

GENTLE.NEWS

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"Reading furnishes the mind only with materials of knowledge; it is thinking that makes what we read ours."

— John Locke

NASA Webb Uncovers Unusual Galaxy Shaped by Cosmic Collision

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images from NASA's James Webb Space Telescope to celebrate its fourth science anniversary, a familiar galaxy transforms into something far richer, and far more complex, than ever seen before. Webb's unprecedented sensitivity across near- and mid-infrared wavelengths cuts through the thick lanes of dust that obscure Centaurus A's center in visible light, showing a densely packed tapestry of individual stars and an active, everchanging galaxy. These images mark four years of better-than-anticipated performance and successful science operations for the most powerful space telescope in history. Centaurus A is 11 million light-years away from Earth, relatively close in cosmic terms. Yet, unlike most nearby galaxies, it is very active, making it a powerful laboratory for understanding how galaxies and black holes grow and evolve together. Image: Centaurus A (MIRI Image) Unable to render the provided source The mid-infrared view of Centaurus A from NASA's James Webb Space Telescope reveals dusty structures and hidden activity within the nearby, active galaxy. Image: NASA, ESA, CSA, STScI; Image Processing: Alyssa Pagan (STScI), Joseph DePasquale (STScI), Macarena Garcia Marin (ESA Office at STScI) At its core sits a supermassive black hole actively feeding on surrounding material. As it does, the black hole launches powerful jets and releases enormous amounts of energy, shaping the galaxy around it. At the same time, Centaurus A bears the scars of a dramatic past: a major collision with another galaxy roughly two billion years ago. The aftermath of that merger is still visible today in its unusual structure and ongoing star formation. Visible light observations from NASA's Hubble Space Tele-

scope could not reveal the central region where dust blocked the view, while NASA's retired Spitzer Space Telescope revealed large scale structures in the infrared without resolving individual stars. Now, Webb brings both clarity and depth, exposing the galaxy's inner workings star by star. Interactive: Journey into Centaurus A Unable to render the provided source Use this interactive tool to journey into NASA's James Webb Space Telescope's mid-infrared view of Centaurus A, where dust gives way to a rich landscape of stars and hidden features. NASA / STScI "No single telescope tells the whole story," said Shawn Domagal-Goldman, division director, Astrophysics, NASA Headquarters in Washington. "Discoveries build over time and new observatories expand on the foundations laid by earlier missions. Webb represents the most powerful step forward yet, opening a window into wavelengths and details never before accessible. This allows astronomers to examine structures and processes that other telescopes could not see." Dust, awe Webb's mid-infrared vision highlights the galaxy's rich dust structures, which glow in intricate shapes that surprise and even perplex astronomers. A warped, parallelogram-like band cuts across the galaxy's center, while wisps of material stretch outward like cosmic clouds. An "S" shaped feature, most notable in the image from Webb's MIRI (Mid-Infrared Instrument), is also unusual and invites questions that need further study to answer. What created this shape? How does the black hole influence it? Is it influenced by merger-induced star formation? Many of the glowing red points in the MIRI image are dust-rich stars or stellar nurseries, where aging stars are shedding material back

into space or new stars are forming. This dust is the raw ingredient for future generations of stars and planets, making it central to the ongoing life cycle of the galaxy. Image: Centaurus A Crop (NIRCam & MIRI)

