



NITRD News Brief

We are pleased to continue NITRD's News Brief that offers insight into the activities NITRD's member agencies are conducting to achieve the Nation's priorities through the lens of the public-facing news sources. These are divided into networking and information technology topics that have been identified as of great importance for improving Americans' daily lives.

For ease of access, under NITRD's logo, the title of each section is listed as a link to that section. The titles of the articles under the section's heading are links that provide immediate access to the news article listed. We hope you find this informative and helpful in your daily activities.

Do you know someone who would like to receive NITRD's weekly news brief? They can email NITRD's IT aficionados at nco@nitrd.gov and voilà they will receive the news brief with the cool technology articles each week!

Federal Agency Funding Opportunities

ERDC announces \$20 million tech challenge to advance civil works R&D through innovation, partnerships

...The U.S. Army Engineer Research and Development Center (ERDC) in conjunction with ERDCWERX launched the Civil Works R&D Collider, a multi-phased tech challenge and competitive opportunity for pre-proposal submissions in 28 diverse civil works project topics, including flood risk management, inland and coastal navigation and more. The ERDC plans to award a combined amount of up to \$20 million in funding to partners and innovators to address these civil works challenges. This tech challenge is designed to spotlight some of the nation's greatest needs and most significant opportunities for civil works R&D collaboration with ERDC. Industry and academia are encouraged to submit pre-proposals via ERDCWERX.org for funding consideration under infrastructure, sediment management, water modeling, artificial intelligence, robotics and data, crisis mitigation and ecosystems. Submissions through the Collider will be accepted through June 26, 2023.

Artificial Intelligence / Machine Learning

National Artificial Intelligence Research and Development Strategic Plan 2023 Update

...The federal government must place people and communities at the center by investing in responsible R&D that serves the public good, protects people's rights and safety, and advances democratic values. This update to the National AI R&D Strategic Plan is a roadmap for driving progress toward that goal. This plan defines the major research challenges in AI to coordinate and focus federal R&D investments. It will ensure continued U.S. leadership in the development and use of trustworthy AI systems, prepare the current and future U.S. workforce for the integration of AI systems across all sectors, and coordinate ongoing AI activities across all federal agencies. This plan, which follows national AI R&D strategic plans issued in 2016 and 2019, reaffirms eight strategies and adds a ninth to underscore a principled and coordinated approach to international collaboration in AI research...

<https://www.nitrd.gov/publications/> - May 24, 2023

MagNav project successfully demonstrates real-time magnetic navigation with AI

...In a groundbreaking achievement, the Department of the Air Force-Massachusetts Institute of Technology Artificial Intelligence Accelerator, or AIA, MagNav project recently performed real-time magnetic navigation, or MagNav. In conjunction with personnel from MIT, MIT Lincoln Laboratory, the Air Force Research Laboratory Sensors Directorate and the Air Force Institute of Technology Autonomy and Navigation Center, the AIA MagNav team harnessed the power of AI and machine learning through the AIA's calibration and positioning neural network, which was trained during flight in a matter of minutes on a commercially-available laptop. The team leveraged transfer learning from AI models built on previously collected C-17 data, which significantly accelerated the neural network training process. ... The groundbreaking collaboration between AIA, MIT, MIT Lincoln Laboratory, and other partners paves the way for further innovation in navigation technologies, benefiting not only the Air Force but also the broader aviation community.

Air Force Link - May 26, 2023

Seeing into the future: AF looks to AI for data analysis

...In an effort to digest and rapidly analyze the process of decision making, Headquarters Air Force Digital Operations Directorate (A3X) developed an artificial intelligence-based software that can be applied to all Air Force specialty codes to better examine and predict operational outcomes. Headquarters Air Staff have developed six software programs for career fields using AI to conduct data analysis. Besides data management, the AI software can calculate predictions based off equations and programming, depending on the type of data available. Whether the predicted outcome is correct or not, the software is capable of learning and adapting to produce even more accurate outcomes for future calculations. The software is adaptable across all AFSCs to interpret different situations. From tracking flight hours to locating equipment, this new application can replace cumbersome applications and software systems presently used to more user-friendly ones for newcomers...

Air Force Link - May 31, 2023

NIH/ARO/AFOSR/NSF fund project to map 3D volumes rather than surfaces for computer graphics problems

...In computer graphics and computer-aided design (CAD), 3D objects are often represented by the contours of their outer surfaces. Computers store these shapes as "thin shells," which model the contours of the skin of an animated character but not the flesh underneath. This modeling decision makes it efficient to store and manipulate 3D shapes, but it can lead to unexpected artifacts. To address shortcomings, researchers at MIT have developed an approach that aligns 3D shapes by mapping volumes to volumes, rather than surfaces to surfaces. Their technique represents shapes as tetrahedral meshes that include the mass inside a 3D object. Their algorithm determines how to move and stretch the corners of tetrahedra in a source shape so it aligns with a target shape. Because it incorporates volumetric information, the researchers' technique is better able to model fine parts of an object, avoiding the twisting and inversion typical of surface-based mapping. The approach Abulnaga and his collaborators developed was able to align shapes more effectively than baseline methods, leading to high-quality shape maps with less distortion than competing alternatives. Their algorithm was especially well-suited for challenging mapping problems where the input shapes are geometrically distinct. ... This research is funded by the National Institutes of Health, the U.S. Army Research Office, the Air Force Office of Scientific Research, and the National Science Foundation...

