CAES Associate Director Quarterly Report
Idaho State University, FY23Q2
January, February, March 2023
Self-reported by ~85% of active CAES Faculty

Section 1. Publications on Behalf of CAES

1. Mahmoud M. Badr, Mohamed I. Ibrahem, Hisham A. Kholidy, **Mostafa M. Fouda**, and Muhammad Ismail, "Review of the Data-Driven Methods for Electricity Fraud Detection in Smart Metering Systems," MDPI Energies, vol. 16, no. 6, article no. 2852, Mar. 2023. (Impact factor: 3.252)
[DOI: 10.3390/en16062852]

2. Mohamed S. Abdalzaher, **Mostafa M. Fouda**, Hussein A. Elsayed, and Mahmoud M. Salim, "Toward Secured IoT-Based Smart Systems Using Machine Learning," IEEE Access, vol. 11, pp. 20827–20841, Mar. 2023. (Impact factor: 3.476)
[DOI: 10.1109/ACCESS.2023.3250235]

3. Mohamed S. Abdalzaher, **Mostafa M. Fouda**, Ahmed Emran, Zubair Md Fadlullah, and Mohamed I. Ibrahem, "A Survey on Key Management and Authentication Approaches in Smart Metering Systems," MDPI Energies, vol. 16, no. 5, article no. 2355, Mar. 2023. (Impact factor: 3.252)
[DOI: 10.3390/en16052355]

4. Hany Habbak, Mohamed Mahmoud, Khaled Metwally, **Mostafa M. Fouda**, and Mohamed I. Ibrahem, "Load Forecasting Techniques and Their Applications in Smart Grids," MDPI Energies, vol. 16, no. 3, article no. 1480, Feb. 2023. (Impact factor: 3.252)
[DOI: 10.3390/en16031480]

5. Abdelrahman Said, Mahmoud Ezzat, Mousa. A. Abd-Allah, **Mostafa M. Fouda**, and Mohamed A. Abouelatta, "Optimization-Based Mitigation Techniques of the Temporary Overvoltage in Large Offshore Wind Farm," IEEE Access, vol. 11, pp. 6320–6330, Jan. 2023. (Impact factor: 3.476)
[DOI: 10.1109/ACCESS.2023.3236799]

6. Mohamed H. Saad, **Mostafa M. Fouda**, and Abdelrahman Said, "A New Method of Fault Localization for 500 kV Transmission Lines Based on FRFT-SVD and Curve Fitting," MDPI Energies, vol. 16, no. 2, article no. 758, Jan. 2023. (Impact factor: 3.252)
[DOI: 10.3390/en16020758]

7. Mohamed S. Abdalzaher, Hussein A. Elsayed, **Mostafa M. Fouda**, Mahmoud M. Salim, "Employing Machine Learning and IoT for Earthquake Early Warning System in Smart Cities," MDPI Energies, vol. 16, no. 1, article no. 495, Jan. 2023. (Impact factor: 3.252)
[DOI: 10.3390/en16010495]

8. K. McLaren, P. Mena, E. Hill, E. Elzinga, C. Spirito, and **L. Kerby**, Exploring the Viability of Trojan Attacks on Nuclear Machine Learning Models, ANS Annual (2023), accepted.

9. S. Chowdhury, R. Stewart, and **L. Kerby**, Utilizing Machine Learning to Model and Analyze the Run-In Scenario of a Pebble Bed Reactor, International Conference of Mathematics and Computational Methods Applied to Nuclear Science and Engineering (2023), accepted.

10. E. Hill, P. Mena, K. McLaren, E. Elzinga, C. Spirito, and **L. Kerby**, Examining the Potential for Adversarial Reprogramming Cyber Attacks on Nuclear Machine Learning Systems Utilizing

Iterative FGSM, International Conference of Mathematics and Computational Methods Applied to Nuclear Science and Engineering (2023), accepted.

