

CAES Associate Director Quarterly Report
Idaho State University, FY23Q3&Q4
April-September 2023
Self-reported by ~85% of active CAES Faculty

Section 1. Publications on Behalf of CAES

1. I. Elgarhy, M. M. Badr, M. Mahmoud, **M. M. Fouda**, M. Alsabaan, and H. A. Kholidy, "Clustering and Ensemble Based Approach For Securing Electricity Theft Detectors Against Evasion Attacks," *IEEE Access*, in press. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3318111](https://doi.org/10.1109/ACCESS.2023.3318111)]
2. M. E. -S., N. E. Akkad, M. Merras, K. Satori, W. ElShafai, T. Altameem, and **M. M. Fouda**, "Securing Images Using High Dimensional Chaotic Maps and DNA Encoding Techniques," *IEEE Access*, early access. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3315658](https://doi.org/10.1109/ACCESS.2023.3315658)]
3. A. F. Ashour, C. Condie, C. Pocock, **S. C. Chiu**, **A. Chrysler**, and **M. M. Fouda**, "A Spectrum Injection-Based Approach for Malware Prevention in UHF RFID Systems," *IEEE Access*, vol. 11, pp. 97786–97806, Sept. 2023. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3313117](https://doi.org/10.1109/ACCESS.2023.3313117)]
4. A. T. El-Toukhy, M. Mahmoud, A. H. Bondok, **M. M. Fouda**, and M. Alsabaan, "Countering Evasion Attacks for Smart Grid Reinforcement Learning-based Detectors," *IEEE Access*, vol. 11, pp. 97373–97390, Sept. 2023. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3312376](https://doi.org/10.1109/ACCESS.2023.3312376)]
5. K. M. Hosny, A. I. Awad, M. M. Khashaba, **M. M. Fouda**, M. Guizani, and E. R. Mohamed, "Enhanced Multi-Objective Gorilla Troops Optimizer for Real-Time Multi-User Dependent Tasks Offloading in Edge-cloud Computing," *Elsevier Journal of Network and Computer Applications*, vol. 218, article no. 103702, Sept. 2023. (Impact factor: 8.7)
[DOI: [10.1016/j.jnca.2023.103702](https://doi.org/10.1016/j.jnca.2023.103702)]
6. A. Khan, **M. M. Fouda**, D. -T. Do, A. Almaleh, and A. U. Rahman, "Short-Term Traffic Prediction Using Deep Learning Long Short-Term Memory: Taxonomy, Applications, Challenges, and Future Trends," *IEEE Access*, vol. 11, pp. 94371–94391, Aug. 2023. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3309601](https://doi.org/10.1109/ACCESS.2023.3309601)]
7. A. Shafee, M. Mahmoud, G. Srivastava, **M. M. Fouda**, M. Alsabaan, and M. Ibrahim, "Detection of Distributed Denial of Charge (DDoC) Attacks Using Deep Neural Networks with Vector Embedding," *IEEE Access*, vol. 11, pp. 75381–75397, Jul. 2023. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3296562](https://doi.org/10.1109/ACCESS.2023.3296562)]
8. K. M. Hosny, M. A. Zaki, N. A. Lashin, **M. M. Fouda**, and H. M. Hamza, "Multimedia Security Using Encryption: A Survey," *IEEE Access*, vol. 11, pp. 63027–63056, Jun. 2023. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3287858](https://doi.org/10.1109/ACCESS.2023.3287858)]
9. M. M. Elsayed, K. M. Hosny, **M. M. Fouda**, M. M. Khashaba, "Vehicles Communications Handover in 5G: A Survey," *Elsevier ICT Express*, vol. 9, no. 3, pp. 366–378, Jun. 2023. (Impact factor: 5.4)
[DOI: [10.1016/j.ict.2022.01.005](https://doi.org/10.1016/j.ict.2022.01.005)]

