



Welcome to the NM Partnerships Newsletter

This quarterly newsletter from Sandia National Laboratories' Academic Alliance program features recent news and accomplishments resulting from the partnership between Sandia and the following universities: University of New Mexico (UNM), New Mexico State University (NMSU), and New Mexico Tech (NMT).

Feel free to share this newsletter with anyone interested in understanding more about these partnerships. Contact [Diane Peebles](#) to be added to the distribution list.

Announcements from the NM Partnerships Program

- "Scholarship" is one of the most exciting words for students and their parents to hear. If you are a student or the parent of a student in Northern NM who is attending UT Austin, the Santa Fe Chapter of the Texas Exes offers an annual scholarship of \$5,000 per year for four years at the university. This scholarship is only available to undergraduate students. For more information, contact [Robin Ward](#) (Santa Fe Texas Exes Scholarship Chair) or [Paul Brice](#) (Santa Fe Texas Exes Scholarship President).
- NM Partnerships Manager Diane Peebles is present on the UNM campus every Thursday. Her office is in Centennial Engineering, Room 2091. Please stop by to chat!

Program Accomplishments

- Interested to learn what it's like to be a Sandia intern? Click [here](#) to view short, exciting videos featuring students from Sandia's Academic Alliance out-of-state universities!
- Sandia was provided dedicated space at NMSU's Anderson Hall/Physical Science Lab to house Sandia student interns and visitors. Sandia artwork and graphics have been installed and the space will be available for use this spring.
- **Advancing fast reactor licensing:** DOE's Nuclear Energy program awarded UNM and Sandia \$800K for three years for Nuclear Instrumentation and Control Simulation for Evaluating Response to Cyberattacks (NICSim). The NICSim platform aids in investigating the cybersecurity of nuclear power plant instrumentation and control systems by developing and validating a programmable logic controller emulation methodology and developing a reliable, fast-running interface that effectively links to a physics-based simulation model within the Matlab Simulink framework. The collaborative project is being led by Mohamed S. El-Genk, Distinguished and

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Regents' Professor of Nuclear Engineering and founding director of the UNM Institute for Space and Nuclear Power Studies

Did you know?

- Sandia and UNM have an umbrella Cooperative Research and Development Agreement (CRADA) to foster partnerships in mutual research areas. The umbrella CRADA with UNM outlines nine areas for collaboration, including quantum information science; computational science and engineering; cybersecurity; data analytics, systems analysis and intelligence science; nuclear engineering and high-energy density science; advanced materials and devices; energy and water; bioscience for national security; and emerging science and engineering capabilities for national security.
- Sandia's NM Partnerships program has initiated an Accelerated Collaborative Research Nucleus (ACORN) program that strives to connect an early career faculty member at a NM university with an early career LDRD principal investigator at Sandia. This program will sponsor one new project per year at each of the NM schools, with each project eligible for three-year funding.

Spotlight on People

Each quarter we highlight people that were engaged in our NM partnership! This can include a student, faculty member, and/or a Sandia principal investigator (PI). If you have suggestions on who to spotlight, please contact [Diane Peebles](#).

Student Spotlight: Maimuna Hossain



Maimuna Hossain is a PhD student in the UNM Department of Mechanical Engineering, pursuing research in structural dynamics and vibrations. She received her bachelor's degree in Mechanical Engineering from Columbia University and worked as a mechanical engineer in the Satellite Communications Branch at the Tobyhanna Army Depot. During the year, Hossain works on an LDRD project focused on finding the dynamic properties of a structure under vibration. The project successfully produced two conference papers and potential journal papers. As she continues her work, this project will become her thesis for dissertation.

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According to Hossain, “Working with Sandia has expanded my understanding of structural dynamics for aerospace applications. It exposed me to what it is like to work for the Labs and allowed me to meaningfully combine skills in linear algebra, advanced computation techniques as well as mechanical and structural engineering in order to solve technical problems.”

Faculty Spotlight: Meeko Oishi

Meeko Oishi, UNM Professor in Electrical and Computer Engineering, will lead a new \$5.5M UNM collaborative program to optimize human cyber-physical systems for autonomous hypersonic systems as well as support Department of Defense work in human automation systems. This collaboration builds on work from an SAA LDRD project and the Autonomy for Hypersonics Mission Campaign. Oishi is interested in building on this new program to create a hub for autonomy research at UNM, ideally in alignment with the major initiatives in autonomy going on concurrently at Sandia and AFRL. With a critical mass of faculty and students working on rich and timely problems, she is excited about what could be accomplished in the next five years.



Notable Events

Research Spotlight Forums

Sandia developed a Research Spotlight Forum series to seed new collaborative relationships with universities by increasing faculty knowledge of Sandia program areas and providing the opportunity for Sandians to learn more about university capabilities, faculty expertise, and their involvement in related programs. Recent Research Spotlight forums included the topics below. Presentations from previous Research Spotlight Forums can be found on the [Sandia web page](#).

