficit/hyperactivity disorder, and depression, you’ll find there’s considerable overlap, or comorbidity, in symptoms. We believe there is a lack of in-depth understanding of the heterogeneity and comorbidity in major psychiatric disorders. Our project will collect more objective measures from the human body. We’ll combine brain imaging data with Machine Learning to identify neurocircuit abnormalities across traditional diagnoses that will help us redefine the classification of mental disorders.”

For more information, visit the following link:

<https://engineering.lehigh.edu/news/article/biomarkers-may-hold-key-precision-mental-health-diagnosis-care>

Reference

Fennessy, C. (Jul 10, 2023). Biomarkers may hold key to precision mental health diagnosis, care. Recovered Jul 10, 2023, Lehigh University:

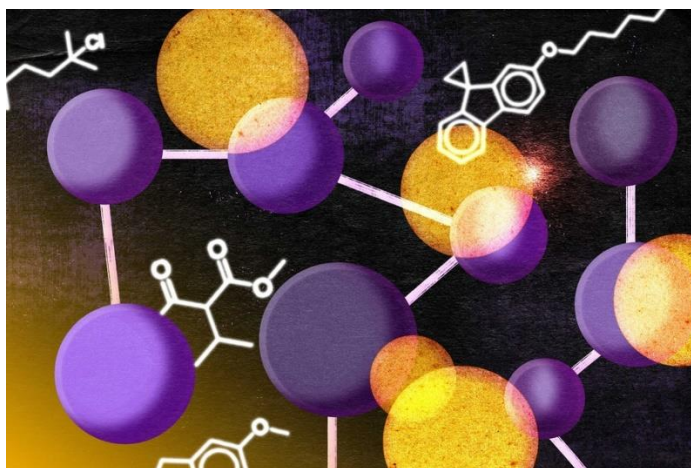
<https://engineering.lehigh.edu/news/article/biomarkers-may-hold-key-precision-mental-health-diagnosis-care>

Information source: (Lehigh University, 2023)



1.2 Learning the language of molecules to predict their properties

Discovering new materials and drugs typically involves a manual, trial-and-error process that can take decades and cost millions of dollars. To streamline this process, scientists often use Machine Learning to predict molecular properties and narrow down the molecules they need to synthesize and test in the lab.



Credit: Massachusetts Institute of Technology

Researchers from MIT and the MIT-IBM Watson AI Lab have developed a new, unified framework that can simultaneously predict molecular properties and generate new molecules much more efficiently than these popular deep-learning approaches. To teach a machine-learning model to predict a molecule's biological or mechanical properties, researchers must show it millions of labeled molecular structures — a process known as training. Due to the expense of discovering molecules and the challenges of hand-labeling millions of structures, large training datasets are often hard to come by, which limits the effectiveness of machine-learning approaches.

For more information, visit the following link:

<https://news.mit.edu/2023/learning-language-molecules-predict-properties-0707>

Reference

Zewe, A. (Jul 07, 2023). Learning the language of molecules to predict their properties. Recovered Jul 07, 2023, Massachusetts Institute of Technology:

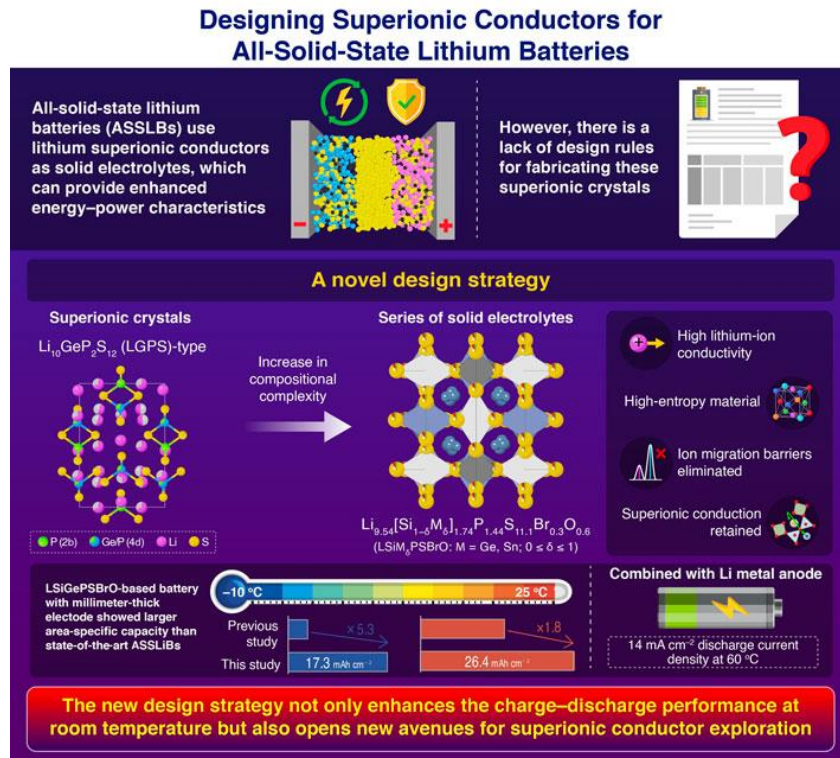
<https://news.mit.edu/2023/learning-language-molecules-predict-properties-0707>

Information source: (Massachusetts Institute of Technology, 2023)



1.3 New design rule for high-entropy superionic solid-state conductors

Solid electrolytes with high lithium-ion conductivity can be designed for millimeter-thick battery electrodes by increasing the complexity of their composite superionic crystals, report researchers from Tokyo Tech. This new design rule enables the synthesis of high-entropy active materials while preserving their superionic conduction.



A lithium superionic conductor for millimeter-thick battery electrode
Li et al. (2023) | Science



Credit: Tokyo Institute of Technology

The paper—authored by a team of researchers led by Prof. Ryoji Kanno from Tokyo Institute of Technology (Tokyo Tech)—describes a new strategy to produce solid electrolytes with enhanced Li-ion conductivity. Their work establishes a design rule for synthesizing high-entropy crystals of lithium superionic conductors via the multi-substitution approach. "Many studies have shown that inorganic ionic conductors tend to show better ion conductivity after multi-element substitution probably because of the flattened potential barrier of Li-ion migration, which is essential for better ion conductivity," points out Prof. Kanno.

For more information, visit the following link:
<https://www.titech.ac.jp/english/news/2023/067100>

Reference

Kanno, R. & Ikematsu, M. (Jul 07, 2023). New design rule for high-entropy superionic solid-state conductors. Recovered Jul 07, 2023, Tokyo Institute of Technology:
<https://www.titech.ac.jp/english/news/2023/067100>

Information source: (Tokyo Institute of Technology, 2023)



1.4 Training robots how to learn, make decisions on the fly

Researchers in the Departments of Aerospace Engineering and Computer Science at the University of Illinois Urbana-Champaign developed a novel learning-based method so robots on extraterrestrial bodies can make decisions on their own about where and how to scoop up terrain samples.



From these 12 materials and terrains made of a unique composition of one or more materials, a database of 6,700 was created.

Credit: University of Illinois Urbana-Champaign

“Rather than simulating how to scoop every possible type of rock or granular material, we created a new way for autonomous landers to learn how to learn to scoop quickly on a new material it encounters,” said Pranay Thangeda, a Ph.D. student in the Department of Aerospace Engineering. “It also learns how to adapt to changing landscapes and their properties, such as the topology and the composition of the materials,” he said. Using this method, Thangeda said a robot can learn how to scoop a new material with very few attempts. “If it makes several bad attempts, it learns it shouldn’t scoop in that area and it will try somewhere else.”

For more information, visit the following link:

<https://aerospace.illinois.edu/news/56817>

Reference

Levey, D. (Jul 06, 2023). Training robots how to learn, make decisions on the fly. Recovered Jul 07, 2023, University of Illinois Urbana-Champaign: <https://aerospace.illinois.edu/news/56817>

Information source: (University of Illinois Urbana-Champaign, 2023)



1.5 Digital skin check service

DermScreen aims to change that by equipping trained melanographers (experts in detecting skin cancer and melanoma) with the hardware and software to perform a full-body skin check within 15 minutes – a scan that is then clinically assessed by a dermatologist at another location.

While currently only based in Bondi Junction, Dr Tong aims to roll DermScreen out across the country and guarantee same-week appointments with melanographers to all patients. *“Digitising the skin check process in a way that’s reproducible also allows us to track your skin over time with a baseline for future comparison. If you use the ABCDE melanoma detection guide, E is for evolution – our technology now lets us objectively assess this,”* Dr Tong said.

