

**CAES Associate Director Quarterly Report**  
**Idaho State University, FY23Q1**  
**October, November, December 2022**  
**Self-reported by ~95% of active CAES Faculty**

**Section 1. Publications on Behalf of CAES**

1. Mughal B., Fadlullah Z., **Fouda M.**, and Ikki S., “Applying Game Theory to Relay Resource Selection in Hybrid-Band Wireless Systems,” *IEEE Sensors Journal*, vol. 22, no. 23, pp. 23552–23564, Dec. 2022. [DOI: 10.1109/JSEN.2022.3213731]
2. **Fouda M.**, Sakib S., Fadlullah Z., Nasser N., and Guizani M., “A Lightweight Hierarchical AI Model for UAV-Enabled Edge Computing with Forest-Fire Detection Use-Case,” *IEEE Network*, vol. 36, no. 6, pp. 38–45, Nov./Dec. 2022. [DOI: 10.1109/MNET.003.2100325]
3. Salim M., Elsayed H., Abd Elaziz M., **Fouda M.**, and Abdalzaher M., “An Optimal Balanced Energy Harvesting Algorithm for Maximizing Two-Way Relaying D2D Communication Data Rate,” *IEEE Access*, vol. 10, pp. 114178–114191, Nov. 2022. [DOI: 10.1109/ACCESS.2022.3216775]
4. Mohamed A., Tag Eldien A., **Fouda M.**, and Saad R., “LSTM-Autoencoder Deep Learning Technique for PAPR Reduction in Visible Light Communication,” *IEEE Access*, vol. 10, pp. 113028–113034, Nov. 2022. [DOI: 10.1109/ACCESS.2022.3216574]
5. Hosny K., Zaki M., Hamza H., **Fouda M.**, and Lashin N., “Privacy Protection in Surveillance Videos Using Block Scrambling-Based Encryption and DCNN-Based Face Detection,” *IEEE Access*, vol 10, pp. 106750–106769, Oct. 2022. [DOI: 10.1109/ACCESS.2022.3211657]
6. Abdalzaher M., **Fouda M.**, and Ibrahim, “Data Privacy Preservation and Security in Smart Metering Systems,” *MDPI Energies*, vol. 15, no. 19, article no. 7419, Oct. 2022. [DOI: 10.3390/en15197419]
7. Yang X. and **Delparte D.**, “A Procedural Modeling Approach for Ecosystem Services and Geodesign Visualization in Old Town Pocatello,” *Idaho Land*, 11(8), 1228, 2022.
8. **LaBrier D.**, Harley J., and Robbins M., “Interactions Between Molten Sodium and Standard Pipe Insulation,” *ASME Nuclear Energy and Radiation Science special issue*, 2022. (under review).
9. Mingfu H., **Ali A.**, and Chen M., “Steady-State Pool Boiling Heat Transfer Experimental Studies of Horizontally-Placed Tubes,” *International Journal of Heat and Mass Transfer*, Vol.196, Nov. 2022.
10. Hasnaeen N. and **Chrysler A.**, “Detection of Malware in UHF RFID User Memory Bank using Random Forests Classifier on Signal Strength Data in the Frequency Domain,” *IEEE International Conference on RFID*, Las Vegas, Nevada, 2022.
11. Ortega L.H., Yee K.L., Perez-Nunez D., McDeavitt S.M., Steinman C., **Schultz R.R.**, **Dunzik-Gougar M.L.**, and Spencer B.W., “Thermal Shock Experiments for Separate-Effects Validation of UO<sub>2</sub> Fuel Fracture Models,” *Journal of Nuclear Materials*, Vol. 572, Paper 154035, Dec. 2022.
12. Spencer B.W., Woolstenhulme N.E., Schulthess J.L., Fleming A.D., Astle L.A., Imholte D.D., Hill C.M., Parry J.R., Chapman D.B., Folsom C.P., Ban D., Ramirez M.R., Woolum C.T., Yeh J.Y., **Dunzik-Gougar M.L.**, Jensen C.B., and Wachs D.M., “Dry In-Pile Fracture Test (DRIFT) for Separate-Effects Validation of Ceramic Fuel Fracture Models,” *Journal of Nuclear Materials*, Vol. 568, Paper 153816, Sept. 2022.