10. A. T. El-Toukhy, M. M. Badr, M. Mahmoud, G. Srivastava, **M. M. Fouda**, and M. Alsabaan, "Electricity Theft Detection Using Deep Reinforcement Learning in Smart Power Grids," *IEEE Access*, vol. 11, pp. 59558–59574, Jun. 2023. (Impact factor: 3.9)
[DOI: [10.1109/ACCESS.2023.3284681](https://doi.org/10.1109/ACCESS.2023.3284681)]
11. S. Hashima, **M. M. Fouda**, K. Hatano, H. Kasban, and E. M. Mohamed, "Dual Objective Bandit for Best Channel Selection in Hybrid Band Wireless Systems," *Springer Journal of Ambient Intelligence and Humanized Computing*, vol. 14, pp. 4115–4125, Apr. 2023.
[DOI: [10.1007/s12652-022-04475-8](https://doi.org/10.1007/s12652-022-04475-8)]
12. S. Hashima, Z. M. Fadlullah, **M. M. Fouda**, E. M. Mohamed, K. Hatano, B. M. ElHalawany, and M. Guizani, "On Softwarization of Intelligence in 6G Networks for Ultra-Fast Optimal Policy Selection: Challenges and Opportunities," *IEEE Network*, vol. 37, no. 2, pp. 190–197, Mar./Apr. 2023. (Impact factor: 9.3)
[DOI: [10.1109/MNET.103.2100587](https://doi.org/10.1109/MNET.103.2100587)]
13. G. Gad, A. Farrag, Z. M. Fadlullah, and **M. M. Fouda**, "Communication-Efficient Federated Learning in Drone-Assisted IoT Networks: Path Planning and Enhanced Knowledge Distillation Techniques," Proc. of the 2023 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2023), Toronto, ON, Canada, Sept. 5–8, 2023.
14. S. Hashima, E. M. Mohamed, K. Hatano, E. Takimoto, **M. M. Fouda**, and Z. M. Fadlullah, "On Enhancing WiGig Communications With A UAV-Mounted RIS System: A Contextual Multi-Armed Bandit Approach," Proc. of the 2023 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2023), Toronto, ON, Canada, Sept. 5–8, 2023.
15. K. Bedda, **M. M. Fouda**, and Z. M. Fadlullah, "PC-SSL: Peer-Coordinated Sequential Split Learning for Intelligent Traffic Analysis in mmWave 5G Networks," Proc. of the 2023 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2023), Toronto, ON, Canada, Sept. 5–8, 2023.
16. S. Eghtessad, T. Hasanli, R. Huynh, K. Workneh, M. I. Ibrahim, and **M. M. Fouda**, "A Survey on Privacy Preservation Methods in Future Vehicular Networks," Proc. of the 2023 International Conference on Information and Communication Technology (ICoICT 2023), Melaka, Malaysia. Aug. 23–24, 2023.
17. W. Donnelly, P. Keifer, R. Minor, U. Muthukumar, B. Parolek, B. Tuck, M. I. Ibrahim, and **M. M. Fouda**, "A Review of Privacy-preserving and Efficient Data Collection and Aggregation in Smart Grids," Proc. of the 2023 International Conference on Information and Communication Technology (ICoICT 2023), Melaka, Malaysia. Aug. 23–24, 2023.
18. A. O. Hashesh, A. S. Tag Eldien, **M. M. Fouda**, and R. M. Zaki, "Best Height of UAV-Aided NOMA Using ML and Optimization Techniques," Proc. of the 2023 IEEE Conference on the Intelligent Methods, Systems, and Applications (IMSA 2023), Cairo, Egypt, Jul. 15–16, 2023.
19. S. Hashima, **M. M. Fouda**, K. Hatano, and E. Takimoto, "Advanced Learning Schemes for Metaverse Applications in B5G/6G Networks," Proc. of the 2023 IEEE International Conference on Metaverse Computing, Networking and Applications Workshops (IEEE MetaCom WKSHPs 2023), Kyoto, Japan, Jun. 26–28, 2023.
20. S. Hashima, **M. M. Fouda**, K. Hatano, E. Takimoto, and Z. M. Fadlullah, "Multi-armed Bandit-Aided Near-Optimal Over-The-Air Updates in Multi-Band V2X Systems," Proc. of the 2023 5th International Conference on Computer Communication and the Internet (ICCCI 2023), Fujisawa, Japan, Jun. 23–25, 2023.
21. G. Gad, Z. M. Fadlullah, K. Rabie, and **M. M. Fouda**, "Communication-efficient Privacy-Preserving Federated Learning via Knowledge Distillation for Human Activity Recognition

