



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

DHS Announces New 23.1 Small Business Innovation Research Pre-Solicitation

...The Department of Homeland Security (DHS) Small Business Innovation Research (SBIR) Program released seven topics for the new SBIR 23.1 Pre-solicitation. The SBIR program provides an opportunity for small businesses, including those that have never partnered with us before, to engage with DHS and make a real-world impact by addressing some of our most pressing homeland security challenges. Innovative small businesses conducting research and development are encouraged to register for the Deconstructing SBIR: 23.1 Solicitation "Who Understood the Assignment?" webinar on Tuesday, December 13, 2022, at 2 PM ET. During this live event, the DHS SBIR director will talk about the upcoming solicitation...

Homeland Security - Nov 18, 2022

DARPA Challenge to Facilitate Scalable, Timely, Accurate Medical Triage

...The DARPA Triage Challenge (DTC) aims to drive breakthrough innovations that will enable medical personnel to respond effectively to mass casualty incidents (MCIs) in complex military and civilian settings, when medical resources are limited relative to the need. Specifically, DARPA sees opportunity in the identification of physiological features of injury, or "signatures," that can be captured by stand-off and non-invasive contact sensors to help medical responders perform scalable, timely, and accurate triage. Competitors will participate in a series of events to spur identification of physiological signatures and development of sensor technologies for use in complex MCI settings. The DARPA Triage Challenge is a three-year effort with three sequential 12-month phases for primary triage and secondary triage in parallel, each culminating in a challenge event. The Challenge is organized into three competitions (Primary Triage-Real World, Primary Triage-Virtual, and Secondary Triage) with tracks for DARPA-funded and self-funded competitors. For teams interested in applying for funding, proposals are due February 13, 2023, and the first of three annual challenge events will be held fall 2024.
DARPA - Nov 16, 2022

HPC

Launching a New Class of U.S. Supercomputing

...Exascale computers get their name from how many calculations they can do per second – called floating operations per second, or FLOPS. With their ability to crunch over a quintillion calculations per second, one computer could complete in a mere second the same monumental task that the entire world population could tackle over five years. The Department of Energy's (DOE) Office of Science recently launched the world's first exascale computer, Frontier, at DOE's Oak Ridge Leadership Computing Facility user facility. It is currently ranked number 1 on the Top500 list of the world's fastest supercomputers, as of November 14, 2022. "Our science communities, from climate modeling to nuclear reactor simulations to epidemiology to control the spread of diseases, have increased their use of high-performance computing in recent decades," said Barb Helland, associate director of the Office of Science's Advanced Scientific Computing Research (ASCR) program...
Department of Energy - Nov 17, 2022

Artificial Intelligence / Machine Learning

Deep learning with light: New method uses optics to accelerate machine-learning computations on smart speakers and other devices

...Ask a smart home device for the weather forecast, and it takes several seconds for the device to respond. One reason this latency occurs is because connected devices don't have enough memory or power to store and run the enormous machine-learning models needed for the device to understand what a user is asking of it. MIT researchers have created a new method for computing directly on these devices, which drastically reduces this latency. Their technique shifts the memory-intensive steps of running a machine-learning model to a central server where components of the model are encoded onto light waves. The waves are transmitted to a connected device using fiber optics, which enables tons of data to be sent lightning-fast through a network. The receiver then employs a simple optical device that rapidly performs computations using the parts of a model carried by those light waves. The U.S. National Science Foundation supported this research...
National Science Foundation - Nov 16, 2022

DARPA's Episode 62: The Model (& Simulation) Researcher

...For this episode of the Voices from DARPA podcast, we talk with new DARPA program manager, Dr. Alvaro Velasquez, a self-described "researcher at heart." His current research interests are at the intersection of formal language theory and machine learning for sequential decision-making. Velasquez discusses his path to DARPA and how it serendipitously led him to inheriting management of a new AI program called Assured Neuro Symbolic Learning and Reasoning (ANSR). He also describes his idea for his next project...
DARPA - Nov 17, 2022