13. **Rodriguez R.**, Baek D., Case M., and Fox R., “Studies Toward the Use of Ionic Liquids and Supercritical CO<sub>2</sub> for the Recovery and Separation of Praseodymium from Waste Streams,” *Catalysts*, Vol. 12, 335, 2022. [<https://doi.org/10.3390/catal12030335>]
14. **Rodriguez R.G.**, Baek D. L., Orme K., Case, M.E., and Fox R.V., “Electrochemical, thermodynamic, and physical properties of tetradecyltrihexylphosphonium ([P6,6, 6,14]<sup>+</sup>) and methyl-propyl piperidinium containing ionic liquids and their propylene carbonate solutions,” *Journal of Molecular Liquids* Vol. 352, 118607, 2022.
15. Ma Z., Zhang S., **Pope C.L.**, and Smith C., “Research to Develop Flood Barrier Testing Strategies for Nuclear Power Plants,” *Nuclear Technology*, 2022 (in press).
16. Bess J., Chipman A., **Pope C.L.**, Jensen C., Ozawa T., Hirooka S., and Kato M., “EBR-II MOX Fuel Characterization Enabling ARES Phase I Testing,” *Nuclear Science and Engineering*, 2022 (in press).
17. Miller J., Ercanbrack S., and **Pope C.L.**, “The Versatile Economic Risk Tool, *Nuclear Technology*,” 2022. [DOI: 10.1080/00295450.2022.2129273]
18. Wells, E., Ryan D., and **Pope C.L.**, “Improving Nuclear Power Plant Flooding Hazard Analysis Through Component Performance Experiment, Fragility Model Development, and Smoothed Particle Hydrodynamic Simulation,” *Elsevier*, 2022 (in review).
19. **Pope C.**, Stewart R., and Lum E. (2022). “Experimental Breeder Reactor II,” Book Chapter. [DOI:<http://dx.doi.org/10.5772/intechopen.105800>]
20. **Pope C.**, Phoenix W. (2022). “Idaho State University Low Power Teaching Reactor – An Overlooked Gem,” Book Chapter. [DOI:<http://dx.doi.org/10.5772/intechopen.105799>]
21. Yadav V., Wells A., **Pope C.L.**, Andrus J. P., Chawasz C. P., Trask C. T., Eskins D. E., Carlson J., Ulmer C., Chandran N., and Iyengar R., “Regulatory Considerations for Nuclear Energy Applications of Digital Twin Technologies,” TLR-RES/DE/REB-2022-06, Nuclear Regulatory Commission, Letter Report, 2022.
22. Ma Z., Zhang S., **Pope C.L.**, Smith C., “Research to Develop Flood Barrier Testing Strategies for Nuclear Power Plants,” *NUREG/CR-7279, INL-EXT-19-56427*, 2022.
23. Iqbal M., **Mashal M.**, Khan M. A., Grider J., Squires R., Richardson R., Koudelka J. A., Thornley A., and **van Woerden I.**, “Should We Offer Disaster Preparedness and Response Training Workshops Across Idaho? A Feasibility Study,” *Journal of Emergency Management*, 2022. [DOI: <https://doi.org/10.5055/jem.0702>]
24. Hogarth K., **Cantrell J.**, **Savage B.**, and **Mashal M.**, “A Disaster Response Complex for Training of First Responders in the Northwest United States,” *Journal of Emergency Management*, 2022. (In Revision)
25. Mahat M., Acharya M., and **Mashal M.**, “The Use of Waste Tires as Transverse Reinforcement and External Confinement in Concrete Columns Subjected to Axial Loads,” *MDPI Applied Sciences*, special issue on Materials for Civil Construction and Sustainability, 2022. (In Revision)

## Section 2. Conferences Attended on Behalf of CAES

1. Hasnaeen N., Neupane S., and **Chrysler A.**, “UHF RFID EM Fingerprint-Based Digital Twin Resolver,” 2022 IEEE International Conference on Digital Twins and Parallel Intelligence, Boston, MA, Oct. 2022.
2. **LaBrier D.** et al., “Revitalization of a Sodium Safety Culture through Experiential Learning,” IAEA Topical Issues on Nuclear Installations, Oct. 2022.

