



## 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

#### NOAA seeks proposals to advance climate science, resilience

...The NOAA Climate Program Office (CPO) announced that its Fiscal Year 2024 grant competitions are open. The competitions for this year are: (1) Improving understanding of urban air composition, the impact of climate change on urban air quality and use of this research to mitigate air pollution. (2) Advancing understanding of ocean variability and change in support of NOAA's Climate, Ecosystems, and Fisheries Initiative. (3) Advancing an integrated NOAA capability for climate predictions and projections in support of

NOAA's Climate, Ecosystems, and Fisheries Initiative. (4) Advancing understanding of multi-year to decadal climate variability and predictability for the U.S. climate. (5) Improving NOAA climate models and applications. (6) Offering an early career opportunity for exceptional research in Earth system model development and application. Letters of intent for all but the "Understanding urban air in a changing climate" competition are due August 18, 2023 at 11:59 p.m. ET. Letters of intent for the "Understanding urban air in a changing climate" competition are due September 11, 2023 at 11:59 p.m. ET. Full applications for all competitions are due November 17, 2023 at 11:59 p.m. ET... National Oceanic and Atmospheric Administration - Jul 13, 2023

## HPC

### **NSF-supported study combines synthesis and computer simulations to design advanced electrode to help remediate stubborn new 'forever chemicals'**

...As new environmental regulations are rolling out to mitigate the industry-retired long-chain chemicals known as PFAS in drinking water, there are concerns regarding a new breed of these "forever chemicals" called short-chain PFAS. Researchers at the University of Illinois Urbana-Champaign are helping shift the focus to include mitigation of the chemicals, which are just as persistent as their long-chain counterparts, more mobile and harder to remove from the environment. The U.S. National Science Foundation-supported research uses electrosorption rather than filters and solvents and combines synthesis, separations testing and computer simulations to help design an electrode that can attract and capture a range of short-chain PFAS from environmental waters. This study was also supported by the National Center for Supercomputing at Illinois, one of five facilities created by NSF's Supercomputer Centers Program...

National Science Foundation - Jul 18, 2023

## Artificial Intelligence / Machine Learning

### **Class is in Session: Teams Selected by DARPA to Teach AI Agents to Interact with People & Learn**

...As part of DARPA's Environment-driven Conceptual Learning (ECOLE) program, several university teams and industry performers will attempt to create artificial intelligence (AI) agents capable of continually learning from linguistic and visual input. Mission-critical analysis require AI with suitable trustworthiness and competence. ECOLE will tackle one of the three areas DARPA experts say is vital to producing such systems – human-AI teaming. All participating teams will focus on transforming machine learning approaches through curriculum learning, sharing amongst multiple participants, and human-machine collaborative analysis. ECOLE will use state-of-the-art data modeling to automatically infer the properties of objects and their role in activities. Research and development from each of the five teams will use complementary techniques...

DARPA - Jul 18, 2023

### **AFRL Airlift Challenge tests AI-based logistics for future operations**

...The Air Force Research Laboratory, hosted an Airlift Challenge competition in January 2023. This online competition is helping to advance state-of-the-art planning algorithms for executing airlift operations for the United States Air Force. The competition uses artificial intelligence, or AI, to assist in the design of plans for the aircraft to follow to efficiently deliver cargo. For each airport at which an aircraft stops, the AI provides an "order" designating which cargo to load or unload, as well as the next destination. The AFRL AI Airlift Challenge scenario shows how AI can deliver cargo. The developed algorithm guides four airplanes through the network to pick up and deliver the cargo. The routes undergo random disruptions, requiring aircraft to either wait for the disruption to clear, or follow a different route...

Air Force Link - Jul 15, 2023

### **Using Deep Learning to Better Assess Lithium Metal Battery Performance**

...In the ongoing quest to develop new battery designs, scientists rely on highly accurate assessment tools so they can understand defects and track performance. A team of researchers from Lawrence Berkeley National Laboratory's Center for Advanced Mathematics for Energy Research Applications (CAMERA) worked with colleagues to develop batteryNET, a deep learning algorithm that enables unprecedented assessment of lithium agglomeration in solid-state lithium metal batteries. batteryNET uses a neural network to track morphologies that appear in batteries over time. The ability of computer vision algorithms like batteryNET to seamlessly transition across scientific domains holds great potential for moving a wide range of research forward. batteryNET also addresses the vanishing gradient problem often found in deep learning: as more layers are added to the neural network, network training gets bogged down in trying to make big decisions from tiny differences in numbers. By introducing residual connections – which provide another path for data to reach latter parts of the neural network by skipping some layers, enabling the flow of information directly from one layer to another – batteryNET helps the network alleviate the degradation of information across deeper layers...

