

Sandia joins Pride parade **Page 10** ABQ mayor visit 4
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Detecting threats beyond the limits of human, sensor sight



DEPLOYED AND PATENTED — Robert Anderson, left, and Tian Ma developed a new, patented software system, currently used by the U.S. government, that gives remote sensing equipment like satellites, drones and security cameras a major performance boost in detecting small moving objects from far away. **Photo by Bret Latter**

Sandia-developed software system finds, tracks moving objects as small as a pixel

By Kristen Meub

emember what it's like to twirl a sparkler on a summer night? Hold it still and the fire crackles and sparks but twirl it around and the light blurs into a line tracing each whirl and jag you make.

A new patented software system developed at Sandia can find the curves of motion in streaming video and images from satellites, drones and far-range security cameras and turn them into signals to find and track moving objects as small as one pixel. The developers say this system can enhance the performance of any remote sensing application.

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Together We Rise: One year later

Funds raised by Sandia staff reach victims of devastating wildfires

By Sofia Wolinski

n the wake of the devastating New Mexico wildfires last year, Sandia launched an ambitious fundraising campaign to aid in recovery efforts. The community involvement team organized the campaign, called **Together We Rise**, to raise funds that supported residents evacuated from areas destroyed by the wildfires. Donations assisted organizations throughout the state to provide essentials such as food and clothing.



GREAT LOSS — The wildfires destroyed homes, property and animals and threatened small towns, like Las Vegas, New Mexico.

Photo by Andres Padilla



Managed by NTESS LLC for the National Nuclear Security Administration

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EDITOR'S NOTE: Please send your comments and suggestions for stories or for improving the paper. If you have a column (500-800 words) or an idea to submit, contact Lab News editor Katherine Beherec at kgbeher@sandia.gov.

STEM program inspires Black students for nearly 50 years

Building scientists, engineers and technologists of the future

By Kim Vallez Quintana

he Hands-on, Minds-on Technology program, better known as HMTech, continues to bring together Sandians and Black students to inspire futures in STEM. In its nearly 50 years of existence, in both official and unofficial forms, HMTech has connected hundreds of minority students to the world of STEM, some of whom have gone on to have successful careers at Sandia.

The annual program teams experts from Sandia with students to give them a hands-on look at disciplines such as computing, electronics, physics, web-page design, forensic analysis, drafting, earth and air pollution chemistry, engineering, environmental science, rocket design, machining, physical science, civil engineering, robotics, geology and sports medicine.



HELPING LEAD THE WAY — Cyber systems research manager Sean Harris is a 19-year employee of Sandia and was an early participant in the HMTech Program. He credits the program with introducing him to Black people working in STEM and inspiring his own career path.

Photo by Craig Fritz

This year's program was held over three Saturdays in June at Albuquerque High School and included 68 students from 36 middle and high schools across the metro, as well as some homeschoolers. The program culminated with a special message from Sandia Deputy Labs Director David Gibson, who served as a guest speaker.

"STEM can be your pathway to a fulfilling career," David said. "Mine has been amazing. I started as a Sandia intern in 1998, my senior year at University of New Mexico. Diverse opportunities led me to meaningful work with far-reaching impact. My colleagues are smart, caring people who solve tough problems and make our world a safer place. Study, learn, succeed in college and doors will open for you."

A long history

HMTech was officially founded in 1986 by Roberta Ingram and Patricia Salisbury after becoming concerned that Black students were being left out of educational programs being launched in the community. As a result, they created an after-school computer class that consisted of 30 students. The community response was so overwhelming, the team added more classes. In the early '90s, HMTech became a Sandia-sponsored program.

However, long before HMTech was an official group, Sandians were helping inspire minority youth. In the late 1970s, a small group of Black employees formed a student outreach program known as the Saturday Science Academy. It was a grassroots effort staffed entirely by Sandia volunteers. It focused on exposing Black students to science and engineering to help increase the number who pursued collegiate and professional careers in STEM. These pioneers recognized that if reached at an early age, they could help youth in their community overcome a lack of educational foundation, exposure to career opportunities, confidence and family support, which they recognized as prevalent problems. It was the basis for the HMTech program.