3. Biswas S., **LaBrier D.**, et al., “Analysis of Degraded G-348 Graphite Used in the High Temperature Test Facility,” American Nuclear Society 2022 Winter Meeting, Nov. 2022.
4. Mauseth T., **Dunzik-Gougar M.L.**, Teng F., and Meher S., “Determining the tensile strength of select TRISO-coated particle layers,” Proceedings of the Annual Meeting of the American Nuclear Society, Jun. 2022.
5. Ibrahim M.I, Mahmoud M., **Fouda M.M.**, ElHalawany B.M, and Alasmay W., “Privacy-preserving and Efficient Decentralized Federated Learning-based Energy Theft Detector,” Proceedings of the 2022 IEEE Global Communications Conference (IEEE GLOBECOM 2022), Rio de Janeiro, Brazil, Dec. 2022. [DOI: 10.1109/GLOBECOM48099.2022.10000881]
6. Mahalal E., Ismail M., Wu Z.Y., and **Fouda M.M.**, “Characterization of Secret Key Generation in 5G+ Indoor Mobile LiFi Networks,” Proceedings of the 2022 IEEE Global Communications Conference (IEEE GLOBECOM 2022), Rio de Janeiro, Brazil, Dec. 2022. [DOI: 10.1109/GLOBECOM48099.2022.10001158]
7. Abdalzaher M.S., Salim M.M., Elsayed H.A., and **Fouda M.M.**, “Machine Learning Benchmarking for Secured IoT Smart Systems,” Proceedings of the 2022 IEEE International Conference on Internet of Things and Intelligence Systems (IEEE IoTaIS 2022), Bali, Indonesia, Nov. 2022. [DOI: 10.1109/IoTaIS56727.2022.9975952]
8. Hegazy H.I., TagEldien A.S., Tantawy M.M., **Fouda M.M.**, and TagEldien H.A., “Online Location-Based Detection of False Data Injection Attacks in Smart Grid Using Deep Learning,” Proc. of the 2022 IEEE International Conference on Internet of Things and Intelligence Systems (IEEE IoTaIS 2022), Bali, Indonesia, Nov. 2022. [DOI: 10.1109/IoTaIS56727.2022.9975951]
9. Bedda K., Fadllullah Z.M., and **Fouda M.M.**, “Efficient Wireless Network Slicing in 5G Networks: An Asynchronous Federated Learning Approach,” Proceedings of the 2022 IEEE International Conference on Internet of Things and Intelligence Systems (IEEE IoTaIS 2022), Bali, Indonesia, Nov. 2022. [DOI: 10.1109/IoTaIS56727.2022.9976007]
10. Salim M.M., Elsayed H.A., Abdalzaher M.S., and **Fouda M.M.**, “RF Energy Harvesting Dependency for Power Optimized Two-Way Relaying D2D Communication,” Proceedings of the 2022 IEEE International Conference on Internet of Things and Intelligence Systems (IEEE IoTaIS 2022), Bali, Indonesia, Nov. 2022. [DOI: 10.1109/IoTaIS56727.2022.9975942]
11. Gupta Y., Fadllullah Z.M., and **Fouda M.M.**, “Toward Asynchronously Weight Updating Federated Learning for AI-On-Edge IoT Systems,” Proceedings of the 2022 IEEE International Conference on Internet of Things and Intelligence Systems (IEEE IoTaIS 2022), Bali, Indonesia, Nov. 2022. [DOI: 10.1109/IoTaIS56727.2022.9975908]
12. Abdelfattah R., Zhang X., **Fouda M.M.**, Wang X., Wang S., “G2Net: Generic Game-Theoretic Network for Partial-Label Image Classification,” Proceedings of the 2022 British Machine Vision Conference (BMVC 2022), London, UK, Nov. 2022. [URL: <https://bmvc2022.mpi-inf.mpg.de/309/>]
13. Hill E., Mena P., McLaren K., Elzinga E., Spirito C., and **Kerby L.**, “Examining the Potential for Adversarial Reprogramming Cyber Attacks on Nuclear Machine Learning Systems Utilizing Iterative FGSM”, submitted to The International Conference on Mathematics and Computational Methods Applied to Nuclear Science and Engineering (M&C 2023).
14. Aispuro B. S. and **Mashal M.**, “Recycled Concrete Aggregate in Eco Friendly Construction,” National Diversity in STEM Conference, Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS), San Juan, Puerto Rico, United States, 2022.