MIT News - May 24, 2023

Engineering team receives \$3.6M from NSF to combat plastic waste using AI and cross-disciplinary expertise

...Washington University in St. Louis is leading a new effort to address the grand challenge of developing the next generation of high-performance, sustainably sourced and biodegradable plastics that advance engineering while also protecting the environment. Marcus Foston and his interdisciplinary team have received a five-year \$3.6 million Growing Convergence Research (GCR) grant from the National Science Foundation (NSF) to develop a new class of biologically synthesized, protein-based and biodegradable

materials that harness motifs from nature to replace traditional petroleum-derived plastics. The project brings together a convergence of cross-disciplinary expertise to evolve the plastics economy by developing a platform for the discovery of synthetic biological materials with desired properties, guided by artificial intelligence, biomimetics and the science of product adoption. They will use machine learning aided with material screening and simulation approaches to accelerate the process of finding promising protein sequences that can be used to make biodegradable materials with targeted properties to replace plastics in both high- and low-value applications. ... The team will work toward developing a workforce pipeline that can innovate at the frontiers of machine learning, synthetic biology and engineering.

The Source - Washington University in St. Louis - May 30, 2023

Robotics / Autonomous Vehicles

Unraveling the mathematics behind wiggly worm knots

...Tiny California blackworms intricately tangle themselves by the thousands to form ball-shaped blobs that allow them to execute a wide range of biological functions. But, most striking of all, while the worms tangle over a period of several minutes, they can untangle in mere milliseconds, escaping at the first sign of a threat from a predator. The NSF-supported research team examined how the blackworms execute their tangling and untangling movements, which could influence the design of fiberlike, shape-shifting robotics that self-assemble and move in ways that are fast and reversible. They set about finding an imaging technique that would allow them to peer inside the worm blob so they could gather more data. After much trial and error, they landed on an unexpected solution: ultrasound. By placing a live worm blob in nontoxic jelly and using a commercial ultrasound machine, they were finally able to observe the inside of the intricate worm tangles. These filaments serve myriad functions and can provide a general motif for engineering multifunctional structures and materials that change properties on demand...

National Science Foundation - May 31, 2023

DARPA/NSF/AFOSR-supported research helps robots handle fluids

...FluidLab, a new simulation tool from researchers at the MIT Computer Science and Artificial Intelligence Laboratory (CSAIL), enhances robot learning for complex fluid manipulation tasks like making latte art, ice cream, and even manipulating air. The virtual environment offers a versatile collection of intricate fluid handling challenges, involving both solids and liquids, and multiple fluids simultaneously. FluidLab supports modeling solid, liquid, and gas, including elastic, plastic, rigid objects, Newtonian and non-Newtonian liquids, and smoke and air. At the heart of FluidLab lies FluidEngine, an easy-to-use physics simulator capable of seamlessly calculating and simulating various materials and their interactions so the simulator can incorporate physics knowledge for a more realistic physical world model, leading to more efficient learning and planning for robotic tasks. The 10 tasks the team put forth fell into two categories: using fluids to manipulate hard-to-reach objects, and directly manipulating fluids for specific goals. Examples included separating liquids, guiding floating objects, transporting items with water jets, mixing liquids, creating latte art, shaping ice cream, and controlling air circulation. For next steps, the team is working to develop a closed-loop policy in simulation that takes as input the state or the visual observations of the environments and performs fluid manipulation tasks in real time, and then transfers the learned policies in real-world scenes. ... The team's research is supported by a DARPA Young Investigator Award, an NSF CAREER award, an AFOSR Young Investigator Award, DARPA Machine Common Sense, and the National Science Foundation.

MIT News - May 24, 2023

NSF-funded engineers to unlock new possibilities for autonomous systems

...Deep reinforcement learning has received a significant amount of research attention recently as it enables autonomous systems, such as autonomous cars or drones, to make decisions in real time. However, researchers are still grappling with the computational demands of learning by such controllers as well as the need to guarantee their safety and transferability into novel environments. Yiannis Kantaros, at Washington University in St. Louis, has received a \$413,694 grant from the National Science Foundation to develop data-efficient machine learning methods that can create safe and verified controllers that allow autonomous robots to satisfy complex mission and safety requirements that may be different from the ones used during the robot's training phase...

The Source - Washington University in St. Louis - May 24, 2023

Quantum

Using quantum physics to secure wireless devices

...U.S. National Science Foundation-supported electrical engineers at the University of Illinois Chicago have been investigating ways to create more secure devices. A method, inspired by quantum physics to improve wireless device identification and protect device-to-device communication, uses a random and unique digital fingerprint to create a hardware encryption system that is virtually unbreakable. Quantum physics describes systems for which precise measurement is difficult or impossible; a quantum state

describes a parameter space or range of possible measurements. Within these states, exceptional points exist where the uncertainty of the system is at its maximum. These points are promising for cryptography — the more uncertain the system, the more secure. The researchers figured out a mathematical approach to identify these exceptional points in a radio frequency identification system. The group created new RFID lock-and-tag devices that use the exceptional point algorithm to create a secure signal. Since every piece of hardware is slightly different due to small variations during the fabrication process, each RFID device produces its own unique digital fingerprint using the maximized uncertainty at the exceptional point...