11. P. Mena, B. Borrelli, **L. Kerby**, Detecting Anomalies in Simulated Nuclear Data using Autoencoders, Nuclear Technology, in review.
12. Dehner, G., **McBeth, M. K.**, Moss, R., & **van Woerden, I.** (2023). A Zero-Carbon Nuclear Energy Future? Lessons Learned from Perceptions of Climate Change and Nuclear Waste. Energies, 16(4), 2025.
13. **McBeth, M. K.**, Warnement Wrobel, M., & **van Woerden, I.** (2023). Political ideology and nuclear energy: Perception, proximity, and trust. Review of Policy Research, 40(1), 88-118.
14. **Ali A**, DOE Report, Replace the Existing AGN-201M Reactor Control Rod Drives with a New Design.
15. A. Champa, M. Rabbi, **M. Zibran**, and M. Islam. Insights into Female Contributions in Open-Source Projects. In 20th IEEE International Conference on Mining Software Repositories (MSR), pp. 1 - 5, Australia, 2023 (to appear).
16. M. Rabbi, A. Champa, F. Eishita, and **M. Zibran**. Are We Aware? An Empirical Study on the Privacy and Security Awareness of Smartphone Sensors. In Springer Studies in Computational Intelligence (SCI), pp. 1 - 20, 2023 (to appear).
17. M. Rabbi, A. Champa, and **M. Zibran**. Phishy? Detecting Phishing Emails Using ML and NLP. In Springer Studies in Computational Intelligence (SCI), pp. 1 - 19, 2023 (to appear).
18. K. Phuyal, **J. Mahar**, **B. Savage**, C. Sato, **M. Mashal**, and K. Mondal. Reducing Concrete Emissions by Incorporating Precipitated Calcium Carbonate (PCC) and Upcycled Aggregate (UA)in Concrete Mix. Future Net-Zero Innovators Symposium, the Center for Advanced Energy Studies, Idaho Falls, Idaho, United States. (Poster Presentation)
19. D. Parajuli, **A. Ebrahimpour**, and **B. Savage**. Finite Element Analysis of High-Pressure Compressed Air Energy Storage Tank. Future Net-Zero Innovators Symposium, the Center for Advanced Energy Studies, Idaho Falls, Idaho, United States. (Poster Presentation)
20. S. Brandeberry, B. Murri, **A. Ebrahimpour**, and **B. Savage**. High Strength Pervious Concrete. Future Net-Zero Innovators Symposium, the Center for Advanced Energy Studies, Idaho Falls, Idaho, United States. (Poster Presentation)
21. M. Acharya, **J. Cantrell**, and **M. Mashal** (2023). Pullout Behavior of Titanium Alloy Reinforcing Bars in Ultra-High Performance Concrete. The Second International Conference on Maintenance and Rehabilitation of Infrastructure Facilities (MAIREINFRA2), Honolulu, HI, United States.
22. M. Acharya, L. Bedrinana, **J. Cantrell**, and **M. Mashal** (2023). Prediction of Ultimate Bond Strength Between UHPC and Titanium Alloy Bars Using a Machine Learning Approach. The Second International Conference on Maintenance and Rehabilitation of Infrastructure Facilities (MAIREINFRA2), Honolulu, HI, United States.
23. U. Sharma, U.S. Medasetti, **M. Mashal**, and V. Yadav (2023). A Review of Mobile Robot Technology for Security Applications at Nuclear Facilities. The American Nuclear Society Student Conference, Knoxville, TN, United States
24. K. Hogarth, **J. Cantrell**, and **M. Mashal** (2023). An Energy Dissipative Double Beam Coupling Beam Equipped with Low Damage Seismic Technology. fib Symposium 2023, Building for the future: Durable, Sustainable, Resilient, Istanbul, Turkey.

25. M. Acharya and **M. Mashal** (2023). 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.
26. Y. Chen, A. Palermo, and **M. Mashal** (2023). Full-scale Cyclic Testing of an Innovative Energy Dissipating Device for Seismic Resiliency. Soil Dynamics and Earthquake Engineering. (Under Review)
27. M. Mahat, M. Acharya, and **M. Mashal** (2023). 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. (In revision)
28. A. Deo, J. Duran, S. Arnold, **J. Cantrell**, **A. Ebrahimpour**, and **M. Mashal** (2023). Enhancing Shear Transfer Across 90-degree Slab-Wall Concrete Connections Using +/- 45-Degree Bidirectional FRP Composites. 11th International Conference on Fiber-Reinforced Polymer (FRP) Composites in Civil Engineering (CICE 2023), Rio de Janeiro, Brazil. (to appear)

Section 2. Conferences Attended on Behalf of CAES

Leslie Kerby:

- K. McLaren, P. Mena, E. Hill, E. Elzinga, C. Spirito, and **L. Kerby**, Exploring the Viability of Trojan Attacks on Nuclear Machine Learning Models, ANS Annual (2023), accepted.
- S. Chowdhury, R. Stewart, and **L. Kerby**, Utilizing Machine Learning to Model and Analyze the Run-In Scenario of a Pebble Bed Reactor, International Conference of Mathematics and Computational Methods Applied to Nuclear Science and Engineering (2023), accepted.
- E. Hill, P. Mena, K. McLaren, E. Elzinga, C. Spirito, and **L. Kerby**, Examining the Potential for Adversarial Reprogramming Cyber Attacks on Nuclear Machine Learning Systems Utilizing Iterative FGSM, International Conference of Mathematics and Computational Methods Applied to Nuclear Science and Engineering (2023), accepted.

