Weekly Newsletter
TECHNOLOGY SURVEILLANCE

Nº 44-2023 NOV 03TH, 2023

CONCYTEC

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

I. NEWS

1.1 Study examines the devastating impact of loneliness on autistic people

New research has revealed just how acutely Autistic people experience loneliness contradicting the stereotype that they avoid seeking meaningful social relationships. Loneliness negatively affects physical and mental health in both neurotypical and neurodivergent individuals and rates of loneliness are up to four times higher in Autistic individuals than their peers. Autistic people also have a greater vulnerability to the negative physical and psychological consequences of loneliness. However, social environments often act as barriers, making it more difficult for people with higher levels of sensory differences to interact with others.

A new study, investigated Autistic people's experiences and sought to not only quantify the level of distress associated with loneliness but also to provide a qualitative insight into Autistic adults' loneliness. The authors include Dr Gemma Williams, a public health research officer in the School of Health and Social Care. She said: *"In the quantitative part of the study, our results indicate that sensory differences are related with higher loneliness and associated poor mental health in both Autistic and non-Autistic adults. This effect was exacerbated in Autistic adults due to a greater presence of sensory processing differences."*

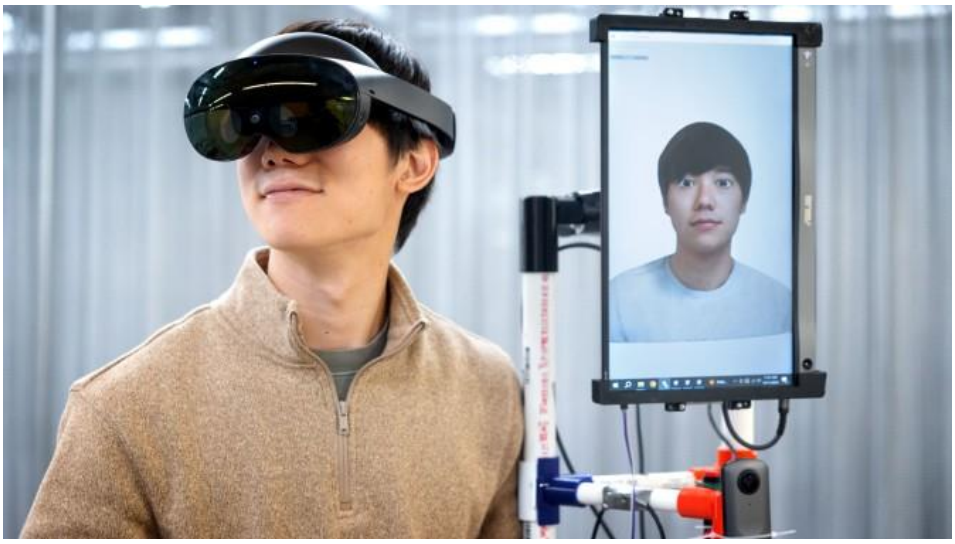
For more information, visit the following link:
https://www.swansea.ac.uk/press-office/news-events/news/2023/11/study-examines-the-devastating-impact-of-loneliness-on-autistic-people.php

Reference
Tomás, K. (Nov 02, 2023). Study examines the devastating impact of loneliness on autistic people. Recovered Nov 02, 2023, Swansea University: https://www.swansea.ac.uk/press-office/news-events/news/2023/11/study-examines-the-devastating-impact-of-loneliness-on-autistic-people.php

Information source: (Swansea University, 2023)

1.2 Robot stand-in mimics your movements in Virtual Reality

Researchers from Cornell and Brown University have developed a souped-up telepresence robot that responds automatically and in real-time to a remote user's movements and gestures made in Virtual Reality.



Student with the VRoxy system.
Credit: Sreang Hok, Cornell University

The robotic system, called VRoxy, allows a remote user in a small space, like an office, to collaborate via VR with teammates in a much larger space. VRoxy represents the latest in remote, robotic embodiment from researchers in the Cornell Ann S. Bowers College of Computing and Information Science. *"The great benefit of Virtual Reality is we can leverage all kinds of locomotion techniques that people use in Virtual Reality games, like instantly moving from one position to another,"* said Mose Sakashita, a doctoral student in the field of information science. *"This functionality enables remote users to physically occupy a very limited amount of space but collaborate with teammates in a much larger remote environment."*

For more information, visit the following link:
https://news.cornell.edu/stories/2023/10/robot-stand-mimics-your-movements-vr

Reference
DiPietro, L. (Oct 26, 2023). Robot stand-in mimics your movements in VR. Recovered Oct 27, 2023, Cornell University:
https://news.cornell.edu/stories/2023/10/robot-stand-mimics-your-movements-vr

Information source: (Cornell University, 2023)

1.3 Vision via sound for the blind

Australian researchers have developed cutting-edge technology known as *"acoustic touch"* that helps people *"see"* using sound.

A research team member who is blind uses acoustic touch to locate and reach for an item on the table.
Credit: Lil Deverell CC-BY 4.0, University of Technolog - Sydney

Australian researchers have developed cutting-edge technology known as *"acoustic touch"* that helps people *"see"* using sound. The technology has the potential to transform the lives of those who are blind or have low vision. Around 39 million people worldwide are blind, according to the World Health Organisation, and an additional 246 million people live with low vision, impacting their ability to participate in everyday life activities. The next generation smart glasses, which translate visual information into distinct sound icons, were developed by researchers from the University of Technology Sydney and the University of Sydney, together with Sydney start-up ARIA Research.

For more information, visit the following link:
https://www.uts.edu.au/news/tech-design/vision-sound-blind

Reference
University of Technology - Sydney (Oct 26, 2023). To excel at engineering design, generative AI must learn to innovate, study finds. Recovered Oct 27, 2023, University of Technology - Sydney: https://www.uts.edu.au/news/tech-design/vision-sound-blind

Information source: (University of Technology - Sydney, 2023)

1.4 Shape-shifting fiber can produce morphing fabrics

Instead of needing a coat for each season, imagine having a jacket that would dynamically change shape so it becomes more insulating to keep you warm as the temperature drops.

Researchers from MIT and Northeastern University developed a liquid crystal elastomer fiber that can change its shape in response to thermal stimuli.
Credit: Massachusetts Institute of Technology

A programmable, actuating fiber developed by an interdisciplinary team of Massachusetts Institute of Technology researchers could someday make this vision a reality. Known as FibeRobo, the fiber contracts in response to an increase in temperature, then self-reverses when the temperature decreases, without any embedded sensors or other hard components. The low-cost fiber is fully compatible with textile manufacturing techniques, including weaving looms, embroidery, and industrial knitting machines, and can be produced continuously by the kilometer. This could enable designers to easily incorporate actuation and sensing capabilities into a wide range of fabrics for myriad applications.

For more information, visit the following link:
https://news.mit.edu/2023/shape-shifting-fiber-can-produce-morphing-fabrics-1026

Reference
Zewe, A. (Oct 26, 2023). Shape-shifting fiber can produce morphing fabrics. Recovered Oct 27, 2023, Massachusetts Institute of Technology:
https://news.mit.edu/2023/shape-shifting-fiber-can-produce-morphing-fabrics-1026

Information source: (Massachusetts Institute of Technology, 2023)

1.5 Artificial Intelligence can alert urban planners and policymakers to cities' decay

More than two-thirds of the world's population is expected to live in cities by 2050, according to the United Nations. As urbanization advances around the globe, researchers at the University of Notre Dame and Stanford University said the quality of the urban physical environment will become increasingly critical to human well-being and to sustainable development initiatives.

However, measuring and tracking the quality of an urban environment, its evolution and its spatial disparities is difficult due to the amount of on-the-ground data needed to capture these patterns. To address the issue, Yong Suk Lee, assistant professor of technology, economy and global affairs in the Keough School of Global Affairs at the University of Notre Dame, and Andrea Vallebueno from Stanford University used Machine Learning to develop a scalable method to measure urban decay at a spatially granular level over time. In their study, Lee and Vallebueno used the YOLOv5 model (a form of Artificial Intelligence that can detect objects) to detect eight object classes that indicate urban decay or contribute to an unsightly urban space — things like potholes, graffiti, garbage, tents, barred or broken windows, discolored or dilapidated façades, weeds and utility markings. They focused on three cities: San Francisco, Mexico City and South Bend, Indiana. They chose neighborhoods in these cities based on factors including urban diversity, stages of urban decay and the authors' familiarity with the cities.