### **Study finds ChatGPT boosts worker productivity for some writing tasks**

...A new MIT study sheds light on generative AI's impact on work. The researchers found it increased productivity for workers assigned tasks like writing cover letters, delicate emails, and cost-benefit analyses. Access to the assistive chatbot ChatGPT decreased the time it took workers to complete the tasks by 40 percent, and output quality, as measured by independent evaluators, rose by 18 percent. To study generative AI's effect on worker productivity, the researchers gave 453 college-educated marketers, grant writers, consultants, data analysts, human resource professionals, and managers two writing tasks specific to their occupation. The 20- to 30-minute tasks included writing cover letters for grant applications, emails about organizational restructuring, and plans for analyses helping a company decide which customers to send push notifications to based on given customer data. The data also showed that performance inequality between workers decreased, meaning workers who received a lower grade in the first task benefitted more from using ChatGPT for the second task. The study was supported by a National Science Foundation Graduate Research Fellowship Grant...

MIT News - Jul 14, 2023

### **How an “AI-tocracy” emerges**

...In China, the research finds, the government has increasingly deployed AI-driven facial-recognition technology to suppress dissent; has been successful at limiting protest; and in the process, has spurred the development of better AI-based facial-recognition tools and other forms of software. AI innovation entrenches the regime, and the regime's investment in AI for political control stimulates further frontier innovation. “AI-tocracy,” describes the connected cycle in which increased deployment of the AI-driven technology quells dissent while also boosting the country's innovation capacity. MIT researchers then examined records of almost 3 million procurement contracts issued by the Chinese government between 2013 and 2019, from a database maintained by China's Ministry of Finance. They found that local governments' procurement of facial-recognition AI services and complementary public security tools — high-resolution video cameras — jumped significantly in the quarter following an episode of public unrest in that area. The scholars reached the conclusion: Facial-recognition technology was being deployed in response to past protests, and then reducing further protest levels. The research team studied the effects of increased AI demand on China's technology sector and found the government's greater use of facial-recognition tools appears to be driving the country's tech sector forward. Support for the research was provided in part by the U.S. National Science Foundation Graduate Research Fellowship Program...

MIT News - Jul 13, 2023

## **Robotics / Autonomous Vehicles**

### **New NASA Artemis Instruments to Study Volcanic Terrain on the Moon**

...As part of NASA's regular cadence of robotic lunar missions through Artemis, the agency has selected a new scientific payload to establish the age and composition of hilly terrain created by volcanic activity on the near side of the Moon. The DIMPLe instrument suite, short for Dating an Irregular Mare Patch with a Lunar Explorer, will investigate the Ina Irregular Mare Patch, discovered in 1971 by Apollo 15 orbital images. Learning more about this mound will address outstanding questions about the evolution of the Moon, which in turn can provide clues to the history of the entire solar system. DIMPLe is the result of the third annual proposal call for PRISM (Payloads and Research Investigations on the Surface of the Moon), which sends science investigations to the Moon through a NASA initiative called CLPS, or Commercial Lunar Payload Services. DIMPLe will help determine whether Irregular Mare Patches formed from recent or ancient volcanic processes. The mission will make use of a CLPS-provided rover, a collection gripping instrument, and a spectrometer that can help determine composition of the lunar material to analyze the age and composition of samples collected from the surface of Ina. DIMPLe will be able to collect and analyze anywhere from three to more than 25 samples to learn more about the timing of the volcanic activity that formed this feature...

National Aeronautics and Space Administration - Jul 14, 2023

### **USGS and partners deploy autonomous vehicles on Lake Erie to improve fishery assessments**

...The U.S. Geological Survey is using autonomous surface and underwater vehicles on Lake Erie to improve fishery surveys. A wind and solar-powered uncrewed surface vehicle called a Saildrone Explorer was launched on Lake Erie. The vehicle is equipped with several environmental sensors both under and above the water, including a fisheries echosounder that uses sound to detect fish, much like a fish-finder on a fishing boat. In addition to the saildrone, a long-range autonomous underwater vehicle (LRAUV) will be deployed, which is operated by the Monterey Bay Aquarium Research Institute (MBARI). Fisheries acoustic surveys on Lake Erie are conducted using diesel-powered research vessels that are relatively loud and, as a result, may impact data collected from near-surface and near-bottom fish. The saildrone and the LRAUV provide advantages for fishery research that may address these potential biases in existing fisheries acoustic surveys. Saildrones are quieter and may detect more fish swimming closer to the surface than noisy vessels which may scatter fish. The LRAUV, which operates in the middle of the water column and has sensors looking up and down, may detect bottom-dwelling and surface-dwelling fish more accurately than traditional fishery research vessels or the saildrone. The partners will also use the autonomous vehicles to study a variety of other questions on Lake Erie, including the effect of harmful algal blooms and the effect of low-oxygen zones on bottom-dwelling fish in the central basin...

