

UW Board of Trustees Research and Economic Development Committee
 Agenda
 May 08, 2024, at 1:00 pm – 3:00 pm

Public Session:

Agenda #	Description:	Page #
1.	<p>UW-NSF Career Award Proposal and Recipients</p> <p><u>Energy Storage Systems for Dynamic Reliability of Modern Clean Smart Grid</u> Dr. Nga Nguyen - Assistant Professor, Electrical Engineering and Computer Science, CEPS</p> <p><i>Propelled by low-carbon energy policies, low costs of operation, and the necessity of phasing out fossil fuels, the U.S. power system is experiencing a fast-paced integration of renewable energy resources (RERs) and electric vehicles (EVs). Despite these advantages, the increasing integration of these resources causes more challenges to system stability and reliability. These challenges can be tackled by energy storage systems (ESSs) with high storage capacity and fast response. Although numerous operational models of ESSs have been developed, they are often based on abstract models and target-specific assumptions. Therefore, this project will develop advanced algorithms to accurately model and manage the operation of ESSs with computational efficiency to improve system stability and reliability and establish adaptable solutions that can adapt to diverse technologies, accommodate new applications, and operate effectively within dynamic markets.</i></p> <p>Dr. Diksha Shukla Assistant Professor, Electrical Engineering and Computer Science, CEPS <i>In the rapidly evolving digital landscape, robust user authentication is crucial. Traditional methods like PINs and biometrics are insufficient, especially in immersive environments. This NSF CAREER project employs Electroencephalography (EEG) signals to craft advanced authentication algorithms tailored for AR/VR systems. Another pivotal long-term objective is to develop a brain signal-based human-machine interaction system. By deciphering brain responses to stimuli, the research aims to forge secure, lightweight, and user-friendly authentication and brain-computer interaction methods. Comprehensive analyses, including investigations into spoofing attacks, ensure reliability. Longitudinal studies further enhance effectiveness. Additionally, the project emphasizes diversity and inclusion in STEM education, fostering a more equitable digital future.</i></p>	<p>3</p> <p>10</p>
2.	<p>REDD Updates Vice President Parag Chitnis EPSCoR/IDEA Office Dr. Shawna McBride Industry and Strategic Partnerships Office Dr. Curtis Biggs Angela Ver Ploeg</p>	<p>17</p> <p>39</p>

REDC
COMMITTEE MEETING MATERIALS

AGENDA ITEM TITLE: NSF Career Award applicant and awardees – Chitnis/McBride

- OPEN SESSION
- CLOSED SESSION

PREVIOUSLY DISCUSSED BY COMMITTEE:

- Yes
- No

FOR FULL BOARD CONSIDERATION:

- Yes [*Note: If yes, materials will also be included in the full UW Board of Trustee report.*]
- No

Attachments/materials are provided in advance of the meeting.

EXECUTIVE SUMMARY:

CAREER: The Faculty Early Career Development (CAREER) Program is a Foundation-wide activity that offers the National Science Foundation's most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization. Activities pursued by early-career faculty should build a firm foundation for a lifetime of leadership in integrating education and research. NSF encourages submission of CAREER proposals from early-career faculty at all CAREER-eligible organizations and especially encourages women, members of underrepresented minority groups, and persons with disabilities to apply. UW has 3 Faculty members who have been awarded this prestigious award in 2023. Dr. Nga Nguyen, Dr. Diksha Shukla and Dr. Xiang Zhang(not presenting today)

PRIOR RELATED COMMITTEE DISCUSSIONS/ACTIONS:

NA

WHY THIS ITEM IS BEFORE THE COMMITTEE:

Information only

ACTION REQUIRED AT THIS COMMITTEE MEETING:

None

PROPOSED MOTION:

NA

REDC
COMMITTEE MEETING MATERIALS

AGENDA ITEM TITLE: REDD Updates– Chitnis

- OPEN SESSION
- CLOSED SESSION

PREVIOUSLY DISCUSSED BY COMMITTEE:

- Yes
- No

FOR FULL BOARD CONSIDERATION:

- Yes [*Note: If yes, materials will also be included in the full UW Board of Trustee report.*]
- No

Attachments/materials are provided in advance of the meeting.

EXECUTIVE SUMMARY:

Vice President Chitnis and others will provide updates on activities within the division, including updates on the EPSCoR/IDEA office and the Industry and Strategic Partnership office.

PRIOR RELATED COMMITTEE DISCUSSIONS/ACTIONS:

Updates provided at each in-person meeting of the Research and Economic Development Committee, EPSCoR/IDEA Office in September 2023, Industry and Strategic Partnerships Office in November 2023.