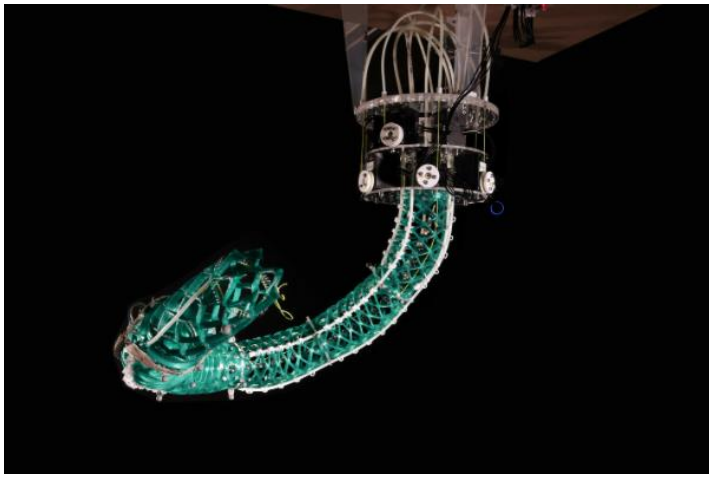
For more information, visit the following link:
https://news.nd.edu/news/ai-can-alert-urban-planners-and-policymakers-to-cities-decay/

Reference
Toler, A. (Oct 26, 2023). AI can alert urban planners and policymakers to cities' decay. Recovered Oct 27, 2023, City University of Notre Dame:
https://news.nd.edu/news/ai-can-alert-urban-planners-and-policymakers-to-cities-decay/

Information source: (University of Notre Dame, 2023)

1.6 Soft, elephant trunk-like robot for close interaction with humans

At EPFL's CREATE lab, under the guidance of Josie Hughes, a breakthrough has been made in the realm of soft robotics. Drawing inspiration from the versatile movement of elephant trunks and octopus tentacles, the team introduced the trimmed helicoid — a novel robotic structure that promises greater compliance and control in robotic designs.



A soft, flexible robot safe for interaction with humans
Credit: Alain Herzog - CC-BY-SA 4.0, Ecole Polytechnique Fédérale de Lausanne

With a blend of keen biological observation and computational modeling, the researchers have now unveiled a soft robot arm capable of intricate tasks, ensuring safer human-robot interactions. The findings, detailing both the structure and methodology, are a collaboration with the Department of Cognitive Robotics at TU Delft. Professor Hughes highlighted the importance of this development: "Through the invention of a new architectured structure, the trimmed helicoid, we've designed a robot arm that excels in control, range of motion, and safety. When the novel architecture is combined with distributed actuation— where multiple actuators are placed throughout a structure or device—this robot arm has a vast range of motion, high precision, and is inherently safe for human interaction."

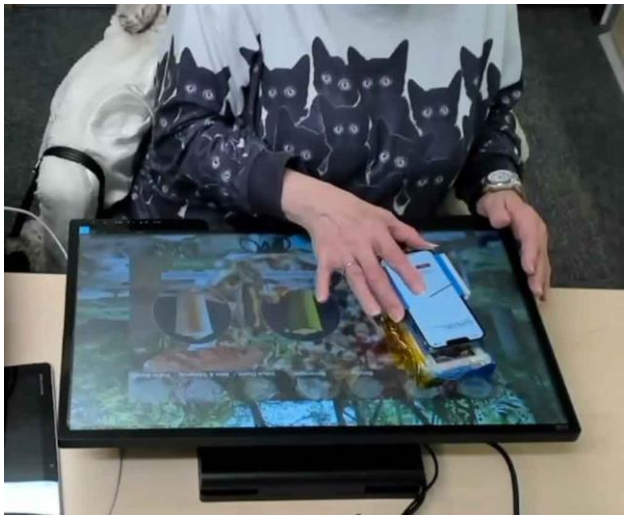
For more information, visit the following link:
https://actu.epfl.ch/news/soft-elephant-trunk-like-robot-for-close-interacti/

Reference
David, M. (Oct 26, 2023). Soft, elephant trunk-like robot for close interaction with humans. Recovered Oct 27, 2023, Ecole Polytechnique Fédérale de Lausanne:
https://actu.epfl.ch/news/soft-elephant-trunk-like-robot-for-close-interacti/

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

1.7 New phone case provides workaround for inaccessible touch screens

A new smartphone case could soon enable folks with visual impairments, tremors and spasms to use touch screens independently.



BrushLens helped people with visual impairments locate items on a touchscreen menu in study trials.
Credit: The University of Michigan

Developed at the University of Michigan, BrushLens could help users perceive, locate and tap buttons and keys on the touch screen menus now ubiquitous in restaurant kiosks, ATM machines and other public terminals. *"So many technologies around us require some assumptions about users' abilities, but seemingly intuitive interactions can actually be challenging for people,"* said Chen Liang, a doctoral student in computer science and engineering. Users can comb through a touch screen interface by holding a phone connected to BrushLens against a touch screen and dragging the phone across the screen. The phone sees what's on the screen with its camera then reads the options aloud by harnessing the phone's built-in screen readers. Users indicate their menu choice through screen readers or an enlarged, easy-to-tap button in the BrushLens app.

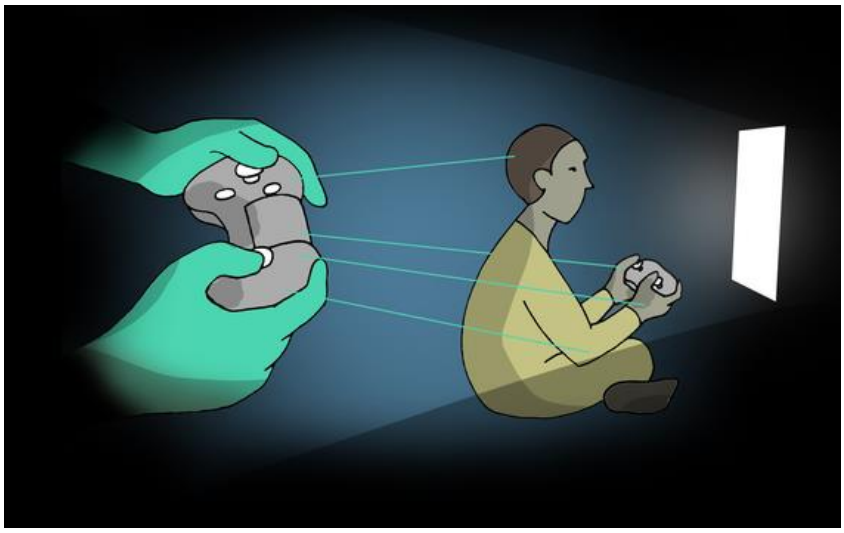
For more information, visit the following link:
https://news.umich.edu/new-phone-case-provides-workaround-for-inaccessible-touch-screens/

Reference
Smith, D. (Oct 26, 2023). New phone case provides workaround for inaccessible touch screens. Recovered Oct 27, 2023, The University of Michigan:
https://news.umich.edu/new-phone-case-provides-workaround-for-inaccessible-touch-screens/

Information source: (The University of Michigan, 2023)

1.8 Online games use dark designs to collect player data

The privacy policies and practices of online games contain dark design patterns which could be deceptive, misleading, or coercive to users, according to a new study from Aalto University.



Dark designs are interface decisions that manipulate users into doing something they otherwise wouldn't.
Credit: Matti Ahlgren/Aalto University

Gaming is a $193 billion industry – nearly double the size of the film and music industries combined – and there are around three billion gamers worldwide. While online gaming can improve wellbeing and foster social relations, privacy and awareness issues could potentially offset these benefits and cause real harm to gamers. The new study, by scientists at Aalto University's Department of Computer Science, reveals potentially questionable data collection practices in online games, along with misconceptions and concerns about privacy among players. The study also offers risk mitigation strategies for players and design recommendations for game developers to improve privacy in online games. The authors identified instances of games using dark design – interface decisions that manipulate users into doing something they otherwise wouldn't. These could facilitate the collection of player data and encourage players to integrate their social media accounts or allow data sharing with third parties.

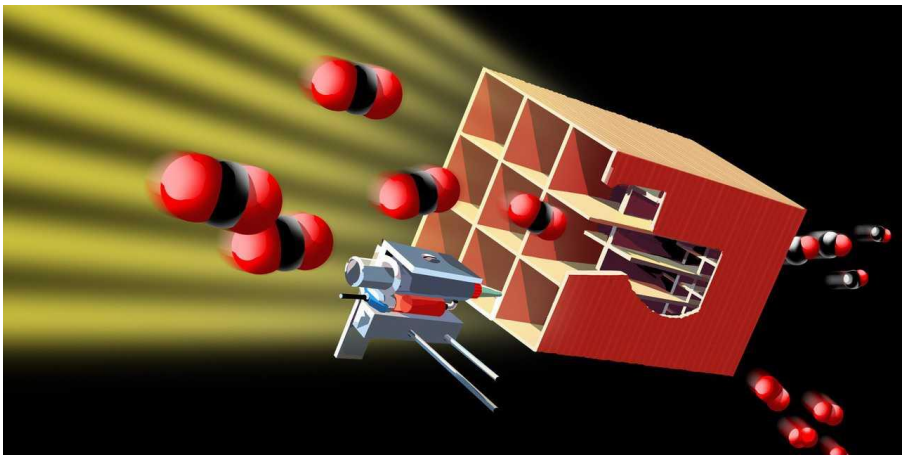
For more information, visit the following link:
https://www.aalto.fi/en/news/online-games-use-dark-designs-to-collect-player-data

Reference
Lindqvist, J. & Bourdoucen, A. (Oct 26, 2023). Online games use dark designs to collect player data. Recovered Oct 30, 2023, Aalto University:
https://www.aalto.fi/en/news/online-games-use-dark-designs-to-collect-player-data

Information source: (Aalto University, 2023)

1.9 3D printed reactor core makes solar fuel production more efficient

In recent years, engineers at ETH Zurich have developed the technology to produce liquid fuels from sunlight and air. In 2019, they demonstrated the entire thermochemical process chain under real conditions for the first time, in the middle of Zurich, on the roof of ETH Machine Laboratory. These synthetic solar fuels are carbon neutral because they release only as much CO_2 during their combustion as was drawn from the air for their production. Two ETH spin-offs, Climeworks and Synhelion, are further developing and commercialising the technologies.