MATH FOR AIRCRAFT — Instructor Gerard Bennet helps students explore the ageless question, "When will I ever use algebra," by showing them how math can help them design better aircraft and bottle rockets.

Photo courtesy of HMTech



RADIATION ALL AROUND US — HMTech historian Brian Bowman helps students in their Radiation Among Us class, where students learned how radiation is used, the dangers and how to protect humans from its harmful effects.

Photo courtesy of HMTech

An HMTech success story

One of the success stories from HMTech is that of Sean Harris, manager of cyber systems research at Sandia. Sean, a 19-year employee, was born and raised in Albuquerque, and is a product of the program.

"It wasn't uncommon for me to be the only Black kid in the whole school; I was definitely the only one in my class. I kind of thought it was normal through middle and high school," he said. Then, one year, Sean's parents took him to the Saturday Science Academy. "I was kind of shocked. I saw other Black kids there. I told myself 'Hey, we are here.' It was cool," he said.

Years later, after HMTech was officially formed, Sean became a regular participant. "I remember working on a robotic circuit board. It was my first exposure to the internal components of computing, including the chips, circuits and wires. We were soldering things," he said

However, something else stood out in his mind even more. "I remember going to HMTech and thinking these students and instructors looked like me. It was the first time seeing Black people in the STEM field, teaching in this technical arena. It gave me the thought that if they were doing this, I could do this too." It was the start of Sean's higher education and a successful career.

Paying it forward

Sean has made it his mission to pay it forward. He is now the co-chair of the Black Leadership Committee, which operates the HMTech program, and he spends time mentoring Black youth, Sandia interns and early career Sandians.

Sean is the nephew of HMTech program co-founder Patricia Salisbury. He recognizes that many Black youth don't have that same support or connection to the world of STEM. The key is catching students early to make sure they have the fundamentals so they can be prepared, he said. Sean spends his time mentoring students by giving them career, financial and professional development advice.

He is motivated by past experiences, like a memory of his only Black professor. "I would try not to make eye contact with him because he always called on me. I came to realize he was invested in my success, and I wasn't just a student ID number," he said.

Another driver, however, was a not-sopleasant experience. "I was in high school and was excited because I was admitted provisionally to University of New Mexico. I went to talk to the guidance counselor and all I remember is her telling me, 'You know you don't have to go to college; there are other avenues you can take.' She was raining on my parade," Sean remembered. Many of his career accomplishments were sparked by her words, and the motto he now lives by: "Never let others tell you what you can't do."

Sean hopes his words and actions will make a lasting impact as well. "I want to make sure I hold the door open for those who come behind me because if it weren't for those who came before me and held the door open for me, I wouldn't be where I am today," he said.

Inspiring other minority programs

Through its huge success, HMTech has inspired other minority STEM programs including MANOS for Hispanic students and Dream Catchers for Native American students.

Mayor Keller on 'The power of us'

Newest installment in the Community Engagement Speaker Series

By Kylie Engleman

ayor Tim Keller gave Sandians insight into the advancements the city of Albuquerque is making to tackle issues of crime, homelessness, drug addiction and mental health.

"All of us, I think, agree that Albuquerque has tremendous potential," Keller said during his June 15 Community Engagement Speaker Series talk, "but, I think all of us also agree that we have a long way to go to achieve that potential."

Keller candidly discussed crime in the Albuquerque area and how past governmental efforts have fallen short in preventing and responding to it. He along with Albuquerque Police Department Cmdr. Kyle



CITY PARTNER — Mayor Keller was given a private tour of the National Security Gallery and was introduced to many of the amazing achievements that Sandia has made over the years.

Photo by Craig Fritz

Hartsock, spoke to the audience about the changes his team has made to get real-time information about when a crime has occurred and how that technology has assisted in the effort to make Albuquerque streets safer.

When he came into office seven years ago, Keller said he identified major problems with the crime prevention strategies that had been previously put in place. To combat this, he said, his team made technological advancements, such as a real-time crime tracking system, roadside speed monitors and gunshot detectors.

Hartsock gave Sandians a real-world glimpse into how this new technology aided in the investigative process with a homicide case in 2022. Through the use gunshot detection technology and advanced surveillance cameras, police were able to identify and locate the suspect's vehicle and link it to footage from the crime scene.

