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MSI Electric Energy Systems Workforce Initiatives at Sandia National Laboratories

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SANDIA HAS FIVE MAJOR PROGRAM PORTFOLIOS

Academic Programs

Building an innovation pipeline through partnerships that facilitate access to talent, ideas, and R&D capabilities

Stimulate innovation through strategic academic relationships while growing the talent pipeline and increasing workforce development opportunities.

CULTIVATE STRATEGIC AND ENDURING INSITUTIONAL RELATIONSHIPS

- Establish university engagement guidelines and best practices
- Facilitate research contracting and university memberships

BUILD AND GROW IMPACTS OF RESEARCH COLLABORATIONS

- Develop university networks and joint research opportunities
- Capitalize on research seed funding

STIMULATE WORKFORCE DEVELOPMENT

- Enable faculty exchanges/faculty loans/joint appointments
- Leverage university networks and research consortiums

FUEL THE TALENT PIPELINE

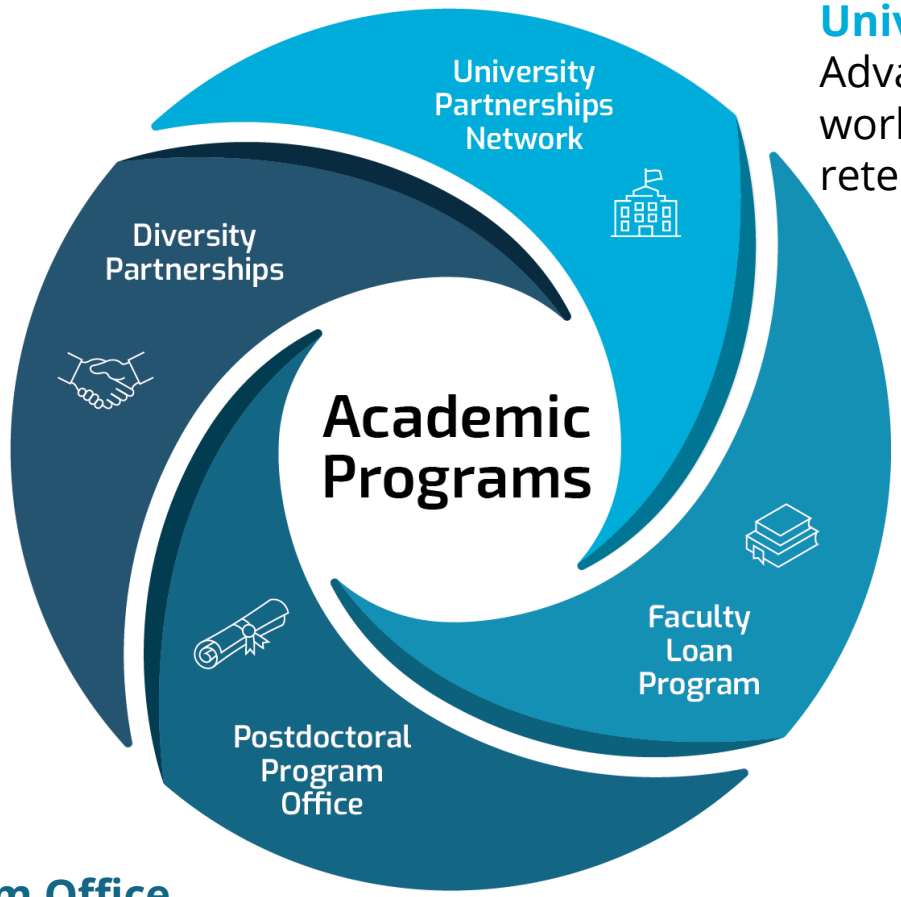
- Maximize student and educational outreach events
- Recruit high-caliber, diverse candidates through targeted development initiatives
- Cultivate the pipeline in critical skills areas

Helping Sandia and NNSA accomplish their mission objectives by facilitating and coordinating university relationships

Academic Programs

Stimulate innovation through strategic academic relationships while growing the talent pipeline and increasing workforce development opportunities to help the line accomplish their mission objectives.

Diversity Partnerships
Coordinating Sandia's engagements with DOE's Minority Serving Institutions (MSI) Programs.



University Partnerships Networ*k*
Advancing capabilities and enhancing workforce development, attraction, and retention through our academic partnerships.

Faculty Loan Program
Enhancing workforce development, attraction, and retention through the Faculty Loan Program.

Postdoctoral Program Office
Ensuring Sandia and its postdoctoral researchers obtain the highest level of benefit from the Postdoctoral Program.

NNSA/DOE MINORITY SERVING INSTITUTIONS PROGRAMS

Fostering a sustainable STEM-pipeline that prepares a diverse workforce of world class talent

- Strategic partnerships between MSIs and the DOE/NNSA Enterprise.
  - Minority Serving Institutions Partnership Program (MSIPP)
  - Minority Serving Institution Internship Program (MSIIP)
  - MSIPP Tribal Education Partnership Program (TEPP)

- Strengthen and expand MSI STEM capacity and research experience in NNSA/DOE mission areas of interest.

