



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!

NITRD News

NITRD and NAIIO SUPPLEMENT TO THE PRESIDENT'S FY2023 BUDGET

...The Networking and Information Technology Research and Development (NITRD) Program is the Nation's primary source of federally funded R&D in advanced IT for computing, networking, and software. R&D is critical to the development of technologies that will launch the Nation into the next computing revolution and ensures that these advances support national priorities such as the Nation's economic competitiveness, security, well-being, response to climate change, and leadership in science and engineering. As such, the NITRD Program's impact on agency R&D collaboration has been crucial in providing agencies a platform to work together and with public and private entities by performing activities...

NITRD - Nov 29, 2022

FY2023 FEDERAL CYBERSECURITY R&D STRATEGIC PLAN IMPLEMENTATION ROADMAP

...The Federal Cybersecurity Research and Development Strategic Plan Implementation Roadmap provides FY2023 implementation plans. This roadmap is provided per statutory requirement for public provision of this information pursuant to the Cybersecurity Enhancement Act of 2014. This document accompanies the NITRD Program and the National Artificial Intelligence Initiative Office Supplement to the President's FY2023 Budget.
NITRD - Nov 29, 2022

CAREER OPPORTUNITIES: Program Manager, National Strategic Computing Reserve Pilot Program Office

...The Federal Government is creating a National Strategic Computing Reserve (NSCR) that can be called up in times of urgent national needs to address emergencies from pandemics to earthquakes to other natural or man-made disasters. The NSCR is envisioned as a coalition of resource providers (of compute, software, and data) and technical experts spanning government, academia, industry, nonprofits/foundations, civil society, and communities of practice supported by appropriate coordination structures and mechanisms that can be mobilized quickly to provide critical cyberinfrastructure capabilities and services in times of urgent need. The Networking and Information Technology Research and Development (NITRD) Program is seeking candidates interested in serving as the Program Manager for the NSCR Pilot Program Office. The NSCR Pilot Program Office will (1) develop a plan, to include the structures, policies, and processes for an NSCR Program Office, and (2) prototype the implementation and operation of these structures, policies, and processes. Submit your resume by December 15, 2022.
The Networking and Information Technology Research and Development (NITRD) Program - Nov 11, 2022

Federal Agency Funding Opportunities

NSF: Advanced Computing Systems & Services: Adapting to the Rapid Evolution of Science and Enginee

...The intent of this solicitation is to request proposals from organizations who are willing to serve as resource providers within the NSF Advanced Computing Systems and Services (ACSS) program. Resource providers would (1) provide advanced cyberinfrastructure (CI) resources in production operations to support the full range of computational- and data-intensive research across all of science and engineering (S&E), and (2) ensure democratized and equitable access to the proposed resources. Deadline date: Full proposal February 21 2023
National Science Foundation - Nov 18, 2022

NSF: Cybersecurity Innovation for Cyberinfrastructure (CICI)

...The objective of the Cybersecurity Innovation for Cyberinfrastructure (CICI) program is to advance scientific discovery and innovation by enhancing the security and privacy of cyberinfrastructure. CICI supports efforts to develop, deploy and integrate cybersecurity that will benefit the broader scientific community by securing science data, computation, collaborations workflows, and infrastructure. CICI recognizes the unique nature of modern, complex, data-driven, distributed, rapid, and collaborative science and the breadth of infrastructure and requirements across scientific disciplines, practitioners, researchers, and projects. CICI seeks proposals in three program areas: (1) Usable and Collaborative Security for Science (UCSS), (2) Reference Scientific Security Datasets (RSSD), (3) Transition to Cyberinfrastructure Resilience (TCR). Deadline date: Full proposal February 17 2023
National Science Foundation - Nov 17, 2022

HPC

NSF/USDA-funded study shows HPC and genetic engineering can boost photosynthesis needed to feed the world by 2050

...Using high-performance computing and genetic engineering to boost the photosynthetic efficiency of plants offers the best hope of increasing crop yields enough to feed a planet expected to have 9.5 billion people on it by 2050. Substantial progress has already been made in the lab and in computer models of photosynthesis. Computer analyses of the way plant leaves intercept sunlight have revealed other ways to improve photosynthesis. Many plants intercept too much light in their topmost leaves and too little in lower leaves; this probably allows them to out-compete their neighbors, but in a farmer's field such competition is counterproductive. Computer modeling of photosynthesis also shows researchers where the traffic jams occur – the steps that slow the process down and reduce efficiency. The computer model predicts that by altering this system by up-regulating some genes and down-regulating others, a 60 percent improvement could be achieved without any additional resource – so 60 percent more carbon could be assimilated for no more nitrogen. Funding for this work was provided by the U.S. Department of Agriculture and the National Science Foundation.
News Bureau - Nov 28, 2022