- Systems,” Proc. of the 2023 IEEE International Conference on Communications (IEEE ICC 2023), Rome, Italy, May 28–June 1, 2023.
22. A. F. Ashour, C. Condie, C. Pocock, **S. C. Chiu**, **A. Chrysler**, and **M. M. Fouda**, “Spectrum-based Malware Detection for RFID Memory Banks in LF, HF, and UHF Bands,” Proc. of the 2023 IEEE International Opportunity Research Scholars Symposium (IEEE ORSS 2023), Atlanta, GA, USA, Apr. 23–Jun. 02, 2023.
 23. S. Chavali, H. Cheema, R. Delgado, E. Nolan, M. I. Ibrahim, and **M. M. Fouda**, “A Review of Privacy-Preserving Authentication Schemes for Future Internet of Vehicles,” Proc. of the 2023 IEEE 12th International Conference on Communication Systems and Network Technologies (CSNT 2023), Bhopal, India, Apr. 8–9, 2023.
 24. A. Almarshoodi, J. Keenan, I. Campbell, T. Hassan, M. I. Ibrahim, and **M. M. Fouda**, “Security and Privacy Preservation for Future Vehicular Transportation Systems: A Survey,” Proc. of the 2023 IEEE 12th International Conference on Communication Systems and Network Technologies (CSNT 2023), Bhopal, India, Apr. 8–9, 2023.
 25. S. Wahlquist, J. Hansel, P. Sabharwall, and **A. Ali**, 2023 " A Critical Review of Heat Pipe Experiments in Nuclear Energy Application," Nuclear Science and Engineering 197 (5), 719-752.
 26. K. Schroeder, S. Wahlquist, A. Hamed, P. Sabharwall, and **A. Ali**, 2023 " Numerical Analysis of Novel Plate Type Heat Exchanger with Oval-Twisted Channels," American Nuclear Societing, November 23, Washington, DC.
 27. S. M. Nehal Hasnaeen, S. Neupane and **A. Chrysler**, "Towards a UHF RFID Electromagnetic Fingerprint-Based Web Resolver for Digital Twins," 2023 IEEE International Conference on RFID (RFID), Seattle, WA, USA, 2023, pp. 36-41, doi: 10.1109/RFID58307.2023.10178655.
 28. Z. Mohammad and **A. Chrysler**, "Airborne Reflector-Based Ground Penetrating Radar for Environmental and Archaeological Studies," in IEEE Open Journal of Antennas and Propagation, vol. 4, pp. 748-753, 2023, doi: 10.1109/OJAP.2023.3295849.
 29. Z. Mohammad and **A. Chrysler**, “Slotted Waveguide for High Dielectric Heating,” in 2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), Jul. 2023
 30. Z. Mohammad, S.M. Nehal Hasnaeen, S. Neupane and **A. Chrysler**, “Machine Learning Approach to Determine the Characteristics of a Longitudinally Slotted Waveguide Immersed into a High Dielectric,” in 2023 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting (AP-S/URSI), Jul. 2023
 31. 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. 357 - 361, Australia, 2023.
 32. A. Champa, M. Rabbi, F. Eishita, and **M. Zibran**. 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 2022), pp. 287 - 294, USA, 2023.
 33. M. Rabbi, A. Champa, and **M. Zibran**. Phishy? Detecting Phishing Emails Using ML and NLP. In 21st IEEE International Conference on Software Engineering, Management and Applications (SERA 2022), pp. 77 - 83, USA, 2023
 34. **D. LaBrier**, C. Pope, W. Marcum, “On Developing a Practical Safety Culture for the Advanced Reactor Workforce: Experiences of Working with Sodium”, Frontiers in Nuclear Engineering-Fission and Reactor Design. April 2023.