While sharing details of the case, Hartsock reflected on the active involvement many community members had in the identification and acquisition of the suspect. "When we really come together, and we take away all the biases and maybe the former personal problems, we can literally do anything," he said.

Community involvement and support is essential, especially regarding support for those dealing with mental health issues themselves or within their families, Keller said. Mental health becomes especially significant when examining public safety and how such calls are handled by police across the country.

"You can call 911, and you wait three hours, on average, for a police officer who may not be able to actually deal with the issue because they're not experts in addiction, they're not experts in mental health," he said. Drug and mental health calls to 911 are often



MAYORAL TALK — Albuquerque Mayor Tim Keller returned to the Labs for the first time since 2018 to address Sandians as part of the latest installment of the Community Engagement Speaker Series. Photo by Craig Fritz

responded to with police or unneeded medical assistance, which creates longer response times for other callers that require a police or medical presence.

To combat these wait times and provide the right response to these calls, Keller and his team, along with Albuquerque Community Safety Director Mariela Ruiz-Angel, started a mental health task force to respond to emergency calls and provide ongoing support for those in need, including housing and employment resources.

"At the end of the day, we see a promise of our city," Keller said, "a transformative Albuquerque that is not just holding back the challenges that are coming upon us, but is actually pushing back and saying we in Albuquerque actually have a chance to live up to that promise to make this a great place for families from all walks of life to live."

Detecting threats

CONTINUED FROM PAGE 1

"Being able to track each pixel from a distance matters, and it is an ongoing and challenging problem," said Tian Ma, a computer scientist and co-developer of the system. "For physical security surveillance systems, for example, the farther out you can detect a possible threat, the more time you have to prepare and respond. Often the biggest challenge is the simple fact that when objects are located far away from the sensors, their size naturally appears to be much smaller. Sensor sensitivity diminishes as the distance from the target increases."

Tian and Robert Anderson started working on the Multi-frame Moving Object Detection System in 2015 as a Sandia Laboratory Directed Research and Development project. A U.S. government agency then funded further







Raw image

Without MMODS

MMODS

TARGET ACQUIRED — This image shows how running streaming data through the Multi-frame Moving Object Detection System makes objects that are otherwise unseeable possible to detect and track.

Image by Eric Lundin

development and demonstration and is currently using the system to enhance its remote sensing capabilities. A paper about MMODS was recently published in Sensors.

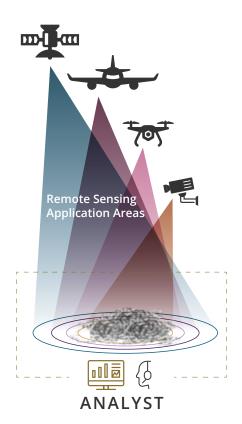
Detecting one moving pixel in a sea of 10 million

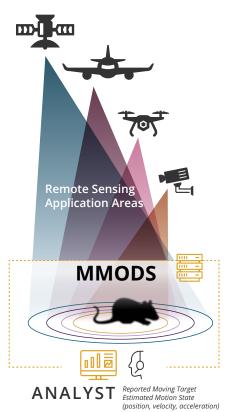
The ability to detect objects through remote sensing systems is typically

limited to what can be seen in a single video frame, whereas MMODS uses a new, multiframe method to detect small objects in low visibility conditions, Tian said. At a computer station, image streams from various sensors flow in, and MMODS processes the data with an image filter frame by frame in real time. An algorithm finds movement in the video frames and matches it into target signals that can be correlated and then integrated across a set of video frame sequences.

This process improves the signalto-noise ratio or overall image quality because the moving target's signal can be correlated over time and increases steadily, whereas movement from background noise like wind is filtered out because it moves randomly and is not correlated.

Before MMODS was deployed for remote sensing enhancement, Tian and Robert demonstrated its effectiveness on simulated data with target objects as small as one pixel with a signal-to-noise ratio close to 1:1, meaning there is no distinction between signal and noise. These objects would normally be undetectable to both human eyes and sensors. The baseline detector system achieved a 30% chance of detecting a moving object. When MMODS was added to that system, it had a 90% chance of detection without increasing the rate of false alarms.