National Science Foundation - May 30, 2023

Understanding the Tantalizing Benefits of Tantalum for Improved Quantum Processors

...Researchers working to improve the performance of superconducting qubits, the foundation of quantum computers, have been experimenting using different base materials in an effort to increase the coherent lifetimes of qubits. The coherence time is a measure of how long a qubit retains quantum information, and thus a primary measure of performance. Recently, scientists discovered that using tantalum in superconducting qubits makes them perform better. Scientists from the Center for Functional Nanomaterials (CFN), the National Synchrotron Light Source II (NSLS-II), the Co-design Center for Quantum Advantage (C2QA), and Princeton University investigated the fundamental reasons that these qubits perform better by decoding the chemical profile of tantalum. Tantalum is a superconductor, which means it has no electrical resistance when cooled to sufficiently low temperatures, and consequently can carry current without any energy loss. Tantalum-based superconducting qubits have demonstrated record-long lifetimes of more than half a millisecond. That is five times longer than the lifetimes of qubits made with niobium and aluminum, which are currently deployed in large-scale quantum processors. The team found several different kinds of tantalum oxides at the surface of the tantalum, which has prompted a new set of questions on the path to creating better superconducting qubits...

Brookhaven Lab - May 31, 2023

UNM one of three universities awarded \$1M grant under the DEPSCoR Capacity Building Competition

...The University of New Mexico continues its continue to 25-year track record of excellence in Quantum Information Science and Engineering (QISE) research after receiving a \$1 million grant from the Department of Defense under its Defense Established Program to Stimulate Competitive Research (DEPSCoR) Capacity Building competition. UNM is home to The Center for Quantum Information and Control (CQuIC) that is focused on theoretical foundations of QISE, and the Center for High Technology Materials (CHTM) that has a long record of conducting research on quantum photonic materials and devices. The two-year \$1 million grant will be used to advance the research ecosystem at UNM by hiring new faculty in photonics-based system-level experimental QISE. Some targeted areas include quantum computing, quantum communications, and workforce development in QISE-relevant areas. The grant will also be used to create and implement a new interdisciplinary graduate degree program in QISE at UNM...

UNM Newsroom - May 24, 2023

Cybersecurity / Privacy

DOD Transmits 2023 Cyber Strategy

...The Department of Defense transmitted the classified 2023 DoD Cyber Strategy to Congress earlier this week. The classified 2023 DoD Cyber Strategy provides direction to the Department to operationalize the concepts and defense objectives for cyberspace set forth in the 2022 National Defense Strategy. It builds upon the direction set by the 2018 DoD Cyber Strategy and is informed by years of real-world experience of significant DoD cyberspace operations. An unclassified summary of the strategy will be rolled out in the coming months...

U.S. Department of Defense - May 26, 2023

5G, Wireless Spectrum, Networking & Communications

NASA, Rocket Lab Complete Launch of TROPICS CubeSat Constellation

...The final pair of NASA's TROPICS (Time-Resolved Observations of Precipitation structure and storm Intensity with a Constellation of Smallsats) are in orbit. Through this mission, NASA will study tropical cyclones and aims to improve forecasting for hurricanes and typhoons. TROPICS is a constellation of four identical CubeSats designed to observe tropical cyclones in a unique, inclined low Earth orbit over Earth's tropics – an orbit that allows them to travel over any given storm about once an hour. Current weather tracking satellites have a timing of about once every six hours. The TROPICS team includes researchers from NASA, the National Oceanic and Atmospheric Administration, and several universities and commercial partners...

National Aeronautics and Space Administration - May 26, 2023

A Mission Out of This World: The Benefield Anechoic Facility tests first space satellite in decades

...The Benefield Anechoic Facility (BAF) at Edwards AFB recently tested its first orbital satellite in decades. Anticipated to launch in late 2023, Navigation Technology Satellite-3 (NTS-3) will be the Department of Defense's first experimental, integrated navigation satellite system in nearly 50 years. In 2019, the Department of the Air Force designed NTS-3 as one of the three Vanguard programs with the goal of delivering remarkable new capabilities that provide warfighters superior advantages in the battlefield. NTS-3, developed by L3Harris Technologies, builds on the legacy of NTS-1 and NTS-2, which were launched in the 1970s. The satellite is poised to push the boundary of today's space-based position, navigation and timing (PNT) technology paving the way for a more robust, resilient and responsive architecture for satellite (SATNAV) technology. The rapidly increasing pace of threats to GPS such as jamming and spoofing, however, indicate that agile and resilient approaches to augment the GPS system are needed to maintain the users' access to its critical service. This is especially true for the warfighter. After the testing is complete, the NTS-3 will operate for one year in a near-geosynchronous orbit and will broadcast navigation signals from its phased array antenna...

Air Force Materiel Command - May 31, 2023

Vanderbilt University's Ralf Bennartz to lead NASA mission to study ice clouds

...Vanderbilt has been chosen to lead a NASA satellite mission, supported by a grant of up to \$37 million, aimed at better understanding Earth's high-altitude ice clouds. The research team will employ an advanced instrument known as the Polarized Submillimeter Ice-cloud Radiometer, or PoSIR. Supported by two "CubeSat" satellites that measure clouds' daily cycle of ice content, the project will help improve climate forecasts. The mission is part of NASA's Earth Venture class, a program dedicated to propelling innovative, cost-effective science missions that broaden knowledge of Earth's intricate weather systems. The grant, capped at \$37 million, is for lifecycle costs and does not include launch costs. The goal is to launch the satellites for this mission by the end of 2027...

