

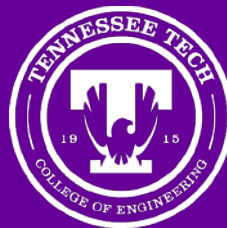
Center For Energy Systems Research

Tennessee Tech University

Annual Report for Fiscal Year 2016-2017



'Solar' energy to the Smart Grid Laboratory

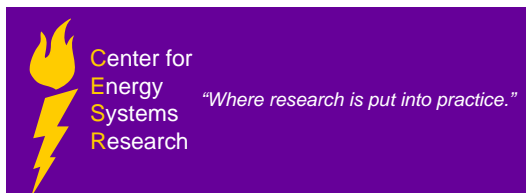


Annual Report for Fiscal Year

July 1, 2016 – June 30, 2017

Satish M. Mahajan, Director

www.tntech.edu/cesr



Center for Energy Systems Research

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Externally mounted solar panel array for integration with the Smart Grid Laboratory.

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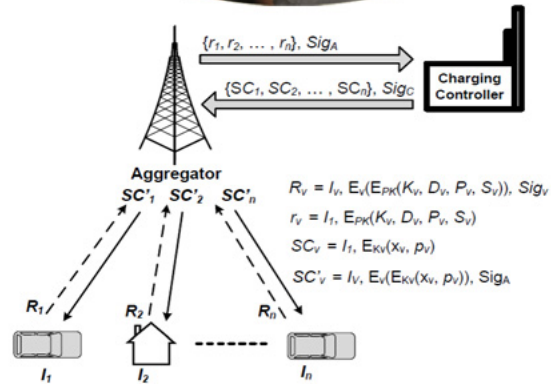
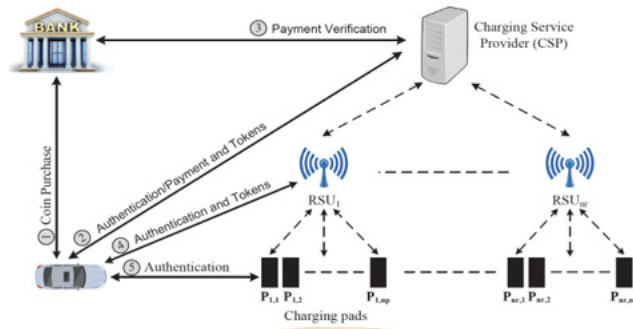
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PROGRAMMATIC REPORT



Assistant Professor Mohamed Mahmoud and graduate student Surya Teja Gunukula working on the 'development of Secure Scheme for Communication between EV and Smart Grid'

MISSION

The Center for Energy Systems Research (CESR) was established to advance and apply scientific and engineering knowledge associated with energy systems and in particular with electric power while supporting the instructional program of Tennessee Technological University (TTU) in academic areas associated with energy systems. During the College of Engineering Strategic Planning of 2012-13, two strategic research areas, Smart Grid and Resilient Infrastructure, were assigned to the Center for Energy Systems Research as focus areas of research. Present research efforts, both theoretical and experimental, are focused on solving current and anticipated problems associated with energy and infrastructure systems. Special emphasis is given to the needs of the electric power industry by way of conducting research on Smart Grid.

VISION

The Center will be known and be recognized nationally for its research contributions in Energy Systems and Infrastructure areas.

The Center's vision is to enhance research and education in support of its mission. The Center will conduct advanced and applied research to enhance knowledge in currently needed and emerging technical areas of Energy and Infrastructure Systems. The Center also has major interests in the dissemination of knowledge and enhancing education in energy systems.

The Center draws upon the expertise from the faculty in the College of Engineering as well as from other faculty on campus. Participating faculty and faculty associates represent Basic Engineering, Chemical Engineering, Civil and Environmental Engineering, Computer Science, Electrical and Computer Engineering, Mathematics, Mechanical Engineering, and Manufacturing and Engineering Technology.

HISTORY

The State of Tennessee established the Center for Electric Power in 1985 in the College of Engineering at Tennessee Technological University. Reflecting the broadening of the activities of the Center, its name was changed to Center for Energy Systems Research. Over the years, research projects have been sponsored by more than 20 major electric utilities, EPRI, federal agencies such as DOE, NASA, NSF, and ONR, State agencies such as TDOT and Tennessee Department of Education, and industries such as Buswell Energy.

In the 2012-2013 academic year, the College of Engineering identified six strategic research areas in which to focus the research efforts of its faculty and students. Of the six areas, CESR chose two areas, namely, 1) Smart Grid and 2) Resilient Infrastructure to focus its research. Development of large collaborative research proposals will be encouraged in these areas.

To promote the research and innovation, CESR provides services of an R&D Engineer, Network Manager, Financial Analyst, and Administrative Associate in support of the various research activities performed by faculty and students. The Center has set up laboratories and computational resources for the benefit of researchers.

The Center promotes international collaboration by hosting visiting scholars, scientists and engineers and establishing Memoranda of Understanding with international academic institutions and research organizations.

YEAR IN REVIEW



Satish M. Mahajan,
Director, CESR

Dr. Satish M. Mahajan continued as the Director of the Center for Energy Systems Research (CESR) for the fiscal year 2016-2017. The CESR continues to focus on two strategic research areas of the College of Engineering: Smart Grid and Resilient Infrastructure.

2016-2017 was a good year for the Center for Energy System's Research. Activations totaling \$1,261,011.15 reflect the extra energy put into invigorating faculty to produce proposals in the preceding years. In addition, the CESR associates submitted proposals over 10 million dollars. It is important to keep up these efforts even with the additional burden of performing the research funded by these projects. The meaningful improvements to the student's education by working on real-world problems is to be applauded and the benefit to the state and other eventual employers of these students directly reflect back on the investment in CESR by the State of Tennessee. As can be seen in the upcoming sections of this report, increased research activity put an extra burden on the CESR staff. Special thanks to each one of them for their efforts!

Dr. Siraj continued to work on the NSF CReST grant with significant contributions to the CESR. Dr. Biernacki also continued to work on the NSF grant in the area of 3D printing of infrastructure materials. Dr. Mahmoud led another NSF grant in the area of smart grid. Dr. Ghafoor was successful in attracting funding from NASA, ORNL and USAID. Dr. Rahman's first success with NSF and Dr. Belkacemi's first success with EPRI in the area of smart grid, and Dr. Chavez's first success with ORNL in the area of desalination deserves recognition. Dr. VandenBerge, Dr. Gannod, Dr. Idem, Dr. Hasan, and several researchers working on the TBR grant, are recognized for their contributions. Also, there was a welcome addition to CESR's funding from DOE by Dr. Rajabali of the physics department at TTU. Dr. Yarnold completed his NSF project and left TTU; we wish him well.

The push for more Ph.D. graduates by the university to "raise the bar" of research was demonstrated by the 16 M.S. students and 7 Ph.D. students who graduated this year with CESR support. This push was recognized by moving TTU up a notch in the Carnegie Classification of Institutions of Higher Education. The center funded 18 M.S. Assistantships (7 on grants) and 17 Ph.D. Assistantships (5 on grants) in the 2016-2017 fiscal year reflecting an ongoing commitment to improved research at TTU. During the past year, CESR associated faculty and students published 48 journal papers 89 proceedings/conference presentations, contributed to 1 book chapter, secured 1 patent and contributed to 2 Standards.