For more information, visit the following link:

<https://www.sydney.edu.au/news-opinion/news/2023/07/11/digital-skin-check-service-wins-sydney-genesis-startup-competiti.html>

Reference

Vesery, H. (Jul 11, 2023). Digital skin check service wins Sydney Genesis startup competition. Recovered Jul 11, 2023, The University of Sydney:

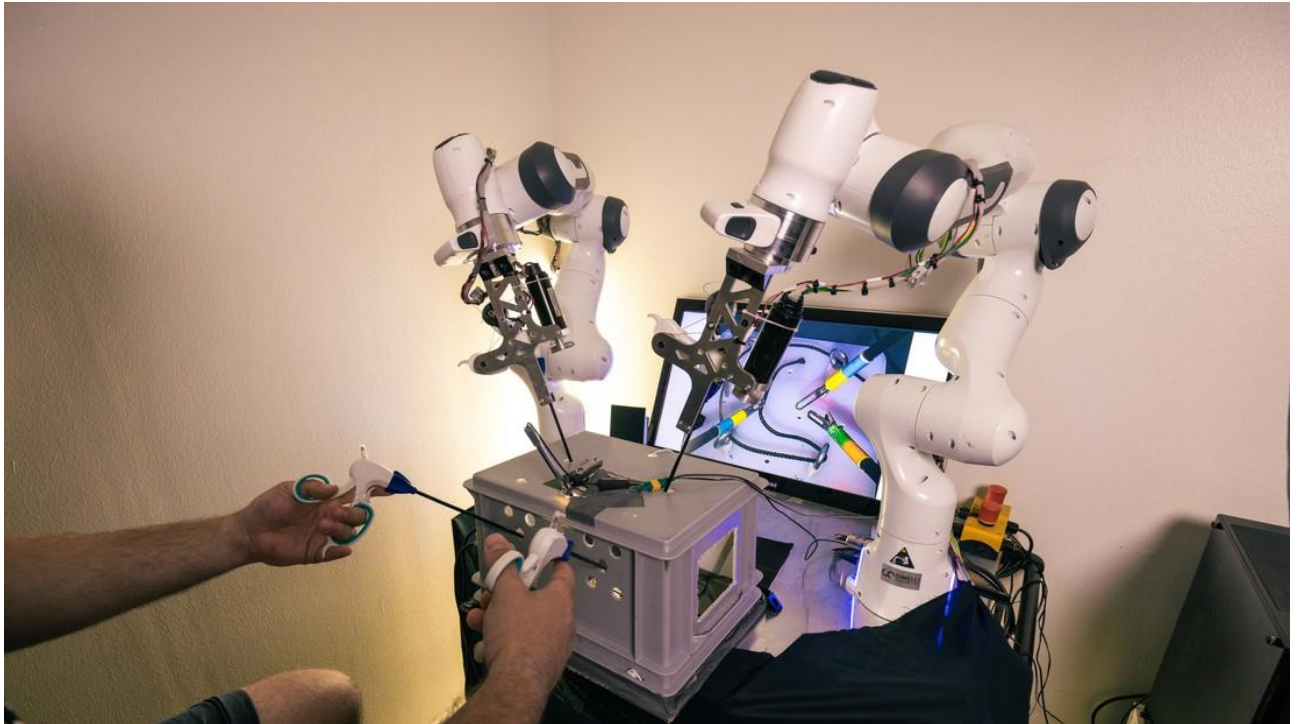
<https://www.sydney.edu.au/news-opinion/news/2023/07/11/digital-skin-check-service-wins-sydney-genesis-startup-competiti.html>

Information source: (The University of Sydney, 2023)



1.6 Robot assisted surgery, four arms are better than two

Roboticians at EPFL have combined multi-limb manipulation with advanced shared control augmentation for an unprecedented advance in the field of laparoscopic surgery. The results, published in *The International Journal of Robotics Research*, confirm the feasibility of the setup for reducing surgeon workload and improving precision and safety. Specialists have already been successfully trained on the system and clinical trials are ongoing in Geneva.



*Researchers at EPFL have developed the first system that enables four-arm laparoscopic surgery by controlling two additional robotic arms via haptic foot interfaces.
Credit: Ecole Polytechnique Fédérale de Lausanne*

“Controlling four arms simultaneously, moreover with one’s feet, is far from routine and can be quite tiring. To reduce the complexity of the control, the robots actively assist the surgeon by coordinating their movements with the surgeon’s through active prediction of the surgeon’s intent and adaptive visual tracking of laparoscopic instruments with the camera. Additionally, assistance is offered for more accurate grasping of the tissues,” says Professor Aude Billard, head of LASA.

For more information, visit the following link:

<https://news.epfl.ch/news/robot-assisted-surgery-four-arms-are-better-than-t/>

Reference

Mitchell, M. (Jul 07, 2023). Robot assisted surgery: four arms are better than two. Recovered Jul 07, 2023, Ecole Polytechnique Fédérale de Lausanne:
<https://news.epfl.ch/news/robot-assisted-surgery-four-arms-are-better-than-t/>

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



1.7 Building models to predict interactions in plant microbiomes

Microbiologists at ETH Zurich have developed computational models that use nutrients and metabolism of plant-associated bacteria to predict how the microbes interact on the surface of leaves and ultimately form the microbiome.



Credit: Eidgenössische Technische Hochschule Zürich

Team of researchers led by Vorholt has identified just such an organising principle for the bacteria that live on the leaves of the model plant *Arabidopsis thaliana* (thale cress). The researchers have developed a set of models that use the nutrient preferences and metabolic abilities of individual bacterial strains to predict how these leaf surface microbes compete or cooperate with each other, thereby helping us better understand the nature of the resulting microbiome.

For more information, visit the following link:

<https://ethz.ch/en/news-and-events/eth-news/news/2023/07/building-models-to-predict-interactions-in-plant-microbiomes.html>

Reference

Keller, J. (Jul 06, 2023). Building models to predict interactions in plant microbiomes. Recovered Jul 07, 2023, Eidgenössische Technische Hochschule Zürich:

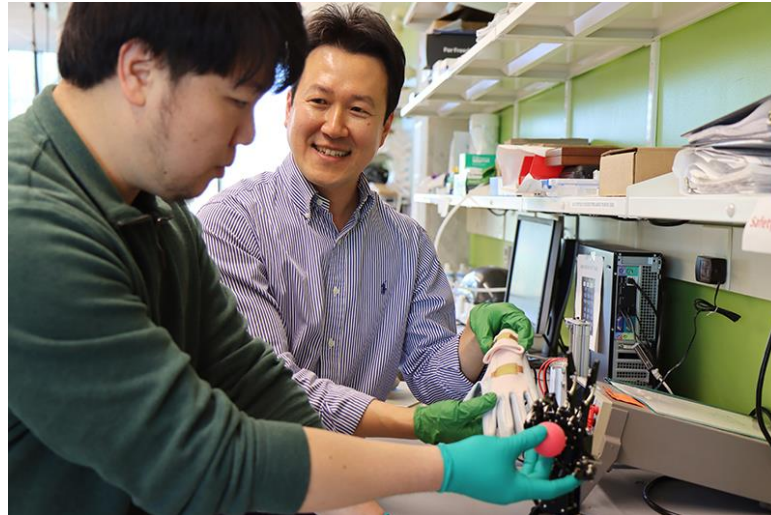
<https://ethz.ch/en/news-and-events/eth-news/news/2023/07/building-models-to-predict-interactions-in-plant-microbiomes.html>

Information source: (Eidgenössische Technische Hochschule Zürich, 2023)



1.8 Sensors with potential health-monitoring applications onto ready-made wearables

A patent-pending method developed by Purdue University researchers brings the public one step closer to clothes with wearable electronics that don't affect the wearer's comfort. The method also simplifies the manufacturing process and boosts sensing capability.



Credit: Purdue University

Wearable electronics that monitor bioinformation like blood pressure, body temperature and respiratory patterns have become prominent in research. Traditional wearable devices such as health-monitoring systems, however, are hard and inflexible, which makes them difficult to wear for extended periods of time. Furthermore, fabricating wearable sensors onto clothing creates different sets of problems, said Sunghwan Lee, assistant professor of engineering technology in the Purdue Polytechnic Institute. Traditional sensors eliminate fabric breathability, or the circulation of air from the inside to the outside. Breathability allows vapor moisture to diffuse, which prevents people from overheating and keeps them comfortable.