35. R. Stewart, A. Shields, **C. L. Pope**, J. Darrington, K. Wilsdon, S. Bayes, K. Heaps, N. Woodruff, J. Scott, G. Reyes, M. Schanfein, E. Trevino, J. Palmer, C. Ritter, “A Digital Twin of the AGN-201 Reactor to Simulate Nuclear Proliferation”, Proceedings of the INMM/ESARD 2023 Joint Annual Meeting, (2023)
36. Z. Ma, S. Zhang, **C. L. Pope**, C. Smith, “Research to Develop Flood Barrier Testing Strategies for Nuclear Power Plants”, Nuclear Technology, DOI: 10.1080/00295450.2022.2145169, (2023)
37. K. Phuyal, U. Sharma, **J. Mahar**, K. Mondal, and **M. Mashal** (2023). A Sustainable and Environmentally Friendly Concrete for Structural Applications. MDPI Sustainability, 15(20):14694.
38. 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, Vol. 15(15), 11620.
39. 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.
40. 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.
41. 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.
42. K. Phuyal, **J. Mahar**, B. Savage, C. Sato, K. Mondal, and **M. Mashal** (2023). Utilization of Precipitated Calcium Carbonate (PCC) and Upcycled Aggregate (UA) in Civil Engineering: Laboratory Experiments and Engineering Properties Assessment. 1st GCC Engineering Symposium, Kuwait City, Kuwait.
43. M. Acharya, J. Cantrell, L. Bedriñana, and **M. Mashal** (2024). Revolutionary Construction Approach for Civil and Critical Infrastructures: Titanium Alloy Reinforced Ultra High-Performance Concrete (TARUHPC). 1st GCC Engineering Symposium, Kuwait City, Kuwait.

Section 2. Conferences Attended/Presented at on Behalf of CAES

1. G. Gad, A. Farrag, Z. M. Fadlullah, and **M. M. Fouda**, “Communication-Efficient Federated Learning in Drone-Assisted IoT Networks: Path Planning and Enhanced Knowledge Distillation Techniques,” Proc. of the 2023 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2023), Toronto, ON, Canada, Sept. 5–8, 2023.
2. S. Hashima, E. M. Mohamed, K. Hatano, E. Takimoto, **M. M. Fouda**, and Z. M. Fadlullah, “On Enhancing WiGig Communications With A UAV-Mounted RIS System: A Contextual Multi-Armed Bandit Approach,” Proc. of the 2023 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2023), Toronto, ON, Canada, Sept. 5–8, 2023.
3. K. Bedda, **M. M. Fouda**, and Z. M. Fadlullah, “PC-SSL: Peer-Coordinated Sequential Split Learning for Intelligent Traffic Analysis in mmWave 5G Networks,” Proc. of the 2023 IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (IEEE PIMRC 2023), Toronto, ON, Canada, Sept. 5–8, 2023.