A formal opening of the Smart Grid Lab with attendees from TVA, NES, and others was an exceptional opportunity to share a research vision of the new space and share ideas with industrial and government entities while fostering collaborative efforts.

A recent proposal to the US DOE, to create a Living Lab between TTU, UTK, and ORNL, has set the formal ground work for many collaborative proposals in the future. Industrial partners like Fitzgerald Trucking who formalized a partnership with TTU in a recent announcement show the commitment to future collaborations.

Dr. Charles Van Neste, who gave two well received seminars in the CESR sponsored seminar series, will be brought to TTU as a Research Assistant Professor. His expertise in single conductor and wireless recharging will be the focus of a new research laboratory created by CESR.

PROGRAMMATIC REPORT

Research contract and grant awards included in Matching from July 1, 2016 thru June 30, 2017 total \$1,039,073.70. Gifts and Other Awards included in Matching total \$300. Therefore, the 2016-2017 Match is \$1,039,373.70. Indirect costs of approximately \$221,637.45 were also received during the 2016-2017 Fiscal Year. The result is that the 2016-2017 Matching and Indirect Costs total \$1,261,011.15. The State Appropriation was \$872,800 for 2016-2017.

CESR continues to enjoy a broad base of support. The funding categories for 1985 thru 2017 as illustrated in Figure 1 are: in-state utilities, 11.46 percent; out-of-state utilities, 6.41 percent; state and local agencies, 10.63 percent; federal government, 58.09 percent; other, 13.41 percent. The “other” category includes a variety of national and international industries, universities and professional societies. Through June 2017, the cumulative research funding of the Center is \$29,030,577.91. State appropriations are compared to matching, on an annual basis, in Figure 2. Matching is divided into contracts and grants (without indirect costs); equipment; and all other items such as software, books and reports, and funding for faculty and student exchange programs. The 32-year match of about \$28.5 million represents 100 percent of the state appropriations of \$28.5 million. Indirect costs of approximately \$5.1 million were also received. A list of the projects conducted under the major research areas is given in SM-3 in this report.

CESR RESEARCH FUNDING 1985 THRU 2017

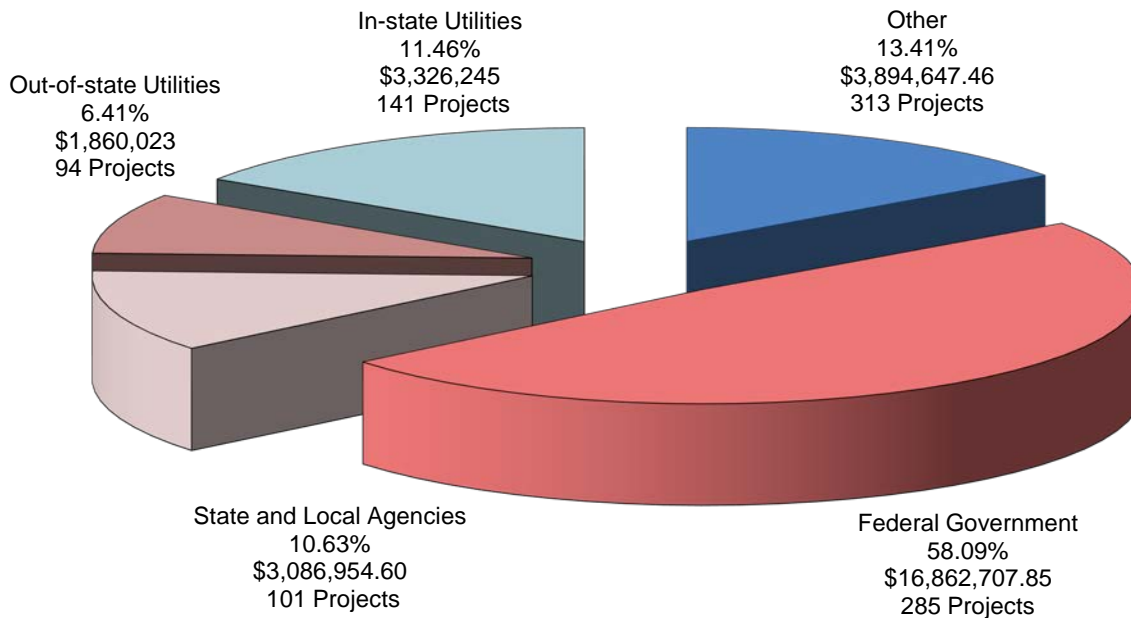


Figure 1: Types of Research Funding (Total \$29,030,577.91)

Total Projects = 934

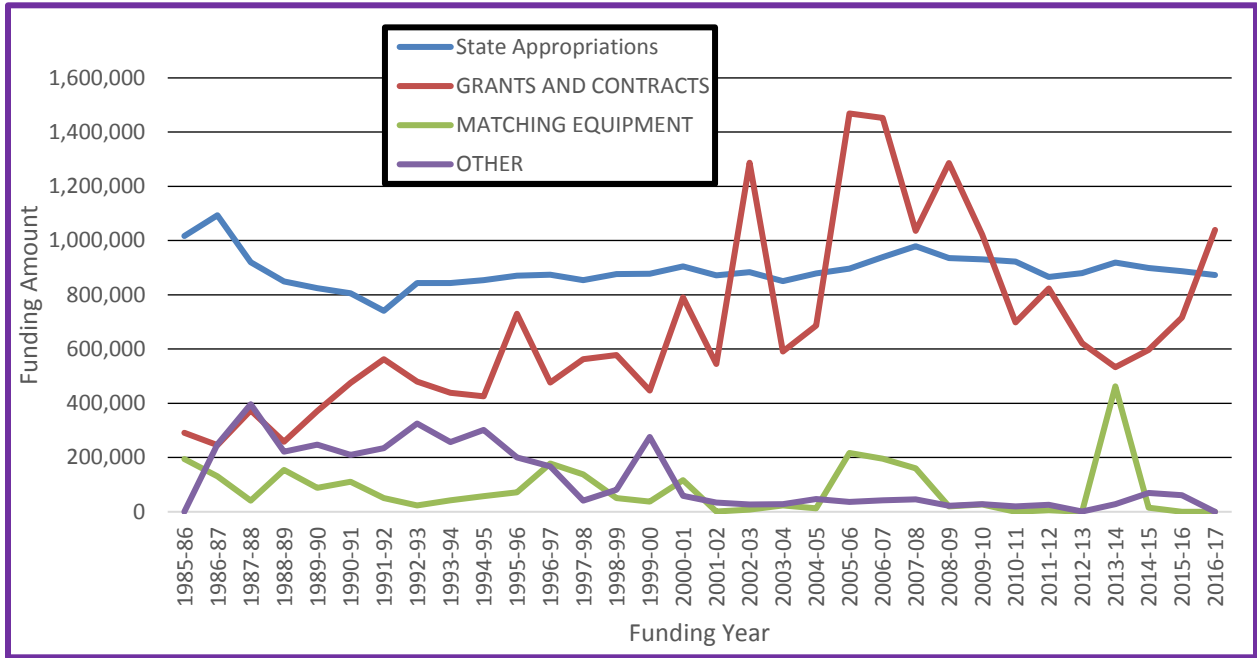


Figure 2: Historical State Appropriations and Matching 1985–2017 (Spring)

