



## 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](mailto:nco@nitrd.gov) and voilà they will receive the news brief with the cool technology articles each week!

### Federal Agency Funding Opportunities

#### Can AI Teach AI? DARPA Seeking Ideas to Explore How AI Tutoring Can Help Adult Learners

...DARPA is seeking ideas for innovative AI approaches that can help adults learn complex topics necessary for the current and future national security workforce (e.g., AI engineering and cyber defense). DARPA invites technologists, researchers, students, teachers, and creators of digital learning platforms or cutting-edge AI techniques to propose AI tools or technologies that can address the critical challenges facing adult learners. Successful tools will seek to create customized learning experiences that improve training of new skills in adults who have completed postsecondary education. Following the pitch event, DARPA will award a total of \$750,000 to winning submissions to develop those concepts. Those who are selected will have the opportunity to present their progress and technologies to industry, technical experts, and philanthropic organizations in the year following the awards...

DARPA - Nov 3, 2022

### **DAF-MIT AI Accelerator to commence CogPilot Data Challenge 2.0**

...The Department of the Air Force-Massachusetts Institute of Technology Artificial Intelligence Accelerator will commence the CogPilot Data Challenge 2.0. The challenge invites participants to explore AI-based solutions linking a pilot's physiology, such as heart rate, eye tracking, and muscle activity, to their behavior and performance of flying tasks varying in difficulty. The AI Accelerator welcomes all participants across the Department of Defense, academia, and industry, and aims to accelerate innovation by engaging the broader AI community in attacking tough DoD technology needs. The CogPilot Data Challenge 2.0, hosted by AIA's Performance Prediction and Optimization research team, consists of two tasks. First, participants are challenged to develop a model that predicts the difficulty level of an aircraft landing performed in virtual reality based only on pilot physiology. For the second task, participants predict how well the pilot performed each approach and landing task using only pilot physiology. The CogPilot Data Challenge 2.0 registration will be open through January 2023 and challenge submissions are due Feb. 15, 2023. Team results will be posted March 7, 2023.  
Air Force Link - Nov 3, 2022

## **HPC**

### **Geochemist Receives NSF Grant for Work in Developing Search Engines for Climate Change Data**

...In the field of low-temperature geochemistry, which studies geochemical processes that occur just at or beneath the Earth's land surface, datasets from different sub-disciplines are deposited in multiple databases and can vary significantly from each other in format. The datasets must be brought into alignment with each other and they are not always published in searchable or discoverable form. A team of software cyberinfrastructure scientists and geoscientists will endeavor to standardize and unify the descriptions of data and tools, facilitating the creation of efficient scientific search engines with a National Science Foundation grant. The initial work of the project will be expanding on the already successful EarthCube GeoCODES framework, enabling the geoscience community to adopt science-on-schema—an established, agreed-upon vocabulary for scientific datasets—to share data and codes...  
Syracuse University News - Nov 4, 2022

## **Artificial Intelligence / Machine Learning**

### **NSF-Funded Researchers Show How Network Pruning Can Skew Deep Learning Models**

...Computer science researchers have demonstrated that a widely used technique called neural network pruning can adversely affect the performance of deep learning models, detailed what causes these performance problems, and demonstrated a technique for addressing the challenge. Deep learning models often require a lot of computing resources to operate, but some systems engage in "neural network pruning" that makes the deep learning model more compact uses fewer computing resources. The research shows that this network pruning can impair the ability of deep learning models to identify some groups. Two factors explain how network pruning can impair the performance of deep learning models: disparity in gradient norms across groups; and disparity in Hessian norms associated with inaccuracies of a group's data. In practical terms, this means that deep learning models can become less accurate in recognizing specific categories of images, sounds or text. Specifically, the network pruning can amplify accuracy deficiencies that already existed in the model. In testing, the researchers demonstrated that using their mitigation technique improved the fairness of a deep learning model that had undergone network pruning, essentially returning it to pre-pruning levels of accuracy. The work was supported by the National Science Foundation...  
Department of Computer Science at North Carolina State University - Nov 2, 2022