USGS - Jul 17, 2023

## Quantum

### **NSF-funded FAMU-FSU researchers confirm theory for superfluid helium**

...Superfluids are governed by quantum mechanics, known for their frictionless flow, their unusual properties, and far-reaching applications. Researchers from FAMU-FSU have achieved a groundbreaking milestone in studying how vortices move in these quantum fluids. Their study of vortex ring motion in superfluid helium provides crucial evidence supporting a recently developed theoretical model of quantized vortices. A key feature of superfluids is the presence of quantized vortices — thin, hollow tubes resembling miniature tornadoes. These play significant roles in phenomena such as turbulence in superfluid helium and glitches in neutron star rotation. The researchers also conducted simulations using various theoretical models and demonstrated that only the recently proposed self-consistent two-way model, or S2W model, accurately reproduces the observed vortex ring motion. According to the S2W model, the ring should shrink as it interacts with the thermal environment, albeit at a slower rate than predicted by earlier theories. The researchers aim to apply this model to other quantum-fluid systems and explore new scientific challenges. This work was supported by the National Science Foundation...

Florida State University News - Jul 17, 2023

## Cybersecurity / Privacy

### **Biden-Harris Administration Announces Cybersecurity Labeling Program for Smart Devices to Protect American Consumers**

...The Biden-Harris Administration announced a cybersecurity certification and labeling program to help Americans more easily choose smart devices that are safer and less vulnerable to cyberattacks. The new “U.S. Cyber Trust Mark” program proposed by Federal Communications Commission (FCC) Chairwoman Jessica Rosenworcel would raise the bar for cybersecurity across common devices, including smart refrigerators, smart microwaves, smart televisions, smart climate control systems, smart fitness trackers, and more. FCC is expected to seek public comment on rolling out the proposed voluntary cybersecurity labeling program, which is expected to be up and running in 2024. As proposed, the program would leverage stakeholder-led efforts to certify and label products, based on specific cybersecurity criteria published by the National Institute of Standards and Technology...

The White House - Jul 18, 2023

### **CISA, Washington Commanders, and Local Partners Conduct Joint Exercise to Keep Fans and Athletes Safe**

...The Cybersecurity and Infrastructure Security Agency (CISA), Washington Commanders, FedExField, and state and local first responders held a tabletop exercise this week to test response plans around hypothetical public safety incidents during a Washington Commanders game. Participants discussed their roles, shared best practices, and improved coordination mechanisms to help keep the public safe during football games. This exercise was part of an ongoing partnership between those involved and was not in response to any specific threat. CISA encourages anyone attending events to follow the guidance of their state and local health officials and remain vigilant and report any suspicious activity to personnel or law enforcement. The Department of Homeland Security's See Something, Say Something® campaign has more information on reporting suspicious behavior...

CISA - Jul 13, 2023

### **Intern develops technology to find EV charging vulnerabilities**

...Idaho National Laboratory intern Jake Guidry has developed a cybersecurity research tool that could improve the security of electric vehicle charging. The AcCCS tool provides access capabilities through CCS (combined charging system) communications protocol and is a combination of hardware and software that emulates the electronic communications that occur between an electric vehicle and an extreme fast charger during the charging process. The tool gives researchers a new way to search for vulnerabilities in electric vehicles and charging stations. Researchers used AcCCS to hack a charging station and a vehicle and then demonstrated a mitigation to the cyberattacks. ... This project is a research effort by Idaho, Sandia and Pacific Northwest national laboratories, and sponsored by the Department of Energy's Office of Cybersecurity, Energy Security and Emergency Response and Vehicle Technologies Office.

Idaho National Laboratory - Jul 18, 2023

# 5G, Wireless Spectrum, Networking & Communications

## **NOAA tracks ongoing marine heat waves in U.S. waters with satellites and other technology**

...NOAA scientists have tracked a steady climb in ocean temperatures since April 2023, which is causing unprecedented heat stress conditions in the Caribbean Basin, including waters surrounding Florida and in the Gulf of Mexico. Marine heat waves are usually defined as any time the ocean temperature is above the 90th percentile for a specific length of time. The National Weather Service's National Data Buoy Center collects and disseminates real-time quality-controlled marine observations using 1,300 weather observing stations. Global ocean surface temperatures are also monitored daily using blended satellite measurements. Temperatures around Southern Florida are the warmest on record (going back to 1981). The latest conditions can be seen on the NOAA PSL Map Room webpage. NOAA's experimental marine heat wave forecasts indicate a 70-100% chance that extreme ocean temperatures will persist in the southern Gulf of Mexico and Caribbean Sea through at least October 2023...

National Oceanic and Atmospheric Administration - Jul 14, 2023

## **Researchers Become “Beaver Believers” and Measure the Impacts of Rewilding with Satellite Data, Smartphone Applications, Geo-Spatial Products, Databases, and Ecological Models**