DOE/ARO/AROSR/NSF-funded research uses electricity to find materials that can learn

...Scientists looking to create a new generation of supercomputers are looking for inspiration from the most complex and energy-efficient computer ever built: the human brain. Researchers are looking at different nonbiological materials whose properties could be tailored to show evidence of learning-like behaviors. These materials could form the basis for hardware that could be paired with new software algorithms to enable more potent, useful and energy-efficient artificial intelligence (AI). The first response, habituation, occurs when the material "gets used to" being slightly zapped. The scientists noticed that although the material's resistance increases after an initial jolt, it soon becomes

accustomed to the electric stimulus. The other response shown by the material, sensitization, occurs when a larger dose of electricity is administered. These two behaviors are controlled by quantum interactions between electrons that can't be described by classical physics, and that help to form the basis for a phase transition in the material. The difference between habituation and sensitization can help scientists overcome a challenge in the development of AI called the stability-plasticity dilemma. Artificial intelligence algorithms can often be, on the one hand, too reluctant to adapt to new information. Too much stability prevents AI from learning, but too much plasticity can lead to catastrophic forgetting. The research was funded by DOE's Office of Science (Office of Basic Energy Sciences), the Army Research Office, the Air Force Office of Scientific Research and the National Science Foundation.

Argonne National Laboratory - Nov 17, 2022

Abdelzaher's IoBT REIGN Alliance Receives 5-year Extension Worth Up to \$25.5M from US ARL

...The Alliance for IoBT Research on Evolving Intelligent Goal-driven Networks (IoBT REIGN) was established in 2017 by the U.S. Army Research Laboratory, and was just awarded a 5-year contract extension with up to \$25.5 million in additional funding. "IoBT," which stands for "Internet of Battlefield Things," was inspired by civilian IoT (Internet of Things) technologies. However, where IoT technologies might control things like home lighting and temperature, "in the battlefield, the services are more about automating decision processes. IoBT REIGN has focused on three main research directions. One is to run calculations efficiently using diverse and distributed battlefield resources—generally small, embedded devices with limited compute capacity. Another is resilience, because systems must operate in a volatile, hostile environment. The third is to enable AI to run effectively in the battlefield at the "point of need," meaning in the field, without cloud support. In the next five years, IoBT REIGN will build on those advances and pursue new areas, particularly scaling, coordination, and massively increased heterogeneity of devices. Another key area will be "multimodal" sensing, in which one uses diverse sensors to overcome adversaries' deception tactics.

News Bureau - Nov 16, 2022

Robotics / Autonomous Vehicles

NASA's Perseverance Rover Investigates Intriguing Martian Bedrock

...NASA's Perseverance Mars rover has begun exploring an area the science team calls "Yori Pass" near the base of Jezero Crater's ancient river delta. The hunt at Jezero Crater for biosignatures (any characteristic, element, molecule, substance, or feature that can serve as evidence for ancient life) is one of the Perseverance rover's four science objectives. Along with its 14 rock-core samples, the rover has collected one atmospheric sample and three witness tubes, all of which are stored in the rover's belly. After it collects a sample from Yori Pass, Perseverance will drive 745 feet (227 meters) southeast to a mega sand ripple. The rover will characterize the planet's geology and past climate, pave the way for human exploration of the Red Planet, and be the first mission to collect and cache Martian rock and regolith...

National Aeronautics and Space Administration - Nov 17, 2022

How to make future autonomous transportation accessible to everyone

...Brad Duerstock, a professor of practice in industrial engineering and biomedical engineering at Purdue University, has seen smartphones, tablets and other types of technology get developed but not become usable for him or others with disabilities until years later. He is working to change that for autonomous vehicles while the technology is still in its early days. The goal is that when these vehicles start to hit the road everywhere, they will be able to accommodate anyone who wants to use them. Duerstock and Brandon Pitts, a Purdue assistant professor of industrial engineering, have worked together for four years on topics related to technology accessibility and inclusive design and have constantly sought opportunities to contribute their ideas to help shape the future of transportation. Their team's design concept won first place in a U.S. Department of Transportation competition this summer. The goal of the competition, called the Inclusive Design Challenge, is to spur the innovation needed to ensure that when autonomous transportation becomes widespread, it can accommodate people with any travel-limiting disability or mobility challenge...

