

## YEAR-END TECHNICAL REPORT

August 29, 2016 to September 28, 2017

# DOE-FIU Science & Technology Workforce Development Initiative

<http://fellows.fiu.edu/>

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**Applied Research Center**

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Addendum:

This document represents one (1) of four (4) reports that comprise the Year End Reports for the period of August 29, 2016 to September 28, 2017 prepared by the Applied Research Center at Florida International University for the U.S. Department of Energy Office of Environmental Management (DOE-EM) under Cooperative Agreement No. DE-EM0000598.

The complete set of FIU's Year End Reports for this reporting period includes the following documents:

Project 1: Chemical Process Alternatives for Radioactive Waste  
Document number: FIU-ARC-2017-800006470-04b-255

Project 2: Environmental Remediation Science and Technology  
Document number: FIU-ARC-2017-800006471-04b-254

Project 3: Waste and D&D Engineering and Technology Development  
Document number: FIU-ARC-2017-800006472-04b-245

Project 4: DOE-FIU Science & Technology Workforce Development Initiative  
Document number: FIU-ARC-2017-800006473-04b-253

Each document will be submitted to OSTI separately under the respective project title and document number as shown above. In addition, the documents are available at the DOE Research website for the Cooperative Agreement between the U.S. Department of Energy Office of Environmental Management and the Applied Research Center at Florida International University: <http://doeresearch.fiu.edu>

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## PROJECT 4 OVERVIEW

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There is a national need for more careers in science, technology, engineering and mathematics (STEM). This shortage is felt not only in the private industry sector but also across many federal agencies. Across the U.S. Department of Energy (DOE) and within DOE Environmental Management (EM), there is a similar critical shortage of entry-level STEM personnel. As of 2008, only 1% of DOE-EM's workforce was 30 years old or younger. The effects are already being felt across DOE EM and new ways to stimulate interest in STEM are being initiated by the federal government. If this shortage is not addressed, the risks include knowledge gaps (discontinuity of lessons learned) within the department and a lack of skilled personnel to carry out its cleanup mission effectively.

Florida International University (FIU), the largest Hispanic serving research-extensive institution in the continental United States, is one of the nation's leading producers of scientists and engineers from underrepresented groups. In 1995, DOE created a unique partnership with FIU to support environmental cleanup technology development, testing and deployment at DOE sites. This partnership spawned a research center at FIU dedicated to environmental research and development (R&D). The center, now known as the Applied Research Center, has tackled and helped solve problems at many DOE sites.

The DOE-FIU Science and Technology Workforce Development Initiative was established in 2007 to create a pipeline of minority engineers specifically trained and mentored to enter the DOE workforce in technical areas of need. This innovative program was designed to help address DOE's future workforce needs by partnering with academic, government and DOE contractor organizations to mentor future minority scientists and engineers in the research, development, and deployment of new technologies addressing DOE's environmental cleanup challenges. The main objective of the program is to provide interested students with a unique opportunity to integrate course work, DOE field work, and research work at FIU into a well-structured academic program that leads to entry into DOE EM or other career opportunities. Students selected as DOE Fellows perform research at FIU and at DOE sites, national laboratories, and DOE contractors. Upon graduation and completion of this fellowship, the students are encouraged to submit an application to join the DOE federal internships programs, apply to DOE contractors, pursue post master or postdoctoral positions at DOE national laboratories, or apply to private industry in their field of study.

Since its inception in 2007, the DOE-FIU Science & Technology Workforce Development Initiative program has inducted 131 minority FIU STEM students. DOE Fellows Induction Ceremonies have been attended by DOE EM officials each year, including Mr. Mark Gilbertson in 2007 all the way to Ms. Stacy Charboneau in 2016.

Highlights during FIU Performance Year 7 include:

- FIU was asked to participate in the National Lab Day on Capitol Hill on September 13, 2016. FIU showcased the DOE Fellows student program and the research that is being conducted in the tasks related to the development of robotics. Three systems were showcased, including the miniature rover, peristaltic crawler and the platform. Each were displayed to demonstrate how students are utilizing the skills learned at FIU on real-

world engineering problems. A DOE Fellow STEM student, Gene Yllanes, was selected to represent the Fellows program and STEM students at this event.

- DOE Fellow Christine Wipfli completed a one year internship at the International Atomic Energy Agency (IAEA) Headquarters in Vienna, Austria. Christine interned in the Waste Technology Section, Division of Nuclear Fuel Cycle & Waste Technology under the mentorship of Mr. Horst Monken-Fernandes. DOE EM included a write up on Christine's achievement, titled "IAEA Awards DOE Fellow Internship," in the Volume 8, Issue 5, of the EM Update newsletter dated March 16, 2016 ([https://content.govdelivery.com/accounts/USDOEOEM/bulletins/13c48e1#link\\_145799\\_0261444](https://content.govdelivery.com/accounts/USDOEOEM/bulletins/13c48e1#link_145799_0261444)).
- Project progress and accomplishments for FIU research were presented to DOE-EM during videoconferences held on July 18, 2017. DOE Fellows presented during the technical projects as well as the workforce development presentations to highlight the research they are performing for DOE EM at ARC and their summer internships as part of this Cooperative Agreement:
  - Project 1
    - **Sebastian Zanlongo** (VTC from Sandia) - Anomaly Detection and Task Planning via Neural Networks and Hierarchical Task Networks
    - **Michael Di Bono** (via phone from University of Texas-Austin) - Simulation of Mobile Platform, Vaultbot, using Robotic Operating System (ROS) and Gazebo
  - Project 2
    - **Frances Zengotita** from (VTC from LANL at Univ of New Mexico location) - Role of Chromohalobacter on the Potential Transport of Lanthanides and Cesium in a Dolomite Mineral System
    - **Ron Hariprashad** (VTC from SRNL) - In-Situ Data Collection, Sampling, and Water Quality Monitoring in Tim's Branch Watershed
  - Project 3
    - **Alexander Piedra** (VTC from SRNL) - High Density Polyurethane Foam for Radiation Shielding & D&D Applications
  - Project 4
    - **Juan Morales & Mohammed Albassam** (VTC from HQ) - Surface/Ground Water Interface and Radioactive Contaminant Ecological Risk Assessment Using EPA Method in the (F-Area)-Savannah River Site (SRS) Aiken, SC.
    - **Hansell Gonzalez** (VTC from FIU) - Unrefined Humic Substances as a Potential Low-Cost Remediation Method for Acidic Groundwater Contaminated with Uranium
    - **Silvina Di Pietro** (VTC from FIU) - Ammonia Gas Treatment for Uranium Immobilization at the DOE Hanford Site
    - **Awmna Rana** (VTC from FIU) - Effect of Acidic Plume on Soil's Properties & Capacity to Retain Uranium at SRS

- **Maxmiliano Edrie** (VTC from FIU) - CFD Evaluation of Mixing Processes for High-Level Waste

Major key accomplishments of this program to date include:

- DOE Fellows program has been featured in national and international newsletters
- Nine (9) DOE Fellows applied to the DOE EMPDC program in 2009 and 2010
- Six (6) DOE Fellows applied to DOE EM SCEP in spring 2011
- DOE Fellows, Edgard Espinosa, Charles Castello, and Lee Brady were selected by DOE EM as part of Student Career Experience Program (SCEP) and completed their SCEP assignments.
- DOE Fellow (Edgard Espinosa) was hired by DOE-EM and began working for Nuclear Materials Disposition under the direction of Mr. Gary Deleon
- DOE Fellow (Charles Castello) was hired by DOE’s Oak Ridge National Laboratory under the Alvin M. Weinberg Fellowship program
- DOE Fellow (Lee Brady) was hired by DOE-EM and began work for D&D and Facility Engineering under the direction of Mr. Andrew Szilagyi
- DOE Fellow (Stephen Wood) joined Oak Ridge National Laboratory’s Bredesen Center for Interdisciplinary Research and Graduate Education as an Energy Science & Engineering PhD Fellow
- DOE Fellow (Rosa Ramirez) was hired into the EM Professional Development Corps program
- Fifty nine (60) other DOE Fellows graduated FIU with bachelor’s or master’s degrees and obtained employment in private industry and government agencies, including:
  - Florida Power & Light (6 Fellows)
  - Beckman Coulter (3 Fellows)
  - Boeing Company (3 Fellows)
  - Nova Consulting Inc. (3 Fellows)
  - HJ Foundation (1 Fellow), Lockheed (3 Fellows)
  - General Electric (2 Fellows)
  - Mount Sinai Medical Center (2 Fellows)
  - CH2M Hill (1Fellow), Stryker (2 Fellows)
  - Kimley-Horn and Associates, Inc. (2 Fellows)
  - PriceSmart Inc. (1 Fellow)
  - Bouygues Civil Works Florida (1 Fellow)
  - Crane Aerospace and Electronics (1 Fellow)
  - Motorola (1 Fellow)
  - Kiewit Power (1 Fellow)
  - CPH Inc. (1 Fellow)
  - Texas Instruments (1 Fellow)
  - ConocoPhillips (1 Fellow)
  - MWH Global (1 Fellow)
  - Johnson & Johnson (1 Fellow)
  - TradeStation (1 Fellow)
  - Raytheon (1 Fellow)
  - Intel Corporation (1 Fellow)
  - Cummins (1 Fellow)
  - Regeneron Pharmaceutical (1 Fellow)
  - Permasteelisa North America (1 Fellow)
  - Goldman Sachs (1 Fellow)
  - HaikuTech Europe B.V. (1 Fellow)
  - Burns & McDonnell (1 Fellow)
  - HDR (1 Fellow)
  - Brown & Caldwell (1 Fellow)

- Creativity, Value, Logic (1 Fellow)
  - King Engineering Associates, Inc (1 Fellow)
  - Sikorsky Aircraft (1 Fellow)
  - Caribe Utilities of Florida, Inc (1 Fellow)
  - BRG Sports (1 Fellow)
  - Magic Leap Inc. (1 Fellow)
  - BND Engineers (1 Fellow)
  - UTC Aerospace Systems (1 Fellow)
  - FIU's Applied Research Center (1 Fellow)
  - AECOM (1 Fellow)
  - Velossa Tech (1 Fellow)
  - John Hopkins - Applied Physics Laboratory (1 Fellow)
- Best Poster Awards at Waste Management Symposia
    - DOE Fellow (Leydi Velez) won Best Professional Poster at WM09
    - DOE Fellow (Denisse Aranda) won Best Student Poster at WM09
    - DOE Fellow (Denny Carvajal) won Best Student Poster at WM10
    - DOE Fellow (Stephen Wood) won Best Student Poster at WM11
    - DOE Fellow (Alexandra Fleitas) won Best Student Poster at WM14
    - DOE Fellow (Christine Wipfli) won Best Student Poster at WM15
  - Completed 119 internships at DOE sites, DOE national labs, DOE-HQ, and DOE contractors since 2007
  - 172 presentations (posters and papers) at Waste Management conferences (2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016) and other national and international conferences, including ICEM2013 in Brussels, Belgium
  - DOE Fellows supported the Energy Facility Contractors Group (EFCOG) and contributed to the development of 13 Lessons Learned and Best Practices documents
  - Development of DOE Fellows web site <http://fellows.fiu.edu/> and Facebook page
  - DOE Fellow Christine Wipfli completed a one year internship position with the International Atomic Energy Agency (IAEA), stationed at the agency headquarters in Vienna, Austria
  - DOE Fellow Alejandro Fernandez obtained first place at the 2016 Life Sciences South Florida STEM Symposium, competing among 80 posters presented by STEM students representing state colleges and universities in the South Florida area
  - The American Nuclear Society (ANS) approved the establishment of an ANS student section at Florida International University (FIU) with DOE Fellows being the key founding members of the chapter
  - Two DOE Fellows received the Roy G. Post Foundation Scholarship at the Graduate Student Level awarded by Waste Management Symposium: Robert Lapierre (2014) and Silvina Di Pietro (2016).
  - DOE Fellow Alejandro Hernandez received the Roy G. Post Foundation Scholarship at the Undergraduate Student Level awarded by Waste Management Symposium in 2017.

## RESULTS AND DISCUSSION

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### 1.0 DOE FELLOWS ENTERING THE WORKFORCE

#### 1.1 DOE's Pathways Program

The vision of this program is to create a “**pipeline**” of minority FIU students who will be trained and mentored as DOE Fellows and enter DOE's workforce. This vision became a reality when our first DOE Fellow (Rosa (Ramirez) Elmetti) was hired by DOE in September 2009 and entered DOE's Professional Development Corps Program. Rosa is currently working for DOE EM's International Program. The success story of the program continued in summer 2010 when DOE Fellow, Duriem Calderin, was hired by a DOE contractor (Columbia-Energy Environmental Services) in Richland, WA. Since then, Duriem has left Columbia-Energy and joined AREVA. The pipeline continued to work during the spring of 2011 when six DOE Fellows applied to the Student Career Experience Program (SCEP) in February/March 2011. This federal internship program allows our DOE Fellows to work as federal employees during work assignments at DOE-HQ and return to FIU to complete their respective degrees. Once the DOE Fellows graduate from FIU and complete the Pathways Program requirements, they are eligible for full-time employment with DOE EM. The following 3 DOE Fellows were selected for the program and started their work assignments at DOE-HQ in Washington, DC during April/May in 2011. Two Fellows (Edgard Espinosa and Lee Brady) completed the SCEP program and joined DOE-EM as fulltime employees. The third Fellow (Charles Castello) completed the SCEP program but obtained an alternative offer from Oak Ridge National Laboratory.

#### 1.2 DOE Fellows Entering the Workforce During FIU Performance Year 7

FIU works to identify federal entry-level career opportunities within DOE with a particular emphasis on federal positions within DOE EM, the national labs, or DOE tier-1 contractors. During this reporting period, an additional two (2) DOE Fellows in STEM disciplines accepted offers of employment: 1) Ryan Sheffield with John Hopkins, and 2) John Conley with Florida Power and Light.

### 2.0 INCREASING THE RETENTION OF MINORITY STUDENTS IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH (STEM) DISCIPLINES

A total of **45 DOE Fellows** are currently pursuing or have completed master's or Ph.D. STEM degrees at FIU. Most of these DOE Fellows started the DOE-FIU Science & Technology Workforce Development Program as undergraduates and were successfully encouraged and prepared to continue on to graduate studies at FIU. The research conducted at ARC, DOE sites, DOE national laboratories, and DOE private contractors serve as the basis for their master's thesis or Ph.D. dissertation topics. Table 1 below shows all the DOE Fellows who are pursuing or have completed graduate level work. In addition, several undergraduate DOE Fellows incorporate their EM applied research into their Senior Design or Capstone Projects at FIU.

**Table 1. DOE Fellows in STEM Graduate Programs**

No	DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
1	Jose Vazquez	Environmental Engineering	Master	Effects of temperature and pH on volatilization of mercury after chemical reduction	2009
2	Serkan Akar	Biomedical Engineering	Master	Design and Development of an Enzyme-Linked Biosensor for Detection and Quantification of Phosphate Species	2010
3	Duriem Calderin	Biomedical Eng.	Master	Modeling of Loose Contamination Scenarios to Predict the Amount of Contamination Removed	2010
4	Leydi Velez	Industrial Eng.	Master	Decision Modeling Tools D&D Surveillance & Maintenance	2010
5	Elsa Cabrejo	Environmental Eng.	Master	Soil/Groundwater - Modeling of Mercury Contamination at ORNL	2011
6	William Mendez	Engineering Mngmt.	Master	Development of Remote Stack Char. System	2011
7	Amaury Betancourt	Environmental Eng.	Master	Soil/Groundwater - Modeling of Mercury Contamination at ORNL	2011
8	Stephen Wood	Mechanical Eng.	Master	Modeling of Pipeline Transients: Modified Method of Characteristics	2011
9	Merlin Ngachin	Environmental Sciences	Master	Waste Processing - Baltman-Lattice Method to Model HLW	2011
10	Denny Carvajal	Biomedical Eng.	Master	Soil/Groundwater – Bacteria Interaction due to Polyphosphate Injection at Hanford	2011
11	Charles Castello	Electrical Eng.	Ph.D.	Soil/Groundwater - Sensor Development for Field Measurement of Mercury	2011
12	Edgard Espinosa	Mechanical Eng.	Master	Waste Processing - CFD Modeling of NuVison’s Power Fluidic Technology/Process Remote Stack Characterization System	2011
13	Melina Idarraga	Environmental Eng.	Master	Dissolution rate of natural meta-autunite: effects of aqueous bicarbonate, pH and temperature	2011
14	Kanchana Iyer†	Biomedical Engineering	Ph.D.	Non-Thesis Option	2011
15	Melissa Sanchez **	Environmental Engineering	Master	Non-thesis option	2012
16	Yulyan Arias**	Environmental Engineering	Master	Non-thesis option	2012
17	Lee Brady	Mechanical Eng.	Master	Non-thesis option	2012
18	Mario Vargas	Mechanical Eng.	Master	Kinematic Control of Remote Stack Characterization System	2012
19	Elicek Delgado-Cepero	Electrical Eng.	Master	Structural Health Monitoring Inside Concrete and Grout Using	2013