WHY THIS ITEM IS BEFORE THE COMMITTEE:

Information only

ACTION REQUIRED AT THIS COMMITTEE MEETING:

None

PROPOSED MOTION:

NA

Energy Storage Systems for Dynamic Reliability of Modern Clean Smart Grid

Nga Nguyen

Department of Electrical Engineering and Computer Science
University of Wyoming



Introduction

- Integration of renewable energy resources and electric vehicles in the U.S. power grid:
 - Advantages: no pollution - low operation cost - phasing out fossil fuels
 - Disadvantages: challenge system stability/reliability
- Solution: Energy storage systems (ESSs)
- Problems:

It is necessary to:

 - Establish accurate models for the dynamics and contributions of ESSs
 - Identify the dedicated communication/coordination of ESSs
 - Develop efficient solutions for ESS management.



Project Goals



Project tasks



Intellectual Merit

- A comprehensive model to examine the dynamics and impacts of ESSs/EVs/RERs (EERs) on system stability
- A new optimal algorithm for controlling EERs in real-time dynamic markets using Mean Field Game theory
- The application of Kron reduction inside reliability framework
- A new Deep Neural Network-assisted Monte Carlo simulation to assess composite reliability in real-time.



Broader Impacts

- Positive impacts in terms of system resilience and sustainability:
 - Resilience: makes microgrids and bulk grids less vulnerable to disturbances
 - Sustainability: increases public awareness, fosters economic development, facilitates social equity, promotes a clean environment
- Impacts on the scientific research community: the project outcomes
- Other notable impacts: the integration of educational activities, which in turn facilitates widespread student involvement in STEM and career opportunities.



Education and Student Success

- Curriculum development: renovate the power engineering curriculum.
- Graduate program development: students will be trained and collaborate with experts from national labs and industry companies.
- Undergraduate program development: project tasks will be included in senior design project.
- Development of a diverse, globally competitive STEM workforce: underrepresented minorities, first-generation college and low-income students.
- Outreach to K-12 students, the community, and beyond: A program that includes inreach and outreach activities is set up to introduce K-12 students in Wyoming to renewable energy resources and energy storage systems.

CAREER: BrainCAPTCHA

Completely Automated Test for User Verification using Dynamic Brain Biometrics



Diksha Shukla
Assistant Professor
Dept. of Electrical Engineering and
Computer Science



College of Engineering
and Applied Science
Electrical Engineering
and Computer Science

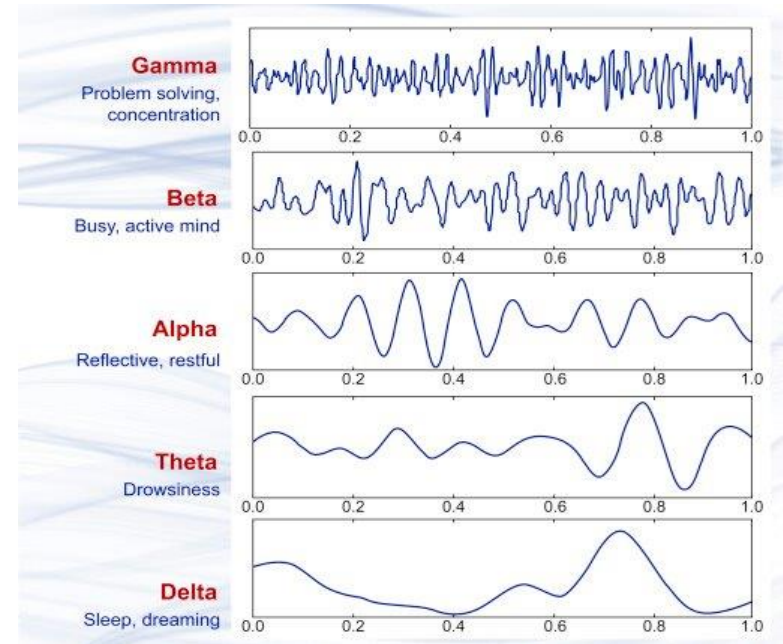
Overarching Goal

The ***overarching goal*** of the proposed work is to **leverage machine intelligence techniques** and the **unique dynamic brain signal (EEG)** features to design and develop an easy-to-use, convenient, lightweight, and cost-effective user authentication system, Brain-CAPTCHA, using an optimized design.

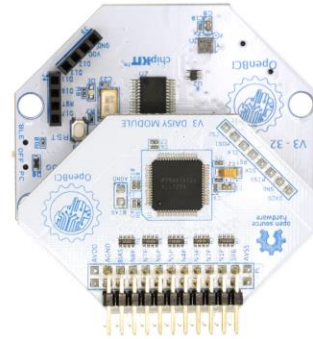
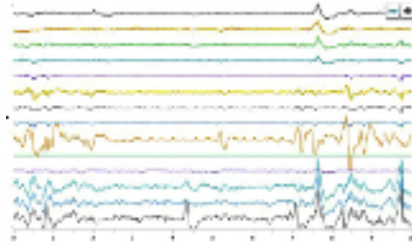
A **longer-term** goal is to design machine intelligence algorithms to facilitate seamless and secure brain computer interaction.