Purdue University - Nov 17, 2022

Quantum

NIST's Grid of Quantum Islands Could Reveal Secrets for Powerful Technologies

...Researchers at the National Institute of Standards and Technology (NIST) have created grids of tiny clumps of atoms known as quantum dots and studied what happens when electrons dive into these archipelagos of atomic islands. Measuring the behavior of electrons in these relatively simple setups promises deep insights into how electrons behave in complex real-world materials and could help researchers engineer devices that make possible powerful quantum computers and other innovative technologies...

National Institute of Standards and Technology - Nov 17, 2022

Cybersecurity / Privacy

NSF-funded study uncovers new threat to security and privacy of Bluetooth devices

...Mobile devices that use Bluetooth are vulnerable to a glitch that could allow attackers to track a user's location. The research revolves around Bluetooth Low Energy (BLE), a type of Bluetooth that uses less energy when compared to Bluetooth Classic (an earlier generation of Bluetooth). Zhang and his adviser, Zhiqiang Lin, professor of computer science and engineering at Ohio State, proved the threat by testing over 50 market-available Bluetooth devices as well as four BLE development boards. They reported the flaw to major stakeholders in the Bluetooth industry. Bluetooth devices have what are called MAC addresses – a string of random numbers that uniquely identify them on a network. About once every 20 milliseconds an idle BLE device sends out a signal advertising its MAC address to other nearby devices that it could connect with. The study identifies a flaw that could allow attackers to observe how these devices interact with the network, and then either passively or actively collect and analyze the data to break a user's privacy. One of the reasons researchers are concerned about such a scenario is because a captured MAC address could be deployed in what is called a replay attack, which may allow the attacker to monitor the user's behaviors, track where the user has been in the past or even figure out the real-time location of the user. ... This work was supported by the National Science Foundation.

Ohio State News - Nov 17, 2022

Adversaries are ready to strike US infrastructure, warns CISA cybersecurity expert at Northeastern event

...Enemies are situating themselves within the cyber operations of U.S. infrastructure sites with the potential of striking at any time, warned Brandon Wales, executive director of the Cybersecurity and Infrastructure Security Agency (CISA). The best way to counteract those efforts is to develop a new security web of U.S. government agencies and private industries to collaborate on cybersecurity—while also encouraging college students to make careers in the field, explained Wales and a panel of experts. The speakers laid out the organizational difficulties and worrisome threats from nations and private hackers that are seeking to disrupt U.S. systems. The event, "Next Steps for Critical Infrastructure & Cyber Security: A Conversation with CISA Executive Director Brandon Wales," was held at Northeastern's Innovation Campus...

Northeastern News - Nov 18, 2022

Information Integrity Research & Development

Safeguarding Science toolkit launched to help researchers defend scientific integrity

...The U.S. National Science Foundation joined federal and university partners to announce a unique collaboration between U.S. government and academic stakeholders to aid researchers facing a broad spectrum of risks to research integrity and security. The Safeguarding Science toolkit was designed with the scientific community for the scientific community. It provides research stakeholders with a single location to access security best practices from across government and academia and to select tools tailored for their individual needs. Developed by the U.S. National Counterintelligence and Security Center in partnership with NSF, the National Institute of Standards and Technology (NIST), the Department of Transportation and its Federal Aviation Administration (FAA), the Department of Health and Human Services the White House Office of Science and Technology Policy, and the American Association of Universities, the toolkit will promote a robust and resilient U.S. research ecosystem that emphasizes integrity, collaboration, openness and security, all of which facilitate innovation...