- Grow the number of minority students who graduate with STEM degrees.

- Grow the number of minority graduates and post-doctoral students hired in to DOE/NNSA's STEM workforce.

- Through university-lab consortia partnerships, students are exposed to cutting-edge research and activities in their relevant fields.

- Network of national security enterprise (NSE)-ready students through enrichment activities from K-20 to post-doctoral level to prepare NNSA's next-generation technical workforce.

MSIPP

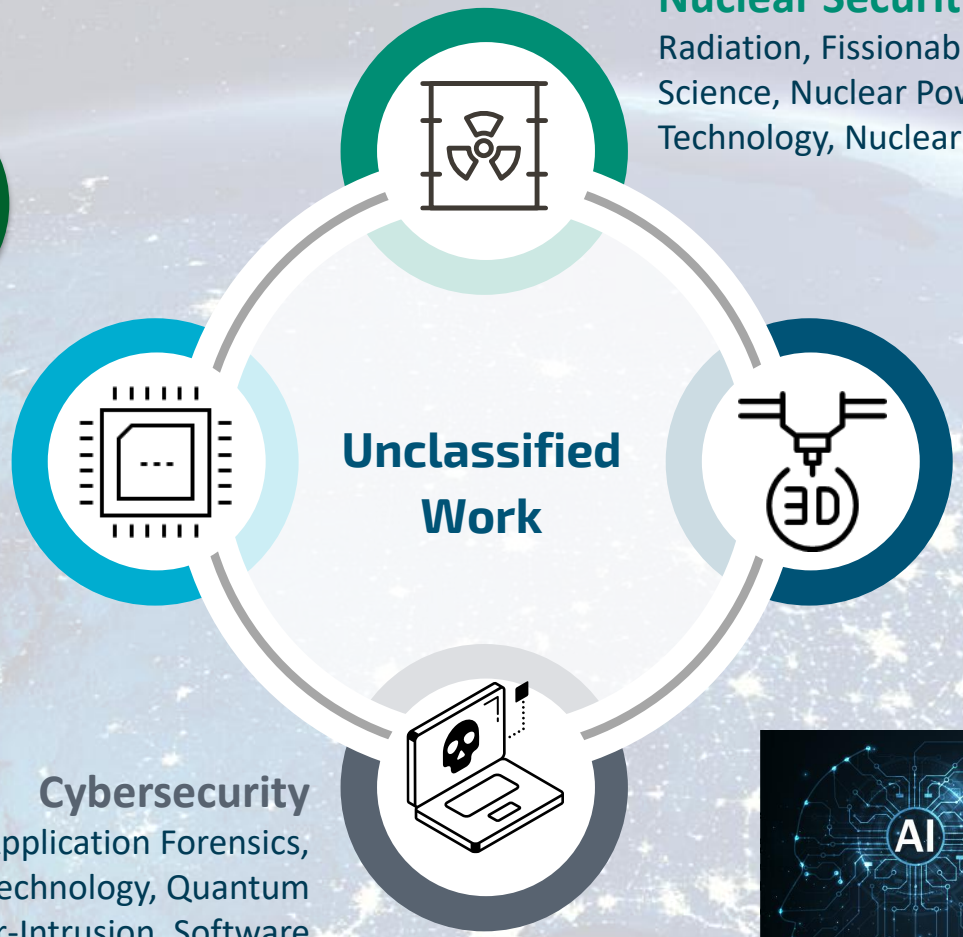
MSIIP

TEPP

Project Topic Areas

Engineering

Computer Engineering, Material Science, Nuclear Engineering, Chemical Engineering, Microelectronics, Nanotechnology Engineering, Electrical Engineering, Microsystems, Mechanical Engineering, Photonics

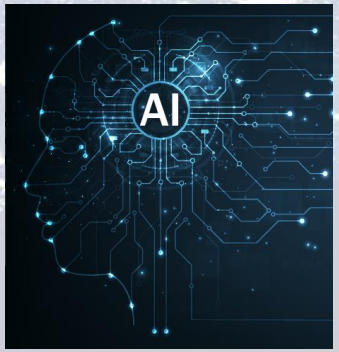


Nuclear Security

Radiation, Fissionable Fuels, Radiation Detection Systems, Nuclear Science, Nuclear Power, Nuclear Security, Nuclear Forensics, Nuclear Technology, Nuclear Physics

Advanced Manufacturing

Metrology, Ceramics, Composites, Materials at Extreme Conditions, Powder Production, Characterization, 3D Printing for Nuclear Application, Physical Property Testing, Enhancing Design, Material Science, Additive Manufacturing & Coating, Modeling & Simulation, Surface Finishes, Polymers