For more information, visit the following link:

<https://www.purdue.edu/newsroom/releases/2023/Q3/purdue-researchers-fabricate-sensors-with-potential-health-monitoring-applications-onto-ready-made-wearables.html>

Reference

Martin, S. (Jul 10, 2023). Purdue researchers fabricate sensors with potential health-monitoring applications onto ready-made wearables. Recovered Jul 10, 2023, Purdue University:
<https://www.purdue.edu/newsroom/releases/2023/Q3/purdue-researchers-fabricate-sensors-with-potential-health-monitoring-applications-onto-ready-made-wearables.html>

Information source: (Purdue University, 2023)



1.9 How polarization patterns enable new technology

University of Illinois Urbana-Champaign researchers have developed a novel method for underwater geolocation using deep neural networks that have been trained on 10 million polarization-sensitive images collected from locations around the world. This new study, led by electrical and computer engineering professor Viktor Gruev, along with computer science professor David Forsyth, enables underwater geolocation using only optical data while providing a tool for tethered-free underwater navigation.



Credit: University of Illinois Urbana-Champaign

“We are showing for the first time, you can geolocate yourself, or a camera, in a number of different conditions, whether in open ocean waters, clear waters or low visibility waters, at day, at night, or at depth,” says Gruev. *“Once you have a sense of where you are, then you can start exploring and use that information to have a better understanding of the underwater world or even how animals navigate.”*

For more information, visit the following link:

<https://ece.illinois.edu/navigating-the-future-of-underwater-geolocation-how-polarization-patterns-enable-new-technology>

Reference

Rose, A. (Jul 10, 2023). Navigating the future of underwater geolocation: how polarization patterns enable new technology. Recovered Jul 10, 2023, University of Illinois Urbana-Champaign: <https://ece.illinois.edu/navigating-the-future-of-underwater-geolocation-how-polarization-patterns-enable-new-technology>

Information source: (University of Illinois Urbana-Champaign, 2023)



1.10 Game-playing automaton acts like an “irrational” human

Humans make lots of irrational decisions in predictable ways, but what if we’re all just doing our best within the limits of our abilities?

Researchers were able to simulate human behaviors using a probabilistic finite automaton, a well-known model of limited computational power. They programmed the automatons to compete against each other in a wildlife poaching game, as either a rhino poacher or a ranger trying to stop the poaching. When the automatons could remember everything, they settled into an optimal game strategy. But when researchers limited their memories, they took some decision-making shortcuts – the same kinds as actual humans playing the game. This new work supports the idea of bounded rationality, that *“sometimes we do silly things or make systemic mistakes, not because we’re irrational but because we have limited resources,”* said first author Xinming Liu. *“Oftentimes, we cannot remember everything that happened in the past or we don’t have enough time to make a fully rational decision.”*

For more information, visit the following link:

<https://news.cornell.edu/stories/2023/07/game-playing-automaton-acts-irrational-human>

Reference

Waldron, P. (Jul 10, 2023). Game-playing automaton acts like an “irrational” human. Recovered Jul 10, 2023, Cornell University:

<https://news.cornell.edu/stories/2023/07/game-playing-automaton-acts-irrational-human>

Information source: (Cornell University, 2023)



1.11 Making headway in precision therapeutics with novel fully organic bioelectronic device

Tiny transistor enables device to acquire and transmit neurophysiologic brain signals while simultaneously providing power to the implanted device



*A vIGT array consisting of half a million transistors conforming to the complex curvilinear surface of the finger of Alma Mater, Columbia University's iconic stature.
Credit: Dion Khodagholy, Claudia Cea/Columbia Engineering*

As researchers make major advances in medical care, they are also discovering that the efficacy of these treatments can be enhanced by individualized approaches. Therefore, clinicians increasingly need methods that can both continuously monitor physiological signals and then personalize responsive delivery of therapeutics. Implanted bioelectronic devices are playing a critical role in these treatments, but there are a number of challenges that have stalled their widespread adoption. These devices require specialized components for signal acquisition, processing, data transmission, and powering. Up to now, achieving these capabilities in an implanted device has entailed using numerous rigid and non-biocompatible components that can lead to tissue disruption and patient discomfort. Ideally, these devices need to be biocompatible, flexible, and stable in the long term in the body. They also must be fast and sensitive enough to record rapid, low-amplitude biosignals, while still being able to transmit data for external analysis.

For more information, visit the following link:

<https://www.engineering.columbia.edu/news/making-headway-in-precision-therapeutics-with-novel-fully-organic-bioelectronic-device>

Reference

Evarts, H. (Jul 10, 2023). Making headway in precision therapeutics with novel fully organic bioelectronic device. Recovered Jul 10, 2023, Columbia University:

<https://www.engineering.columbia.edu/news/making-headway-in-precision-therapeutics-with-novel-fully-organic-bioelectronic-device>

Information source: (Columbia University, 2023)



1.12 Researchers devise algorithm to break through “*search bubbles*”

When looking for a new type of book, movie, or restaurant, your search may suggest a title or venue you’ve already purchased or experienced. This is because the Artificial Intelligence tools many companies rely on push users into a “*filter bubble*,” resulting in recommendations identical, or very similar to, what has been previously purchased.

A team of computer scientists has now devised a way to break through these search bubbles with an algorithm, Pyrorank, that draws from the natural world—mimicking interactions in an ecosystem. It does so by reducing the impact of users’ profiles and broadening recommendations that still reflect the focus of the search, producing more diverse and useful results. “*When it comes to inspiration for solutions to computer science problems, nature is the perfect place to look*,” explains Anasse Bari, a clinical associate professor at NYU’s Courant Institute of Mathematical Sciences and a co-creator of the algorithm. “*Natural phenomena, such as bird flocks searching for food, show that nature can often find optimal, yet simple, solutions to address needs.*”

For more information, visit the following link:

<https://www.nyu.edu/about/news-publications/news/2023/july/researchers-devise-algorithm-to-break-through--search-bubbles-.html>

Reference

Devitt, J. (Jul 10, 2023). Researchers devise algorithm to break through “*search bubbles*”. Recovered Jul 10, 2023, New York University:

<https://www.nyu.edu/about/news-publications/news/2023/july/researchers-devise-algorithm-to-break-through--search-bubbles-.html>

Information source: (New York University, 2023)



1.13 Next-generation flow battery design sets records

A common food and medicine additive has shown it can boost the capacity and longevity of a next-generation flow battery design in a record-setting experiment.

A research team from the Department of Energy's Pacific Northwest National Laboratory reports that the flow battery, a design optimized for electrical grid energy storage, maintained its capacity to store and release energy for more than a year of continuous charge and discharge. The PNNL research team that developed this new battery design includes researchers with backgrounds in organic and chemical synthesis. These skills came in handy when the team chose to work with materials that had not been used for battery research, but which are already produced for other industrial uses. As described in the research study, the sugar additive accepts positively charged protons, which helps balance out the movement of negative electrons as the battery discharges.

For more information, visit the following link:

<https://www.pnnl.gov/news-media/next-generation-flow-battery-design-sets-records>

Reference

Hede, K.. (Jul 10, 2023). Next-generation flow battery design sets records. Recovered Jul 10, 2023, Pacific Northwest National Laboratory:

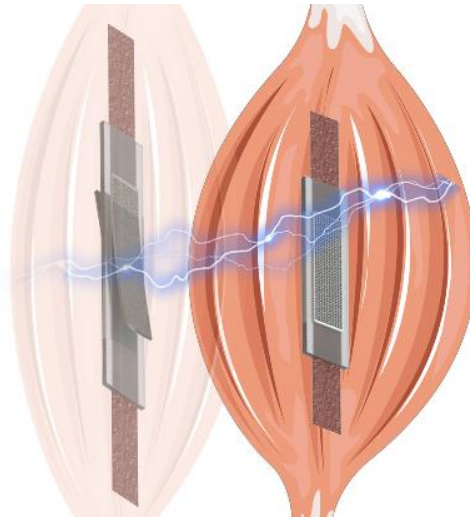
<https://www.pnnl.gov/news-media/next-generation-flow-battery-design-sets-records>

Information source: (Pacific Northwest National Laboratory, 2023)



1.14 Revolutionary self-sensing electric artificial muscles

Muscle contraction hardening is not only essential for enhancing strength but also enables rapid reactions in living organisms. Taking inspiration from nature, the team of researchers at Queen Mary's School of Engineering and Materials Science has successfully created an artificial muscle that seamlessly transitions between soft and hard states while also possessing the remarkable ability to sense forces and deformations.



