

Technology Roundup

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Poultry Science Conference

2nd International Conference on
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12th Annual Energy Science &
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Enterprises



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Pakistan Aims to Sign Cooperation Agreement on China-Led Moon Research Base

Dr. Amer Nadeem, Head of SUPARCO, recently visited the Deep Space Exploration Laboratory located in Hefei, China. During the visit, Pakistan expressed its eagerness to determine the particular contributions it can make to the International Lunar Research Station (ILRS), led by China, and indicated its intention to soon sign a cooperation agreement pertaining to the ILRS.

The ILRS is expected to be a full-fledged, long-term base on the moon for scientific exploration by 2050. Dr. Amer Nadeem, was briefed on the project's progress during his visit to the lab in Hefei, Anhui province, and "conducted in-depth exchanges" with Wu Weiren, chief designer of the Chinese lunar exploration programme and laboratory director, according to its website. Chinese authorities in this regard, are willing to welcome Pakistan to fully participate in the ILRS, foster close partnership with the laboratory, and set an example for working together to build a shared future for mankind in outer space.

Since the release of the initial road map for the International Lunar Research Station (ILRS) by the China National Space Administration in 2021, Pakistan has joined a group of approximately six nations and international organizations in signing letters of intent or cooperation agreements.



Image credit and source:

<https://www.scmp.com/news/china/science/article/3223585/pakistan-looks-sign-cooperation-agreement-china-led-moon-research-base>

Pakistani Woman Invents Supersonic Jet Engine and Secures International Patents

Sarah Qureshi, a graduate of the National University of Sciences and Technology (NUST), has recently received patents for her groundbreaking invention, a supersonic jet engine, in both the United States and Great Britain. This remarkable achievement comes as she collaborated with her father, Masood Latif Qureshi, in the invention of this revolutionary engine.

The novel supersonic jet engine promises a revolutionized future for the aviation sector, unlocking new possibilities for high-speed travel. This design represents a pivotal milestone in the field of aviation, catering to the primary challenges of excessive noise generation leading to restrictions and limitations on their usage. However, Qureshi's advanced design ensures a significant reduction in noise levels. Also, the supersonic engine does not compromise on performance either, offering enhanced speed and efficiency.

The patent grants are a result of Qureshi's expertise in the aerospace industry. As the CEO of Aero Engine Craft, she served as a driving force behind the development of this mind-blowing engine.



Image credit: <https://twitter.com/AeroEngineCraft>

Source: <https://en.dailypakistan.com.pk/19-May-2023/pakistani-woman-invents-supersonic-jet>

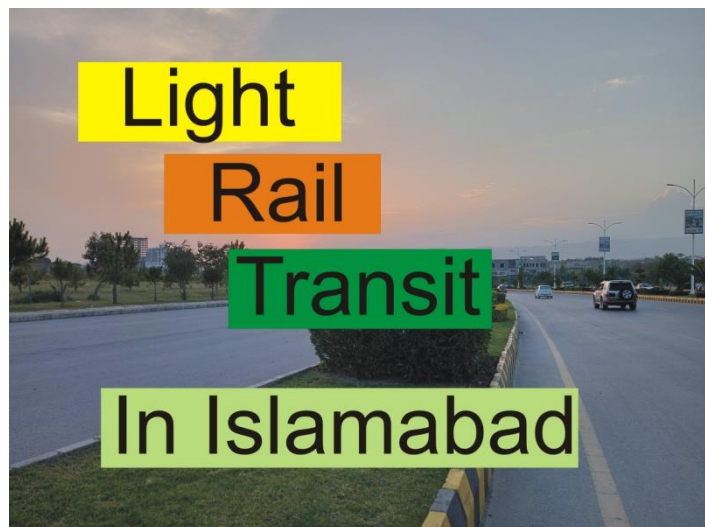
Light Rail Transit (LRT) Planned for Islamabad by CDA

The Islamabad Capital Development Authority (CDA) has initiated the process of devising a plan for the implementation of the Light Rail Transit (LRT) system in Islamabad, with the objective of addressing the increasing transportation demands within the city.

The planning department of the CDA has contacted the Economic Affairs Division in order to secure financial support for the implementation of the project through an international donor, such as the Asian Development Bank or the Japan International Cooperation Agency (JICA).

Based on preliminary assessments, a comprehensive study has identified four potential routes for the Light Rail Transit (LRT) system. These routes include a 30.5km long route from Rawat to Faisal Mosque along Islamabad Expressway and Faisal Avenue, a 13.7km route from N5 (popularly known as G.T. Road) to Pakistan Monument via Srinagar Highway, a 27.5km route from Rawat at T-Chowk to 26 No Stop on G.T. Road, and a 10.4km route from Pirwadhai to Faizabad via the IJP road.

The developed countries implemented similar transportation systems to benefit their residents over a century ago. Notable examples of successful models include London's pioneering underground railway system, the subway network in New York City, and the subway system in Tokyo.



In light of the significant congestion caused by the high volume of vehicles on the roads, city officials in Islamabad have made the decision to introduce the Light Rail Transit (LRT) system. Traffic engineers have concluded that the current Bus Rapid Transit System (BRTS) is inadequate to handle the increasing demand and load on the transportation network.

Source: <https://www.nation.com.pk/13-Jun-2023/cda-starts-planning-to-introduce-lrt-in-islamabad>

Deployment of 16,000 KM Fiber Optic Cable Started in Pakistan

Pakistan has initiated a significant endeavor aimed at accelerating the digitalization and networking process by deploying a fiber optic cable spanning an impressive distance of 16,000 kilometers. The project, undertaken by Sunwalk, places a strong emphasis on rapid deployment while adhering to the quality standards set forth by ITU-T.

In light of the long-term strategic relationship between Pakistan and China, Sunwalk has taken the initiative to commence the national fiber project, as stated in an official statement. Despite the prevailing economic challenges in the country, Sunwalk has remained committed in fulfilling its promise, recognizing the significance of this project in strengthening the bond between Pakistan and China.

Sunwalk has fulfilled its promise by initiating the national fiber backbone project, despite the current economic situation in the country. In this connection, the groundbreaking of Phase 1 (Islamabad to Multan) to provide a nationwide fiber backbone was done on Thursday, and now we are officially announcing this great news for the people of Pakistan after the completion of the required manners related to the project. Sunwalk is in the process of issuing the right of way (ROW) from government departments so we can proceed with our work immediately because after getting the ROW we are planning to invest \$100 million. Sunwalk Group already invested \$ 5 million in Khuzdar (Baluchistan) where no commercial fiber was available.

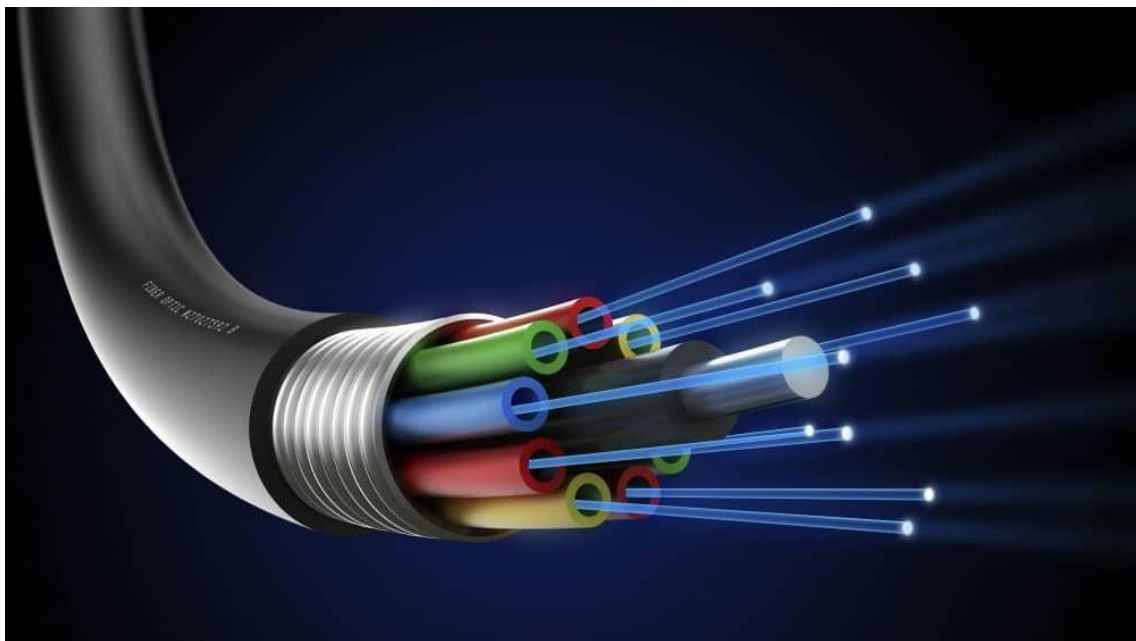


Image credit and source: <https://propakistani.pk/2023/05/19/chinas-sunwalk-group-starts-project-to-deploy-16000-km-fiber-optic-cable-in-pakistan/>