The artwork illustrates a 3D-printed ceria structure with hierarchically channeled architecture. Concentrated solar radiation is incident on the graded structure and drives the solar splitting of CO_2 into separate flows of CO and O_2. Credit: Eidgenössische Technische Hochschule Zürich

At the heart of the production process is a solar reactor that is exposed to concentrated sunlight delivered by a parabolic mirror and reaches temperatures of up to 1500 degrees Celsius. Inside this reactor, which contains a porous ceramic structure made of cerium oxide, a thermochemical cycle takes place for splitting water and CO_2 captured previously from the air. The product is syngas: a mixture of hydrogen and carbon monoxide, which can be further processed into liquid hydrocarbon fuels such as kerosene (jet fuel) for powering aviation.

For more information, visit the following link:
https://ethz.ch/en/news-and-events/eth-news/news/2023/10/efficient-production-of-solar-fuels.html

Reference
Rüegg, P. (Oct 27, 2023). 3D printed reactor core makes solar fuel production more efficient. Recovered Oct 30, 2023, Eidgenössische Technische Hochschule Zürich:
https://ethz.ch/en/news-and-events/eth-news/news/2023/10/efficient-production-of-solar-fuels.html

Information source: (Eidgenössische Technische Hochschule Zürich, 2023)

1.10 Smart speaker data is used in ways you might not expect

Smart speakers offer amazing convenience — from playing your favorite tunes to re-ordering toilet paper — with only a simple voice command. But that convenience can come with a steep cost in privacy that many consumers aren't even aware they're paying.

Credit: Unsplash, Washington University in St. Louis

We've all had the uncanny experience of searching for something on the internet and then suddenly ads for that very thing are popping up everywhere we look online. It's no coincidence, said Umar Iqbal, an assistant professor of computer science and engineering at the McKelvey School of Engineering at Washington University in St. Louis. To crack open the black box around smart devices and the data they capture, the research team built an auditing framework to measure the collection, usage and sharing of Amazon Echo interaction data. First, they created several personas with interests in specific categories and one control persona. Each persona interacted with a different Echo device, then the researchers measured data collection by intercepting network traffic and inferred data usage by observing ads targeted to each persona on the web and on Echo devices.

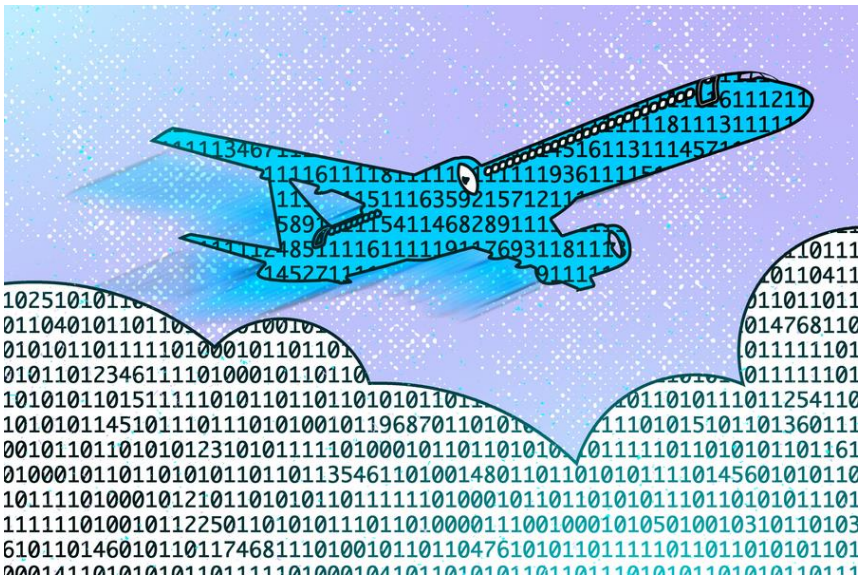
For more information, visit the following link:
https://source.wustl.edu/2023/10/washu-expert-your-smart-speaker-data-is-used-in-ways-you-might-not-expect/

Reference
Ballard, S. (Oct 26, 2023). WashU Expert: Your smart speaker data is used in ways you might not expect. Recovered Oct 30, 2023, Washington University in St. Louis: https://source.wustl.edu/2023/10/washu-expert-your-smart-speaker-data-is-used-in-ways-you-might-not-expect/

Information source: (Washington University in St. Louis, 2023)

1.11 New techniques efficiently accelerate sparse tensors for massive Artificial Intelligence models

Researchers from MIT and NVIDIA have developed two techniques that accelerate the processing of sparse tensors, a type of data structure that's used for high-performance computing tasks. The complementary techniques could result in significant improvements to the performance and energy-efficiency of systems like the massive machine-learning models that drive generative Artificial Intelligence.



Researchers from MIT and NVIDIA developed two complementary techniques that could dramatically boost the speed and performance of high-performance computing applications like graph analytics or generative AI. Credit: Jose-Luis Olivares, Massachusetts Institute of Technology

Tensors are data structures used by machine-learning models. Both of the new methods seek to efficiently exploit what's known as sparsity — zero values — in the tensors. When processing these tensors, one can skip over the zeros and save on both computation and memory. For instance, anything multiplied by zero is zero, so it can skip that operation. And it can compress the tensor (zeros don't need to be stored) so a larger portion can be stored in on-chip memory.

For more information, visit the following link:
https://news.mit.edu/2023/new-techniques-efficiently-accelerate-sparse-tensors-1030

Reference
Zewe, A. (Oct 30, 2023). New techniques efficiently accelerate sparse tensors for massive AI models. Recovered Oct 30, 2023, Massachusetts Institute of Technology: https://news.mit.edu/2023/new-techniques-efficiently-accelerate-sparse-tensors-1030

Information source: (Massachusetts Institute of Technology, 2023)

1.12 Using lasers to *"heat and beat"* 3D-printed steel could help reduce costs

Researchers have developed a new method for 3D printing metal that could help reduce costs and make more efficient use of resources. The method, developed by a research team led by the University of Cambridge, allows structural modifications to be *"programmed"* into metal alloys during 3D printing, fine-tuning their properties without the *"heating and beating"* process that's been in use for thousands of years.

Credit: University of Cambridge

The new 3D printing method combines the best qualities of both worlds: the complex shapes that 3D printing makes possible, and the ability to engineer the structure and properties of metals that traditional methods allow. The results are reported in the journal Nature Communications. 3D printing has several advantages over other manufacturing methods. For example, it's far easier to produce intricate shapes using 3D printing, and it uses far less material than traditional metal manufacturing methods, making it a more efficient process. However, it also has significant drawbacks.

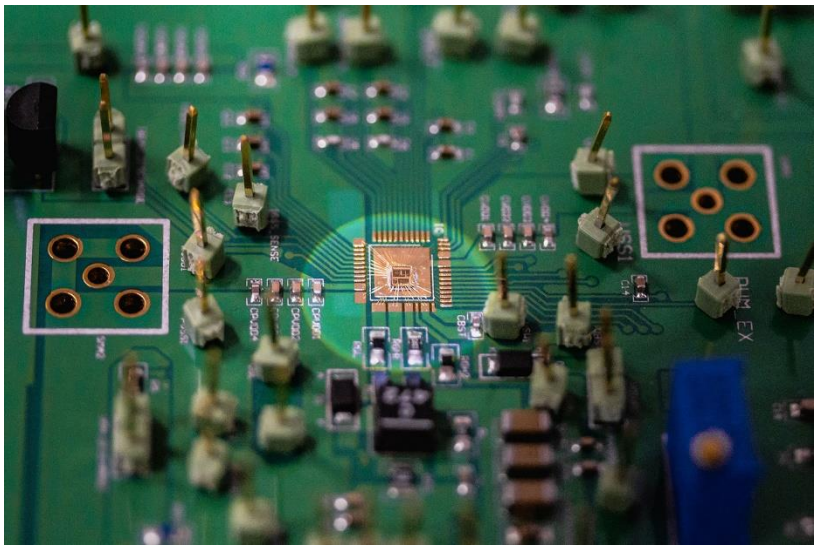
For more information, visit the following link:
https://www.cam.ac.uk/research/news/using-lasers-to-heat-and-beat-3d-printed-steel-could-help-reduce-costs

Reference
Collins, S. (Oct 30, 2023). Using lasers to *"heat and beat"* 3D-printed steel could help reduce costs. Recovered Oct 30, 2023, University of Cambridge:
https://www.cam.ac.uk/research/news/using-lasers-to-heat-and-beat-3d-printed-steel-could-help-reduce-costs

Information source: (University of Cambridge, 2023)

1.13 Researchers develop technology to protect EVs from chip *"noise"*

University of Texas at Dallas researchers have developed a first-of-its-kind technology to detect and reduce *"noise"* from electromagnetic interference (EMI) in electric vehicles. Such interference can cause malfunctions, such as providing incorrect navigation or compromising collision-avoidance systems.