### **In machine learning, synthetic data can offer real performance improvements**

...Researchers train machine-learning models using vast datasets of video clips that show humans performing actions. However, it is expensive and laborious to gather and label millions or billions of videos and the clips often contain sensitive information. Researchers are turning to synthetic datasets made by a computer using 3D models of scenes, objects, and humans to quickly produce many varying clips of specific actions — without the potential copyright issues or ethical concerns that come with real data. MIT researchers and colleagues found that the synthetically trained models performed even better than models trained on real data for videos that have fewer background objects. This work could help researchers use synthetic datasets in such a way that models achieve higher accuracy on real-world tasks. This research was supported by the Defense Advanced Research Projects Agency.  
MIT News - Nov 3, 2022

## **UB teams receive over \$2.6 million in federal funding for environmental research**

...Research teams affiliated with the UB's RENEW Institute have received three federal grants totaling more than \$2.6 million for studies focused on environmental concerns. The projects are funded by the National Science Foundation (NSF) and the Environmental Protection Agency (EPA). Topic areas of these funded projects include development of "net-zero-water" buildings with a self-sustaining water supply; in-ground sensors that monitor soil health...  
University at Buffalo - Nov 3, 2022

## **Robotics / Autonomous Vehicles**

### **NSF-funded engineers discover new process for synthetic material growth, enabling soft robots that grow like plants**

...A NSF-funded team of University of Minnesota Twin Cities scientists and engineers has developed a first-of-its-kind, plant-inspired process that enables synthetic material growth. The new approach will allow researchers to build better soft robots that can navigate hard-to-reach places, complicated terrain and, potentially, areas within the human body. Soft-growing robots can create new material and "grow" as they move. Current soft-growing robots drag a trail of solid material behind them and use heat or pressure to transform that material into a more permanent structure. However, the trail of solid material becomes more difficult to pull around bends and turns, making it hard for the robots to navigate terrain with obstacles or winding paths. The researchers solved this problem by developing a new means of extrusion, a process where material is pushed through an opening to create a specific shape. That allows the robot to create its synthetic material from a liquid instead of a solid. "We took the idea that plants and fungi add material at the end of their bodies, either at their root tips or at their new shoots, and we translated that to an engineering system." ...  
National Science Foundation - Nov 8, 2022

### **DARPA's Robotic In-Space Mechanic Aces Tests, on Track for Launch**

...DARPA's Robotic Servicing of Geosynchronous Satellites (RSGS) program has the goal to enable inspection and servicing of satellites in geosynchronous Earth orbit (GEO). Currently, no options exist for visual diagnosis, upgrades, or repairs of a malfunctioning satellite's components. Throughout the remainder of this year, engineers will complete testing of the flight robotic hardware and software. Integration of the robotic payload with the spacecraft bus will begin in 2023, followed by testing and verification of the combined system. After launch in 2024, the host vehicle will use highly efficient electric propulsion to climb to GEO. Following a period of checkout and calibration activities, the program anticipates on-orbit satellite servicing activities will begin in 2025. DARPA partnered with SpaceLogistics, a Northrop Grumman company, to provide the spacecraft bus, launch, and operations of the integrated spacecraft in exchange for the ability to use the robotic payload to provide commercial servicing once on-orbit. DARPA is funding the U.S. Naval Research Laboratory (NRL) to lead development of the RSGS robotic servicing capabilities. The on-orbit system DARPA is providing will include two robotic arms, multiple robotic tools, on-orbit checkout and calibration equipment, equipment stowage ports, cameras and lighting, and associated avionics boxes running advanced robotics control flight software. Each arm consists of seven high-strength, high-performance joints as well as a tool drive. Avionics boxes provide power, data, and control services to the arms. DARPA designed RSGS with the ability to resupply it during flight with additional tools and hardware, enabling it to solve unanticipated or emerging challenges in GEO...  
DARPA - Nov 8, 2022

### **NASA Sounding Rockets Launch Multiple Science Payloads**

...Newly proven technology turns a single sounding rocket into a hive deploying a swarm of up to 16 instruments. The technology offers unprecedented accuracy for monitoring Earth's atmosphere and solar weather over a wide area. The Swarm Communications technology, as dubbed by its NASA Wallops creators, spreads sub-payloads up to 25 miles out from the rocket. Each cannister streams its unique telemetry and science data using onboard radios through the host rocket's communications system to the ground. Sounding rockets provide an affordable platform to test new space-bound technology and conduct science experiments that cannot be accomplished on the ground. Sounding rockets, along with balloons and aircraft, are part of NASA's affordable access to space program that brings these opportunities to scientists, educational institutions, and students...  
National Aeronautics and Space Administration - Nov 2, 2022