Unable to render the provided source In the combined mid- and near-infrared view of Centaurus A, the NIRCam (Near-Infrared Camera) on NASA's James Webb Space Telescope brings out the galaxy's dense field of millions of stars. Image: NASA, ESA, CSA, STScI; Image Processing: Alyssa Pagan (STScI), Joseph DePasquale (STScI), Macarena Garcia Marin (ESA Office at STScI) Written in its stars With Webb's high resolution, astronomers can now study Centaurus A star by star, even in its long-obscured central region. What looks "grainy" in the image from Webb, most obvious in the combined MIRI and NIRCam (Near-Infrared Camera) view, is actually a densely packed field of individual stars, together carrying information about the galaxy's past. With Webb's view of Centaurus A, it becomes a case of galactic archaeology. Each star revealed helps to reconstruct when different events happened: when older stars first formed, when activity slowed down, a burst of star formation during the collision, and stars born from gas stirred in its aftermath. Together, they form a timeline of the galaxy's evolution. Dynamic black hole Webb's capabilities go beyond imaging. By analyzing light with spectroscopy , astronomers can measure how gas moves within the galaxy. Early findings from Webb show fast-moving ionized gas flowing outward, likely driven by the black hole's activity, and warmer molecular hydrogen in a warped rotating disk near the center. These observations help explore

one of astronomy's biggest questions: How does a black hole influence an entire galaxy? The answer appears to be complex. The black hole can trigger star formation by compressing gas, but also limit it by pushing material away. Centaurus A offers a rare, nearby view of this cosmic interplay. By tracing dust in never-before-seen detail, resolving millions of stars, and revealing the motion of gas near a supermassive black hole, Webb transforms Centaurus A into a vivid record of cosmic history. The James Webb Space Telescope is the world's premier space science observatory. Webb is solving mysteries in our solar system, looking beyond to distant worlds around other stars, and probing the mysterious structures and origins of our universe and our place in it. Webb is an international program led by NASA with its partners, ESA (European Space Agency) and CSA (Canadian Space Agency). To learn more about Webb, visit: <https://science.nasa.gov/webb> Downloads & Related Information The following sections contain links to download this article's images and videos in all available resolutions followed by related information links, media contacts, and if available, research paper and Spanish translation links. Related Images & Videos Centaurus A (MIRI Image) The mid-infrared view of Centaurus A from NASA's James Webb Space Telescope reveals dusty structures and hidden activity within the nearby, active galaxy. Centaurus A Crop (NIRCam and MIRI Image) In the combined mid- and near-infrared view of Centaurus A, the NIRCam (Near-Infrared Camera) on NASA's James Webb Space Telescope brings out the galaxy's dense field of millions of stars. Centaurus A Context Image (ESO and

Webb Images) A ground-based image of nearby galaxy Centaurus A from the European Southern Observatory (top left) puts the near-infrared and mid-infrared views from NASA's James Webb Space Telescope image into context. Centaurus A (MIRI Compass Image) Annotated image of the active galaxy Centaurus A captured by the James Webb Space Telescope's MIRI (Mid-Infrared Instrument), with compass arrows, a scale bar, and color key for reference. The north and east compass arrows show the orientation of the image on the sky. Note ... Centaurus A Crop (NIRCam and MIRI Compass Image) Annotated image of the active galaxy Centaurus A captured by the James Webb Space Telescope's NIRCam (Near-Infrared Camera) and MIRI (Mid-Infrared Instrument), with compass arrows, a scale bar, and color key for reference. The north and east compass arrows show the orientat... Related Links Read more: What Are Active Galactic Nuclei? Watch : Black Hole Snapshot Explore more: ViewSpace: Black Holes: Centaurus A Infographic : Dissecting Supermassive Black Holes Watch : Galaxy collisions: Simulation vs Observations More Webb: News | Images | Science | Home Page Share Details Last Updated Jul 06, 2026 Location NASA Goddard Space Flight Center Contact Media Laura Betz NASA's Goddard Space Flight Center Greenbelt, Maryland laura.e.betz@nasa.gov Hannah Braun Space Telescope Science Institute Baltimore, Maryland Christine Pulliam Space Telescope Science Institute Baltimore, Maryland Related Terms James Webb Space Telescope (JWST) Astrophysics Elliptical Galaxies Galaxies Goddard Space Flight Center Interacting Galaxies Science & Research The

Universe Keep Exploring Related Topics James Webb Space Telescope
Webb is the premier observatory of the next decade, serving thousands of
astronomers worldwide. It studies every phase in the... Galaxies Galaxies
Stories Universe