The researchers' integrated circuit, which is less than 2 millimeters long, is bonded directly to a printed circuit board via gold wire connections for chip testing
Credit: The University of Texas at Dallas

Electric vehicles (EVs) contain a large number of electrical components packed into small areas. EMI can block communication between these components in the same way that lots of people talking in a crowded room can make it difficult to hear an individual nearby. *"If a device in an electric vehicle fails, the results could be catastrophic,"* said Lixiong Du, an electrical engineering doctoral student who led the research. *"Not only can our technology predict EMI, but we also apply measures to reduce EMI."*

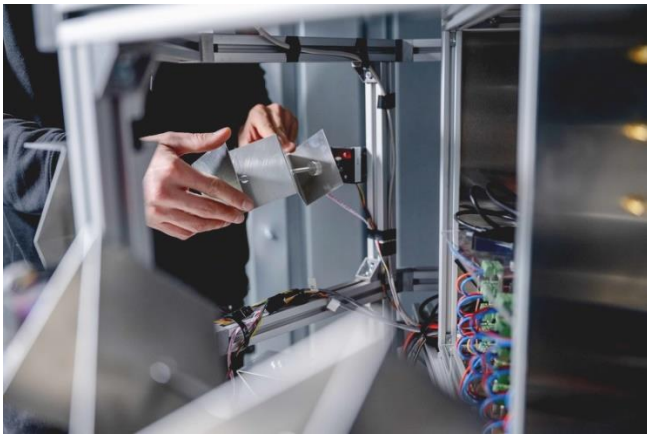
For more information, visit the following link:
https://news.utdallas.edu/science-technology/evs-chip-noise-2023

Reference
Horner, K. (Oct 27, 2023). Researchers develop technology to protect EVs from chip *"Noise"*. Recovered Oct 30, 2023, The University of Texas at Dallas:
https://news.utdallas.edu/science-technology/evs-chip-noise-2023

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

1.14 Monitoring nuclear weapons stockpiles with radio waves

An international research team has proposed a new method for monitoring nuclear disarmament treaties. The IT security experts developed a mechanism that uses radio waves to remotely monitor whether any changes are being made in a specific room. The researchers describe how robust and secure the approach is in the journal Nature Communications, published online on 17 October 2023. Teams from the Max Planck Institute for Security and Privacy (MPI-SP) in Bochum, Ruhr University Bochum, the School of Public and International Affairs at Princeton University, the University of Connecticut, Harvard University, PHYSEC GmbH, and Technische Universität Berlin collaborated on the development.



These adjustable mirrors are at the heart of the radio wave technology. Credit: Ruhr-Universität Bochum

The researchers approached their project from a scenario in which State A wants to ensure that there are no changes in State B's nuclear weapons stockpile – and to do so without permanent on-site monitoring. Specifically, a major threat is indicated by the removal of stored nuclear warheads to prepare them for deployment. "Our system uses two antennas to record a radio fingerprint of the room," explains Dr. Johannes Tobisch, who earned his PhD on this research field in the CASA Cluster of Excellence at Ruhr University Bochum and MPI-SP and has since moved on to work in industry. One of the antennas emits a radio signal that is reflected off the walls and objects in the room. The other antenna records the signal. The recorded signal is characteristic: if the objects were moved only minimally, this would noticeably change the radio fingerprint. Major changes, such as the removal of a stored nuclear warhead, can thus be reliably detected.

For more information, visit the following link:
https://news.rub.de/english/press-releases/2023-10-30-it-security-monitoring-nuclear-weapons-stockpiles-radio-waves

Reference
Weiler, J. (Oct 30, 2023). Monitoring nuclear weapons stockpiles with radio waves. Recovered Oct 30, 2023, Ruhr-Universität Bochum:
https://news.rub.de/english/press-releases/2023-10-30-it-security-monitoring-nuclear-weapons-stockpiles-radio-waves

Information source: (Ruhr-Universität Bochum, 2023)

1.15 A Google Slides extension can make presentation software more accessible for blind users

Screen readers, which convert digital text to audio, can make computers more accessible to many disabled users — including those who are blind, low vision or dyslexic. Yet slideshow software, such as Microsoft PowerPoint and Google Slides, isn't designed to make screen reader output coherent. Such programs typically rely on Z-order — which follows the way objects are layered on a slide — when a screen reader navigates through the contents. Since the Z-order doesn't adequately convey how a slide is laid out in two-dimensional space, slideshow software can be inaccessible to people with disabilities.

A team led by researchers at the University of Washington has created A11yBoard for Google Slides, a browser extension and phone app that allows blind users to navigate through complex slide layouts and text. Combining a desktop computer with a mobile device, A11yBoard lets users work with audio, touch, gesture, speech recognition and search to understand where different objects are located on a slide and move these objects around to create rich layouts. For instance, a user can touch a textbox on the screen, and the screen reader will describe its color and position. Then, using a voice command, the user can shrink that textbox and left-align it with the slide's title.

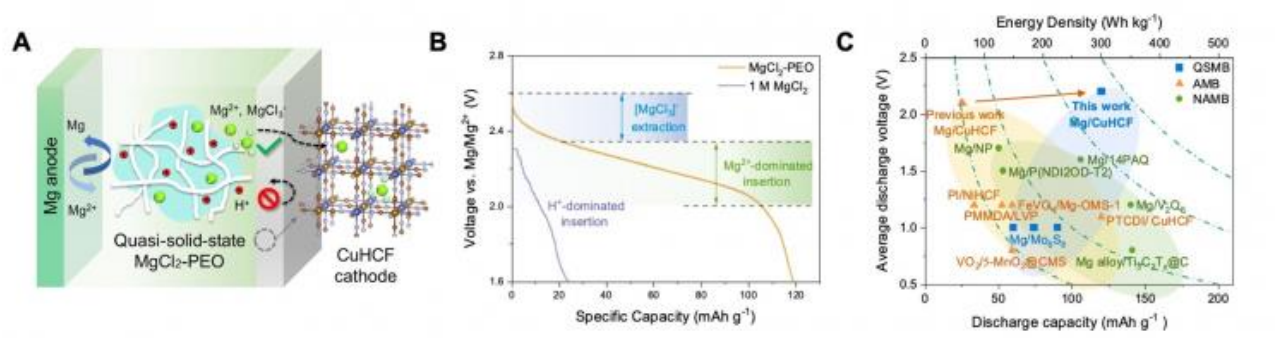
For more information, visit the following link:
https://ischool.uw.edu/news/2023/10/google-slides-extension-can-make-presentation-software-more-accessible-blind-users

Reference
Milne, S. (Oct 30, 2023). A Google Slides extension can make presentation software more accessible for blind users. Recovered Oct 30, 2023, University of Washington: https://ischool.uw.edu/news/2023/10/google-slides-extension-can-make-presentation-software-more-accessible-blind-users

Information source: (University of Washington, 2023)

1.16 Unveils innovative battery design that promises high energy density and sustainability

A research team led by Professor Dennis Y.C. Leung of the University of Hong Kong (HKU)'s Department of Mechanical Engineering has achieved a major breakthrough in battery technology with the development of a high-performance quasi-solid-state magnesium-ion (Mg-ion) battery. This innovative design offers a sustainable, safe, and high-energy-density alternative to conventional lithium-ion batteries, addressing the limitations of material scarcity and safety concerns.



Credit: The University of Hong Kong

Recently featured in Science Advances under the title "Next-generation magnesium-ion batteries: The quasi-solid-state approach to multivalent metal ion storage", the new Mg-ion battery has the potential to revolutionize the industry. "It is a game-changing development," said Professor Leung. In recent years, Mg-ion batteries have emerged as a potential solution in light of lithium-ion batteries' limitations. However, the road to developing efficient Mg-ion batteries has been fraught with challenges, including the need to overcome the narrow electrochemical window in aqueous or water-based systems, and the poor ionic conductivity in non-aqueous systems.

For more information, visit the following link:
https://www.hku.hk/press/press-releases/detail/26742.html

Reference
Lee, C. & Lai, C. (Oct 30, 2023). HKU Engineering team unveils innovative battery design that promises high energy density and sustainability. Recovered Oct 31, 2023, The University of Hong Kong: https://www.hku.hk/press/press-releases/detail/26742.html

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

1.17 Artificial Intelligence powered SmartRehab platform to provide an accessible and affordable rehabilitation strategy for stroke patients globallyo

SmartRehab is a mobile application that is accessible from a tablet or mobile phone and aims to facilitate personalised stroke rehabilitation in the community setting. SmartRehab was developed and validated by a multidisciplinary team comprising neurologists, engineers, translational neuroscientists, physiotherapists and occupational therapists from HKU Stroke, HKU SAIL and HKSR. SmartRehab currently encompasses 10 gross movement exercises.

SmartRehab patient interfaces.
Credit: The University of Hong Kong

These exercises are recommended and designed by therapists from the HKSR and are tailored specifically for stroke patients to improve upper limb function, weight shifts and balance. In contrast to traditional telerehabilitation platforms, SmartRehab utilises the built-in RGB camera of a tablet or mobile phone, for which the team has developed a computer vision-based pose-estimation algorithm to predict the precise body framework and segment key joint locations.