4. S. Eghtessad, T. Hasanli, R. Huynh, K. Workneh, M. I. Ibrahem, and **M. M. Fouda**, “A Survey on Privacy Preservation Methods in Future Vehicular Networks,” Proc. of the 2023 International Conference on Information and Communication Technology (ICoICT 2023), Virtual, Aug. 23–24, 2023.
5. W. Donnelly, P. Keifer, R. Minor, U. Muthukumaran, B. Parolek, B. Tuck, M. I. Ibrahem, and **M. M. Fouda**, “A Review of Privacy-preserving and Efficient Data Collection and Aggregation in Smart Grids,” Proc. of the 2023 International Conference on Information and Communication Technology (ICoICT 2023), Virtual, Aug. 23–24, 2023.
6. S. Hashima, **M. M. Fouda**, K. Hatano, E. Takimoto, and Z. M. Fadlullah, “Multi-armed Bandit-Aided Near-Optimal Over-The-Air Updates in Multi-Band V2X Systems,” Proc. of the 2023 5th International Conference on Computer Communication and the Internet (ICCCI 2023), Fujisawa, Japan, Jun. 23–25, 2023.
7. 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. 357 - 361, Australia, 2023.
8. A. Champa, M. Rabbi, F. Eishita, and **M. Zibran**. 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 2022), pp. 287 - 294, USA, 2023.
9. M. Rabbi, A. Champa, and **M. Zibran**. Phishy? Detecting Phishing Emails Using ML and NLP. In 21st IEEE International Conference on Software Engineering, Management and Applications (SERA 2022), pp. 77 - 83, USA, 2023
10. **D. LaBrier**, **M. Mashal**, M. Acharya, M. Benson, B. Sosa Aispuro, “Utilization of Ultra-High Performance Concrete (UHPC) in Commercial Fusion Energy Facilities,” TechConnect 2023 World Innovation Conference, National Harbor MD. June 2023.
11. **D. LaBrier**, A. Tahhan-Acosta, C. Pitcher Jr., “Use of Tetrataenite as a Magnetic Material in Nuclear Engineering Applications: (poster), TechConnect 2023 World Innovation Conference, National Harbor MD. June 2023.
12. J. Egbert, D. Richens, **R. Rodriguez**, “Advanced Manufacturing Methods with a Gas Phase Approach”, Idaho Academy of Science and Engineering Meeting, Boise, ID, Poster Presentation, April 2023
13. **R. Rodriguez**, F. Hiatt, S. Van Leuven, “Studies of the Inter- and Intra-molecular Interactions in Ionic Liquids with Nuclear Magnetic Resonance Spectroscopy”, Idaho Academy of Science and Engineering Meeting, Boise ID, Oral Presentation, April 2023.

Sections 3. External Proposal Activities

Sections 3.1 Submitted/Funded Proposals Related to CAES Activities

Principal Investigator	Funding Agency	Amount	Department	Title	Awarded
Srinath Pashikanti	US Department of Energy	\$749,999	Biomedical and Pharmaceutical Sciences	A Multidisciplinary Study of Phosphonium Ionic Liquids Harnessing the Combined Strength of Experiment, Theory, and Machine Learning	Pending
Keith Weber	Federal Emergency Management Agency	\$81,083	GIS Center	2023 Idaho LiDAR Delivery, Outreach, and Services (DOS)	Pending
Amir Ali	US Nuclear Regulatory Commission	\$500,000	Nuclear Engineering	Understanding Fire Risks In Small Modular Reactors with the Implementation of CFD and Probabilistic Risk Assessment (PRA) Tools	Pending
Mustafa Mashal	National Science Foundation (Lead = Rowan University)	\$500,000	Civil and Environmental Engineering	Global Center for ZERO-Emissive BUILT Environment Technologies (BUILT-ZERO)	No
Daniel LaBrier	US Nuclear Regulatory Commission	\$485,620	Nuclear Engineering	Establishment of the Structural Materials Advanced Reactor Testing (SMART) Laboratory at Idaho State University	Pending

Section 3.2. Other Proposals/Grants Related to CAES Activities

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), Feb. 2023 to Sep. 2024. Principal Investigator: Cameron Krome (INL), Co-investigator: Mostafa Fouda (ISU).
- Collaborative Research: NeTS: JUNO3: SWIFT: Softwarization of Intelligence for Efficient 6G Mobile Networks, National Science Foundation (NSF), \$450K (ISU share is \$225K), Sept. 2022 to Aug. 2025. Principal Investigators: Muhammad Ismail (Tennessee Tech) and Mostafa Fouda (ISU).