What is EEG?

Electroencephalogram (EEG) captures the electrical activity on the scalp that comes from the voltage fluctuations of ionic current flows among the neurons in the brain.



EEG Devices and Experimental Setup



Research Objectives

RO1: Develop novel algorithms to learn the user's distinctive brain behavior in various practical settings.

RO2: Analyze and validate the persistence and longitudinal behavior of EEG traits.

RO3: Refine EEG biometrics for enhanced resilience against forgery attacks.

Research Task 1: EEG Traits Dataset Creation

Research Task 2: User Identity Representation and Authentication Modeling

Research Task 3: Persistence Analysis and Longitudinal Study

Research Task 4: Spoofing and Imitation Attack Design and Testing

Research Task 5: Usability Evaluation and Analysis

**Adoption Potential and Commercialization will be
Explored with Technology Vendors.**

Education Objectives

EO1: Create awareness and understanding of immersive technology, cybersecurity, brain-inspired machine learning, and EEG for user authentication and controller operations, encouraging an early interest in science and technology.

EO2: Disseminate knowledge about forgery attacks in immersive environments, security vulnerabilities in brain behavior-based applications, and effective countermeasures to empower and protect vulnerable users.

Activity 1: Learner Driven and Experiential Course Design

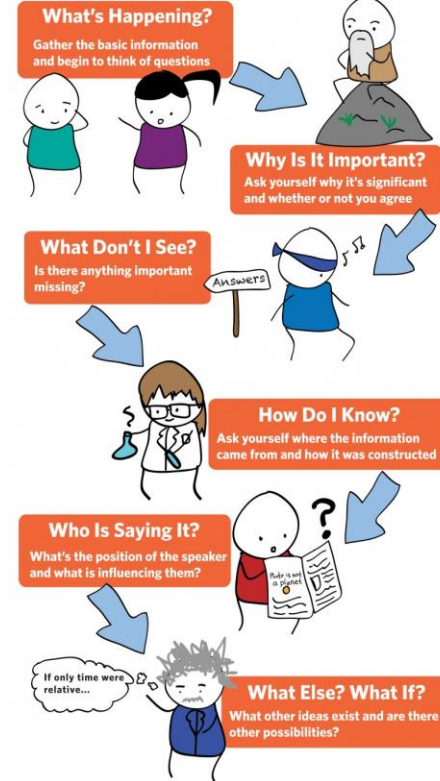
Activity 2: Secure Computing Education Seminar

Activity 3: Broad Educational Outreach in Rural Wyoming

Research Experiences for Undergraduate Students (REUs)
and Research Experiences for Teachers (RET)
are integrated in this project.

Thank you!

Questions a Critical Thinker Asks



a place of mind

learningcommons.ubc.ca

Wyoming EPSCoR-IDeA and Research Development Office

Director, Dr. Shawna McBride





Vision, Mission, and Goals



Vision

To increase sponsored research, proposal success rates, and participation in research and education projects at the University of Wyoming and within the state to grow the UW research enterprise

Mission

To provide research development support – from finding opportunities to cultivating research teams to providing professional development opportunities – that enhances research opportunities and productivity in Wyoming



Goals

- To provide professional development opportunities, including workshops, seminars, and networking activities to help inform researchers of opportunities
- To serve as a centralized office for EPSCoR-IDEA programs, as well as seed grants and limited submission opportunities to facilitate information sharing
- To help identify funding opportunities for researchers and provide curated opportunity listings using PIVOT–RP funding databases and other resources
- To provide planning and seed grants for pilot data and exploration of new research areas
- To provide proposal development support for EPSCoR, IDEA, and other proposals
- To provide a centralized office to support Broader Impacts planning and connect researchers with groups on campus engaged in BI-related work, including K-12 STEM engagement and undergraduate research