...A NASA-supported effort in Idaho adds remote sensing data to the suite of tools used to predict which streams can support beavers and to monitor how water and vegetation change once they return. Sending people out into the field to take measurements is time-intensive, which can be expensive for smaller research teams working in remote sites. NASA's fleet of Earth-observing missions collect data across large areas of the world and pass over the same areas regularly and across seasons. Researchers can observe an area in real time and also look back to previous weeks, months, or even years. The scientists are turning data from Earth science missions like Landsat and Sentinel into information that more people can understand and use. Cory Mosby of Idaho Fish and Game is excited about how satellite data can expand his crew's ability to monitor miles of waterways across his state. According to Mosby, remote sensing data helps them monitor more areas and quantify those positive changes. NASA Applied Sciences' Ecological Conservation program area funds the beaver rewilding project. The project includes four parts: updating the existing Beaver Restoration Assessment Tool, creating two applications using Earth observations to measure beaver rewilding impacts, and a smartphone application for comparing photos of field sites. Monthly Mesic Resource Restoration Monitoring Aid (MRRMaid) uses historic data from the NASA-U.S. Geological Survey's Landsat missions, as well as machine learning, to estimate past and future surface water. Mesic Vegetation Persistence (MVP): This application uses Sentinel-2 and Landsat data to produce near-real time measures of mesic vegetation. Beaver Restoration Assessment Tool (BRAT) uses USDA & The Nature Conservancy's LANDFIRE data. Phlux is a smartphone application that will allow people in the field to compare photos of the same area and check visible change over time...

National Aeronautics and Space Administration - Jul 17, 2023

## **USACE's Digital buoys could expand inland navigation communications network**

...With more than 12,000 buoys already playing a critical role in our nation's inland navigation system, the U.S. Army Corps of Engineers is researching a way to use patented technology to make those buoys even more valuable. Leveraging digital buoy technology, USACE is now exploring the idea of turning buoys that are positioned and designed to mark shipping channels into critical components of an extensive inland waterways network. Right now, the Lock Operation Management Application (LOMA) system has a network around locks and dam sites to pass information to mariners as they approach the structure, but once they get further down the waterway – away from that site – there is no network access. The thought is this network could push important navigation information to the mariners along the entire waterway, not just around the locks and dam locations. Developed in conjunction with the Inland Electronic Navigational Charts Program (IENC) and USACE Louisville District, the technology was first targeted at providing the U.S. Coast Guard with real-time locations of its buoys...

US Army Corps of Engineers - Jul 14, 2023

## **NASA's Starling Mission Sending Swarm of Satellites into Orbit**

...NASA is sending a team of four six-unit (6U)-sized CubeSats into orbit around Earth to see if they're able to cooperate on their own, without real-time updates from mission control. While that kind of autonomous cooperation may not sound too difficult for humans, this team will be robotic – composed of small satellites to test out key technologies for the future of deep space missions, where more complex and autonomous spacecraft will be essential. Once launched, the four CubeSats will fly in two different formations to test several technologies paving the way towards a future where swarms of satellites can cooperate to do science in deep space. This mission, called Starling, will last at least six months, positioning the spacecraft about 355 miles above Earth and spaced about 40 miles apart. Swarm technologies allow for the ability to take scientific measurements from multiple points in space, build networks capable of patching themselves if one piece goes down, and have spacecraft systems that don't need to stay in touch with Earth to respond to changes in the environment. A swarm of spacecraft is also more resilient against failures or malfunctions within the team as each spacecraft is redundant to another. If one fails, the others can compensate. Each CubeSat also has its own “star tracker” sensors onboard, normally used so that a satellite can keep track of its own orientation in space, much like sailors using the stars to navigate at night. Because the satellites will be relatively close together, in addition to stars, these sensors will pick up the light from their fellow swarm spacecraft and use specialized software to keep track of the rest of the swarm. Called StarFOX (Starling Formation-Flying Optical Experiment), this unique use of common spacecraft sensors will allow the backdrop of the stars to keep the swarm together...



National Aeronautics and Space Administration - Jul 18, 2023

### **ESF Members NSA and CISA Publish Second Industry Paper on 5G Network Slicing**

...Enduring Security Framework (ESF) partners the National Security Agency (NSA) and Cybersecurity and Infrastructure Security Agency (CISA) published an assessment of 5G network slicing. ESF, a public-private cross-sector working group led by NSA and CISA, identifies three keys for keeping this emerging technology secure: Security Consideration for Design, Deployment, and Maintenance. 5G network slicing is a network architecture which allows mobile service providers to divide their network up into several independent ones in order to create specific virtual networks that cater to different clients and use cases. This paper introduces 5G stakeholders to the benefits associated with network slicing, assesses 5G network slicing threat vectors, presents guidance in line with industry best practices, and identifies perceived risks and management strategies that may address those risks...

National Security Agency/Central Security Service - Jul 17, 2023

### **Technology to the Rescue! NOAA's ASTER3 Program Uses Satellite Tagging, AI, and Modeling to Prevent Extinction Amid Climate Change Impacts**

...Smalltooth sawfish are an endangered species found in the Southeastern United States, primarily in the Florida Everglades. The main threats to smalltooth sawfish include habitat loss due to coastal development and death due to direct and accidental capture in fisheries. Climate-related impacts such as warming ocean temperatures, rising sea levels, unpredictable storms, and more severe flood and drought cycles pose significant threats to the smalltooth sawfish. Sawfish give birth to relatively few young, reach maturity late, and exhibit moderate rates of population growth. All of these traits may make it difficult for sawfish to adapt to rapidly shifting habitat conditions. Since NOAA Fisheries designated the smalltooth sawfish as an endangered species in 2003, its population decline has slowed. With their partners, NOAA has taken a series of steps to advance climate-focused science and management. NOAA has launched the Advanced Sampling and Technology for Extinction Risk Reduction and Recovery (ASTER3) program. It was established to prevent extinction and promote recovery of protected species through transformational technological advances including satellite tagging, artificial intelligence, statistical models, and biomolecular sampling. NOAA's Climate, Ecosystem, and Fisheries Initiative builds ocean models and provides climate-relevant information that supports decision makers, including those who manage protected species and habitats, as they prepare for and respond to changing conditions...