Minhaz Zibran:

- Insights into Female Contributions in Open-Source Projects. In 20th IEEE International Conference on Mining Software Repositories (MSR), Melbourne, Australia, May 2023.
- Are We Aware? An Empirical Study on the Privacy and Security Awareness of Smartphone Sensors. In 21st IEEE International Conference on Software Engineering, Management and Applications (SERA), Orlando, FL, USA, May 2023.
- Phishy? Detecting Phishing Emails Using ML and NLP. In 21st IEEE International Conference on Software Engineering, Management and Applications (SERA), Orlando, FL, USA, May 2023.

Kabiraj Phuyal (MS Student):

- Future Net-Zero Innovators Symposium, the Center for Advanced Energy Studies, Idaho Falls
    - Advisor: Mustafa Mashal

Durga Parajuli (MS Student):

- Future Net-Zero Innovators Symposium, the Center for Advanced Energy Studies, Idaho Falls
    - Advisor: Arya Ebrahimpour

Samuel Brandeberry and Brenna Murri (BS Students):

- Future Net-Zero Innovators Symposium, the Center for Advanced Energy Studies, Idaho Falls
    - Advisors: Arya Ebrahimpour, Bruce Savage

Sections 3. External Proposal Activities

Sections 3.1 Submitted/Funded Proposals Related to CAES Activities

Principal Investigator	Funding Agency	Amount	Department	Title	Awarded
Daniel LaBrier	Univ of Idaho	$49,913	Nuclear Eng/Health Physics	Evaluation of Tetrataenite as a Viable Magnetic Material for Extraterrestrial Projects	-
Anirban Chakraborty	Oak Ridge Associated Univ Inc	$5,000	Biological Sciences	Investigation of Extremophiles in Deep Marine Cold SeepsÂ	-
Leslie Kerby	Battelle Energy Alliance LLC	$100,000	Computer Science Engineering	Data Science Applications with Software Bills of Materials (SBOMs)Â	-
Kristi Moser-Mcintire	Battelle Energy Alliance LLC	$85,563	Center for Adv Energy Studies CAES	FY23 ISU Purchase of Chemicals to Support CAES	Yes
Mustafa Mashal	Battelle Energy Alliance LLC	$90,123	Center for Adv Energy Studies CAES	FY23 INL Joint Appointment Agreement - Mustafa Mashal - CAES AD	Yes
Daniel LaBrier	US Department of Energy	$4,054,790	Nuclear Eng/Health Physics	PRIME: Program for Research-Integrated Methods in Education	-
Andrew Chrysler	Idaho Department of Commerce	$277,405	Electrical Engineering	Mad Maxx Security Barrier and Threat Deterrence	-
Rajib Mahamud	University of Texas RGV - UTRGV	$44,845	Mechanical Engineering	Lithium Recovery from Geothermal Brine Using Field-Assisted High-Temperature Membrane Distillation Crystallization with Nanocomposite Membrane	-
Mary-Lou Dunzik-Gougar	Battelle Energy Alliance LLC	$98,620	Nuclear Eng/Health Physics	University of Wyoming Course: Fundamentals of Nuclear Energy	Yes
Ryan Pitcher	Battelle Energy Alliance LLC	$199,997	ESTEC	ESTEC Educational Support/Battelle FY23	-
Farjana Eishita	Univ of Idaho	$12,500	Chemistry	Free STEM Summer Camp for Underrepresented K-12 Students Designed and Delivered by STEM Undergraduates and Graduate Students at ISU	-
Rajib Mahamud	US Department of Energy	$398,126	Mechanical Engineering	Multiphysics modeling and assessment of hydrogen explosion risks in the event of severe nuclear reactor accident	-