Celebrating Habitat Month

July is Habitat Month at NOAA Fisheries! All month long, we'll be sharing how we conserve and restore habitat to sustain our nation's fisheries and support coastal communities. NOAA conserves habitats like wetlands , rivers , and coral reefs to support fisheries—but habitat isn't valuable just for the home it provides for fish and wildlife. Healthy habitats help keep our drinking water clean, protect us from storms and flooding, and support industries like boating and fishing. From jobs to seafood to tourism, coastal habitats are vital to America's national and local economies. Follow us here and on X (formerly Twitter) at @NOAA-Habitat . You can also stay up-to-date on our latest habitat conservation stories all year long by subscribing to HabitatNews .

Habitat Features Restoration of Florida's Robinson Preserve Benefits Fish, Visitors, and Local Economy Investments in the restoration of Florida's Robinson Preserve are paying off for fish, visitors, and the local economy, according to a recent economic study and fisheries monitoring results. The 700-acre coastal preserve—once degraded farmland—now supports a healthy sport-fish population, attracts about 240,000 visitors each year, and generates millions of dollars in economic activity. Read about the NOAA-supported restoration at Robinson Preserve Habitat Restoration Helps Put Anglers Back on the Pier, Hikers Back on the Trail When environmental disasters like oil or chemical spills disrupt waterfront access, NOAA restores

habitat to reconnect communities to the outdoors. Through our Damage Assessment, Remediation, and Restoration Program, we work to quantify recreational losses and determine the economic and social value of the lost use of the resource. Then, we use settlement funds to restore the injured habitats and fund restoration projects. Learn more about how NOAA works to restore recreational access [Updates from Partners on Engaging the Recreational Fishing Community to Restore Habitat through the National Fish Habitat Partnership](#) Through the National Fish Habitat Partnership, NOAA Fisheries supports projects that restore habitat in collaboration with recreational anglers. Partners are reporting progress on several ongoing projects that actively engage local communities and recreational anglers to conserve fish habitat. Learn more about the ongoing projects with partners in Maryland, Alaska, and Hawai'i [NOAA-Funded Research Highlights Economic Effects of Oyster Reef Restoration](#) Scientists at Morgan State University forecast that restored oyster reefs—especially when paired with eelgrass recovery—boost habitat, blue crab harvest, and the economy. Oyster reefs provide habitat and food for commercially important species, including blue crabs. More healthy reef habitat means more blue crabs are available for harvest and for your dinner table. That provides financial benefits to watermen and supporting industries along the way. Learn more about how restored oyster reefs help support local economies [Restoring Habitat, Bolstering the Economy, and Supporting Jobs in Florida Coastal](#) restoration might bring to mind images of wetlands, sand dunes, and tidal marshes—but there's another impact of

this work: jobs and economic growth. An economic analysis shows that community-led restoration contributes broadly to local, state, and national economies. It finds that \$72.5 million invested across 12 habitat restoration projects in Florida is estimated to support jobs and wages and increase both spending and economic activity. Learn more about the results of this economic analysis

[Muskegon Lake Removed from List of Most Degraded Great Lakes Sites](#) Muskegon Lake has been officially removed from the U.S. Environmental Protection Agency's Areas of Concern list. It was originally designated one of the most environmentally degraded sites in the Great Lakes 40 years ago. NOAA, the EPA, and other partners worked for decades to restore the area. We addressed environmental challenges such as fish and wildlife habitat loss, contaminated soils, and hardened shorelines. Read about our habitat restoration work in the Muskegon Lake area

[Interactive Tool Gives Virginia Communities Data on Economic Effects of Marshes and Living Shorelines](#) Chesapeake Bay marshes and living shorelines play important roles in the ecosystem and benefit nearby communities. NOAA and partners, including the Virginia Institute of Marine Science, work to restore these important places. VIMS researchers developed a tool that individual land owners, communities, and resource managers can use to help them make decisions about marsh and living shoreline projects in Virginia's Middle Peninsula. Learn how the tool calculates the benefits of marsh restoration projects