Office Structure



**Director, Wyoming EPSCoR-IDEA
& Research Development Office:
Dr. Shawna McBride**

**Program Manager,
Research Development:
Nicholas Giraldo**

**Program Manager,
Communications & Data Analysis:
Victoria Smith-Gostas**

**Grant Development
Specialist – CEPS**

**Grant Development
Specialist – CALSNR**

**Grant Development
Specialist –
College of Health Sciences**

**Grant Development
Specialist –
Haub School**

**Broader Impacts
Coordinator**



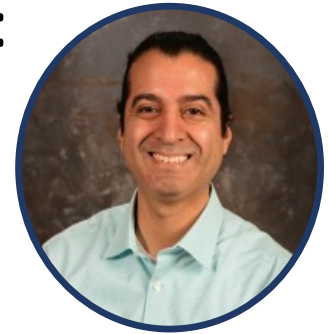
Office Structure

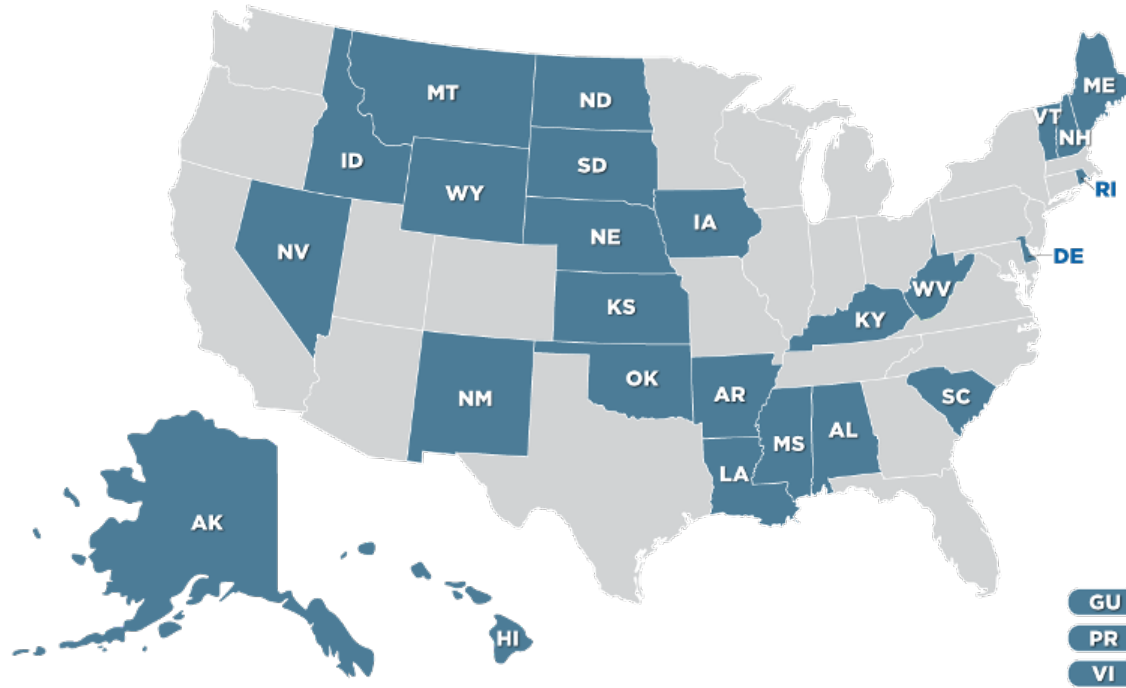
- **Director:** oversee staff and daily operations, develop new resources and programs to assist in research development, serve on UW and national committees, engage with stakeholders
- **Program Manager – Communications and Data Analysis:** oversee public relations and communications, maintain websites and social media, provide evaluation and data analysis of research-related metrics, develop infographics, and serve as the point of contact for information sharing



Office Structure

- **Program Manager – Research Development:** oversee grant development staff, assist in large, complex, multidisciplinary grant proposals, provide training and expertise in proposal development
- **Grant Development Specialists:** serve a specific college and assist researchers in all areas of grant proposal development from finding opportunities, reviewing proposals, and assisting in submitting proposals
- **Broader Impacts Coordinator:** serve as a central location for information about broader impacts programs on campus, connect researchers to BI programs, and assist in proposal development





EPSCoR-IDeA Support



What is EPSCoR-IDeA?

- EPSCoR engages with states that have historically received limited federal research and development funds, aiming to elevate research, education, and technological capabilities within those states
- The primary goal of EPSCoR and NIH IDeA programs are to foster research in specialized, jurisdiction-specific areas, positioning states to become more competitive for national research programs at NSF, NIH, NASA, USDA, DOE, and DOD



EPSCoR – IDeA Support: Advocacy

- Communicate with funding agencies and stakeholders
- Convene the State EPSCoR-IDeA committee
- Assist in developing a Wyoming Science & Technology Plan
- Cultivate statewide partnerships and relationships
- Facilitate collaborations between existing programs on campus and in the state



EPSCoR – IDeA Support: Research

- Centralized location for information about EPSCoR and IDeA opportunities
 - Identification of funding opportunities
 - Selection process for limited submission opportunities
 - Informational seminars and consultations with experts
- Proposal development support
- Support for existing and underutilized EPSCoR-IdEA programs
- Development of new programs
 - E-CORE & E-RISE and increased funding from CHIPs and Science Act