Credit: Queen Mary University of London

Dr. Ketao Zhang, a Lecturer at Queen Mary and the lead researcher, explains the importance of variable stiffness technology in artificial muscle-like actuators. *"Empowering robots, especially those made from flexible materials, with self-sensing capabilities is a pivotal step towards true bionic intelligence,"* says Dr. Zhang.

For more information, visit the following link:

<https://www.qmul.ac.uk/media/news/2023/se/revolutionary-self-sensing-electric-artificial-muscles--.html>

Reference

Queen Mary University of London. (Jul 11, 2023). Revolutionary self-sensing electric artificial muscles. Recovered Jul 11, 2023, Queen Mary University of London:
<https://www.qmul.ac.uk/media/news/2023/se/revolutionary-self-sensing-electric-artificial-muscles--.html>

Information source: (Queen Mary University of London, 2023)



1.15 Data scientists predict stock returns with Artificial Intelligence and online news

Cornell researchers have discovered it can also inform the algorithm behind a new financial predicting model. In their paper, “*News-Based Sparse Machine Learning Models for Adaptive Asset Pricing*,” published in *Data Science in Science* in April, the researchers draw from interdisciplinary fields such as Machine Learning, natural language processing (NLP) and finance to build a new, interpretable machine-learning framework that captures stock- and industry-specific information and predicts financial returns with greater accuracy than traditional models.

“One of the knocks on Machine Learning is it’s not interpretable,” said Martin Wells, the Charles A. Alexander Professor of Statistical Sciences in the Cornell Ann. S Bowers College of Computing and Information Science and the paper’s senior author. *“Often when researchers use big models such as these, they may not know what the outputs mean or what is underlying the model. This research leverages text data from the news to build interpretable machine-learning models where you can see the important features explicitly.”*

For more information, visit the following link:

<https://news.cornell.edu/stories/2023/07/data-scientists-predict-stock-returns-ai-and-online-news>

Reference

DiPietro, L. (Jul 11, 2023). Data scientists predict stock returns with AI and online news. Recovered Jul 11, 2023, Cornell University:

<https://news.cornell.edu/stories/2023/07/data-scientists-predict-stock-returns-ai-and-online-news>

Information source: (Cornell University, 2023)



1.16 The ground is deforming, and buildings aren't ready

A new Northwestern University study has, for the first time, linked underground climate change to the shifting ground beneath urban areas. As the ground heats up, it also deforms. This phenomenon causes building foundations and the surrounding ground to move excessively (due to expansions and contractions) and even crack, which ultimately affects structures' long-term operational performance and durability. Researchers also report that past building damage may have been caused by such rising temperatures and expect these issues to continue for years to come.

Although rising temperatures do pose a threat to our infrastructure, the researchers also view it as a potential opportunity. By capturing the waste heat emitted underground from subterranean transportation systems, parking garages and basement facilities, urban planners could mitigate the effects of underground climate change as well as reuse the heat into an untapped thermal energy resource.

For more information, visit the following link:

<https://news.northwestern.edu/stories/2023/07/the-ground-is-deforming-and-buildings-arent-ready/>

Reference

Morris, A. (Jul 11, 2023). The ground is deforming, and buildings aren't ready. Recovered Jul 11, 2023, Northwestern University:

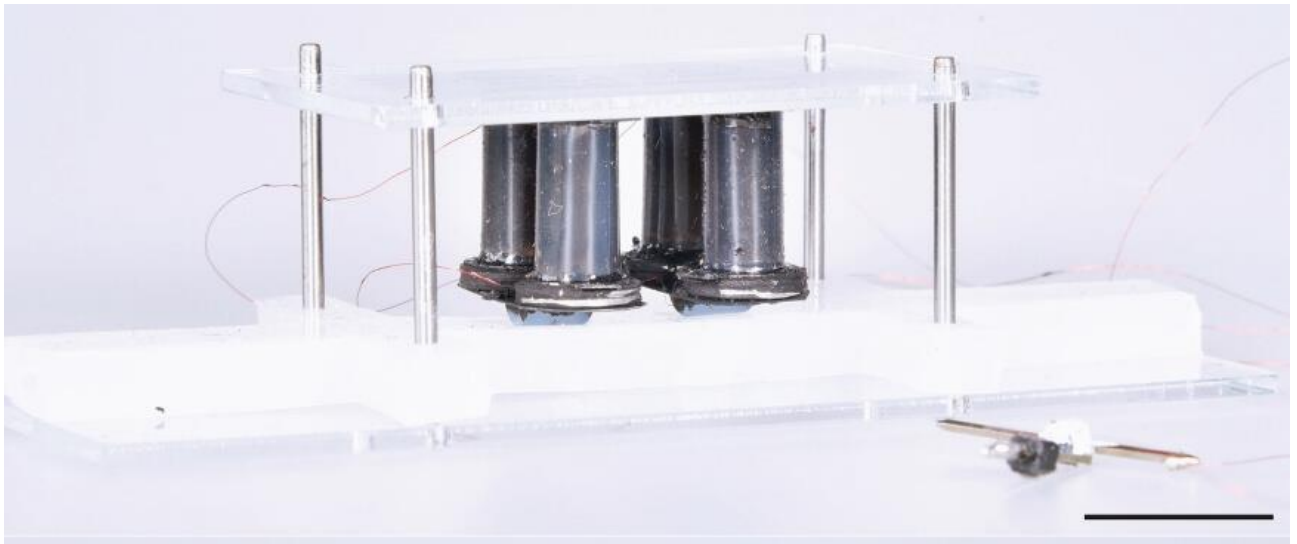
<https://news.northwestern.edu/stories/2023/07/the-ground-is-deforming-and-buildings-arent-ready/>

Information source: (Northwestern University, 2023)



1.17 Pump powers soft robots, makes cocktails

Wood's team developed a compact, soft pump with adjustable pressure flow versatile enough to pump a variety of fluids with varying viscosity, including gin, juice, and coconut milk, and powerful enough to power soft haptic devices and a soft robotic finger.



*A dual dielectric elastomer actuator-based soft peristaltic pump
Credit: Harvard Microrobotics Lab/Harvard SEAS*

The pump's size, power and versatility opens up a range of possibilities for soft robots in a variety of applications, including food handling, manufacturing, and biomedical therapeutics. Peristaltic pumps are widely used in industry. These simple machines use motors to compress a flexible tube, creating a pressure differential that forces liquid through the tube. These types of pumps are especially useful in biomedical applications because the fluid doesn't touch any component of the pump itself.

For more information, visit the following link:

<https://seas.harvard.edu/news/2023/07/pump-powers-soft-robots-makes-cocktails>

Reference

Burrows, L. (Jul 10, 2023). Pump powers soft robots, makes cocktails. Recovered Jul 11, 2023, Harvard John A. Paulson School of Engineering and Applied Sciences:
<https://seas.harvard.edu/news/2023/07/pump-powers-soft-robots-makes-cocktails>

Information source: (Harvard John A. Paulson School of Engineering and Applied Sciences, 2023)



1.18 Could AI-powered robot “companions” combat human loneliness?

While it is increasingly difficult to make new friends as an adult to help offset loneliness, making a companion robot to support socially isolated older adults may prove to be a promising solution. “*AI presents exciting opportunities to give companion robots greater skills to build social connection,*” said Elizabeth Broadbent, Ph.D., professor of Psychological Medicine at Waipapa Taumata Rau, University of Auckland. “*But we need to be careful to build in rules to ensure they are moral and trustworthy.*”



Credit: Duke University

Social robots like the ElliQ have had thousands of interactions with human users, nearly half related to simple companionship, including company over a cup of tea or coffee. A growing body of research on companion robots suggests they can reduce stress and loneliness and can help older people remain healthy and active in their homes. Newer robots embedded with advanced AI programs may foster stronger social connections with humans than earlier generations of robots. Generative AI like ChatGPT, which is based on large language models, allows robots to engage in more spontaneous conversations, and even mimic the voices of old friends and loved ones who have passed away.