US AFOSR/NSF funds project to break the scaling limits of analog computing

...As machine-learning models become larger and more complex, they require faster and more energy-efficient hardware to perform computations. Conventional digital computers are struggling to keep up. An analog optical neural network could perform the same tasks as a digital one. Because computations are performed using light instead of electrical signals, optical neural networks can run many times faster while consuming less energy. However, these analog devices are prone to hardware errors that can make computations less precise. MIT researchers have added a tiny hardware component to the optical switches that form the network's architecture, reducing uncorrectable errors that would otherwise accumulate in the device. Their work could enable a super-fast, energy-efficient, analog neural network that can function with the same accuracy as a digital one. This research is funded, in part, by a National Science Foundation graduate research fellowship and the U.S. Air Force Office of Scientific Research.
MIT News - Nov 29, 2022

Physicists awarded DOE supercomputing time for 'high-impact' projects

...Four physicists from Washington University in St. Louis were allocated supercomputer access to complete high-impact computational science projects in 2023 through the U.S. Department of Energy's (DOE) Innovative and Novel Computational Impact on Theory and Experiment (INCITE) program. The DOE Office of Science awarded time to a total of 56 projects nationwide. These awards, which will pursue transformational advances in science and engineering...
The Source - Washington University in St. Louis - Nov 29, 2022

Artificial Intelligence / Machine Learning

Department of Energy Announces \$4.3 Million for Research on Artificial Intelligence in High Energy Physics

...The U.S. Department of Energy (DOE) announced \$4.3 million in funding for 16 projects in artificial intelligence (AI) research for high energy physics (HEP). These awards support the DOE Office of Science initiative in artificial intelligence research to use AI techniques to deliver scientific discoveries that would not otherwise be possible, and to broaden participation in high energy physics research. Funded projects include constructing models to increase the speed of simulations for cosmology and particle physics; the use of deep learning to develop governing theories; and ML techniques to efficiently and thoroughly search the parameter spaces of likely new theories of particle physics that have their origins at the highest energy scales. These investments also include development of new methods for machine learning in real-time (known as edge computing) for data collection and efforts toward performing robust data analysis with self-consistent ML measurement techniques...
Department of Energy - Nov 29, 2022

QRIP-equipped CAF F-35s set the stage for future Crowd-Sourced Flight Data platform integration

...In March 2022, the first set of U.S. Air Force operational aircraft were equipped with the Quick Reaction Instrumentation Package, or QRIP, enabling the first Combat Air Forces contribution to Crowd-Sourced Flight Data. Instrumentation packages like QRIP are traditionally reserved for integration on test aircraft, designed to collect data strictly for test and evaluation purposes. These devices have historically been too large, cumbersome and expensive to consider for operational aircraft integration until now. Ultimately, the QRIP informs operational data sets while improving mission data reprogramming, data products and software development. QRIP captures data that is currently not being recorded, or being discarded at the cutting room floor, and makes it available and accessible at the speed of relevance. Big data analytics, machine learning, and artificial intelligence do the heavy lifting to sift through this data and highlight where action needs to be taken...
Air Force Link - Nov 27, 2022

Robotics / Autonomous Vehicles

NREL and Collaborators Design Special Space Capsule for Autonomous Culturing

...A plastic-degrading enzyme and an engineered bacterial strain have just been launched into space with an important mission: to convert waste plastics to upcycled materials during spaceflight. Currently orbiting Earth on board the International Space Station (ISS), engineered variants of *Pseudomonas putida* and the PETase enzyme are part of an experiment to see how biological plastic degradation and upcycling performs in low Earth orbit. And the experiment will proceed entirely on its own in a custom payload designed for autonomous cultivation and sampling. To carry out this on the ISS, the project team needed to invent an autonomous experiment-in-a-box, and their solution could allow a new approach to microbial studies in space and other remote sites. The team invented a self-contained experiment with timed sampling, passaging, and automatic data logging. The bio-culturing payload design is intended to be open source and will be fully explained in a forthcoming publication. It uses hardware that can be purchased from

commercial vendors and parts that can be 3D-printed by anyone, and it is built to accommodate biological research in a closed system. With minor modifications, it could potentially be used in other remote research, like culturing in the ocean or polar ice. This research is a collaboration with MIT Media Lab Space Exploration Initiative, Harvard Medical School, and Seed Health, and funded in part by the National Renewable Energy Laboratory (NREL)-led Bio-Optimized Technologies to keep Thermoplastics out of Landfills and the Environment (BOTTLE™) Consortium, which is sponsored by the Department of Energy's Bioenergy Technologies Office and Advanced Materials and Manufacturing Technologies Office...