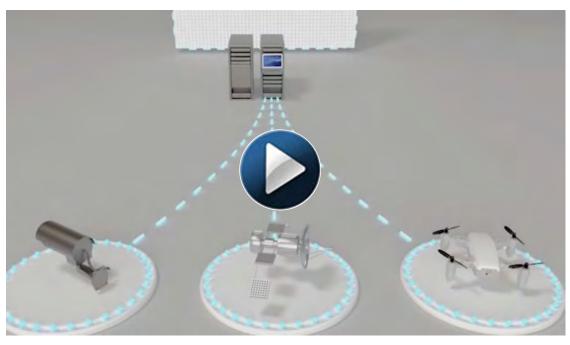


ADVANCED DETECTION — The Multi-frame Moving Object Detection System makes it possible for remote sensors to detect small moving objects that would normally be unseeable to both sensors and human eyes.

Infographic by Eric Lundin

In another demonstration, the researchers used MMODS to detect moving objects from live data collected with a remote camera at the peak of Sandia Mountain. Without prior knowledge of Albuquerque's roads, MMODS detected vehicles moving throughout the city.

"Given that a modern video camera has about 10 million pixels, being able to detect and track one pixel at a time is a major advance in computer vision technology," Tian said. "MMODS has been proven to improve modern detection sensitivity by 200 to 500% and works for fast- and slow-moving objects, even in poor visibility conditions."



MMODS IN ACTION — This animation shows how images stream from cameras and other sensors in real-time to a computer system equipped with the Multi-frame Moving Object Detection System, which then processes the data, looks for movement and matches it into target signals that can then be correlated and integrated across a set of video frame sequences, enabling the detection of small moving objects from long distances.

Animation by Eric Lundin

July brings wealth of well-being information

By Karyn Scott

andia will present next month Financial Well-Being and Beyond, a series of virtual presentations focusing on finances, emotional well-being and family care. Presentations covering a wide variety of topics such as retirement planning, managing stress and resources for putting family first will be offered from July 10-27.

This year's finale will have in-person events in New Mexico on July 25, 26 and 27, which will also be livestreamed.

The goal for this year's program is to provide Sandians with resources that empower them on their well-being journey.

"Overall well-being means finding balance among many important aspects of one's life," said Benefits senior manager Mary Romero Hart. "Aspects of wellness such as financial health, emotional well-being and family care work in tandem — a healthy mind is connected to a healthy wallet, and so forth."

Presenters for this year's events include Fidelity Investments, the Social Security Administration, Edelman Financial Engines, Prudential Financial Inc., Blue Cross and Blue Shield of New Mexico and Optum Employee Assistance Program, as well as Sandia's HR Solutions, Employee Health Services and Sandia Resources.

All Financial Well-Being and Beyond events are free to staff members.

View the schedule of events, enroll for sessions and explore other financial, emotional well-being and family care resources by visiting the Sandia Well-Being Lab.

The Financial Well-Being and Beyond program supports the Labs' People and Culture Strategy, which aims to maximize the success of Sandia's people and organizational performance through an intentional focus on Sandia's workforce capabilities, workforce effectiveness, organizational culture and employee health and wellbeing. Learn more about the People and Culture Strategy on the People Initiatives website.

Focus on Your Financial Well-Being and Beyond



Together We Rise

CONTINUED FROM PAGE 1

Sandia staff raised \$103,000, which was matched with a \$25,000 donation from NTESS, totaling \$128,000 in wildfire relief. As the one-year anniversary of the wildfires is remembered, the Albuquerque Community Foundation has released a breakdown of how the donations were distributed.

The total raised by Sandia staff and NTESS was added to the Emergency Action Fund, created by The Albuquerque Community Foundation and the United Way of North Central New Mexico to support communities damaged by wildfires. The Emergency Action Fund raised \$563,000, including the \$128,000 donated by Sandia. Of the action fund's total, \$100,000 was given immediately to nonprofits that provided emergency and basic human need services. The remainder of the funds were set aside to be used for long-term recovery.