National Science Foundation - Nov 16, 2022

Empowering social media users to assess content helps fight misinformation

...When fighting the spread of misinformation, social media platforms typically place most users in the passenger seat. Platforms often use machine-learning algorithms or human fact-checkers to flag false or misinforming content for users. MIT researchers conducted a study in which they put that power into the hands of social media users instead. They developed a prototype platform that enables users to assess the accuracy of content, indicate which users they trust to assess accuracy, and filter posts that appear in their feed based on those assessments. This work shows that a decentralized approach to moderation can lead to higher content reliability on social media. The researchers built a Facebook-like prototype platform, called Trustnet. In Trustnet, users post and share actual, full news articles and can follow one another to see content others post. But before a user can post any content in Trustnet, they must rate that content as accurate or inaccurate, or inquire about its veracity, which will be visible to others. Once the prototype was complete, they conducted a study in which 14 individuals used the platform for one week. The researchers found that users could effectively assess content, often based on expertise, the content's source, or by evaluating the logic of an article, despite receiving no training. They were also able to use filters to manage their feeds, though they utilized the filters differently. ... This work was supported, in part, by the National Science Foundation.

MIT News - Nov 16, 2022

5G, Wireless Spectrum, Networking & Communications

NSF-funded study on reef halos may enable coral telehealth checkup worldwide

...Coral reef halos are bands of bare, sandy seafloor that surround coral patch reefs. Reef halos have been associated with marine reserves designed to protect predator and herbivore species from being overfished. These features, clearly visible from satellite imagery, may provide a window into reef health around the world, according to a U.S. National Science Foundation-supported study by scientists at the University of Hawaii at Mānoa. The team analyzed high-resolution satellite imagery and historical aerial imagery from the 1960s from around the globe. The researchers documented the previously undescribed presence of halos outside of the tropics surrounding seagrass reefs and revealed the timescales over which coral reef halos change, merge and persist...

National Science Foundation - Nov 21, 2022

NOAA's GOES-U Completes Thermal Vacuum Testing

...NOAA's GOES-U, the final satellite in the GOES-R Series of advanced geostationary environmental satellites, recently completed thermal vacuum (TVAC) testing as part of a rigorous assessment program to ensure the satellite can withstand the harsh conditions of launch and orbiting 22,236 miles above Earth's equator. The GOES-R program is a collaborative effort between NOAA and NASA. NASA builds and launches the satellites for NOAA, which operates them and distributes their data to users worldwide. The satellites provide critical data for weather forecasts and warnings, detecting and monitoring environmental hazards like fire, smoke, fog, volcanic ash, and dust, and monitoring solar activity and space weather. GOES-U, the final satellite in the GOES-R Series, is scheduled to launch in April 2024 from Cape Canaveral Space Force Station in Florida. The satellite will be renamed GOES-19 once it reaches geostationary orbit, approximately two weeks after launch. The GOES-R Program is a four-satellite mission that includes GOES-R (GOES-16, launched in 2016), GOES-S (GOES-17, launched in 2018), GOES-T (GOES-18, launched in 2022), and GOES-U. The GOES-R Series satellites are planned for operation into the 2030s. NOAA and NASA have begun work on the next-generation geostationary mission called Geostationary Extended Observations (GeoXO). GeoXO will continue observations provided by GOES-R and bring new capabilities to address our changing planet and the evolving needs of NOAA's data users...

National Aeronautics and Space Administration - Nov 21, 2022

Biden-Harris Administration Awards \$5.5 Million to Rhode Island in 'Internet for All' Planning Grants

...The Department of Commerce's National Telecommunications and Information Administration (NTIA) announced that Rhode Island received its first "Internet for All" grants for deploying high-speed Internet networks and developing digital skills training programs under the Biden-Harris Administration's Internet for All initiative. Rhode Island is receiving \$5,506,100.07 in funding from the Bipartisan Infrastructure Law, signed by President Biden, to plan for the deployment and adoption of affordable, equitable, and reliable high-speed Internet throughout the state. The Digital Equity Act provides \$2.75 billion to establish three grant programs to ensure that all people and communities have the skills, technology, and capacity needed to reap the full benefits of our digital economy. The first part of NTIA's execution of the Digital Equity Act is to fund digital equity planning efforts. NTIA recently launched a series of new high-speed Internet grant programs funded by the law that will build high-speed Internet infrastructure across the country, create more low-cost high-speed Internet service options, and address the digital equity and inclusion needs in our communities...