National Renewable Energy Laboratory - Nov 28, 2022

USDA-Funded \$1.1 Million Project Uses Drones to Develop System That Will Create Soil Moisture Maps for Farmers

...Seyed Zekavat and a team of researchers are bringing together drones, ground-penetrating radar, and artificial intelligence algorithms to develop a low-cost system that will rapidly map root-zone soil moisture levels on large farms and help farmers irrigate more efficiently. The \$1,172,896 project has launched with outdoor soil-mapping experiments at Gateway Park and will run for three years, funded by a grant from the U.S. Department of Agriculture (USDA). Satellite-based microwave systems can cover large areas, but the resolution is low and only provides information about surface moisture. Mega farms need root-zone moisture information to determine where to irrigate, how much to irrigate, and how to reduce runoff that strips minerals from the soil. The research team led by Zekavat will integrate drones and ground-penetrating radar to create rugged systems that can fly over farmland for at least 30 minutes to collect data about moisture in the top 1 to 2 feet of soil, where roots grow. The researchers also will develop new software that will use AI algorithms to create a database for three-dimensional soil moisture maps.

Worcester Polytechnic Institute (WPI) - Nov 28, 2022

Quantum

National Quantum Initiative Advisory Committee

...This notice announces an open meeting of the National Quantum Initiative Advisory Committee (NQIAC). The NQIAC has been established to provide advice and guidance on a continuing basis to the President, the Secretary of Energy, and the National Science and Technology Council Subcommittee on Quantum Information Science (QIS), the National Quantum Initiative (NQI) program, and on trends and developments in quantum information science and technology, in accordance with the National Quantum Initiative Act. The public comment period for this meeting will take place on December 16, 2022.

Federal Register - Nov 24, 2022

Scientists construct novel quantum testbed one atom at a time

...Scientists at the U.S. Department of Energy's (DOE) Argonne National Laboratory have created a novel testbed to explore the behavior of electrons in a special class of materials called topological insulators, which could see applications in quantum computing. Topology — a field of mathematics regarding the nature of shapes — provides unique insight into the physics of materials. Electrons on the surface of topological insulators can exist in states that allow them to flow with almost no resistance. These states can also protect the system from external noise, or influence, a major challenge for emerging quantum information technologies. Scientists are exploring the power of quantum mechanical phenomena like these topological states to store and communicate information with greater speed, security and energy efficiency. The team constructed artificial graphene nanoribbons by placing individual carbon monoxide (CO) molecules very precisely onto a copper surface using a scanning tunneling microscope (STM). They developed computer algorithms to automate construction, allowing them to operate the STM remotely. This work was supported by the DOE Office of Science...

Argonne National Laboratory - Nov 28, 2022

Cybersecurity / Privacy

DOD Releases Path to Cyber Security Through Zero Trust Architecture

...The Defense Department released its Zero Trust Strategy and Roadmap, which spells out how it plans to move beyond traditional network security methods to achieve reduced network attack surfaces, enable risk management and effective data-sharing in partnership environments, and contain and remediate adversary activities over the next five years. The Zero Trust Strategy and Roadmap outlines four high-level and integrated strategic goals that define what the department will do to achieve that level of security:

* Zero Trust Cultural Adoption * DOD information Systems Secured and Defended * Technology Acceleration * Zero Trust Enablement. The development of the Zero Trust Strategy and Roadmap was done in collaboration with the National Security Agency, the Defense Information Systems Agency, the Defense Manpower Data Center, U.S. Cyber Command and the military services...