For more information, visit the following link:

<https://today.duke.edu/2023/07/could-ai-powered-robot-companions-combat-human-loneliness>

Reference

Vahaba, D. (Jul 12 2023). Could AI-powered robot “companions” combat human loneliness?. Recovered Jul 12, 2023, Duke University:

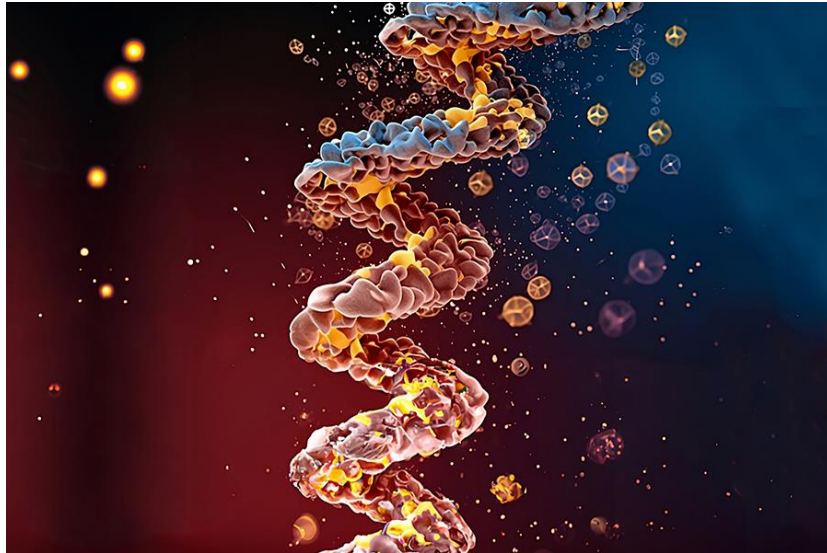
<https://today.duke.edu/2023/07/could-ai-powered-robot-companions-combat-human-loneliness>

Information source: (Duke University, 2023)



1.19 Generative Artificial Intelligence imagines new protein structures

To advance our capabilities in protein engineering, MIT CSAIL researchers came up with “*FrameDiff*,” a computational tool for creating new protein structures beyond what nature has produced. The Machine Learning approach generates “*frames*” that align with the inherent properties of protein structures, enabling it to construct novel proteins independently of preexisting designs, facilitating unprecedented protein structures.



Credit: Massachusetts Institute of Technology

"In nature, protein design is a slow-burning process that takes millions of years. Our technique aims to provide an answer to tackling human-made problems that evolve much faster than nature's pace," says MIT CSAIL PhD student Jason Yim, a lead author on a new paper about the work. "The aim, with respect to this new capacity of generating synthetic protein structures, opens up a myriad of enhanced capabilities, such as better binders. This means engineering proteins that can attach to other molecules more efficiently and selectively, with widespread implications related to targeted drug delivery and biotechnology, where it could result in the development of better biosensors. It could also have implications for the field of biomedicine and beyond, offering possibilities such as developing more efficient photosynthesis proteins, creating more effective antibodies, and engineering nanoparticles for gene therapy."

For more information, visit the following link:

<https://news.mit.edu/2023/generative-ai-imagines-new-protein-structures-0712>

Reference

Gordon, R. (Jul 12, 2023). Generative AI imagines new protein structures. Recovered Jul 12, 2023, Massachusetts Institute of Technology: <https://news.mit.edu/2023/generative-ai-imagines-new-protein-structures-0712>

Information source: (Massachusetts Institute of Technology, 2023)



1.20 New oxychloride solid-state electrolyte for lithium batteries shows good performance with ultra-low cost

A research team led by Prof. MA Cheng from the University of Science and Technology of China (USTC) of the Chinese Academy of Sciences (CAS) developed a new type of solid-state electrolyte.

All-solid-state lithium batteries (ASSLBs) are a game changer for electric vehicles since they not only overcome the serious safety issues of the current commercial lithium-ion batteries, but also possess larger room for energy-density improvement. Identifying an appropriate solid-state electrolyte is essential for the construction of ASSLBs. Nevertheless, presently the high-performance solid-state electrolytes are generally too expensive for commercialization. In this study, the researchers developed a new solid-state electrolyte named lithium zirconium oxychloride (LZCO). LZCO can be synthesized from the commonly affordable compounds such as lithium hydroxide monohydrate, lithium chloride, and zirconium chloride.

For more information, visit the following link:

https://english.cas.cn/newsroom/research_news/chem/202307/t20230712_333507.shtml

Reference

Liu, J. (Jul 12, 2023). New oxychloride solid-state electrolyte for lithium batteries shows good performance with ultra-low cost. Recovered Jul 12, 2023, Chinese Academy of Sciences:
https://english.cas.cn/newsroom/research_news/chem/202307/t20230712_333507.shtml

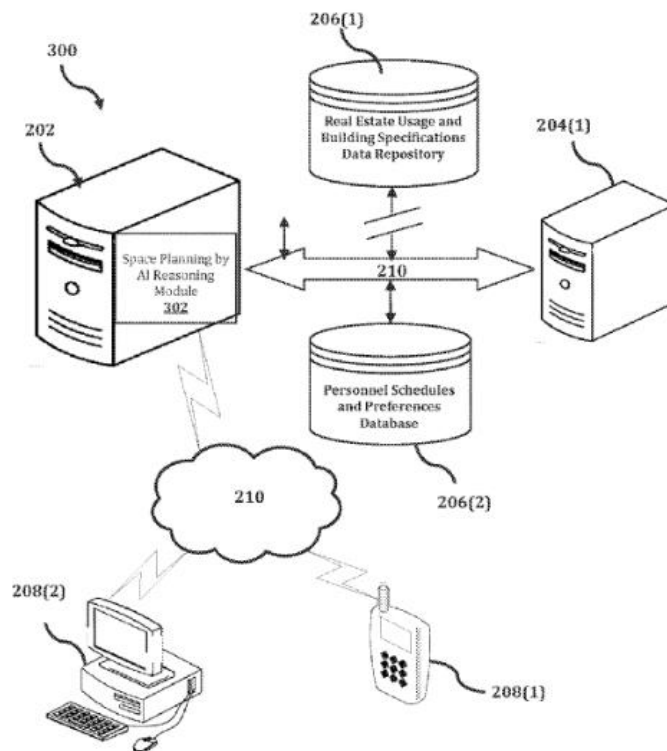
Information source: (Chinese Academy of Sciences, 2023)



II. PATENTS

2.1. Method and system for space planning by Artificial Intelligence reasoning

A method and a computing apparatus for allocating space in a building are provided. The method includes: receiving a first input that includes information that relates to a plurality of persons that intend to occupy the building; receiving a second input that includes information that relates to building specifications; receiving a third input that includes information that relates to constraints that are mandatory and preferences that are not mandatory.



Shows an exemplary system for implementing a method for using Artificial Intelligence and Machine Learning techniques to optimize real estate usage and space planning.

Credit: Ramos, R.; Pozanco, A.; Zehtabi, P.; Magazzeni, D. & Veloso, M., WIPO IP Portal

And determining, based on each of the first input, the second input, and the third input, an allocation of each person to a corresponding space within the building and a respective schedule for each person to occupy the corresponding space. The determination of the allocation and the respective schedule may be effected by applying an Artificial Intelligence (AI) algorithm that is configured to satisfy all of the mandatory constraints and to optimize a satisfaction of the preferences.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US400934462&_cid=P22-LJYHT5-40486-1

Reference

Ramos, R.; Pozanco, A.; Zehtabi, P.; Magazzeni, D. & Veloso, M. (Jul 06, 2023). Automated categorization of groups in a social network. Recovered Jul 06, 2023, WIPO IP Portal:

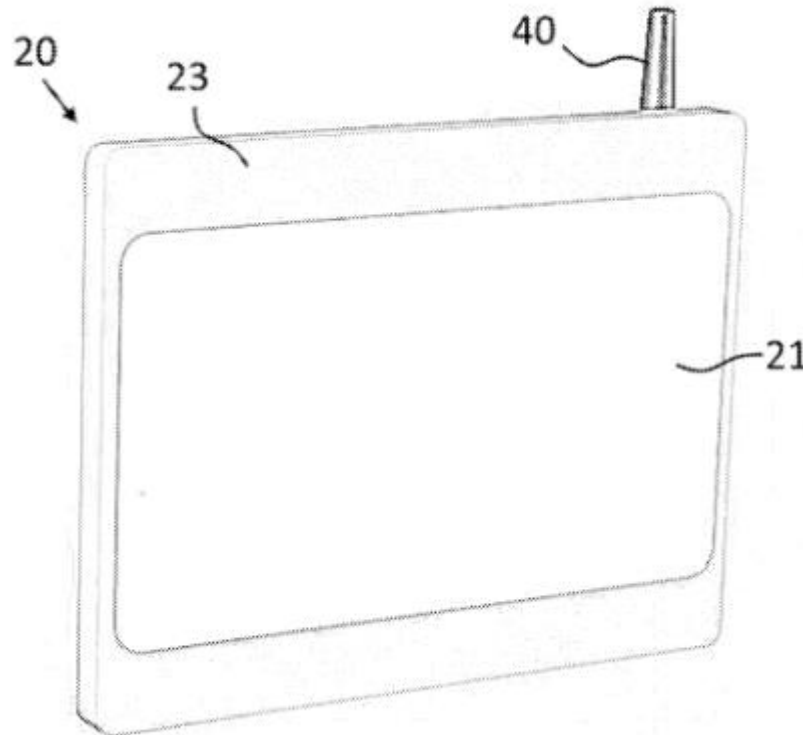
https://patentscope.wipo.int/search/es/detail.jsf?docId=US400934462&_cid=P22-LJYHT5-40486-1

Information source: (WIPO IP Portal, 2023)



2.2. Biohazard decision support system and method

A decision support system providing minimization of devastating impacts of epidemics by means of identification of epidemics/biohazards symptoms of which are known in the literature and taking them under control as soon as possible, and characterized by comprising at least one data input device that enables the entry of epidemic/biohazard-related findings and data and the transmission of the entered data to the central data processing device.