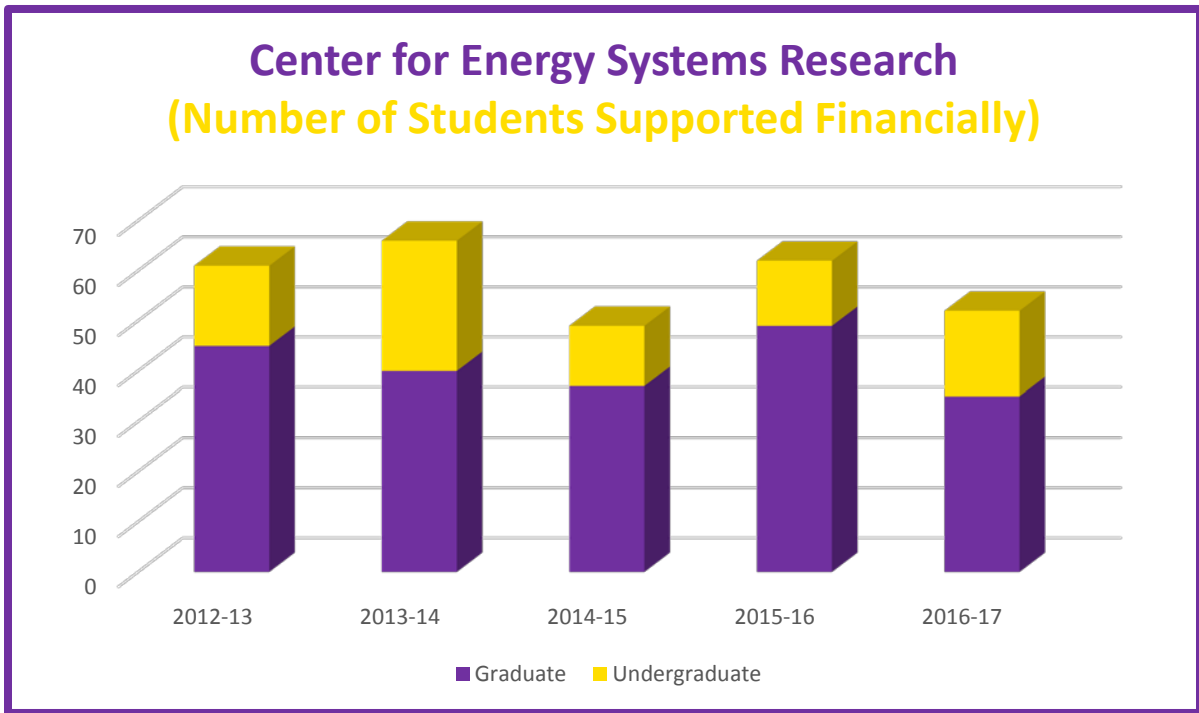


Fig. 3. Number of Students Supported



BIERNACKI RECEIVES TWO INTERNATIONAL AWARDS FROM AMERICAN CERAMIC SOCIETY.

Joseph Biernacki, professor of chemical engineering and University Distinguished Faculty Fellow, recently received two international distinctions from the American Ceramic Society: the Della Roy Lecture Award and the Brunauer Award.

The Della Roy Award acknowledges career achievement in the field of cement science. The award was presented in conjunction with Biernacki's lecture at the American Ceramic Society Cements Division annual meeting held on the North Western University (September 2016).

"It is a great honor to receive an award named for Stephen Brunauer," said Biernacki. "Brunauer is extremely well known for his work on gas adsorption on surfaces as well as great contributions to the field of cement chemistry."

In 1938, Brunauer and two other scientists, Paul Hugh Emmett and Edward Teller invented the widely used surface area measuring technique now referred to as the Brunauer Emmett Teller (BET) method.

"I am extremely grateful to receive awards honoring Della Roy, who I had the pleasure of knowing, and Stephen Brunauer, who I only read about in books," Biernacki said.



Smart Grid Open House, March 30, 2017 with guests from TVA, NES, and TTU.



MCAA Stipend Award Winner

James Locum, Ph.D. student, advisor L.K. Crouch, attended the World of Coal Ash Conference (WOCA) in Lexington, Kentucky May 8-11, 2017 and presented a paper.

James was one of four students who was awarded a \$500 stipend sponsored by the Midwest Coal Ash Association (MCAA).

STUDENTS CONFERENCE PRESENTATIONS

BROOK ABEGAZ

(Satish M. Mahajan) presented paper and attended 2016 PES (Power & Energy Society Gen. Meeting in Boston, MA on July 17-21, 2016

OJAS CHAUDHARI

(Joseph J. Biernacki, Advisor) Presented paper and attended Am Ceramic Society at Northwestern U, Evanston, IL, July 10-11, 2016

ARJAN N. RIMAL

(Rabie Belkacemi) Presented paper and attended the IEEE Innovative Smart Grid Conference 2016 on Sept 7, 2016 in Minneapolis, MN.

OSAMA O. ELKEELANY

(Joseph J. Biernacki) Attend and presented paper at AIChE National Conference, Nov. 10-14, 2016 in San Francisco, CA

A H M JAKARIA

(Mohammad Rahman) Attended ACM Int'l Workshop on SDN-NFV Security 2017 in conjunction with ACM CODASPY 2017, as presenter, March 23-24, 2017 in Scottsdale, AZ.

RANI VIJAYA PENUMAKA

(Indranil Bhattacharya) Attended and presented paper at the 231st Electrochemical Society (ECS) Meeting from May 28-June 1, 2017 in New Orleans, LA

FUTURE PLANS



Inflatable cooling chimney setup demonstration. (Photo furnished by Robert Craven.)

PLANS FOR 2017-2018

1. Increase research activity in the areas of the center

This goal intersects the University Flight Plan's Multidisciplinary Research Innovation sub goal. The creation of the Smart Grid and Resilient Infrastructure focus areas is to foster multidisciplinary research efforts. Even if considered to be primarily one department; getting power engineers, communication engineers, cyber security researchers, etc. to focus on a common laboratory for collaborative efforts has resulted in several collaborative proposals being prepared.

The new Center Focus Areas also intersect the University Flight Plan focus areas to Create Distinctive Programs and Invigorate Faculty. In addition to hosting meetings for each research area to promote collaboration and proposal writing, the Center has initiated several seminars and introductory trips to kick start collaborative research efforts and energize faculty efforts, these efforts will be continued in the next year.

2. Increase Student Research activity

Continue pursuing the increase in the number of MS and Ph.D. graduates in the strategic research areas of the Center by 25% as measured by a running average of 3 years. Next year will be the first year the calculations of this metric will be possible comparing the average of years 1-3 with years 2-4.

Support at least two undergraduate research projects per year in the areas related to energy systems.

This goal intersects the University Flight Plan's New Graduate Programs sub goal. Since the Center now has the Smart Grid and Resilient Infrastructure focus areas, graduate degrees resulting from this focused Center attention will yield more hire-able graduates in these areas of recognized national importance.

3. Increase Collaborative research

Continue pursuing the development and submission of two collaborative proposals with interdisciplinary focus. The number of collaborative proposals submitted per year should be at least two per year.

This goal intersects the University Flight Plan's Multidisciplinary Research Innovation sub goal. A recent alliance between TTU, UTK, and ORNL as well as many industrial partners in an endeavor to provide value to the transportation industry is conceived as the TennSmart Living Lab. This effort will be pursued further with additional proposals in the coming year.