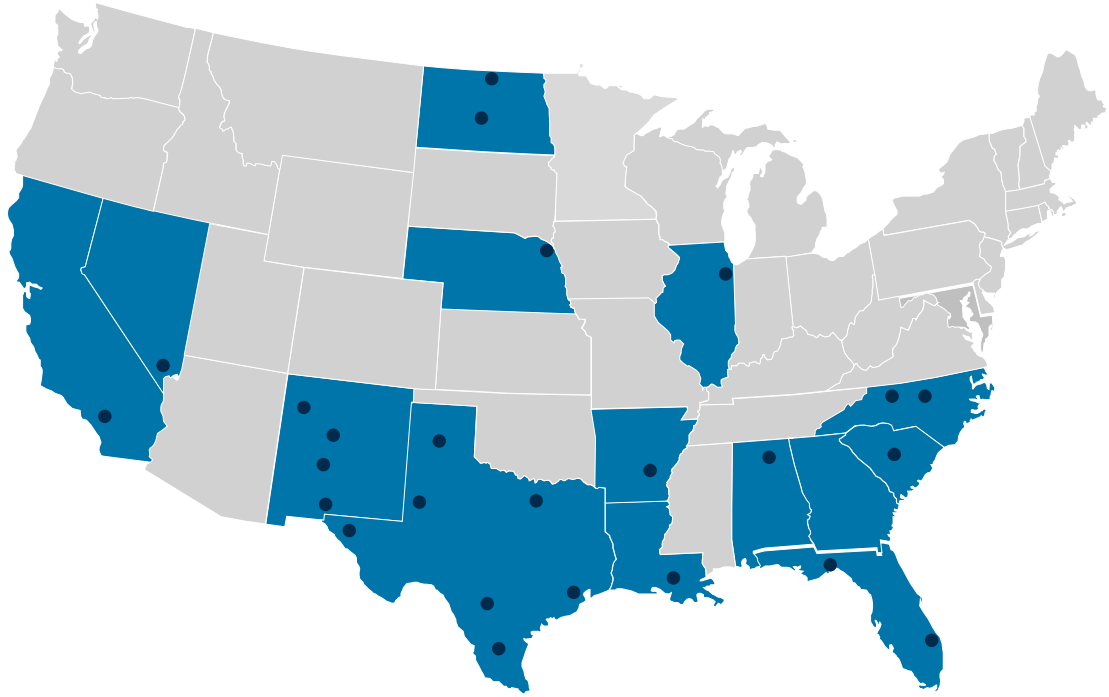
Cybersecurity

Machine Learning, Embedded Programming, Application Forensics, Cyber & Network Analytics, Information Technology, Quantum Computing, Network Forensics, Counter-Intrusion, Software Development, Systems Administration, Protecting Digital Evidence, Cloud –Based Forensics, Software & Hardware Engineering, Vulnerability Assessment, Host-Based Forensics, Data Science

Minority Serving Institute Partnerships Program

Consortia consisting of Minority Serving Institutions (MSIs) and Tribal Colleges and Universities (TCUs) with a focus on building and supporting the workforce capacity of the National Nuclear Security Administration's (NNSA) Nuclear Security Enterprise (NSE) by:

- Expanding scientific and technical knowledge in the areas of Advanced Manufacturing, Cybersecurity, Engineering, or Nuclear Security
- Providing experiential learning opportunities for students STEM related disciplines
- Building and strengthening research and education capacities of participating institutions
- Promoting collaborations with the NNSA NSE