## **Cybersecurity / Privacy**

### **Letter from the President to Select Congressional Leadership on the Nation's Critical Infrastructure**

...The strategic imperatives of today must address the increasing digitalization and automation of our infrastructure, efforts by our adversaries to gain footholds into our infrastructure, and the existential threat of climate change. Updated policy would strengthen the public-private partnership and provide clear guidance to executive departments

and agencies (agencies) on designating certain critical infrastructure as systemically important. Moreover, it would clarify the roles, responsibilities, and services of the Sector Risk Management Agencies and the Cybersecurity and Infrastructure Security Agency (CISA) to coordinate a national effort to secure and protect against critical infrastructure risks. The National Security Council and the Office of the National Cyber Director staff will closely monitor and provide guidance to CISA, as appropriate, in the implementation of the action items in the Secretary's report...

The White House - Nov 7, 2022

### **Thank Goodness for Secure Infrastructure**

...November is when we recognize and celebrate this vast, multifaceted system and understand the importance of strengthening its defenses and resilience. In celebration of Infrastructure Security Month, let's take a look at some S&T initiatives helping set our country up for success. \* Bolstering In-Building Security with Smart Sensors: The resulting In-Building Sensor Testbed addresses three primary functions: building monitoring, building energy performance, and building safety. The testbed has enabled S&T to build a 3D digital twin of the space, deploy a variety of environmental sensors, apply artificial intelligence and machine learning techniques to the camera system, perform dynamic air flow modeling to assess conditions over time, and bring it all together with an advanced analysis platform integrated into the existing building management system for daily operations. \* Tracking Rising Flood Waters: S&T has worked with a number of companies awarded Small Business Innovation Research program funds to design, develop and test a network of inexpensive, deployable, internet-of-things flood inundation sensors. These devices have had a positive impact on various communities. \* Protecting the National Public Warning System: The Federal Emergency Management Agency (FEMA) Integrated Public Alert and Warning System (IPAWS) Program and the Cybersecurity & Infrastructure Security Agency (CISA), S&T released an important report with recommendations on ways to shield against electromagnetic pulse (EMP) and geomagnetic disturbance (GMD) events. \* Performing Security and Resilience Research: S&T launched a major effort dedicated to conducting research and development for critical infrastructure protection vital to national economic security, as well as national public health and safety. The resulting newly formed Critical Infrastructure Security and Resilience Research (CISRR) program will focus on five key areas. \* ...

Homeland Security - Nov 7, 2022

### **MSU, MGCCC, state/federal partners celebrate opening of Mississippi Cyber Center**

...The Mississippi Cyber Center houses initial capabilities established as part of the MSU-led Mississippi Cyber Initiative. The building contains three different labs that support law enforcement, training at Keesler Air Force Base and MGCCC, as well as a digital ecosystem for outreach, collaboration and training. The Mississippi Cyber Initiative, established in 2021, is a statewide effort to broaden the state's capabilities and coordination in cybersecurity, a field that will play a key role in Mississippi's economy for decades to come. The initiative grew out of MSU's support for cyber activities at Keesler Air Force Base in Biloxi, a major training hub for the U.S. Air Force. MCI is leveraging collective expertise among academia, the private sector, federal and local government, law enforcement, the U.S. Department of Defense and the Mississippi National Guard. The Mississippi Cyber Initiative has worked to build collaborations, assess stakeholder needs and develop the Mississippi Cyber Center, which currently serves as the initiative's headquarters. The building contains a Digital Forensics Lab that is assisting 15 law enforcement agencies as they carry out investigations with a digital device component...

Mississippi State University - Nov 9, 2022

## **5G, Wireless Spectrum, Networking & Communications**

### **Airmen compete in joint global radio contest Noble Skywave**

...Military units from around the world recently participated in Noble Skywave, a global cyber contest, at U.S. Army Garrison Baumholder. This year's competition brought together 429 military units from across 13 nations competing to determine who can most efficiently utilize high-frequency radio technology. During the contest, teams set up a fully functioning radio station and utilized their skills to connect with other radio stations, some being thousands of miles away. High-frequency radio technology and its operators are crucial to the U.S. military, allies and partners as it is not reliant on conventional ways of communications technology, such as satellites or cell phone towers which are vulnerable to weather conditions or an attack from an adversary. The technology works by bouncing radio waves off the ionosphere, a layer in the atmosphere that is electrically charged by the sun, allowing communication between people that are a vast distance apart...