Mustafa Mashal	Idaho Transportation Dept	$149,968	Civil/Environmental Engineering	Alkali-Silica Reaction Mitigation Strategies with Specific Admixtures	-
Daniel LaBrier	US Department of Energy	$700,710	Nuclear Eng/Health Physics	Reimagining Irradiated Materials Testing through the Use of Diamond Anvil Cells	-
Mary Lou Dunzik-Gougar	Battelle Energy Alliance LLC	$11,944	Nuclear Eng/Health Physics	Focused Ion Beam Work with TRISO-Coated Fuel	-
Dustin McNulty	US Department of Energy	$724,727	Physics	Precision Electroweak Probes of Beyond Standard Model Physics	-
Rajib Mahamud	Univ of Idaho	$49,100	Mechanical Engineering	Development of A Deep Neural Network (DNN) Augmented Interactive Flamelet Method for The Numerical Simulation of Supersonic Reacting Flows	-
Donna Delparte	Univ of Idaho	$60,000	Geosciences	Combining In-situ and Remote Sensing-Based Monitoring Methods to Improve the Efficiency and Accuracy of Landslide Monitoring Activities	-
Mustafa Mashal	Battelle Energy Alliance LLC	$16,024	Civil/Environmental Engineering	Investigate the Use of Visualization and Sensors to Support Structural Health Monitoring for Fission Battery	-
Anirban Chakraborty	Univ of Idaho	$49,871	Biological Sciences	Microbiome surveillance of the sulfate-rich aquifers in Reynolds Creek Critical Zone Observatory in SW Idaho - a potential Mars analog habitat?	-
Kellie Wilson	Univ of Idaho	$25,000	Mechanical Engineering	NASA Grant	-
Andrew Chrysler	National Science Foundation	$2,499,170	Electrical Engineering	S-STEM: Guiding Rural East Idaho Undergraduates in Attaining Engineering, CS, and Math Degrees	-
Farjana Eishita	Univ of Nevada Las Vegas	$65,947	Computer Science Engineering	Gamified Digital Intervention to Ameliorate the Aptitude of Imaginal Exposure for OCD: A Neoteric Approach in Post-Pandemic Scenario	-

Farjana Eishita	Battelle Energy Alliance LLC	$16,400	Computer Science Engineering	CAES - Summer Visiting Faculty Program (2023)	-
Taher Deemyad	Battelle Energy Alliance LLC	$16,401	Mechanical Engineering	CAES - Summer Visiting Faculty Program (2023)	-
Yaodan Hu	Battelle Energy Alliance LLC	$15,975	Electrical Engineering	CAES - Summer Visiting Faculty Program (2023)	-
Bruce Savage	Battelle Energy Alliance LLC	$16,401	Civil/Environmental Engineering	CAES - Summer Visiting Faculty Program (2023)	-
Bruce Savage	US Department of Energy	$2,984,725	Civil/Environmental Engineering	Innovative Pumped Storage using Repurposed Tires	-
Rene Rodriguez	Battelle Energy Alliance LLC	$23,970	Chemistry	ISU- Support for Transient Spectrokenetic Measurements 2023 Equipment	Yes
Amir Ali	Battelle Energy Alliance LLC	$20,000	Nuclear Eng/Health Physics	Trifecta of Advanced Sensing, Modeling and Artificial Intelligence to Avoid the Formation of Defects in Additively Manufactured Parts	Yes
Amir Ali	Battelle Energy Alliance LLC	$20,000	Nuclear Eng/Health Physics	Development of Hybrid Thermal Energy Storage Concept for Dynamic load/process heat Demand in Heat Pipe Cooled Microreactors/Fission Batteries	
Keith Weber	Idaho Office of Information Technology Services (ITS)	$3,106	GIS Center	CPI Internship to Support Hazard Mapping Idaho	Yes

Section 3.2. Other Proposals/Grants Related to CAES Activities

Amir Ali:

A Model-based Approach to an Optimal Net-Zero Framework for INL to Achieve a 2029 Deployment with MARVEL 2.0, Laboratory Directed Research & Development (LDRD), Collaborators: Travis Lange (INL). Porter Zohner (INL), Yasir Arafat (INL), Kostadin Ivanov (NC State University), Jeff Jones (Walsh Engineering), Amir Ali (ISU).

Leslie Kerby:

- Data Science Applications with Software Bills of Materials (SBOMs), $100,000, 2023, Idaho National Laboratory. ISU Principal Investigator: Leslie Kerby; INL Collaborator: Shannon Eggers.
- Cyber Security for Nuclear Machine Learning Applications, $247,510, 2022–2023, Idaho National Laboratory, ISU Principal Investigator: Leslie Kerby; INL Collaborator: Chris Spirito.