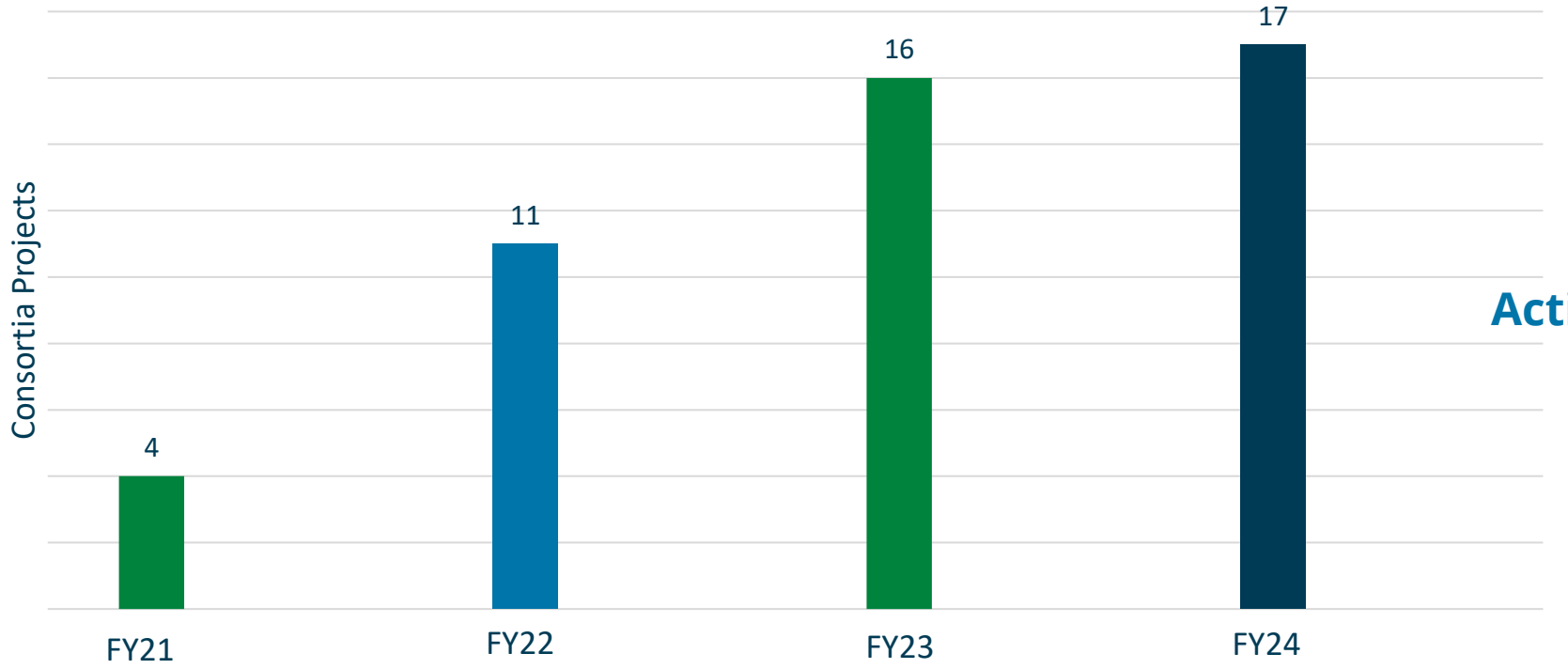


16 HSIs	10 HBCUs	**17 Sandia Consortia** (FY23-24)	3 NSE Labs
5 TCUs	2 AANAPISIs		5 SNL hires

65 Interns

5 Faculty

Sandia’s MSIPP Consortia Growth



Active Consortia

Sandia's involvement in MSIPP has seen significant growth, with the number of consortia projects increasing from 4 in FY21 and reaching 17 in FY24

This expansion reflects our commitment to strengthening and expanding educational and research capacities at minority and tribal serving institutions, fostering collaborations that provide direct access to NSE resources, and increasing the number of minority graduates and post-doctoral students hired into the NSE’s technical and scientific workforce

Sandia MSIPP Participation: Past/Inactive Consortia

1. **CECOR:** The Consortium Enabling Cybersecurity Opportunities & Research (formerly known as the Whitehouse Cyber Initiative)
   - **Norfolk State University**
   - Clark Atlanta University
   - Paine College
   - Bowie State University
   - *North Carolina A&T State University
   - Allen University
   - Benedict College
   - Claflin University
   - Denmark Technical College
   - Morris College
   - South Carolina State University
   - Voorhees College
   - Charleston County School District
   - University of the Virgin Islands
   - Lawrence Livermore National Laboratory
2. **CIESESE:** Consortium for Integrating Energy Systems in Engineering and Science Education
   - **Universidad Ana G. Mendez**
   - University of Texas El Paso
   - University New Mexico
   - University Puerto Rico Mayaguez
   - Miami Dade College
   - National Energy Technology Laboratory
3. **AMNI:** Advanced Manufacturing Network Initiative
   - **Navajo Technical University**
   - Bay Mills Community College (BMCC)
   - Cankdeska Cikana Community College(CCCC)
   - Salish Kooteani College (SKC)
   - Turtle Mountain Community College
   - United Tribes Technical College

"CECOR's main focus is to establish a world-class workforce development, education and research program that combines the strengths of Historically Black Colleges and Universities (HBCUs) and Sandia Labs to develop a K-20 pathway for students to participate in cybersecurity and other STEM fields. CIESESE provides opportunities for students from Hispanic Serving Institutions (HSI) to pursue studies and careers in energy systems R&D. AMNI's goal is to establish a network of Tribal Colleges and Universities (TCUs) with essential advanced manufacturing facilities, associated training and education programs, and private and federal agency partnerships to both prepare a workforce and create economic and employment opportunities within tribal communities through design and manufacture of high quality parts."

Sandia MSIPP Participation

4. **CREPES:** Consortium for Research and Education in Power and Energy Systems
   Florida International University
   University of Texas El Paso
   Alabama A&M University

5. **STEP2NL:** Successful Training and Effective Pipelines to National Laboratories
   New Mexico State University
   University of New Mexico
   Central New Mexico College

6. **CHRES:** Consortium for Hybrid Resilient Energy Systems
   Universidad Ana G. Mendez
   University of Texas El Paso
   University New Mexico
   University Puerto Rico Mayaguez

7. **CONCISE:** Consortium on National Critical Infrastructure Security
   University of Texas San Antonio
   North Carolina A&T State University
   University of Nevada Las Vegas
   Savannah State University

8. **GSC:** Growing Stems Consortium
   Texas Tech University
   New Mexico Institute of Mining and Technology
   Amarillo College