[Oyster Restoration Investments Net Positive Returns for Economy and Environment](#) A report by the North Carolina Coastal Feder-

ation shows that NOAA and partners' investments in oyster restoration produce almost double the amount in economic and environmental benefits. The economic report found that for every \$1 spent on oyster reef restoration, the state sees \$1.70 in return. Learn how oyster restoration projects support jobs and local economies Yakima River Salmon Get a Lifeline with Removal of Causeway NOAA funding helped the Yakama Nation and partners remove a causeway in Richland, Washington, that had wreaked havoc on Yakima River salmon and steelhead populations. Now, fish have a better chance of surviving migration in and out of the river. Read more about the Bateman Island Causeway removal Habitat 101 Shallow Coral Reef Habitat Coral reefs are the most diverse habitats on the planet. Reefs occur in less than 1 percent of the ocean, yet are home to nearly one-quarter of all ocean species. They also provide jobs, tourism and recreation opportunities, seafood, wave protection, and more. Learn more about shallow coral reefs Estuary Habitat Estuaries are bodies of water where rivers meet the sea. They provide homes for diverse wildlife, including popular fish species. They also support recreation, jobs, tourism, shipping, and more. Learn more about estuaries Coastal Wetland Habitat Wetlands are a pivotal part of the natural system, providing tremendous benefits for coastal ecosystems and communities. They provide us with clean water, flood protection, abundant fisheries, and more. Learn more about coastal wetlands Oyster Reef Habitat Oysters are a crucial component of global ocean health. These animals filter and clean the surrounding water and provide habitat, food, and jobs. Today, however,

oyster populations are at historic lows. NOAA works with partners to restore oysters and regain the critical ecosystem functions they provide. Learn about the importance of oyster reef habitat

Friday's Findings | A USGS Webinar Series

Friday's Findings | A USGS Webinar Series Twice-monthly short talks highlighting USGS ecosystems science. By Ecosystems Mission Area July 6, 2026 Friday's Findings is a public webinar series hosted by the USGS Ecosystems Mission Area. Each 30-minute session provides an overview of a current science topic and includes an opportunity for attendees to engage directly with USGS scientists through a question-and-answer segment. Webinars are held from 2:00-2:30 PM Eastern/11:00 -11:30 AM Pacific, unless otherwise noted. Subscribe to announcements on upcoming talks! Friday's Findings highlights the breadth of ecosystem science conducted by the USGS, offering insights into research that informs the management and conservation of natural resources. Topics span a wide range of issues, including environmental health, wildlife disease, invasive species, climate change, and species population monitoring. Through Friday's Findings , the USGS aims to share knowledge that supports understanding and stewardship of the ecosystems upon which society depends.

2026 Friday's Findings Schedule

Using new tools for old problems: Innovative and actionable science that informs decision making for our vast and dynamic U.S. drylands Date: January 9, 2026 Sasha Reed , Research Ecologist, USGS Southwest Biological Science Center

CASC Climate Adaptation Technical Services: Science and lessons from the first year Date : January 23, 2026 Presenters: USGS National Climate