U.S. Department of Defense - Nov 28, 2022

U.S. Cyber Command, DARPA Initiate Rapid Cyber Capability Prototyping and Integration Pilot

...The United States Cyber Command (CYBERCOM) and DARPA are kicking off a pilot program aimed at getting new cyber capabilities into the hands of cyber operators faster. Known as Constellation, the pilot program will enable the flow of new cyber capabilities resulting from high-risk, high-reward cyber science and technology (S&T) research by creating a user-directed, incremental, and iterative pipeline to accelerate the creation, proving, adoption, and delivery of those capabilities into CYBERCOM's software ecosystem. Constellation will provide a framework and create mechanisms to provide virtual and physical infrastructure, people and contracts, sustainment of relationships required to bridge the gap between science and technology, research, development, and operational warfighting capabilities, and feedback to the S&T community regarding evolving cyber threats and mission needs...

DARPA - Nov 28, 2022

Information Integrity Research & Development

Fact Sheet: Summit for Democracy: Progress in the Year of Action

...Following the first Summit for Democracy in December 2021, the United States and over 100 partner governments around the world have taken meaningful steps to build more resilient democracies, combat corruption, and defend human rights. Summit participants have undertaken important pro-democracy reforms at home, contributed to impactful multilateral initiatives, and worked together to resist authoritarian aggression, including Russia's unprovoked and unjustified war against Ukraine. President Biden is pleased to announce that on March 29-30, 2023, he will co-host the second Summit for Democracy. At this second Summit, world leaders will showcase progress made on their commitments to build more resilient democracies; announce new commitments and initiatives to build on that momentum; reaffirm the central role of democratic institutions in delivering prosperity and safeguarding liberty; and underscore the effectiveness of collective action in tackling the most pressing challenges of our time. Select achievements during the Year of Action aligned to the five pillars of the Summit for Democracy's Presidential Initiative for Democracy Renewal...

The White House - Nov 29, 2022

5G, Wireless Spectrum, Networking & Communications

NASA's Ice, Cloud and Land Elevation Satellite 2 Shows Phytoplankton May Be Abundant Under Antarctic Sea Ice

...A decade ago, scientists on a NASA-sponsored ocean expedition found massive populations of phytoplankton blooming beneath sea ice in the Arctic Ocean. Now scientists using underwater instruments and a NASA satellite have found evidence of potentially significant blooms beneath the sea ice encircling Antarctica. New evidence shows there are just enough cracks, thin spots, and gaps to let sufficient daylight through the sea ice. In the wide and coarse views from most satellites, ice cover can appear uniform and sheet-like, reinforcing the idea that light would be too scarce and faint for plant-like life below. But viewed from and below the ocean surface -- and now with the laser eyes of NASA's Ice, Cloud and Land Elevation Satellite 2 (ICESat-2) -- scientists see that Antarctic sea ice is actually riddled with fractures and openings. Sunlight slips through the cracks and provides the energy for notable under-ice blooms in the Southern Ocean. The team analyzed ice conditions with ICESat-2 data to develop a picture of where and how much light was penetrating through the cracks and openings in Antarctic sea ice. The primary instrument on ICESat-2 is a laser altimeter, which sends pulses of light toward Earth's surface and then measures, to within a billionth of a second, how long it takes individual photons to return to the satellite. From this information scientists can derive the height of sections of ice -- and also spot the cracks and gaps between them. Building off of ice-cover models from the Coupled Model Intercomparison Project Phase 6, the team estimated the location and thickness of Southern Ocean ice cover and how it moved...

National Aeronautics and Space Administration - Nov 28, 2022

The story of the Manned Orbiting Laboratory – part two

...This is continuation of the story of the Manned Orbiting Laboratory (MOL) ... MOL was originally planned to have six launches, each with a mission length of 30 days. This was an ambitious goal: 30 days would be the longest any human had spent in space to date. It was only three years earlier in 1962 that John Glenn became the first American to orbit the planet, and when MOL was publicly announced, the NASA Gemini V mission just completed eight days in space...

National Reconnaissance Office (NRO) - Nov 28, 2022

NASA's Lunar Flashlight SmallSat Readies for Launch

...NASA's Lunar Flashlight is a small satellite that will search for water ice in permanently shadowed craters at the Moon's South Pole, using an orbit only one other spacecraft has employed. No larger than a briefcase, Lunar Flashlight will use a reflectometer equipped with four lasers that emit near-infrared light in wavelengths readily absorbed by surface water ice. This is the first time that multiple colored lasers will be used to seek out ice inside these dark craters. Should the lasers hit bare rock or regolith (broken rock and dust), the light will reflect back to the spacecraft. But if the target absorbs the light, that would indicate the presence of water ice. The greater the absorption, the more ice there may be. Small satellites, or SmallSats, carry a limited amount of propellant, so fuel-intensive orbits aren't possible. A near-rectilinear halo orbit requires far less fuel than traditional orbits, and Lunar Flashlight will be only the second NASA mission to use this type of trajectory. Lunar Flashlight will use a new kind of "green" propellant that is safer to transport and store than the commonly used in-space propellants such as hydrazine. In fact, Lunar Flashlight will be the first interplanetary spacecraft to use this propellant... National Aeronautics and Space Administration - Nov 28, 2022