U.S. Department of Commerce - Nov 22, 2022

GIS Day 2022: Exploring Humanitarian GIS

...The Library celebrates GIS Day with a virtual event exploring the role of GIS in addressing humanitarian disasters. Virtual attendees will have the chance to hear from geospatial experts across several sectors, including nonprofit, government, academia and the private sector...

Library Of Congress - Nov 16, 2022

NSF-Funded Scientist To Lead Expansion of Observatory with World's Largest Radar

...Dr. Fabiano Rodrigues, associate professor of physics at The University of Texas at Dallas, has received a five-year, \$2.8 million grant from the National Science Foundation (NSF) Major Research Instrumentation (MRI) Program will be used to develop and deploy two large radio receiving stations that will augment the observational capabilities of the Jicamarca Radio Observatory, located near Lima, Peru. The instrumentation will allow researchers to gather more detailed information about the Earth's atmosphere and ionosphere, a region where Earth's upper atmosphere meets outer space. One of the goals of the new instrumentation is a better specification and understanding of space weather. Disturbances and turbulence among the particles that make up the ionosphere are part of a global space weather system that can affect radio communications as well as degrade the quality of GPS signals used for positioning and navigation. A better understanding of the dynamics of the region and the factors affecting it will help scientists develop models to forecast space weather more accurately...

The University of Texas at Dallas - Nov 16, 2022

Microelectronics

Bipartisan Infrastructure Law helps map critical mineral resources in Nevada and Oregon

...The U.S. Geological Survey (USGS), in partnership with Nevada and Oregon officials, announces more than \$1.45 million has been awarded to conduct geologic mapping, airborne geophysical surveying and geochemical sampling in support of critical mineral resource studies. The funding will support an airborne electromagnetic survey of more than 32,000 km² (12,500 mi²) in northern and central Nevada and parts of southern Oregon. In addition, a grant to the Nevada Bureau of Mines and Geology will support geologic mapping and geochemical analyses within McDermitt Caldera, which hosts some of the richest lithium deposits in the United States. The USGS will conduct airborne electromagnetic and magnetic surveys over several key areas within the Great Basin that have known or potential critical-mineral resources, including lithium, beryllium, tungsten and a wealth of other commodities. The airborne survey will be the largest flown in the region, covering extensive portions of Nevada, the top mineral-producing state in the nation...

USGS - Nov 16, 2022

Advancing Emerging Microchip Technologies in the U.S.

...Only about 10 to 14 percent of microchips sold globally are manufactured in the United States. A new collaboration aims to overcome the gap between inventing new devices in the lab and manufacturing new chips in commercial foundries by providing semiconductor microchip prototypes that can be used to demonstrate integration of new devices in the early stages of innovation. The George Washington University is one of five academic research partners working with the U.S. Department of Commerce's National Institute for Standards and Technology (NIST), Google and semiconductor manufacturer SkyWater Technology to create a domestic, affordable supply of such microchips for researchers and startups. The collaboration aims to unleash innovation in the semiconductor and nanotechnology industries and comes just a few months after the U.S. government enacted the bipartisan CHIPS Act. The team will produce silicon wafers comprising of hundreds of microchips, which will be distributed to the community. The goal is to provide researchers with an accessible pre-planarized chip platform suitable for integration and for benchmarking the performance of their novel devices against other devices from the community...