Air Taxi Service in Pakistan

Sky Wings, a private company, has officially announced the imminent launch of Pakistan's inaugural air taxi service. Two aircraft belonging to the company have arrived in Karachi, marking a significant milestone. According to company officials, an online application will be provided for individuals interested in utilizing the air taxi service. The primary objective of this service is to ensure timely transportation to remote areas across the country, particularly in urgent situations. Pakistan boasts a total of 29 airstrips, with approximately eight of them currently operational, serving as crucial hubs for ticketing and landing purposes.

To develop the application, a foreign and a Pakistani company was consulted. It is highly delightful that the results of the Pakistani company's developed application are outstanding. The same Pakistani company's application would be used for the service. The officials of the Sky Wings claimed that international companies were contacting them for participation in the business as well. The Sky Wings Electric Air Vehicles (EAVs), included in the aviation fleet, are capable of flying at a speed of 300 kilometers per hour, and can fly at an altitude of 14,000 feet during the flight.

Apart from political, religious and business personalities, other professionals like tourists, lawyers, journalists and doctors and ordinary citizens will also be able to benefit from aerial taxis. This service will not only provide a faster way of travelling but also boost tourism in the country.



Image credit and source: <https://www.thenews.com.pk/latest/1072553-in-a-first-air-taxi-to-operate-in-pakistan>

Pakistan's First 3D Concrete Printer

Students from NUST have completed the development of Pakistan's first 3D Concrete Printer. This indigenous 3D concrete printer has a frame size of 1.2m x 1.2m x 1m. Utilizing its 3-axis movement controlled by servos and gearboxes, a variety of nozzles (with a max size of 3 inches), continuous intake capacity, screw extrusion, and a digital control system, it can print a volume of 1m x 1m x 0.5m.

This inexpensive concrete printer serves as a prototype for large-scale construction applications. It is capable of printing various-shaped architectural and structural components. The concept of using this printer is very simple. A 3D CAD Model is created on computer software and the model is sliced as per the requirement the mach3 controller in this printer reads the G-Code file and extrudes the layer of concrete.

This unique prototype of the 3D concrete printer is designed to provide multiple advantages in the construction sector including design flexibility, topological optimization, increased productivity, reduced labor effort, greater research potential, highly precise deposition, high-end technology-based jobs, multifunctionality of structural/architectural elements, cost-effective mass housing solution, energy efficient, promising methodology & output, safer construction work and balance between beauty, form & function.

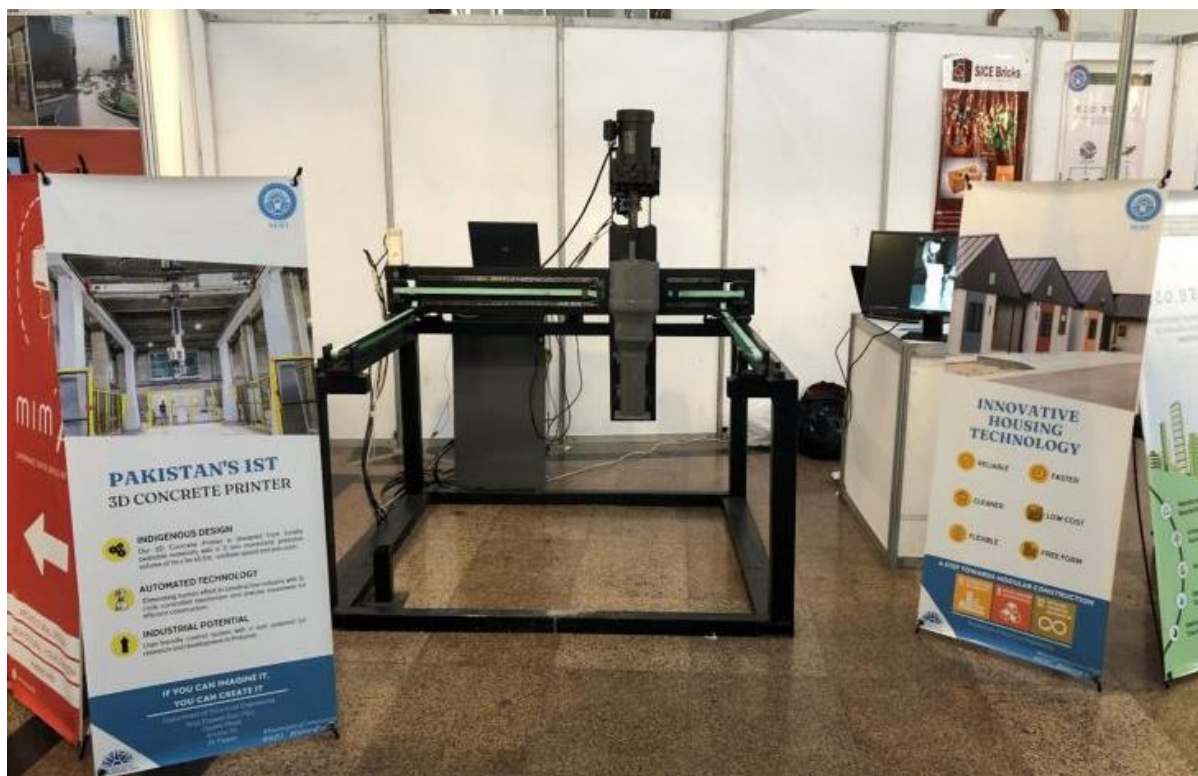


Image credit and source: <https://researchblog.nust.edu.pk/pakistans-first-3d-concrete-printer-developed-by-nust/#:~:text=Muhammad%20Usman>

First-Ever Software Technology Park in Skardu

HBL Microfinance Bank (HBL MFB) has announced its partnership with Special Communications Organization (SCO) to establish and operate the first-ever Software Technology Park (STP) in Skardu, Gilgit-Baltistan. For this initiative, HBL Microfinance Bank has extended its support of Rs. 15 million. The STP Skardu has shown promising results in its pilot launch phase, generating revenue of Rs. 2 million from IT companies operating from the STP and providing employment to 60 individuals. Both organizations are excited for the next phase to tap into its maximum potential. By extending this support, HBL MFB would like to usher in a new era of working with SCO for the betterment of the Gilgit Baltistan region.

SCO has played a significant role in connecting the country's northern region and supporting the local population. This initiative will not only boost the IT industry in the region but also create job opportunities for the local population. This partnership represents a significant step towards promoting the technology sector in Pakistan's northern region and supporting local communities through increased employment opportunities. The success of the pilot launch phase of STP Skardu has been encouraging, and we are confident that with HBL MFB's support, we can unlock its maximum potential. This partnership is a significant milestone for both HBL Microfinance Bank and SCO, and it highlights their shared commitment to the development of the region.