Advanced Manufacturing

NIST BLOG: 3 Lessons Manufacturers Can Learn From NASCAR Racing

...The NASCAR pit stop – it's exciting, intense, and can mean the difference between winning and losing a race. Outside of the racetrack, could the NASCAR pit stop be the answer to exciting young people about manufacturing? Race car builders are truly artisans. Racing engineers employ computerized numerical control (CNC) machining, various types of welding, and 3D printing to create their cars. They use light-weighting and supply chain optimization, and they navigate tight specifications, tolerances, and inspections. From large parts to small, manufacturing powers racing – and our lives. Business success is the integrated team approach, where representatives from across the business – design, additive manufacturing, subtractive manufacturing, quality, shipping and more – all participate in the process of bringing a product to market. This integration means that the part is designed for both end use and manufacturability along the way. A 100% digital workflow ties the entire system together, ensuring that logistics, accounting, human resources, quality control and other departments are all looped in where necessary... National Institute of Standards and Technology - Nov 29, 2022

AFRL enhances Computed Tomography Lab with state-of-the-art infrastructure, imaging capabilities

...The Air Force Research Laboratory's Computed Tomography Laboratory supports nondestructive testing of 3D-printed materials for the Defense Department's internal and external customer base. An extensive makeover of the facility included the installation of an additional computed tomography, or CT, machine and the construction of a brand-new suite to safely house the added equipment. CT refers to a form of computerized X-ray imaging that can be used to look for potential defects in aerospace-grade materials to ensure airworthiness and durability. The roughly \$4.5 million, 6,600-square-foot-facility renovation project was covered by Flex-4 funding and is slated to be completed by December 2. The Department of Defense provides Flex-4 funds to enable unique research capabilities within its laboratories. Roughly \$1 million in supplemental AFRL funding financed the additional computed tomography machine... 514th Air Mobility Wing - Nov 26, 2022

Microelectronics

NIST Finds a Sweet New Way to Print Microchip Patterns on Curvy Surfaces

...NIST scientist Gary Zabow buried microscopic magnetic dots in hardened chunks of sugar — hard candy, basically — and sending these sweet packages to colleagues in a biomedical lab. The sugar dissolves easily in water, freeing the magnetic dots for their studies without leaving any harmful plastics or chemicals behind. By chance, Zabow had left one of these sugar pieces, embedded with arrays of micromagnetic dots, in a beaker, and it did what sugar does with time and heat — it melted, coating the bottom of the beaker in a gooey mess. When he rinsed out the beaker, the microdots were gone. But they weren't really missing; instead of releasing into the water, they had been transferred onto the bottom of the glass where they were casting a rainbow reflection. The colors indicated that the arrays of microdots had retained their unique pattern. Could regular table sugar be used to bring the power of microchips to new and unconventional surfaces? Semiconductor chips, micropatterned surfaces, and electronics all rely on microprinting, the process of putting precise but minuscule patterns millionths to billionths of a meter wide onto surfaces to give them new properties. When dissolved in a small amount of water, this sugar mixture can be poured over micropatterns on a flat surface. Once the water evaporates, the candy hardens and can be lifted away with the pattern embedded. The sugar/corn syrup combination maintains a high viscosity as it melts, letting the pattern maintain its arrangement as it flows over curves and edges. Then, using water, the sugar can be washed away, leaving just the pattern behind. Using this technique, called REFLEX (REflow-driven FLExible Xfer), microcircuit patterns could be transferred like a stencil to allow scientists or manufacturers to etch and fill the materials they need in the right places... National Institute of Standards and Technology - Nov 25, 2022