Air Force Link - Nov 6, 2022

### **Satellites Help Scientists Track Dramatic Wetlands Loss in Louisiana**

...New research uses NASA satellite observations and advanced computing to chronicle wetlands lost (and found) around the globe. Scientists used the NASA/USGS Landsat satellite record to track shoreline changes across Louisiana from 1984 to 2020. Some of those wetlands were submerged by rising seas; others were disrupted by oil and gas infrastructure and hurricanes. But the primary driver of losses was coastal and river engineering. Human intervention and engineering often hold back or divert the flow of sediments that naturally accrete to build and replenish wetlands. Reinforced levees and thousands of miles of canals and excavated banks have isolated many wetlands from the Mississippi River and the network of streams that course through its delta like veins and capillaries. By analyzing Landsat imagery with tools from cloud computing, the

researchers developed a remote sensing model that focused on accretion or the lack of it. The Delta-X research team has been studying the Mississippi River Delta using airborne sensing and field measurements of water, vegetation, and sediment changes in the face of rising sea level. The Landsat analysis builds on this airborne mission. Delta-X is part of NASA's Earth Venture Suborbital (EVS) program, managed at NASA's Langley Research Center...  
National Aeronautics and Space Administration - Nov 7, 2022

### **There's room for improvement in a popular climate-smart agricultural practice, NASA/USDA-funded study shows**

...The reality of planting cover crops during the off-season – a much-touted and subsidized approach to climate change mitigation – is that cover cropping reduces corn and soybean yields, and could lead to indirect environmental impacts from expanded cultivation to make up for the losses. Maintaining vegetation cover on agricultural fields in the off-season can lead to large reductions in runoff and leakage of nitrogen into streams and groundwater, reduced soil erosion, and reduced need for weed control chemicals. The practice can also be a cost-competitive strategy for keeping carbon dioxide out of the air. The U.S. Department of Agriculture has subsidized the practice with more than \$100 million per year since 2016. In the first large-scale, field-level analysis of yield impacts from cover cropping across the U.S. Corn Belt, the researchers used satellite imagery to look over about 20 million acres of farmland in Iowa, Indiana, Missouri, Ohio, Illinois, and Michigan. They analyzed every field that had grown cover crops for at least three years, comparing them to similar fields that had not been planted with cover crops. On average, fields with cover crops saw yield declines of 5.5% for corn and 3.5% for soybeans. The greater maize yield losses likely reflect the crop's greater need for nitrogen fertilizer. More research can help guide that implementation by showing, among other things, how alternatives to rye – the most commonly used cover crop in the U.S. Corn Belt – might result in higher primary crop yields in some regions. The combination of satellite data and powerful machine learning methods can help us be more nimble in making these adjustments. ... This research was funded by NASA and the United States Department of Agriculture.

Stanford News - Nov 8, 2022

## **Microelectronics**

### **Entering a New Phase: NIST Technique Simultaneously Locates Multiple Defects on Microchip Circuits**

...By modifying an existing technique for identifying defects, researchers at the National Institute of Standards and Technology (NIST) have developed a method that can simultaneously locate individual electrical flaws in multiple microcircuits on the same chip. Because the technique relies on a relatively inexpensive and common imaging tool, an atomic force microscope (AFM), it may provide a new way to test the interconnected wiring of computer chips in the factory. Scientists apply an AC voltage to the tip as it scans across individual wires buried in parallel several micrometers below the surface of a silicon chip. The voltage difference between the tip and each wire generates an electric force. A break or defect in a wire will show up as an abrupt change in the vibration of the tip. The method of searching for defects with an AFM, known as electrostatic force microscopy (EFM), has a drawback. NIST scientists solved the problem by applying specific AC voltages to individual neighboring wires instead of to the tip...

National Institute of Standards and Technology - Nov 3, 2022

### **DoD's Microelectronics Commons Takes Shape**

...The United States is a world leader in microelectronics design, but is responsible for only about 12% of microelectronics production globally. Thanks to funding provided by the CHIPS and Science Act, DoD is about to bring the Microelectronics Commons to life. This key network of microelectronics infrastructure investments, facilities, companies, and manufacturers is designed to empower commercial leaders to guide the DoD's efforts in microelectronics development. With the creation of regional technology hubs, each focusing on key technology areas, the Microelectronics Commons will close the gap between research ideas and realization of those ideas...