Noaa Fisheries - Jul 19, 2023

## **Microelectronics**

### **The Economics of Investing in America**

...The President's plan—Bidenomics—is rooted in the recognition that the best way to grow the economy is from the middle out and the bottom up. This is based on the belief that targeted public investment can attract more private sector investment, rather than crowd it out. This is particularly true in sectors that are central to the long-term economic and national security interests of the United States—from our infrastructure, to semiconductors, to clean energy and climate security. The National Economic Council and the Investing in America Chief Economist released a brief that outlines the economic case for this approach. Necessary investments in the semiconductor, clean energy, and electric vehicle supply chains will not be made by the private sector alone. Risky or long-term investments in innovation require public investments to fill the gaps that private investors won't. From increasing private investment in semiconductors, electric vehicles, and clean energy to funding over 35,000 infrastructure projects to building a Made-in-America electric vehicle charging network, Bidenomics is leading to new investments in communities all across America...

The White House - Jul 14, 2023

### **Asserting the U.S. Advantage: Delivering Highest-Qualified, Cutting-Edge Tech to Troops Faster**

...Troops around the world can leverage troves of data at their fingertips, which is an important step forward for warfighter technology, but to maximize decision-making at speed, these data volumes require granular, high-speed processing at their points of collection. High-performance computing relies heavily on internal microelectronics. Going forward, breakthrough performance will be driven by 3D heterogeneously integrated (3DHI) technologies that stack separately manufactured components, containing different semiconductors and materials, within a single package. The Advanced Sources for Single-event Effects Radiation Testing (ASSERT) program is focused on assuring that advanced U.S. microelectronics components can operate in harsh radiation environments with the highest-possible reliability. To facilitate the development of optimally radiation-hardened (rad-hard) components – and to rapidly deliver cutting-edge tech to the warfighter – ASSERT seeks to disrupt the status quo in rad-hard design and qualification by integrating radiation testing throughout the design and development lifecycle...

DARPA - Jul 14, 2023

### **NIST/DARPA/NSF support leads to new material could hold key to reducing energy consumption in computers and electronics**

...A University of Minnesota team has, for the first time, synthesized a thin film of a unique topological semimetal material that has the potential to generate more computing

power and memory storage while using significantly less energy. While traditional semiconductors are the technology behind most of today's computer chips, scientists and engineers are always looking for new materials that can generate more power with less energy to make electronics better, smaller and more efficient. One such candidate for these new and improved computer chips is a class of quantum materials called topological semimetals. The electrons in these materials behave in different ways, giving the materials unique properties that typical insulators and metals used in electronic devices do not have. A team of University of Minnesota researchers synthesized a thin film and showed that it has the potential for high performance with low energy consumption. This research is supported by SMART, one of seven centers of nCORE, a Semiconductor Research Corporation program, sponsored by National Institute of Standards and Technology. It is also partly supported by ASCENT, one of six centers of JUMP, a Semiconductor Research Corporation program that is sponsored by DARPA. Parts of this work were carried out in the Characterization Facility of the University of Minnesota Twin Cities, which receives partial support from the National Science Foundation. Portions of this work were conducted in the Minnesota Nano Center, which is supported by the NSF Nano Coordinated Infrastructure Network.  
University of Minnesota Twin Cities - Jul 14, 2023

## Climate Change / Green Energy & IT

### **FACT SHEET: Biden-Harris Administration Launches Historic \$20 Billion Competition to Catalyze Investment in Clean Energy Projects and Tackle the Climate Crisis**

...Vice President Kamala Harris will announce a \$20 billion competition to capitalize a clean energy financing network that will massively expand investment in new projects that reduce pollution across the country. The \$20 billion will be deployed through two separate and complementary competitions, each aimed at mobilizing a national-scale clean energy financing network that ensures the clean energy opportunity reaches all Americans. The Greenhouse Gas Reduction Program advances the Biden-Harris Administration's Justice40 Initiative, which sets the goal that 40% of the overall benefits from certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution. Earlier this month, the Department of Energy announced nine states and three Tribal nations as the third cohort to receive more than \$200 million in Grid Resilience State and Tribal Formula Grants. These grants are part of \$2.3 billion from President Biden's Bipartisan Infrastructure Law to ensure that communities across the Nation have access to affordable, reliable, clean electricity. In June, the Treasury Department released guidance on direct pay, a key provision in the Inflation Reduction Act to expand the reach of clean energy tax credits and help build projects more quickly and affordably. This week, the U.S. Department of Agriculture announced the availability of \$21 million in technical assistance grants from the Inflation Reduction Act through the Rural Energy for America Program to help agricultural producers and rural small businesses access federal funds for renewable energy and energy efficiency improvements...  
The White House - Jul 14, 2023