No	DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
				the Wireless Identification Sensing Platform	
20	Eric Inclan	Mechanical Eng.	Master	Mesh adaptation for use in Lattice Boltzmann code	2012
21	Lilian Marrero	Environmental Eng.	Master	Soil/Groundwater - Modeling of Mercury Contamination at ORNL	2012
22	Janty Ghazi	Electrical Eng.	Master	Control, through Sensors and LabVIEW, of the Asynchronous Pulsing Unit	2013
23	Jaime Mudrich	Mechanical Eng.	Master	Development of a Coupling Model for Fluid-Structure Interaction using the Mesh-free Finite Element Method and the Lattice Boltzmann Method	2013
24	Jose Matos	Mechanical Eng.	Master	Development of improved Bodies for a Peristaltic Crawler for Radioactive Pipeline Unplugging	2013
25	Heidi Henderson	Environmental Eng.	Master	Surface water and contaminant transport within the Oak Ridge National Laboratory	2013
26	Mariela Sliva	Engineering Management	Master	Non-Thesis Option	2013
27	Valentina Padilla	Environmental Eng.	Master	Non-Thesis Option	2014
28	Nadia Lima	Civil Eng.	Master	Non-Thesis Option	2014
29	Joel McGill*	Environmental Eng.	Master	Non-Thesis Option	2014
30	Paola Sepulveda	Biomedical Eng.	Master	Investigating the Role of a Less Uranium Tolerant Strain, Isolated from the Hanford Site Soil, on Uranium Interaction in Polyphosphate Remediation Technology	2014
31	Revathy Venkataraman	Computer Science	Master	Performance Evaluation of Mobile Applications with KMIT Technology Web Services	2014
32	Dayron Chigin*	Electrical Engineering	Master	Non-Thesis Option	2015
33	Andrew De La Rosa*	Computer Science	Master	Non-Thesis Option	2015
34	Orlando Gomez†	Physics	Ph.D.	TBD	TBD
35	Robert Lapierre*	Chemistry	Master	Mineral characterization after uranium sequestration by pH manipulation using NH3 gas	2017
36	Claudia Cardona	Environmental Eng.	Ph.D.	Remediation of the uranium-contaminated subsurface in the deep vadose zone via NH3 gas injection	2016 (anticipated)

No	DOE Fellow	Discipline	Degree	Research Topic Based on DOE EM projects	Year of Graduation
37	Natalia Duque	Environmental Engineering	Master	Non-Thesis Option	2017
38	Maximiliano Edrei	Mechanical Engineering	Master	Investigation of Mixing Times of Sparged Bingham plastic type fluids as applied to the Pulse Jet Mixing Process	2017 (anticipated)
39	Sebastian Zanlongo	Computer Science	Ph.D.	Multipurpose All-Terrain Robotic Platform for D&D	2018 (anticipated)
40	Silvina Di Pietro	Chemistry	Ph.D.	Ammonia Gas Treatment for Uranium Immobilization at DOE Hanford's Site	2018 (anticipated)
41	Hansell Gonzalez	Chemistry	Ph.D.	Unrefined humate solution as a potential low-cost remediation method for groundwater contaminated with heavy metals	2018 (anticipated)
42	Alejandro Garcia	GeoScience	Master	The influence of biofilm formation on the SIP response of Hanford vadose zone sediment	2018 (anticipated)
43	Mohammed Albassam	Water resource Engineering	Master	TBD	2018 (anticipated)
44	Ron Hariprashad	GeoScience (Hydrogeology)	Master	TBD	2018 (anticipated)
45	Juan Morales	Public Health	Ph.D.	TBD	2019 (anticipated)

\*This student left the DOE Fellows program before completion of their master's degree.

\*\*This student left the DOE Fellows program but completed their master's degree at FIU.

† This student left the DOE Fellows program before completion of their doctoral degree.

### 3.0 DOE FELLOWS RECRUITMENT & SELECTION

DOE Fellows spring recruitment efforts were initiated on March 29, 2017 and ran through April 14, 2017. Recruitment campaigns were conducted by placing recruitment tables at the College of Engineering and at the main FIU campus in the physics & chemistry and computer science buildings. A signup sheet was used to collect contact information from interested students and emails were sent out with information on requirements and components of the program along with application instructions and a checklist. The deadline for FIU students to submit applications for DOE Fellowships was April 14, 2017, and a total of 18 applications were received. The DOE Fellows selection committee, comprised of ARC researchers and staff, reviewed the applications and recommended ten (10) FIU students for formal interviews which were conducted from May 9 through May 10, 2017. Dr. Leonel Lagos (Program Director) subsequently asked for the committees input and recommendations to make the final selections and complete the recruitment process. Three (3) students from the spring recruitment were selected to join the program as DOE Fellows Class of 2017.

The fall recruitment efforts for new DOE Fellows were initiated on August 28, 2017 and the deadline for FIU students to submit applications for DOE Fellowships was September 29, 2017. Thirty-one (31) applications were received and reviewed by ARC researchers and staff. The DOE Fellows selection committee recommended sixteen (16) FIU students for formal interviews



which were conducted from October 6, 2017 through October 12, 2017. Eight (8) additional students were selected to join the program as DOE Fellows Class of 2017.

**Table 2. New DOE Fellows and ARC Mentors**

<b>Recruitment Period</b>	<b>First Name</b>	<b>Last Name</b>	<b>Major</b>	<b>Degree</b>	<b>ARC Mentor</b>
<b>Spring</b>	Anibal	Morales	Electrical Engineering	BS	Mr. Anthony Abrahao
	Joseph	Coverston	Mechanical Engineering	MS	Dr. Reza Abassi Baharanchi
	Manuel	Losada	Electrical Engineering	BS	Dr. Aparna Aravelli
<b>Fall</b>	Alejandro	Koszarycz	Computer Science	BA	Dr. Himanshu Upadhyay
	Christopher	Excellent	Mechanical Engineering	BS	Dr. Dwayne McDaniel
	Joshua	Núñez	Mechanical Engineering	BS	Mr. Joseph Sinicrope
	Katherine	Delarosa	Environmental Engineering	BS	Dr. Ravi Gudavalli
	Ryan	Cruz	Information Technology	BS	Dr. Himanshu Upadhyay
	Silvia	Garcia	Biological Sciences	BS	Dr. Vasileios Anagnostopoulos
	Tristan	Ponce	Mechanical Engineering	BS	Mr. Joseph Sinicrope
	Ximena	Lugo	Environmental Engineering	BS	Dr. Yelena Katsenovich

Each new DOE Fellow was assigned to an ARC staff member to act as their mentor and supervise their EM research work. Orientation for the new DOE Fellows was conducted and the new Fellows completed the FIU’s Environmental Health & Safety courses required by the university and ARC prior to conducting any work in ARC’s lab facilities. The new DOE Fellows also created a brief bio to include on the DOE Fellows website.

**4.0 DOE FELLOWS INTERNSHIPS**

The DOE Fellows program director completed coordination for placement of DOE Fellows for summer internships. During summer 2017, twelve (12) DOE Fellows participated in 10-week internships across the DOE Complex and at two universities. The DOE Fellows engaged in research projects at DOE Headquarters in Maryland, DOE national laboratories (Savannah River National Lab and Sandia National Lab), Savannah River Ecology Laboratory, the Waste Isolation Pilot Plant, University of Texas-Austin Nuclear and Applied Robotics Group, and San Jose State University. Table 3 shows the internships for summer 2017.



**Figure 1. Summer 2017 Interns (DOE Fellows) with Program Director Dr. Leo Lagos.**

**Table 3. Summer 2017 Internships**

<b>DOE Fellow(s)</b>	<b>Site</b>	<b>Mentor(s)</b>
Juan Morales Mohammed Albassam	DOE-HQ	Skip Chamberlain
Christine Wipfli	DOE HQ	Robert Seifert
Sebastian Zanlongo	Sandia National Lab	Kristopher Klingler Bill Prentice Jon Bradley
Andres Cremisini	Sandia National Lab	Kristopher Klingler Bill Prentice Jon Bradley
Sarah Solomon Ripley Raubenolt	SRNL	Mike Paller Brian Looney
Alexander Piedra	SRNL	Aaron Washington Connor Nicholson
Ron Hariprashad	SRNL/SREL	John Seaman (SREL) Brian Looney (SRNL)
Michael Di Bono	University of Texas-Austin	Mitch Pryor
Frances Zengotita	WIPP	Don Reed Tim Dittrich
Alejandro Hernandez*	San Jose State University*	David Robertson Annalise Van Wyngarden

\*This internship was separate from and not funded by the DOE-FIU Cooperative Agreement.

Upon returning to FIU in August, the DOE Fellows began to develop their technical reports based on their summer 2017 internships. Table 4 shows the summer 2017 internship technical report titles.

**Table 4. Summer 2017 Internship Technical Reports**

<b>DOE Fellow(s)</b>	<b>Report Title</b>
Juan Morales and Mohammed Albassam	Groundwater/Surface Water Interface and Radioactive Contaminant Ecological Risk Assessment at SRS F-Area
Christine Wipfli	Supporting DOE EM 4.31, Office of Regulatory Compliance
Sebastian Zanlongo	Anomaly Detection and Task Planning via Neural Networks and Hierarchical Task Networks
Andres Cremisini	Coding a Weather Model
Sarah Solomon and Ripley Raubenolt	Mercury Speciation via Diffusive Gradients in Thin-Film Technology
Ron Hariprashad	In-Situ Data Collection, Sampling, and Water Quality Monitoring in Tims Branch Watershed, Savannah River Site
Michael Di Bono	Simulation of a Mobile Robotic Platform in Gazebo and RViz using ROS
Frances Zengotita	The Role of Chromohalobacter on Transport of Lanthanides and Cesium in the Dolomite Mineral System

Highlights from the internship assignments are included below.

**DOE FELLOW:** Andres Cremisini  
**LOCATION:** Sandia National Laboratory  
**MENTORS:** Kristopher Klingler, Bill Prentice and Jon Bradley

This summer Andres helped developed a weather model for a large system currently in development at Sandia National Labs under the mentorship of Kristopher Klingler, Bill Prentice and Jon Bradley. The work entailed researching statistical methods primarily for wind modeling and identifying efficient algorithms to implement these methods, packaging the algorithms into a software library and integrating this library into the larger system. Andres states that the work was challenging and very fun.

**DOE FELLOW:** Sebastian Zanlongo  
**LOCATION:** Sandia National Lab  
**MENTORS:** Kristopher Klingler, Bill Prentice and Jon Bradley

This summer, DOE Fellow Sebastian Zanlongo participated in a 10-week internship at Sandia National Laboratory under the mentorship of Kristopher Klingler, Bill Prentice and Jon Bradley. He participated in the development of a weather model for a large system currently in development. The work entails researching statistical methods primarily for wind modeling and identifying efficient algorithms to implement these methods, packaging the algorithms into a software library and integrating this library into the larger system.



**Figure 2. DOE Fellows Sebastian Zanlongo and Andres Cremisini interning at Sandia.**

**DOE FELLOW:** Michael DiBono  
**LOCATION:** University of Texas-Austin  
**MENTORS:** Mitch Pryor

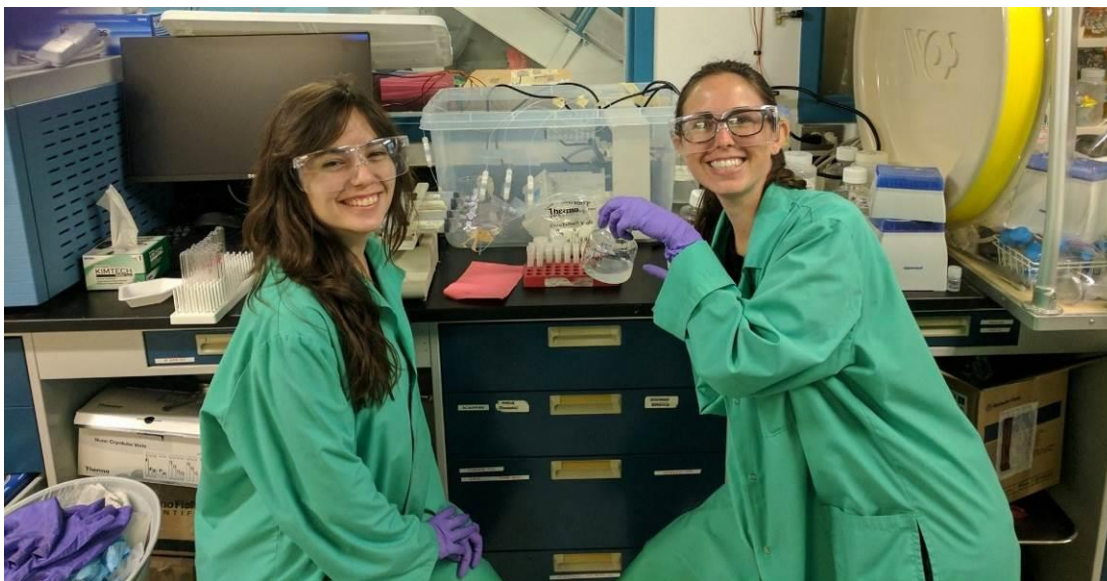
Michael DiBono conducted his summer internship at the Applied Robotics Group at the University of Texas at Austin. Michael’s research work was on the simulation of their mobile platform, Vaultbot, using Robotic Operating System (ROS) and Gazebo. The Vaultbot was developed for the inspection and radiation surveying of the Canyon Air Exhaust tunnel (CAEX) at the DOE Savannah River Site. The Vaultbot has a LIDAR attached to the front for mapping and navigation, along with two industrial manipulators (arms) mounted to the top for inspection.



**Figure 3. DOE Fellow Michael DiBono pictured with the robotic system developed for inspection and radiation surveying of CAEX.**

**DOE FELLOW:** Frances Zengotita  
**LOCATION:** WIPP  
**MENTORS:** Don Reed, Tim Dittrich

Frances Zengotita interned at Los Alamos National Laboratory Carlsbad Field Office and investigated how a salt-resistant microbe may be affecting the mobility of contaminants at the Waste Isolation Pilot Plant (WIPP), a deep geologic repository for permanent disposal of transuranic radioactive waste that is a byproduct of the nation's nuclear defense program. Dr. Hilary Emerson at ARC worked with Frances Zengotita to quantify both the mobility of the contaminants in the presence of microbes and the remobilization potential by microbes after sorption to subsurface minerals.



**Figure 4. Frances Zengotita at WIPP with ARC mentor Dr. Emerson.**

**DOE FELLOW:** Ron Hariprashad  
**LOCATION:** SREL/SRNL  
**MENTORS:** John Seaman (SREL), Brian Looney (SRNL)

Ron Hariprashad conducted an internship at Savannah River Site where he conducted fieldwork in Tims Branch with assistance from Dr. John Seaman and his research team at the Savannah River Ecology Lab (SREL). The aim was to collect cross-section measurements along the main Tims Branch stream, as well as *in situ* water quality and flow data to assist in calibration of the hydrological models being developed by ARC. Water and biofilm samples were also collected for chemical analysis of radiological and other contaminants of concern, and to monitor the chemical by-product of a tin-based DOE EM implemented remediation technology.



**Figure 5. DOE Fellow Ron Hariprashad collecting flow data along the Tims Branch stream at SRS with ARC mentor Dr. Mahmoudi.**

**DOE FELLOW:** Christine Wipfli  
**LOCATION:** DOE Headquarters  
**MENTOR:** Robert Seifert

Christine Wipfli (DOE Fellow Class of 2014) spent her DOE Fellow internship at the Department of Energy's Office of Environmental Management, Office of Regulatory Compliance in Germantown, Maryland, under the mentorship of Mr. Robert Seifert, the Office Director. Christine spent her internship supporting various environmental compliance projects pertaining to the National Environmental Policy Act (NEPA), along with The Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Christine also supported a National Dialogue effort which is an initiative with the Environmental Protection Agency (EPA) and local governments. This was Christine's second internship at DOE EM headquarters, her first was completed two summers ago with the Office of Soil and Groundwater (now the Office of Subsurface Closure).



Figure 6. DOE Fellow Christine Wipfli during her internship at DOE HQ.

**DOE FELLOW:** Alexander Piedra  
**LOCATION:** SRNL/SREL  
**MENTORS:** John Seaman (SREL) and Brian Looney (SRNL)

DOE Fellow, Mr. Alexander Piedra, completed his 10-week internship at SRNL under the mentorship of Dr. Aaron Washington and Dr. Connor Nicholson. During his internship, he participated in two tasks; the first was to help establish the testing protocols and personnel safety paperwork for the radiologically hot 235-F demonstration of incombustible fixatives. This task entails coordination with F-area personnel, document generation, and testing setup development for the demonstration-level deployment. The second task involved fabrication and testing of radiological shielding foams to be used for small-scale contaminated environments such as gloveboxes. For this task, Alexander worked alongside SRNL researchers in the lab to generate samples and test them with low level radiation sources.



Figure 7. DOE Fellow Alexander Piedra during his internship at SRNL/SREL.

**DOE FELLOWS:** Mohammed Albassam and Juan Morales  
**LOCATION:** DOE EM Headquarters, Maryland  
**MENTORS:** Skip Chamberlain and Kurt Gerdes

Mr. Mohammed Albassam and Mr. Juan Morales (DOE Fellow Class of 2016) conducted their summer internship at DOE- EM Headquarters in Maryland. They were assigned to conduct research involving surface/groundwater interface mechanisms, radionuclide contaminant plume migration applications, and an ecological risk assessment for the F-Area Seepage Basins located at the Savannah River Site. Their efforts were mentored by Mr. Skip Chamberlain, (Physical Scientist, EM-4.12) at the Office of Environmental Management. Their research will support former investigations contributing to the ecological effects of the SRS F-Area.