Stable, faster computer memory storage

...When computer “brains” evolve, they get smaller and smaller. This is because the components that perform calculations and consolidate stored information work more efficiently when there are more of them tightly packed on a chip. But when the chip feature sizes get too small their physical and material properties can change, rendering them less reliable at doing their jobs. Scientists have made great strides in uncovering new substances that instead become increasingly stable as they scale down, hinting at the promise of smaller storage devices that can be integrated onto silicon computer processing units (CPUs) to increase speed and functionality. One such compound is hafnium dioxide (HfO₂), a material that was found to retain a desirable property, known as ferroelectricity, even at the few-nanometer scale (~2nm). What makes HfO₂ special is that it can rapidly switch between an up or down mode—corresponding to the ones and zeroes computers use—at reduced dimensions and then retain this information until it is switched again. But how it’s able to achieve this feat has remained a mystery. HfO₂ undergoes a two-step transition resulting in a change in the arrangement of its atoms when grown on a thin film. This allows it to transition from one phase, which isn’t very useful, to a special one that could be useful for the next generation of information storage devices. ... The research is supported as part of the center for 3D Ferroelectric Microelectronics, an Energy Frontier Research Center funded by the U.S Department of Energy, Office of Science, Basic Energy Sciences.

Penn News - Nov 28, 2022

Climate Change / Green Energy & IT

NOAA, Microsoft team up to advance Climate-Ready Nation

...NOAA and Microsoft have forged a formal agreement to harness Microsoft’s cloud computing tools and help advance NOAA’s mission to create a Climate-Ready Nation. The new Cooperative Research and Development Agreement (CRADA) involves scientists and engineers from across NOAA who will work with Microsoft to reach these goals over the next year. NOAA and Microsoft will perform collaborative research and development to advance five major goals: (1) Help NOAA’s Earth Prediction Innovation Center (EPIC) implement pilot projects to effectively enable earth system modeling and research using Microsoft Azure. (2) Harness the power of machine learning to improve NOAA’s climate models and forecast models for air quality, wildfire smoke and particulate pollution. (3) Integrate Microsoft computing tools to accelerate data collection, processing, storage and dissemination of NOAA Fisheries’ survey and observation data to advance sustainable fisheries management. (4) Create a new searchable catalog of ocean observations, which includes case studies of how they are used to support public policy, safety, economic growth, environmental protection and increase climate resilience in developed and developing nations. (5) Envision and design a resilient and accessible weather modeling and forecasting system that will enable data collection, access and processing across the NOAA enterprise, as well as incorporate data from external sources...

National Oceanic and Atmospheric Administration - Nov 30, 2022

Most detailed maps of polar regions ever created

...A team of researchers led by the University of Minnesota, Twin Cities has released four more years of high-resolution imagery data, which has been added to eight years of previous data, to make the most detailed polar region terrain maps ever created. The maps use high-resolution satellite data to show the polar regions in detail and will provide new insights into the effects of climate change over time. "Our previous data resulted in more than 300 scientific publications," said Claire Porter, acting co-director of the U.S. National Science Foundation-funded Polar Geospatial Center at the University of Minnesota, Twin Cities. The project began with images taken from polar-orbiting satellites about 400-700 kilometers above Earth. Researchers at the Polar Geospatial Center created the digital elevation models based on 50-centimeter resolution images captured by commercial satellites owned by Maxar and licensed by the National Geospatial-Intelligence Agency. Partners at The Ohio State University and Ohio Supercomputer Center developed the software to process the images, and University of Minnesota scientists put the maps together with computing resources, including the Blue Waters supercomputer, from the University of Illinois Urbana-Champaign. They processed millions of images to create high-resolution topographic maps. The polar regions are important because the effects of climate change are amplified at the poles...

National Science Foundation - Nov 28, 2022

DOE funds the development of a new source of clean energy with the universe’s most abundant element

...Green energy is taking a step forward at Clemson University with new research that could help hasten the development of turbines that are fueled by hydrogen, the universe’s most abundant element. Researchers aim to create a new type of coating that would armor turbine blades against intense heat and high-velocity steam, an environment so extreme it is not yet well understood and would vaporize many materials. Hydrogen burns hotter than other fuels with temperatures in the turbine inlet reaching about 1,700 degrees Celsius. The goal is to create a coating that will allow hydrogen-fueled turbines to operate for 32,000 continuous hours, even as the inlet temperature reaches 1,700 degrees Celsius, which is 150-200 degrees higher than current state-of-the-art technology allows. ... The bulk of the project’s funding, \$800,000, comes from the U.S.

Department of Energy’s Office of Fossil Energy and Carbon Management.