9. **NSAM-ML:** Nuclear Security Advanced Manufacturing Enhanced by Machine Learning
   North Carolina Central University
   Southern University at Baton Rough
   Elizabeth City State University

10 - 16. **TCU:** Tribal Colleges and University Consortiums

ENRGE: Enabling Native Researchers and Graduate Education Systems
Navajo Tech University

ASPIRE: Advanced Synergistic Program for Indigenous Research in Engineering
Turtle Mountain Community College
United Tribes Technical College

PAMER: Partnership for Advanced Manufacturing Education and Research
Navajo Technical University
Nebraska Indian Community College
University of Texas El-Paso
Southwestern Indian Polytechnic Institute

IMPACT: Indigenous Mutual Partnership to Advanced Cybersecurity Technology

NEXT: Native Education Excellence in Trades

BEST: Business Enablers in Science & Technology

Sandia MSIPP Participation

17. **Grand CARES:** The Rio Grande Consortium for Advanced Research on Exascale Simulation
    University of New Mexico
    University of Texas at El Paso
    New Mexico State University
    New Mexico Institute of Mining and Technology

18. **E3C:** Consortium for Education and Research in Electronics for Extreme Environments
    University of Texas El Paso
    North Carolina A&T State University
    University of New Mexico

19. **MEMENCYS - UC-Sandia Partnership:** Microelectronics & Materials Engineering Education for Nuclear and Cyber Security
    University of California Riverside

20. **SEEP-IT Consortium on Sensing**: Energy-efficient Electronics and Photonics with 2D Materials and Integrated Systems for Training the Next-Generation DOE-NNSA STEM Workforce
    University of North Texas
    University of Texas at Arlington
    University of Arkansas at Pine Bluff
    ANL

21. **MATE**: MSIPP Gulf Coast A&M Consortium: Materials-At-The-Extreme-Material Science for Extreme Environment
    Florida A&M University
    Prairie View A&M University
    LANL

22. **IAM-EMPOWEReD**: Advance manufacturing research and training in additive processed ceramics, polymers, composites, and metals.
    Florida A&M University
    Florida State University
    Benedict College
    University of Texas Rio Grande Valley

Consortium for Research and Education in Power and Energy Systems (CREPES 1.0)

- Establish a pipeline of diverse qualified students in Power and Energy Systems from Hispanic-Serving Institutions (HSI) and Historical Black Colleges and Universities (HBCU)

- Sandia to hire ~10 funded MSIPP interns each summer for three years (2022-2024) from three specific universities, paid mostly by the CREPES program

- **Our *team:***
  - *University Partners:*
    - ***Florida International University (FIU) Lead***
    - ***University of Texas at El Paso (UTEP)***
    - ***Alabama A&M University (AAMU)***
  - DOE/NNSA partners:
    - **Sandia National Laboratories,**
    - **Lawrence Livermore National Laboratory**

FIU held the first annual workshop

Consortium for Research and Education in Power and Energy Systems (CREPES 1.0)

- **Opportunities for the Students**
  - Mentorship (partnered with at least one staff member)
  - Hands on R&D experience
  - Hands on Laboratory experience
  - Tours of state of the art facilities
  - Seminar invites to Subject Matter Experts distinguished talks

- **Success Stories**
  - 28 summer internship opportunities
  - 10 interns converted to year-round internships
  - 3 interns accepted to very competitive programs to have Sandia pay for their Masters degrees
  - 4 interns hired as full time staff.

Year	Undergrad Interns	Graduate Interns	Converted to Year-round Interns	Converted to Staff
Summer 2022	8	2	2	3
Summer 2023	5	4	6	1
Summer 2024	2	7	2	
Total	**15**	**13**	**10**	**4**

CREPES Intern Highlights

Name: Yuliana Mendoza-Carmona
University: Florida International University, Georgia Institute of Technology
Degree pursuing: MS in Cybersecurity
CREPES dates: May 2022 – July 2022

Internship project topic area: Wireless Power Transfer Systems

Research interests: Cyber-Physical Systems, Power Grids, Cybersecurity

"The CREPES internship at Sandia gave me the opportunity to perform research and work with a variety of professionals in bringing an idea to reality. From it, I learned new perspectives and valuable skills."

Name: Antonio Avila
University: University of Texas at El Paso
Degree pursuing: PhD in Electrical & Computer Engineering
CREPES dates: May 2023 – July 2023.

Internship project topic area: Decarbonization and Incorporating Inverter-based Resources into Power Systems

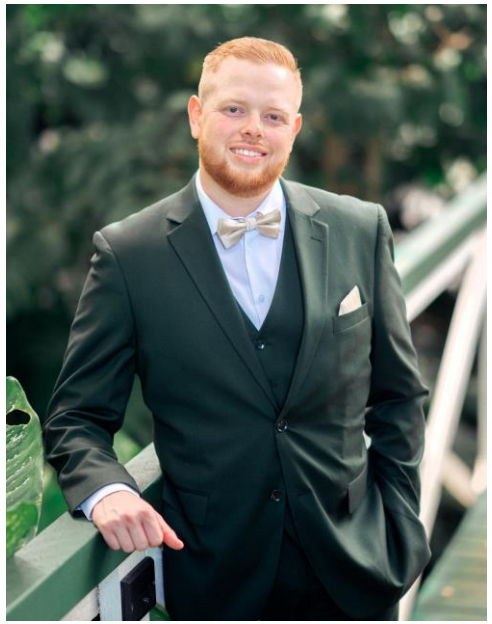
Research interests: Integrating electric vehicles (EVs), optimal demand response strategies, distributed energy resources (DERs), extreme weather events.