Is front view of data input device.

Credit: Koluman, A.; Ciylan, F.; Başol, S. & Türk, M., WIPO IP Portal

Microprocessor in the data input device that enables data collection, processing and encryption, wireless communication module and antenna that enable the data collected with the data input device to be transmitted to the central data processing device, a database providing the storage of the data sent by the data input device, at least one central data processing device providing meaningful results for decision makers by processing the data with Artificial Intelligence algorithms.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023129042&_cid=P22-LJYJ2W-56015-1

Reference

Koluman, A.; Ciylan, F.; Başol, S. & Türk, M. (Jul 06, 2023). Biohazard decision support system and method. Recovered Jul 06, 2023, WIPO IP Portal:

https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023129042&_cid=P22-LJYJ2W-56015-1

Information source: (WIPO IP Portal, 2023)



2.3. Evaluating organizational skills using cognitive computing to determine cost of entering a new market

Generating a model for evaluating organizational skills to determine cost of entering a new market includes training a Machine Learning model to define business capabilities, processes and required skills of an organization based on a current business strategy.

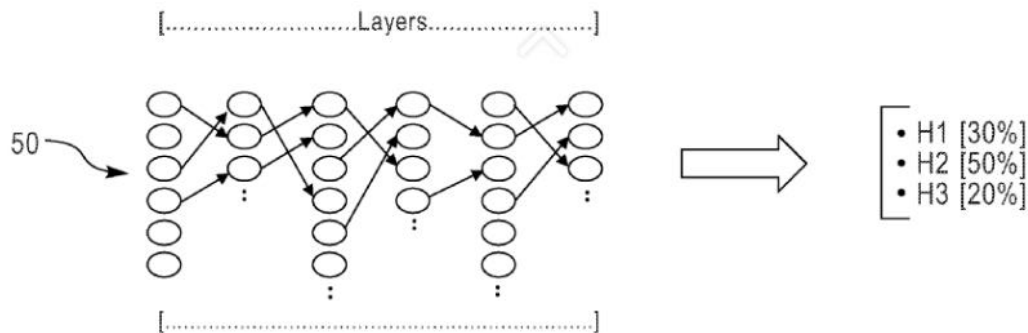


Diagram showing the relationship of the layers for horizons.

Credit: Larise, L.; Sukhija, S.; Kaplan, G.; Daley, S.; Bharti, H. & Mikucionis, J., WIPO IP Portal

Training the Machine Learning model to define a plurality of skill classes of the required skills of the organization using the cognitive computing processor device, training the Machine Learning model to define skill profiles of the available talent of the organization based on the plurality of skill classes, determining skill gaps of the available talent of the organization by analyzing the required skills of the organization and the skill profiles, assessing skills required for a new business strategy for the organization, and determining a cost of the organization executing the new business strategy based on the skill profiles, the at least one skill gap and the new business strategy skills.

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US400934675&_cid=P22-LK03T3-21672-1

Reference

Larise, L.; Sukhija, S.; Kaplan, G.; Daley, S.; Bharti, H. & Mikucionis, J. (Jul 06, 2023). Evaluating organizational skills using cognitive computing to determine cost of entering a new market. Recovered Jul 06, 2023, WIPO IP Portal:

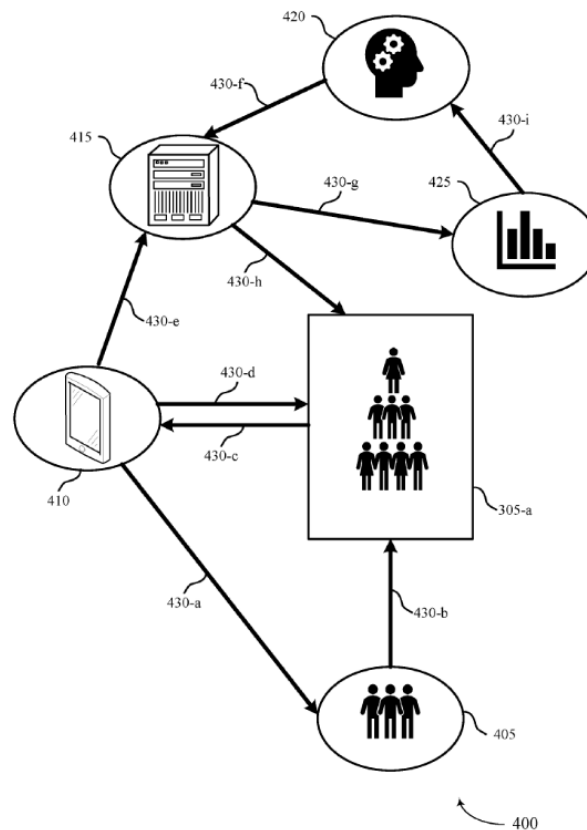
https://patentscope.wipo.int/search/es/detail.jsf?docId=US400934675&_cid=P22-LK03T3-21672-1

Information source: (WIPO IP Portal, 2023)



2.4. Interactive temperature control system

Methods, systems, and devices for an interactive environmental control system are described. In some examples, operating temperatures for individual zones of an environment may be determined based on inputs received from occupants of the respective zones. For example, a building may be separated into zones, and environmental conditions at each zone may be monitored and adjusted independently.



Illustrates an example of a schematic that supports an interactive environmental control system in accordance with examples as disclosed herein

Credit: Yao, C.; Chakma, G. & Bokade, B., WIPO IP Portal

Each occupant of a zone may update their environmental preference and the system may utilize the user inputs to set and adjust an operating temperature for the respective zone based on the occupants' preferences. In some examples, the system may implement Machine Learning techniques to predict and set operating conditions for the zones based on inputs, such as a history of inputs, from building occupants (e.g., from occupants of a respective zone).

For more information, visit the following link:

https://patentscope.wipo.int/search/es/detail.jsf?docId=US400933012&_cid=P22-LK03T3-21672-1

Reference

Yao, C.; Chakma, G. & Bokade, B. (Jul 06, 2023). Interactive temperature control system. Recovered Jul 06, 2023, WIPO IP Portal:

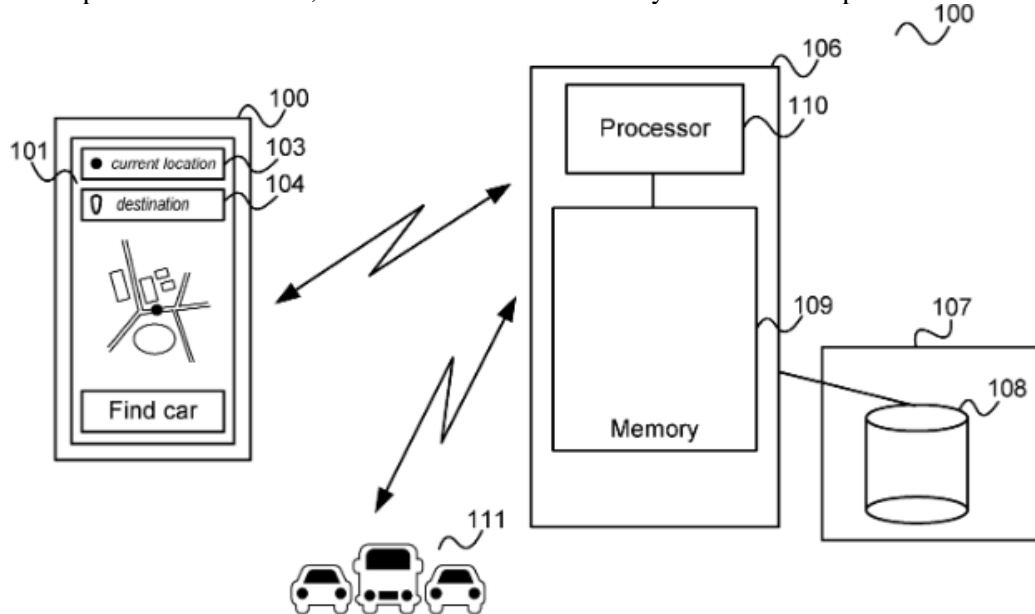
https://patentscope.wipo.int/search/es/detail.jsf?docId=US400933012&_cid=P22-LK03T3-21672-1

Information source: (WIPO IP Portal, 2023)



2.5. Method and device for determining a location of a mobile device

Aspects concern a method for determining a location of a mobile device comprising, for each order of a transport or transport-related service, wherein the order is made by means of a respective mobile terminal.