Clemson University - Nov 28, 2022

Digital Health

NIH-funded machine learning tools map seizures in the brain and within minutes can pinpoint where seizures begin

...Two new models could solve a problem that's long frustrated millions of people with epilepsy and the doctors who treat them: how to find precisely where seizures originate to treat exactly that part of the brain. Using equations based on machine learning and calculus to reveal patterns in brain activity, the models identify where seizures begin in the brain. And they do it in just minutes. Sridevi V. Sarma, associate director of Johns Hopkins Institute of Computational Medicine and head of the Neuromedical Control Systems Lab, created heat maps predicting where seizures begin. Sarma's team studied patients' brains both when they weren't having seizures and when their brains were stimulated with quick electrical pulses. In their models, the brain is a network of nodes that influence each other. The researchers hypothesize that when a patient isn't having a seizure, it's because the nodes in the part of the brain where seizures begin are constrained by nodes in the healthy part of the brain. During a seizure, the nodes switch roles. ... The work was supported by a grant from the National Institutes of Health and a NIH IRACDA Fellowship through the ASPIRE program at Johns Hopkins.
Hub - Johns Hopkins University - Nov 29, 2022

NIH-funded machine learning model builds on imaging methods to better detect ovarian lesions

...Although ovarian cancer is the deadliest type of cancer for women, only about 20% of cases are found at an early stage, as there are no real screening tests for them and few symptoms to prompt them. Additionally, ovarian lesions are difficult to diagnose accurately — so difficult, in fact that there is no sign of cancer in more than 80% of women who undergo surgery to have lesions removed and tested. Quing Zhu, at Washington University, and members of her lab have applied a variety of imaging methods to diagnose ovarian cancer more accurately. They have developed a new machine learning fusion model that takes advantage of existing ultrasound features of ovarian lesions to train the model to recognize whether a lesion is benign or cancerous from reconstructed images taken with photoacoustic tomography. Machine learning traditionally has been focused on single modality data. Recent findings have shown that multi-modality machine learning is more robust in its performance over unimodality methods. Funding for this research is from the National Institutes of Health.
The Source - Washington University in St. Louis - Nov 29, 2022

AHRQ-Funded AI System Gives Doctors and Patients a New Tool to Aid in Conversations About Diet

...Talking with patients about nutrition can be delicate, and few medical doctors have training in nutritional science. But now, physicians will be able to get assistance from a new artificial intelligence system designed by researchers at The University of Texas at Austin. Nutri is the brainchild of Marissa Burgermaster, Ph.D., an assistant professor of population health at UT Austin's Dell Medical School. It offers clinicians a decision-support system for discussing nutrition with patients in minutes and making solid decisions with them about improvements in their diets. Funding for the project comes from the Agency for Healthcare Research and Quality...
Dell Medical School - Nov 30, 2022

Other IT Related

NIST BLOG: I Have a Wicked Dream

...Wicked problems are those that typically involve a combination of technical, social, and economic challenges. They are complex with many interdependencies. Typically, their solution involves collaboration among people with different technical disciplines and different self-interests. Wicked scientific problems are not narrowly defined by a need for interdisciplinary scientific research. They are shaped by broader challenges that impact society. Examples include curing cancer, addressing climate change, and solving population health or food insecurity. Wicked problem solvers are a unique group of interdisciplinary thinkers. They accept and celebrate interim successes. They enjoy collaborative thinking. The Communities of Excellence 2026 Fall Conference have a framework document, based on the Baldrige Excellence Framework®, to guide their journeys. Furthermore, on August 9, 2022, the CHIPS and Science Act of 2022 was signed into law, authorizing communities as the seventh category eligible for the Malcolm Baldrige National Quality Award. This is the first big step toward the future implementation of this award category. Would your community benefit from addressing their wicked problems? Consider joining the next cohort of Communities of Excellence 2026...
National Institute of Standards and Technology - Nov 29, 2022

'Listen' to the Light Echoes From a Black Hole

...One of the surprising features of black holes is that although light (such as radio, visible, and X-rays) cannot escape from them, surrounding material can produce intense bursts of electromagnetic radiation. As they travel outward, these blasts of light can bounce off clouds of gas and dust in space, similar to how light beams from a car's headlight

will scatter off fog. A new sonification turns these “light echoes” from the black hole called V404 Cygni into sound. This material periodically generates bursts of radiation, including X-rays. As the X-rays travel outward they encounter clouds of gas and dust in between V404 Cygni and Earth and are scattered at various angles. NASA’s Chandra X-ray Observatory and Neil Gehrels Swift Observatory have imaged the X-ray light echoes around V404 Cygni. Because astronomers know exactly how fast light travels and have determined an accurate distance to this system, they can calculate when these eruptions occurred. This data, plus other information, helps astronomers learn more about the dust clouds, including their composition and distances. These sonifications were led by the Chandra X-ray Center (CXC) and included as part of NASA’s Universe of Learning (UoL) program. ...