Vanderbilt University - May 25, 2023

Advanced Manufacturing

DOE Launches New Energy Earthshot to Decarbonize Transportation and Industrial Sectors

...The U.S. Department of Energy announced the launch of the Clean Fuels & Products Shot™, a new initiative that aims to significantly reduce greenhouse gas emissions (GHGs) from carbon-based fuels and products. The Clean Fuels & Products Shot™ supports the national goal of achieving net-zero emissions by 2050 by developing the sustainable feedstocks and conversion technologies necessary to produce crucial fuels, materials, and carbon-based products that are better for the environment than current petroleum-derived components...

Department of Energy - May 24, 2023

Microelectronics

DoD Announces \$10 Million Defense Production Act Title III Agreement With Six Sigma to Strengthen the Domestic Microelectronics Industrial Base

...As part of the nation's effort to sustain the microelectronics manufacturing capability necessary for national and economic security, and in support of Executive Order 14017, America's Supply Chains, the Department of Defense recently entered a \$10 million agreement with Six Sigma utilizing Defense Production Act (DPA) Title III authorities. Six Sigma will increase the capacity of both its copper solder column manufacturing and column attach processes to enable the production of high-reliability Column Grid Array components (such as Field Programmable Gate Arrays and Application Specific Integrated Circuits) for military and aerospace applications...

U.S. Department of Defense - May 24, 2023

Climate Change / Green Energy & IT

Diving into the decade: Ocean science to combat climate change

...The United Nations designates decade themes to increase visibility and action around priorities, and 2021-2030 is the Decade of Ocean Science for Sustainable Development. The Ocean Decade calls on everyone to advance "the science we need for the ocean we want." Part of advancing "the science we need" means creating

opportunities when existing categories are limiting. The U.S. National Science Foundation has demonstrated global leadership in doing exactly this in the ocean science space. One way NSF is rising to meet this challenge is with the Coastlines and People, or CoPe, program, which tackles the environmental stressors and pressures on our coasts and coastal communities outside the bounds of strictly engineering, biology or any single scientific discipline. One CoPe award, led by University of South Florida civil and environmental engineering professor Maya Trotz, is engaging communities in the Gulf of Mexico, U.S. Virgin Islands and Belize to reduce climate risks through nature-based solutions. NSF's Technology, Innovation and Partnerships, or TIP, Directorate also recognizes the need for new methods of funding and conducting science that enables and expedites societal impacts — including our relationship with the ocean. One program is the Convergence Accelerator, which includes the Networked Blue Economy research track focused on producing products, processes and resources to engage with the ocean more sustainably both as an environment and a resource. Backyard Buoys is a Convergence Accelerator project, led by Jan Newton at the University of Washington, that is empowering Indigenous and other coastal communities to collect and use ocean data to support their blue economy. This involves bringing together existing regional ocean observing networks, underserved Indigenous communities and a sensor company. [Watch the video on this really cool NSF TIP-funded project!!]...
National Science Foundation - Jun 1, 2023

Introducing the Energy Savings Hub

...The Department of Energy recently launched its Energy Savings Hub, a one-stop shop for consumers to learn how they can take advantage of energy efficient technologies while also lowering their energy costs and saving money. Here are the top things to know about this energy savings tool: The Hub's toolkit can help you take the best care of your home and maximize your energy use. Current and prospective EV owners can use the Hub to learn how these vehicles can save them money. Another important feature of the Energy Savings Hub is our catalogue of different appliances, electric vehicles and home improvement measures. Browse through our curated playlist to meet Sparky and dive deeper into new clean energy technology...
Department of Energy - May 30, 2023

Extracting a clean fuel from water

...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. A multi-institutional team led by the U.S. Department of Energy's (DOE) Argonne National Laboratory has developed a low-cost catalyst for a process that yields clean hydrogen from water. 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 main ingredient in the new catalyst is cobalt, which is substantially cheaper than iridium. The team deciphered critical structural changes that occur in the catalyst under operating conditions by using X-ray analyses. In addition, computational modeling at Berkeley Lab revealed important insights into the catalyst's durability under reaction conditions. The team's achievement is a step forward in DOE's Hydrogen Energy Earthshot initiative. ... This research was supported by the DOE Office of Energy Efficiency and Renewable Energy...
Argonne National Laboratory - May 30, 2023

NSF/NASA-funded study shows why protecting forests means reduced emissions at global scale

...A recent NSF and NASA-funded study used 3D satellite imagery collected by technology on the International Space Station and found that worldwide protected forests have an additional 9.65 billion metric tons of carbon stored in their aboveground biomass compared to ecologically similar unprotected areas—a finding that quantifies just how important protected areas are in our continued climate mitigation efforts. The team of researchers compared protected areas' efficacy in avoiding emissions to the atmosphere with unprotected areas' ability to do the same and tested the assumption that protected areas provide disproportionately more ecosystem services—including carbon storage and sequestration—than non-protected areas. "We have never had these 3D satellite datasets before, so we have never been able to map forest carbon accurately at this scale. Analyzing the data to discover the magnitude of avoided emissions in protected areas shines yet another light on the global importance of forest conservation," said NASA researcher Duncanson, lead author of the study. A key finding was that the amount of aboveground biomass—the dry mass of woody matter in vegetation that stands above the ground—gained from protected areas is roughly equivalent to one year of annual global emissions from fossil fuels. These results are novel in that they provide the first, long-anticipated evidence that protected areas are effectively sequestering a lot more CO₂ from the atmosphere than otherwise similar but degraded areas that surround them. The study also highlights the urgency of protection and restoration for biodiversity conservation and climate change mitigation. the Intergovernmental Panel on Climate Change found that nature-based solutions such as reducing the destruction of forests and other ecosystems, restoring them and improving the management of working lands, such as farms, are among the top five most effective strategies for mitigating carbon emissions by 2030...
NAU News - Jun 1, 2023