Image credit and source: <https://propakistani.pk/2023/05/16/hbl-microfinance-bank-partners-with-sco-to-establish-first-ever-software-technology-park-in-skardu/>

First Biofloc Fish Farm Establishment in Tando Jam

A sizable biofloc fish farm has been established in Hyderabad's Tando Jam neighbourhood as a first. The biofloc fish farm, which covers 1.5 acres, has 60 tanks with mechanically controlled oxygen levels and temperature that can produce 50 tonnes of fish or prawns annually for both domestic and international markets. A fish farming system called Biofloc Technology (BT) uses leftover nutrients as fish food. To create microbial protein from toxic fish waste and other organic matter in the water, Biofloc, or more specifically, cultured microorganisms, are added to the water. This saves money while also maintaining water quality.

Earlier, BT was implemented in Sindh as small-scale pilot project, and eventually, a commercial organization called "As-Sammak" established it on a large scale. Additionally, As-Sammak is offering consulting and assistance with the development of the BT fish farm.

According to the founder and chairman of As-Sammak, Mr. Shaukat Hussain, BT fish farming can satisfy both local market demand and export. Hussain claimed that the investment in a BT fish tank cost Rs. 270,000 and could be repaid in two years, pending sales. He explained that as soon as the initial cost is recovered, the profit margin grows. Fish waste is used as fish feed in BT fish farming, so the cost of commercial feed is not included in operating costs. Hussain stated that although they are currently concentrating on fish, they intend to raise prawns and prawns in the future as these are exportable products that can help the nation raise much-needed foreign currency.



Image credit and source: <https://tribune.com.pk/story/2418307/biofloc-tech-for-fish-farming-comes-to-sindh>

Smart Helmets Developed by Pakistani Engineers to Safeguard Motorcyclists

Karachi computer engineers have created a smart helmet and accident alert system to protect motorbike riders from collisions and ensure prompt medical care in the event of an accident. The goal is to save the lives of motorcyclists in Karachi by providing immediate medical assistance. The helmet sends out alerts to specific phone numbers, hospitals, ambulances, and wards, as well as the location of the motorbike rider wearing the helmet, to let friends and family know when there has been an accident or emergency.

According to Muhammad Altmish Akhtar, the solar-powered smart helmet and emergency alert system are furnished with standard pressure plates, helmet-mounted sensors, and GPRS systems in addition to GSM. The majority of the components in the initial sample are installed outside the helmet, whereas they will be installed inside the smart helmets in the final product to protect them from the effects of rain and wear and tear. It is possible to provide immediate emergency medical assistance to the accident-prone motorcyclist by using the ambulance service's vibration sensor system to alert friends and family to pre-specified emergency numbers of nearby hospitals. The location is also shared with the alert.

The alert won't be issued in the event of a helmet fall because pressure plates are installed inside the helmet, which are only activated when the helmet is worn. However, motorcyclists can manually issue an alert in other emergency situations by pressing a button. Additional features, such as virtual head-off displays and machine learning, can also be added to the helmet. With

the help of virtualization on the helmet screen, the Virtual Head of Display facility will make it possible for maps and communication.

Delivery service Riders won't have to

keep turning their phones around in their hands because all communication and navigation will be visible on the windscreen of the helmet.

Image credit and source: <https://www.technologytimes.pk/2023/05/25/karachis-skilled-computer-engineers-introduce-smart-helmets/>



Technology to Conduct Biometric Identification of Animals in Pakistan

Nowadays, it's quite simple to find technology that can read and recognize human fingerprints, DNA, eyes, or blood arteries, but the same cannot be true for animals. Such technology is uncommon since it is difficult to deal with distinctive identifiers that can authenticate animals.

But owing to Syed Umaid Ahmed, a Ph.D scholar at FAST-NUCES, Karachi, Pakistan will soon be one of the few nations to successfully utilize this technology. Syed Umaid and his colleagues have just finished working on a project called Animal Biometrics, which seeks to identify animals and the owners of those animals. It is being trained to work with horses, dogs, and other animals, but its main consideration is on cattle, especially cows and buffalo.

This technology allows identification and authentication of various animals using just a smartphone app by snapping images and collecting their data, much as fingerprints recorded with NADRA. No two animals have the same nose patterns, just like no two people have the same fingerprints. Through these nasal patterns, the aforementioned smartphone app will be able to identify an animal and store its identity in a directory. The app's algorithm is trained using more than 4000 cattle-related photographs. According to Syed Umaid, the app is almost 70% complete and will be made available to the public for free. Additionally, it will be open-source so that anyone can utilize it.



Source: <https://mmnews.tv/pakistan-develops-unique-animal-identification-app/>

NADRA Introduces Iris Biometric Verification Technology

National Database and Registration Authority (NADRA) has introduced Iris Recognition System at its few registration centers to strengthen the existing biometric verification system. NADRA started off with fingerprint matching as the first biometric reduplication modality over a decade ago which was subsequently strengthened with facial images matching capability.

The Iris recognition system, which was piloted at NADRA Headquarters, has now been rolled out at its registration centers at Blue Area Islamabad, PECO Road Lahore and DHA Karachi. The phased deployment of the technology will continue across all 700 NRCs (NADRA registration centers) nationwide. This automated biometric identification modality registers distinctive patterns within a ring-shaped region surrounding the pupil of each eye for identification. The Iris Recognition is an extremely reliable and accurate identification method with negligible false match rates adding third biometric modality to the biometric verification system.

The deployment of premium identity authentication by the authority leverages state-of-the-art recognition technology, offering precision with enhanced security and efficiency in the identity verification of citizens. The introduction of the Iris Recognition System marks a significant leap forward in securing citizens' identities, where the window to their soul becomes the fortress of their digital existence. NADRA's achievement will usher in a new era in Pakistan where an individual's identity credentials can be captured through the most precise, secure and hygienic option of Iris biometrics.



Image credit and source: <https://www.nation.com.pk/04-Jun-2023/nadra-rolls-out-iris-biometric-verification-system>

LoI on China-Pakistan Agricultural S&T Collaboration Signed

The Shanghai Academy of Agricultural Sciences (SAAS) and the University of Agriculture, Faisalabad (UAF) have signed a Letter of Intent (LoI) on China-Pakistan agricultural science and technology collaboration. This milestone agreement signifies a new era of agricultural cooperation between the two countries.

The LoI outlines the intention of both institutions to collaborate on joint teaching, training, research, and other mutually agreed activities. The goal is to strengthen the program and foster a closer relationship between SAAS and UAF.

Areas of collaboration specified in the LoI include post-harvest treatment of agricultural products, integrated pest management in crops such as rice, corn, and nut fruits, understanding the molecular mechanisms of pests and their interaction with agricultural products, utilization of agricultural resources, germplasm evaluation, deployment of specialty maize hybrids, and more.

This collaboration holds great promise for the agricultural sectors of both countries. By sharing knowledge, expertise, and resources, China and Pakistan can work together to address common challenges and drive innovation in the field of agriculture. The LoI signing marks a significant step towards deepening bilateral ties and unlocking new opportunities for growth and development in the agricultural sector.



Image credit and source: <https://tribune.com.pk/story/2418101/china-pakistan-enhance-agricultural-collaboration>

U.S. Ambassador Highlights U.S.-Pakistan “Green Alliance” Framework

In Jhimpir, Ambassador Blome visited the USAID-funded power grid station and the U.S. International Development Finance Corporation-funded Hawa Energy Limited wind power project. The plant contributes 50 megawatts (MW) of renewable energy to Pakistan’s national grid, enough to power more than 10,000 homes. USAID support for power transmission infrastructure has also enabled 780 MW of wind power to flow to Pakistan’s power grid. He also visited the Center for Advanced Studies in Water at Mehran University of Engineering and Technology, initially established through a \$12 million cooperative agreement between Mehran University and USAID, where he discussed the partnerships between U.S. and Pakistani universities that strengthen research in water and environment related fields. As part of the U.S.-Pakistan “Green Alliance” framework, the United States is working with partners throughout Pakistan to support clean energy and sustainable water management in the country.