Building Resources & Capacity

Research Development Roadmap



Research Development Roadmap

- **Advocacy with Stakeholders**

- Visits with federal Program Officers
- Statewide EPSCoR-IDeA partnership development
- Data analysis and infographics for legislators and stakeholders

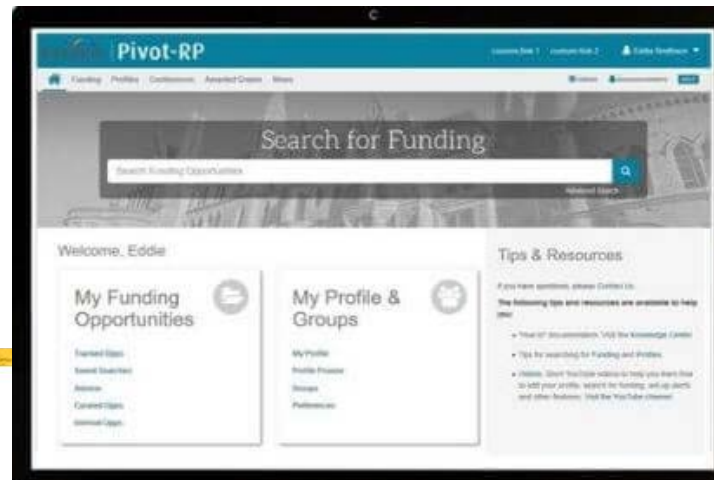
- **Professional Development Opportunities**

- Travel funding for workshops/conferences
- Early career seminars for junior faculty
- Grant writing and proposal development seminars for all
- Networking opportunities to cultivate interdisciplinary teams
- 1:1 consultations and proposal review with outside experts



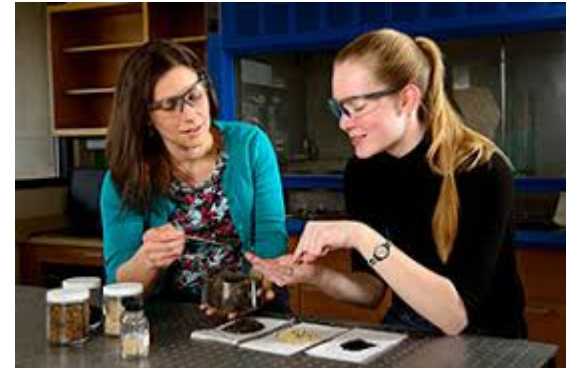
Research Development Roadmap

- **Identify Funding Opportunities**
 - Serve as a central location for information pertaining to EPSCoR-IDEA, limited submission, and seed grants
 - Provide selection process for limited submission opportunities using InfoReady reviews
 - Provide a searchable database of opportunities and curated listings for faculty using PIVOT-RP software



Research Development Roadmap

- **Planning and Seed Grants**
 - Provide small internal grants to assist researchers in developing pilot data for larger proposals or for planning large, interdisciplinary team proposals



Research Development Roadmap

- **Proposal Development Support**

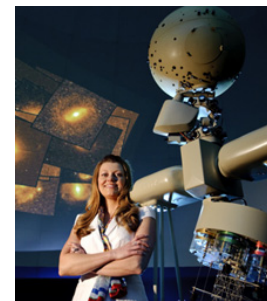
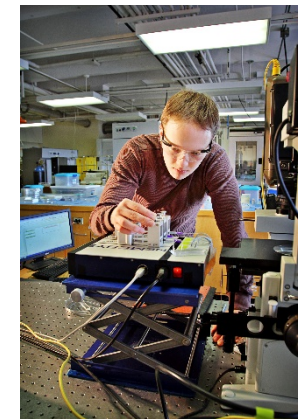
- Setup file sharing system for teams
- Create checklists and timelines
- Provide template documents for proposal components
- Serve as a resource for questions
- Assist with non-technical components
- Upload docs into RoamWyo and online submission systems
- Provide a non-technical review of proposals for formatting, grammar, responsiveness to solicitation, flow
- Facilitation of external reviews and proposal preparation services with The Implementation Group (TIG)



Research Development Roadmap

- **Broader Impacts Support**

- Connect researchers with groups on campus engaged in Broader Impacts-related activities, including K-12 STEM engagement, undergraduate research, & public engagement
- Provide professional development opportunities and resources related to Broader Impacts
- Serve as a central location for BI info



Research Development Roadmap



Outcomes to Date

- Provided 8 Early Career Seminars
- Connected 6 faculty with external consultants
- Assisted with 27 grant proposals
- Facilitated 2 conferences – including Undergraduate Research Day
- Provided support for Medicine Bow National Forest research permits
- Assembled a State EPSCoR-IDeA committee
- Hiring Grant Development and Broader Impacts staff



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Office of Industry and
Strategic Partnerships