Minhaz Zibran:

- Source Code Migration from Griffin to Create a New MOOSE (Multiphysics Object Oriented Simulation Environment) Module, Boltzmann. In collaboration with Dr. Jackson Harter a staff scientist at INL under the FY 2022 CAES Collaboration Program Development Funds program.
- VizSoft: Interactive Visualization of Software Aspects in IDE. In collaboration with Dr. Rajiv Khadka a visualization researcher at INL with support from an ISU CAES Seed Grant.

Mostafa Fouda:

- Reinforcement-Learning-Based Approach to Optimizing Quality of Service and Security on Fifth-Generation Networks, Laboratory Directed Research & Development (LDRD), $800K (ISU share is $150K USD), Oct. 2022 to Sep. 2024. Principal Investigator: Cameron Krome (INL), Co-investigator: Mostafa Fouda (ISU).

Rene Rodriguez:

- Writing a grant with Dr. Pashikanti, Dr. Holland, Dr. Sharma, and Dr. Perez-Garcia from AMES Lab on Ionic Liquid Research.

Mustafa Mashal:

- Carbon Sequestration Using Concrete Employing Waste Products (Pre-Application), Laboratory Directed Research & Development (LDRD), $1,500,000, Principal Investigator: Ninad Mohale (INL), Co-investigator: Rajiv Khadka, Som Duhlipala, Co-investigator: Mustafa Mashal, Daniel LaBrier, Rajib Mahamud (ISU).
- Alkali-Silica Reaction Mitigation Strategies with Specific Admixtures. $150,000 to Idaho Transportation Department. PI: Mustafa Mashal, Co-PI: Bruce Savage (ISU).
- Investigate the Use of Visualization and Sensors to Support Structural Health Monitoring for Nuclear Power Plants. $40,000 to Battelle Energy Alliance. PI: Rajiv Khadka (INL), Co-PI: Mustafa Mashal, Jared Cantrell (ISU).
- Using Virtual and Mixed Reality to Train Radiation Emergency Responders. $40,000 to Battelle Energy Alliance. PI: Jack Dunker (INL), Co-PI: Mustafa Mashal, Jared Cantrell (ISU).

Section 4. Patents, Licenses, other IP

Section 5. Other Awards

1. **Larry Leibrock**: Fulbright-National Science Foundation Cybersecurity and Critical Infrastructure Scholar (Iceland)
2. **Mostafa Fouda and Ahmed Ashour (Ph.D. Student):** Best Paper Award at the 2023 International Conference on Computer Science, Information Technology, and Engineering in Jakarta, Indonesia.
3. **Katie Hogarth (Ph.D. Student), Arya Ebrahimpour, and Mustafa Mashal:** Best Paper in Theme 2 “Advances in Infrastructure Sustainability, Renovation, and Monitoring” at Conference on Civil Infrastructure and Construction in Doha, Qatar
4. **Mustafa Mashal**: Fulbright Middle East and North Africa (MENA) Regional Travel Program at the University of Jordan, Amman, Jordan.
5. **Mustafa Mashal:** Accomplished Under 40 (Idaho Business Review)
6. **Mustafa Mashal:** Fellow of the American Society of Civil Engineers Structural Engineering Institute

7. **Samuel Brandeberry and Brenna Murri (BS Students), Arya Ebrahimpour, Bruce Savage:** 2nd Place Poster at the Future Net-Zero Innovators Symposium, Idaho Falls.

Section 6. Graduated CAES-Affiliated Students

Section 7. Continuing CAES-Affiliated Students

1. Amir Ali (Advisor): Scott Wahlquist (Ph.D.), Sutapa Biswas (Ph.D.), and Kyle Shredder (M. Sc.)
2. Andrew Chrysler (Advisor): Suman Neupane, Zayed Mohammad, Nehal Hasnaeen, Barrett Durtschi, Brandon Starks
3. Dan LaBrier (Advisor): Antonio Tahhan (Ph.D.)
4. Leslie Kerby (Advisor): Three students
5. Minhaz Zibran (Advisor): Arifa I. Champa, Md Fazle Rabbi
6. Mostafa Fouda (Advisor): Ahmed Ashour (Ph.D.), and Antora Dev (M.S.)
7. Rene Rodriguez (Advisor): Jacob Egbert (BS), Dessa Richins (BS), and Forrest Hiatt (BS)
8. Mustafa Mashal (Advisor): Jared Cantrell (Ph.D.), Mahesh Acharya (Ph.D.), Katie Hogarth (Ph.D.), Saksham Maharjan, Jose Duran, Ujwal Sharma, Aashish Deo, Kabiraj Phuyal (MS Students), Sindi Banda, Asa Flowers (Undergraduate students)