NSF/NASA-Funded Research Indicates Climate Change to Push Species Over Abrupt Tipping Points

...A new NSF/NASA-funded study predicts when and where climate change is likely to expose species across the globe to potentially dangerous and unprecedented temperatures. The research team analyzed data from over 35,000 species of animals and seagrasses from every continent and ocean basin, alongside climate projections

running up to the year 2100. The researchers investigated when areas within each species' geographical range will cross a threshold of thermal exposure. They found that when a species starts to be exposed to unprecedented temperatures, it happens in a coordinated way across most of the range at once for almost all the 35,000 species examined! The abrupt loss of habitat due to future climate change could be disastrous for many species. That could mean that species have little opportunity to move or evolve, compared to a scenario where exposure is gradual. Their findings suggest that once it is noticed that a species is suffering under unfamiliar conditions, there may be very little time before most of its range becomes inhospitable, so it's important to identify in advance which species may be at risk in coming decades. The next phase of their research is to develop for all species across the planet an automated global monitoring program powered by NASA satellite observations of extreme events...

UConn Today - Jun 1, 2023

Digital Health

TEFCA Awareness Among Hospitals and Variations Regarding Intent to Participate

...ONC recognized six organizations that have been accepted for onboarding as Qualified Health Information Networks (QHINs) under Trusted Exchange Framework and Common Agreement (TEFCA). These six candidate QHINs have committed to achieving "go-live" by the end of 2023. With that date just around the corner, we thought the time was right to better understand awareness and plans to participate in TEFCA among the broader health care delivery system. A seventh candidate QHIN was accepted for onboarding in May. Even with TEFCA having been out since January 2022, but go-live still several months away, it is important to identify whether health care providers were aware of TEFCA, whether those aware of TEFCA plan to participate, and whether some types of hospitals were less likely to know about TEFCA and thus, less likely to plan to participate...

Health IT - May 31, 2023

NIH/DOE/Army/AFOSR-Funded 'Lab-on-a-Chip' Diagnostic Device Can Tell the Difference Between COVID and the Flu

...Three years into the COVID-19 pandemic, accurate testing remains a challenge. A new diagnostic device that can differentiate between COVID-19 and the flu overcomes the challenge of being not sensitive enough to detect the virus in early phases or when there is a low concentration of it in the sample, in addition to its ability to differentiate between illnesses. The new "lab-on-a-chip" testing technology builds on a silicon complementary metal oxide semiconductor-compatible, photonic chip-based platform Ray Chen and his team, at The University of Texas at Austin, have been developing for several years. The goal is to provide lab-quality diagnostics, while shrinking them down to a portable size so they can reach people in isolated areas. The project is funded through grants from the AFOSR MURI Research Center on Silicon Nanomembranes, the National Institutes of Health, the U.S. Department of Energy and the U.S. Army...

UT News - The University of Texas at Austin - May 31, 2023

DARPA/DTRA/DOE fund scientists using AI to find a drug that could combat drug-resistant infections

...Over the past several decades, many pathogenic bacteria have become increasingly resistant to existing antibiotics, while very few new antibiotics have been developed. Using an artificial intelligence algorithm, researchers at MIT and McMaster University 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. The microbe is also a leading cause of infections in wounded soldiers. 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*. Once the model was trained, the researchers used it to analyze a set of 6,680 compounds it had not seen before, which came from the Drug Repurposing Hub at the Broad Institute. This analysis, which took less than two hours, yielded a few hundred top hits. Of these, the researchers chose 240 to test experimentally in the lab, focusing on compounds with structures that were different from those of existing antibiotics or molecules from the training data. Those tests yielded nine antibiotics, including one that was very potent. This compound, which was originally explored as a potential diabetes drug, turned out to be extremely effective at killing *A. baumannii* but had no effect on other species of bacteria. This "narrow spectrum" killing ability is a desirable feature for antibiotics because it minimizes the risk of bacteria rapidly spreading resistance against the drug. Another advantage is that the drug would likely spare the beneficial bacteria that live in the human gut. This finding further supports the premise that AI can significantly accelerate and expand our search for novel antibiotics. ... The research was funded by DTRA Discovery of Medical Countermeasures Against New and Emerging Threats program, the DARPA Accelerated Molecular Discovery program, and the Department of Energy Biological and Environmental Research program.

MIT News - May 25, 2023

NSF-funded research uses AI to create better, more potent medicines

...While it can take years for the pharmaceutical industry to create medicines capable of treating or curing human disease, a new study suggests that using generative artificial intelligence could vastly accelerate the drug-development process. To identify the synthesis paths, scientists often employ a technique called retrosynthesis – a method for creating potential drugs by working backward from the wanted molecules and searching for chemical reactions to make them. Researchers at The Ohio State University have

created a generative AI framework called G2Retro that is able to supply multiple different synthesis routes and options, as well as a way to rank different options for each molecule. To further test the AI's effectiveness, Ning's team conducted a case study to see if G2Retro could accurately predict four newly released drugs already in circulation: Mitapivat, a medication used to treat hemolytic anemia; Tapinarof, which is used to treat various skin diseases; Mavacamten, a drug to treat systemic heart failure; and Oteseconazole, used to treat fungal infections in females. G2Retro was able to correctly generate exactly the same patented synthesis routes for these medicines, and provided alternative synthesis routes that are also feasible and synthetically useful. This study builds on previous research of Xia Ning's where her team developed a method named Modof that was able to generate molecule structures that exhibited desired properties better than any existing molecules. ... This research was supported by the National Science Foundation.