The George Washington University - Nov 16, 2022

Climate Change / Green Energy & IT

FACT SHEET: The Biden-Harris Administration Advances Transmission Buildout to Deliver Affordable, Clean Electricity

...The Department of Energy (DOE) announced that first-round applications are open for competitive grants under the Grid Resilience and Innovation Partnership Programs, which total \$10.5 billion in available funding, as well as the \$2.5 billion Transmission Facilitation Program. An estimated 70 percent of the nation's transmission lines are over 25 years old, and this aging infrastructure makes American communities, critical infrastructure, and economic interests vulnerable. New and upgraded transmission lines deliver electricity to where it's needed, whether that means delivering wind and solar power to towns and cities across the country or moving power from one region to another that needs it in the face of storms, heat waves, and other extreme weather...

The White House - Nov 18, 2022

USAID Invests in Early Warning Systems for Impending Climate-Related Disasters to Save Lives

...The U.S. Agency for International Development (USAID) announced \$33 million to provide communities at risk of climate-prone disasters – including cyclones, droughts, and floods – with access to effective early warning systems. Increasing access to early warning systems translates to early action, allowing communities to prepare for disasters before they happen. To help communities prepare for impending climate hazards and adapt to climate change, USAID is partnering with the National Oceanic and Atmospheric Administration (NOAA), the World Meteorological Organization (WMO), and national authorities in vulnerable areas around the world to scale up early warning systems and build the capacities of their local-level meteorological and disaster management agencies...

United States Agency for International Development - Nov 17, 2022

U.S. Secretary of Energy Advances America's Commitment to Reaching Net Zero Global Emissions and Combatting Climate Change at COP27

...U.S. Secretary of Energy Jennifer M. Granholm traveled to Sharm El-Sheikh, Egypt for the 27th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP27) to showcase this year's achievements from Net Zero World (NZW), the Department of Energy's (DOE) signature program to accelerate the global

transition to net-zero emissions while enhancing economic prosperity. The event highlighted the first in a series of reports that summarizes modeling of partner countries' energy trajectories and systems, which can help guide government decision makers to make informed climate and energy policy and investment decisions for the transition to a net-zero future. The Secretary also announced a call for applications for a new Net Zero World women's leadership program. DOE, in collaboration with the governments of Japan and the United Kingdom, announced the winners of the H2 Twin Cities 2022 program. The H2 Twin Cities is a global program under the Clean Energy Ministerial's Hydrogen Initiative to connect cities and communities around the world to deploy clean hydrogen solutions...

Department of Energy - Nov 17, 2022

Digital Health

A Proclamation on National Rural Health Day, 2022

...On National Rural Health Day, we recommit to delivering quality, affordable health care to every zip code in America by making insurance and prescription drugs more affordable, expanding mental health and substance use disorder services, and by keeping rural facilities open and staffed with dedicated doctors, nurses, and other health professionals. We launched an innovative program to train rural providers through the Department of Veterans Affairs to better serve the nearly five million veterans who live in rural areas. We are also helping to build and renovate rural facilities while boosting access to telehealth — a lifeline in remote areas — with historic investments in rural broadband and expansion of services that can be delivered via telehealth to providers serving Medicare beneficiaries...

The White House - Nov 16, 2022

Researchers 3D bioprint breast cancer tumors and treat them in new study

...U.S. National Science Foundation-supported researchers at Penn State have successfully 3D bioprinted breast cancer tumors and treated them in a breakthrough study to better understand the disease that is one of the leading causes of mortality worldwide. The advancement will enable future study and development of anti-cancer therapies without the use of "in vivo" — or "in animal" — experimentation. The researchers used a relatively new technique called aspiration-assisted bioprinting to precisely locate tumors in three dimensions and create the tissue. The researchers then formed the tissue into a multi-scale vascularized breast tumor model with blood vessels, which they discovered responded to chemotherapy and cell-based immunotherapeutics. The researchers used human CAR-T cells that were engineered via gene editing to recognize and fight an aggressive form of breast cancer cells. After 72 hours of circulating the edited CAR-T cells through the tumor, the researchers found that the cells within the bioprinted tumor had generated a positive immune response and were fighting off the cancer cells...