U.S. Department of Defense - Nov 4, 2022

### **For autonomous cars, a new laser beam steering device**

...A University of Texas at Arlington electrical engineering professor was awarded a four-year, \$400,000 National Science Foundation grant to explore an optical laser beam steering device for 3D sensing in autonomous driving cars. High-speed beam steering is important in many emerging applications, including autonomous driving, augmented reality, free space communications, 3D sensing and imaging systems. The vertical-cavity, surface-emitting laser (VCSEL) used in the project is also found in computer mice, fiber optic communications, face identification, smart phones, laser printers and smart glasses. A new-age optical beam steering device would speed up so many aspects of the semiconductor world.

The University of Texas at Arlington - Nov 9, 2022

## **Advanced Manufacturing**

### **Metal 3D Printer Installed on USS Bataan**

...The Navy advanced efforts to improve self-sufficiency for deployed ships and their crews and reduce supply chain lead times by leveraging additive manufacturing (AM) through the installation of the first metal 3D printer permanently installed aboard a naval ship. The introduction of Additive Manufacturing (AM) into naval operations supports readiness and self-sufficiency. Additive manufacturing (AM) – more commonly known as 3D printing – is the process of joining materials to make parts from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing and formative manufacturing methodologies. The Navy's efforts to leverage AM illustrate enterprise-wide business process reform and innovation. NAVSEA subject matter experts and industry partners are working to test, evaluate, and field the most advanced AM technologies to improve readiness and increase capabilities, as demonstrated on USS Bataan...  
Navy.mil - Nov 4, 2022

## **Climate Change / Green Energy & IT**

### **Announcement: For Public Comment: Draft 5th National Climate Assessment**

...The White House Office of Science and Technology Policy (OSTP) and the U.S. Global Change Research Program (USGCRP) announce the release of the draft Fifth National Climate Assessment (NCA5) for public comment. The National Climate Assessment is the preeminent source of climate information for the United States, used by hundreds of thousands of people across the country and around the world. This report assesses the science of climate change, its impacts, and our options for reducing present and future risk. National Climate Assessments evaluate and synthesize the state of the science, reporting where advances in scientific or technical knowledge have been made and where uncertainties remain. Thus, the National Climate Assessment is a risk management tool that can inform actions or policy. The NCA5 public comment period will run through January 27, 2023. Two public webinars will provide more context and background: 11/29 12:00 p.m. – 1:00 p.m. ET and 12/1 5:00 p.m. – 6:00 p.m. ET.  
The White House - Nov 7, 2022

### **FACT SHEET: Biden-Harris Administration Announces Roadmap for Nature-Based Solutions to Fight Climate Change, Strengthen Communities, and Support Local Economies**

...The Biden-Harris Administration is releasing the Nature-Based Solutions Roadmap, an outline of strategic recommendations to put America on a path that will unlock the full potential of nature-based solutions to address climate change, nature loss, and inequity. This marks the first time the U.S. has developed a strategy to scale up nature-based solutions. The Administration is also announcing new and recent interagency commitments aligned with the roadmap including: agency actions to ensure over \$25 billion in infrastructure and climate funding can support nature-based solutions; a new guide for bringing the power of nature to maximize the value and resilience of military bases; and a new technical working group to better account for nature-based options in benefit cost analysis – a powerful tool for federal decisions. The Roadmap submitted to the National Climate Task Force today calls on expanding the use of nature-based solutions and outlines five strategic areas of focus...  
The White House - Nov 8, 2022

### **NASA Fieldwork Studies Signs of Climate Change in Arctic, Boreal Regions**

...The Arctic is being affected by climate change more than most places on Earth. Since 2015, scientists participating in NASA's Arctic Boreal Vulnerability Experiment (ABoVE) have been studying the impacts of climate change on Earth's far northern regions and how those changes are intertwined. One of the key components of ABoVE is the airborne campaign, which uses research aircraft like the NASA Gulfstream III airplane. This year the plane was mounted with the Uninhabited Aerial Vehicle Synthetic Aperture Radar, or UAVSAR, which sends out pulses of radio waves that reflect off of Earth's surface and give scientists an accurate idea of the shape of the land and water surfaces below – even when looking through clouds or thick vegetation. UAVSAR is similar to the main instrument on an upcoming satellite. The NASA-ISRO (NISAR) satellite will be a joint mission between the Indian Space Research Organization and NASA to observe Earth's land and ice. NISAR is also part of NASA's upcoming Earth System Observatory. ABoVE and UAVSAR give the research community a really good example of what NISAR data will look like and what kind of science they can extract from these datasets...  
National Aeronautics and Space Administration - Nov 2, 2022