*Shows a communication arrangement for usage of an e-hailing or related service including a smartphone and a server.
Credit: Scherwitz, S., WIPO IP Portal*

Generating a training data element from a wireless radio fingerprint observed by the respective mobile terminal at the time of the order and a location of the order, training a Machine Learning model with the training data elements by using the wireless radio fingerprints as inputs and the respective locations as ground truth and determining the location of a mobile device by acquiring a wireless radio fingerprint observed by the mobile device and feeding the wireless radio fingerprint to the trained Machine Learning model.

For more information, visit the following link:

<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023128867>

Reference

Vadgama, V. & Leng, M. (Jul 06, 2023). Method and device for determining a location of a mobile device. Recovered Jul 06, 2023, WIPO IP Portal:

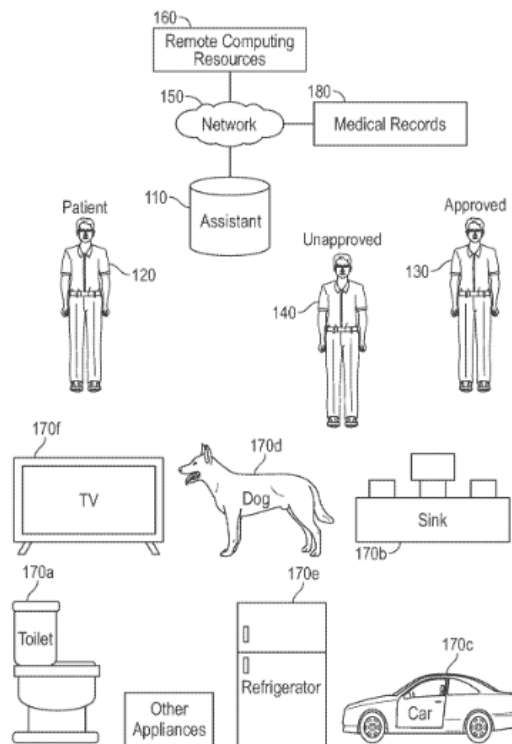
<https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023128867>

Information source: (WIPO IP Portal, 2023)



2.6. Passive assistive alerts using Artificial Intelligence assistants

Embodiments herein determine when to place a passive assistive call using personal Artificial Intelligence (AI) assistants. The present embodiments improve upon the base functionalities of the assistant devices by monitoring the usually discarded or filtered-out environmental sounds to identify when a person is in distress to automatically issue an assistive call in addition to or alternatively to monitoring user speech for active commands to place assistive calls.



Illustrates an environment in which an assistant device, hosting a local client for an AI assistant, may be deployed to interact with various persons, according to embodiments of the present disclosure.

Credit: Alam, S.; Dsouza, K.; Kadam, K.; Ostrem, A. & Prajapati, A., Espacenet Patent Search

The assistant device may be in communication with various other sensors to enhance or supplement the audio assessment of the persons in the environment, and may be used in a variety of scenarios where prior call systems struggled to quickly and accurately identify distress in various monitored persons (e.g., patients) including falls, stroke onset, and choking.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086992826/publication/US2023210372A1?q=artificial%20intelligence>

Reference

Alam, S.; Dsouza, K.; Kadam, K.; Ostrem, A. & Prajapati, A. (Jul 06, 2023). System and methods for determination of effective nutritional supplements to improve performance and well-being. Recovered Jul 06, 2023, Espacenet Patent Search:

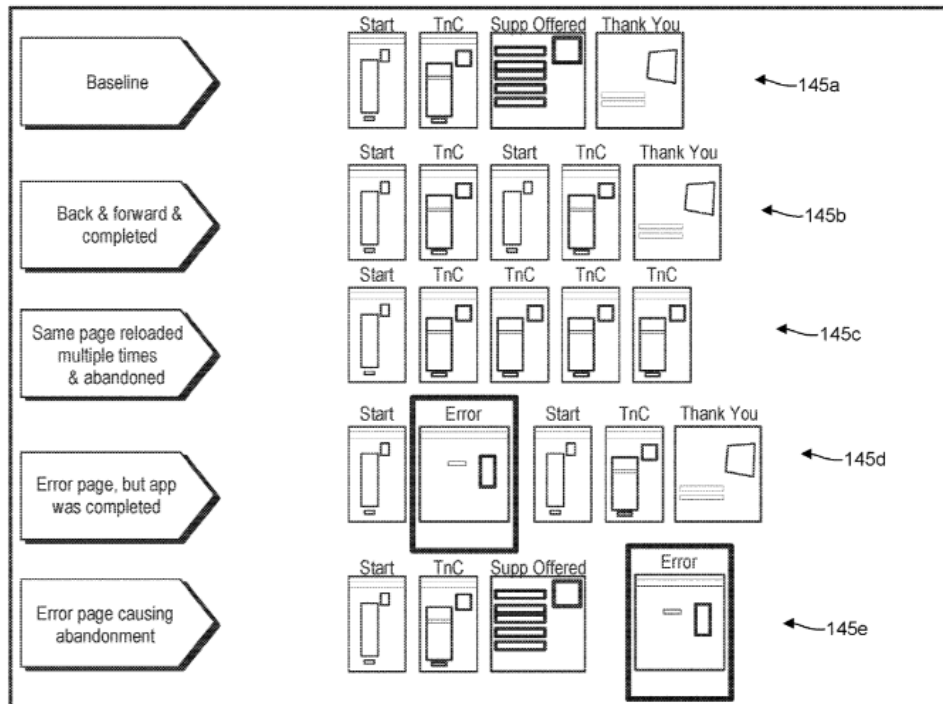
<https://worldwide.espacenet.com/patent/search/family/086992826/publication/US2023210372A1?q=artificial%20intelligence>

Information source: (Espacenet Patent Search, 2023)



2.7. Automated identification of website errors

Systems and methods for automated detection of website errors during a sequence of device interactions with a website. In one example, a computing device is configured to receive a website navigation sequence of a series of web page interactions between a client device and a website.



Is a drawing of example website navigation sequences of a client device interacting with a website according to various embodiments of the present disclosure.

Credit: Moctezuma, J.; Mondal, A.; Rosette, K. & Tkachenko, A., Espacenet Patent Search

The computing device can determine a predicted completion time for a next measurement of the client device executing the website navigation sequence. An actual completion time for the next measurement of the client device executing the website navigation sequence can be determined. Then, the computing device can determine an anomaly website event based on the actual completion time failing to meet a boundary threshold. The anomaly website event is determined to be a website error based on a second Machine Learning model being trained with a plurality of previous website errors identified from a plurality of previous website navigation sequences.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086991639/publication/US2023214288A1?q=machine%20learning>

Reference

Moctezuma, J.; Mondal, A.; Rosette, K. & Tkachenko, A. (Jul 06, 2023). Automated identification of website errors. Recovered Jul 06, 2023, Espacenet Patent Search:

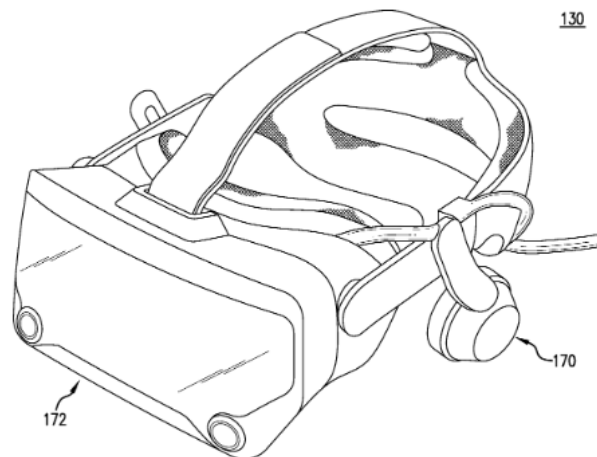
<https://worldwide.espacenet.com/patent/search/family/086991639/publication/US2023214288A1?q=machine%20learning>

Information source: (Espacenet Patent Search, 2023)



2.8. Virtual reality de-escalation tool for delivering electronic impulses to targets

A VR system is described. A simulation engine receives position data of an object during a scenario and transmits the position data to a modular symptoms generator. The modular symptoms generator queries a database to determine predefined position data for the object during the scenario and compares the captured position data with the predefined position data for the object during the scenario.