4. Add Laboratory Facilities

Dr. Charles Van Neste, who gave two well received seminars, will be brought to TTU as a Research Assistant Professor. His expertise in single conductor and wireless recharging will be the focus of a new research laboratory created by CESR. Additional funding will be sought through proposals.

This goal intersects the University Flight Plan's Physical Infrastructure Priorities sub goal and the Technology Service to Students sub goal, and the Technology in Teaching sub goal. Better facilities in areas of national importance like the Smart Grid benefit research, education, and hire-ability of our graduates.

5. Increase outreach activities

Organize a minimum of two seminars by external speakers per year.

This goal intersects the University Flight Plan's Co-Curricular Undergraduate Program sub goal and the Multidisciplinary Research Innovation sub goal. By having research area experts from outside the university come teach seminars, workshops or short courses, the students will be exposed to a broader base of information and hopefully promote collaborative efforts from TTU researchers with those at other institutions.

SUPPORTING MATERIALS



Undergraduate, Brandon Childress, working on Single Phase Testbed in CESR Smart Grid Laboratory

CESR FACULTY AND STAFF

2016-2017

Center Directors:	Satish M. Mahajan, Professor	Director, CESR
CESR Staff:	Robert Craven Anthony Greenway Linda Lee Tammy Martin (Part Time) Etter Staggs Emilio Piesciorovsky, Ph.D. Rob Reab (Part Time) Brook Abegaz, Ph.D. (Part Time) Abdul Salem Mohammad (Part Time) Pallavi P. Patil (Part Time)	R&D Engineer Information Technology Associate 9 Administrative Associate 3 Administrative Associate 3 Financial Analyst Postdoctoral Research Associate IT Systems Administrator Research Assistant II Research Assistant 1 Research Assistant 1
Visitors:	Lecturer Funso Ariyo, Ph.D. Hossein Dehnavifard, Ph.D. Jiang Liang	Visiting Research Scholar from Obafemi Awolowo University, Nigeria Visiting Scholar from the University of Cape Town in South Africa Visiting Research Scholar from the Beijing Jiaotong University in China

Faculty participating in the Strategic Research of the Center are:

Smart Grid

Ali Alouani - ECE
Steven Anton - ME
Rabie Belkacemi ECE
Indranil Bhattacharya ECE
Hicham Chaoui ECE
Robert Craven - CESR
Jie Cui - ME
Omar Elkeelany - ECE
Sheikh Ghafoor - CSC
Terry Nan Guo -CMR
Seyed Rafay Hasan - ECE
ChaBum Lee - ME
Satish Mahajan - ECE
Mohamed Mahmoud – ECE
Joseph Ojo - ECE
Robert Qiu - ECE
Emilio Piesciorovsky – CESR/ECE
Robert Qiu - CMR
Ghadir Radman – ECE
Mohammad Rahman - CSC
Stephen Scott – CSC
Alireza Pezhman Shirvanian - ME
Ambareen Siraj - CSC

Resilient Infrastructure

Daniel Badoe - CEE
Joseph Biernacki, CHE
Laura Arias Chavez - ChE
Stephen Canfield - ME
Steven Click - CEE
L. K. Crouch - CEE
Ahmed Elsayy - MET
Ismail Fidan – MET
David Huddleston -CEE
Stephen Idem - ME
Wayne Johnson – ECE
Alfred Kalyanapu - CEE
Ahmed Kamal – MET
Ehsan Languri - ME
Jane Liu - CEE
Benjamin Mohr - CEE
John Peddieson - ME
Guillermo Ramirez –CEE
Holly Stretz - ChE
Daniel VandenBerge-- CEE
Matthew Yarnold - CEE

CONTRACT AND GRANT AWARDS

SM-3

Activated Between July 1, 2016 and June 30, 2017

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
531291	TWC: Small: Collaborative: Multi-National Science Layer Approaches for Securing Enhanced AMI Networks against Traffic Analysis Attacks (Principal Investigator: Assistant Professor Mohamed Mahmoud)	Foundation	9/1/16-8/31/17	155,105.00	66,445.63
535260	Hybrid AC/DC Islanded Micro-Grids in Qatar: Planning, Operation, and Cyber Security (Principal Investigator: Assistant Professor Mohamed Mahmoud)	Texas A&M Engineering Experiment Station (Funding from the Qatar National Research Fund)	8/1/16-7/31/17	28,651.20	25,400.74
531283	Collaborative Research: Cyberworkshops: Resources and Strategies for Teaching Cybersecurity in Computer Science (Year 3 of 3) (Principal Investigator: Associate Professor Ambareen Siraj)	National Science Foundation	9/1/16-8/31/17	120,672.00	104,064.69
531224	Collaborative Research: Structural Health Monitoring using Temperature Related Data (Year 3) (Principal Investigator: Assistant Professor Matthew Yarnold)	National Science Foundation	8/1/16-7/31/17 (Extended to 8/31/18)	64,704.00	75,946.79
532331	Tracking Water Storage in Lakes: Citizens and Satellites (Principal Investigator: Associate Professor Sheikh Ghafoor)	The University of North Carolina at Chapel Hill (Funding from NASA Grant No. NNX17AG99A)	2/24/17-2/23/18	31,898.00	-
SUB - TOTAL GRANTS AND CONTRACTS				401,030.20	271,857.85

CONTRACT AND GRANT AWARDS

SM-3

Activated Between July 1, 2016 and June 30, 2017

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
533151	Recruitment, Retention, and Recognition: A Three-Tiered Approach to Graduating Renaissance Engineers (Principal Investigator: Elizabeth Powell; Co-Principal Investigators Harry Ingle and Tony Marable)	Tennessee Board of Regents	7/1/16-6/30/17	25,000.00	22,563.35
535261	Modeling a Distribution Feeder along with Distribution-Connected Smart Inverters and Composite Load in Time Domain (Principal Investigator Assistant Professor Rabie Belkacemi) (Co-Principal Investigator Professor and Director Satish M. Mahajan)	Electric Power Research Institute	8/25/16-8/1/17 (Extended to 9/30/17)	60,000.00	52,953.58
531205	Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) (Year 4 of 5) (Principal Investigator: Dean Joseph Rencis)	Tennessee State University (Funding from the National Science Foundation)	9/15/16-9/14/17	29,000.00	28,250.00
532325	Knowledge-Based Flood Inundation Forecast on Affordable Mobile Platforms to Empower Farmers (Year 2) (Principal Investigator: Associate Professor Sheikh Ghafoor)	USAID through University of Washington	1/28/17-1/27/19	17,500.00	20,074.34
SUB - TOTAL				131,500.00	123,841.27
GRANTS AND CONTRACTS					