National Science Foundation - Nov 21, 2022

News Release: S&T Announces Five Awards to Improve DHS Workforce Safety and Wellness

...The Department of Homeland Security (DHS) Science and Technology Directorate (S&T) announced five awardees from the "Human Performance and Resiliency" solicitation which sought innovative technologies and methods to improve workforce safety and wellness for DHS personnel. S&T's Silicon Valley Innovation Program (SVIP) issued the solicitation, which sought groundbreaking solutions to identify and resolve issues before reaching crisis levels, and to promote resilience and wellness tools that could serve the mission needs of DHS components and programs, including the U.S. Customs and Border Protection (CBP). "The DHS workforce is often placed in situations of extreme stress while carrying out their mission-critical responsibilities," said Melissa Oh, managing director of SVIP. "These health and wellness technologies will enhance DHS's ability to support its employees as they work to secure the nation."...

Homeland Security - Nov 17, 2022

US ONR & NSF funded skin-like electronics could monitor your health continuously

...Flexible, wearable electronics are making their way into everyday use, and soon, this technology could be used for precision medical sensors attached to the skin, designed to perform health monitoring and diagnosis. Future wearable electronics could potentially detect possible emerging health problems — such as heart disease, cancer or multiple sclerosis — even before obvious symptoms appear. The team called upon neuromorphic computing, an AI technology that mimics the operation of the brain by training on past data sets and learning from experience. Its advantages include compatibility with stretchable material, lower energy consumption and faster speed than other types of AI. The key material in any electronic device is a semiconductor. Stretchable electronics require that the semiconductor be a highly flexible material that is still able to conduct electricity. The team's skin-like neuromorphic "chip" consists of a thin film of a plastic semiconductor combined with stretchable gold nanowire electrodes. Even when stretched to twice its normal size, their device functioned as planned without formation of any cracks. As one test, the team built an AI device and trained it to distinguish healthy electrocardiogram (ECG) signals from four different signals indicating health problems. After training, the device was more than 95% effective at correctly identifying the ECG signals. ... This work was funded by the U.S. Office of Naval Research and the National Science Foundation.

Argonne National Laboratory - Nov 16, 2022

NSF & ONR-Funded Math Approach May Make Drug Discovery More Effective, Efficient

...Dr. Baris Coskunuzer, professor of mathematical sciences at UT Dallas, and his colleagues developed an approach based on topological data analysis to screen thousands of possible drug candidates virtually and narrow the compound candidates considerably to those that are most fit for laboratory and clinical testing. The UTD and Novartis team framed the virtual screening process as a new type of topology-based graph ranking problem, from a branch of mathematics called topological data analysis. Their method characterizes each molecular compound based on the shape of its underlying physical substructure — its topology — as well as a series of physical and chemical properties of the components of the molecule. From this information, the researchers develop a unique “topological fingerprint” for each compound that is used to rank it according to how well it fits the desired properties. The next step will be to generalize the method to molecular property prediction, which includes scoring a compound on how soluble it is in water. Solubility can be critical to a drug’s efficacy in the human body. The UTD researchers are supported by grants from the National Science Foundation and the Office of Naval Research.

The University of Texas at Dallas - Nov 17, 2022

Other IT Related

Engineers draw inspiration from geometrical frustration

...U.S. National Science Foundation-supported researchers have drawn inspiration from the art of origami to create programmable surfaces that allow engineers to alter the physical properties of a uniform substance. Researchers described structures that are also programmable, so dimensions and corresponding properties can shift as needed. The researchers hope that designers will be able to apply the techniques to medical devices, architecture, robotics and aerospace. To create the structures, they began with cells of four kite-shaped figures known as rhombuses; each rhombus is connected to two others along two sides, with a tail end of each rhombus-free. The connecting sides are hinged in some special ways, so each cell can click through a variety of forms, from a wide basket to thin folds. The researchers combined many of these cells to create a wide range of surfaces. By adjusting cells, the engineers can change the properties of the entire surface...