### **NASA & NOAA Collaborate for Low Altitude Flights to Study Everyday Emissions**

...The AEROMMA project – Atmospheric Emissions and reactions Observed from Megacities to Marine Areas – is a collaboration between the National Oceanic and Atmospheric Administration (NOAA) and NASA. From the end of June 2023 through mid-August, scientists will use NASA's DC-8 aircraft, the largest flying science laboratory in the world, to fly low over several cities to collect data on pollution sources. Their goal is to study the air quality hovering over some of our most densely populated spaces in North America. Unlike pollution from transportation, pollution from everyday products remains proportional to a population because everyone uses them. Whether a cleaning agent for your windows or a dry shampoo for hurried mornings, the products we use on a regular basis are engineered to emit vapors into the atmosphere by carrying scent or allowing coatings to dry. These volatile ingredients are often refined from fossil fuels and affect our shared air quality. The AEROMMA project brings together airborne, ground, and satellite observing systems, as well as state-of-the-art air quality and climate models to quantify the flux of anthropogenic emissions over North American cities. By collaborating with other partners conducting complementary air quality studies -- AEROMMA, STAQS, CUPiDS, GOTHAAM -- scientists will help build a synergistic observing system more robust than any singular mission could provide alone...  
National Aeronautics and Space Administration - Jul 13, 2023

### **EWN toolkit streamlines and standardizes USACE Coastal Storm Modeling**

...To better incorporate Natural and nature-based features (NNBFs) into numerical models, the U.S. Army Corps of Engineers (USACE) has developed an Engineering With Nature® toolkit for the Coastal Storm (CSTORM) Modeling System, enabling planners to test the hydrodynamic, ecologic and adaptive effects of NNBFs on coastal or estuarine environments. The EWN toolkit for CSTORM modeling is a graphic user interface, or GUI, that allows a numerical modeler to represent NNBFs digitally in existing numerical models and standardizes and streamlines the augmentation of those features into the modeling framework...  
US Army Corps of Engineers - Jul 14, 2023

### **Climate Modeling: A Meteorologist's Crystal Ball**

...Climate modeling is like an extension of weather forecasting. While weather models make predictions over specific locales and short timespans, climate modeling looks into

the future with a bird's eye view. Analyzing longer timespans, they predict how conditions will change in a region over the coming years and decades. With the help of supercomputers meteorologists and other experts look at complex earth systems, and they analyze and predict things like ocean circulation and melting glaciers. In 2020, an evaluation of global climate models used to predict Earth's future global average surface temperatures over the past half-century shows that most of the models have been correct...

Department of Energy - Jul 17, 2023

### **USDA-funded Montana State ecologist to examine response of grassland forage to climate variability**

...Forage plants are a key element of cattle grazing as well as helping maintain soil nutrition, preventing erosion, and providing a food source for wildlife. With funding from the U.S. Department of Agriculture's National Institute for Food and Agriculture, a Montana State University scientist will explore how those crops respond to changes in water availability. Geospatial analysis and remote sensing are part of the project. Because agencies like NASA have conducted global satellite observation for more than 30 years historical data on drought and forage cover in large areas like the Northern Great Plains are easily accessible. Comparing the chemical analysis of the forage samples with historic data about rain, snow and forage growth will provide a more nuanced look at the response of important forage crops to changes in precipitation patterns...

Montana State University - Jul 17, 2023

### **Montana State part of \$3 million Defense Department project on social elements of climate change**

...A Montana State University geographer is leading part of a multi-institutional study funded by the U.S. Department of Defense to examine the effects of climate change on agriculture in Africa and how that may tie into U.S. national security. The study is funded by a \$3 million grant from the Defense Department's Minerva program, which supports cross-institutional projects related to national security. It involves researchers from five universities and is led by the University of California, Santa Barbara. Researchers will conduct surveys in Kenya and Zambia in 2024 and again in 2027 to assess whether climate-caused changes in food production, processing, distribution and consumption are influencing people's decisions to relocate. The surveys also will inform satellite-based analysis in Tanzania...

Montana State University - Jul 18, 2023

## **Digital Health**

### **Interoperability is a Team Sport**

...The Office of the National Coordinator for Health IT (ONC) and the Centers for Medicare & Medicaid Services (CMS) play different but complementary roles to advance health data interoperability. ONC and CMS each lead regulatory and programmatic efforts to evolve the interoperability landscape, collaborating closely with each other and industry groups – payers, providers, developers, standards organizations, and patient advocates – along the way. Through the ONC Health IT Certification Program and several CMS regulatory policies, we work together to address key challenges and gaps to create a cohesive vision and roadmap for advancing interoperability. The adoption of the Health Level Seven International (HL7®) Fast Healthcare Interoperability Resources (FHIR®) standard in the ONC Cures Act Final Rule and the required use of FHIR application programming interfaces (APIs) in the CMS Patient Access and Interoperability Final Rule are prime examples of the power of this type of collaboration. Looking ahead, ONC and CMS are focused on initiatives related to exploring the National Directory of Healthcare Providers and Services concept, supporting the continued advancement and use of the United States Core Data for Interoperability (USCDI) and associated projects, as well as streamlining electronic Prior Authorization (ePA) processes...