Depicts a schematic diagram of a head-mounted display for use in a VR system, according to at least some embodiments disclosed herein.

Credit: Dabush, E. & Shiffman, R., Espacenet Patent Search

If the position data for the object meets or exceeds the predefined position data, the modular symptoms generator executes a first modification on a portion of the scenario and if the position data for the object fails to meet or exceed the predefined position data, the modular symptoms generator executes a second modification on a portion of the scenario. The first modification results in a more favorable situation as compared to the situation resulting from the second modification.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086991599/publication/US2023214007A1?q=virtual%20reality>

Reference

Dabush, E. & Shiffman, R. (Jul 06, 2023). Virtual reality de-escalation tool for delivering electronic impulses to targets. Recovered Jul 06, 2023, Espacenet Patent Search:

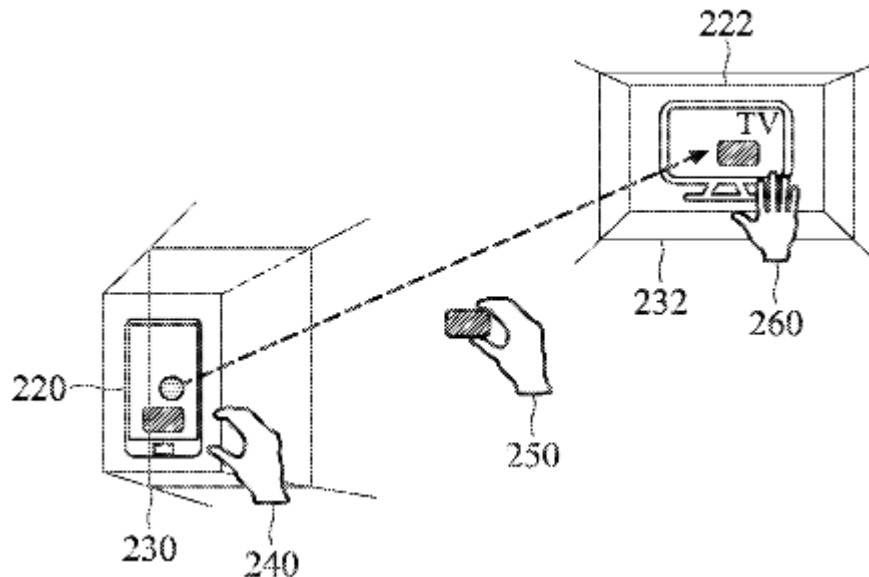
<https://worldwide.espacenet.com/patent/search/family/086991599/publication/US2023214007A1?q=virtual%20reality>

Information source: (Espacenet Patent Search, 2023)



2.9. Method and an electronic device for 3D gesture interaction across nearby electronic devices

A method for 3D gesture interaction across electronic devices includes: measuring spatial location information of the electronic devices based on Location Technology; generating a 3D gesture field of the electronic devices based on the spatial location information.



*Is a schematic diagram of different gestures in accordance with some embodiments of the present invention.
Credit: Sun, G.; Li, N. & Wang, Y., Espacenet Patent Search*

Setting the location update method, the detection method of 3D gesture, the frequency band of detecting 3D gesture, and the time sequence of detecting gesture at different devices; detecting the cooperative gesture; generating interactive auxiliary messages based on the detection of the cooperative gesture; updating the 3D gesture field if the location of any devices have update; identifying the cooperative gesture in the 3D gesture field of the electronic devices; performing the commands corresponding to the cooperative gesture; detecting that the cooperative gesture is beyond the 3D gesture field of the electronic devices; and sending the cooperative gesture to other electronic devices based on the direction of the cooperative gesture.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086991604/publication/US2023214023A1?q=3D>

Reference

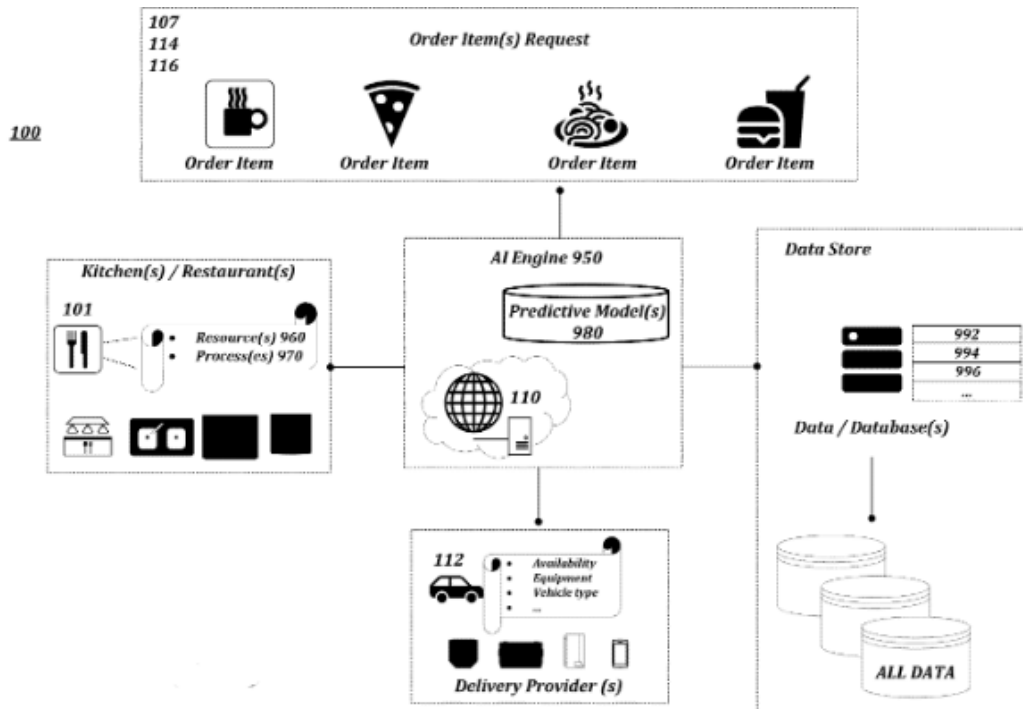
Sun, G.; Li, N. & Wang, Y. (Jul 06, 2023). Method and an electronic device for 3D gesture interaction across nearby electronic devices. Recovered Jul 07, 2023, Espacenet Patent Search:
<https://worldwide.espacenet.com/patent/search/family/086991604/publication/US2023214023A1?q=3D>

Information source: (Espacenet Patent Search, 2023)



2.10. Coordinated food production and preparation

According to one aspect, a method for improved kitchen production is provided, the method comprising: receiving a request for one or more order items to be prepared in a kitchen, each of the one or more order items comprising: a recipe requiring: one or more resources for preparation, one or more processes for preparation, and an estimated preparation time, and a requested pickup time.



Illustrates a network diagram of a system including an Artificial Intelligence (“AI”) engine consistent with the present disclosure.

Credit: Garcia, M., Espacenet Patent Search

Retrieving a kitchen production capacity comprising a plurality of resources of the kitchen and a plurality of processes of the kitchen; projecting kitchen availability comprising: resource availability at a timeframe, process availability at the predetermined timeframe, current order items being prepared in the kitchen, and order items awaiting preparation in the kitchen; assessing the kitchen production capacity and the kitchen availability in view of the recipes of the one or more order items; and scheduling, based on the comparing, production the one or more order items.

For more information, visit the following link:

<https://worldwide.espacenet.com/patent/search/family/086991916/publication/US2023214735A1?q=artificial%20intelligence>

Reference

Garcia, M. (Jul 06, 2023). Coordinated food production and preparation. Recovered Jul 07, 2023, Espacenet Patent Search:

<https://worldwide.espacenet.com/patent/search/family/086991916/publication/US2023214735A1?q=artificial%20intelligence>

Information source: (Espacenet Patent Search, 2023)