**Figure 8. Mohammed Albassam, Kurt Gerdes, & Juan Morales (left) and Juan Morales, Skip Chamberlain, Mohammed Albassam (right).**

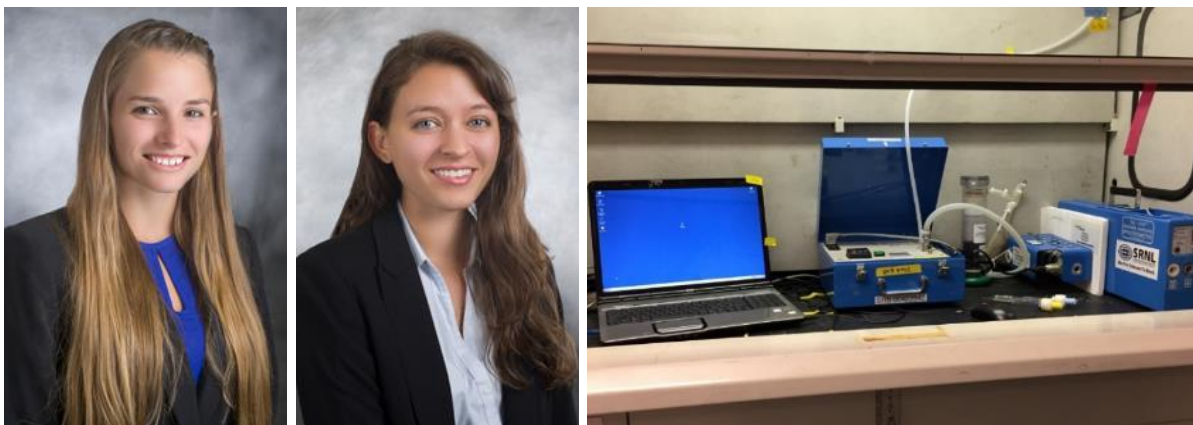


**Figure 9. DOE Fellow Juan Morales in after hours recreational activities while on internship.**



**DOE FELLOWS:** Ripley Raubenolt and Sarah Solomon  
**LOCATION:** Savannah River National Laboratory  
**MENTORS:** Dr. Paller, Dr. Looney, and Dr. Jackson

Ms. Ripley Raubenolt and Ms. Sarah Solomon (DOE Fellow Class of 2016) conducted their summer internship at the Savannah River National Laboratory. Ripley and Sarah investigated the ability of different types of diffusive gradients in thin film (DGT) probes to measure organic mercury in water, conduct mercury analyses on a mercury analyzer, perform computations, and write a project report. Development of a suitable method will facilitate risk reduction in contaminated soil, water, groundwater and sediment and help to improve and modernize environmental monitoring within the DOE complex.



**Figure 10. DOE Fellows Ripley Raubenolt, Sarah Solomon, and SRNL equipment for analysis.**

**DOE FELLOW:** Alejandro Hernandez  
**LOCATION:** San Jose State University  
**MENTORS:** David Robertson and Annalise Van Wyngarden

*This internship was separate from and not funded by the DOE-FIU Cooperative Agreement.*

DOE Fellow, Mr. Alejandro Hernandez, was awarded one of the twelve national fellowships for the National Nuclear Chemistry School, funded by the Department of Energy and sponsored by the American Chemical Society. During this six-week program at San José State University, Alejandro attended lectures by prominent nuclear scientists on the fundamentals and applications of nuclear science (e.g., nuclear medicine, environmental radiochemistry, energy production, etc.), performed hands-on experiments on state-of-the-art instrumentation routinely used in the nuclear field, as well as visited national lab facilities, including the National Ignition Facility at Lawrence Livermore National Lab and Lawrence Berkeley National Lab. The summer school program was founded as an educational outreach and workforce development activity to promote expertise in nuclear science and to provide trained personnel to meet national needs in nuclear research.



**Figure 11. DOE Fellow Alejandro Hernandez during his internship at Sandia.**

DOE-EM coordinated a presentation session for all of their summer interns to share their internship experience on August 3, 2017. A total of six (6) DOE Fellows participated in this event and presented information based on their summer internship.

SRNL Interns

- Sarah Solomon
- Ripley Raubenolt
- Alexander Piedra

HQ Interns

- Juan Morales
- Mohammed Albassam
- Christine Wipfli

Also, DOE Fellow Christine Wipfli completed a one year internship at the International Atomic Energy Agency (IAEA). From April 2016 through March 2017, Christine interned at the Waste Technology Section, Division of Nuclear Fuel Cycle & Waste Technology at IAEA's Headquarters in Vienna, Austria.



**Figure 12. DOE Fellow Christine Wipfli started an internship at IAEA in March 2016.**

Ms. Wipfli worked with the Division of Nuclear Fuel Cycle and Waste Technology and assisted in managing global environmental remediation projects. The IAEA is an international organization which reports to both the United Nations General Assembly and Security Council, and works for the safe, secure and peaceful uses of nuclear science and technology. Ms. Wipfli joined the DOE Fellows Program in fall of 2014 and has received three awards for poster competitions at FIU and at national conferences. Her expected graduation date is December of 2017.

## **5.0 DOE FELLOWS POSTER EXHIBITION AND COMPETITION**

FIU conducted the 10<sup>th</sup> annual DOE Fellows Poster Exhibition and Competition on November 2, 2016. The purpose of this event was to showcase the DOE Fellows' research accomplishments for the past year as a result of their participation in various DOE EM related applied research projects. A total of 19 posters were exhibited. Some of the projects showcased by the students were a result of their summer internship assignments at DOE sites, national laboratories, and DOE HQ in Washington, DC. Additional posters reflected the DOE Fellows' DOE EM applied research that they conduct at ARC as part of the DOE-FIU Cooperative Agreement sponsored research. For some of the graduate students, these projects are also a part of their thesis towards a master's or Ph.D. degree. This year's panel of judges included Dr. Jeff Griffin (Associate Laboratory Director, Environmental Stewardship, SRNL), Dr. Hope Lee (Manager, Soil and Groundwater Program, PNNL), Dr. Yong Cai (Professor & Chair, FIU Dept. of Chemistry & Biochemistry/ S.E. Environmental Research Center), Dr. Michael Sukop (Professor, FIU Arts & Sciences, Dept. of Earth & Environment), and Dr. Inés Triay (ARC Executive Director). The poster titles and DOE Fellow presenters were:

1. **Alejandro Garcia:** The influence of biofilm formation on the SIP response of Hanford vadose zone sediment

2. **Alejandro Hernandez:** In-situ Precipitation of AgCl for Treatment of I-129 Contaminated Groundwater
3. **Alexander Piedra:** Baseline Adhesion Testing of Intumescent Coatings
4. **Awmna Rana:** Study of the Fate and Transport of Irrigated Tritium Waste Water in Biological Receptors
5. **Christopher Strand:** Calculating the Retention Storage Volume of Surface Water within a Predetermined Contour Area
6. **Clarice Davila:** Thermal management and modeling of nuclear waste in DST's at Hanford using miniature sensors
7. **Frances Zengotita:** Role of Ionic Strength on Sorption of Neodymium on Dolomite
8. **Gene Yllanes:** Robotic Platform for Inspection of Highly Radioactive Areas
9. **Hansell Gonzalez:** Unrefined humate solution as a potential low-cost remediation method for groundwater contaminated with heavy metals
10. **John Conley:** Nonmetallic Material Testing of Hanford's HLW Transfer System
11. **Juan Morales:** Watershed Toxicology Management approach analyzing point source pollutants in Tims Branch, Savannah River Site, SC
12. **Maximiliano Edrei:** Investigation of Mixing Times of Sparged Bingham plastic type fluids as applied to the Pulse Jet Mixing Process
13. **Michael DiBono:** Miniature Motorized Inspection Tool for DOE Hanford Site Tank Bottoms
14. **Mohammed Albassam:** In-Situ Water Quality Sampling and Flow Measurement to Support Hydrological Model Development for Tims Branch Watershed, Savannah River Site, SC
15. **Natalia Duque:** Development of a Flow Model to Simulate Discharge in Tims Branch, Savannah River Site
16. **Ryan Sheffield:** Pneumatic pipe crawler for Hanford DOE site double-shell tanks
17. **Sarah Bird:** Sustainability Index for Comparison of Environmental Remediation Technologies
18. **Sarah Solomon:** Shewanella oneidensis MR1 Interaction with U(VI) in Bicarbonate Media
19. **Silvina Di Pietro:** Ammonia Gas Treatment for Uranium Immobilization at DOE Hanford's Site



**Figure 13. 2016 Poster Competition and Exhibition Participants and Judges.**

## **6.0 DOE FELLOWS 2015 INDUCTION CEREMONY**

On November 3, 2016, FIU conducted the tenth (10th) annual DOE Fellows Induction Ceremony. This year, eleven (11) FIU STEM students were inducted as DOE Fellows. Ms. Stacy Charboneau (Associate Principal Deputy Secretary for Field Operations, DOE EM) was one of the keynote speakers for the ceremony. Other distinguished guests from DOE EM included Mr. Barton Barnhart (Director, Office of Infrastructure Management & Disposition Policy), Mr. Kurt Gerdes (Director, Office of Subsurface Closure), and Mr. Andrew Szilagyi (Director, Office of Infrastructure and D&D). Additional distinguished guests Dr. Terry Michalski (Executive Vice President of SRNS and Director of SRNL), Dr. Jeff Griffin (Associate Laboratory Director, Environmental Stewardship, SRNL), Dr. Hope Lee (Manager, Soil and Groundwater Program, PNNL), Mr. Jose E. Sanchez (Director, Coastal and Hydraulics Laboratory, US Army Engineer Research & Development Center (ERDC), US Army Corps of Engineers), and Dr. Carlos Ruiz (Senior Research Scientist, ERDC, Army Corps of Engineers).

FIU was represented at the event by Mr. Steve Sauls (FIU Former Vice President of Governmental Relations), Dr. Inés Triay (ARC Executive Director) and Dr. Leonel E. Lagos (Principal Investigator for DOE-FIU Cooperative Agreement and Director, DOE Fellows Program), as well as FIU faculty, staff, and students. Former DOE Fellows who participated in the event included Dr. Stephen Wood (DOE Fellow Class of 2008, Computational Engineer, University of Tennessee/PRNL Joint Institute for Computational Sciences) and Ms. Melina Idarraga-Istambouli (DOE Fellow Class of 2008, Engineer, Miami Dade County Permitting and Inspection Center).

Ms. Stacy Charboneau and the other distinguished guests had the opportunity to participate in morning tours of the ARC research laboratories and listen to DOE Fellows presenting their research work. Presentations were given by Dr. Lagos and DOE Fellows Michael DiBono and Alexandro Hernandez. Dr. Lagos presented an overview of the DOE Fellows program. DOE Fellow Michael DiBono presented his DOE EM research on developing a miniature motorized inspection tool for DOE Hanford Site tank bottoms. DOE Fellow Alexandro Hernandez presented his DOE EM research on sodium silicate treatment to attenuate uranium mobility in acidic groundwater plumes. Tours of the ARC facilities included: 1) the robotics and sensors laboratory for a demonstration of the inspection tools being developed for double-shell tanks at the Hanford Site as well as the technologies being investigated for pipeline corrosion and erosion evaluation; 2) the materials testing laboratory where non-metallic materials are undergoing testing and evaluation for multiple stressors in support of the high level waste research; 3) the soil and groundwater laboratory for an overview of the research being performed in support of SRS and PNNL; 4) the radiological laboratory; 5) the ARC test and evaluation facility for a demonstration on the incombustible fixatives research; and 6) the modeling, simulation & GIS laboratory.



**Figure 14. Induction ceremony guests touring ARC’s laboratory facilities.**



**Figure 15. New DOE Fellows at the 2016 Induction Ceremony.**

During this year’s induction ceremony, 11 new FIU STEM students were inducted as DOE Fellows:

**Table 5. DOE Fellows Class of 2016 Inducted into Program**

<b>New DOE Fellows</b>	<b>Degree</b>	<b>Major Area of Study</b>
Mohammed Albassam	B.S.	Environmental Engineering
Andres Cremisini	B.S.	Computer Science
Clarice Davila	B.S.	Mechanical Engineering
Michael DiBono	B.S.	Mechanical Engineering
Ron Hariprashad	B.S.	Environmental Engineering
Daniel Khawand	B.S.	Computer Science
Juan Morales	M.S.	Public Health
Alexander Piedra	B.S.	Mechanical Engineering
Ripley Raubenolt	B.S.	Environmental Engineering
Sarah Solomon	B.S.	Environmental Engineering
Francis Zongotita	B.S.	Chemistry And English

In addition, awards were presented to the DOE Fellows that won the DOE Fellows Poster Exhibition and Competition held on the previous day. First place was awarded to Mr. Michael DiBono for his poster titled, “Miniature Motorized Inspection Tool for DOE Hanford Site Tank Bottoms.” Second place went to Mr. Maximiliano Edrei for his poster titled, “Investigation of

Ethanol as a Feasible Tracer in the Experimental Investigation of a Non-Newtonian Fluid Undergoing Pulse Jet Mixing.” Third place was awarded to Mr. Alejandro Hernandez for his poster titled, “In-Situ Precipitation of AgCl for Treatment of I-129 Contaminated Groundwater.”

For the eighth year, the DOE Fellow of the Year Award and the Mentor of the Year Award were presented at the ceremony. DOE Fellows were requested to nominate their ARC mentors and ARC mentors were requested to nominate the DOE Fellows. An ARC committee was established to review and select the winners from the submitted nominations. The 2016 Mentor of the Year Award went to Research Scientist Anthony Abrahao. The 2016 DOE Fellow of the Year Award was awarded to Mr. Maximiliano Edrei (DOE Fellows Class of 2014).

## 7.0 CONFERENCE PARTICIPATION

### 7.1 Waste Management Conference 2016

DOE Fellows completed preparation and participated in the Waste Management 2017 Symposia (WM17) in Phoenix, AZ, from March 5-9, 2017. The DOE Fellows completed technical posters, presentation materials, written biographies, and resumes for the WM conference to introduce themselves and their research.

A total of seventeen (17) DOE Fellows attended WM17 and presented technical posters during Session 33 (Student Posters: The Next Generation – Industry Leaders of Tomorrow) on Monday, March 6, 2017. The posters presented the DOE-EM research that they have performed at FIU’s ARC and during their summer internships at DOE sites, HQ, and national research laboratories, in the research areas of high level waste/waste processing, soil and groundwater modeling and remediation, and deactivation and decommissioning. The DOE Fellow posters presented during the Student Poster Competition at WM17 are presented below.

In addition, two DOE Fellows gave professional oral presentations based on the applied research being conducted by ARC on behalf of DOE-EM in major areas of research, including:

- Ammonia Gas Treatment for Uranium Immobilization at US DOE Hanford Site. Silvina Di Pietro, Hilary Emerson, Yelena Katsenovich (FIU). **Presenter: Silvina Di Pietro (DOE Fellow)**
- Development and Testing of Robotic Inspection Tools for the High-Level Waste Double Shell Tanks at Hanford. Michael DiBono, Dwayne McDaniel, Yew Teck (William) Tan, Anthony Abrahao, Ryan Sheffield (FIU). **Presenter: Michael DiBono (DOE Fellow)**



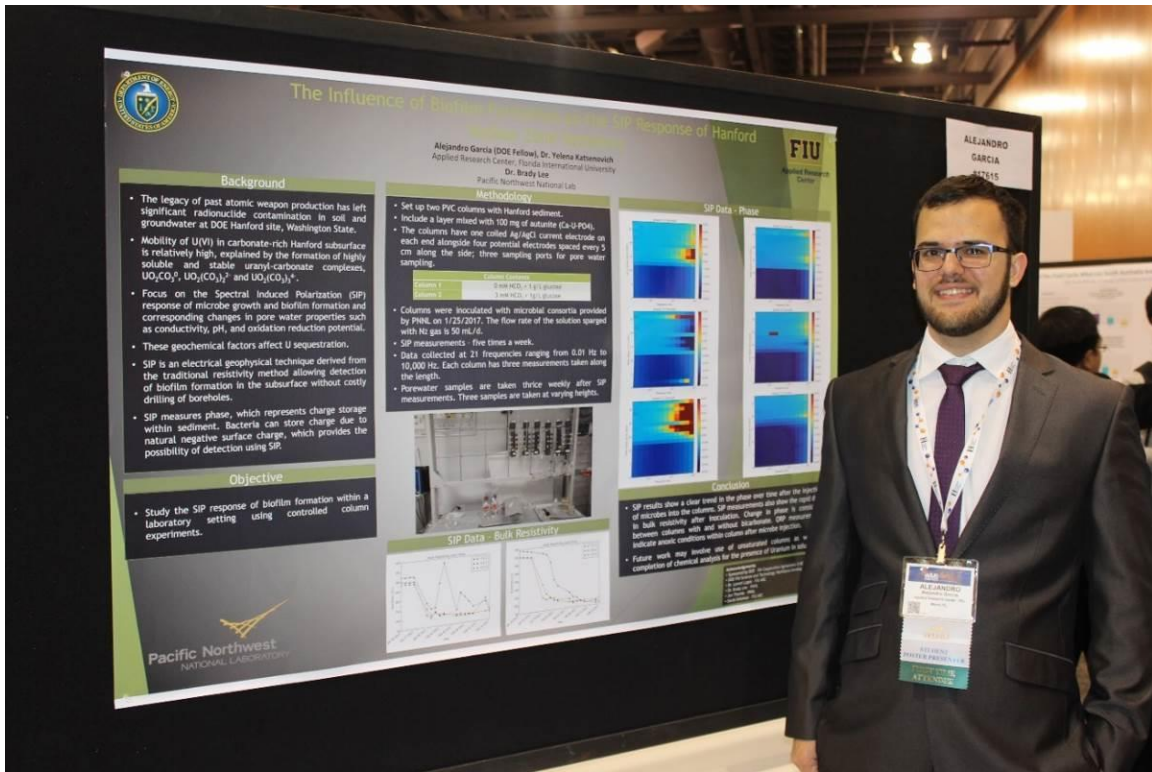


Figure 16. The Influence of Biofilm Formation on the SIP Response of Hanford Vadose Zone Sediment - Alejandro Garcia