Long-term recovery

While using Together We Rise donations to provide immediate relief was crucial, the wildfires caused so much damage that sustained, continuing efforts are necessary to fully recover the affected areas. The fires increased vulnerability of the exposed lands to seasonal rains, triggering flash flooding and debris flows, which resulted in both short-term and

long-term damage to local homes, vegetation, streams and wildlife. Long-term planning and continued financial support rebuild and regenerate effectively.

Lawrence Leahy, a Federal Emergency Management Agency long-term recovery specialist working in northern New Mexico, reported to the donors involved in the grant selection process.

from funding for long-term recovery efforts long after the fire. Funds are needed for immediate response support and also for long-term recovery support. Long-term recovery can last for several years; it is vital that funds continue to be available so communities can successfully achieve their recovery goals," Leahy said.

Many receiving organizations have reported how much these funds are helpful to them in their efforts to repair the community and protect their homesteads from monsoon flooding. Donations went to organizations focused on reforestation, prevention and increasing economic opportunities.

Helen Forte, director of Community Impact at Taos Community Foundation, expressed her gratitude for the donation and stated that the "funds were distributed to the Hermit's Peak Watershed Alliance for watershed mitigation, and to St. Paul's Peace for housing needs in communi-

are critical to ensure the affected areas can

displacement caused by the wildfires."

Through the generosity of Sandia staff, the Together We Rise campaign has substantially impacted short- and long-term recovery from the wildfires and has played a vital role in supporting affected communities, community relations specialist Roberta Rivera said. The campaign raised significant funding that continues to provide a strong foundation for rebuilding efforts. The success of this campaign demonstrates the collective determination of the Sandia community to rally during crisis.

"Communities impacted by fires benefit

ties still suffering from the damage and

Emergency Action Fund distributions

- \$100,000, distributed in 2022 to nonprofits that provide emergency and basic human need services.
- \$100,000, distributed in early 2023 to the Las Vegas Community Foundation. Of this amount, \$50,000 was donated to the Long-Term Recovery Group to provide communities with needs such as firewood and well repairs, and support more than 1,000 families. The remaining \$50,000 was distributed to support economic opportunities.
- \$50,000, distributed in early 2023 to the Taos Community Foundation to support housing needs in their affected communities.
- \$50,000, distributed in early 2023 to the Flower Hill Institute located on the Jemez Pueblo to support ongoing work in reforestation, revitalization and prevention.
- \$263,000, distributed in May 2023 through a request for proposal process. The following organizations were awarded funds through this process.
 - o \$40,000 to Mora Valley Community Health Services to repair homes for people impacted by the fires.
 - o \$30,000 to the National Forest Foundation.
 - o \$50,000 to the Valencia Soil and Water Conservation District and Friends of Whitfield Wildfire Conversation Area.
 - o \$35,000 to the Hermits Peak Watershed Alliance.
 - o \$15,000 to the Collins Lake Autism Center.
 - o \$25,000 to the Wildfire Resiliency Training Center.
 - o \$15,000 to the Mora Friday Outdoor School.
 - o \$25,000 to the Rocky Mountain Youth Corps for Acequia Wildfire Recovery.
 - o An additional \$28,000 to the Las Vegas Community Foundation Long-Term Recovery Group.



RAGING FIRES — The Calf Canyon and Hermits Peak Fire tear through mountains and valleys near Las Vegas, New Mexico, last summer. Photo courtesy of Andres Padilla

Mileposts





































Search















Retiree Deaths

January - May 2023

Robert Chan (age 74)	January 7
Saundra Monroe (74)	January 11
Jamy Peevy (67)	January 13
John Vandyke (85)	January 15
Robert Johnsen (93)	January 20
Malcolm Buttram (80)	January 22
Vernon Easley (99)	January 23
Bonita Grant (88)	January 25
Richard Beasley (92)	January 28
Zelma Creager (88)	January 28
Ronald Sorley (72)	February 3
Robert Wood (93)	February 3
Hilary Jones (83)	February 5
C. Potthoff (95)	February 5
Anderson Jones (73)	February 7
Richard Medina (83)	February 19
Rita Pitts (85)	February 20