During his visit to Karachi, Ambassador Blome toured a U.S. government-funded UNICEF project, where he was able to see how a solar powered reverse osmosis desalination plant installed at the community mosque is making a positive difference in the lives of Afghan



refugees and Pakistani host community members. He observed mobile nutrition screening and heard how the project is helping children and pregnant and nursing mothers from the surrounding area, which does not have a local health clinic. Ambassador Blome also visited Makli Necropolis, one of the largest historic burial grounds in the world. He visited the site with the Sindh Minister of Culture and a representative of the Heritage Foundation to see the results of the \$260,000 Ambassadors Fund for Cultural Preservation (AFCP) project to preserve and stabilize the 400-year-old tombs of Sultan Ibrahim and Amir Sultan Muhammad, two of the most prominent structures at Makli Hill.

Image credit and source: <https://pk.usembassy.gov/u-s-ambassador-blome-highlights-u-s-pakistan-green-alliance-framework-during-visit-to-sindh/>

China's Fusion Motor Car Industry

Chinese electric vehicle maker Nio has invested in a startup firm that is developing fusion technologies. The newly established company, Neo Fusion, will research and develop technologies that aim to bring controlled fusion for commercial uses globally in two decades. With registration capital of 5 billion yuan (\$723.37 million), Neo Fusion is 50% controlled by China's eastern province of Anhui government-owned. Nio aims to facilitate the R&D and commercialization of nuclear fusion technology by making financial investment into this project.

Nio Capital and Anhui's State-owned Assets Supervision and Administration Commission did not immediately reply to requests for comment. Fusion is seen to one day be able to help the world slash emissions linked to climate change. Unlike today's fission reactors, it can generate power without producing long-lasting radioactive waste.

Technological advances in recent years have brought it closer to being achieved in reality, sparking an investment spree among companies and governments globally, including the United States, Japan and China, which want to dominate the next generation of energy technology. It has also been developing battery technologies and is planning to build a battery plant with annual capacity of 40 gigawatt hours in Hefei city in Anhui province.



Image credit and source: <https://www.usnews.com/news/technology/articles/2023-05-19/chinese-ev-maker-nio-invests-in-nuclear-fusion-startup>

UAE Signs Nuclear Energy Agreements with China for Regional Goals

The UAE signed agreements with Chinese nuclear companies, boosting partnerships after the South Koreans built a plant in Barakah. Last week, Turkey's Akkuyu Nuclear Power Plant was inaugurated at a ceremony that saw the participation of Erdogan and Putin via videolink.

The United Arab Emirates (UAE) is the latest country to join the nuclear club with a series of agreements signed with Chinese entities. In the UAE, the Emirates Nuclear Energy Corporation (ENEC) signed three agreements with Chinese entities in order to boost low-carbon nuclear energy. The Arab country, which will host the COP28 climate summit this year, wants to obtain 6 per cent of its energy from nuclear power, and China is the privileged partner it picked for its energy transition plan. The three memorandums of understanding (MoU) cover nuclear energy cooperation, high-temperature gas-cooled reactors, and nuclear fuel supply and investment.

The Chinese entities involved are the China Nuclear Power Operations Research Institute, the China National Nuclear Corporation Overseas, and the China Nuclear Energy Industry Corporation. UAE is already building a multi-unit operating nuclear power plant, the first in the Arab world, with the Korea Electric Power Corp (KEPCO) of South Korea. When completed, the Barakah plant will have four reactors with 5,600 megawatts (MW) of total capacity – equivalent to about 25 per cent of the UAE's peak demand.



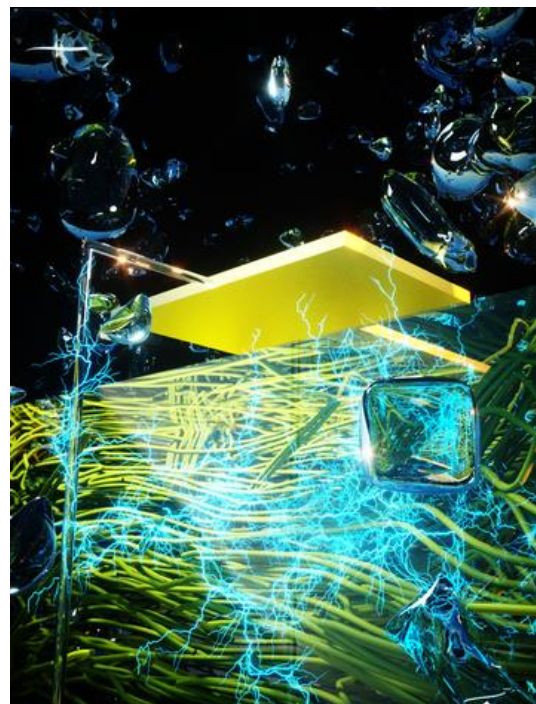
Image credit and source: <https://www.asianews.it/news-en/With-Chinese-help,-the-UAE-is-taking-on-the-nuclear-challenge-in-the-Middle-East-58337.html>

Engineers Harvest Abundant Clean Energy from Thin Air, 24/7

A team of engineers at the University of Massachusetts Amherst has recently shown that nearly any material can be turned into a device that continuously harvests electricity from humidity in the air. The secret lies in being able to pepper the material with nanopores less than 100 nanometers in diameter. The air contains an enormous amount of electricity. Think of a cloud, which is nothing more than a mass of water droplets. Each of those droplets contains a charge, and when conditions are right, the cloud can produce a lightning bolt but we don't know how to reliably capture electricity from lightning. What we've done is to create a human-built, small-scale cloud that produces electricity for us predictably and continuously so that we can harvest it.

The researchers realized that they could design an electricity harvester based around this number. This harvester would be made from a thin layer of material filled with nanopores smaller than 100 nm that would let water molecules pass from the upper to the lower part of the material.

But because each pore is so small, the water molecules would easily bump into the pore's edge as they pass through the thin layer. This means that the upper part of the layer would be bombarded with many more charge-carrying water molecules than the lower part, creating a charge imbalance, like that in a cloud, as the upper part increased its charge relative to the lower part. This would effectually create a battery—one that runs as long as there is any humidity in the air. Because air humidity diffuses in three-dimensional space and the thickness of the Air-gen device is only a fraction of the width



of a human hair, many thousands of them can be stacked on top of each other, efficiently scaling up the amount of energy without increasing the footprint of the device. Such an Air-gen device would be capable of delivering kilowatt-level power for general electrical utility usage.

Image credit and source: <https://www.umass.edu/news/article/engineers-umass-amherst-harvest-abundant-clean-energy-thin-air-247>

Robot ‘Chef’ Learns to Recreate Recipes from Watching Food Videos

Researchers have trained a robotic ‘chef’ to watch and learn from cooking videos, and recreate the dish itself. The researchers, from the University of Cambridge, programmed their robotic chef with a ‘cookbook’ of eight simple salad recipes. After watching a video of a human demonstrating one of the recipes, the robot was able to identify which recipe was being prepared and make it.

In addition, the videos helped the robot incrementally add to its cookbook. At the end of the experiment, the robot came up with a ninth recipe on its own. Robotic chefs have been featured in science fiction for decades, but in reality, cooking is a challenging problem for a robot. Several commercial companies have built prototype robot chefs, although none of these are currently commercially available, and they lag well behind their human counterparts in terms of skill. Human cooks can learn new recipes through observation, whether that’s watching another person cook or watching a video on YouTube, but programming a robot to make a range of dishes is costly and time-consuming. The researchers then used a publicly available neural network to train their robot chef. The neural network had already been programmed to identify a range of different objects, including the fruits and vegetables used in the eight salad recipes (broccoli, carrot, apple, banana and orange).

Using computer vision techniques, the robot analyzed each frame of video and was able to identify the different objects and features, such as a knife and the ingredients, as well as the human demonstrator’s arms, hands and face. Both the recipes and the videos were converted to vectors and the robot performed mathematical operations on the vectors to determine the similarity between a demonstration and a vector. By correctly identifying the ingredients and the actions of the human chef, the robot could determine which of the recipes was being prepared. The robot could infer that if the human demonstrator was holding a knife in one hand and a carrot in the other, the carrot would then get chopped up.