Section 8. Incoming CAES-Affiliated Students

1. Dan LaBrier (Advisor): Antonio Tahhan (Ph.D.)
2. Leslie Kerby (Advisor): Two students
3. Mostafa Fouda (Advisor): Yomna Mohamed (Ph.D.)
4. Mustafa Mashal (Advisor): Arpan Adhikari (BS)

Section 9. Joint Appointments (Continuing)

1. Chad Pope (Nuclear Engineering)
2. Benjamin Lampe (ESTEC/Cybersecurity)
3. Larry Leibrock (Computer Science/Cybersecurity)
4. Mustafa Mashal (CAES Associate Director)

Section 10. New Equipment

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 (2023)

ISU PI	ISU Department	ISU co-PIs	CAES co-PIs	INL co-PI	Project
Schoen, Marco	Mechanical Engineering	-	-	Andrew Gorman Jorgen Rufner	Preliminary Reinforcement Learning Control for Continuous Spark Plasma Sintering
Zibran, Minhaz	Computer Science	Farjana Eishita	-	Rajiv Khaka	VizSoft: Interactive Visualization of Software Aspects in IDE
Rodriguez, Rene	Chemistry	-	-	Kiyo Fujimoto	Plasma Methods for Novel Advanced Manufacturing Feedstock Development
Ali, Amir	Nuclear Engineering	-	-	Ahmed Hamed	Validation Experiments of CAES Developed Advanced Heat Exchanger Technology for Integrated Energy and Storage System Applications
Thackray, Glenn	Geosciences	-	Jennifer Pierce (BSU)		Reliable Small-Hydropower Generation and the Consistency of Water Supply from Central Idaho Mountain Streams
Fouda, Mostafa	Electrical & Computer engineering	-	-	Mohamma d Abdo	Effective Load and Generation Forecasts in Power Grids
Mashal, Mustafa	Civil & Environmen tal Engineering	Jared Cantrell Uma Shankar Medasetti	-	Vaibav Yadav	Methodology for Assessment of Performance Effectiveness of Mobile Robots for Nuclear Power Plant Security Applications
Sato, Chikashi	Civil & Environmen tal Engineering	John Dudgeon	-	Kunal Mondal	Integrating microbial fuel cell into algae cultivator for the development of sustainable energy-water-food system
Xu, Danny	Biomedical & Pharmaceuti cal Sciences	-	-	Eric Whiting	Hearing loss prevention through integrative high-performance computing and data science

Mahamud, Rajib	Mechanical Engineering	-	-	Ahmed Hamed	Development of combustion and flame propagation models within the MOOSE Multiphysics computational framework

Section 11.4. Other Collaboration and Outreach

- Dr. Scott Snyder (Dean of College of Science and Engineering) and Dr. Mashal visited the following universities and entities in Qatar and Kuwait, discussing research and other collaboration with ISU and CAES.
    - Kuwait University, Kuwait City, Kuwait
    - Australian University, Kuwait City, Kuwait
    - The U.S. Embassy in Kuwait, Kuwait City, Kuwait
    - Qatar University, Doha, Qatar
    - Hamad Bin Khalifa University, Doha, Qatar
    - Community College of Qatar, Doha, Qatar
    - University of Doha for Science and Technology, Doha, Qatar
    - Qobolak, Doha, Qatar
    - Ministry of Education and Higher Education, Doha, Qatar
- Dr. Martin Blair (Vice President for Research and Economic Development) and Dr. Mustafa Mashal discussed research collaboration with the leadership of following university in Jordan.
    - The University of Jordan, Amman, Jordan
- Kristi Moser-McIntire: New ISU CAES Deputy Associate Director
    - ISU Administrative Council Meeting at the CAES Building
    - ISU Research Council Meeting at the CAES Building
    - ISU College of Technology Tour of the CAES Building

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

Andrew Chrysler:

- Antenna Design (ECE 6635)

Amir Ali:

- Computational Thermal Hydraulics (NS4499-5599)