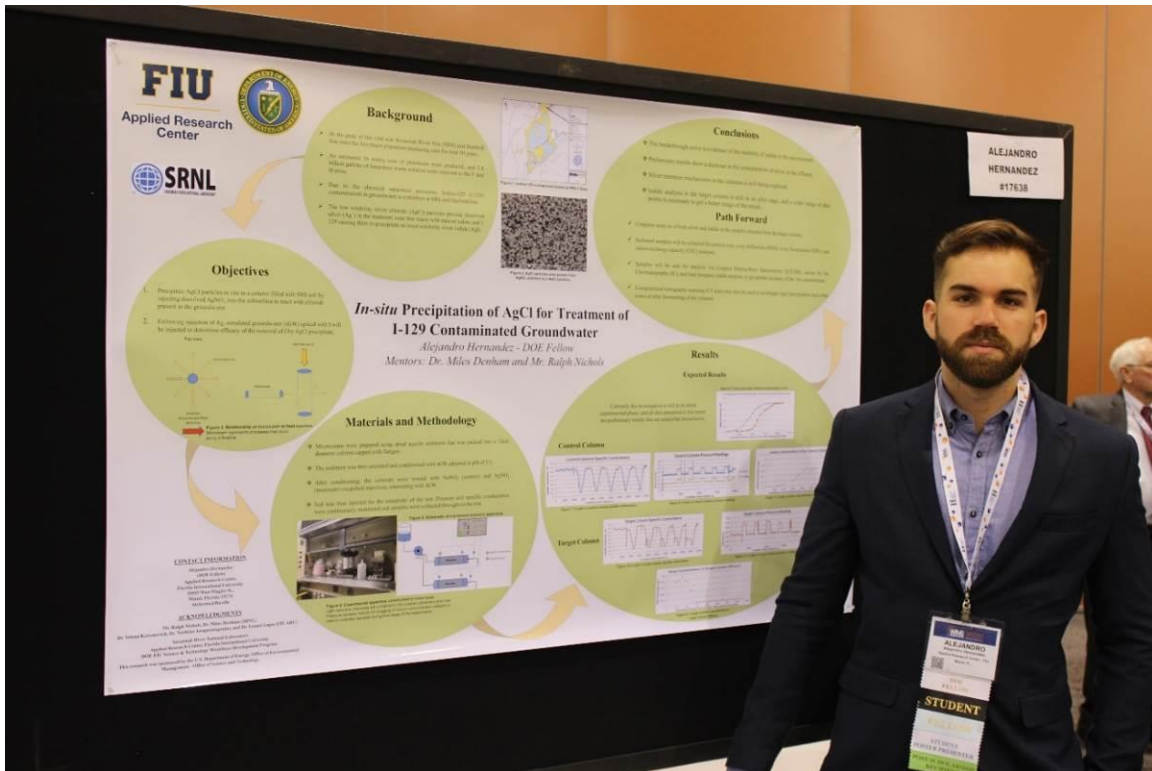


Figure 17. In Situ Precipitation of Silver Chloride for Treatment of I-129 Contaminated Groundwater - Alejandro Hernandez

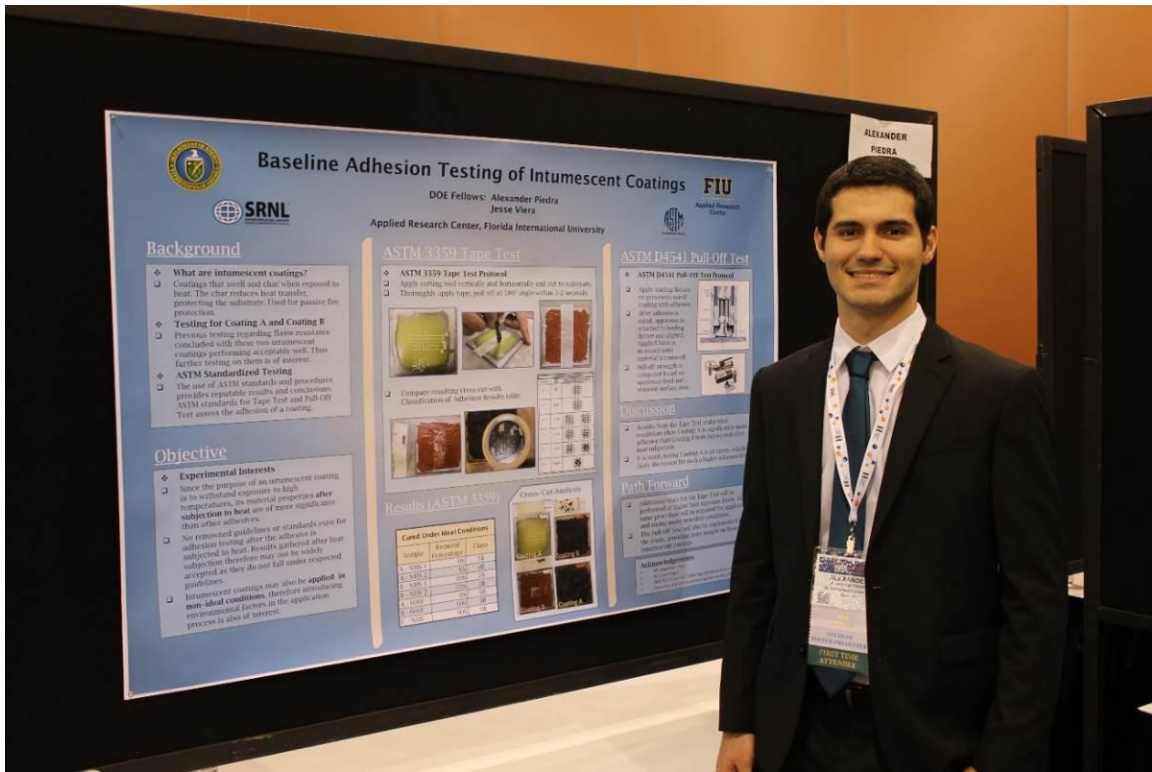


Figure 18. Baseline Adhesion Testing of Intumescent Coatings - Alexander Piedra

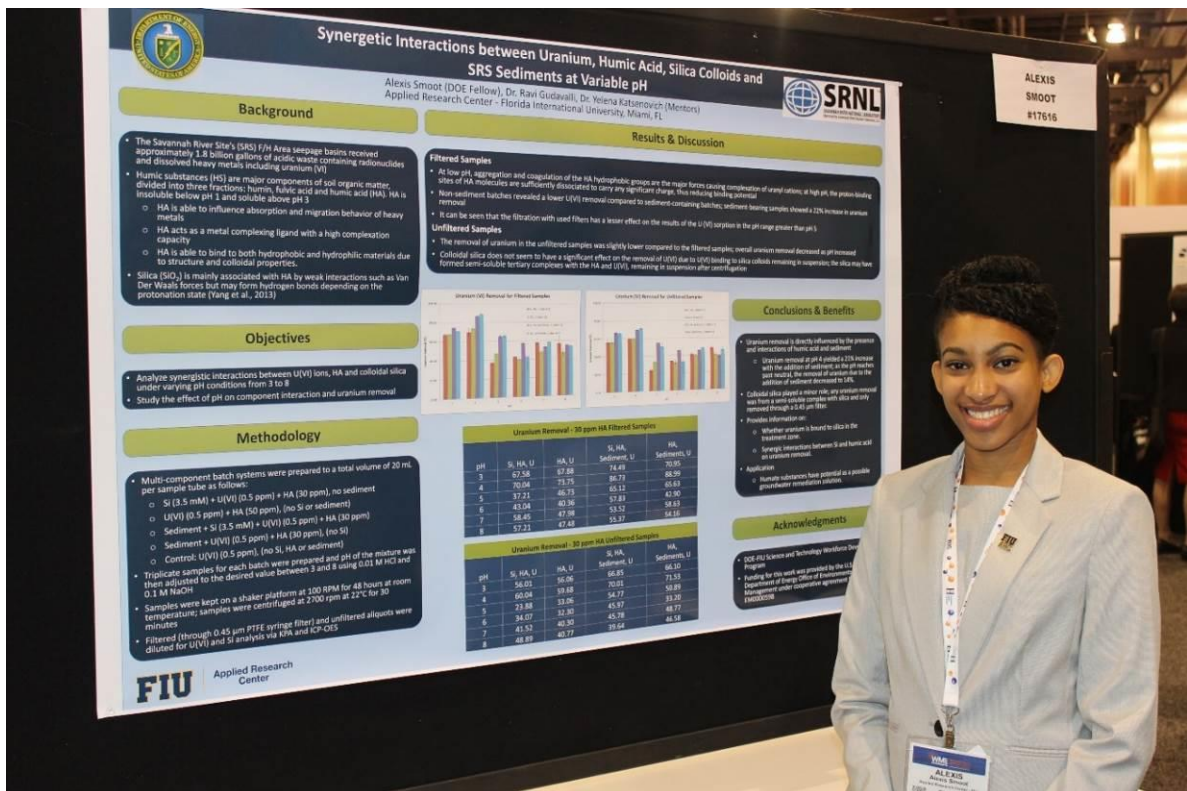


Figure 19. Synergetic Interactions between Uranium, Humic Acid, Silica Colloids & SRS Sediments at Variable pH - Alexis Smoot

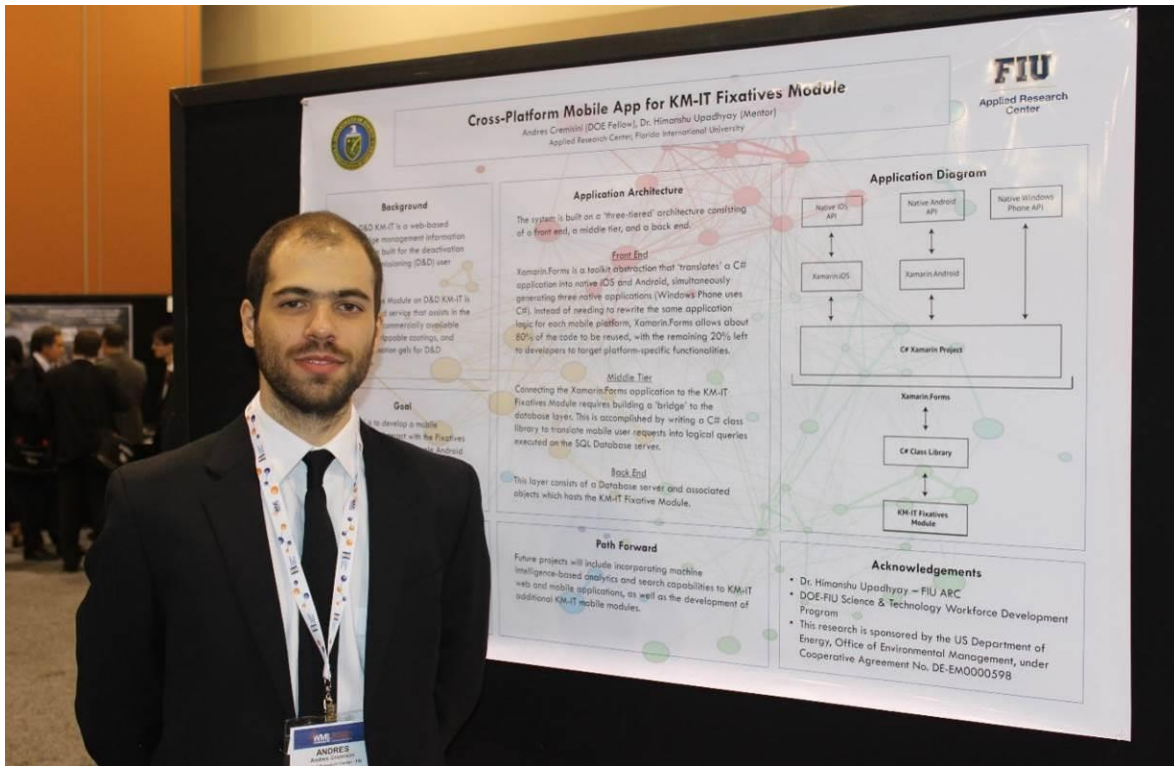


Figure 20. Cross-Platform Mobile App for KM-IT Fixatives Module - Andres Cremisini

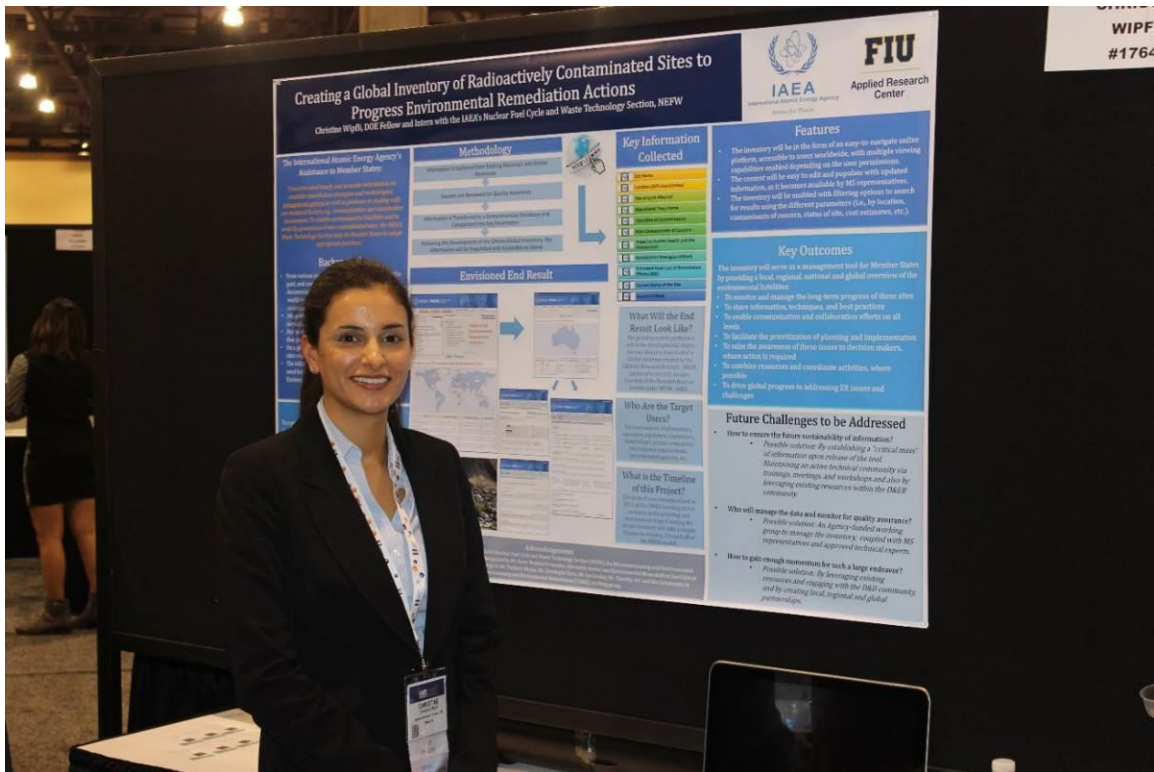


Figure 21. Creating a Global Inventory of Radioactively Contaminated Sites to Progress Environmental Remediation Actions - Christine Wipfli

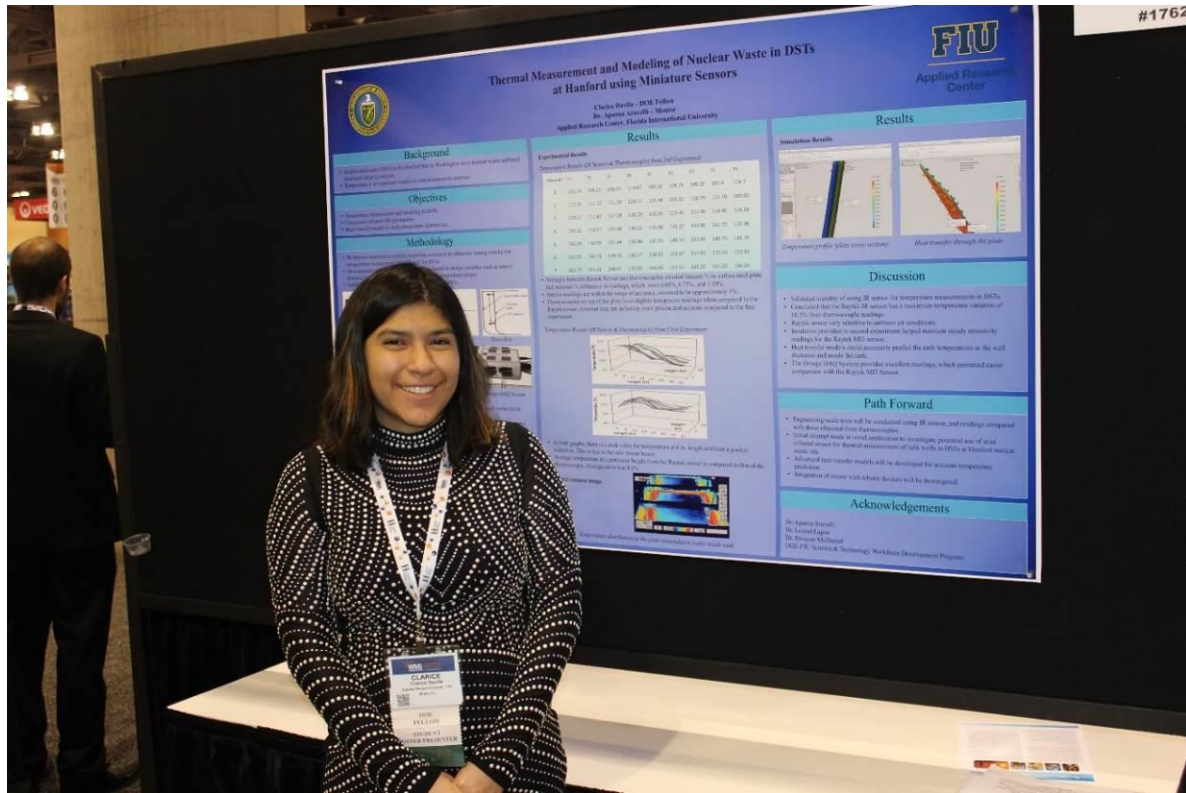


Figure 22. Thermal Measurement and Modeling of Nuclear Waste in DSTs at Hanford using Miniature Sensors - Clarice Davila