### **AT&T, FEMA and Argonne National Laboratory collaborate to launch climate risk and resilience portal for U.S. communities**

...The U.S. Department of Energy's Argonne National Laboratory today announced the launch of the Climate Risk and Resilience Portal (ClimRR), which advances access to cutting-edge science for climate projections to help improve America's preparedness for future climate extremes. Using climate science modeling that is among the most sophisticated methodologies worldwide, ClimRR gives state, local, tribal and territorial emergency managers and community leaders free access to localized data about future climate risks that can be used to explore strategies for resilience. Initial hazards included in ClimRR are temperature, precipitation, wind and drought conditions. Additional risks, such as wildfire and flooding, will be added in the coming months. ClimRR provides peer-reviewed climate data sets in a nontechnical format and puts high-resolution, forward-

looking climate insights into the hands of those who need them most. Climate projections from ClimRR can be overlaid with community and infrastructure information sourced from the Resilience Analysis and Planning Tool (RAPT). Combining data from ClimRR and RAPT allows users to understand local-scale climate risks in the context of existing community demographics and infrastructure, including the location of vulnerable populations and critical infrastructure...  
Argonne National Laboratory - Nov 7, 2022

### **Scientists awarded \$3M to study climate science, community resilience**

...The National Oceanic and Atmospheric Administration awarded 12 Colorado State University researchers more than \$3.1 million for such innovative science as improving how satellites show smoke plumes, using AI to predict precipitation, and, perhaps for the first time, evaluating how individual storms could change with climate intervention. One project, "Explainable AI and process diagnostics to understand state-dependent precipitation forecast errors", will use novel artificial intelligence to identify and improve forecasts from NOAA's weather forecasting model of North American precipitation at subseasonal-to-seasonal lead times...  
Colorado State University - Nov 2, 2022

### **\$4.2 million NOAA grant for innovative ocean research using autonomous vehicles, AI-driven analytics, and state-of-the-art climate models to study stressors facing Dungeness crab, other marine life under climate change**

...The National Oceanic and Atmospheric Administration has awarded Oregon State University and its research partners \$4.2 million to investigate how multiple climate change-related stressors are impacting marine ecosystems off the coast of Oregon, Washington and Northern California. The researchers will focus on two key species: Dungeness crab, which plays a significant economic and cultural role in Indigenous and other coastal communities and is considered the most valuable single-species fishery in Oregon; and krill, which are tiny crustaceans that play a critical role in the ocean's food web and serve as a bellwether for ocean health. The goal of the new project is to better understand the direct and indirect impacts of those stressors and help commercial fisheries and state and Tribal resource managers prepare for the changes ahead. Researchers will use existing and new ocean data, ocean and climate models, laboratory experiments and fisheries management evaluation techniques to learn more about the relationships between the different stressors and the potential cascading impacts that may result. They will use key pieces of innovative ocean research, including observations from undersea autonomous vehicles, AI-driven analytics of ocean food webs and state-of-the-art climate models. The project will also integrate Traditional Ecological Knowledge, which is the accumulation of Indigenous science, including information, practices and beliefs about relationships and environmental functions, including all elements, species and processes within ecosystems...  
Oregon State University - Nov 2, 2022

### **Methane research takes on new urgency at MIT**

...One of the most notable climate change provisions in the 2022 Inflation Reduction Act is the first U.S. federal tax on a greenhouse gas (GHG). That the fee targets methane (CH<sub>4</sub>), rather than carbon dioxide (CO<sub>2</sub>), emissions is indicative of the urgency the scientific community has placed on reducing this short-lived but powerful gas. Methane, responsible for at least a quarter of today's gross warming, causes about 120 times more warming upon release. Current methods for measuring atmospheric methane, such as ground, drone, and satellite sensors, are not readily abundant and do not always agree with each other. The researchers are working on improving the accuracy of the sensors using machine learning techniques and are planning to integrate internet-of-things technology to transmit alerts. The MIT Methane Network brings together 26 researchers from MIT along with representatives of other institutions "that are dedicated to the idea that we can reduce methane levels in our lifetime. The organization supports research, such as zeolite and sensor projects, as well as designing pipeline-fixing robots, developing methane-based fuels for clean hydrogen, and researching the capture and conversion of methane into liquid chemical precursors for pharmaceuticals and plastics. The coal mining project is funded by the U.S. Department of Energy and "The DOE would like us to spin out the technology for scale-up within three years"...  
MIT News - Nov 2, 2022