MAY 8 , 2024

Industry and Strategic Partnership Office

- Industry

Small industry and large corporation

- Sponsored research
- Philanthropy
- Brand awareness
- Student experiential learning
- Faculty engagement
- Innovation course engagement
- Licensing of UW IP
- Entrepreneurial sponsorship

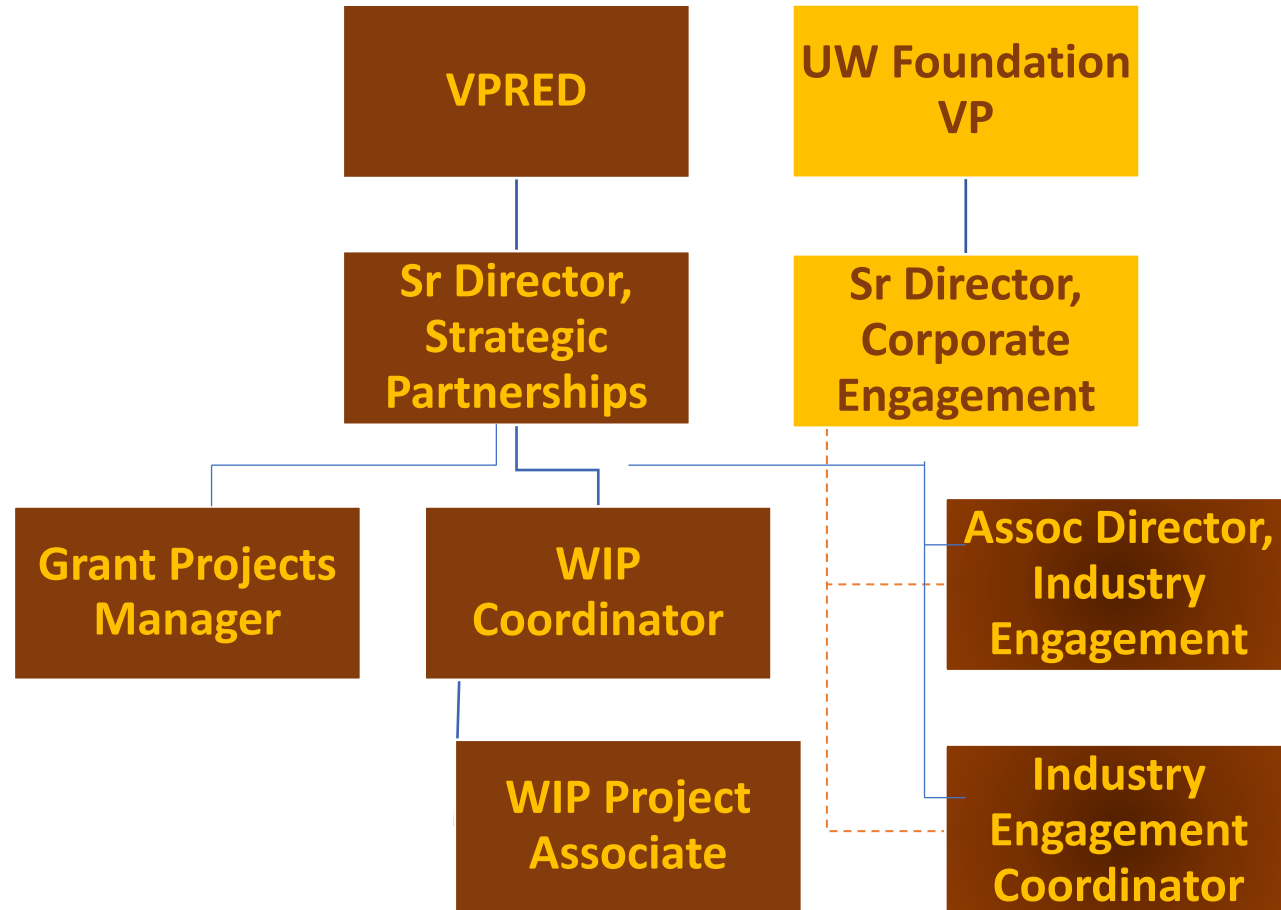
- Strategic Partnerships

Community Colleges; Local, State, Federal Governments, Econ Development and Research entities

- Sponsored projects
- Student experiential learning
- Faculty engagement
- Academic collaborations
- Innovation course engagement
- Entrepreneurial sponsorships

Industry and Strategic Partnership Office

- Leading from the middle
 - Structure allows for speedy and effective establishment of the office
- Future
 - Additional positions for strategic partnerships and data



