

CAES Associate Director Quarterly Report
Idaho State University, FY21Q3: April, May, June 2021

Section 1. Publications on behalf of CAES

None compiled (ISU faculty are currently off-contract and were not asked for their publication lists)

Section 2. Conferences Attended on behalf of CAES

None compiled (ISU faculty are currently off-contract and were not asked for their conference lists).

Sections 3. Submitted Proposals Related to CAES Activities

Lead PI	Admin Unit	Title	Sponsor	Status
Chad Pope	Nuclear Eng/Health Physics	U.S-Brazil Joint Study to Assess Market ...	BEA	Submitted
Michael McCurry	Geosciences	INL SSHAC Level 3 PVHA: Participatory Pe...	BEA	Submitted
Mostafa Fouda	Electrical Engineering	ERI Designing A Non-intrusive Smart Sens...	NSF	Submitted
Rene Rodriguez	Chemistry	Synthesis, Characterization and Testing ...	BEA	Funded
Mostafa Fouda	Electrical Engineering	Toward Privacy Preserving Machine Learni..	ISBOE	Funded
Jon Stoner	Idaho Accelerator Center	133mXe Isotope Beam Time	BEA	Funded
Leslie Kerby	COSE Informatics / Comp Sci	Develop an effective artificial intellig...	BEA	Funded
Shannon Kobs	Geosciences	PVHA TectInt Team	BEA	Funded
Shannon Kobs	Geosciences	Eastern Snake River Plain Volcanic Event...	BEA	Funded
Amir Ali	Nuclear Eng/Health Physics	CAES ATHeRM Training Update	BEA	Funded
Leslie Kerby	COSE Informatics / Comp Sci	Bootcamp	BEA	Funded
Andrew Chrysler	Electrical Engineering	Far-Field Detection of Rogue and Malicio...	Idaho	Funded
Andrew Chrysler	Electrical Engineering	Internship for Far-Field Detection of Ro...	Idaho	Funded
Amir Ali	Nuclear Eng/Health Physics	Molten Salt Nuclear Battery Design and D...	Idaho	Submitted
Courtney Jenkins	Chemistry	Radiation-Generated Radicals for Chemica...	BEA	Submitted
Mostafa Fouda	Electrical Engineering	Privacy-Preserving Health Monitoring Sys...	Qatar Nat	Submitted
Mostafa Fouda	Electrical Engineering	Reliable Biomedical Image Reconstruction...	Qatar Nat	Submitted

Section 3.5. Funded Awards related to CAES Activities

Lead PI	Title	Sponsor
Rene Rodriguez	Synthesis, Characterization and Testing c	BEA
Shannon Kobs	PVHA TectInt Team	BEA
Shannon Kobs	Eastern Snake River Plain Volcanic Event	BEA
Jon Stoner	133mXe Isotope Beam Time	BEA
Leslie Kerby	Develop an effective artificial intelligence	BEA
Amir Ali	CAES ATHeRM Training Update	BEA
Mostafa Fouda	Toward Privacy Preserving Machine Learn	ISBOE
Andrew Chrysler	Internship for Far-Field Detection of Rogu	Idaho
Andrew Chrysler	Far-Field Detection of Rogue and Malicio	Idaho
Leslie Kerby	Randomized Computing for Multiphysics	BEA
Leslie Kerby	Bootcamp	BEA
Mustafa Mashal	Bulk Storage of Hydrogen Energy	BEA
Mustafa Mashal	Radiological Dispersal Device Training	BEA
Amir Ali	Nuclear Microreactor Heat Pipe Modeling	BEA

Section 4. Patents, Licenses, other IP

None

Section 5. Other Awards

None

Section 6. Outgoing CAES Personnel

None compiled (ISU faculty are currently off-contract and were not asked for their student lists)

Section 7. Incoming CAES Personnel

None compiled (ISU faculty are currently off-contract and were not asked for their student lists)

Section 8. New Joint Appointments

None

Section 9. New Equipment

None compiled (ISU faculty are currently off-contract and were not asked for their equipment lists)

Section 10. Collaborative Research:

(1) CAES Visiting Faculty Program, Summer 2021

Idaho State University	INL Collaborators
Mostafa Fouda	Kurt Derr
Andrew Chrysler	Lloyd Landon
Justin Wood/Marcus Burger (withdrawn)	Ron Fisher
Mustafa Mashal	Chandu Bolisetti, Som Dhulipala
Irene van Woerden	Rajiv Khadka

(2) INL Collaboration Fund Program, Spring/Summer 2021

INL Investigator	ISU Investigator	Research Topic
Joshua Hansel	Amir Ali	Nuclear Microreactor Heat Pipe Modeling and Simulation Database
Kunal Mondal	Mustafa Mashal, Bruce Savage, Rene Rodriguez, Kavita Sharma	Bulk Storage of Hydrogen Energy
Bryon Marsh	Mustafa Mashal	Radiological Dispersal Device Training
Som Dhulipala	Leslie Kerby	Randomized Computing for Multiphysics Modeling and Simulations

(3) Idaho I-Corps Summer 2021 (co-sponsored by CAES)

Name	Affiliation	Venture/Initiative
Donna Delparte	Geosciences	Potato Crop Virus/Imaging
Jared Barrott	Pharmacy	Hydrogen therapy/CPAP
Amir Ali	Nuclear Engineering	Heat Exchanger
Nirajan Bhattarai	Pharmacy	Hearing Loss
Anish Sebastian	Mechanical Engineering	Automated Rouging