Amir Ali:

- NRC-R&D (\$500,000) - Amir Ali, PI, and Chad Pope, Co-PI
- NEUP R&D (\$1,000,000) - Amir Ali, PI, Co-PIs: Prahalada Rao (Virginia Tech), Michael Hurley (BSU), Haiyan Zhao (UoI), Donna Guillen (INL)

- NEUP General Infrastructure Instrumentation (\$250,000) - Amir Ali, PI, Co-PIs: Prahalada Rao (Virginia Tech), Michael Hurley (BSU), Donna Guillen (INL)
- NEUP R&D (\$500,000)- Amir Ali, PI, Zhangxian Deng(BSU), Co-PI

Mustafa Mashal:

- QRDI (\$733,810) “Carbon Negative Concrete: A Paradigm Shift from the Use of Recycled to Upcycled Aggregate to Combat Climate Change”, full proposal in collaboration with Qatar University, Co-PI
- Department of Energy (\$1,500,000) “Carbon Sequestration Using Concrete Employing Waste Products (Pre-Application), PI

Section 4. Patents, Licenses, other IP

- **M. Mashal** (2023), US Patent No. 11,788,314 Title: “Ductile Connections for Pre-Formed Construction Elements”

Section 5. Other Awards

1. Mahesh Acharya (PhD Candidate) “Pacific Rim Earthquake Engineering Mitigation Protective Technologies International Virtual Environment Advanced Studies Institute (PREEMPTIVE – ASI), Advisor = Mustafa Mashal
2. Kathryn Hogarth (PhD Student), “Charles Pankow Foundation Student Fellowship, Advisor = Mustafa Mashal
3. Aashish Deo, “American Concrete Institute (ACI) Intermountain Chapter Scholarship, Advisor = Mustafa Mashal

Section 6. Graduated CAES-Affiliated Students

4. Amir Ali (Advisor): Kyle Schroeder (MS)
5. Andrew Chrysler (Advisor): Suman Neupane (MS), Zayed Mohammad (MS), Nehal Hasnaeen (MS)
6. Paul Bodily (Advisor): Caleb Eardley (BS)
7. Chad Pope (Advisor): Mikayla Thompson (MS), Braeden Higby (MS)

Section 7. Continuing CAES-Affiliated Students

8. Amir Ali (Advisor): Scott Wahlquist (PhD), Sutapa Biswas (PhD)
9. Rene Rodriguez (Advisor): Jacob Egbert
10. Dan LaBrier (Advisor): Antonio Tahhan (PhD)
11. Marco Schoen (Advisor): Antorra Dev (MS), Golam Gause Jaman (PhD)
12. Minhaz Zibran (Advisor): Arifa I. Champa, Md Fazle Rabbi
13. Mostafa Fouda (Advisor): Ahmed Ashour (Ph.D.), Yomna Mohamed (PhD), Antora Dev (MS), Thomas Kopcho (MS)
14. Paul Bodily (Advisor): Alex Diviney (BS)
15. Chad Pope: (Advisor): Eva Barker (PhD), Jooyoung Park (PhD), Kofi Tuffour Achampong (PhD), Benjamin Johnson (MS), Andrew Fowler (MS), Bonnie Moon (MS), Sally Bartelmo (MS), Rick Gunderson (MS), Kyle Massey (MS), Abigayle Hargreaves (MS), Mitchell Frasure (MS)

- Mustafa Mashal (Advisor): Mahesh Acharya (PhD), Kathryn Hogarth (PhD), Kabiraj Phuyal (MS), Ujwal Sharma (MS), Saksham Maharjan (MS), Manish Acharya (MS), Aashish Deo (MS), Saksham Maharjan (MS), Jose Duran (MS),), Asa Flowers (BS), Arpan Adhikari (BS), Joe Shurtleff (BS)

Section 8. Incoming CAES-Affiliated Students

- Dan LaBrier (Advisor): Zachary Czajkowski (MS)
- Marco Schoen (Advisor): Nusrat Farheen (PhD)
- Rene Rodriguez (Advisor): Shanae Van Leuven, Adam Storms
- Mostafa Fouda (Advisor): Tanzim Mostafa (M.S.) and Shijon Das (M.S.)
- Mustafa Mashal (Advisor): Samjhana Rajbhandari (MS), Pawan Bhattarai (MS), Raghav Sharma (MS), Kshitiz Raisal (MS)
- Rajiv Khadka/Mustafa Mashal (Advisors): Pramesh Shah (BS), Saugat Acharya (BS), Sindi Banda (BS)
- Minhaz Zibran/Taher Deemyad (Advisors): Amir Hafezi
- Paul Bodily (Advisor): - Russell Phillips (BS), Andrija Sevaljevic (BS)
- Chikashi Sato (Advisor): Yashodha Nyaupane (MS)