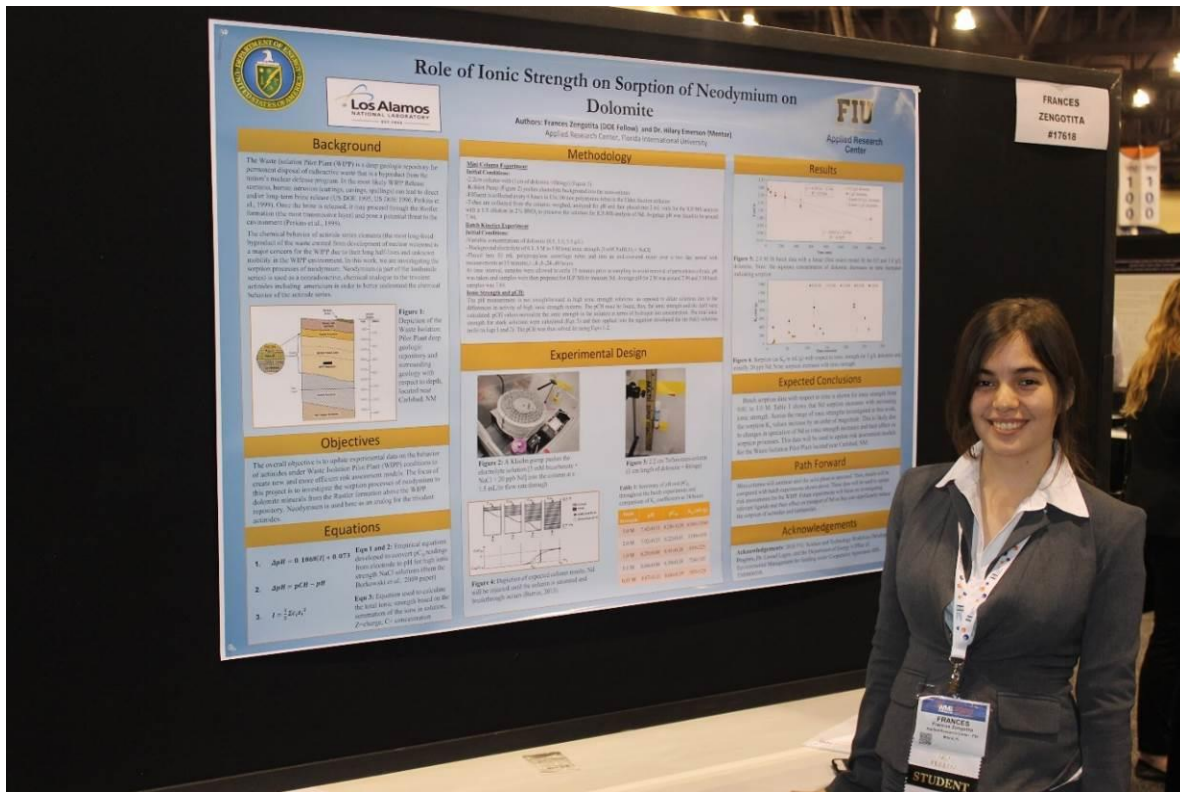


Figure 23. Role of Ionic Strength on Sorption of Neodymium on Dolomite - Frances Zengotita

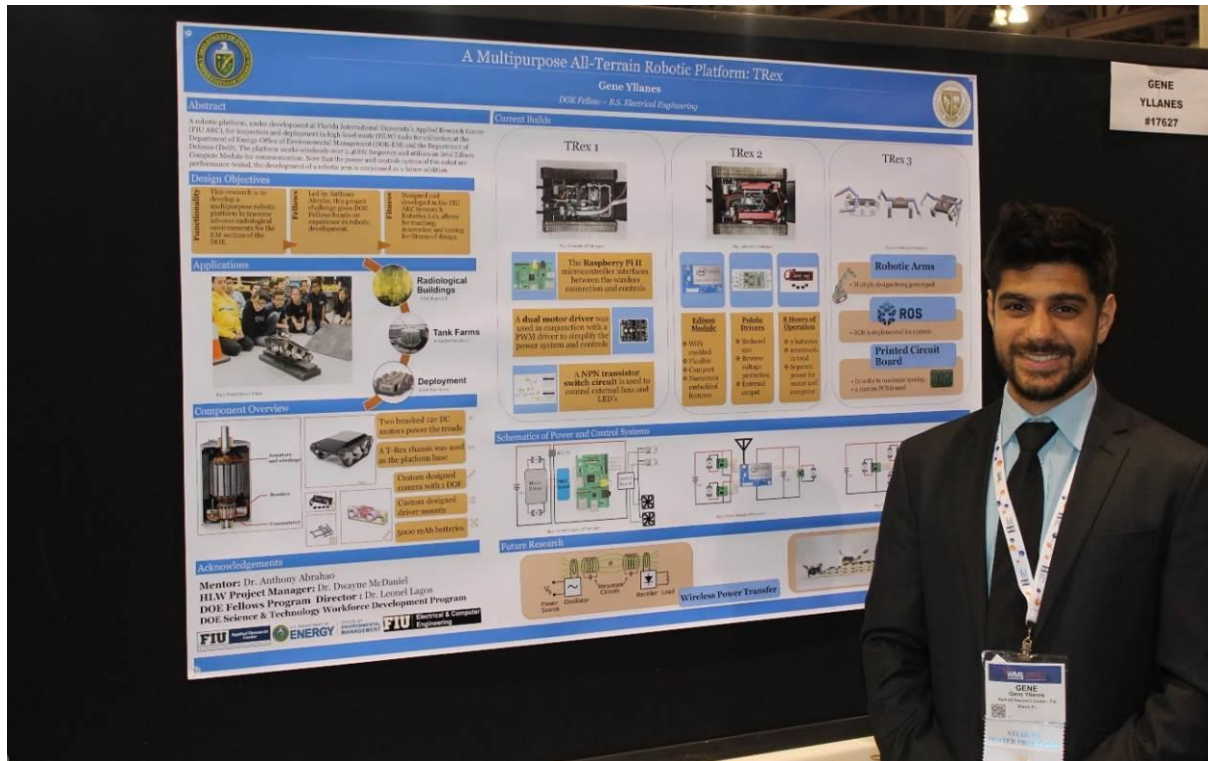


Figure 24. A Multipurpose All-Terrain Robotic Platform: T-Rex - Gene Yllanes

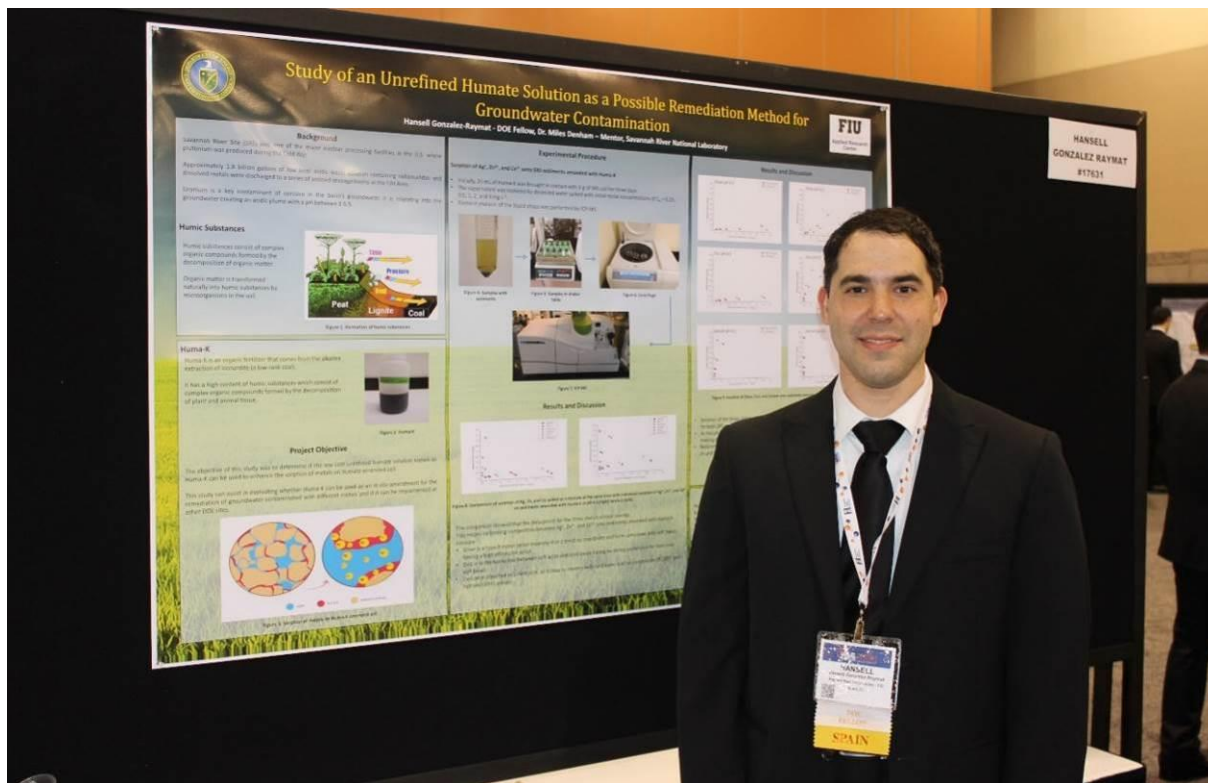
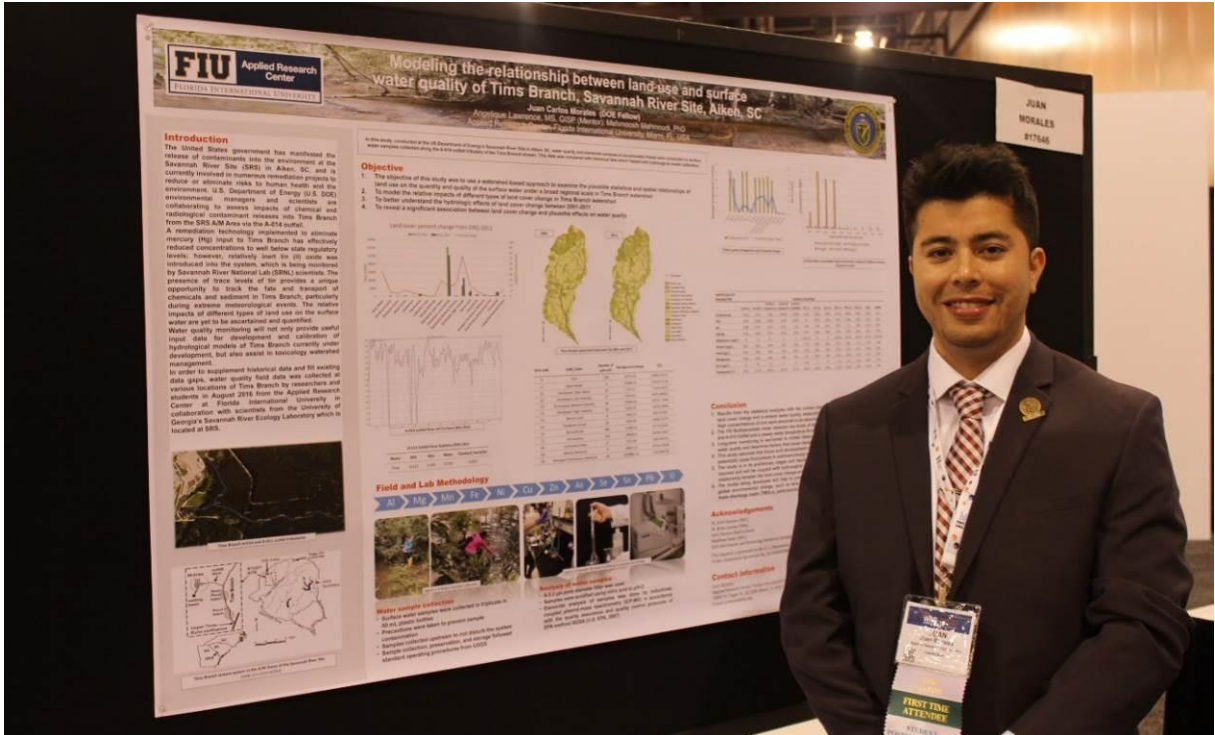


Figure 25. Study of an Unrefined Humate Solution as a Possible Remediation Method for Groundwater Contamination – Hansell Gonzalez Raymat



**Figure 26. Modeling the Relationship between Land Use and Surface Water Quality of Tims Branch, Savannah River Site, Aiken, SC - Juan Morales**



**Figure 27. Miniature Motorized Inspection Tool for DOE Hanford Site Tank Bottoms - Michael DiBono**



Figure 28. In-Situ Water Quality Sampling and Flow Measurement to Support Hydrological Model Development for Tims Branch Watershed, Savannah River Site, SC - Mohammed Albassam

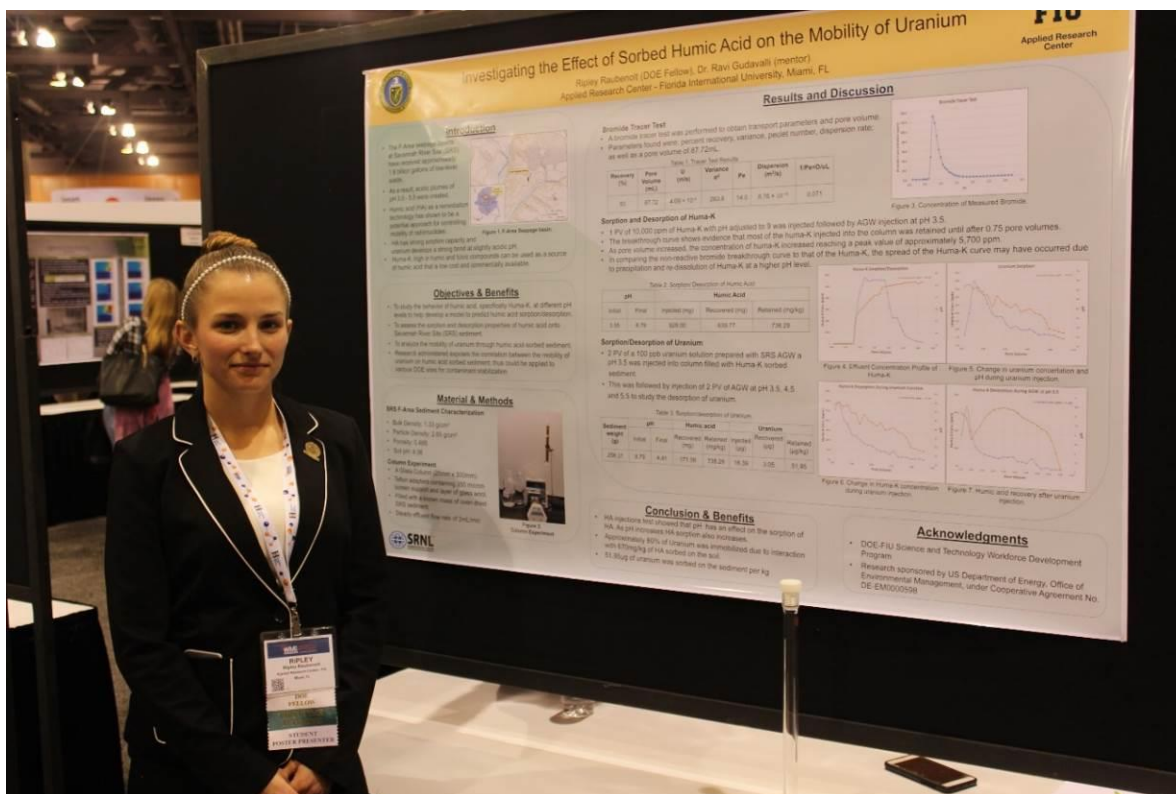


Figure 29. Investigating the Effect of Sorbed Humic Acid on the Mobility of Uranium - Ripley Raubenolt