15. Acharya M., Maharajan, S. and **Mashal M.**, “Metallic Dissipaters Made of Conventional and Advanced Materials for Seismic Protection of Structures, “fib Symposium 2023, Building for the future: Durable, Sustainable, Resilient, Istanbul, Turkey, 2022. (Under Review)

### Sections 3. External Proposal Activities

#### Sections 3.1 Submitted/Funded Proposals Related to CAES Activities

Principal Investigator	Funding Agency	Amount	Department	Title	Status
Anirban Chakraborty	University of Idaho	83,992	Biological Sciences	Detection and characterization of s.....	Submitted
Donna Delparte	Boise State University	118,306	Geosciences	"Archive, Model, and Protect Ecolog.....	Submitted
Mary Lou Dunzik-Gougar	US Nuclear Regulatory Commission	399,717	Nuclear Eng/Health Physics	NRC Fellowship (2023) .....	Submitted
Mary Lou Dunzik-Gougar	US Nuclear Regulatory Commission	197,009	Nuclear Eng/Health Physics	NRC Scholarship (2023) .....	Submitted
Mostafa Fouda	Battelle Energy Alliance LLC	150,000	Electrical Engineering	Reinforcement-Learning-Based Approa.....	Submitted
John Kalivas	National Science Foundation	606,915	Chemistry	CDS&E: Immersive Virtual Reality fo.....	Submitted
Leslie Kerby	Battelle Energy Alliance LLC	158,000	Computer Science Engineering	Metaheuristic Machine Learning Acce.....	Submitted
Leslie Kerby	Battelle Energy Alliance LLC	200,000	Computer Science Engineering	FY23 Cyber Attack and Defense for A.....	Awarded
Daniel LaBrier	US Department of Energy	1,001,359	Nuclear Eng/Health Physics	Development of a U.S.-Based Educati.....	Submitted
Daniel LaBrier	Battelle Energy Alliance LLC	19,695	Nuclear Eng/Health Physics	FY 23 Thermal Testing of Materials.....	Submitted
Daniel LaBrier	Battelle Energy Alliance LLC	66,867	Nuclear Eng/Health Physics	Informative Design of High Temperat.....	Awarded
Rajib Mahamud	National Science Foundation	197,469	Mechanical Engineering	ERI: Plasma flame interactions on f.....	
Kristi Moser-Mcintire	Battelle Energy Alliance LLC	81,051	Center for Adv Energy Studies CAES	ISU Purchase of Chemicals to Suppor.....	Awarded
Kristi Moser-Mcintire	Battelle Energy Alliance LLC	122,820	Center for Adv Energy Studies CAES	FY23 CAES Assistant to the Safety O.....	Awarded
Kristi Moser-Mcintire	University of Idaho	12,356	Center for Adv Energy Studies CAES	FY23 CAES Assistant to the Safety O.....	Submitted
Kristi Moser-Mcintire	Boise State University	12,356	Center for Adv Energy Studies CAES	FY23 CAES Assistant to the Safety O.....	Awarded
Kristi Moser-Mcintire	Battelle Energy Alliance LLC	53,876	Center for Adv Energy Studies CAES	FY23 EHS Interns.....	Awarded
Kristi Moser-Mcintire	Boise State University	94,287	Center for Adv Energy Studies CAES	FY23 MaCS Lab Personnel Agreement.....	Awarded

Joshua Pak	MJ Murdock Charitable Trust	19,000	Chemistry	Mechanistic and Kinetic Analysis of.....	Submitted
Srinath Pashikanti	American Association of Colleges of Pharmacy	10,000	Biomed and Pharmaceutical Sciences	Mitochondrial membrane disruption u.....	Awarded
Chad Pope	Battelle Energy Alliance LLC	56,165	Nuclear Eng/Health Physics	Development of High-Burnup Commerci.....	Awarded
Chad Pope	Battelle Energy Alliance LLC	94,024	Nuclear Eng/Health Physics	Development of a Digital Twin for t.....	Awarded
Rene Rodriguez	Battelle Energy Alliance LLC	5,000	Chemistry	ISU- Support for Transient Spectrok.....	Awarded
Marco Schoen	Battelle Energy Alliance LLC	27,410	Mechanical Engineering	Continuous-Electric Field Assisted.....	Awarded
Anish Sebastian	University of Idaho	39,636	Mechanical Engineering	Digital Transformation through Arti.....	Submitted
van Woerden	National Institutes of Health	392,153	Public Health	A secondary analysis examining alte.....	Submitted