Ohio State News - May 30, 2023

NSF funds the world's 1st outdoor sweating, breathing and walking manikin

...Funded by an NSF Major Research Instrumentation Grant, ANDI is the world's first indoor-outdoor breathing, sweating and walking thermal manikin. ANDI can mimic the thermal functions of the human body and has 35 different surface areas that are all individually controlled with temperature sensors, heat flux sensors and pores that bead sweat. ANDI is the first thermal manikin in existence that can be used outdoors, enabled by a unique internal cooling channel. ANDI is built with internal cooling channels that circulate cool water throughout its body, which enable him to stay cool enough to withstand extreme heat while measuring complex variables that contribute to our perception of heat in different environments — solar radiation from the sun, infrared radiation from the ground and convection from the surrounding air. The ASU research project aims to measure the effects of extreme heat on human health. Inside ANDI's current home, ASU's newly developed heat chamber, researchers can simulate heat-exposure scenarios from different places around the globe. Dubbed the "Warm Room," the heat chamber is outfitted with advanced technologies that control the wind, temperature up to 140 degrees Fahrenheit and solar radiation. This summer, researchers will pair ANDI with MaRTy, ASU's biometeorological heat robot, to work together and better understand human sweating mechanisms. MaRTy measures the environment, and then ANDI can then tell us how the body can react. This project is funded by the National Science Foundation's Leading Engineering for America's Prosperity, Health and Infrastructure (LEAP HI) program...

Arizona State University - May 25, 2023

NIH-Funded Researchers' Artificial Intelligence-Based Speech Sound Therapy Software Wins \$2.5M NIH Grant

...Three Syracuse University researchers, supported by a recent \$2.5 million grant from the National Institutes of Health, are working to refine a clinically intuitive automated system that may improve treatment for speech sound disorders while alleviating the impact of a worldwide shortage of speech-language clinicians. Their system uses the evidence-based Speech Motor Chaining software, an extensive library of speech sounds and artificial intelligence to "think" and "hear" the way a speech-language clinician does. The project focuses on the most effective scheduling of Speech Motor Chaining sessions for children with speech sound disorders and also examines whether artificial intelligence can enhance Speech Motor Chaining. This project looks at whether AI-assisted speech therapy can increase the intensity of services through at-home practice between sessions with a human clinician. The speech clinician is still in charge, providing oversight, critical assessment and training the software on which sounds to say are correct or not; the software is simply a tool in the overall arc of clinician-led treatment. Benway wrote ChainingAI's patent-pending speech analysis and machine learning operating code, which converts audio from speech sounds into recognizable numeric patterns. The system was taught to predict which patterns represent "correct" or "incorrect" speech. Predictions can be customized to individuals' speech patterns...

Syracuse University News - May 24, 2023

FDA green-lights bionic pancreas: artificial intelligence insulin delivery and glucose monitoring system

...While it won't cure children of type 1 diabetes, the "bionic pancreas," an artificial intelligence-powered system cleared May 19 by the U.S. Food and Drug Administration, will relieve youth and their parents of constant worries over estimating insulin doses and carb intake from food. The automated insulin-delivery system is paired with a continuous glucose monitoring system. At mealtimes, users estimate their carbohydrate intake simply as small, medium or large. Instead of having preset insulin dosing, this device enables AI algorithms to learn a patient's insulin requirements. For every young person with type 1 diabetes, the constant management that is required can be very stressful, so to have a system that is automatic in ensuring the children's safety and well-being through regulated glucose levels is truly a dream come true...

UT Health San Antonio - May 25, 2023

Other IT Related

FACT SHEET: The Biden-Harris Administration Advances Equity and Opportunity for Asian American, Native Hawaiian, and Pacific Islander Communities Across the Country

...Since day one of this Administration, President Joe Biden and Vice President Kamala Harris have prioritized the advancement of opportunity, equity, and safety for Asian American, Native Hawaiian, and Pacific Islander (AA and NHPI) communities to realize the full promise of our nation. As we continue to make progress to advance equity and

opportunity for AA and NHPI communities, today the Biden-Harris Administration is providing a comprehensive update on our efforts to combat anti-Asian violence and discrimination and to provide AA and NHPI communities the resources, access, and opportunities to thrive...
The White House - May 31, 2023

Benchy the Boat, Irradiated Mangoes, Quantum Window: A Sample of Stories on NIST Social Media

...NIST's research can range from the complex to the downright whimsical, but all the papers published here can trace back to a benefit for everyone in the U.S. We're catching you up on a few of the happenings at NIST... * The 3D-printing design, Benchy (a nickname for "benchmark"), isn't a NIST original work of art but is helping them make waves with a technique called vat photopolymerization. NIST researchers used PECs with a branch of additive manufacturing called vat photopolymerization, a technique that uses light to solidify a liquid resin, layer by layer, into a 3D-printed shape. * Antennas need lots of calibration steps for consistent, accurate measurements of radio frequency (RF) fields and a new way uses atomic physics...
National Institute of Standards and Technology - May 31, 2023