Adaptation Science Center Ryan Boyles , Senior Advisor and CATS Lead
Katherine Kurth , Biologist Marta Lyons , Biologist Andy Maguire ,
Biologist Kasia Nikiel , Physical Scientist Sarah Whipple , Biologist
Rapid mapping tool for grassland birds in the Great Plains and Sagebrush
biomes Date : February 6, 2026 Presenter: Caleb Roberts , Unit Leader,
USGS Arkansas Cooperative Fish & Wildlife Research Unit Tackling
invasive mussels with science and strategy Date : February 20, 2026
Presenter: Diane Waller , Research Fishery Biologist, USGS Upper
Midwest Environmental Sciences Center Geospatial applications to
visualize science and support decision-making across scales Date : March
6, 2026 Presenters: Dan Jones , Physical Scientist, USGS Utah Water
Science Center Brianna Williams , Geographer, USGS New Jersey Water
Science Center Stephanie Gordon , Physical Scientist, USGS Eastern
Ecological Science Center Living Dinosaurs of the Hudson: Shortnose
Sturgeon Science and Recovery Date : March 20, 2026 Presenter:
Shannon White , Research Biologist, USGS Eastern Ecological Science
Center Which bees need help? Assessing Southeast species before the
buzz fades Date : April 10, 2026 Presenter: Hailey Shanovich , Biologist
and Climate Adaptation Service Scientist, Southeast Climate Adaptation
Science Center Wildlife Health Awareness Day - Highly pathogenic avian
influenza (HPAI) implications to ecosystem health Date : April 24, 2026
Presenters: Andy Ramey , Research Wildlife Geneticist and Director of the
Molecular Ecology Lab, USGS Alaska Science Center Camille Hopkins ,
Fish & Wildlife Disease Research Coordinator, USGS Ecosystems Mis-

sion Area Amphibian Week: At Home in a Habitat Date : May 8, 2026
Presenter: Brian Halstead , Research Wildlife Biologist, USGS Western
Ecological Research Center Causal Analysis of Fire Regime Drivers Date :
May 29, 2026 Presenter: Jon Keeley , Senior Scientist, USGS Western
Ecological Research Center A Tale of Two Islands and the Future of an
Ocean Sentinel Seabird Date : June 12, 2026 Presenters: Sarah Converse ,
Unit Leader, USGS Washington Cooperative Fish & Wildlife Research
Unit, University of Washington Amelia DuVall, post-doc, Washington
Cooperative Fish and Wildlife Research Unit, University of Washington
Discovering New Populations of an Endangered Bumble Bee to Support
Recovery Efforts Date : June 26, 2026 Presenter: Clint Otto , Research
Ecologist, USGS Northern Prairie Wildlife Research Center Pollinator Lab
Voyage into the past: Ocean exploration and the story of the California
Current over the last 100,000 years Date : July 17, 2026 Presenter: Jason
Addison , Research Geologist, USGS Geology, Minerals, Energy, and
Geophysics Science Center Coral Reef Awareness Week - What Happens
to Coral Reefs Hit By Disease? Date : July 24, 2026 Presenter: Kevin
Lafferty , Senior Ecologist, USGS Western Ecological Research Center
Hawaiian Honeycreepers Celebration Day Date : August 7, 2026
Presenter: Katherine McClure , Research Ecologist, USGS Pacific Island
Ecosystems Research Center Understanding how rare earth elements and
other critical minerals may affect aquatic species Date : August 21, 2026
Presenter: David Soucek , Research Biologist, USGS Columbia Environ-
mental Research Center Advancing evaluation of ecological efficacy for

climate adaptation actions Date : September 11, 2026 Presenter: Meagan Oldfather , Biologist, USGS North Central Climate Adaptation Science Center Coastal wetland resilience: Lessons learned from large-scale field manipulations, measurements, and modeling Date : September 25, 2026 Presenters: Joel Carr , Research Ecologist, USGS Eastern Ecological Science Center Mike Osland , Research Ecologist, USGS Wetland and Aquatic Research Center Co-developing an adaptive management framework for a cold-water river facing ecosystem change Date : October 9, 2026 Presenter: Kaili Gregory, Graduate Student, USGS Georgia Cooperative Fish & Wildlife Research Unit Bat Week Date : October 23, 2026 Presenter: Bethany Shulze, Biological Science Technician, USGS Western Ecological Research Center DOI Bison Metapopulation Strategy Date : November 6, 2026 Presenter: Sara Oyler-McCance , Supervisory Research Geneticist and Branch Chief for the Ecosystem and Organismal Ecology Branch, USGS Fort Collins Science Center GIS Day / Geography Awareness Week - Generating habitat maps in GIS for 12 Ohio reservoirs Date : November 20, 2026 Presenter: Michael Booth , Assistant Unit Leader, USGS Michigan Cooperative Fish and Wildlife Research Unit Supporting healthy recreational fish and wildlife game species through partnerships with State conservation agencies Date : December 4, 2026 Presenter: David Alvarez , Research Chemist, USGS Columbia Environmental Research Center The North American Breeding Bird Survey: On the road again for a bird survey that counts! Date : December 18, 2026 Presenter:

David Ziolkowski Jr. , North American Breeding Bird Survey (BBS)
Program Manager, USGS Eastern Ecological Science Center

What the world misses when it doesn't understand statelessness

Even though statelessness affects millions of people around the world, it remains largely invisible. Originally published on Global Voices. A blurred photo of a crowded street. Image from Pxhere . (CC0 Public Domain).

By Christy Chitengu This editorial was written by Christy Chitengu at The Global Movement Against Statelessness (GMAS). GMAS is a content partner of Global Voices. This post is part of Global Voices' July 2026 Spotlight series, " Statelessness ." This series offers insight into the issue of statelessness and how it hinders people's freedom of movement, educational opportunities, political access, and more. You can support this coverage by donating here . There is a moment that many stateless people know well. It comes when someone asks for a passport, a birth certificate, a national ID card, or proof of nationality. For most people, these are routine documents, bureaucratic details of modern life. For a stateless person, that simple request can unravel into a conversation far more complicated than anyone expects. You find yourself explaining. You explain that no, you are not a foreigner. No, you are not necessarily a refugee. No, you may not have crossed any borders. No, you may not have another country that claims you. You explain that despite being born somewhere, growing up somewhere, speaking the language, and belonging to a community, no state recognizes you as its citizen. Then comes the silence. Sometimes it is confusion. Sometimes disbelief. Often, it is the

realization that the person in front of you has never heard of statelessness at all. As someone directly affected by statelessness, I have experienced these conversations throughout my life. They reveal something important: Even though statelessness affects millions of people around the world, it remains largely invisible. It exists in the shadows of public awareness, frequently misunderstood and often conflated with migration, displacement, or refugeehood. While these issues can overlap, statelessness is its own reality, one with distinct causes, consequences, and histories. Yet too often, those distinctions disappear from public narratives. When the Global Movement Against Statelessness and Global Voices came together to develop this Spotlight, we encountered that invisibility again. Global Voices reaches audiences far beyond the circles where statelessness is usually discussed. Its readers include journalists, activists, researchers, community leaders, students, and everyday people seeking to understand the world through the experiences of others. As we began planning this collaboration, it became clear that many readers would be encountering the word “statelessness” for the first time. That realization stayed with me. For years, many of us within the statelessness movement have focused on advocacy, legal reform, policy discussions, and community organizing. We have worked tirelessly to change laws, improve access to rights, and challenge systems that exclude people from citizenship. Yet somewhere along the way, we also began assuming a shared understanding that often did not exist. We were speaking to policymakers, international organizations, legal experts, and fellow advocates. We were speaking to people

already familiar with the issue. We were, in many ways, speaking to the converted. But what happens when the broader public does not know the problem exists? How can people support solutions to statelessness if they have never heard the stories? How can they understand its urgency if the issue itself remains hidden? How can they appreciate what citizenship means to those denied it if they never hear directly from those living without it? These questions became the foundation of this Spotlight. At its heart, this series is an invitation. An invitation to pause and listen to voices that are often excluded from mainstream conversations. An invitation to move beyond legal definitions and policy language and meet the people living these realities every day. Because statelessness is often described through technical terms, nationality laws, citizenship frameworks, legal identity systems, and registration procedures. These dimensions matter. They shape people's lives in profound ways. But legal language alone cannot capture what statelessness feels like. It cannot fully describe the anxiety of not knowing whether you will be able to continue your education. It cannot express the frustration of being blocked from opportunities because you cannot present the documents that others take for granted. It cannot explain what it means to repeatedly prove your existence, your belonging, or your worth to institutions that refuse to recognize you. Nor can it capture the quieter losses. The feeling of being told, directly or indirectly, that you do not belong. The uncertainty that follows you into adulthood. The psychological burden of navigating systems designed without you in mind. The experience of watching your