### Section 3.2. Other Proposals/Grants Related to CAES Activities

#### Dan LaBrier:

- Use of UHPC in Nuclear Applications (**Mustafa Mashal, Arya Ebrahimpour** – ISU; Kunal Mondal, Drew Johnson, Elmar Eidelpes – INL)
- Investigation of Metal Hydride Distribution and Speciation (Mahmut Cinbiz, Chase Taylor – INL); INL LDRD FY21 Subaward
- INL Joint Appointment, Oct. 2022-Sept. 2023 (Pending) (INL sponsor: Bryce Kelly)

#### Mary Lou Dunzik-Gougar:

- PI of NEUP project "Measuring Mechanical Properties of Select Layers and Layer Interfaces of TRISO particles via Micromachining and In-Microscope Tensile Testing"
  - Collaborators at INL: Subhashish Meher, Fei Teng
  - Collaborators at PNNL: Isabella Van Rooyen
- PI for Nuclear Regulatory Commission Fellowship (\$394,695) and Scholarship (\$192,390) grants awarded in 2022

#### Leslie Kerby:

- FY23 Cyber Attack and Defense for Autonomous or Remote Operations of Nuclear Reactors: an additional \$200k coming to ISU for FY23. ISU PI: Leslie Kerby; the INL PI is Chris Spirito.
- Metaheuristic Machine Learning Accelerated Quantum Chemistry for Investigating Multiphase Interactions in Electrochemical Systems: this is a 2-yr LDRD. \$158k coming to ISU over FY23-24. ISU PI: Leslie Kerby; the INL PI is Meng Li.
- Cyber Attack and Defense for Autonomous or Remote Operations of Nuclear Reactors: \$47k to ISU. ISU PI: Leslie Kerby; INL PI is Chris Spirito. (Summer 2022)
- Using Artificial Intelligence to Guide the Run-In of a Pebble Bed Reactor: \$16k to ISU. ISU PI: Leslie Kerby; INL PI is Ryan Stewart. (Summer 2022)

#### Mostafa Fouda:

- Title: “Reinforcement-Learning-Based Approach to Optimizing Quality of Service and Security on Fifth-Generation Networks”
  - Program: Laboratory Directed Research & Development (LDRD)
  - Fund Amount: \$800K USD (ISU share is \$150K USD)
  - Dates: Oct. 2022 to Sep. 2024 (2 years)
  - Principal Investigator: Cameron Krome, Directorate: NS&T  
External Co-investigator: Dr. Mostafa Fouda Institution: Idaho State University

#### Mustafa Mashal:

- Participated in two concept papers on “Innovative Pumped Storage” to the Department of Energy. PI = Bruce Co-PIs = Thomas Baldwin, Mustafa Mashal, James Mahar, Chikashi Sato, and Jared Cantrell (Pending Review)

#### **Section 4. Patents, Licenses, other IP**

1. **Mashal M.** (2022). “Ductile Connections for Pre-Formed Construction Element”, United States Patent and Trademark Office - Patent No.11,286,683.

#### **Section 5. Other Awards**

1. **Mashal. M.** (2022-23): Fulbright U.S. Scholar (Qatar)

#### **Section 6. Graduated CAES-Affiliated Students**

1. Chad Pope (Advisor): Brenna Carbno (MS Student)
2. Amir Ali (Advisor): Wesely Yockey (MS Student)
3. Rene Rodriguez (Advisor): Bailey Vahsholtz (BS Student)
4. Dan LaBrier (Advisor): Michael Benson (MS Student)
5. Mustafa Mashal (Advisor): Katie Hogarth (MS Student)

#### **Section 7. Continuing CAES-Affiliated Students**

1. Amir Ali (Advisor): Scott Wahlquist, Sutapa Biswas (PhD Students), and Kyle Shredder (MS Student)
2. Andrew Chrysler (Advisor): Nehal Hasnaeen, Suman Neupane
3. Dan LaBrier (Advisor): Eslam Ali, Sutapa Biswas
4. Keith Webber (Advisor): Alyssa Farnes (BS Student)
5. Mary Lou Dunzik-Gougar (Advisor): Tanner Mauseth, Malwina Wilding, Scott McBeath, Austin Tam, Todd Sherman (PhD Students), Charlie Rivera (MS Student)
6. Chad Pope (Advisor): Benjamin Johnson, Andrew Fowler, Braeden Higby, Bonnie Moon, Sally Bartelmo, Mikayla Thompson, Richard Gunderson (MS Students), Eva Barker, Jooyoung Park, Kofi Tuffour Achampong (PhD Students)
7. Mustafa Mashal (Advisor): Ujwal Sharma, Aashish Deo, Kabiraj Phuyal (MS Students), Sindi Banda (Undergraduate student)