For more information, visit the following link:
https://www.hku.hk/press/news_detail_26756.html

Reference
The University of Hong Kong. (Oct 27, 2023). HKU develops AI-powered SmartRehab platform to provide an accessible and affordable rehabilitation strategy for stroke patients globally. Recovered Oct 31, 2023, The University of Hong Kong:
https://www.hku.hk/press/news_detail_26756.html

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

1.18 First digital atlas of human fetal brain development published

A team of over 200 researchers around the world, involving multiple health and scientific institutions, led by the University of Oxford, the first digital atlas showing the dynamics of normative maturation of each hemisphere of the fetal brain between 14 and 31 weeks' gestation - a critical period of human development.

Credit: University of Oxford

The study is unique because, for the first time, an international dataset of 3D US scans, collected using standardised methods and equipment, has been analysed with advanced Artificial Intelligence (AI) and image processing tools to construct a map showing how the fetal brain matures as pregnancy advances. Demonstrating remarkably similar patterns of fetal brain growth and development across diverse populations represents an important scientific advance in the field of neuroscience. The results are entirely consistent with previously reported findings, from the same INTERGROWTH-21st population, for fetal skeletal growth, newborn size and infant neurocognitive development.

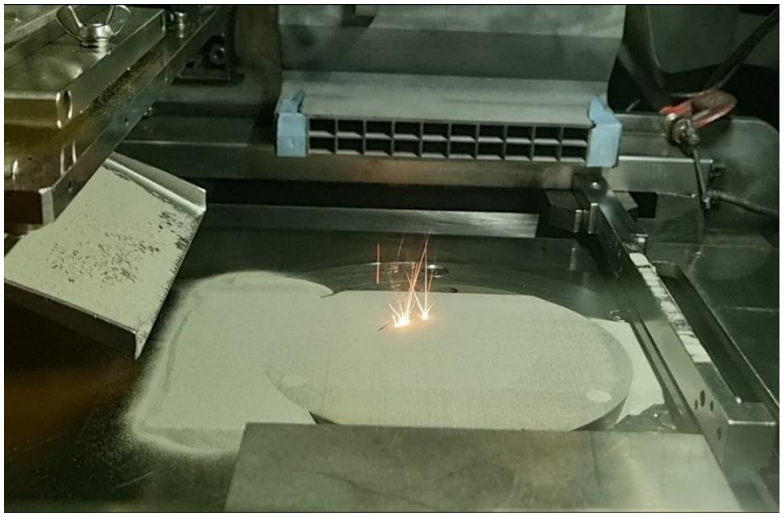
For more information, visit the following link:
https://www.ox.ac.uk/news/2023-10-26-first-digital-atlas-human-fetal-brain-development-published

Reference
University of Oxford. (Oct 26, 2023). First digital atlas of human fetal brain development published. Recovered Oct 31, 2023, University of Oxford:
https://www.ox.ac.uk/news/2023-10-26-first-digital-atlas-human-fetal-brain-development-published

Information source: (University of Oxford, 2023)

1.19 New method to make 3D-printed metals with contrasting properties

Scientists have developed a new method that can make customised 3D-printed metal parts containing different properties – such as having some regions of the metal stronger than others.



Credit: Nanyang Technological University

The new technique from the researchers – led by NTU Singapore and the University of Cambridge – uses 3D-printing steps. Unlike traditional metal manufacturing processes, it does not require additional raw materials, mechanical treatment or drastic machining processes to achieve a similar effect, such as coating the metal with a different material, thus potentially helping to reduce manufacturing costs. Besides designing a 3D-printed metal part with different strength levels, the new process should theoretically also allow manufacturers to design a part with other features, such as differing levels of electrical conductivity or corrosion resistance in the same metal.

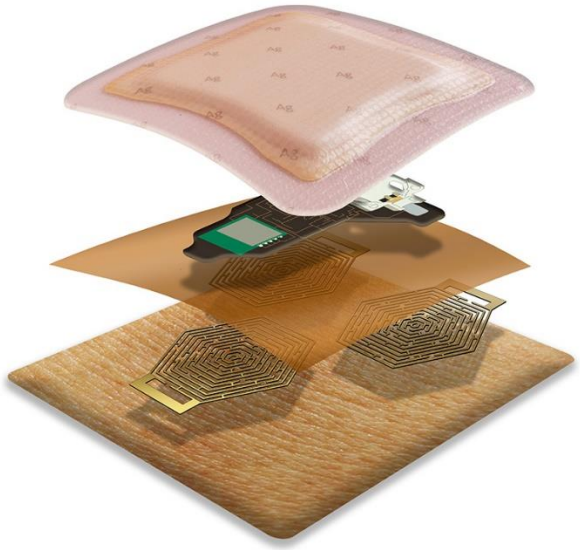
For more information, visit the following link:
https://www.ntu.edu.sg/news/detail/new-method-to-make-3d-printed-metals-with-contrasting-properties

Reference
Nanyang Technological University. (Oct 31, 2023). New method to make 3D-printed metals with contrasting properties. Recovered Oct 31, 2023, Nanyang Technological University: https://www.ntu.edu.sg/news/detail/new-method-to-make-3d-printed-metals-with-contrasting-properties

Information source: (Nanyang Technological University, 2023)

1.20 Wearable heart monitor ticks all the boxes for better healthcare

A new compact, lightweight, gel-free and waterproof electrocardiogram (ECG) sensor offers more comfort and less skin irritation, compared to similar heart monitoring devices on the market.



An artist's impression of the RMIT ECG device, showing the various layers including a dressing, Bluetooth module and dry electrodes.
Credit: Supplied by the research team, RMIT University

ECGs help manage cardiovascular disease – which affects around 4 million Australians and kills more than 100 people every day – by alerting users to seek medical care. The team led by RMIT University has made the wearable ECG device that could be used to prevent heart attacks for people with cardiovascular disease, including in remote healthcare and ambulatory care settings. While most wearable ECG monitors typically weigh a few hundred grams, the RMIT device weighs only 10 grams.

For more information, visit the following link:
https://www.rmit.edu.au/news/all-news/2023/nov/ecg-device

Reference
Wright, W. (Nov 01, 2023). Wearable heart monitor ticks all the boxes for better healthcare: study. Recovered Nov 02, 2023, RMIT University:
https://www.rmit.edu.au/news/all-news/2023/nov/ecg-device

Information source: (RMIT University, 2023)

II. PATENTS

2.1. Smart lighting management system

A system and method for the management of the electric lighting circuits are disclosed. The method includes monitoring one or more lighting circuits connected to a controller through one or more sensors. The one or more sensors are connected to the one or more lighting circuits and the controller.

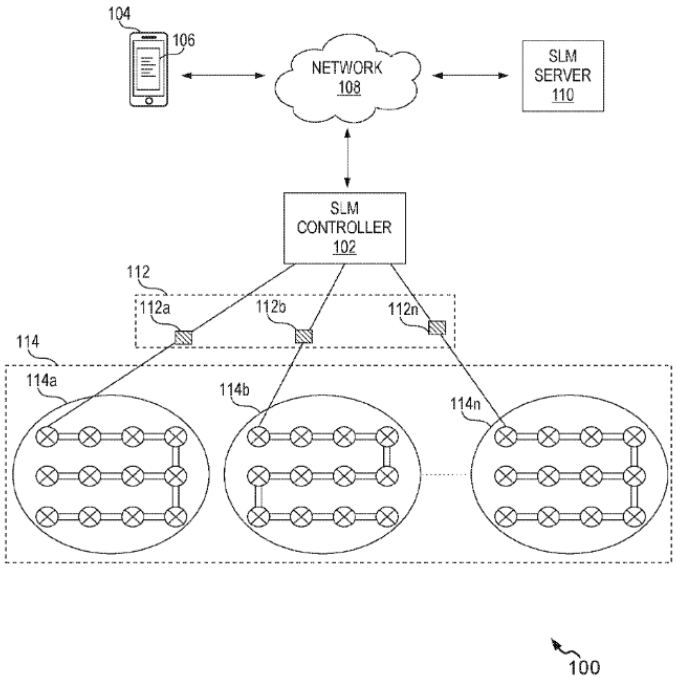


Illustration of an environment related to at least some example embodiments of the present disclosure.
Credit: Doorandish, M., WIPO IP Portal

Further, the method includes detecting a change in current of a lighting circuit of the one or more lighting circuits. Furthermore, the method includes determining an anomaly in the lighting circuit based on the detected change in current of the lighting circuit. Thereafter, the method includes transmitting a report including at least the anomaly to a server for verification of the anomaly, in response to the determination. The server receives the initial data related to lighting circuits from controllers. The server trains an Artificial Intelligence (AI) model based on the initial data to determine the anomalies.