Health IT - Jul 18, 2023

### **DARPA-funded study shows AI-guided brain stimulation aids memory in traumatic brain injury**

...Traumatic brain injury (TBI) has disabled 1 to 2% of the population, and one of their most common disabilities is problems with short-term memory. Electrical stimulation has emerged as a viable tool to improve brain function in people with other neurological disorders. A team of neuroscientists studied TBI patients with implanted electrodes, analyzed neural data as patients studied words, and used a machine learning algorithm to predict momentary memory lapses. The top causes of TBI are motor vehicle accidents, which are decreasing, and falls, which are rising because of the aging population. Stimulation delivered when memory is expected to fail can improve memory, whereas stimulation administered during periods of good functioning worsens memory. The stimulation in that study was open-loop, meaning it was applied by a computer without regard to the state of the brain. ... This research was supported by the Defense Advanced Research Projects Agency.

Penn News - Jul 17, 2023

### **USDA/NSF-funded study shows precision technology and machine learning lead to early diagnosis of calf pneumonia**

...Monitoring dairy calves with precision technologies based on the "internet of things," or IoT, leads to the earlier diagnosis of calf-killing bovine respiratory disease. New technology is becoming increasingly affordable, offering farmers opportunities to detect animal health problems soon enough to intervene, saving the calves and the investment



they represent. In this study IoT technologies such as wearable sensors and automatic feeders were used to closely watch and analyze the condition of calves. To make such data easier to interpret, and provide clues to calf health problems, the researchers adopted machine learning to discriminate between sick and healthy calves, given the input from the IoT devices. ... This work was supported by the U.S. Department of Agriculture and the National Science Foundation.  
Penn State University - Jul 13, 2023

### **Recent albuterol shortage sparks FDA-funded VCU study on improving the manufacturing process**

...The most common generic drug prescribed with inhalers is liquid albuterol, which is one of the latest medications to suffer a shortage in the United States. This shortage inspired a new research project that is funded by the U.S. Food and Drug Administration for \$5 million and in collaboration with Rutgers University and the National Institute for Pharmaceutical Technology and Education. This project examined how albuterol is manufactured, identifying how chemistry can help build a process that improves efficiency, reduces drug costs and ultimately increases availability for those who depend on the drug. Researchers are looking to develop a continuous manufacturing process for albuterol production, a flow that would eliminate transition times and create the final product much more quickly. Continuous manufacturing has been applied to pharmaceuticals before but never for liquid formations like albuterol. This project expands the application of advanced manufacturing methods to the second-largest category of pharmaceutical products — liquid formulations, including oral liquids, aerosols and liquid injectables. The project will implement and demonstrate a continuous, end-to-end, modular advanced manufacturing system for liquid products...

Virginia Commonwealth University News - Jul 14, 2023

### **Giving Neural Networks an Immune System**

...Ren Wang at Illinois Institute of Technology research uses insights from the human adaptive immune system to make artificial intelligence systems more resilient. He received a Computer and Information Science and Engineering Research Initiation Initiative award from the National Science Foundation. The black box nature of these systems has made it difficult to develop techniques for keeping them safe from errors or attacks. AI's proliferation in real-world applications has led to real consequences when an AI system makes an error or encounters something it wasn't trained to deal with. With neural networks already borrowing from the brain, Wang says that looking to the immune system for defense techniques is a natural fit for making AI models more robust. Wang is focusing on certain elements of the adaptive immune system, such as examining how B cells are generated, proliferated, and utilized in the body. Wang is aiming to develop general techniques that could be adopted by a broad range of AI systems, but he is also specifically applying his findings to power system applications driven by AI. These applications, such as power system control and stability analysis, require high levels of robustness...

Chicago-Kent College of Law - Jul 18, 2023

### **NIH-funded study sheds light on where conscious experience resides in brain**

...More than a quarter of all stroke victims develop a bizarre disorder — they lose conscious awareness of half of all that their eyes perceive. This puzzling affliction, called unilateral neglect, highlights a longstanding question in brain science: What's the difference between perceiving something and being aware or conscious of perceiving it? Most methods used to record neural activity in humans, such as functional MRI (fMRI) or electroencephalography (EEG), only allow researchers to make detailed inferences about where brain activity is happening or when, but not both. By employing electrodes implanted inside the skull, the Hebrew University/UC Berkeley researchers were able to bridge this gap. After analyzing the data using machine learning, the team found that, contrary to earlier studies that saw only a brief burst of activity in the brain when something new was perceived, the visual areas of the brain actually retained information about the percept at a low level of activity for much longer. The sustained pattern of neural activity was similar to the pattern of the initial activity and changed when a person viewed a different image. ... The study was supported by the National Institutes of Health...