Image credit and source: <https://www.cam.ac.uk/research/news/robot-chef-learns-to-recreate-recipes-from-watching-food-videos>

AI Based Drug That can Combat Drug-Resistant Infections

The machine-learning algorithm identified a compound that kills *Acinetobacter baumannii*, a bacterium that lurks in many hospital settings. Using an artificial intelligence algorithm, researchers have identified a new antibiotic that can kill a type of bacteria that is responsible for many drug-resistant infections.

If developed for use in patients, the drug could help to combat *Acinetobacter baumannii*, a species of bacteria that is often found in hospitals and can lead to pneumonia, meningitis, and other serious infections. *Acinetobacter* can survive on hospital doorknobs and equipment for long periods of time, and it can take up antibiotic resistance genes from its environment. It's really common now to find *A. baumannii* isolates that are resistant to nearly every antibiotic.

The researchers identified the new drug from a library of nearly 7,000 potential drug compounds using a machine-learning model that they trained to evaluate whether a chemical compound will inhibit the growth of *A. baumannii*. This finding further supports the premise that AI can significantly accelerate and expand our search for novel antibiotics. In their initial demonstration, the researchers trained a machine-learning algorithm to identify chemical structures that could inhibit growth of *E. coli*. In a screen of more than 100 million compounds, that algorithm yielded a molecule that the researchers called halicin, after the fictional artificial intelligence system from "2001: A Space Odyssey." This molecule, they showed, could kill not only *E. coli* but several other bacterial species that are resistant to treatment.

To obtain training data for their computational model, the researchers first exposed *A. baumannii* grown in a lab dish to about 7,500 different chemical compounds to see which ones could inhibit growth of the microbe. Then they fed the structure of each molecule into the model. They also told the model whether each structure could inhibit bacterial growth or not. This allowed the algorithm to learn chemical features associated with growth inhibition.



Image credit and source: <https://news.mit.edu/2023/using-ai-scientists-combat-drug-resistant-infections-0525#:~>

Extracting Clean Fuel from Water

New catalyst lowers cost for producing environmentally sustainable hydrogen from water. Clean hydrogen could not only propel vehicles with no emitted pollutants but also help decarbonize industrial processes. A plentiful supply of clean energy is lurking in plain sight. It is the hydrogen we can extract from water (H₂O) using renewable energy. Scientists are seeking low-cost methods for producing clean hydrogen from water to replace fossil fuels, as part of the quest to combat climate change.

Hydrogen can power vehicles while emitting nothing but water. Hydrogen is also an important chemical for many industrial processes, most notably in steel making and ammonia production. Using cleaner hydrogen is highly desirable in those industries. By using the cobalt-based catalyst prepared by new method, we can remove the main bottleneck of cost to produce clean hydrogen in an electrolyzer.

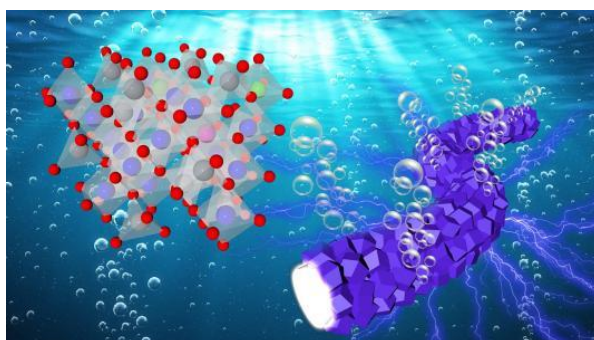
A process called electrolysis produces hydrogen and oxygen from water and has been around for more than a century. Proton exchange membrane (PEM) electrolyzers represent a new generation of technology for this process. They can split water into hydrogen and oxygen with higher efficiency at near room temperature. The reduced energy demand makes them an ideal choice for producing clean hydrogen by using renewable but intermittent sources, such as solar and wind.

This electrolyzer runs with separate catalysts for each of its electrodes (cathode and anode). The cathode catalyst yields hydrogen, while the anode catalyst forms oxygen. A problem is that the anode catalyst uses iridium, which has a current market price of around \$5,000 per ounce. The lack of supply and high cost of iridium pose a major barrier for widespread adoption of PEM electrolyzers.

The team's achievement is a step forward in DOE's Hydrogen Energy Earthshot initiative, which mimics the U.S. space program's "Moon Shot" of the 1960s. Its ambitious goal is to lower the cost for green hydrogen production to one dollar per kilogram in a decade. Production of green

hydrogen at that cost could reshape the nation's economy. Applications include the electric grid, manufacturing, transportation and residential and commercial heating.

Image credit and source: <https://www.anl.gov/article/extracting-a-clean-fuel-from-water>



Fiber-Optic Sensing and New Materials that can Reduce the Cost of Floating Offshore Wind (FOSW) Turbines

Researchers are giving floating offshore wind turbines abilities to self-monitor and self-heal. In shallow waters, offshore wind turbines are fixed to the ocean floor. However, in deep water areas where winds are typically stronger and have the capacity to reap more than double the energy, floating offshore wind turbines must be moored to the seabed where the ocean is too deep for fixed structures. Scientists at the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) are developing sensing technologies consisting of fiber-optic cables, which could be installed on FOSW structures that have been planned off the California coast. This would allow structures to self-monitor damaging conditions that could lead to costly repairs and would also help gauge how FOSW impacts marine mammals by detecting their activity.

In collaboration with experts in materials science, engineering, geophysics, and FOSW developers from around the world, Berkeley Lab scientist Yuxin Wu is now working to develop solutions to reduce the cost of FOSW development and deployment, while minimizing potential environmental impacts.

A fiber cable has a glass core that allows you to send an optical signal at the speed of light; when there is any vibration, strain, or change in temperature of the material that is

being monitored, that information will be carried in the light signal that is scattered back. When attached to or embedded within the wind turbine structure, this gives it a “nervous system”



which allows it to “hear” and “feel.” The fiber is able to monitor surrounding acoustic signals, such as whale calls, which can help scientists assess potential impacts to large marine mammals from FOSW operations.

Image credit and source: <https://newscenter.lbl.gov/2023/06/01/reducing-the-cost-of-floating-offshore-wind/>

Liquid Metal Sticks to Surfaces without a Binding Agent

Everyday materials such as paper and plastic could be transformed into electronic “smart devices” by using a simple new method to apply liquid metal to surfaces, according to scientists in Beijing, China. The study demonstrates a technique for applying a liquid metal coating to surfaces that do not easily bond with liquid metal. The approach is designed to work at a large scale and may have applications in wearable testing platforms, flexible devices, and soft robotics.

Before, we thought that it was impossible for liquid metal to adhere to non-wetting surfaces so easily, but here it can adhere to various surfaces only by adjusting the pressure. previous research has mainly focused on a technique called transfer printing, which involves using a third material to bind the liquid metal to the surface. But this strategy comes with drawbacks i.e. adding more materials can complicate the process and may weaken the end product’s electrical, thermal, or mechanical performance.

The researchers found that rubbing the liquid metal-covered stamp against the paper with a small amount of force enabled the metal droplets to bind effectively to the surface, while applying larger amounts of force prevented the droplets from staying in place. The team folded the metal-coated paper into a paper crane, demonstrating that the surface can still be folded as usual after the process is completed. And after doing so, the modified paper still maintains its usual properties.

Just like wet ink on paper can be wiped off by hand, the liquid metal coating without packaging here also can be wiped off by the object it touches as it is applied,” said Yuan. “The properties of the coating itself will not be greatly affected, but objects in contact may be soiled.