community, your family, your history, and your identity being questioned because of a status over which you have little control. And yet, if there is one thing I hope readers take from this series, it is that stateless people are far more than the challenges they face. Too often, stories about marginalized communities focus exclusively on suffering. While it is necessary to acknowledge injustice, it is equally important to recognize agency. Across the world, stateless people are organizing, mobilizing, creating, leading, and advocating. They are building movements, supporting one another, documenting their histories, and challenging the systems that exclude them. This is something I have witnessed firsthand through the Global Movement Against Statelessness . In recent years, I have had the privilege of connecting with activists and leaders from different regions whose experiences of statelessness are shaped by distinct histories, cultures, and political contexts. Some live in countries where discriminatory nationality laws continue to prevent entire communities from obtaining citizenship. Others navigate the legacies of colonialism, conflict, state succession, or administrative exclusion. Their circumstances differ, but their stories share common themes of resilience, dignity, and determination. Again and again, I have been struck not by what stateless people lack, but by what they continue to build despite the barriers before them. This Spotlight reflects that reality. The stories featured here span countries, regions, and experiences. They explore the systems that create and perpetuate statelessness, but they also illuminate the creativity and resistance emerging from affected communities. They demonstrate that statelessness is not a distant

or isolated issue. It is intertwined with questions of identity, belonging, human rights, technology, governance, and power. It asks us to consider who is recognized, who is excluded, and who gets to participate fully in society. These are not abstract questions. They shape the lives of millions of people every day. As you read through this Spotlight, I encourage you to approach these stories with curiosity and openness. Some may challenge assumptions. Others may reveal realities you have never encountered before. Many will remind us that behind every discussion about citizenship, documentation, and legal status are human beings seeking the same things most people want: security, dignity, opportunity, recognition, and a place to belong. Visibility alone will not end statelessness. But invisibility has allowed it to persist for far too long. This Spotlight is one small effort to change that. Not by speaking about stateless people, but by creating space for stateless people and those closely connected to affected communities to speak for themselves. Because understanding begins with listening. And perhaps, through these stories, more people will come to understand that statelessness is not merely the absence of citizenship. It is a question of humanity, belonging, and whether the world is willing to recognize people as they recognize themselves. That recognition is where change begins. Written by Global Movement Against Statelessness

MAD³ manufacturing revolution

David Montes de Oca Zapiain, left, Hojun Lim, center, and Benjamin Greene chart the results and capabilities of machine-learning algorithm MAD³, which was created to accelerate materials simulation. (Photo by Bret Latter) Click on the thumbnail for a high-resolution image. ALBUQUERQUE, N.M. — When Sandia National Laboratories researchers Hojun Lim and David Montes de Oca Zapiain began working on software to accelerate materials simulations, they started with just an idea. Now, eight years later, they have award-winning, ready-to-use software they believe can revolutionize manufacturing. Materials Data Driven Design, or MAD³ combines machine learning and materials science to predict, in minutes, how metals deform in real-world manufacturing scenarios. It's a tool they say could have a major impact on automotive, aerospace and metal manufacturing as well as academia and research labs. "It's exciting to take something that was developed from the research scope and see it transition all the way to a ready-to-use product," Montes de Oca Zapiain said. While MAD³ has been used on various projects across Sandia, the goal is to get it licensed and into the hands of companies around the country to advance and accelerate American manufacturing. Manufacturing challenges Companies can spend millions of dollars a year on simulations, experiments and testing to ensure the materials they choose can be shaped into their designed components. "Metals are made up of micro-