CONTRACT AND GRANT AWARDS

SM-3

Activated Between July 1, 2016 and June 30, 2017

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
539347	Development of Tennessee Travel Demand Model Users' Group (Year 5 of 5) (Principal Investigator: Professor Daniel Badoe)	UTK, TDOT	1/1/17-12/31/17	11,200.00	10,279.09
531279	Tennessee CyberCorps: A Hybrid Program in Cybersecurity (Principal Investigator: Associate Professor Ambareen Siraj)	National Science Foundation	1/1/17-12/31/17	346,097.15	161,244.90
531288	Collaborative Research: 3D Printing of Civil Infrastructure Materials with Controlled Microstructural Architectures (Year 2 of 3) (Principal Investigator: Professor Joe Biernacki)	National Science Foundation	6/15/17-5/31/18	38,265.00	55,890.47
535264	Global Stability Analysis of MSE Walls Constructed over Improved Soil Foundations (Principal Investigator: Assistant Professor Daniel VandenBerge)	GeoPier Foundation Company	10/25/16-12/31/17	10,000.00	10,000.00
539368	Benchmark and Analyze Numerical Libraries on HPC Architectures for Performance Prediction (Principal Investigator: Associate Professor Sheikh Ghafoor)	Oak Ridge National Laboratory	11/11/16-8/15/17 (Extended to 9/29/17)	25,000.00	16,253.78
534302	Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care (Principal Investigator: Chair/Professor Gerald Gannod)	Miami University	7/1/16-6/30/17	37,876.00	32,615.40
SUB - TOTAL				468,438.15	286,283.64
GRANTS AND CONTRACTS					

CONTRACT AND GRANT AWARDS

SM-3

CONTRACT AND GRANT AWARDS Activated Between July 1, 2016 and June 30, 2017

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
532279	The Structure of Neutron-rich Deformed Nuclei Studied via Beta Decay (Principal Investigator: Assistant Professor Mustafa Rajabali)	Department of Energy	2/1/17-1/31/18	75,000.00	10,874.51
531272	CRII: CPS: Noninvasive Security Analysis for Smart Grid Energy Management System (Principal Investigator: Assistant Professor Mohammad Rahman)	National Science Foundation	5/15/17-5/14/18	86,494.00	-
539369	Nuclear Hybrid Energy Systems: Desalination Case study (Principal Investigator: Assistant Professor Laura Arias Chavez)	Oak Ridge National Laboratory	3/20/17-12/31/17	55,000.00	1,683.41
535226	Experimental Comparison of Pressure Loss in Typical Flexible and Sheet Metal Residential Duct Systems (Principal Investigator: Professor Stephen Idem)	Air Duct Council	5/8/17-7/31/17	18,671.00	14,020.77
535224	Investigation of Effective Management of Energy Demand in Distribution Management Systems of Smart Grids using Formal Verification Methods (Year 1) (Principal Investigator: Assistant Professor Syed Hasan)	ICT Fund, UAE	2/24/17-2/23/18	10,997.80	-
SUBTOTAL, GRANTS AND CONTRACTS				246,162.80	26,578.69
TOTAL, GRANTS AND CONTRACTS				1,247,131.15	708,561.45

CONTRACT AND GRANT AWARDS

SM-3

Activated Between July 1, 2016 and June 30, 2017

POWER-TEST-SERVICE ACCOUNT

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
538597	Power-Test-Service Account (Principal Investigators: Professor and Director Satish M. Mahajan, Professor L. K. Crouch, Professor Stephen Idem, Professor Jie Cui, Professor Joe Biernacki, Robert Craven)	Various	7/1/16-6/30/17	13,580.00	5,422.72
SUB - TOTAL				13,580.00	5,422.72
POWER-TEST-SERVICE ACCOUNT					
TOTAL				1,260,711.15	713,984.17
CONTRACTS AND GRANTS DURING 2016-2017					

STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
1.	CAREER: Beyond Lithium: Next Generation Energy Dense, Safe and Cost-Effective Sodium Based Batteries and Serving Society through Outreach Activities	Assistant Professor Indranil Bhattacharya	National Science Foundation	540,811	Unfunded
2.	CAREER: Identification of Intrinsic Forces in Constructed Structural Systems	Assistant Professor Matthew Yarnold	National Science Foundation	500,488	Unfunded
3.	CAREER: A Framework for Hardware Trojan Resilient System on Chip (HTR-SoC): Leveraging Formal Verification	Assistant Professor Syed Rafay Hasan	National Science Foundation	486,790	Pending
4.	CAREER: Autonomous Navigation and Wireless Charging of Unmanned Aerial Systems for Power Line Inspection	Assistant Professor Rabie Belkacemi	National Science Foundation	513,996	Unfunded
SUBTOTAL, PROPOSALS FOR 2016-2017				2,042,085	

**STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017**

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
5.	Hybrid AC/DC Islanded Micro-grids in Qatar: Planning, Operation, and Cyber Security	Assistant Professor Mohamed Mahmoud	Subcontract to Texas A&M Engineering Experiment Station from Qatar National Research Fund	85,957.20	Year 1 Funded
6.	Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care	Professor Jerry Gannod	Miami University (funded from the Ohio Department of Medicaid)	159,992	Funded
7.	CRII: CPS: Noninvasive Security Analysis for Smart Grid Energy Management Systems	Assistant Professor Mohammad Rahman	National Science Foundation	174,973	Funded
8.	Structural Steel Education Research	Assistant Professor Matthew Yarnold	American Institute of Steel Construction (AISC)	200,000	Pending
SUBTOTAL, PROPOSALS FOR 2016-2017				620,922.20	

**STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017**

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
9.	REU Site: Immersive Research in Energy Generation, Storage/Conversion, and Power Transmission (IREST)	Assistant Professor Indranil Bhattacharya, Professor Joseph Biernacki, Professor and Director Satish M. Mahajan, Assistant Professor Rabie Belkacemi, Associate Professor Holly Stretz, Associate Professor Cynthia Rice, Assistant Professor Steve Anton, Assistant Professor Ehsan Languri, Assistant Professor Laura Arias Chavez, Associate Professor George Chitiyo	National Science Foundation	366,592	Unfunded
10.	Tracking Water Storage in Lakes: Citizens and Satellites; Original budget \$273,362; revised to \$281,083 in January 2017	Associate Professor Sheikh Ghafoor	Subcontract to the University of North Carolina at Chapel Hill; funding from NASA	281,083	Prototype Year to be funded in Feb. 2017; other 3 years may be funded
SUBTOTAL, PROPOSALS FOR 2016-2017				647,675.00	

STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
11.	GP-EXTRA: Inspiring and Engaging 21st Century Geo-Professionals through Geoscience Field Stations	Assistant Professor Daniel VandenBerge, Assistant Professor Joseph Asante, Professor and Chair Michael Harrison, Assistant Professor Jeanette Wolak, Assistant Professor Lauren Michel, Associate Professor Benjamin Mohr	National Science Foundation	497,701	Pending
12.	Modeling Deflection of Unreinforced Spiral Flat Oval Ducts	Professor Stephen Idem, Professor Jane Liu	Spiral Duct Manufacturer's Association (SPIDA)	19,290	Pending
13.	Adaptive Overcurrent Protection for a Microgrid with Distributed Generators Based on Power Line Sensors and Programmable Logic	Assistant Professor Belkacemi, Professor and Director Satish M. Mahajan, Postdoctoral Research Associate Emilio Piesciorovsky	National Science Foundation	374,797	Pending
14.	GOALI: Multi-Phase Permanent Magnet Assisted Synchronous Reluctance Drive for Electric Vehicle Traction and Battery Charging	Professor Joseph Ojo	National Science Foundation	458,520	Unfunded
SUBTOTAL, PROPOSALS FOR 2016-2017				1,350,308	

**STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017**

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
15.	Benchmark and Analyze Numerical Libraries on HPC Architectures for Performance Prediction	Associate Professor Sheikh Ghafoor	Oak Ridge National Laboratory	25,000	Funded
16.	Real-Time UAV based Raman Spectroscopic Remote Sensing of Water Quality	Professor and Director Satish M. Mahajan, Assistant Professor Tania Datta	National Science Foundation	397,347	Pending
17.	Synthesis, Characterization and Investigation of Transport Mechanisms in Triphylite Type Sodium-ion Batteries	Assistant Professor Indranil Bhattacharya	National Science Foundation	300,599	Pending
18.	SaTC: Core: Medium: Collaborative: Towards Agile Cyber-Physical Systems for Attack Resilient Operations	Assistant Professor Mohammad Rahman	National Science Foundation	360,000	Pending
SUBTOTAL, PROPOSALS FOR 2016-2017				1,082,946	

STATUS OF PROPOSALS

Submitted Between July 1, 2016 and June 30, 2017

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
19.	Global Stability Analysis of MSE Walls Constructed over Improved Soil Foundations	Assistant Professor Daniel VandenBerge	GeoPier Foundation Company	10,000	Funded
20.	Tuning the Morphology of Donor/Acceptor Blends in the Active Layer of Polymer-Based Solar Cells for Improving the Efficiency	Assistant Professor Venkat Padmanabhan	Department of Energy	754,982	Pending
21.	NeTS: Small: Collaborative Research: CoNFV: Collaborative and Agile Virtualized Network Resource Sharing	Assistant Professor Mohammed Rahman	National Science Foundation	250,000	Pending
22.	NeTS: Small: Collaborative Research: Towards Secure and Privacy-Preserving Communications for Smart Grid Energy Storage Units	Assistant Professor Mohamed Mahmoud, Professor Robert Qiu, R&D Engineer Nan Terry Guo	National Science Foundation	320,000	Pending
SUBTOTAL, PROPOSALS FOR 2016-2017				1,334,982	

STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
23.	Rapid Distributed Sensing of Subsurface In-situ Stress	Assistant Professor Daniel VandenBerge	Luna Innovations	49,988	Pending
24.	Thermoelectric Cementitious Materials for Building Science Efficiency	Associate Professor Benjamin Mohr and Assistant Professor Matthew Yarnold	National Science Foundation	299,161	Pending
25.	CyberTraining:CDL: iPDC - Summer Institute for Integrating Parallel and Distributed Computing in Introductory Programming Classes	Associate Professor Sheikh Ghafoor, Associate Professor Michael Rogers, Instructor David Brown, and Professor Ada Haynes	National Science Foundation	499,988	Funded
26.	Directed Self-Assembly of Nanoparticles in Polymer	Assistant Professor Venkat Padmanabhan	Defense Advanced Research Projects Agency (DARPA), Defense Sciences Office (DSO)	325,979	Pending
SUBTOTAL, PROPOSALS FOR 2016-2017				1,175,116	

STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
27.	Solar-Power Conversion on the Upper Cumberland	Professor and Director Satish M. Mahajan, Assistant Professor Ehsan Languri, R&D Engineer Robert Craven	United States Department of Agriculture, Rural Development, Rural Energy for America Project	100,000	Funded at \$68,764
28.	Nuclear Hybrid Energy Systems: Desalination Case Study	Assistant Professor Laura Arias Chavez	Oak Ridge National Laboratory	78,676	Funded
29.	Reinforced Learning for Blackout Prevention in Power Systems including Uncertainties	Assistant Professor Rabie Belkacemi, Professor and Director Satish M. Mahajan, Assistant Professor Lukun Zheng	National Science Foundation	247,146	Pending
30.	CPS: Medium: Collaborative Research: Autonomous Local Traffic Management System through Incentivized Participatory-sensing and Secure Data Sharing	Assistant Professor Mohamed Mahmoud	National Science Foundation	210,754	Pending
SUBTOTAL, PROPOSALS FOR 2016-2017				636,576	

STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
31.	Efficient Energy Management System with Integrated Cybersecurity Measures in Qatar's Smart Grid	Assistant Professor Mohamed Mahmoud, Associate Professor Omar Elkeelany	Subcontract from Texas A&M (Prime: Qatar National Research Fund QNRF)	89,964	Pending
32.	Security and Privacy of AMI Networks in Qatar's Smart Grid	Assistant Professor Mohamed Mahmoud, Assistant Professor Syed Hasan	Subcontract from Texas A&M (Prime: Qatar National Research Fund QNRF)	131,976	Pending
33.	CPS: Medium: Collaborative Research: Resiliency Analysis and Hardening for Supervisory Control and Data Acquisition in Smart Grids	Assistant Professor Mohammad A. Rahman, Assistant Professor Rabie Belkacemi	National Science Foundation	513,821	Pending
34.	Expanding Diversity: Offering Mentoring and Resources for First-Generation Students	Assistant Vice President Robert Owens, Director Harry Ingle, Director Andrew Courtner, Director Edith Duvier, Director Julie Galloway, Director Jeannie Smith, Director Allen Mullis, Associate Dean Julie Baker, Assistant Director Elizabeth Ojo, Assistant Director Elizabeth Powell	Tennessee Board of Regents	34,263	Funded
SUBTOTAL, PROPOSALS FOR 2016-2017				770,024	

**STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017**

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
35.	Experimental Comparison of Pressure Loss in Typical Flexible and Sheet Metal Residential Duct Systems	Professor Stephen Idem	Air Duct Council (ADC)	18,671	Funded
36.	Determine the Absolute Roughness of Phenolic Duct	Professor Stephen Idem	ASHRAE	49,704	Funded
37.	Integrated Underground Mine Safety Management Tool Utilizing Fiber Optics and Photogrammetry	Assistant Professor Daniel VandenBerge	Michigan Technological University; Funding from the Alpha Foundation	74,986	Pending
38.	Comparing Strength and Modulus of Elasticity Values for Prisms Constructed with Lightweight and Normal Weight Grout	Professor Craig Henderson, Associate Professor and Chair Benjamin Mohr	National Concrete Masonry Education and Resource Foundation (NCMA)	67,023	Pending
39.	Update and Revisions to UFC 3-220-10N Soil Mechanics (DM7-01)	Assistant Professor Daniel VandenBerge	Virginia Tech University (Funding from the U.S. Navy)	63,238	Pending
SUBTOTAL, PROPOSALS FOR 2016-2017				273,622	

STATUS OF PROPOSALS
Submitted Between July 1, 2016 and June 30, 2017

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
40.	The Structure of Neutron-rich Deformed Nuclei Studied via Beta Decay	Assistant Professor Mustafa Rajabali	Department of Energy	177,000	Funded
SUBTOTAL, PROPOSALS FOR 2016-2017				177,000	
TOTAL, PROPOSALS FOR 2016-2017				10,111,256.2	

ARIAS CHAVEZ, LAURA**Technical Presentations**

1. Esfahani, M. R.; Languri, E. M.; Arias Chavez, L. H. Combined effects of hydrodynamics and support layer geometry on internal concentration polarization in forward osmosis: A numerical study. In Gordon Research Conference on "Membranes: Materials & Processes", New London, NH, 2016. (Poster presentation)
2. Hornsby, S.B. and Arias Chavez, L. H. Variability in morphology of polyamide active layers on a reverse osmosis membrane, In Gordon Research Conference on "Membranes: Materials & Processes", New London, NH, 2016. (Poster presentation by MS advisee Hornsby)

Posters Presented:

1. Hornsby, S.B.; **Arias Chavez, L.H.** *Variability in morphology of polyamide active layers for thin-film composite membranes.* In 12th Annual Student Research Day, Cookeville, TN, 2017. (Poster presentation by MS advisee Hornsby.)
2. Huttes, D.A.; Ong, X.-Z.; **Arias Chavez, L.H.** *Separation of inorganic components from industrial wastewater via a hybrid FO/RO system.* In 12th Annual Student Research Day, Cookeville, TN, 2017. (Poster presentation by MS advisee Huttes.)
3. Ong, X.-Z.; Huttes, D.A.; **Arias Chavez, L.H.** *Organic transport and fouling in forward osmosis separation of industrial wastewater.* In 12th Annual Student Research Day, Cookeville, TN, 2017. (Poster presentation by MS advisee Ong.)
4. Ranjan, P.; Hornsby, S.B.; **Arias Chavez, L.H.** *The role of polyamide morphology in determining contact angle variability.* In 12th Annual Student Research Day, Cookeville, TN, 2017. (Poster presentation by MS advisee Ranjan.)
5. Goans, B.J.; Sealy, K.T.; Olawole, W.S.; **Arias Chavez, L.H.** *A Method for Evaluating Variability in Perm-Selectivity of Polyamide Thin-Film Composite Membranes.* In 12th Annual Student Research Day, Cookeville, TN, 2017. (Poster presentation by undergraduate advisees Goans, Sealy, and Olawole)
6. Templeton, L.M.; Barnett, E.M.; **Arias Chavez, L.H.** *Forward Osmosis for Enhanced Sustainability at the Food-Energy-Water Nexus.* In 12th Annual Student Research Day, Cookeville, TN, 2017. (Poster presentation by undergraduate advisees Templeton and Barnett)
7. Varner, R.A.; Schubert, K.E.; Himes, J.H.; **Arias Chavez, L.H.** *Thermal desalination for utilization of waste heat from nuclear power production.* In 12th Annual Student Research Day, Cookeville, TN, 2017. (Poster presentation by undergraduate advisees Varner, Schubert, and Himes). **1st place in undergraduate poster competition in category of Chemical Engineering.**

BADOE, DANIEL**Peer Reviewed Journal Publications:**

1. Badoe, D. A. and A. A. Biney (2017), "**Receipt of Travel Survey Advance-Letter and its Impact on Reported Trips and Phone-Calls for Survey Completion in Telephone-Surveys**". ASCE Journal of Urban Planning and Development, Volume 143, Issue 2.

Invited Technical Presentations:

1. Ivey, S. and Badoe, D.A., (2016). "Travel Models and the Application of Performance Measures: MPO Experiences. Presented at the Quarterly Meeting of the Tennessee Model Users Group, Mt. Juliet, Tennessee, October 2016.
2. Locum, J.T., Crouch, L.K., and Badoe, D.A. (2017). "**Universal CLSM Using High LOI Fly Ash and Limestone Screenings without Portland Cement**". Presented at the World of Coal Ash 2017 Conference in Lexington, Kentucky. May 8-11, 2017.

- Locum, J.T., Crouch, L.K., and Badoe, D.A. (2017). “**Excavatable and Early Strength CLSM Using High LOI Fly Ash and Limestone Screenings**”. Presented at the World of Coal Ash 2017 Conference in Lexington, Kentucky. May 8-11, 2017.

Trade Magazine (Refereed):

- Crouch, L.K., Locum, J., Crowley, A., Dillon, S., Badoe, D.A. and Hall, H.P., (2016). “Determining Concrete Chloride Permeability More Efficiently – Part 2: Accelerated VS. Normal Curing – Choosing A Curing Method”, *Tennessee Concrete*, Winter 2016/2017, Volume 30, No. 3, pp. 8-13.
- Crouch, L.K., Locum, J., Crowley, A., Dillon, S., Badoe, D.A. and Hall, H.P., (2016). “Determining Concrete Chloride Permeability More Efficiently – Part 1: A New Sheriff in Town”, *Tennessee Concrete*, Fall 2016, Volume 30, No. 2, pp. 8-15.

BELKACEMI, RABIE

Journal papers

- A.A. Babalola, **R. Belkacemi**, S. Zarrabian, and R. Craven, “Adaptive Immune System Reinforcement Learning-Based Algorithm for Real-Time Cascading Failures Prevention”, **Engineering Applications of Artificial Intelligence, Elsevier, Volume 57**, January 2017, Pages 118-133.
- Adeniyi Babalola, **Rabie Belkacemi**, “Real-Time Cascading Failures Prevention for Multiple Contingencies in Smart Grids through a Multi-Agent System”, **IEEE Transaction on Smart Grid**, 2016. 10.1109/TSG.2016.2553146. Available: <http://ieeexplore.ieee.org/document/7452679/>.
- S. Zarrabian, **R. Belkacemi**, and A. Babalola, “Reinforcement Learning Approach for Congestion Management and Cascading Failure Prevention with Experimental Application,” **Electric Power Systems Research, Elsevier**, Volume 141, December 2016, Pages 179-190.
- “Real-Time Cascading Failures Prevention Through MAS Algorithm and Immune System Reinforcement Learning”, Rabie Belkacemi, Adeniyi Abdulrasheed Babalola, and Sina Zarrabian, **Electric Power Components and Systems**, Vol. 45, Issue 5, 2017.

Conference papers:

- Arjan Rimal, **Rabie Belkacemi**, “CPS Compliant Adaptive Immune Based Load Frequency Control with Varying Wind Penetrations”, *IEEE Innovative Smart Grid Technologies, ISGT* September 2016, Minneapolis.

BHATTACHARYA, INDRANIL

Journal / Transactions:

- M.J. Hossain, B. Tiwari, I. Bhattacharya, “Novel High Efficiency Quadruple Junction Solar Cell with Current Matching and Quantum Efficiency Simulations”, **Solar Energy Journal**, Volume 139, 1 December 2016, Pages 100-107.
- B. Tiwari, M.J. Hossain, I. Bhattacharya, “GaP/InGaAs/InGaSb Triple Junction Current Matched Photovoltaic Cell with Optimized Thickness and Quantum Efficiency”, **Solar Energy Journal**, Volume 135, October 2016, Pages 618-624.

BIERNACKI, JOSEPH J.

Refereed Journal Publications:

- J. J. Biernacki**, *The Degrees of Freedom Concept – Extending the Domain*, **Chem. Eng. Ed.**, 20(2), 114-124 (2016).
- O. Chaudhari, **J. J. Biernacki** and S. Northrup, “Behavior of Organic Compounds in the Pore Solution of Cement – Experimental and Molecular Dynamics Study”, **J. Am. Ceram. Soc.**, June 26, 2017.
- J. J. Biernacki**, J. W. Bullard, G. Sant, K. Brown, F. P. Glasser, S. Jones, T. Ley, R. Livingston⁸, L. Nicoleau, J. Olek, F. Sanchez⁵, R. Shahsavari¹¹, P. E. Stutzman, K. Sobolev, T. Prater,

4. "Cements in the 21st Century: Challenges, Perspectives, and Opportunities", **J. Am. Ceram. Soc.**, Invited Feature Article, 100 (7), 2746-2773 (2017).