"Being part of CREPES and interning at Sandia National Labs has significantly enhanced my understanding of grid-following systems for BESS and inspired me to contribute to sustainable energy solutions."

CREPES Intern Highlights

Name: Ernesto Alva Chavez
University: Florida International University
Degree pursuing: MS in Data Science & Artificial Intelligence
CREPES dates: May 2024 – Aug. 2024
Internship project topic area: Energy Storage
Research interests: Machine Learning, Power Systems

"My internship at Sandia has been a combination of constant learning and applying my knowledge to a real-world relevant project. Overall a very enriching experience."



Name: Oscar Samuel Acosta
University: The University of Texas at El Paso
Degree pursuing: PhD in Electrical & Computer Engineering
CREPES dates: May 2022 – December 2024
Internship project topic area:
- Instant arc detection to reduce wildfire ignition with fast protective relaying
- Improving resiliency during evacuations for increased EV penetration

Research interests:
- DER integration techniques, Extreme weather resilience, Grid modeling and modernization

"Working for Sandia has allowed me to fulfill my career aspiration of utilizing both intellectual ability and creativity to achieve meaningful goals."

CREPES Intern Highlights

Name: Armando Y. Montoya
University: The University of Texas at El Paso**,** Georgia Institute of Technology
Degree pursuing: M.S. in Electrical Engineering
CREPES dates: Jan 2022 – May 2023

Internship project topic area: Embedded System Development for Power System Protections and Power Electronics

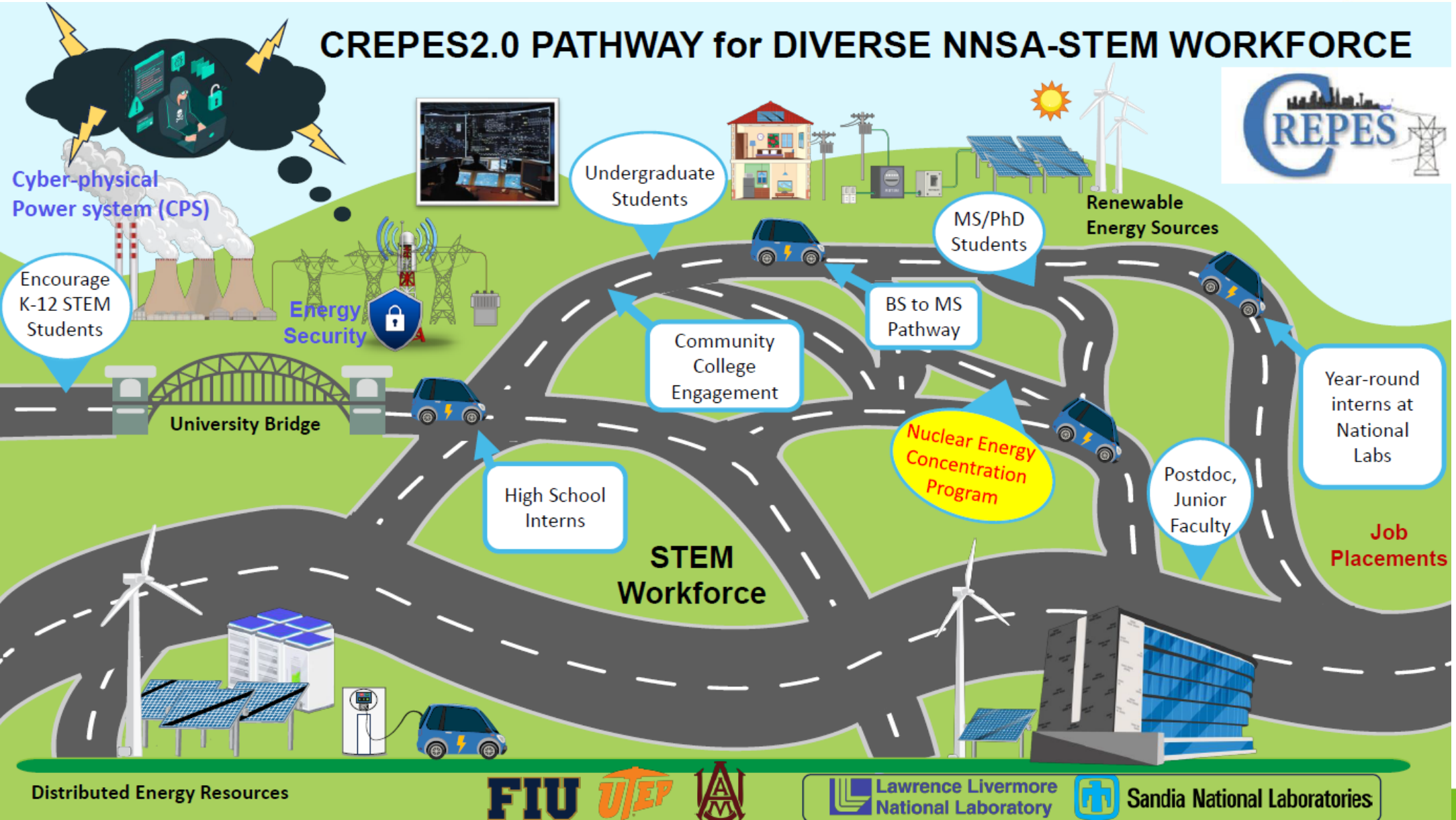
Research interests: Designing embedded systems for optimal control of modular and distributed power electronic systems