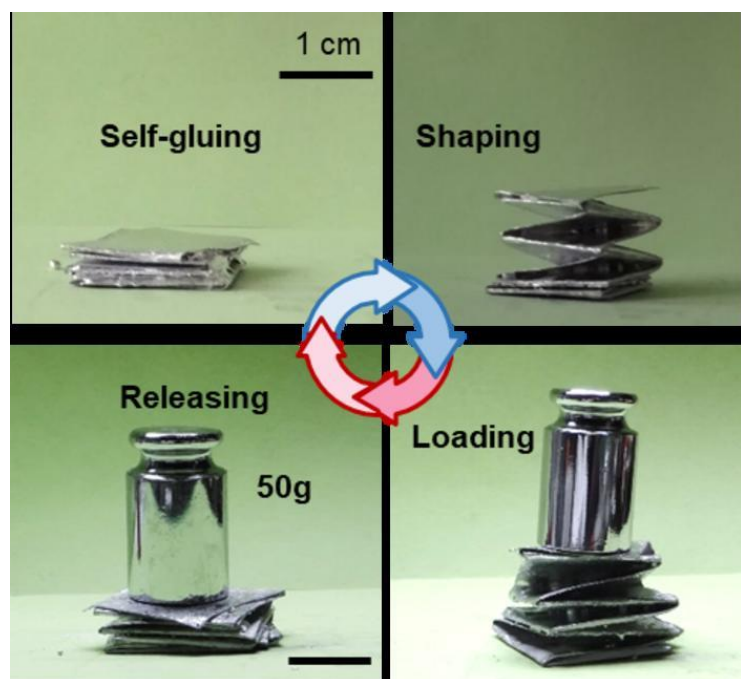


Image credit and source: <https://www.eurekalert.org/news-releases/991183>

‘Heat Highways’ Could Keep Electronics Cool

As smart electronic devices become smaller and more powerful, they can generate a lot of heat, leading to slower processing times and sudden shutdowns. But shrinking sizes mean that these devices concentrate heat in smaller areas, which can cause lagging computing speeds and even force devices to completely shut down unexpectedly to prevent damage. Now, in ACS Applied Nano Materials, researchers use an electrospinning approach to produce a new nanocomposite film. To dissipate this heat, researchers are turning to nanocomposite materials that contain a flexible polymer and thermally conductive filler. A simple way to make nanocomposites is by electrospinning, in which a solution of polymer and filler is jetted out of a syringe through an electrically charged nozzle, forming fibers that build up into a thin film. While simple, electrospinning from a single solution, or uniaxial electrospinning, makes it difficult to control the material’s properties.

The researchers made one solution with their selected polymer, polyvinyl alcohol, and a separate solution with the thermally conductive filler, a nanodiamond material, to produce the new nanocomposite. By fitting a syringe of each solution onto a nozzle that combined the two, the researchers made fibers with a polyvinyl alcohol core and nanodiamond coating, rather than a random distribution of the two components. The researchers say the coated fibers act as a “highway” to direct heat, like traffic, along and across the fibers throughout the film. In tests, the new materials dissipated heat better than those made with the traditional nozzle and



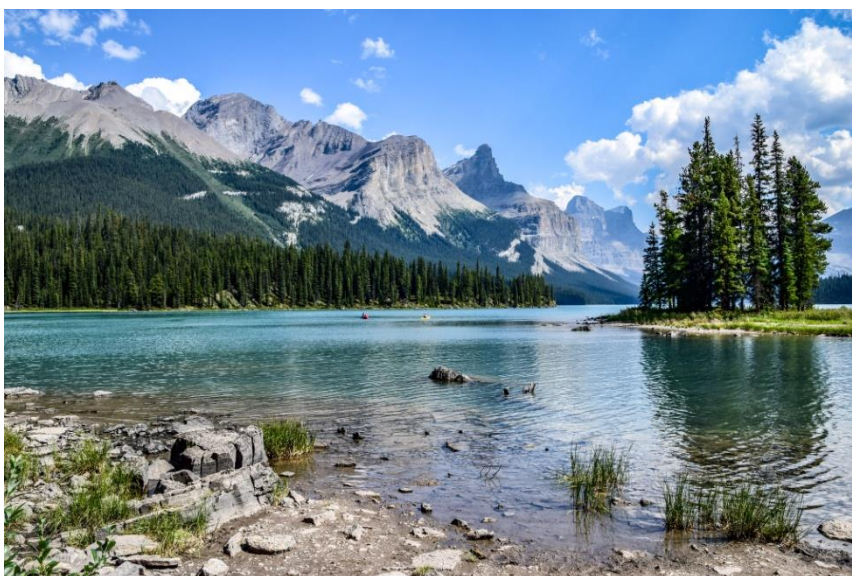
were four times as thermally conductive as previously reported nanocomposites. The researchers say that these films could one day be used to keep tiny electronics working hard while staying cool.

Image credit and source: <https://www.acs.org/pressroom/presspacs/2023/june/heat-highways-could-keep-electronics-cool.html>

Water Molecules Define the Materials around Us

A new paper argues that materials like wood, bacteria, and fungi belong to a newly identified class of matter, "hydration solids". A new research argues that the character of many biological materials is actually created by the water that permeates these materials. Water gives rise to a solid and goes on to define the properties of that solid, all the while maintaining its liquid characteristics. The authors group these and other materials into a new class of matter that they call "hydration solids," which they say "acquire their structural rigidity, the defining characteristic of the solid state, from the fluid permeating their pores".

One of the researcher involved in this study, used the metaphor of a building to describe the team's finding. According to him, "If you think of biological materials like a skyscraper, the molecular building blocks are the steel frames that hold them up, and water in between the molecular building blocks is the air inside the steel frames. We discovered that some skyscrapers aren't supported by their steel frames, but by the air within those frames. This idea may seem hard to believe, but it resolves mysteries and helps predict the existence of exciting phenomena in materials.



When water is in its liquid form, its molecules strike a fine balance between order and disorder. But when the molecules that form biological materials combine with water, they tip the balance toward order: Water wants to return to its original state. As a result, the water molecules push the biological matter's molecules away. That pushing force, called the hydration force, was identified in the 1970s, but its impact on biological matter was thought to be limited. This research arguments that the hydration force is what defines the character of biological matter almost entirely, including how soft or hard it is, thus comes as a surprise.

Image credit and source: <https://phys.org/news/2023-06-scientists-molecules-materials.html#:~:text=Scientists%20discover>

Tiny Video Capsule an Alternative to Conventional Endoscopy

While ingestible video capsule endoscopes have been around for many years, the capsules have been limited by the fact that they could not be controlled by physicians. They moved passively, driven only by gravity and the natural movement of the body. Now, according to a first-of-its-kind research study at George Washington University, physicians can remotely drive a miniature video capsule to all regions of the stomach to visualize and photograph potential problem areas. The new technology uses an external magnet and hand-held video game style joysticks to move the capsule in three-dimensions in the stomach. This new technology comes closer to the capabilities of a traditional tube-based endoscopy.

While using the joystick requires additional time and training, software is being developed that will use artificial intelligence to self-drive the capsule to all parts of the stomach with a push of the button and record any potential risky abnormalities. That would make it easier to use the system as a diagnostic tool or screening test. In addition, the videos can be easily transmitted for off-site review if a gastroenterologist is not on-site to over-read the images.

The researchers conducted a study of 40 patients at a physician office building using the magnetically controlled capsule endoscopy. They found that the doctor could direct the capsule to all major parts of the stomach with a 95 percent rate of visualization. Capsules were driven by the physician and then the study reports were reviewed by an attending gastroenterologist who was physically off-site.



Image credit and source: <https://mediarelations.gwu.edu/tiny-video-capsule-shows-promise-alternative-endoscopy>

Scientists Report World's First X-Ray of a Single Atom in Nature

Researchers have taken the world's first X-ray SIGNAL (or SIGNATURE) of just one atom. Since its discovery by Roentgen in 1895, X-rays have been used everywhere, from medical examinations to security screenings in airports. Even Curiosity, NASA's Mars rover, is equipped with an X-ray device to examine the materials composition of the rocks in Mars. The smallest amount one can X-ray a sample is in attogram, that is about 10,000 atoms or more. This is due to the X-ray signal produced by an atom being extremely weak so that the conventional X-ray detectors cannot be used to detect it.