## **Digital Health**

### **NSF-funded program to develop robots to assist with everyday tasks for people with spinal cord injuries**

...A University of Texas at Arlington computer science researcher received a \$218,000 grant from the National Science Foundation's (NSF) Disability and Rehabilitation Engineering (DARE) program to develop a robotic system that helps people with spinal cord injuries perform everyday tasks. The goal is to design a personalized assistive robotic system, named Intelligent Robotic Cooperation for Safe Assistance (iRCSA), that can recognize, assess and respond to a person's cognitive fatigue level during tasks such as cooking. To do these human-robot collaboration (HRC) tasks, the team will develop a multi-sensory system that collects physiological data like facial expressions from the human teammate during an HRC task. The system then applies advanced machine learning/deep learning methods to automatically assess the individual's cognitive fatigue...  
The University of Texas at Arlington - Nov 4, 2022

### **NSF Awards \$800,000 to Support Development of Edge AI Applications for Wearable Device**

...The University of Arkansas received an \$800,000 award to support development of Edge AI applications that is part of a larger \$6 million award from the National Science Foundation to six collaborating universities and several private-sector partners to extend the boundaries of new Edge AI technology. Edge AI locates and analyzes data locally, whether through a camera, smart phone or wearable device. The more limited goal of the project is to build a smart, wearable device for diabetics to monitor their blood sugar levels. The primary virtue of this approach would be the elimination of blood draws. Instead, the wearable device will monitor the wearer's breath, collecting up-to-date data points on blood sugar levels. While the sensor won't initially be as accurate as a blood draw, the AI algorithm used by the device will still be able to make timely recommendations, such as "seek medical attention." The National Science Foundation award comes under the EPSCoR Research Infrastructure Improvement Program: Track-2 Focused EPSCoR Collaborations...

News - University of Arkansas - Nov 4, 2022

### **New AI tool can predict melanoma recurrence**

...Most deaths from melanoma — the most lethal form of skin cancer — occur in patients who were initially diagnosed with early stage melanoma and then later experienced a recurrence, which typically goes undetected until it has spread or metastasized. A team led by investigators at Massachusetts General Hospital recently developed an artificial intelligence-based method to predict which patients are most likely to experience a recurrence and are therefore expected to benefit from aggressive treatment. The team collected 1,720 early stage melanomas and extracted 36 clinical and pathologic features of these cancers from electronic health records to predict patients' recurrence risk with machine learning algorithms. Algorithms were developed and validated with various patient sets, and tumor thickness and rate of cancer cell division were identified as the most predictive features. The comprehensive risk prediction platform using novel machine learning approaches to determine the risk of early stage melanoma recurrence reached high levels of classification and time to event prediction accuracy. ... This work was supported by the National Institutes of Health.

Harvard Gazette - Nov 4, 2022

## **Other IT Related**

### **Preparing for future battlefields: MARCORSSCOM drives Marine Corps Enterprise Network modernization efforts**

...Marine Corps Systems Command recently launched the Technical Management and Analysis Directorate – or TMAD – in a drive to modernize the Marine Corps Enterprise Network, or MCEN. The MCEN is an interconnected "network-of-networks" that links service personnel, architecture, processes, physical and logical topology, and cyber operations. The MCEN allows the warfighter working in a tactical environment to remain connected to garrison. We're providing them an authoritative data source that they can access in future battles. Currently, TMAD – previously known as Task Force Aquila – is tasked with undertaking a process-driven approach to track significant, enterprise-level changes to the MCEN, ultimately providing technical, performance and threat evaluations of proposed changes to the network and ensuring that network modernization decisions are satisfactorily informed. The prospect of a program-specific lab where experiments can be run on the MCEN's Digital Twin on the horizon, the engineering lead believes his team's impact will be even greater in the future...