National Science Foundation - Nov 22, 2022

NASA’s Webb Draws Back Curtain on Universe’s Early Galaxies

...A few days after officially starting science operations, NASA’s James Webb Space Telescope propelled astronomers into a realm of early galaxies, previously hidden beyond the grasp of all other telescopes until now. The initial findings are from a broader Webb research initiative involving two Early Release Science (ERS) programs: the Grism Lens-Amplified Survey from Space (GLASS), and the Cosmic Evolution Early Release Science Survey (CEERS). With just four days of analysis, researchers found two exceptionally bright galaxies in the GLASS-JWST images. These galaxies existed approximately 450 and 350 million years after the big bang (with a redshift of approximately 10.5 and 12.5, respectively), though future spectroscopic measurements with Webb will help confirm...

National Aeronautics and Space Administration - Nov 17, 2022

New Horizons in the Alaska Fisheries Data Environment: Data-linking projects with the support of the Alaska Fisheries Information Network

...Understanding the amount and composition of bycatch in a given fishery is key to sustainably managing our shared ocean resources. Data gathered by fisheries observers are critical components of this data collection. While he was a research mathematical statistician at the Alaska Fisheries Science Center, Jordan Watson studied salmon bycatch in the Bering Sea groundfish trawl fisheries. He was trying to look for and understand any potential patterns in bycatch events that might add to our understanding of how to prevent them. His first thought was to compare observer data reports with sea surface temperatures to see what correlations might exist. But there were 3 billion sea surface temperature data points to sift through, and it took several weeks on multiple computers to download satellite data. The Alaska Fisheries Information Network started working with Shotwell and Watson to build a web-based data management tool. “Now we have a system where people can upload their data,” explains Shotwell. “It sends out automatic updates, so I have time to catch errors more quickly than I could before. ... The Center is continuing to expand upon its work on data integration. A third project to merge data from vessel monitoring and automatic identification systems, and to further incorporate socio-economic and ecosystem data for stock assessments, is currently underway. All three phases were funded via NOAA Fisheries’ Fisheries Information System request for proposals process...

Noaa Fisheries - Nov 17, 2022

STEM / Workforce & IT

STEM Appreciation Day – Celebrate With Four STEM-Inspired Toys and Activities

...November 8 was STEM (science, technology, engineering and mathematics) Appreciation Day – subjects that we believe should be emphasized year round. This spotlight on STEM education has reignited an interest in technology-based toys. Here are a few ideas for encouraging interest in STEM for the children on your holiday gift list...
National Institute of Standards and Technology - Nov 21, 2022

U. of Utah, Air Force establish engineering education partnership

...The University of Utah College of Engineering and the U.S. Air Force announced a new education partnership that will create valuable learning opportunities for students and research projects that can advance technologies from wireless communications and cybersecurity to robotics and composite materials. This education partnership allows university faculty and students to work more closely with Air Force researchers on a wide range of topics that could include data analytics, machine learning for materials discovery, prosthetics, nuclear engineering, additive manufacturing and more. Air Force personnel will also work with the University on developing new educational programs and will make laboratory personnel available to teach courses. The agreement, which officially launched this summer, is scheduled to last five years...
Air Force Materiel Command - Nov 21, 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

NITRD News

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

Upcoming Conferences / Workshops / Webinars

NICE K12 Cybersecurity Education Conference: Dec 5-6th

...The Nice K12 Cybersecurity Education Conference will take place in-person at the Marriott St. Louis Grand in St. Louis Missouri on December 5-6, 2022.

NICE K12 Cybersecurity Education Conference - Jul 20, 2022

NCCoE Learning Series: Cybersecurity for the Water and Wastewater Systems Sector Dec 8th

...Facilities in the Water and Wastewater Systems (WWS) sector play an important role in our national critical infrastructure. It is important that these utilities are equipped with resources to help them address and reduce their cybersecurity risks. 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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