\$8.8M*

TOTAL CORPORATE INVESTMENTS

All in number of dollars raised from companies in FY 2023



746

NUMBER OF COMPANIES WHO GAVE

Corporate entities that provided support to the University of Wyoming



410

EMPLOYERS RECRUITED

Number of employers who attended UW campus for a career fair



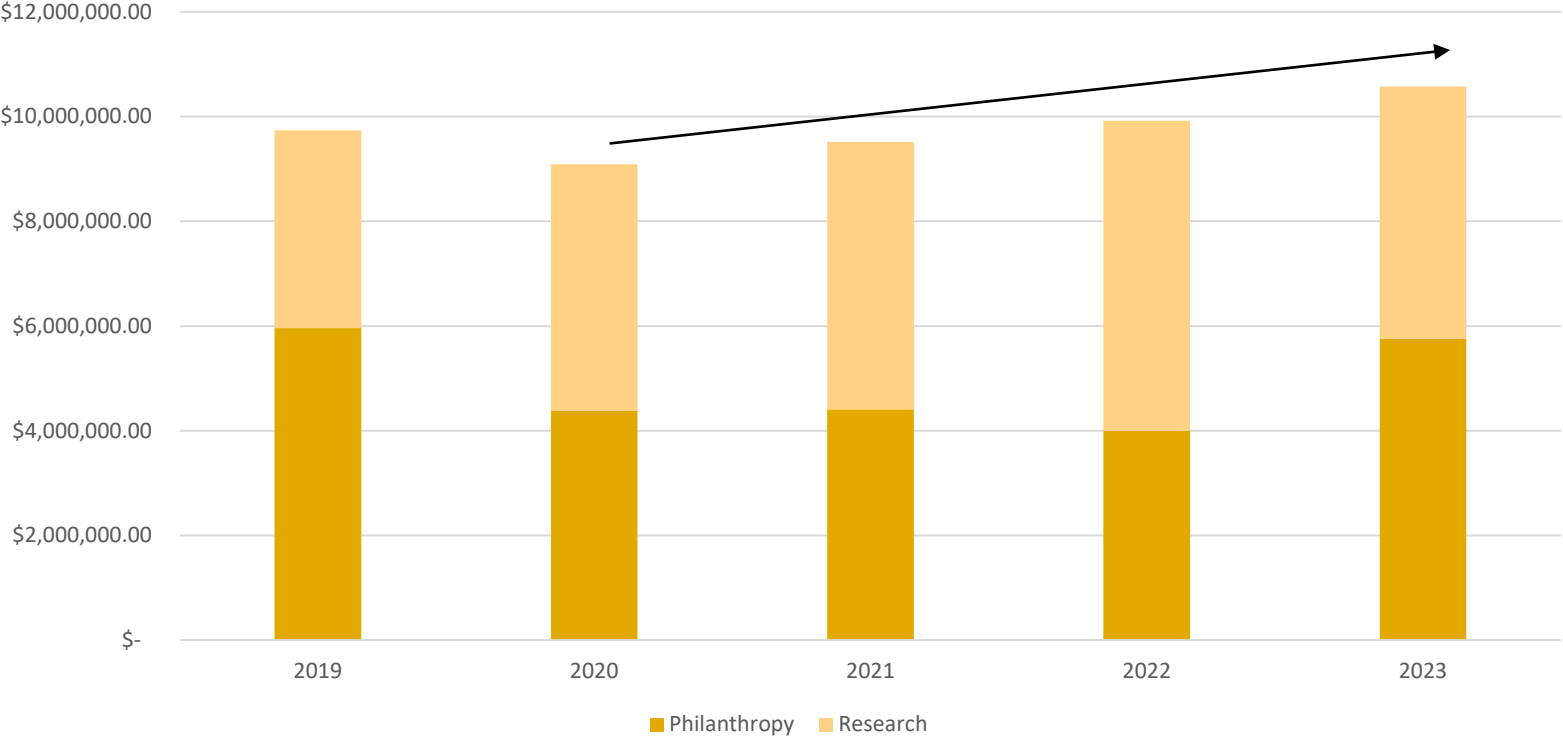
***INCLUDES:**

- PHILANTHROPIC GIVING
- PRIVATE GRANTS FOR RESEARCH



HISTORICAL SNAPSHOT

Industry Investment FY2019 - FY2023



RESEARCH

- SPONSORED PROJECTS
- SPONSORED RESEARCH

PHILANTHROPY

- CASH
- IN-KIND
- COMPANY MATCHING GIFTS

MENU

NEWS RELEASES



BACK TO 2024 ARCHIVE



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New UW Office of Industry and Strategic Partnerships Fosters Innovation and Economic Impact

Published January 17, 2024

The University of Wyoming has formed the Office of Industry and Strategic Partnerships, a collaborative venture between UW's Research and Economic Development Division and the UW Foundation to establish dynamic alliances between academia and industry that will foster innovation and economic impact throughout the state and beyond.