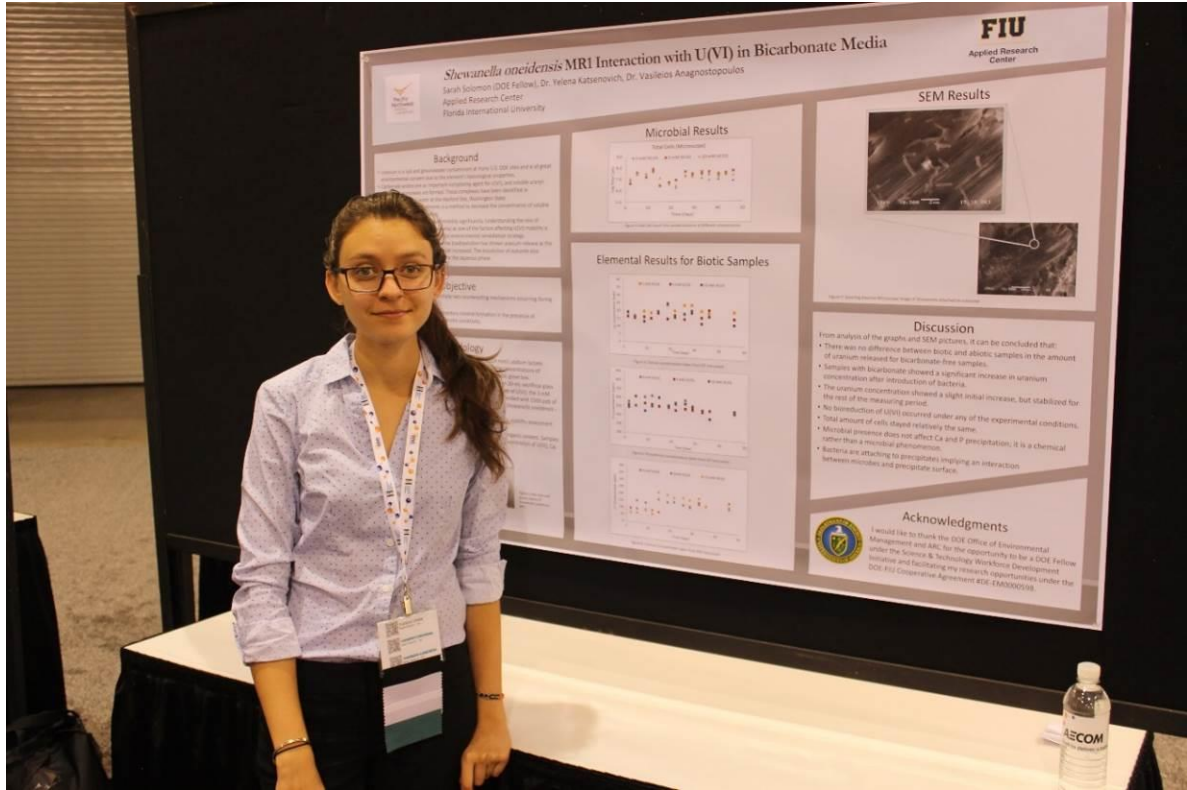


Figure 30. *Shewanella oneidensis* MRI Interaction with U(VI) in Bicarbonate Media - Sarah Solomon

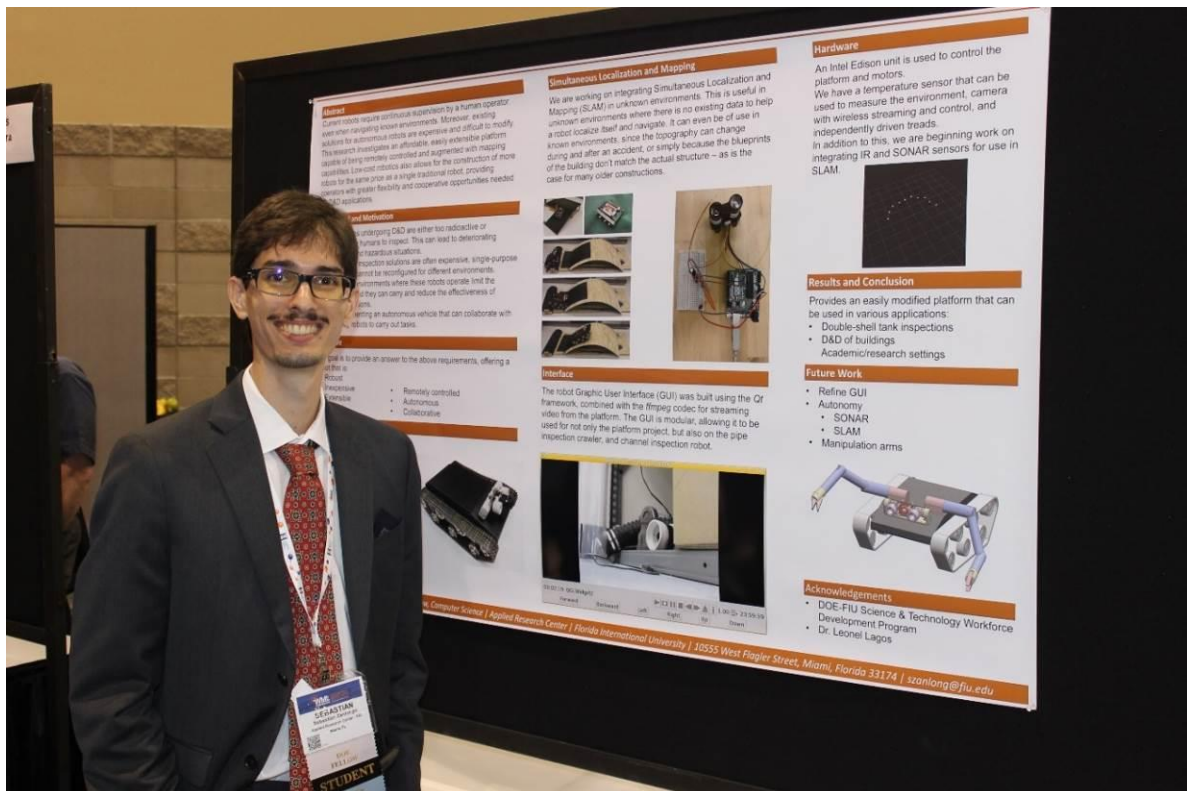


Figure 31. Low-Cost Robotic Platform for D&D Activities - Sebastian Zanlongo



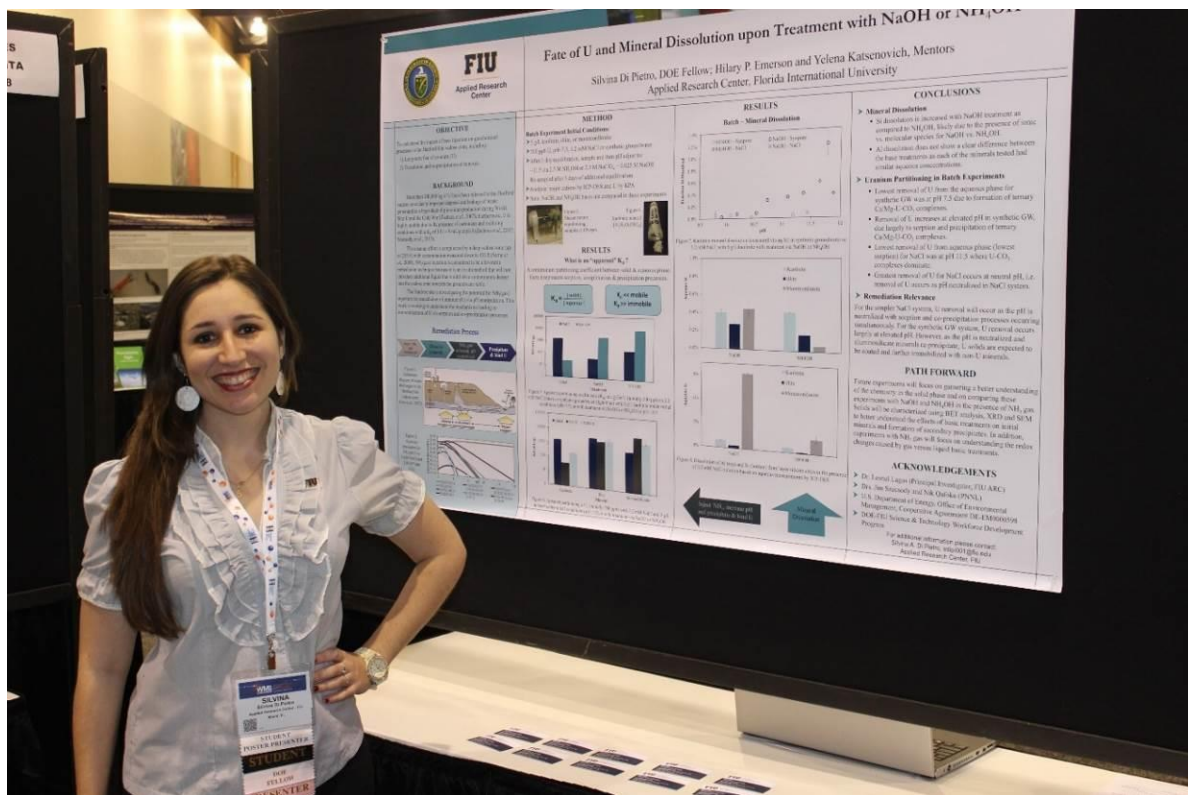


Figure 32. Fate of U and Mineral Dissolution upon Treatment with NaOH or NH<sub>4</sub>OH - Silvana Di Pietro

Session 41 on Tuesday, March 7, hosted a panel discussion on Graduating Students and New Engineers: Wants and Needs - STEM Students: Industry Dialog & Exchange of Knowledge Session. **DOE Fellow Christine Wipfli** participated as the panel reporter and **DOE Fellow Michael DiBono** participated in the panel discussion. This panel focused on new hires and graduating engineers having open lines of communication with employers. Considering the projected shortfalls in the workforce, effective communication of wants-and-needs of both the employer and employee must exist.

In addition, Session 042, also on Tuesday, hosted a panel discussion on Young Professionals in Nuclear Science and Engineering: An International Perspective Session. **DOE Fellow Christine Wipfli** participated in this panel discussion. This panel focused on young professionals and covers views on radioactive waste management from young persons' perspectives from all around the world with an aim to encourage fresh thinking and provide an opportunity for an open and frank discussion on issues.



**Figure 33. DOE Fellow Christine Wipfli during panel session at WM 17.**

A 2017 Roy G. Post Foundation Scholarship at the Undergraduate Student Level was awarded to **DOE Fellow Alejandro Hernandez** during the WM2017 Conference Honors and Awards Luncheon on Tuesday, March 7, 2017.



**Figure 34. Announcement of scholarship award to DOE Fellow Alejandro Hernandez at WM17.**

The DOE Fellows joined staff from the Applied Research Center at Florida International University to host a booth in the exhibitor hall during the conference, interacting with conference attendees on how FIU-ARC provides support to the DOE EM in their mission of accelerated risk reduction and environmental legacy cleanup. DOE Fellows also participated as Student

Assistants during the conference, assisting conference organizers and presenters during the technical sessions.



**Figure 35. DOE Fellows and ARC staff at FIU booth during WM17 Exhibit Hall.**



**Figure 36. DOE Fellows at the FIU booth during WM17.**

Sixteen (16) DOE Fellows prepared and submitted abstracts for the student poster session at the 2018 Waste Management Conference based on their summer internship and ARC research being conducted in close collaboration with national laboratories and DOE site. The titles of the abstracts submitted are as follows:

- Alejandro Garcia - Evaluating the Effects of Microbes on the Spectral Induced Polarization Response in Hanford Sediment
- Alejandro Hernandez - Interaction of Technetium-99 with Fe(II)-performed minerals in the presence of bicarbonates under reducing conditions
- Awmna Rana - Effect of Acidic Plume on Soil Properties and Capacity to Retain Uranium at the Savannah River Site
- Christine Wipfli - Investigating the Remobilization of Technetium-99 in the Presences of Bicarbonates at the Hanford Site
- Clarice Davila - Erosion/Corrosion Detection in Carbon Steel Pipes Using Ultrasonic Sensors
- Frances Zengotita - Role of Chromohalobacter on the potential transport of lanthanides and cesium in a dolomite mineral system
- Hansell Gonzalez - Study of an Unrefined Humate Solution as a Possible Remediation Method for Groundwater Contamination
- Joseph Coverston - Development of an Experimental Pipeline Flushing Guideline for the Transport of High Level Waste
- Juan Morales - Ecological Role in Health Physics by Monitoring the Effective Dose Rates of Radionuclides in Lepomis Auritus Fish Species, Savannah River Site- (FASB), Aiken, S.C.
- Michael DiBono - Simulation of a Mobile Robotic Platform in Gazebo and RVIZ using ROS
- Mohammed Albassam - Understanding the Groundwater / Surface-Water Interface Phenomenon and the Contaminants of the (F-Area)-Savannah River Site (SRS) Aiken, SC
- Ripley Raubenolt - Investigating the Effects of Sorbed Humic Acid on the Mobility of Uranium
- Ron Hariprashad - Accumulation and Distribution of Tin in Soil and Biofilm Samples in Tims Branch on the Savannah River Site, Aiken, S.C.
- Sarah Solomon - Autunite Dissolution in the Presence of Shewanella Oneidensis MR1
- Sebastian Zanlongo - Informative Path Planning for Leak Detection
- Silvina Di Pietro - Effects of Alkaline Treatment and Redox Conditions on Mineral Dissolution for Hanford Sediments

## 7.2 Other Conferences & Workshops

Four (4) DOE Fellows (Alexis Smoot, Awmna Kalsoom Rana, Frances Zengotita and Mohammed Albassam) presented their research at the FIU McNair Scholars Research Conference held at the main FIU campus on October 20-21, 2016. An oral presentation was given by DOE Fellow Awmna Rana titled “Tritium Partitioning in the Biosphere at Savannah River Site, Aiken, SC” Poster presentations were given by all four DOE Fellows. **Mohammed was awarded second place for his performance in the McNair poster presentations.**

- Alexis Smoot: Synergetic Interactions between Uranium, Humic Acid, Silica Colloids and SRS Sediments at Variable pH
- Awmna Rana: Study of the Fate and Transport of Irrigated Tritium Waste Water in Biological Receptors
- Frances Zengotita: Role of Ionic Strength on Sorption of Neodymium on Dolomite
- Mohammed Albassam: In-Situ Water Quality Sampling and Flow Measurement to Support Hydrological Model Development for Tims Branch Watershed, Savannah River Site, SC

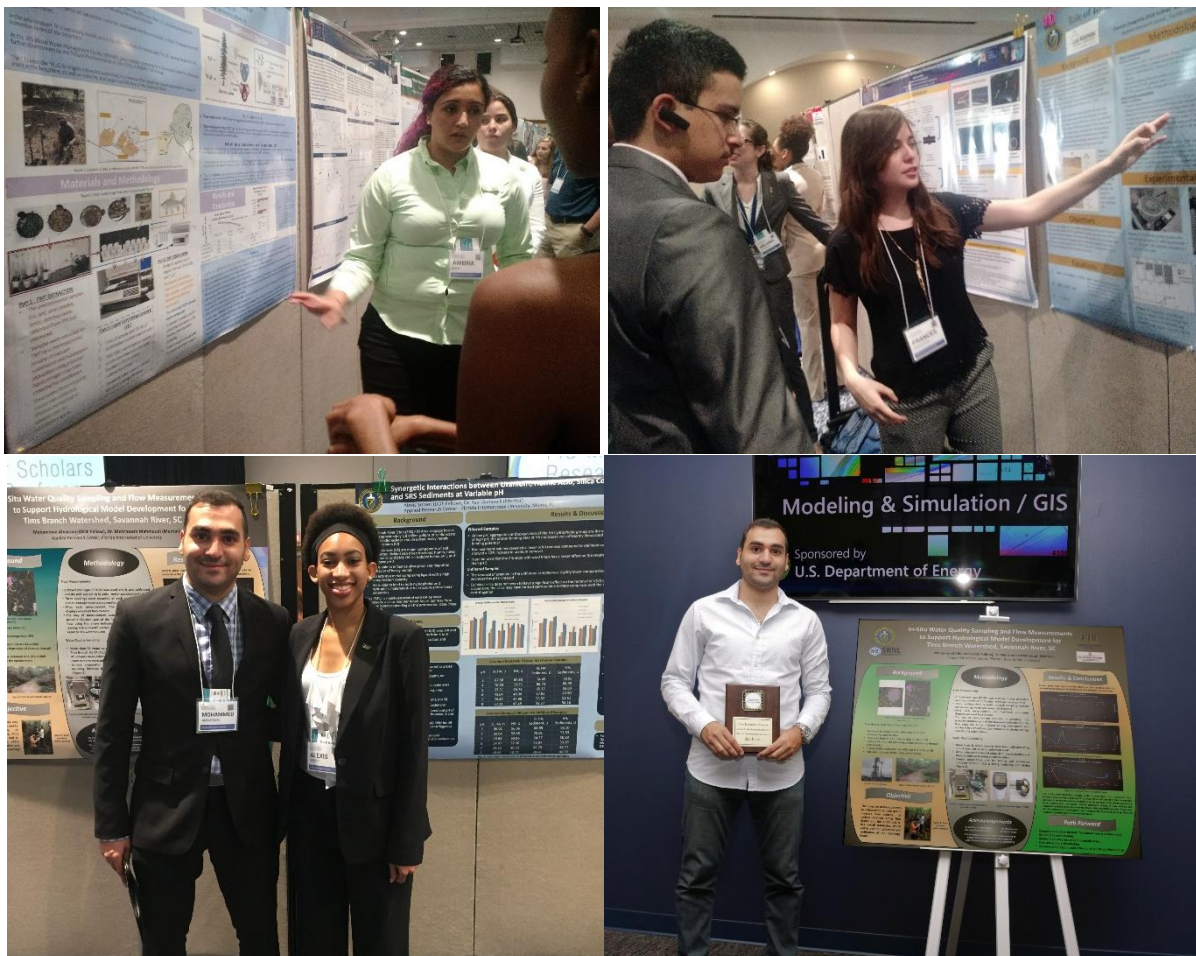


Figure 37. DOE Fellows participated at FIU’s McNair Research Conference

DOE Fellows Alexis Smoot presented a poster titled “Sustainability Index” at an FIU Undergraduate Research Presentation for FIU’s Foundation Board of Directors hosted by FIU’s Honors College on Friday January 27, 2017. The poster Alexis presented was based on her summer internship research carried out at DOE HQ at the Germantown facility. The goal of her research project to develop a high level sustainability analysis comparing active and passive remediation technologies at Hanford 100 and 200 area sites and the Mound, Ohio site. The sustainability index attempts to quantify the relative sustainability of active and passive remediation strategies by examining a variety of metrics and perspectives from those involved in the decision-making process.