Atoms can be routinely imaged with scanning probe microscopes, but without X-rays one cannot tell what they are made of. We can now detect exactly the type of a particular atom, one atom-at-a-time, and can simultaneously measure its chemical state. This will have a great impact on environmental and medical sciences and maybe even find a cure that can have a huge impact for humankind. This discovery will transform the world. For demonstration, the team chose an iron atom and a terbium atom, both inserted in respective molecular hosts. To detect X-ray signal of one atom, the research team supplemented conventional detectors in X-rays with a specialized detector made of a sharp metal tip positioned at extreme proximity to the sample to collect X-ray excited electrons – a technique known as synchrotron X-ray scanning tunneling microscopy or SX-STM. X-ray spectroscopy in SX-STM is triggered by photoabsorption of core level electrons, which constitutes elemental fingerprints and is effective in identifying the elemental type of the materials directly. The spectrums are like fingerprints, each one being unique and able to detect exactly what it is. The technique used, and concept proven in this study, broke new ground in X-ray science and nanoscale studies. Using X-rays to detect and characterize individual atoms could revolutionize research and give birth to new technologies in areas such as quantum information and the detection of trace elements in environmental and medical research.

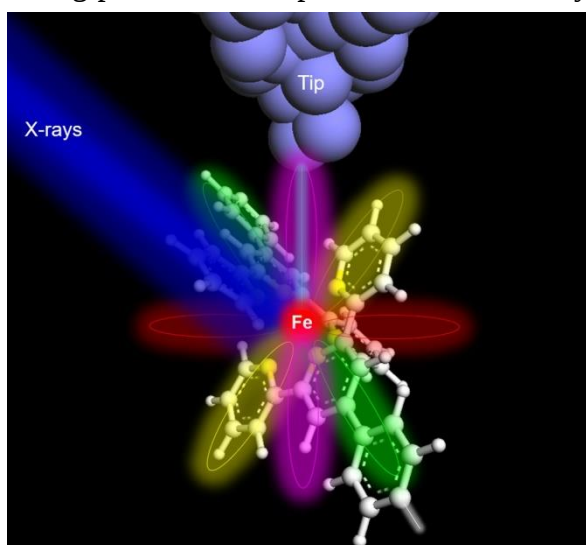


Image credit and source: <https://www.ohio.edu/news/2023/05/scientists-report-worlds-first-x-ray-single-atom-nature>

Four-Legged Robot Traverses Tricky Terrains through 3D Vision

Researchers led by the University of California San Diego have developed a new model that trains four-legged robots to see more clearly in 3D. The robot is enabled to autonomously cross challenging terrain with ease, including stairs, rocky ground and gap-filled paths, clearing obstacles in its way.

By providing the robot with a better understanding of its surroundings in 3D, it can be deployed in more complex environments in the real world. The robot is equipped with a forward-facing depth camera on its head. The camera is tilted downwards at an angle that gives it a good view of both the scene in front of it and the terrain beneath it. To improve the robot's 3D perception, the researchers developed a model that first takes 2D images from the camera and translates them into 3D space. It does this by looking at a short video sequence that consists of the current frame and a few previous frames, then extracting pieces of 3D information from each 2D frame. That includes information about the robot's leg movements such as joint angle, joint velocity and distance from the ground. The model compares the information from the previous frames with information from the current frame to estimate the 3D transformation between the past and the present. The model fuses all that information together so that it can use the current frame to synthesize the previous frames. As the robot moves, the model checks the synthesized frames against the frames that the camera has already captured. If they are a good match, then the model knows that it has learned the correct representation of the 3D scene. Otherwise, it makes corrections until it gets it right. The



3D representation is used to control the robot's movement. By synthesizing visual information from the past, the robot is able to remember what it has seen, as well as the actions its legs have taken before, and use that memory to inform its next moves. The approach allows the robot to build a short-term memory of its 3D surroundings so that it can act better.

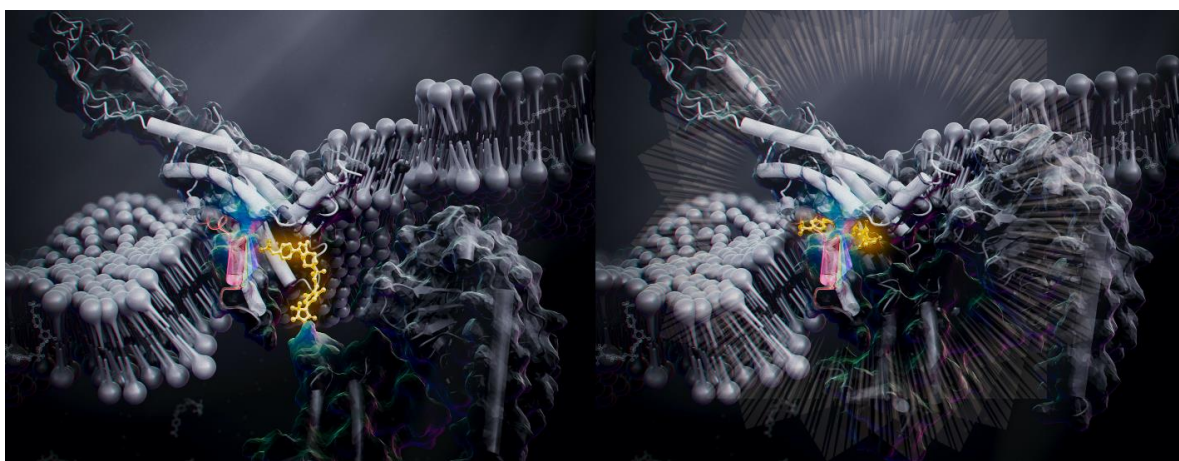
Image credit and source: <https://today.ucsd.edu/story/four-legged-robot-traverses-tricky-terrains-thanks-to-improved-3d-vision>

A New Way to Develop Drugs without Side Effects

Researchers discovered a novel method to activate G-protein coupled receptors from inside the cells, and it helps develop drugs without side effects. We often wonder how drugs reach their targets and achieve their function within our bodies? If a drug molecule or a ligand is a message, an inbox is typically a receptor in the cell membrane.

One such receptor, involved in relaying molecular signals is a G protein coupled receptor (GPCR). About one-third of existing drugs work by controlling the activation of this protein. Japanese researchers now reveal a new way of activating GPCR by triggering shape changes in the intracellular region of the receptor. This new process can help researchers design drugs with fewer or no side effects. If the cell membrane is like an Oreo cookie sandwich, GPCR is like a snake with seven segments traversing in and out of the cookie sandwich surface. The extracellular loops are the inbox for messages. When a message molecule binds to the extracellular side of the receptor, it triggers a shape change activating G proteins and β -arrestin protein attached to the intracellular side of the receptor. Like a molecular relay, the information passes downstream and affects various bodily processes.

A team of researchers at the University of Tokyo, discovered a new receptor activation mode of a bone metabolism related GPCR called human parathyroid hormone type 1 receptor (PTH1R) without signal transduction from the extracellular side.



Treatments for osteoporosis that target PTH1R require strict dosage, have administration route restrictions, and there aren't yet any better alternatives. The team synthesized a non-peptide message molecule called PCO371 which binds to the intracellular region of the receptor and interacts directly with G protein subunits. In other words, PCO371 activates the receptor after entering the cell.

Image credit and source: <https://www.s.u-tokyo.ac.jp/en/press/2023/8480/>

Megawatt Electrical Motor Designed By MIT Engineers to Electrify Aviation

Aviation's huge carbon footprint could shrink significantly with electrification. To date, however, only small all-electric planes have gotten off the ground. Their electric motors generate hundreds of kilowatts of power. To electrify larger, heavier jets, such as commercial airliners, megawatt-scale motors are required. These would be propelled by hybrid or turbo-electric propulsion systems where an electrical machine is coupled with a gas turbine aero-engine.

To meet this need, a team of MIT engineers is now creating a 1-megawatt motor that could be a key stepping stone toward electrifying larger aircraft. The team has designed and tested the major components of the motor, and shown through detailed computations that the coupled components can work as a whole to generate one megawatt of power, at a weight and size competitive with current small aero-engines.