"With the formation of the Office of Industry and Strategic Partnerships, UW is poised to enhance its relationships with our local, national and international business partners, which will drive greater success for our students, faculty, staff and the greater UW community," UW President Ed Seidel says.

The Office of Industry and Strategic Partnerships connects companies to UW to create meaningful partnerships. These partnerships will highlight opportunities for UW faculty and subject-matter experts; foster cutting-edge research; direct curricula and experiential learning; enhance graduate hiring; and generate investment to support the university.

As a part of the launch of the Office of Industry and Strategic Partnerships, UW has partnered with UNITE, a leading consulting, technology and training company specializing in holistic university-industry collaboration.

"UW has potential to increase its sponsored funding and experiential learning opportunities from industry and nongovernmental organizations," says Parag Chitnis, vice president for research and economic development. "The Office of Industry and Strategic Partnerships and its contract with UNITE will allow us to realize this potential. I'm grateful for the synergistic collaboration between the Research and Economic Development Division and the UW Foundation."

Curtis Biggs is serving as interim executive director as the office is established, in close collaboration with Angela Ver Ploeg, senior director of corporate engagement at the UW Foundation.



UNITE PARTNERSHIP



A Corporate Engagement Solution
Bringing Universities and Industry Together



UPDATES

ACCOMPLISHED SINCE JANUARY

- Signed contract with UNITE
- Communicating regularly across teams to share industry collaborations – TTO, Pre-Award, OSP
- UNITE Activities
- Quarterly Report
- Salesforce Integration
- Structure, roles and responsibilities
- Design job descriptions for new ISP roles
- Company success stories!

ON DECK

- UNITE Process, roll out components (councils, portfolios, engagement teams)
- Finalize mission statement
- Communicate structure
- Hires: 1. Associate Director of Industry Engagement and 2. Industry Engagement Coordinator
- Annual report design
- Website, marketing and communications (internal and external)
- Determine success metrics
- Database and data governance
- Build processes for industry to engage with UW



OUTCOMES OF FORMALIZING THE OFFICE OF INDUSTRY AND STRATEGIC PARTNERSHIPS

INCREASED SUPPORT FROM INDUSTRY

- Sponsored research
- Philanthropy
- In-Kind Donations
- In-Kind Cost Share

INCREASED CAMPUS COORDINATION

- Policies and guidelines that support campus-wide coordination
- Pre-award processes
- Timely interactions between company and campus partners
- Data collection and sharing processes to facilitate information sharing
- Internal collaboration and leveraging of information and resources
- Coordinated industry strategy and process
- Evaluation of progress and validation with cross-functional teams

INCREASED INTERACTIONS WITH INDUSTRY

- Experiential learning (senior design, innovation projects, etc.)
- Classroom speaking engagements
- Faculty/administration participation in industry relations efforts

INCREASED EXPOSURE

- Industry inquiries to collaborate
- Marketing and communications strategy around industry engagement

INCREASED INTEGRATED RESEARCH DEVELOPMENT

- Collaborations with sponsored research and technology transfer office
- Identification of industry partners for federal research proposals



INDUSTRY PARTNERSHIP SUCCESS STORIES

- SAFRAN
 - Commitment to research support
 - Co-Located on Campus
 - Hiring alumni, recruiting students
 - Growing company in the community
- Eucenix
 - SBIR Grant Support
- Navajo Transitional Energy Company
 - NDA
 - Sponsored Research Project
- BWXT
 - Master Research Agreement
 - Multiple Sponsored Research Projects
- Ciner – We Soda – Project West
 - Planned Campus Visit
 - Master Research Agreement (in the works)
 - NDA (in the works)
 - Sponsored Research Project Discussions



STRATEGIC PARTNERSHIPS SUCCESS STORIES

- Wyoming Innovation Partnership
 - Leading/Managing Phase I (\$14.6mil) & Phase II (\$5mil) Awards/Projects
 - Leading/Managing Phase III RFP Process (awards announced May 2024)
- EDA University Center Grant
 - 5-year, \$1mil award
 - Establish small business/entrepreneurial ecosystem and referral structure
 - Support small businesses and communities in training, certifications, and economic analysis
 - Partnering with WY Business Council, other agencies
- EDA Tech Hubs Intermountain-West Nuclear Energy Corridor Grant
 - Led WY in two-state (WY, ID) \$70mil proposal
 - Fully funded, would support \$25mil+ in Wyoming projects (~\$20mil toward UW projects)
 - Awards announced Summer 2024
- CO-WY NSF Innovation Engine grant
 - \$160mil total award
 - Contributing expertise and referrals in:
 - Workforce development/Labor Market info
 - Technical (e.g., analytics, modeling)
 - Additional key stakeholders (WY, other)



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