**Section 8. Incoming CAES-Affiliated Students**

1. Rene Rodriguez (Advisor): Shanae VanLeuven, Aaron Barlow, Forrest Hiatt
2. Mostafa Fouda (Advisor): Ahmed Ashour (PhD Student), Antora Dev (MS Student)

**Section 9. Joint Appointments (Continuing)**

1. Chad Pope (Nuclear Engineering)
2. Sean McBride (ESTEC/Cybersecurity)
3. Larry Leibrock (Computer Science/Cybersecurity)
4. David Rodgers (CAES Associate Director)

**Section 10. New Equipment**

1. Jared Cantrell and Mustafa Mashal (Principal Investigators): Large-Scale Drop Hammer Testing Apparatus & Accessories (INL Surplus)

**Section 11. Collaborative Research**

**Section 11.1 CAES Collaboration Grants – (Continuing from FY22 Into FY23)**

INL PI	ISU co-PI	ISU Department	Project Title
Kunal Mondal	Mustafa Mashal	Civil & Environmental Engineering	Net Zero: Utilization of Waste Products from Agricultural and Biomass Industries to Reduce Concrete Emissions
Vaibhav Yadav	Mustafa Mashal	Civil & Environmental Engineering	Mobile Robot for Security Applications in Remotely Operated Advanced Reactors
Ryan Stewart	Leslie Kerby	Computer Science	Using Artificial Intelligence to Guide the Run-In of a Pebble Bed Reactor
Joshua Fishler	Amir Ali	Nuclear Engineering	Fundamentals of Computational Analysis of Thermal Systems: Curriculum Development
Asef Redwan	Anirban Chakraborty	Biological Sciences	Improving the electron shuttling efficiency of activated carbon in relation to biological nitrogen removal during water treatment
Md Riaz Kayser Ahmed Hamed	Mostafa Fouda	Electrical & Computer Engineering	Developing Machine Learning Based Force Field for Predicting Radiation Resistance of High Entropy Alloys

**Section 11.2. ISU-CAES Seed Grant Program (2022)**

ISU PI	ISU Department	ISU Co-PI(s)	CAES Universities Co-PI(s)	INL Co-PI(s)	Project
Amir Ali	Nuclear Engineering	-	-	Yasir Arafat	Performance optimization of MARVEL Microreactor power conversion system

Paul Bodily	Computer Science	-	-	Rajiv Khadka	Application of Advanced Computational Theory to Facilitate Efficient Solutions to Real- World Combinatorial Problems
Tony Forest	Physics	-	-	Chutiing Tan	A neutron Generator for Materials Testing
Mostafa Fouda	Electrical & Computer Engineering	-	-	Ahmed Hamed	Smart Analytics of Biomass Images
John Kalivas	Chemistry	-	-	John Koudelka	Virtual Reality for Dynamic Data Visualization of Analytical Chemical Data
Mustafa Mashal	Civil & Environmental Engineering	Dan LaBrier, Jared Cantrell	-	Som Duhlipala, Amit Jain	Machine Learning-Aided Validation of a Sustainable and Highly Durable Construction Technology for the Containment Facility of Advanced Reactors
Srinath Pashikanti	Biomedical and Pharmaceutical Sciences	Rene Rodriguez	-	Robert Fox, Donna Baek	Incorporation of Sterics in novel Phosphonium Ionic Liquid (PIL) and their Effect on Ligand Intermolecular Interactions and Chelation Properties
Bruce Savage	Civil & Environmental Engineering	Chikashi Sato, Jim Mahar, Mustafa Mashal	Karen Humes, Dakota Roberson (UI)		Water Storage Infrastructure Viability using Repurposed Tires for Pumped Hydro
Keith Weber	GIS TReC	-	Kathleen Araujo and Cassandra Koerner (BSU)	Kelly Wilson, Ryan Hruska, Shiloh Elliot, Chris Forsgren	The Power Grid/Wildfire Nexus: Using GIS and Satellite Remote Sensing to Identify Vulnerabilities
Danny Xu	Biomedical and Pharmaceutical Sciences	-	Kenneth Cornell (BSU)	Eric Whiting	Hearing Loss Prevention through Integrative High Performance Computing, Data Science, and Experimental Biology