Marines - Nov 4, 2022

## **STEM / Workforce & IT**

### **U.S. Department of Energy Awards \$30 Million to Minority Serving Institutions to Invest in Next Generation STEM Leaders**

...The U.S. Department of Energy (DOE) today announced \$30 million in financial assistance grants to Minority Serving Institutions (MSI) in South Carolina, Tennessee, and Washington. These grants, distributed by DOE's Office of Environmental Management's (EM) Minority Serving Institutions Partnership Program (MSIPP), will help develop highly qualified science, technology, engineering, and math (STEM) students and foster a well-trained, technically skilled, and inclusive workforce. MSIPP promotes the education and development of the next generation workforce in critical STEM related disciplines that support EM's mission. MSIPP grants assist MSIs, including Historically Black Colleges and Universities, Hispanic-Serving Institutions, and Tribal Colleges and Universities, efforts to build competitive academic STEM programs and to purchase the tools and equipment necessary for scientific learning...

Department of Energy - Nov 7, 2022

### **Science beyond Siri: A team of educators and computer scientists take on AI**



...Soon enough, AI competency will be an essential workforce skill. A group of computer scientists and learning science experts are considering what a foundational introduction to AI might look like for middle school and high school students. Two years ago, a like-minded group of STEM (science, technology, engineering and mathematics) educators, and computer scientists began meeting weekly to discuss a future workforce skills gap in addressing AI problems. They began to brainstorm about a new tool, or perhaps a teaching module, that would introduce AI concepts to the young researchers of tomorrow. The team, which includes scientific and educational outreach staff from Argonne and STEM educators from Northern Illinois University (NIU) and UIC, wanted to explore areas where a future workforce undoubtedly will be needed: AI software developers and data science domain experts. In July 2021, the team ran a month-long summer pilot program with high school students recruited through NIU's Upward Bound program. After being introduced to the broader concepts of AI and machine learning, students worked in groups to analyze AI-generated data sets using some of the same tools that scientists use to train different machine learning models, including Jupyter Notebooks. They used Spotify data and models to learn how to identify a music genre, then how to catalog and recognize bird songs. In the summer of 2022, the team restructured the camp to be shorter and more intensive, and the activities relied on sensor-collected data about the environment in Northern Illinois. Students explored how computer vision might be used to optimize street crossings. Another task involved sorting and ranking images of a river to try to determine its pollution level. The team noticed that once the students did a data-sorting and weighting activity by hand they were better able to grasp the algorithm and understand how a computer would do the same task. It was educational for the students to reason through the information processing tasks instead of simply letting someone else's algorithm do the work...

Argonne National Laboratory - Nov 2, 2022

## **STEM / Workforce Resources & Opportunities**

### **2023-2024 White House Fellowship**

...The application for the 2023-2024 White House Fellowship is now open. The White House Fellowship offers exceptional Americans first-hand experience working at the highest levels of the Federal Government on a strictly non-partisan basis. Selected individuals spend one year in Washington, D.C., working as a full-time paid government employee, aiding Cabinet Secretaries, senior White House staff, and other top-ranking government officials. The application is available as of November 1, 2022, and will remain open until January 6, 2023, at 5:00 p.m. ET.

The White House - Nov 3, 2022

### **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 - Oct 18, 2022

## **Upcoming Conferences / Workshops / Webinars**

### **Brookhaven Scientists Ready to Show how 'HPC Accelerates' at SC22**

...At the 34th annual International Conference for High Performance Computing, Networking, Storage and Analysis (SC22) November 13-18, scientists from the Department of Energy's Brookhaven National Laboratory, including the Computational Science Initiative, National Synchrotron Light Source II and many of their global colleagues, will demonstrate how high-performance computing is key for managing the rapid expansion of voluminous data, impacting the pace of research and accelerating scientific discovery. Workshops, demonstrations and panel discussions throughout the week...

Brookhaven Lab - Nov 7, 2022

### **8th Annual NICE K12 Cybersecurity Education Conference: Dec 5-6th**

...The NICE K12 Cybersecurity Education Conference in St. Louis, Missouri is on December 5-6, 2022 and it is the national conference for K12 cybersecurity education! Gain tools to accelerate learning, identify methods to nurture a diverse learning community, and guide career development for the cybersecurity workforce of the future.

National Institute of Standards and Technology - Nov 10, 2022

## **Innovation Through NITRD Coordination**

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

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