(4) ISU-CAES Seed Grant Program (Ongoing Research in FY21Q3)

ISU PI	ISU Department	ISU co-PIs	University co-PIs	INL co-PI	Project
Ali, Amir	NE		David Arcilesi (UI)	Piyush Sagharwall	Small-Scale Heat Exchanger Thermal Performance Facility
Jenkins, Cori	Chemistry	Josh Pak		Chris Zarzana Brittany Hodges	Urethane degradation analysis for upcycling and designing sustainable plastics
Leung Solomon	CE		Yaqiao Wu (BSU MaCS)	Don Wood	Sorption Removal of Gaseous Fission Products in Nuclear Fuel Reprocessing by MCM-41, TiO ₂ , and their Functionalized Derivatives
Mashal, Mustafa	CE	Bruce Savage Jared Cantrell Roy Dunker		Rajiv Khadka Xingue Yang John Koudelka Maya Redden Bryon Marsh Shad Keele Michael Shurtliff	The Use of Emerging Technologies for Training of Emergency Responders
Murray, Kendra	Geosciences		Nick Bulloss (BSU MaCS)	Xiaofei Pu	Olivine phenocryst evolution in the Snake River Plain basalt flows that underlie the INL
Pashikanti, Srinath	Pharmacy/ Chemistry	Rene Rodriguez		Robert Fox Donna Baek	Synthesis of Conformationally-Rigid Tetralkyl phosphonium based Ionic Liquids for extraction of critical element Cobalt
van Woerden, Irene	Community & Public Health			Rae Moss	Perceptions of INL and Nuclear Energy in the local community

(5) Active Laboratory Projects in the CAES building

PI	Project title	Status
Dan LaBrier	Integrated Sensor Development for Used Fuel Storage Canisters	Completed
Dan LaBrier	Chemical Interaction Studies between Molten Sodium and Standard Insulation Types	Work Control Approved; will be combined with project below
Dan LaBrier	Molten Salt Migration in Nuclear Grade Graphite	Work Control Approved; will be combined with project above
Dan LaBrier	Heat Treatment and Autoclave Testing	
Amir Ali	Scaled Heat Exchanger Performance Loop	Focused Review completed
Amir Ali	Goniometer Tensiometer	Installed

Section 11. Research Highlight: Integrated Sensor Development for Used Fuel Storage Canisters

In May 2020, researchers from Idaho State University (ISU) began investigating a unique detection system that could be implemented in storage canisters for used fuel plates from the Advanced Test Reactor (ATR) at the Idaho National Laboratory (INL). Under guidance from the Office of Environmental Management (EM) within the Department of Energy (DOE), INL was tasked with evaluating sensor technologies that could provide in situ measurements of moisture and hydrogen content within extended dry storage canisters used to house aluminum-clad used nuclear fuel.

A prototype of the remote, canister-monitoring system (RCMS) for determining and monitoring environmental conditions within dry fuel storage canisters was constructed by INL for testing the first sensor candidate at the Center for Advances Energy Studies (CAES), in Idaho Falls. The collaboration between ISU and INL focused on a combined sensor system capable of acquiring a point measurement of information within the canister, including temperature, relative humidity, and hydrogen gas concentration (Figure 1).

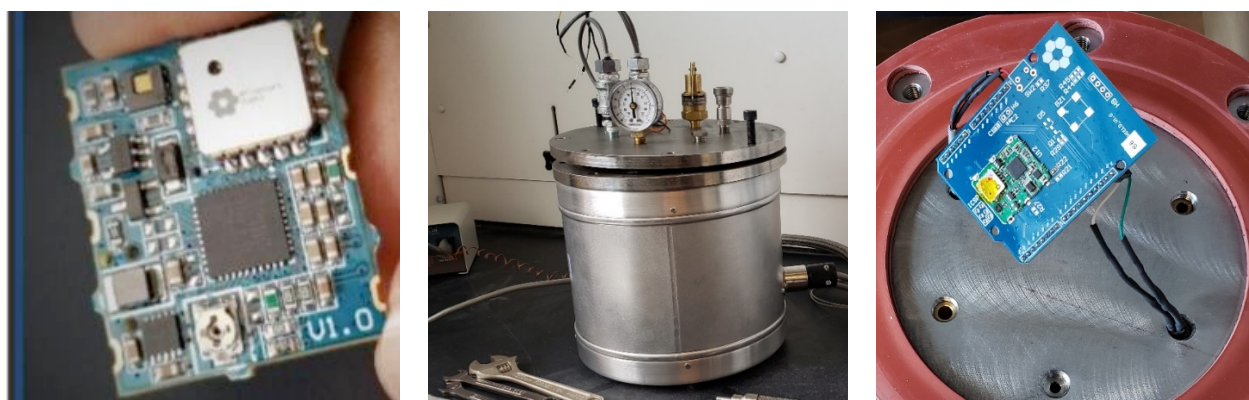


Figure 1. Combined sensor installed on an Arduino board (left), RCMS mock canister for CAES testing (center), and installed multi-component sensor system (right).

For the experimental campaign performed at CAES, the research team (from INL – Evans Kitcher (PI), John Buttles, Michael Fanning, Nancy Johnson, Phil Winston; from ISU – Daniel LaBrier (co-PI), Eslam Ali) investigated the performance of sensors chosen by the INL team, along with feasible use of wireless transmission of collected data to a remotely-located data acquisition system. This project was successfully completed in May 2021.