DOE Announces \$46 Million for Commercial Fusion Energy Development

...The U.S. Department of Energy announced \$46 million in funding to eight companies advancing designs and research and development for fusion power plants. Fusion reactions power the stars, and research is underway to make fusion energy production on Earth possible, providing an abundant, inherently safe, non-carbon-emitting energy source for the planet. This funding from the Milestone-Based Fusion Development Program will solidify U.S. leadership in fusion commercialization, a gamechanger that would help the United States meet the President's goal of reaching a net-zero economy by 2050...
Department of Energy - May 31, 2023

Webb Maps Surprisingly Large Plume Jetting From Saturn's Moon Enceladus

...A water vapor plume from Saturn's moon Enceladus spanning more than 6,000 miles – nearly the distance from Los Angeles, California to Buenos Aires, Argentina – has been detected by researchers using NASA's James Webb Space Telescope. Enceladus, an ocean world about four percent the size of Earth, just 313 miles across, is one of the most exciting scientific targets in our solar system in the search for life beyond Earth. Sandwiched between the moon's icy outer crust and its rocky core is a global reservoir of salty water. Geyser-like volcanos spew jets of ice particles, water vapor, and organic chemicals out of crevices in the moon's surface informally called 'tiger stripes.' Previously, observatories have mapped jets hundreds of miles from the moon's surface, but Webb's exquisite sensitivity reveals a new story. The rate at which the water vapor is gushing out, about 79 gallons per second...
National Aeronautics and Space Administration - May 30, 2023

Regional Innovation Showcase brings together head of the NSF Directorate for Technology, Innovation and Partnerships with nine universities

...Vanderbilt University's Office of the Vice Provost for Research and Innovation hosted a Regional Innovation Showcase, bringing together research and innovation experts from nine universities based in Tennessee and Kentucky. The event provided an opportunity for the participants to connect, collaborate and share the latest developments in research and innovation within the region with each other and with guest of honor Erwin Gianchandani, assistant director of the National Science Foundation's Directorate for Technology, Innovation and Partnerships (TIP) that was founded in 2022. The event featured a keynote conversation with Erwin Gianchandani moderated by Vanderbilt's Padma Raghavan, vice provost for research and innovation, and Deborah Crawford, vice chancellor for research, innovation and economic development at the University of Tennessee...
Vanderbilt University - May 24, 2023

STEM / Workforce & IT

Seriously, Drop What You're Doing and Launch this Manufacturing Youth Engagement Program Right Now

...A manufacturing youth engagement program that excites local businesses, offers templates and guidance to effectively launch in new regions, has a 10-year track record of connecting hundreds of students annually, and is financially sustainable? That's exactly what Pennsylvania's What's So Cool About Manufacturing@ program offers. The goal of What's So Cool is simple: create manufacturing awareness across an entire community through a middle school video competition that spotlights why local manufacturing businesses are cool. Over the course of five months, each team of seventh- and eighth-graders partners with a local manufacturer to create a two-minute video outlining why their assigned manufacturer is "cool." The students are coached by a digital media expert on the basics of storytelling and video production so they can create a compelling vignette. In watching these videos, parents, students, siblings, educators, and community members all learn about the manufacturing going on in their backyards – and dispel the "dark, dirty, and dangerous" myths that plagues American manufacturing...
National Institute of Standards and Technology - May 24, 2023

US Department of Labor announces Job Corps, New York City partnership to promote, recruit, connect students to careers, higher education

...The U.S. Department of Labor announced a partnership between Job Corps and the City of New York to help recruit students and promote enrollment at local centers and inform their students and graduates about higher education institutions, social service programs and job opportunities with the city. By signing a Memorandum of Understanding with Job Corps, the New York City Mayor's Office has made the nation's largest city the first to partner with the nation's largest job training and education program to offer young people access to workforce development training. Job Corps' students will receive training intended to equip students for careers in high-demand industries, such as advanced manufacturing, information technology, clean energy fields and construction...

U.S. Department of Labor - May 24, 2023

DOE funds UNM to lead \$5 million, 5-year Rio Grande consortium project for regional workforce development

...The Minority Serving Institution Partnership Program (MSIPP) of the DOE's National Nuclear Security Administration recently awarded \$5 million over five years to a consortium being led by School of Engineering faculty at The University of New Mexico. Peter Vorobieff, a professor of mechanical engineering, is heading the Rio Grande Consortium for Advanced Research of Exascale Simulation (Grande CARES). The team's goal is to develop a sustainable workforce pathway for students interested in pursuing advanced modeling and simulation. The consortium will address the pressing gap in discipline-specific education of students that prepares them for careers in large-scale computational simulations and modeling. The goal is to develop, validate and integrate cutting-edge computational tools for complex engineering challenges using high-performance computing, machine learning, data analytics/big data concepts, uncertainty quantification and various computational capabilities. These fields will experience growth in coming years, as big data needs will grow and engineers will strive to develop solutions for complex challenges such as climate change...