For all-electric applications, the team envisions the motor could be paired with a source of electricity such as a battery or a fuel cell. The motor could then turn the electrical energy into mechanical work to power a plane's propellers. The electrical machine could also be paired with a traditional turbofan jet engine to run as a hybrid propulsion system, providing electric propulsion during certain phases of a flight.

As a whole system, the motor is designed such that the distributed circuit boards are close coupled with the electrical machine to minimize transmission loss and to allow effective air cooling through the integrated heat exchanger.



Image credit and source: <https://news.mit.edu/2023/megawatt-motor-could-help-electrify-aviation-0608>

New Technique Substantially Reduces Mouse Damage to Crops Even During Plagues

A non-toxic method to prevent mice from devouring wheat crops has been shown to drastically reduce seed loss. The technique, developed by scientists at the University of Sydney, could be a game-changer in the management of crop loss to mice plague. The team estimates that mice could steal 63 percent less wheat seeds, compared to untreated crop, if a wheat crop is sprayed with diluted wheat germ oil during and after sowing.

The researchers found that if the wheat plot was also sprayed with the same solution before planting, then seed loss could be reduced by 74 percent. This is because the mice had learned to ignore unrewarding wheat odor by the time the crop is planted. The researchers found that they could reduce mice damage during plague conditions simply by making it hard for mice to find their food, by camouflaging the seed odor. Because they're hungry, they can't spend all their time searching for food that's hard to find. When the smell of the seed is everywhere, they'll just go and look for something else instead of being encouraged to dig. That's because mice are precise foragers that can smell seeds in the ground and dig exactly where a seed is, but they can't do that in this situation because everything smells like the seeds. This misinformation tactic could work well in other crop systems too, indeed any animal that finds food by smell is potentially vulnerable to this manipulation.

The camouflage appeared to last until after the seeds germinated, which is the period of vulnerability when wheat needs to be protected.



Image credit and source: <https://www.sydney.edu.au/news-opinion/news/2023/05/24/technique-reduces-mouse-damage-to-crops-even-during-plagues.html>

FORTHCOMING TECH EVENTS

PAKISTAN

- International Workshop on Nanomaterials And Catalysis (IWNMC-23)
July 4 – 6, 2023, PIEAS, Islamabad
<http://www.pieas.edu.pk/proclaim-detail.cshtml?ProclaimId=143>
- 13th National Media Workshop (13th NMW)
July 10 – 15, 2023, National Defense University, Islamabad
<https://www.ndu.edu.pk/temp/issra/NMW/NMW-13.jpg>
- 36th International Young Physicists' Tournament (IYPT)
July 18 – 25, 2023, Kohsar University, Murree
<https://kum.edu.pk/kum/index.php/iypt-2023/#1683538595419-407536dd-dd90>
- International Conference on CPEC, Sustainable Tourism Development for Women Empowerment in Pakistan
September 14 – 15, 2023, Karakoram International University, Gilgit
<https://fjwu.edu.pk/fjwu-events/international-conference-on-cpec-sustainable-tourism-development--for-women-empowerment-in-pakistan/>
- Poultry Science Conference (PSC@IPEX2023)
September 21 – 23, 2023, University of Veterinary & Animal Sciences, Lahore
<http://aims.uvas.edu.pk/LAMS/login.aspx>
- 2nd International Conference on Emerging Trends in Science and Technology (ICETST, 2023)
October 2 – 6, 2023, Fatima Jinnah Women University, Rawalpindi
<https://fjwu.edu.pk/icetst/>

INTERNATIONAL

- 12th Annual Energy Science & Technology Conference 2023
July 05 – 09, 2023, Spokane, Washington
<https://energyscienceconference.com/>
- 16th International Conference on Computer Science and Information Technology
July 6 – 8, 2023, Paris, France
<http://iccsit.org/>
- 5th IEEE International Conference on Artificial Intelligence Testing
July 17 – 20, 2023, Athens, Greece
<https://ieeaaitest.com/>
- 4th International Conference on Stem Cell
July 19 – 20, 2023, Rome, Italy
<https://www.meetingsint.com/conferences/stemcellresearch>
- 45th Annual International Conference of the IEEE Engineering in Medicine and Biology Society
July 24 – 27, 2023, Sydney, Australia
<https://embs.org/2023/program/>
- 38th International Conference on Solution Chemistry
July 9 – 14, 2023, Belgrade, Serbia
<https://iupac.org/event/38icsc/>
- 2nd International Conference on Physics and its Applications
July 17 – 19, 2023, Los Angeles, CA
<https://physics.unitedscientificgroup.org/>
- 9th Annual International Conference on Biology
July 17 – 20, 2023, Athens, Greece
<https://www.atiner.gr/biology>

- 8th International Conference on Networks, Communications, Wireless and Mobile Computing (NCWMC 2023)
July 22 – 23, 2023, Toronto, Canada
<https://ccsit2023.org/ncwmc/index>
- 24th International Conference on Engineering Design
July 24 – 28, 2023, Bordeaux, France
<https://iced.designsociety.org/>
- 6th International Symposium on Engineering and Applied Science (ISEAS)
July 26 – 28, 2023, Okinawa, Japan
<https://iseas.org/>
- 26th International Conference on Chemical Thermodynamics (ICCT-2023)
July 30th – August 4th, 2023, Osaka, Japan
<https://iupac.org/event/icct->
- 9th International Conference on Bioengineering and Biotechnology
August 9 – 11, 2023, London, United Kingdom
<https://bbseries.org/>
- IUPAC World Chemistry Congress 2023
August 20 – 27, 2023, The Hague, Netherlands
<https://iupac.org/event/iupac-world-chemistry-congress-2023/>
- 1st International Conference on AI-generated Content (AIGC2023)
August 25 – 26, 2023, Shanghai, China
<https://icaigc.org/index.html>
- Small Business Expo 2023
September 6th, Los Angeles
<https://www.thesmallbusinessexpo.com/city/los-angeles/>
- 8th International Conference on Accelerating Biopharmaceutical Development (AccBio 2023)
September 6 – 8, 2023, Cambridge, USA
<https://www.aiche.org/sbe/conferences/accelerating-biopharmaceutical-development-abd/2023?gclid>
- 25th International Conference on Engineering and Product Design Education
September 7 – 8, 2023, Barcelona, Spain
<https://epde.info/2023/>
- 7th International Conference on Engineering Technology and Innovation (ICETI 2023)
September 13 – 17, 2023, Belgrade, Serbia
<https://www.iceti.org/>
- EV Charging Infrastructure 2023
September 18 – 19, 2023, Toronto, Canada
<https://www.canada.evcharging-infrastructure.com/>
- 16th International Congress on the Chemistry of Cement 2023
September 18 – 22, 2023, Bangkok, Thailand
<https://www.iccc2023.org/>
- International Conference on Computer Vision
October 2 – 6, 2023, Paris, France
<https://iccv2023.thecvf.com/>
- International Conference on Medical Education 2023
October 7 – 10, 2023, Baku, Azerbaijan
<https://icme-riphah.org/>

TECH AND TRADE OFFERS

A to Z Global Enterprises

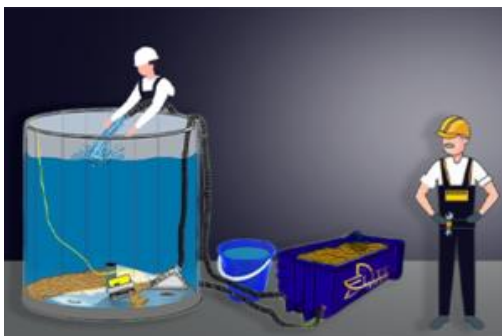
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PEST CONTROL SERVICE



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Cell: +92306 92 35 0 99

Web: <https://atozglobalenterprises.com/>

Smart Sun Power

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Our mission is to provide one of the best solar energy solutions to our customers making them part of cleaner and greener earth.

Our Services

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