Berkeley News - Jul 19, 2023

## **Other IT Related**

### **Bio-inspired device captures images by mimicking human eye**

...In research supported by seven grants from the U.S. National Science Foundation, Penn State scientists developed a new device that produces images by mimicking the red, green and blue photoreceptors and the neural network found in human eyes. To achieve this in an artificial device, the scientists created a new sensor array from narrowband perovskite photodetectors, which mimic our cone cells, and connected it to a neuromorphic algorithm, which mimics our neural network, to process the information and produce high-fidelity images. They found a novel way to design perovskite material that is sensitive to only one wavelength of light. The new technology may represent a way around using filters found in modern cameras that lower resolution and increase cost and manufacturing complexity. Because the researchers used perovskite materials, the new devices generate power as they absorb light, potentially opening the door to battery-free camera technology. This research could trigger further developments in artificial retina biotechnology. Devices based on this technology could someday replace dead or damaged cells in the eyes to restore vision...

National Science Foundation - Jul 18, 2023

## **NIST's International Engagement – Brussels and Beyond**

...NIST has collaborated with the State Department on participation in various international dialogues, including the US-Japan Cybersecurity Dialogue and US-Switzerland Dialogue to discuss the CSF 2.0 update, IoT cybersecurity guidance, and other resources. International engagement is an integral part of many ongoing NIST efforts, including the Journey to the Cybersecurity Framework (CSF 2.0) update, our update to the digital identity guidelines, and increasing awareness of the NIST Privacy Framework and IoT cybersecurity work. At NIST's February 2023 virtual workshop on the CSF 2.0 update, participants from Italian and New Zealand governments and Mexican industry spoke on panels. NIST leveraged the international audience that attends RSAC and met with various international partners to discuss the CSF update along with other NIST cybersecurity and privacy resources. NIST also delivered a presentation at the conference that focused on the CSF 2.0 update, which included information on international uptake. One recent international engagement was a visit from a team of NIST representatives to Brussels, Belgium in March of this year. NIST's subject matter experts presented on NIST IoT cybersecurity guidance and the CSF 2.0 update at the European Union (EU) Cyber Act Conference. NIST briefed interagency colleagues at the U.S. Embassy, as well as our colleagues at the European Union on our cybersecurity and privacy efforts. These efforts were facilitated by the State Department and International Trade Administration (ITA) within the Department of Commerce as well as industry organizations...

National Institute of Standards and Technology - Jul 18, 2023

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

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

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

The Networking and Information Technology Research and Development (NITRD) Program - Jun 21, 2023

### **FEDERAL HIGH END COMPUTING INFORMATION PORTAL**

...Networking and Information Technology Research and Development (NITRD) has a portal that provides information about U.S. Federal government high performance computing activities, including available computing resources; HEC relevant publications; fellowship and training opportunities; and technology transfer, licensing, and industry engagement opportunities. The HEC IWG (Interagency Working Group on High End Computing) agencies provide the information contained in this portal. HEC IWG agencies are involved in various Federal activities in the HEC area including R&D and providing infrastructure and application. Take a look at it!

Networking and Information Technology Research and Development - Jun 14, 2023

### **NASA Space Apps Announces 2023 Theme: Explore Open Science Together**

...NASA Space Apps, in collaboration with NASA Transform to Open Science (TOPS), is proud to announce the 2023 NASA International Space Apps Challenge theme: "Explore Open Science Together." This year's theme celebrates the benefits and successes created through the equitable and open sharing of knowledge and data. Registration for this year's in-person and virtual events is now open through October 8. Explore Open Science Together acknowledges 2023 as "A Year of Open Science," as declared by the White House, NASA, and other federal agencies. NASA Space Apps will incorporate open science tips, tools, and resources from the NASA TOPS initiative into this year's event. Interested participants are encouraged to explore these resources ahead of the hackathon, including the new Open Science 101 tutorial, which will help equip participants to build a team, work better together, and share their science with the world. Participants in the Space Apps Challenge use free and open data provided by NASA and its space agency partners to develop their hackathon projects...

National Aeronautics and Space Administration - Jul 13, 2023

## **NITRD News**

### **Can Arctic submarine cable systems enhance secure intercontinental connectivity?**

...Presentation by Erik-Jan Bos, NORDU.net, at the Joint Engineering Team (JET) monthly meeting on July 18, 2023. Abstract: "The current geopolitical situation has further increased the need for more resilience for the world's intercontinental submarine cable infrastructure. Add to this, the desire of Europe and Asian countries to have direct

interconnectivity, and this has put the focus on one of the last remaining submarine cable white spots on our planet: The Arctic Ocean. This talk will dive into the opportunity and need for at least two submarine cable systems through the Arctic, possibly equipped with sensing equipment for science purposes, such as climate research and marine biology."

Networking and Information Technology Research and Development - Jul 19, 2023

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

### **Innovation Through NITRD Coordination**

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

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