Section 9. Joint Appointments (Continuing)

Name	Sponsor	Home Organization
Larry Leibrock	National & Homeland Security	Idaho State University
Ben Lampe	National & Homeland Security	Idaho State University
Chad Pope	Environment Safety Health & Quality	Idaho State University
Mustafa Mashal	Center for Advanced Energy Studies	Idaho State University
Shane Stailey*	National & Homeland Security	Idaho National Laboratory
Chris Zarzana*	National & Homeland Security	Idaho National Laboratory

*Denotes outgoing Joint Appointment

Section 10. New Equipment

- Mostafa Fouda: 4 laptops and 3 PC workstations for graduate students
- Amir Ali: Stylus Surface Profilometer (funded by Dean Strategic Fund and to be installed in CAES Innovation Laboratory)
- Chikashi Sato: Cary 3500 Multicell Peltier UV-Vis System with air cooled thermal control and no moving parts, and simultaneous measurements and permanent alignment
- Minhaz Zibran: Three laptops and one 75" interactive display panel.
- Rene Rodriguez: Power supply for Magnetron Sputter Tool
- Jared Cantrell: Drop Hammer Apparatus and Accessories

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 Fouada	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	-	-	Mohammad Abdo	Effective Load and Generation Forecasts in Power Grids
Mashal, Mustafa	Civil & Environmental 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 & Environmental Engineering	John Dudgeon	-	Kunal Mondal	Integrating microbial fuel cell into algae cultivator for the development of sustainable energy-water-food system
Xu, Danny	Biomedical & Pharmaceutical 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

Mostafa Fouda:

- Mohammad G. Abdo, Modeling and Simulation Scientist, (NS&T), INL

Amir Ali:

- Understanding of Fire Hazards and Risks in Small Modular Reactors with the Implementation of Computational Fluid Dynamic (CFD) and Probabilistic Risk Assessment (PRA) Tools.
- Engineering the Microstructure of Laser Powder Bed Fusion (LPBF) Additive Manufactured Nuclear Components to Achieve Enhanced Anti-Corrosion Properties
- Enhancing Advanced Manufacturing Capabilities through Real-time Sensing and Data Analytics in Laser Powder Bed Printing
- Additively Manufactured Flow Induced Vibration (FIV) Sensor for Nuclear Applications: Concept Development and Evaluation

Rene Rodriguez:

- “ISU-Support for Transient Spectrokinetic Measurements,” with Dr. Rebecca Fushimi from the INL

Mustafa Mashal:

- Bengal Energy Network Event (BENE), CAES Building
- ISU-C3 Collaboration Event, CAES Building
- ISU-ATR-C Collaboration

Kristi Moser-McIntire:

- Many tours of the CAES Building and its facilities were held for researchers from INL, students from Idaho Universities, potential industry collaborators, and officials from the government

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

Mostafa Fouda:

- ECE 6652 / CS 6692 “SP: Intelligent Systems” (Fall 2023)

Chad Pope:

- Motor Operated Valves in Nuclear Power Plant Applications, conducted at Idaho State University for US Nuclear Regulatory Commission representatives, course coordinator, August 7-11, 2023.
- Hands-On Approach-to-Critical and Nuclear Criticality Safety, conducted at Idaho State University for Naval Reactors Facility Nuclear Safety representatives, course coordinator and instructor, July 24, 2023.
- Motor Operated Valves in Nuclear Power Plant Applications, conducted at Idaho State University for US Nuclear Regulatory Commission representatives, course coordinator, May 15-19, 2023.

Leslie Kerby:

- “Computational Engineering And Data Science (CEADS) Summer Program”, over 20 students from ISU participated in this program in the CAES Building.