"The CREPES program paved the way for me to become a successful researcher and has opened the door to many opportunities I never thought to be possible."

"Working with CREPES and Sandia has allowed me to explore computer science research and shape my future career aspirations." ~Andres Lopez, FIU

"The CREPES program helped me discover my passion for research in engineering and allowed me to gain invaluable experience through internship programs at prestigious labs like Sandia National Laboratories which has motivated me to pursue graduate school in the future." ~Luis Garza, UTEP

Consortium for Research and Education in Power and Energy Systems (CREPES 2.0)



CREPES Program Overall

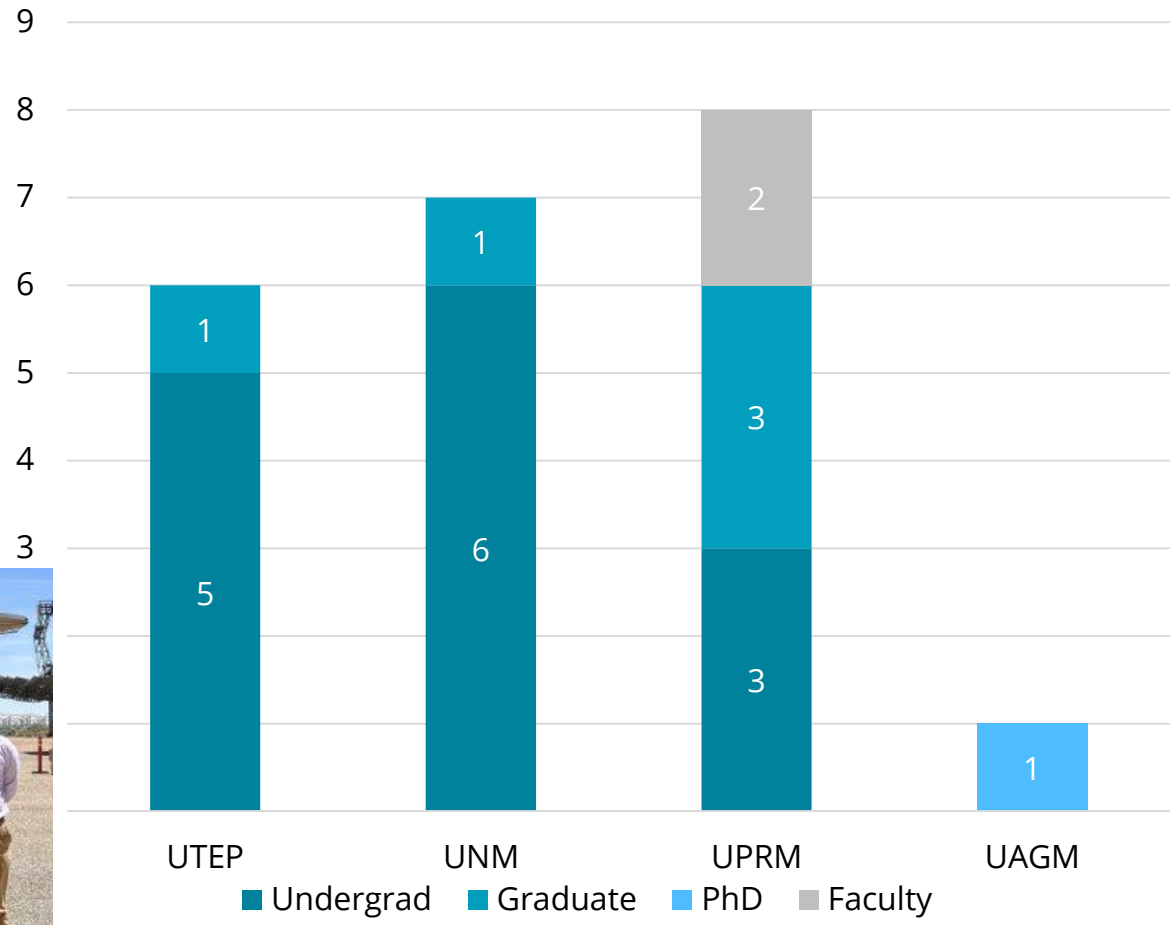
FY 2022 – FY 2029

Consortium for Hybrid Resilient Energy Systems (CHRES)