David Hasti (86)	February 24
Ronald Domres (84)	February 27
Roger Campbell (92)	February 28
Charles Robinson (81)	March 2
Richard Jennings (94)	March 2
Forrest James (78)	March 2
David Brown (97)	March 3
Robert Sallach (92)	March 3
Gordon Barnett (104)	March 5
Kay Nordeen (76)	March 8
Mary Wagner (82)	March 9
Gordon Boettcher (91)	March 10
Wayne McMurtry (86)	March 14
Ronald Hartenberger (79)	March 14
Salomon Moya (82)	March 14
Peter Rand (82)	March 17
Norma Goodwin (85)	March 20
David Baldwin (77)	March 21
Angela Granger (91)	March 24
Joseph Pelletier (91)	March 25
Billy Wayne Duggin (92)	March 25
Patricia Shorty (79)	March 25
Arley Turner (96)	March 27
Louis Baca Flores (95)	March 29
Lawrence Desonier (72)	March 31
Edward Constantineau (89)	April 2

R. Curtis Mueller (85)	April 6
James Uhl (84)	April 7
James Bear (92)	April 8
Lester Lathrop (88)	April 9
Gordon Harvey (100)	April 10
K. Dan Hardin (92)	April 16
Gerald Reynolds (74)	April 17
David McArthur (84)	April 18
Rita Roybal (91)	April 20
Russell Brown (89)	April 25
Jake Romero (79)	April 26
C. MacCallum (94)	April 27
Marian Jordan (88)	April 28
Glenn Herreid (96)	April 30
John Darby (72)	April 30
Mary Ann Melo (90)	May 4
Jacquelin Pfarner (89)	May 4
William Peila (84)	May 4
G. Eugene Mutchie (83)	May 6
Charles Martinez (89)	May 7
Larry O'Connor (85)	May 13
Jere Harlan (86)	May 23
Robert Graham (92)	May 30
Ray Hannah (73)	May 30
Bruce Engler (68)	May 31

DOE's Lady Idos chats diversity, inclusion

By Sofia Wolinski

ady Idos, deputy director and head of the DOE Office of Diversity, Equity, Inclusion and Accessibility, spoke to



Lady Idos

Photo courtesy of DOE

Sandians about how the nation's largest employer, "the federal government, must model practices where all employees are treated with equity and respect."

Idos, who uses the pronouns she and they, presented virtually June 21 as part of the Sandia Pride Alliance Network's **Pride Blitz**.

Idos began the presentation by discussing their role in conducting a plan to increase diversity, equity, inclusion and accessibility.

To develop the DOE's strategy, Idos helped perform an internal analyses that identified areas of improvement, an external analysis that provided feedback on the self-assessment and finally in implementing a governmentwide plan. Idos said the team mapped out clear goals, which included requiring hiring managers to complete training on inclusive hiring, promoting paid internships and establishing an employee resource group for disability inclusion.

Idos also spoke about how to transition the country's energy system without exacerbating social, economic or health inequality, emphasizing the concept of energy justice. They discussed how the concept has become a priority for the federal government and reviewed a series of recent executive orders with the goal of increasing equity in the clean energy transition.

Before assuming their current role, Idos served as the chief diversity, equity and inclusion officer at Lawrence Berkeley National Laboratory, where they developed and implemented a labwide comprehensive IDEA strategy.

Idos has a master's degree in public administration from the University of San Francisco, a bachelor's in sociology from the University of California, Santa Cruz, and a diversity and inclusion certificate from Cornell University. Recognized for their outstanding contributions, Idos received the prestigious 2022 U.S. Secretary of Energy Achievement Award. They were honored for their instrumental role as part of the Bipartisan Infrastructure Law Standup Team.

Leadership, staff represent the Labs in Albuquerque Pride parade



FLOAT ON — Engineer Claudia Hartline, center, waves the transgender flag as Sandians walk down Central Avenue during the Pride parade in Albuquerque on June 10. **Photo by Craig Fritz**



RAISE A FLAG — Project controller Mary Guth joins the Sandia float during the Pride parade in Albuquerque. Photo by Craig Fritz



ALLIES IN ACTION — Labs Director James Peery, right, waves a pride flag atop the Sandia float as it moves down Central Avenue during the Pride parade.

Photo by Craig Fritz