**Figure 38. Student presenters at the FIU Honors College Board of Directors Research Event (Far Right: DOE Fellow Alexis Smoot)**

In addition, Alexis Smoot submitted an abstract for the “Sustainability Index” to the 2017 National Conference of Undergraduate Research and was selected to present an academic research poster at the conference held in Memphis, TN. Selected from a pool of 4,000 submissions, the abstract demonstrated “a unique contribution” to the field of environmental engineering and remediation. Alexis will present the sustainability index poster in April.

DOE Fellow Silvina Di Pietro was invited to talk at the FIU’s Panther Alumni Week (PAW) 1st year Honors College interdisciplinary course. She presented her undergraduate experience within FIU and the FIU’s Honors College and advised students on leadership. She stressed the importance of participating in an internship before graduating and shared her internship experience at PNNL last summer as part of the DOE Fellows Program at FIU. She concluded her presentation by providing students with information about the DOE Fellows Program.



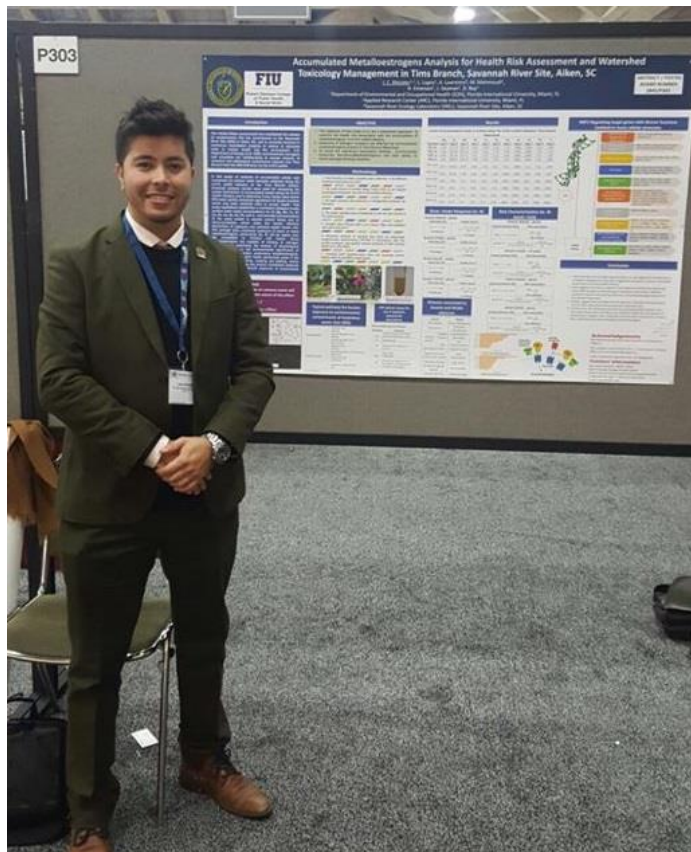
**Figure 39. DOE Fellow Silvina Di Pietro guest lecture at Panther Alumni Week (PAW).**



**Figure 40. Silvina Di Pietro introducing FIU students to the DOE Fellows Program.**

DOE Fellow Juan Carlos Morales also recently attended the 2017 Society of Toxicology Expo (March 12-17, 2017) to present his technical research conducted for SRS. Before his abstract acceptance, Morales performed in-situ sampling and field data collection in Tims Branch at SRS. The data collected will subsequently be used for contaminant transport modeling and an environmental human exposure assessment. He was able to extrapolate his data and develop an abstract titled, *“Accumulated Metalloestrogens Analysis for Health Risk Assessment and*

*Watershed Toxicology Management in Tims Branch, Savannah River Site, Aiken, S.C.,”* which was accepted for presentation at the Ecotoxicology ToxExpo poster session.



**Figure 41. DOE Fellow Juan Morales presenting his research poster at the Society of Toxicology Expo.**

Three DOE Fellows participated in the 2nd Annual FIU Undergraduate Research Conference on March 31, 2017. Fellow Ripley Raubenolt presented the effect of sorbed humic acid on the mobility of uranium, Awmna Rana presented the investigation of the properties of acid-contaminated sediments and its effect on contaminant mobility, and Alexis Smooth presented the synergetic interactions between uranium, humic acid, silica colloids and SRS sediments at variable pH.





**Figure 42. DOE Fellows Ripley Raubenolt (top left), Alexis Smoot (bottom left) and Awmna Rana (Right) presenting their research posters at the FIU undergraduate research conference.**

Silvina Di Pietro presented the effects of ammonia and variable redox conditions on mineral dissolution to the 253<sup>rd</sup> American Chemical Society National Meeting & Exposition in San Francisco, CA, on April 2-6, 2017. Silvina is studying the use of an innovative remediation technique that would inject ammonia gas into the subsurface at the Hanford Site to decrease the movement of uranium contamination below ground. The results can help to predict the long-term effectiveness of the remediation technique.



**Figure 43. DOE Fellow Silvina Di Pietro presenting at 253rd American Chemical Society National Meeting & Exposition in San Francisco, CA**

Frances Zengotita presented the role of ionic strength on the sorption of neodymium on dolomite at the 5<sup>th</sup> Annual Life Sciences South Florida Undergraduate Research Symposium at Palm Beach State College, FL on April 1, 2017. This research will lead to a better understanding of the

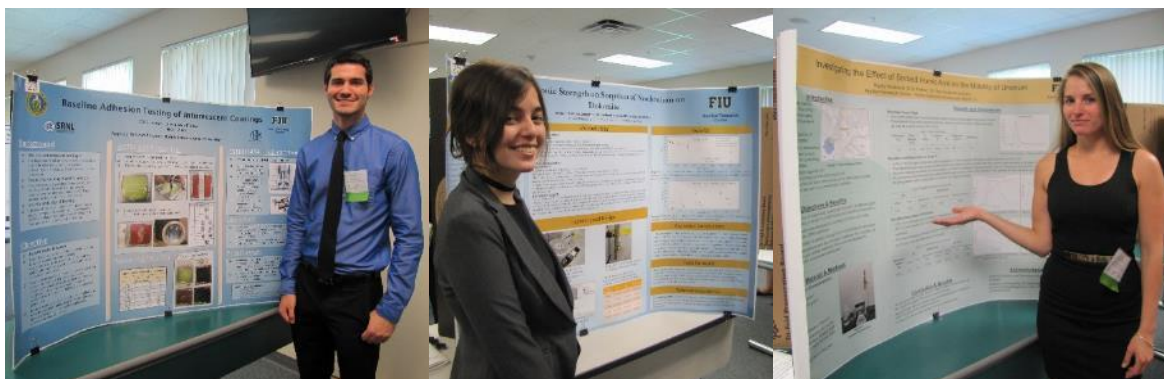
long-term behavior of contaminants in the subsurface at the Waste Isolation Pilot Plant (WIPP) and will be used to update the long-term risk assessment models for the site.

Alexander Piedra presented the baseline adhesion testing of intumescent coatings at the 5<sup>th</sup> Annual Life Sciences South Florida Undergraduate Research Symposium at Palm Beach State College, FL on April 1, 2017. Alexander is researching the effectiveness of commercially available intumescent coatings to enhance the fire resiliency of fixatives and facilities in support of D&D projects facing potential fire and/or extreme heat conditions.

Gene Yllanes presented on the T-Rex, multipurpose all-terrain robotic platform, at the 5<sup>th</sup> Annual Life Sciences South Florida Undergraduate Research Symposium at Palm Beach State College, FL on April 1, 2017. Gene’s research is investigating how to integrate robotic systems into hazardous work environments to accomplish high priority/high risk tasks, thereby reducing the risks to the workforce.



**Figure 44. DOE Fellows and ARC staff at 5th Annual Life Sciences South Florida Undergraduate Research Symposium: Vasileios Anagnostopoulou, Gene Yllanes, Alexander Piedra, Frances Zengotita, Ripley Raubenolt and Leonel Lagos.**



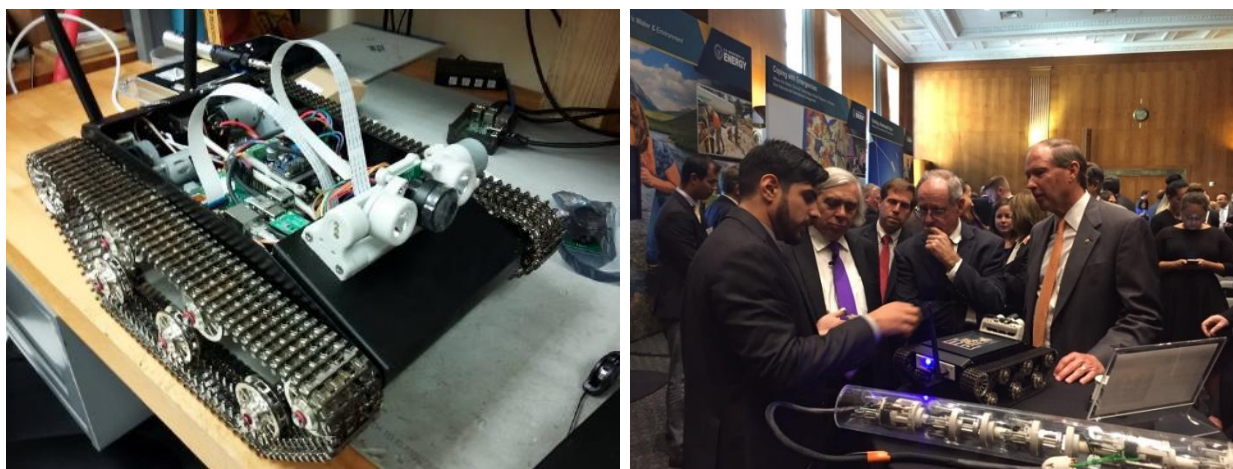
**Figure 45. DOE Fellows Alexander Piedra (left) Frances Zengotita (middle) and Ripley Raubenolt (right) at the Annual Life Sciences South Florida Undergraduate Research Symposium.**

One of FIU’s DOE Fellow students (Gene Yllanes) and the DOE Fellows Program Director (Dr. Leo Lagos) had a unique opportunity to participate in this year’s Environmental Stewardship National Lab Day on Capitol Hill event. The event articulated the important role of DOE in addressing a broad array of environmental challenges, ranging from the safe cleanup of the ARC Year-End Technical Progress Report

environmental legacy brought about from its nuclear programs, to responding and managing emergencies such as natural disasters, to understanding how earth systems function in order to produce a more sustainable energy future.

The FIU DOE Fellows program was featured during this event as part of the national labs role in developing the next generation scientific workforce. During the session, DOE Fellow Gene Yllanes was able to meet and greet the U.S. Secretary of Energy, Ernest Moniz, and members of Congress and showcase some of the robotic technologies being developed under the DOE EM – FIU Cooperative Agreement. Gene, an undergraduate electrical engineer STEM student, represented not only the FIU’s DOE Fellows program but also the next generation workforce that will continue DOE EM’s environmental restoration mission into the future.

During his presentation, Gene explained to Secretary Moniz his role in the development of the robotic systems at FIU for applications in DOE’s contaminated facilities. He also mentioned how his hands-on research as a DOE Fellows has connected the dots between what he has learned in the classroom to real life problems and practical engineering applications.



**Figure 46. Robotic platform developed at FIU showcased in Washington DC. (left) and DOE Fellow Gene Yllanes with Secretary Moniz and members of Congress at the event (right).**

## 8.0 DOE FELLOWS DIRECTLY SUPPORTING DOE EM PROJECTS

DOE Fellows provide direct support to DOE EM projects around the complex. Details of the applied research performed at ARC in support of DOE EM is reported in the FIU Performance Year 7 Year End Reports for Project 1, 2, and 3. The following DOE Fellows provided direct project support during FIU Performance Year 7.

**Chemical Process Alternatives for Radioactive Waste (Project 1):** Anthony Fernandez (undergraduate, mechanical engineering), Erim Gokce (undergraduate, mechanical engineering), Gene Yllanes (undergraduate, electrical engineering), John Conley (undergraduate, mechanical engineering), Max Edrei (graduate, M.S., mechanical engineering), Sebastian Zanlongo (graduate, Ph.D., computer science), Clarice Davila (undergraduate, mechanical engineering), Ryan Sheffield (undergraduate, mechanical engineering), Michael DiBono (undergraduate, mechanical engineering), Manuel Losada (undergraduate, electrical engineering), Anibal

Morales (undergraduate, electrical engineering), and Joseph Coverston (graduate, M.S., mechanical engineering).

**Environmental Remediation Science & Technology (Project 2):** Alejandro Garcia (graduate, M.S. geoscience), Alejandro Hernandez (undergraduate, chemistry), Alexis Smoot (undergraduate, environmental engineering), Awmna Kalsoom Rana (undergraduate, chemistry), Christine Wipfli (undergraduate, environmental engineering), Christopher Strand (undergraduate, civil & environmental engineering), Claudia Cardona (graduate, Ph.D., environmental engineering), Hansell Gonzalez (graduate, Ph.D., chemistry), Natalia Duque (graduate, M.S., environmental engineering), Robert Lapierre (graduate, M.S., chemistry), Sarah Bird (undergraduate, environmental engineering), Silvina Di Pierro (graduate, Ph.D., chemistry), Sarah Solomon (undergraduate, environmental engineering), Mohammed Albassam (graduate, M.S., Water resource Engineering), Frances Zengotita (undergraduate, chemistry and health), Juan Morales (graduate, M.S., public health), Ripley Raubenolt (undergraduate, environmental engineering), and Ron Hariprashad (graduate, GeoScience -Hydrogeology).

**Waste and D&D Engineering & Technology Development (Project 3):** Jesse Viera (undergraduate, mechanical engineering), Alexander Piedra (undergraduate, mechanical engineering), Andres Cremisini (undergraduate, computer science), and Daniel Khawand (undergraduate, computer science).

## 9.0 INTRODUCTION TO DOE FELLOWS CLASS OF 2016 (TENTH COHORT)



**Figure 47. Alexander Piedra (Mechanical Engineering) joins DOE Fellows Class of 2016.**

Alexander Piedra joined the DOE Fellows as an undergraduate student pursuing a Bachelor of Science in mechanical engineering with a professional certificate in robotics. His professional interests include clean and renewable energy, mechanical design, material optimization, and robotics.



**Figure 48. Andres Cremisini (Computer Science) joins DOE Fellows Class of 2016.**

Andres Cremisini joined the DOE Fellows as an undergraduate in computer science. His interests lie broadly in the field of machine intelligence, considering it a powerful tool for our increasingly interconnected systems and societies.



**Figure 49. Clarice Davila (Mechanical Engineering) joins DOE Fellows Class of 2016.**

Clarice Davila graduated from Miami Dade College in the spring of 2015 with an Associate in Arts degree in biology. After receiving her A.A., Clarice transferred to FIU to pursue her bachelor’s degree in mechanical engineering. Her interests are clean and renewable energy, such as hydroelectric and biomass.



**Figure 50. Daniel Khawand (Computer Science) joins DOE Fellows Class of 2016.**

Daniel Khawand joined the workforce development program as an undergraduate student pursuing a bachelor's degree in computer science with a minor in mathematics. Daniel is primarily interested in parallel computing and algorithm efficiency.



**Figure 51. Frances Zengotita (Chemistry) joins DOE Fellows Class of 2016.**

Frances Elisa Zengotita is currently an undergraduate student pursuing two degrees: a Bachelor of Science in chemistry and a Bachelor of Arts in English, along with a certificate in exile studies. Prior to becoming a DOE Fellow, Frances was a Nuclear Regulatory Commission (NRC) scholar. She expects pursue a Ph.D. in chemistry once she completes her undergraduate studies.



**Figure 52. Juan Morales (Public Health) joins DOE Fellows Class of 2016.**

Juan Carlos Morales is a graduate student pursuing a master’s degree in public health with a major in environmental and occupational health. Once he graduates, he would like to further his education by completing a Ph.D. in the same field. His current interests lie in examining environmental biomarkers of exposure and the effect of radionuclides in the environment. This involves utilization of integrated geographic information systems (GIS) and hydrological modeling tools to determine the fate and transport of contaminants, as well as other environmental characterization techniques.



**Figure 53. Michael DiBono (Mechanical Engineering) joins DOE Fellows Class of 2016.**

Michael DiBono is an undergraduate student pursuing a Bachelor of Science degree in mechanical engineering. His professional interests include mechanical design, robotics, and renewable energy. After completing his bachelor’s degree, Michael plans to continue his education by pursuing a master’s degree at FIU.



**Figure 54. Mohammed Albassam (Environmental Engineering) joins DOE Fellows Class of 2016.**

Mohammed Albassam joined the DOE Fellows as an undergraduate student. He completed his bachelor's degree in environmental engineering and is currently a graduate student pursuing a master's degree in the same discipline. His professional interests include green energy, environmental hydrology, water resources, and sustainable engineering.



**Figure 55. Ripley Raubenolt (Environmental Engineering) joins DOE Fellows Class of 2016.**

Ripley Raubenolt is an undergraduate student pursuing a Bachelor of Science degree in environmental engineering. Her professional interests include coastal restoration, ocean acidification, coral reef conservation, and remediation, and she plans to later pursue a master's degree in environmental engineering.





**Figure 56. Ron Haraprashad (Environmental Engineering) joins DOE Fellows Class of 2016.**

Ron Hariprashad is currently pursuing his Bachelor of Science in environmental engineering and plans to pursue his master’s degree in geosciences, hydrogeology track, along with another bachelor’s degree in biochemistry at FIU. His research interests include anaerobic digestion, wastewater treatment engineering, and hydraulic modeling.