August 6 | Cybersecurity | David White, Cybersecurity Champion

Presenters and participants from Sandia, UNM, NMSU, NMT, and Georgia Tech discussed many facets of cybersecurity R&D and applications to understand, identify, and stop threats to networks and critical infrastructures, especially energy infrastructure. Research topics discussed included analytics and emulotics, machine learning, authentication for software/firmware/hardware, novel electronics and manufacturing to build trusted components and systems, and privacy. Participants

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discussed educational collaborations needed to develop a workforce with the mindset to build security into technologies during conception rather than as a response.

October 17 | Grid Resiliency | EpSCor’s Anne Jakle, Grid Resiliency Champion

This session focused on R&D to modernize the electric grid to ensure energy security can be assured through resiliency (i.e., responding, adapting, maintaining operations, and recovering from natural or human-caused threats). Topics presented by researchers from Sandia, UNM, and NMSU included physical and cyber security, renewable sources, modeling and machine learning, novel electronic technologies and control systems, and resilient community design. Participants discussed collaboration opportunities for innovative integration of cutting-edge capabilities in these areas to address the full spectrum of threat to recovery.

Jan 7 | Advanced Manufacturing | Randy Schunk, Advanced Manufacturing Champion

The Advanced Manufacturing forum participants discussed myriad facets of advanced manufacturing and R&D needs and opportunities to enhance performance, improve reliability, and lower cost, while also reducing the time for discovery, engineering, qualification, and acceptance of materials and components for national security applications. Topics presented by researchers from Sandia, UNM, NMSU, UT Austin, and Georgia Tech included design optimization, in situ metrology and control, and understanding how processes and defects impact properties and performance. Topics also included additive manufacturing at all scales—from nanotweezers for precise atomic manipulation to full component production—and addressed applications including advanced microelectronics and energetic materials.

**SAA University Partnerships
Capstone Kickoff**

A meeting to kick off the first New Mexico Capstone Challenge was held at Sandia on September 20, 2019. There was a total of 21 attendees from the UNM, NMSU, and NMT engineering schools. The kickoff provided students and faculty with an overview of Sandia and its national security mission, allowed participants to meet the other teams and learn more about the challenge,



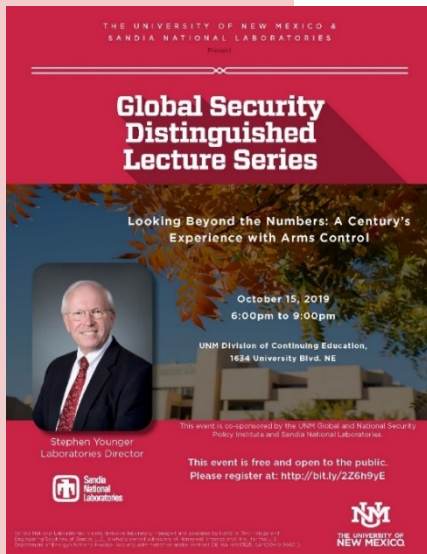
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and tour MESA and the Environmental Test Facility. The NM Capstone Challenge is designed to support undergraduate engineering design course objectives by providing a multidisciplinary challenge that increases awareness of Sandia as a national laboratory and potential employer for engineering graduates, and our national security mission. Each team will build and test an integrated sensing device to compete on April 24.

UNM/Sandia Global Security Distinguished Lecture Series with Steve Younger



Steve Younger was the inaugural speaker for the new UNM/Sandia Global Security Distinguished Lecture Series on October 15, 2019 at UNM’s Continuing Education Center. The UNM/Sandia Global Security Distinguished Lecture Series is a collaborative effort with principal goals to highlight current topics in global security and increase community awareness. This partnership enables key high-level speakers to engage with the general Albuquerque community, improve awareness of global security issues, and strengthen global collaborations in this very important area. In his lecture titled, “Looking Beyond the Numbers: A Century’s Experience with Arms Control,” Younger discussed how these treaties succeeded in their near-term objectives but failed to prevent the Second World War. He also outlined several options aimed at optimizing the probability of strategic stability in the coming century. There

were an estimated 100 attendees from Sandia, UNM, and the Albuquerque community. You can view the video recording [here](#).

Recent Joint Publications

Entries on January 14 using data from the [Clarivate Web of Science](#). Titles below link to DOI references for full information.

UNM

- [Razorback – A reactor transient analysis code for large rapid reactivity additions in a natural circulation research reactor](#)
- [Molecular dynamics investigation of threshold displacement energies in CaF2](#)
- [A Priori Methods to Assess the Strength of Nonlinearities for Design Applications](#)
- [Predictive Modeling of Bolted Assemblies with Surface Irregularities](#)

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Sandia National Laboratories

NM Partnerships Report



EXTERNAL NEWS

February 2020

POC: [Diane Peebles](#)

NMSU

[A Priori Methods to Assess the Strength of Nonlinearities for Design Applications](#)
[Predictive Modeling of Bolted Assemblies with Surface Irregularities](#)

NMT

None

Upcoming Events

Date

Event

March 10, 2020

[Research Spotlight Forum: Social Sciences and Decision Making](#)

March 10, 2020

UNM Bioengineering Workshop

April 10, 2020

[UNM ADVANCE Workshop: How to Build Collaborations with Sandia Scientists](#)

April 24, 2020

Capstone Competition

April 28, 2020

[Research Spotlight Forum: Bio-Informatics and Bioengineering](#)

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