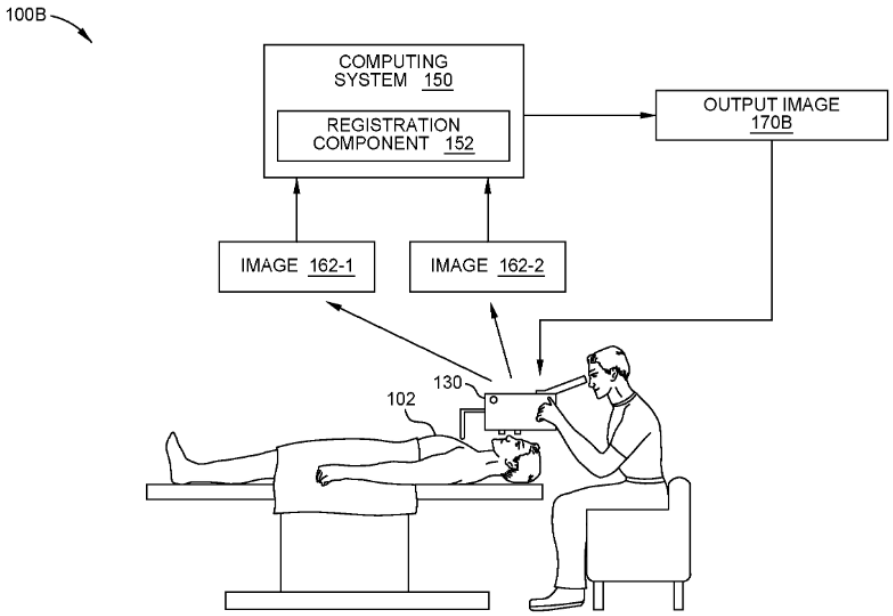
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023203553&_cid=P22-LOWYTA-26598-2

Reference
Doorandish, M. (Oct 26, 2023). Smart lighting management system. Recovered Oct 26, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023203553&_cid=P22-LOWYTA-26598-2

Information source: (WIPO IP Portal, 2023)

2.2. Ophthalmic image registration using interpretable Artificial Intelligence based on deep learning

In certain embodiments, an ophthalmic system and computer-implemented method for performing ophthalmic image registration are described. The ophthalmic image registration includes obtaining a plurality of images of an eye of a user.



Example system for performing ophthalmic image registration, according to certain embodiments. Credit: Yin, L.; Sarangapani, R. & Suresh, V., WIPO IP Portal

Within each image of the plurality of images, a segmented region(s) of the eye within the image is determined based on evaluating the image with a neural network(s), and a set of point features of the eye within the segmented region(s) of the eye is determined based on evaluating the image with the neural network(s). A set of transformation information for transforming at least one of the plurality of images is generated based on performing one or more image processing operations on the set of point features within each image of the plurality of images. At least one of the plurality of images is transformed, based on the set of transformation information.

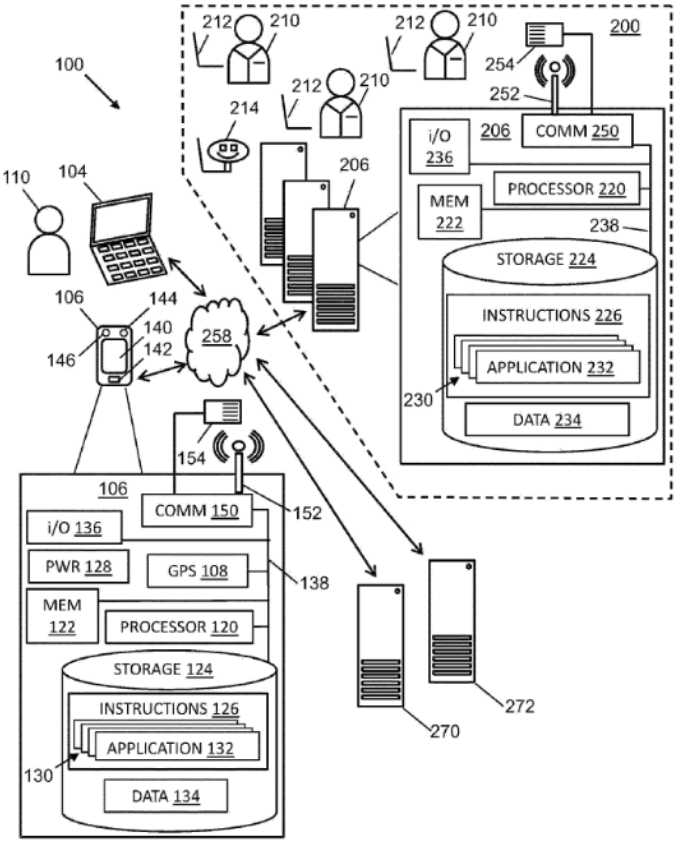
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023203433&_cid=P22-LOWYTA-26598-2

Reference
Yin, L.; Sarangapani, R. & Suresh, V. (Oct 26, 2023). Ophthalmic image registration using interpretable Artificial Intelligence based on deep learning. Recovered Oct 26, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=WO2023203433&_cid=P22-LOWYTA-26598-2

Information source: (WIPO IP Portal, 2023)

2.3. Automated processing and dynamic filtering of content for display

Disclosed are systems and methods that automatically classify, segment, and parse content data using Artificial Intelligence and natural language processing technology, and generate graphical user interfaces that allow end users to dynamically filter content data for display. The systems processes volumes of content data to identify interrogative data, content sources that generated the interrogative data, and subject identifiers relating to the content data.



Is an example system diagram according to one embodiment.
Credit: William, K.; Thomas, H.; Councill, P. & Xu, J., WIPO IP Portal

The system generates graphical user interfaces that allow end users to effectively filter the data by choosing between layouts that display one or more of the various categories of data, including the interrogative data, content source identifiers, and/or subject identifiers. The user interfaces include content view input functions that utilizes mapping data to locate and extract segments of the underlying content data from which displayed data is derived, thereby allowing end users to expediently review both the aggregated and reduced content data and the underlying source data.

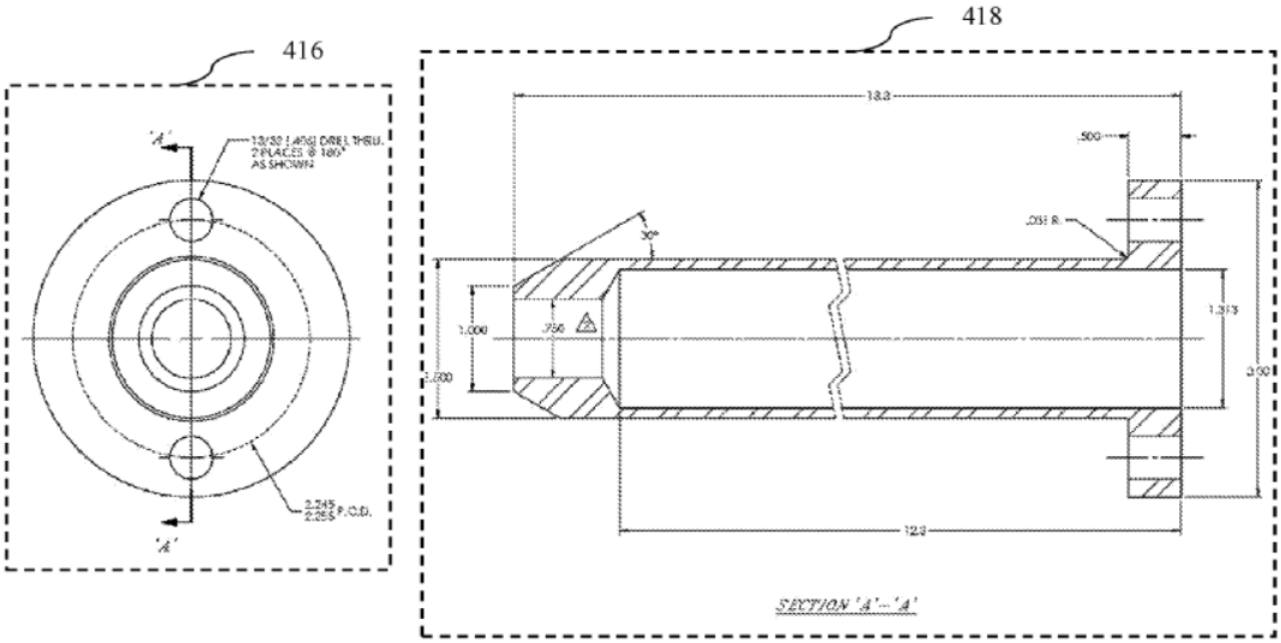
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US411586512&_cid=P22-LOWYTA-26598-2

Reference
William, K.; Thomas, H.; Councill, P. & Xu, J. (Oct 26, 2023). Automated processing and dynamic filtering of content for display. Recovered Oct 26, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US411586512&_cid=P22-LOWYTA-26598-2

Information source: (WIPO IP Portal, 2023)

2.4. Artificial Intelligence based system and method for recognition of dimensional information within engineering drawings

An AI-based system and method for recognition of dimensional information within engineering drawings is disclosed. The AI-based method includes receiving one or more engineering drawings from one or more user devices and detecting one or more objects in the one or more engineering drawings.



Illustrates exemplary pictorial depiction of engineering drawings, in accordance with an embodiment of the present disclosure.
Credit: Komminani, G. & Yanture, S., WIPO IP Portal

The AI-based method further includes identifying a focus object from the one or more objects and detecting a central line and one or more texts of the focus object. Further, the AI-based method includes creating a graph and classifying one or more texts into a predefined set of classes by applying the graph onto a trained dimension recognition based deep reinforcement learning model. The AI-based method determining dimensional information associated with the one or more engineering drawings and outputting the dimensional information associated with the one or more engineering drawings on user interface screen of the one or more user devices.