## **Section 11.4. Other Collaboration and Outreach**

### Rene Rodriguez:

- Collaboration with Dr. Rebecca Fushimi on catalysis project
- Collaboration with Dr. Fox in ionic liquid project
- Started new collaboration with Dr. Kiyo Fujimoto and received CAES funding in Dec. 2022 for a project with her.

### Minhaz Zibran:

- Started working with Jackson Harter (INL) on a project supported by CAES Collaboration Program Development Funds.
- Starting with the project “VizSoft: Interactive Visualization of Software Aspects in IDE” with support from the ISU CAES Seed Grant. Grant notification received on Dec 12, 2022.

### Mary Lou Dunzik-Gougar:

- Participated in Graduate Student Fair organized by American Nuclear Society
- Moderated ANS webinar for K-12 Teachers (Nuclear Energy: Fission, Fusion and Future)
- Member of the ANS committee that is looking into developing a nuclear certificate program for people new to nuclear or just coming into the working world.
- Chaired an ABET team visit to Purdue University to review their Occupational Health BS program and Occupational and Environmental Health Sciences MS program.
- Worked with College of Tech to develop pathway for AS degree holders in Nuclear Operations BS degree program in Nuclear Engineering
- Conducted numerous tours of reactor facility for students, faculty, staff and members of the public
- Attended 4-hour media training at meeting of the American Nuclear Society (training on how to do media interviews)

### Chad Pope:

- Hands-On Approach-to-Critical and Nuclear Criticality Safety, conducted at Idaho State University for TerraPower, Southern Co., and Idaho National Laboratory representatives, course coordinator and instructor, October 26-27, 2022.
- Using Experience, Reliability Information, and Bayesian Inference to Improve Probability Estimates, International Conference on Nuclear Energy – 29, Workshop 4, August 9, 2022.
- Motor Operated Valves in Nuclear Power Plant Applications, conducted at Idaho State University for US Nuclear Regulatory Commission representatives, course coordinator, August 1-5, 2022.
- Nuclear Reactors – Spacecraft Propulsion, Research Reactors, and Reactor Analysis Topics, edited by C. L. Pope, IntechOpen, 10.5772.intechopen.95676, 2022.

### Jay Kunze:

- Motor Operated Valves in Nuclear Power Plant Applications, conducted at Idaho State University for US Nuclear Regulatory Commission representatives, course coordinator, August 1-5, 2022.

### Jared Cantrell and Mustafa Mashal:

- The DRC hosted multiple tour and training events.
- H.E. Congressman Mike Simpson visited the indoor Disaster Response Complex (DRC) in the former Armory Building.
- The College of Science and Engineering Dean's Advisory Board toured some of the College's facilities, including the DRC facilities and labs in the Engineering Research Complex (ERC).
- Collaboration with researchers from Human Factors & Reliability Department at INL. The INL researchers visited the DRC.
- A team of students from Qatar University led by Dr. Mashal for the project Research, Education, Advancement, Curriculum, and Training (REACT) was among the shortlisted teams for the National Entrepreneurship Competition (Al Fikra 2022) in Qatar.
- Mashal toured and visited three five universities in the Middle East and North Africa, also presented ISU research and discussed collaboration:
  - Kuwait University, Kuwait City, Kuwait
  - Australian University, Kuwait City, Kuwait
  - Qatar University, Doha, Qatar
  - Ain Shams University, Cairo, Egypt
  - The British University in Egypt, Cairo, Egypt

## **Section 12. CAES-Related Instruction (Classes or Short Courses)**

### Mostafa Fouda:

- ECE 6658 Machine Learning in Cybersecurity
- Advanced Computer Architecture (ECE 4460)
- Advanced Computer Architecture Lab (ECE 4460L)

### Mary Lou Dunzik-Gougar

- Radioactive Waste Management (NSEN6618)
- Introduction to Nuclear Engineering (NE 1120)
- Nuclear Seminar (NE 4451/5551)
- ~6 hours operating reactor with trainees