National Aeronautics and Space Administration - Nov 23, 2022

NASA Webb Telescope Awarded Popular Science ‘Best of What’s New’ Award

...NASA’s James Webb Space Telescope was named a Popular Science 2022 “The Best of What’s New Award” winner in the Aerospace category. “Each of us on the team dedicated a part of our lives to building the James Webb Space Telescope to open the next door of exploration for humankind,” said Julie Van Campen, Webb Integrated Science Instrument Module (ISIM) systems engineer, deputy commissioning manager at NASA’s Goddard Space Flight Center. Webb is an infrared observatory that will complement and extend the discoveries of the Hubble Space Telescope, with longer wavelength coverage and greatly improved sensitivity. Webb is a unique mission with ambitious science goals, which required the development of several innovative and powerful new technologies ranging from optics to detectors to thermal control systems. The James Webb Space Telescope is the world’s premier space science observatory. Webb’s design pushed the boundaries of space telescope capabilities to solve mysteries in our solar system, look beyond to distant worlds around other stars, and probe the mysterious structures and origins of our universe and our place in it. The Best of What’s New Award recognizes the tremendous contribution that Webb is to both space telescope technologies and to infrared astronomy...

National Aeronautics and Space Administration - Nov 30, 2022

STEM / Workforce & IT

Research team awarded grant from NIST to develop new standards-based educational modules

...A team of researchers from Rochester Institute of Technology was recently awarded a grant to develop curricular modules on infrastructure improvement and resilience that introduce students to public and private sector standards, including industry standards—the benchmarks and generally accepted requirements for performing industry product development and operations as well as risk mitigation. Industry standards, as concepts, are not often taught in undergraduate coursework. This is changing as the National Institute of Standards and Technology (NIST) has sought university faculty to bridge concepts with applications to help prepare students for careers in fields as varied as construction management to medical device design. RIT’s modules will emphasize infrastructure resiliency and environmental sustainability, and be available to use in undergraduate and graduate courses. Content will address national trends and challenges related to climate change and infrastructure protections. Modules could supplement courses such as cybersecurity programming and risk management, as well as introduction to civil engineering, principles of construction leadership and management, sustainable building design and construction, risk management for information security, and solid and hazardous waste management...

Rochester Institute of Technology - Nov 28, 2022

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 Program - Nov 22, 2022

DHS S&T Announces New Student Research Internship

...The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) launched the competition for graduate and undergraduate students across the United States and territories to participate in the 2023 Homeland Security Professional Opportunities for the Student Workforce to Experience Research (HS-POWER) internship program. The DHS HS-POWER program, administered by S&T’s Office of University Programs, offers internships for students majoring in homeland security related sciences,

technology, engineering and mathematics (STEM) disciplines to gain quality experiences conducting DHS mission-relevant research. Student applications are accepted until December 9, 2022...
Homeland Security - Nov 29, 2022

Idaho National Laboratory's 2023 Bright Future in Energy Scholarship opens

...Idaho National Laboratory is pleased to announce the opening of the 2023 Bright Future in Energy Scholarship competition. The program is open to 11th- and 12th-grade students interested in pursuing a postsecondary education and career focused on nuclear energy, the environment or protecting our nation's critical infrastructure from cyberattacks. Participating students will research one of three science-related prompts and prepare a virtual presentation for an expert panel of INL judges during the week of Feb. 13-17, 2023. To be considered, students should submit their application by Feb. 8, 2023.
Idaho National Laboratory - Nov 28, 2022

Upcoming Conferences / Workshops / Webinars

NICE K12 Cybersecurity Education Conference

...The NICE K12 Cybersecurity Education Conference will take place in-person in St. Louis, Missouri on December 5-6, 2022. Check out the keynote speakers...
NICE K12 Cybersecurity Education Conference - Jul 20, 2022

NCCoE Learning Series: Cybersecurity for the Water and Wastewater Systems Sector

...The NCCoE is in the initial phase of a project that will result in a reference architecture designed specifically for the Water and Wastewater Systems sector. The project team is currently seeking the public's input on a draft project description. VIRTUAL EVENT: December 8, 2022 2:00 - 3:30pm EST.
National Institute of Standards and Technology - Nov 17, 2022

Innovation Through NITRD Coordination

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