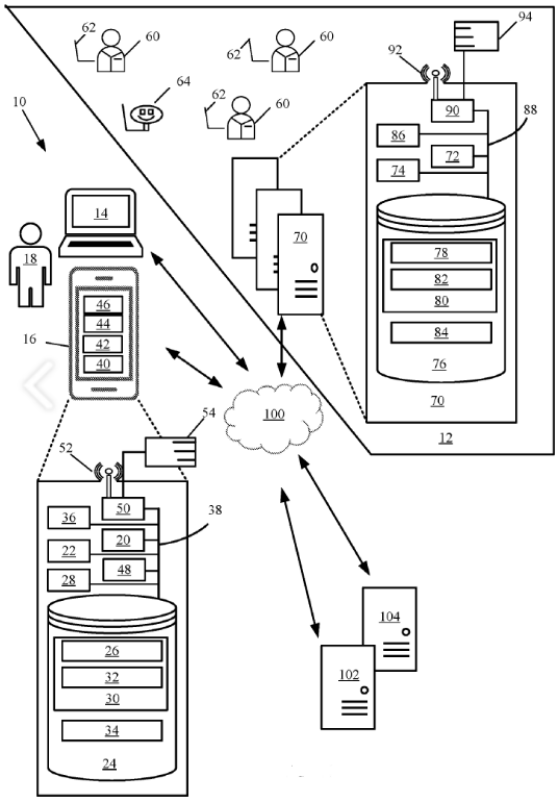
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US411587174&_cid=P22-LOWYTA-26598-2

Reference
Komminani, G. & Yanture, S. (Oct 26, 2023). Artificial Intelligence based system and method for recognition of dimensional information within engineering drawings. Recovered Oct 26, 2023, WIPO IP Portal: https://patentscope.wipo.int/search/es/detail.jsf?docId=US411587174&_cid=P22-LOWYTA-26598-2

Information source: (WIPO IP Portal, 2023)

2.5. Identifying user requirements to determine solutions using Artificial Intelligence

A system for using a Machine Learning model to introduce new solutions, based on data gathering and processing, to a user based on user requirements and current solutions. The system includes a back-end server having a processor for processing data and information, a communications interface communicatively coupled to the processor, and a memory device storing data and executable code.



Illustrates a system and environment thereof by which a user benefits through use of services and products of an enterprise system.
Credit: Thirles, K. & Gerard, P., WIPO IP Portal

The executable code causes the processor to collect data and information from multiple interaction channels, where the data corresponds to interactions between the user and multiple nodes indicating user requirements, store the collected data and information in the memory device, process the stored data and information through a Machine Learning model to determine which of a set of available solutions are currently being implemented, receive a result from the Machine Learning model, where the result includes identifying new solutions, and transmit a communication to the user to propose the new solutions.

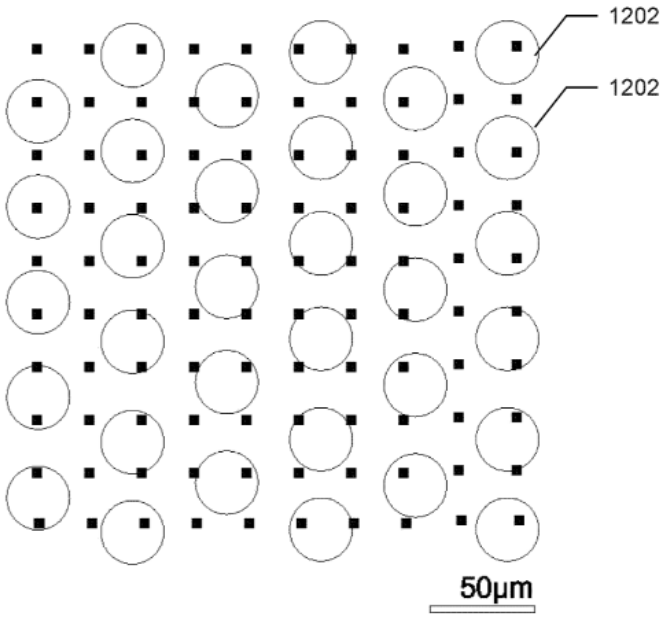
For more information, visit the following link:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US411587426

Reference
Thirles, K. & Gerard, P. (Oct 26, 2023). Identifying user requirements to determine solutions using Artificial Intelligence. Recovered Oct 26, 2023, WIPO IP Portal:
https://patentscope.wipo.int/search/es/detail.jsf?docId=US411587426

Information source: (WIPO IP Portal, 2023)

2.6. System for artificial vision

Embodiments may provide improved visual prosthesis to restore functional vision in those with partial or total blindness.



Exemplary illustration of approximate representation of how the optrode array could fit over a dense neural network. Credit: Howard, N., Espacenet Patent Search

In an embodiment, a system for artificial vision may comprise a camera adapted to obtain visual information corresponding to a field of view of a person, processing circuitry adapted to transform the obtained visual information to control signals for controlling artificial visual stimulation, communication circuitry adapted to transmit the control signals to an implanted device to perform artificial visual stimulation, and an implant device adapted to be implanted within a body of the person for interacting with brain tissue to perform artificial visual stimulation, wherein the implant device is adapted to receive the control signals, generate stimulation signals based on the control signals, and apply the stimulation signals to neural tissue, wherein the implant device is further adapted to apply stimulation to at least 100,000 sites of the neural tissue.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/088416406/publication/US2023338136A1?q=artificial%20intelligence

Reference
Howard, N. (Oct 26, 2023). System for artificial vision. Recovered Oct 26, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/088416406/publication/US2023338136A1?q=artificial%20intelligence

Information source: (Espacenet Patent Search, 2023)

2.7. Digital Blockchain voting technology system and method

A method for transaction settlement using guarantee tokens includes: receiving a transaction request from a first financial institution including a receiving party digital address, a digital token issued by the first financial institution to the receiving party digital address, a sending party address, an asset network identification, and an asset identification.

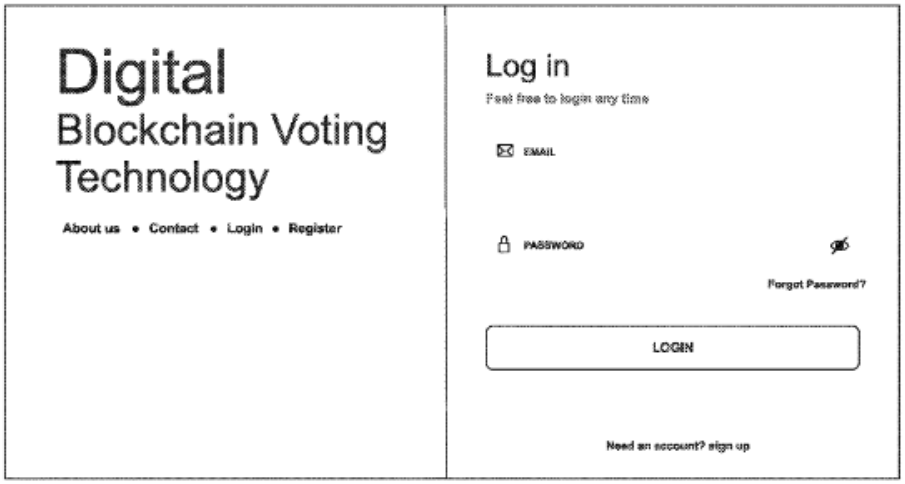


Image of a user screen of the application according to an embodiment of the present disclosure. Credit: White, T, Espacenet Patent Search

Generating a guarantee token against the digital token; generating an asset request transaction including the guarantee token, the receiving party digital address, the sending party digital address, and the asset identification; transmitting the asset request transaction to the asset network; receiving an asset transaction from the asset network including the asset, the receiving party digital address, and the sending party digital address; generating an asset transfer transaction including the receiving party digital address, the sending party digital address, and the asset identification; and transmitting the asset transaction to the receiving party digital address.