**Figure 57. Sarah Solomon (Environmental Engineering) joins DOE Fellows Class of 2016.**

Sarah Solomon is an undergraduate student pursuing a Bachelor of Science degree in environmental engineering. Her interests include ecological restoration design, bioremediation technology, water resources, climate change solutions and sustainability practices. After graduation, Sarah hopes to get involved in ecological restoration projects that focus on restoring the balance of biotic and abiotic features of an ecosystem to create sustainable environments. Upon completion of her bachelor’s degree, she plans to continue her education by pursuing a master’s degree in environmental engineering.

## 10.0 ADDITIONAL PROGRAM ACTIVITIES

### 10.1 Lecture Series

During the performance year, the DOE Fellows also participated in a number of lecture series events. An ARC hosted a lecture in September 2016 featuring Dr. Aparna Aravelli with the title of “Thermal Measurement and Modeling of Nuclear Waste in the Double Shell Tanks at Hanford Nuclear Waste Site Using Miniature Sensors.”

In addition, Dr. Annie Kersting (Director of university relations and science and education, Lawrence Livermore National Laboratory) visited FIU on December 15 and presented “Plutonium in the Environment: Can we Predict its Subsurface Behavior?” to the DOE Fellows and ARC staff as part of the DOE Fellows lecture series. Dr. Kersting also toured the FIU-ARC facilities and participated in technical discussions with ARC researchers about potential future collaborations.

In January 2017, FIU hosted a visit from Ms. Vivian Cato from SRNL. Ms. Cato is the program manager for the U.S. Department of Energy Office of Environmental Management’s Minority Serving Institutions Partnership Program (MSIPP). Ms. Cato had an opportunity to meet with our DOE Fellows as well as tour ARC’s and Department of Chemistry’s research facilities. In addition, Ms. Cato provided a comprehensive overview of the MSIPP program during a presentation attended by DOE Fellows, ARC researchers/staff and FIU Department of Chemistry faculty. Ms. Cato also had an opportunity to meet with NRC’s Fellows and Scholars.



**Figure 58. Ms. Vivian Cato with Dr. Lagos (ARC Director of Research) and FIU-DOE Fellow students**

FIU hosted a visit from Dr. David Shuh on February 3, 2017 and the DOE Fellows participated in lab tours during his visit. Dr. Shuh gave a lecture titled “Soft X-ray Radiation Investigations of Materials Relevant to Actinide Science.”

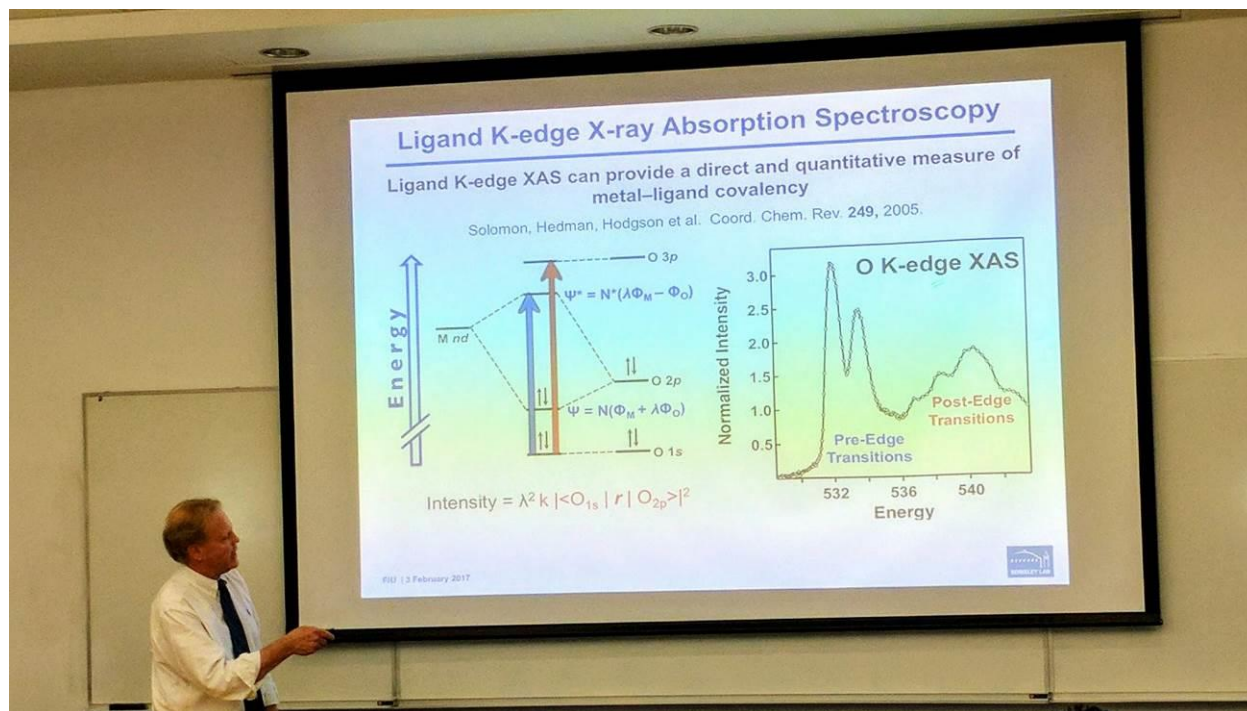


Figure 59. Dr. David Shuh during his visit to FIU.

On February 7, 2017, Dr. Michael Poirier (SRNL) visited and met with our DOE Fellows and the Project 1 researchers/scientists and faculty. The main purpose of his visit was to identify areas of collaboration in the area of tank waste as well as understand FIU-ARC’s overall research and student program (DOE Fellows program). Dr. Poirier was also interested in potential summer internships for our DOE Fellows and recruitment of FIU graduates.

DOE Fellows further participated in lab tours during Dr. Howard Hall’s visit to FIU on March 17. Dr. Hall is the director of the Global Security program and Governor’s Chair for Global Nuclear Security. During his visit, Dr. Hall gave a talk titled “Radiochemistry Center of Excellence: Expanding the Horizons of Nuclear Forensics Analysis.”

Also, DOE Fellows attended a lecture series featuring Drs. Altmaier and Kienzler from Karlsruhe Institute of Technology - Institute for Nuclear Waste Disposal (KIT-INE) during their visit to FIU on March 24. The titles for their talks were “Recent Advances on Aquatic Radionuclide Chemistry” and “Site Selection Process in Germany and Overview on Disposal Related R&D at KIT,” respectively.



**Figure 60. Drs. Altmaier and Kienzler from Karlsruhe Institute of Technology - Institute for Nuclear Waste Disposal (KIT-INE) with ARC staff.**

Finally, DOE Fellows attended the ARC Lecture Series held on March 31, featuring Dr. Lou Centofanti (CEO, Perma-Fix Environmental Services, Inc.). The title of his talk was "The Evolution of Chemical Waste Treatment in the Nuclear Industry - Simple Solutions for Complex Problems."

## 10.2 Other Activities

DOE Fellows had many opportunities throughout the year to share the research that they have performed in support of DOE-EM at ARC as well as during their summer. These presentations have been in the research areas of high level waste/waste processing, soil and groundwater modeling and remediation, deactivation and decommissioning, and technology development.

DOE Fellows Ryan Sheffield and Hansell Gonzalez presented their research accomplishments during the FIU Cooperative Agreement Research Review presentations held on September 21, 2016. In addition, a team of our DOE Fellows (Natalia Duauqe, Mohammed Albassam and Juan Morales) along with their mentor presented "In-situ Data Collection and Sampling to Support Flow and Contaminant Transport Modeling Effort for Tims Branch, Savannah River Site, SC" based on the visit they made to SRS for collect some data to be incorporated into the model that is being developed under Project 2.

DOE Fellows again participated and presented their research accomplishments during FIU's Research Review with DOE-HQ and the national labs on July 18, 2017, as a part of technical

projects 1, 2 and 3 as well as during the workforce development project 4. Below is the list of presentations given by DOE Fellows under the various projects:

### Project 1

- **Sebastian Zanlongo** (VTC from Sandia) - Anomaly Detection and Task Planning via Neural Networks and Hierarchical Task Networks
- **Michael Di Bono** (via phone from University of Texas-Austin) - Simulation of Mobile Platform, Vaultbot, using Robotic Operating System (ROS) and Gazebo

### Project 2

- **Frances Zengotita** from (VTC from LANL at Univ of New Mexico location) - Role of Chromohalobacter on the Potential Transport of Lanthanides and Cesium in a Dolomite Mineral System
- **Ron Hariprashad** (VTC from SRNL) - In-Situ Data Collection, Sampling, and Water Quality Monitoring in Tim's Branch Watershed

### Project 3

- **Alexander Piedra** (VTC from SRNL) - High Density Polyurethane Foam for Radiation Shielding & D&D Applications

### Project 4

- **Juan Morales & Mohammed Albassam** (VTC from HQ) - Surface/Ground Water Interface and Radioactive Contaminant Ecological Risk Assessment Using EPA Method in the (F-Area)-Savannah River Site (SRS) Aiken, SC.
- **Hansell Gonzalez** (VTC from FIU) - Unrefined Humic Substances as a Potential Low-Cost Remediation Method for Acidic Groundwater Contaminated with Uranium
- **Silvina Di Pietro** (VTC from FIU) - Ammonia Gas Treatment for Uranium Immobilization at the DOE Hanford Site
- **Awmna Rana** (VTC from FIU) - Effect of Acidic Plume on Soil's Properties & Capacity to Retain Uranium at SRS
- **Maxmiliano Edrie** (VTC from FIU) - CFD Evaluation of Mixing Processes for High-Level Waste

DOE Fellow Hansell Gonzalez prepared and submitted a paper for a student paper competition with the 9th International Conference on Remediation and Management of Contaminated Sediments, to be held in New Orleans on January 9-12, 2017. The title of his paper is "Unrefined humic substances as a potential low-cost remediation method for groundwater contaminated with uranium in acidic conditions."

DOE Fellow Juan Carlos Morales was awarded the Robert Stempel College of Public Health & Social Work Path Merit Award Scholarship for outstanding achievements during his program of study. The award provides supplemental funds to students who have an exemplary academic record, participate in student activities, and demonstrate notable achievements in helping the community. In efforts to complete his master's degree, Morales has participated in numerous research projects and community activities which made him an eligible candidate for the award. This scholarship has given him the opportunity to travel to several conferences. More importantly, he has gained experience which has aided in his research approach and communication skills.

Two DOE Fellows, including Sarah Solomon and Ron Hariprashad, were in the team of FIU STEM students who were awarded 2<sup>nd</sup> Place in the 2016-2017 Environmental Engineering and Science Foundation (EESF)/Association of Environmental Engineering and Science Professors (AEESP) Student Video Competition for their video production entitled “Take Action on Climate Change.” This video is intended to motivate and teach young adults how they can impact climate change through their own day to day activities. The team will be traveling to Washington, DC to receive their award on April 13, 2017 at the 2017 Excellence in Environmental Engineering and Science Awards Luncheon and Conference. The video can be viewed on YouTube via the following link: <https://www.youtube.com/watch?v=dOyhrCQKobc>



**Figure 61. AAEES National President Robert Williams awards FIU Students.**

Four DOE Fellows graduated from FIU and participated during FIU’s fall 2016 graduation ceremony held during December 11 - 14, 2016:

- Mohammed Albassam (Class of 2016) - B.S., Environmental Engineering
- Natalia Duque (Class of 2013) - M.S., Environmental Engineering
- Ron Hariprashad (Class of 2016) - B.S., Environmental Engineering
- Ryan Sheffield (Class of 2014) - B.S., Mechanical Engineering

Starting in the spring semester of 2017, Mohammed and Ron began their graduate degree programs, majoring in water resources engineering and geoscience, respectively. Ryan accepted an employment offer with the applied physics laboratory at Johns Hopkins University and started his new job in January 2017.



**Figure 62. DOE Fellows Natalia, Mohammed and Ron during FIU's Fall 2016 graduation ceremony.**

An additional four DOE Fellows graduated from FIU and participated in FIU's spring 2017 graduation ceremonies held from April 29 to May 3, 2017.

- Alexandro Hernandez - B.S., Chemistry
- John Conley - B.S., Mechanical Eng
- Sarah Bird - B.S., Environmental Eng
- Christopher Strand - B.S., Environmental Eng

ARC researchers and DOE Fellows had the opportunity to participate in the first ever TechNeeds seminar which brought together robotic experts from federal agencies, national research laboratories, industry and academia to address the integration of robotic systems into hazardous work environments and how they can be used to assist and support the workforce to accomplish high priority/high risk tasks. Titled, "Robots, Sensors & Humans – Benefits & Challenges of the Implementation of Robotic Systems in Hazardous Environments," the seminar was held at the Modesto A. Maidique campus of Florida International University (FIU) in Miami, FL, on May 3 and 4, 2017.

During the seminar, representatives from a variety of agencies discussed important key issues related to robotics and how they can be used to support their respective missions. Integration of robotic systems into hazardous work environments and how they can be used to assist and support the workforce to accomplish tasks are among a number of topics presented. Specific problems/needs were identified and the associated challenges and constraints with developing and integrating the systems were discussed. Rod Rimando, director of EM's Office of Technology Development, opened the event with a discussion of robotics needs and opportunities within EM.

On the afternoon of the first day, seminar participants had the opportunity to tour the FIU Applied Research Center facilities and view live technology demonstrations of commercially available robotics and robotic technologies under development. DOE Fellows attributed to the success of the event by participating as student assistants throughout the seminar.



**Figure 63. Robotics seminar participants.**



**Figure 64. Leo Lagos (Director of Research, FIU ARC) and the DOE Fellows with Rod Rimando (DOE EM).**

All Fellows also participated in a weekly meeting conducted by the program director. During each of these meetings, one DOE Fellow presents the work they performed during their summer internship and/or EM research work they are performing at ARC (Table 6).

**Table 6. DOE Fellow Presentations on their Summer 2015 Internships or EM Research at ARC**

<b>Fellow</b>	<b>Internship Location</b>	<b>Planned Presentation Date</b>
Michael Di Bono	University of Texas-Austin	September 29, 2017
Juan Morales and Mohammed Albassam	DOE-HQ	October 11, 2017
Ron Hariprashad	SRNL/SREL	October 25, 2017
Sebastian Zanlongo	Sandia	November 1, 2017
Francis Zengotita	WIPP	November 15, 2017
Christine	DOE-HQ	TBD
Sarah Solomon and Ripley Raubenolt	SRNL	TBD

A robotic platform was developed by DOE Fellows Michael Dibono and Gene Yllanes under the supervision of their mentor Anthony Abraho under Project 1; this platform was showcased during the Environmental Lab Day on the Hill Exhibits (National Laboratories - Advancing US ARC Year-End Technical Progress Report



Environmental Stewardship through Innovation). DOE Fellow Gene Yllanes and Dr. Lagos (Program Director and PI) attended and showcased the robotic platform and other robotics technologies prototyped at FIU in support of the DOE EM environmental remediation mission. The FIU technologies were also be displayed and showcased at the National Cleanup Workshop held in Alexandria, VA on September 14 and 15, 2016.



**Figure 65. DOE Fellow, Gene Yllanes with Secretary Moniz and members of Congress (left) and Dr. Monica Regalbuto (DOE-EM), Secretary Moniz, DOE Fellow (Gene Yllanes), and Dr. Leonel Lagos (DOE Fellows Program Director, FIU-ARC) (right).**

## CONCLUSIONS

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This innovative workforce development program was officially established in March 2007. This project is successfully meeting its objectives by providing research training and mentoring for students from underrepresented groups on environmental problems at DOE sites in addition to providing several new formal recruitment and retention mechanisms for qualified students from underrepresented groups to pursue advanced studies, research training, and eventual career placement at DOE sites. Additional information about the entire program and the DOE Fellows can be found on the website <http://fellows.fiu.edu/>.

## APPENDIX

The DOE Fellows are finalizing their DOE Fellows Summer Internship Reports. The table below shows the DOE Fellows, internship location, summer mentors, and report titles. The following reports will be made available at the DOE Fellows website, <http://fellows.fiu.edu>.

<b>DOE Fellow(s)</b>	<b>Location</b>	<b>Mentor(s)</b>	<b>Summer Intern Report Title</b>
Juan Morales, Mohammed Albassam	DOE-HQ	Skip Chamberlain	Groundwater/Surface Water Interface and Radioactive Contaminant Ecological Risk Assessment at SRS F-Area
Christine Wipfli	DOE HQ	Robert Seifert	Supporting DOE EM 4.31, Office of Regulatory Compliance
Sebastian Zanlongo	Sandia National Lab	Kristopher Klingler Bill Prentice Jon Bradley	Anomaly Detection and Task Planning via Neural Networks and Hierarchical Task Networks
Andres Cremisini	Sandia National Lab	Kristopher Klingler Bill Prentice Jon Bradley	Coding a Weather Model
Sarah Solomon, Ripley Raubenolt	SRNL	Mike Paller Brian Looney	Mercury Speciation via Diffusive Gradients in Thin-Film Technology
Ron Hariprashad	SRNL/SREL	John Seaman Brian Looney	In-Situ Data Collection, Sampling, and Water Quality Monitoring in Tims Branch Watershed, Savannah River Site
Michael Di Bono	University of Texas-Austin	Mitch Pryor	Simulation of a Mobile Robotic Platform in Gazebo and RViz using ROS
Frances Zengotita	WIPP	Don Reed Tim Dittrich	The Role of Chromohalobacter on Transport of Lanthanides and Cesium in the Dolomite Mineral System

In addition, the following report is available at the DOE Research website for the Cooperative Agreement between the U.S. Department of Energy Office of Environmental Management and the Applied Research Center at Florida International University: <http://doeresearch.fiu.edu>

1. Florida International University, *Project Technical Plan*, Project 4: DOE-FIU Science & Technology Workforce Development Program, October 2016.