sized grains or crystals, and their orientation determines directional or mechanical strength, commonly referred to as plastic anisotropy,” Lim said. “When you apply a force to a material in different directions, you will see a varying response in the deformation, and that directly influences a material’s strength, failure or formability. In manufacturing, the ability to form or shape parts from sheet metal heavily relies on understanding these properties.” Metals are made up of micro-sized grains or crystals whose orientation determines directional or mechanical strength, commonly referred to as plastic anisotropy . (Graphic courtesy of David Montes de Oca Zapiain and Hojun Lim) Click to watch the animation. Performing experiments is still considered the most accurate way to determine material properties, but it’s costly and, in many cases, impractical. “You do not build a whole engine, plane or car when trying to change one component,” Montes de Oca Zapiain said. For that reason, many companies use high-fidelity computer simulations to perform virtual tests. But these tests can be cumbersome. They require extensive computing, take weeks to perform, and require access to supercomputers and experts who know how to run them. That is why Montes de Oca Zapiain and Lim built MAD³. The pair combined their materials science and AI background to create something they believe can be revolutionary. “We are targeting the verified pain points in industry,” Montes de Oca Zapiain said. “With MAD³ you are getting fast and accurate solutions with the help of machine learning. You just run your data, and in a couple of seconds, you get results.” What makes MAD³ different MAD³ is different from other

simulation software because it leverages machine learning and materials science techniques to improve speed while maintaining accuracy. It extracts knowledge from 70,000 high-fidelity simulations using deep learning — more specifically, a variational Bayesian inference neural network model. MAD³ is ready to use on any operating system and doesn't require users to know how to code. "Our main goal was to make it as easy to use as possible," Lim said. "Anyone can use it." Montes de Oca Zapiain and Lim say that, in its most basic form, MAD³ can drastically cut costs and time for manufacturers. They have also recently developed the software further to perform at even higher levels and incorporate new metal alloys. "With its initial capability, we could tell you what deformation capabilities a material would have. Now we can do the inverse," Montes de Oca Zapiain said. "If you specify a target property, we can determine the optimal internal structure." Lim and Montes de Oca Zapiain are exploring potential partnerships with a major American automotive manufacturer, an aeronautics company, a defense and cyber-space company, and an aircraft engine designer and manufacturer. They say the software is adapted to meet manufacturing needs, a result of years of research and development and conversations with 120 potential customers. "We learned a lot from doing interviews and getting feedback," Lim said. "It really opened our eyes to see what is really needed on the manufacturing side. This application is based not only on a scientific point of view but also on suggestions and feedback from experts in industry, academia and national labs." (Graphic courtesy of David Montes de Oca

Zapiain and Hojun Lim) “We learned that great ideas don’t always make great products,” Montes de Oca Zapiain said. “This was a product created through a customer discovery process.” Award winning invention Montes de Oca Zapiain and Lim received an R&D 100 Award for MAD³ in 2023 , a significant honor. But they’re eager to see their invention at work in American industry. MAD³ is now available for licensing from Sandia. Montes de Oca Zapiain and Lim hope it can revolutionize manufacturing. “It’s been a really illuminating journey,” Montes de Oca Zapiain said. “If we kept going with just the science, it would have gone in a different direction. The software is focused on what’s being experienced in industry. We are targeting those pain points.” “I think this was my first time getting some of my work out of my computer and sharing it with many people. So, it was a very rewarding experience,” Lim said. MAD³ was featured on the Department of Energy’s National Lab Discovery series in January 2026. Licensing Opportunity: For MAD³ licensing information ,

Activity Time - Word Search

Find the words below in the puzzle. Words go across or down only.

Words to Find:

Z	Q	E	A	Z	T	G	J	G	U	G
F	W	N	R	E	N	Y	B	S	N	G
R	D	U	U	X	W	Z	S	X	I	D
A	L	G	Q	E	D	E	J	F	N	G
X	V	Q	F	Z	Q	B	G	V	X	Q
Z	X	I	U	H	X	L	L	M	C	W
Y	E	F	H	L	E	F	L	F	Q	W
X	D	U	J	G	L	Q	N	L	P	E
Q	H	L	R	P	I	M	G	C	Q	K
D	W	G	A	K	G	C	Z	D	F	S
O	T	K	D	G	S	N	V	D	S	C