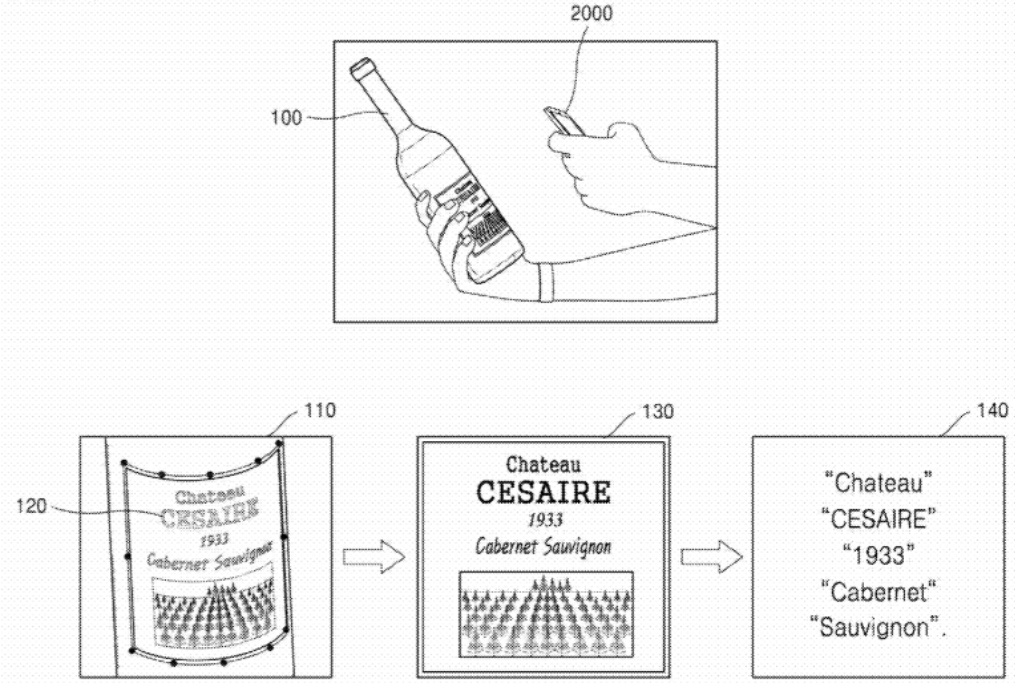
For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/088415752/publication/US2023342764A1?q=Blockchain

Reference
White, T. (Oct 26, 2023). Digital Blockchain voting technology system and method. Recovered Oct 26 2023, Espacenet Patent Search:
https://worldwide.espacenet.com/patent/search/family/088415752/publication/US2023342764A1?q=Blockchain

Information source: (Espacenet Patent Search, 2023)

2.8. Electronic device for processing image, and operation method of electronic device

A method includes: obtaining a first image of an object including a surface having a non-flat shape; identifying a region corresponding to the surface as a region of interest by applying the first image to a first Artificial Intelligence model.



Example in which an electronic device according to an embodiment of the disclosure removes distortion of an image; Credit: Choi, I.; Kim, D.; Hwang, J. & Byun, D., Espacenet Patent Search

Obtaining data about a three-dimensional (3D) shape type of the object by applying the first image to a second AI model; obtaining a set of values of a 3D parameter related to the object, the surface, or the first camera, based on the region and the data; estimating the non-flat shape of the surface, based on the set of values of the 3D parameter; and obtaining a flat surface image in which the non-flat shape of the surface is flattened, by performing a perspective transformation on the surface.

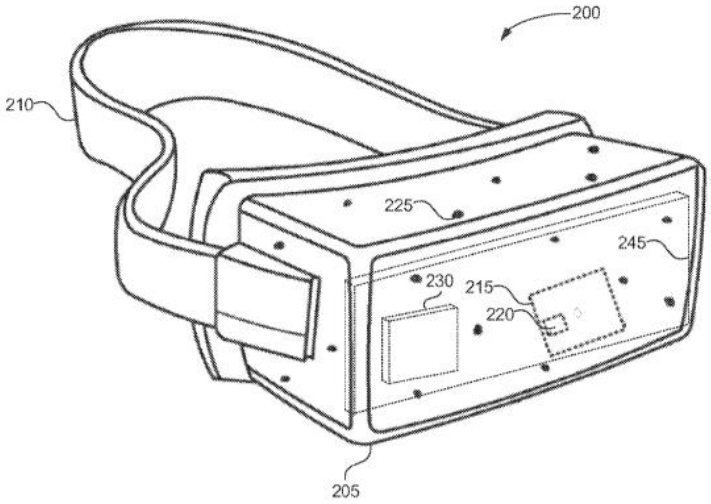
For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/088415808/publication/US2023343061A1?q=3d

Reference
Choi, I.; Kim, D.; Hwang, J. & Byun, D. (Oct 26, 2023). Electronic device for processing image, and operation method of electronic device. Recovered Oct 26, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/088415808/publication/US2023343061A1?q=3d

Information source: (Espacenet Patent Search, 2023)

2.9. Facilitating creation of objects for incorporation into Augmented/Virtual Reality environments

Methods, systems, and storage media for facilitating creation of objects for incorporation into artificial reality environments are disclosed.



Is a wire diagram of a Virtual Reality head-mounted display (HMD), in accordance with one or more implementations. Credit: Williams, J. & Arunachala, A., Espacenet Patent Search

Exemplary implementations may: receive, from a first user, a media representation of an object for incorporation into an artificial reality environment; generate an offer of compensation for creation of the object of the media representation in a format capable of being incorporated into the artificial reality environment; receive, from a second user, acceptance of the offer of compensation; receive an indication that the object of the media representation has been created in the format capable of being incorporated into the artificial reality environment; and cause addition of the created object to a global asset library accessible by a plurality of users.

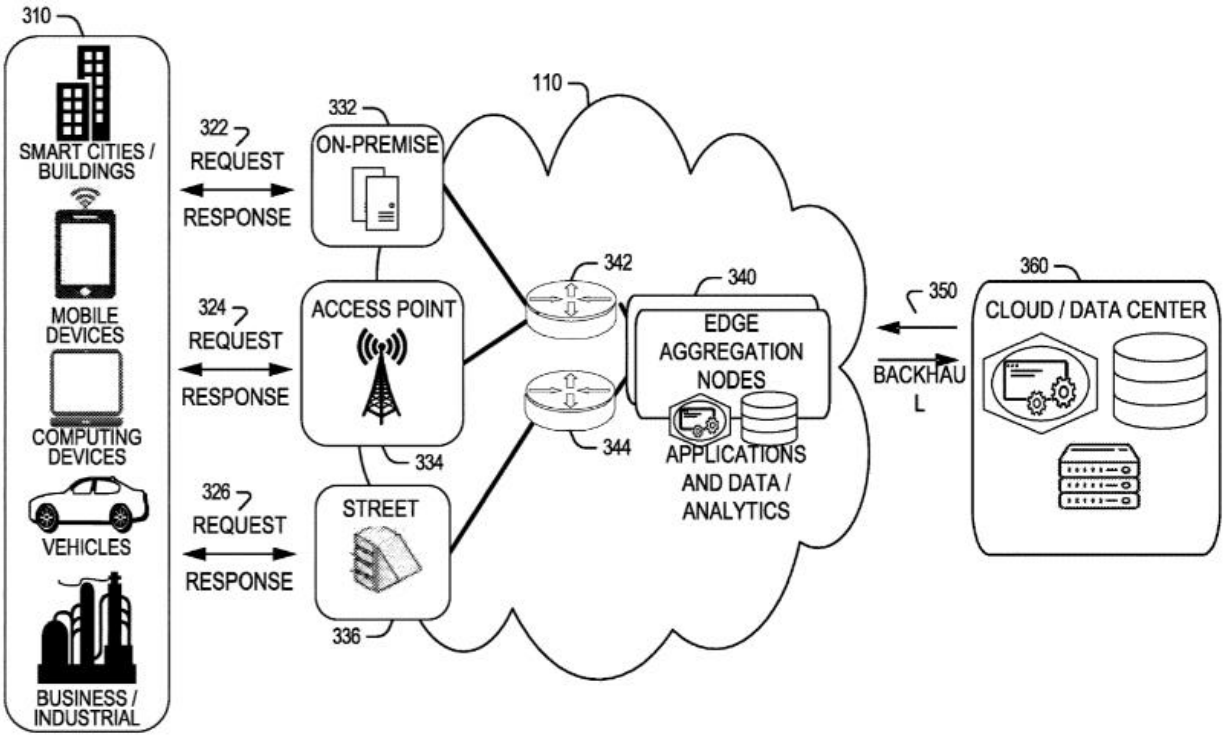
For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/088415787/publication/US2023343034A1?q=virtual%20reality

Reference
Williams, J. & Arunachala, A. (Oct 26, 2023). Facilitating creation of objects for incorporation into augmented/Virtual Reality environments. Recovered Oct 27, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/088415787/publication/US2023343034A1?q=virtual%20reality

Information source: (Espacenet Patent Search, 2023)

2.10. Methods and apparatus for autonomous mobile robots

Systems, apparatus, articles of manufacture, and methods are disclosed. A first example apparatus disclosed herein is an autonomous mobile radio access network (RAN) node that includes communication circuitry, instructions, and programmable circuitry to cause the communication circuitry to transmit a workload to a server via a network, initiate local processing of the workload after a loss of connectivity with the server, and move the autonomous mobile RAN node from a first location to a second location.



Illustrates an example approach for networking and services in an edge computing system. Credit: Thyagaturu, A.; Garg, M.; Bernat, F. & Moustafa, H., Espacenet Patent Search

A second example apparatus disclosed herein is an autonomous mobile RAN node that includes communication circuitry, instructions, and programmable circuitry to cause communication of a workload from a client device to a server to process the workload, identify a second location relative to a first location of the compute device based on network performance, and cause the autonomous mobile RAN node to move from the first location to the second location.

For more information, visit the following link:
https://worldwide.espacenet.com/patent/search/family/088415311/publication/US2023341848A1?q=machine%20learning

Reference
Thyagaturu, A.; Garg, M.; Bernat, F. & Moustafa, H. (Oct 26, 2023). Methods and apparatus for autonomous mobile robots. Recovered Oct 27, 2023, Espacenet Patent Search: https://worldwide.espacenet.com/patent/search/family/088415311/publication/US2023341848A1?q=machine%20learning

Information source: (Espacenet Patent Search, 2023)