FY2023:

- **20** Total Students (17 CHRES Funded + 3 Direct Funded)
- **2** Faculty Fellows
- **4** Centers/**12** Departments Represented
- **15** Mentors

UNIVERSITIES & ACADEMIC LEVELS



Tribal Colleges and Universities (TCU) Summer Camps, Sandia Tours, & SME Lectures

Stanley Atcitty (Stan), Ph.D.
Senior Scientist, IEEE Fellow
Nuclear Fuel Cycle & Grid Modernization, Center 08800
Sandia National Laboratories

Email: satcitt@sandia.gov

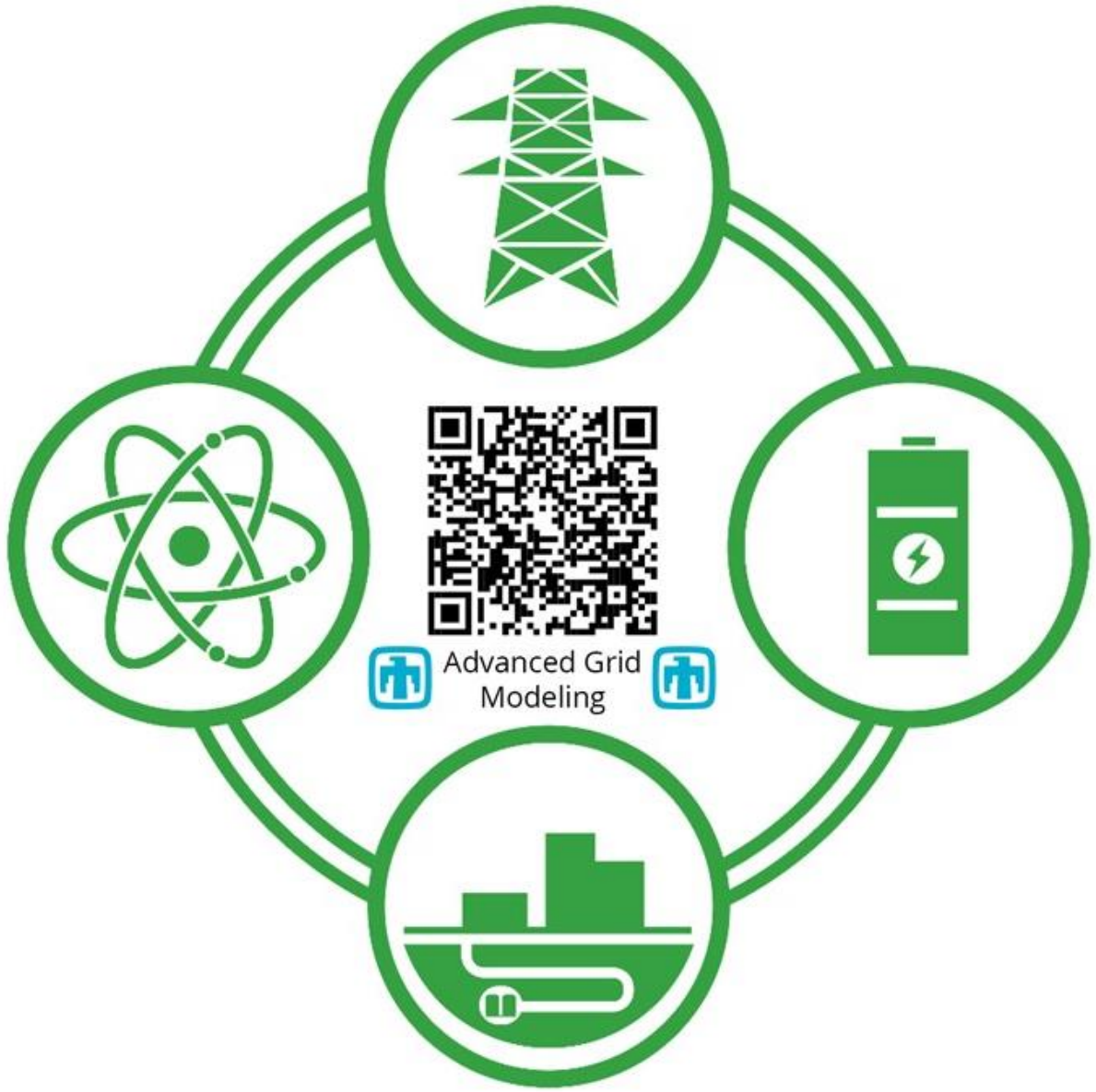
Acknowledgement

Thank you to NNSA and DOE

National Nuclear Security Administration

Thank you to the dedicated staff, interns, and our university partners

U.S. DEPARTMENT OF ENERGY



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