UNM Newsroom - May 30, 2023

From the heart, VCU student group promotes Latinx health equity

...Mariana Fernandes Gragnani and Daniela Negrete, biomedical engineering students, have been leaders of Collective Corazón, a Virginia Commonwealth University student organization that aims to break down cultural barriers in health care. They are collectively fighting for the goal to empower the Latino community, to support them, to overcome health barriers and also other barriers that may affect their lives as well, so that they can live a healthy and happy lifestyle. As a volunteer interpreter for a Richmond-area health nonprofit, Negrete knew that diabetic Latinx patients would be unlikely to follow a clinician's advice to shift away from traditional foods. She saw how even with an interpreter, a conversation between practitioner and patient could be stilted, unclear and incomplete. The interaction with a Spanish-speaking patient is completely different if you're a Spanish-speaking provider versus an English-speaking provider using an interpreter. It just flows a lot better if you're able to communicate with that patient in their native language and they feel a lot more comfortable. To encourage Spanish-speaking students considering health careers, Collective Corazón organized a symposium in March. "Latinx in Healthcare Virtual Symposium: Latinx Leadership & Resilience" included doctors from Virginia and beyond who outlined key issues as well as successful programs and ideas. After graduating, Negrete will work at an NIH lab focused on virology and immunology...

Virginia Commonwealth University News - May 24, 2023

STEM / Workforce Resources & Opportunities

R&D WORKFORCE TRAINING: FEDERAL AGENCIES' STEM INTERNSHIPS, SCHOLARSHIPS, AND TRAINING OPPORTUNITIES

...Increasing the availability of STEM opportunities is a priority in the Biden Harris Administration. To help facilitate this, the team at NITRD developed a STEM Portal that allows anyone to search for internships and other training opportunities at Federal agencies. The NITRD STEM PORTAL is a searchable database that includes a description, link, and contact information for each program listing. Government sponsored internships and training programs are competitive, but there are many Federal opportunities and the NITRD STEM Portal is here to help...

The Networking and Information Technology Research and Development (NITRD) Program - May 17, 2023

AI Researchers Portal

...Our Nation's AI innovation begins with the inspirational ideas of researchers from all across the country. To make it easier for researchers to locate and explore the many Federal resources and funding programs available to support and investigate novel ideas in AI, the National AI Initiative Office, in partnership with Federal departments and agencies and the Networking and Information Technology Research and Development coordination office, established an AI Researchers Portal. This portal connects AI researchers to Federal resources that can support their research, including data, computing, and testbeds, as well as AI-relevant grant funding programs. It also provides searchable repositories of approximately 140 current Federal grant programs relevant to AI, and around 40 Federally-funded testbed resources, in addition to a wide variety of data and computing resources useful for AI research...

National Artificial Intelligence Initiative - May 31, 2023

NSF 101: Graduate and postdoctoral researcher funding opportunities

...The U.S. National Science Foundation supports research opportunities and provides stipends for graduate students and postdoctoral fellows and scholars. There are multiple ways to find these programs, including the funding search on NSF's website and the NSF Education & Training Application, which is growing its list of opportunities for graduate students and postdoctoral scholars. The following opportunities are available for early career researchers...

National Science Foundation - May 25, 2023

Upcoming Conferences / Workshops / Webinars

U.S. Leadership in Software Engineering & AI Engineering: Critical Needs & Priorities 2023

...Carnegie Mellon University (CMU) Software Engineering Institute (SEI) and the Networking and Information Technology Research and Development (NITRD) Software Productivity, Sustainability, and Quality (SPSQ) Interagency Working Group are partnering on this workshop, to inform a community strategy for building and maintaining U.S. leadership in software engineering and AI engineering, and positively impact progress in multiple application domains. Using Architecting the Future of Software Engineering: A National Agenda for Software Engineering Research and Development as a starting point, we will identify and explore important research areas for the future of software engineering that are critical for multidisciplinary research. June 20-21, 2023...

resources.sei.cmu.edu - May 24, 2023

NICE Conference & Expo: Resetting Expectations: Jun 5-7, 2023

...This year's conference Theme "Resetting Expectations: Creating Accessible Cybersecurity Career Pathways" is about reimagining what it takes to be a cybersecurity professional. By resetting the expectations, cybersecurity will be an accessible career path through various, nontraditional avenues. June 5 - 7th, 2023...

NICE | Conference and Expo - May 16, 2023

Federal Register: Request for Information (RFI)

Request for Information: National Priorities for Artificial Intelligence

...The Biden-Harris Administration is developing a National Artificial Intelligence (AI) Strategy that will chart a path for the United States to harness the benefits and mitigate the risks of AI. This strategy will build on the actions that the Federal Government has already taken to responsibly advance the development and use of AI. To inform this strategy, OSTP requests public comments to help update U.S. national priorities and future actions on AI. Comments must be submitted via the Federal eRulemaking Portal at regulations.gov. Interested individuals and organizations are invited to submit comments by 5:00 p.m. ET on July 7, 2023...

The White House - May 24, 2023

Notice of Workshop on U.S. Leadership in Software Engineering & Artificial Intelligence Engineering: Critical Needs & Priorities

...The workshop on U.S. Leadership in Software Engineering & AI Engineering: Critical Needs & Priorities will take place on June 20 and 21, from 9:30 a.m. to 5:00 p.m. (ET), at the National Science Foundation, in Alexandria, VA. Workshop goals are to: (1) Identify research questions that excite the computing community and spark new collaborations. (2) Identify addendums or updates to the National Agenda for Software Engineering roadmap. (3) Produce a report summarizing challenges and strategic priorities for building and maintaining U.S. leadership in software engineering & AI engineering for the advanced computing and software community. Due to space limitations, in-person attendance is by invitation only; remote participation will be available via Zoom...

Federal Register - May 24, 2023

Note: Any mention in the text of commercial, non-profit, academic partners, or their products, or references is for information only; it does not imply endorsement or recommendation by any U.S. Government agency.

Innovation Through NITRD Coordination

Networking and Information Technology Research and Development National Coordination Office, Washington, DC USA

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