Conference Presentations:

1. A. S. Mohammad, J. J. Biernacki and S. Northrup, *Molecular-Scale Modeling of Whole Biomass Pyrolysis: Morphological Changes*, AIChE Annual Meeting, November 2016.
2. M. Adenson, J. J. Biernacki, M. Kelley and O. Elkelany, *Extracting Kinetic Parameters from TGA Datasets: Ensuring Optimal Outcomes for Cellulose Pyrolysis*, AIChE Annual Meeting, November 2016.
3. J. R. Sanders, J. J. Biernacki, A. Haris and P. E. Arce, *Characterization of Hydrogel Porous Structure by Using the Differential Scanning Calorimetry Technique*, AIChE Annual Meeting, November, 2016.
4. A. Zolghadr and J. J. Biernacki, *Impact of Carrier Gas and Temperature on biomass Fast Pyrolysis using a New Microsphere Microreactor Approach*, AIChE Annual Meeting, November, 2016.
5. A. Zolghadr, C. Templeton and J. J. Biernacki, *A Novel Single Microsphere-Microreactor Approach Modeling and Experimental for Study of Biomass Fast Pyrolysis*, AIChE Annual Meeting, November, 2016.
6. O. Chaudhari, **J. J. Biernacki** and S. Northrup, "The Effect of Select Organic Compounds on Hydration of Portland Cement: Experimental and Molecular Dynamic Study", AIChE Annual Meeting, November, 2016.
7. **J. J. Biernacki**, D. Cruz, W. Eberle and D. Talbert, "Might Artificial Intelligence be an Opportunity for Cement Modelers"? ACerS Cements Division Annual Meeting, July, 2016.
8. O. Chaudhari, S. Northrup and **J. J. Biernacki**, "The Effect of Select Organic Compounds on Hydration of Portland Cement: Molecular-Scale Insights", ACerS Cements Division Annual Meeting, July, 2016.
9. D. Cruz, D. Talbert, W. Eberle and **J. J. Biernacki**, *A Neural Network Approach for Predicting Microstructure Development in Cement*, Proceedings of the 2016 Int'l Conf. Artificial Intelligence (ICAI'16), 328-334 (2016).

Proceedings

1. **J. J. Biernacki**, "The Degrees of Freedom Concept – Extending the Domain", Chem. Eng. Ed., 20(2), 114-124 (2016).
2. D. Cruz, D. Talbert, W. Eberle and **J. J. Biernacki**, "A Neural Network Approach for Predicting Microstructure Development in Cement", Proceedings of the 2016 Int'l Conf. Artificial Intelligence (ICAI'16), 328-334 (2016).

CANFIELD, STEVE**Journal Papers**

1. Qualls, J., Canfield, S. L., and A. Shibakov, "Kinematic Control of a Mobile Robot Performing Manufacturing Tasks on Non-Planar Surfaces," **Journal of Automation, Mobile Robotics and Intelligent Systems**, Vol. 10, No. 3, 2016.
2. Canfield, S.L. and S. Zuccaro, "Digital homework for Kinematics and Dynamics of Machinery", **Int. Jrl. for Mech. Eng. Educ.**, Vol. 44, 2: pp. 165-182, 2016.

Conference Presentations

1. Canfield, S., Qualls, J., Shibakov, A., and T. Hill, "Kinematics Analysis of Skid-Steer Mobile Robot Operating on Non-Planar Surfaces," Proc. of the 2016 ASME International Design Engineering Technical Conferences, Charlotte, NC, IDETC2016-60303, Aug. 2016.

2. Canfield, S. L., Hill, T. and S. Zuccaro, "Modeling Power Requirements for Skid Steer Mobile Robots in Manufacturing Environments", Proc. of the 2016 ASME International Design Engineering Technical Conferences, Charlotte, NC, IDETC2016-60152, Aug. 2016.
3. Hill, S. and S. L. Canfield, "An Assessment of Fused Deposition Modeling for the Manufacturing of Flexural Pivots in an Anthropomorphic Robotic Hand Design," Proc. Of the 2016 ASME International Design Engineering Technical Conference, Charlotte, NC, Aug. 2016, IDETC2016-60253.
4. Canfield, S. L., Hill, T. and S. Zuccaro, "Creating a Concept Inventory Set of a Kinematics and Dynamics Machinery Course to Support Lectures in a Flipped Classroom Environment," Proc. Of the 2016 ASME International Design Engineering Technical Conference, Charlotte, NC, Aug. 2016, IDETC2016-60367.

Patents

1. Beard, J. Canfield S. L. and D. A. Bryant, "Climbing Vehicle with Suspension Mechanism," US patent no. 9,428,231, Aug. 2016.

Proceedings

1. Canfield, S. L., Beard, J. and S. Glovsky, "Development of Remote Operated Vehicle Prototype for Dry Stainless Steel Storage Canister for Used Nuclear Fuel," Proceedings of the ANS D&RS (Decommissioning and Robotic Systems) 2016, Pittsburg, PA, Aug 2016.
2. Canfield, S. L. and S. Zuccaro, "Evaluation of a Mobile Welding Platform for Remotely Operated Repairs," Proceedings of the ANS D&RS (Decommissioning and Robotic Systems) 2016, Pittsburg, PA, Aug 2016.
3. Kumar, P., Canfield, S. L., and J. Qualls, "Modeling of Climbing Robots for non-Planar Surfaces," Proceedings of the ANS D&RS (Decommissioning and Robotic Systems) 2016, Pittsburg, PA, Aug 2016.

CRAVEN, ROBERT

Journal papers

1. A.A. Babalola, **R. Belkacemi**, S. Zarrabian, and R. Craven, "Adaptive Immune System Reinforcement Learning-Based Algorithm for Real-Time Cascading Failures Prevention", **Engineering Applications of Artificial Intelligence, Elsevier, Volume 57**, January 2017, Pages 118-133.

CROUCH, L. K.

Magazine/Journal Articles:

1. "Determining Concrete Chloride Permeability More Efficiently: Part 1: A New Sheriff in Town?", L. K. Crouch, James Locum, Aaron Crowley, Sarah Dillon, Daniel Badoe, and Heather P. Hall, Tennessee Concrete, Vol. 30, No. 2, Fall 2016.
2. "Determining Concrete Chloride Permeability More Efficiently: Part 2: Accelerated vs. Normal Curing – Choosing a Curing Method", L. K. Crouch, James Locum, Aaron Crowley, Sarah Dillon, Daniel Badoe, and Heather P. Hall, Tennessee Concrete, Vol. 30, No. 3, Winter 2016/17.

Conference Presentations:

1. "Universal CLSM Using High LOI Fly Ash and Limestone Screenings without Portland Cement", Locum, Crouch and Badoe, World of Coal Ash Conference in Lexington, KY in May 2017.
2. "Excavatable and Early Strength CLSM Using High LOI Fly Ash and Limestone Screenings", Locum, Crouch and Badoe, World of Coal Ash Conference in Lexington, KY in May 2017.

Technical Reports:

1. “Higher Volume Fly Ash (HVFA) Portland Cement Concrete (PCC) for Sustainability and Performance”, L. K. Crouch, James Locum, Aaron Crowley, Sarah Dillon, Daniel Badoe, and Heather P. Hall, Tennessee Concrete, Vol. 30, No. 2, Fall 2016.

CUI, JIE**Proceedings:**

1. Languri, E., Cunningham, G., Cui, J., and Idem, S., “Feasibility Study of the Use of Ground-Coupled Condensers in Industrial Thermal Management,” paper PowerEnergy2016-59074, ASME 2016 Power and Energy Conference and Exhibition, Charlotte, North Carolina, 2016.

ELKEELANY, OMAR**Conference Presentations:**

1. **Omar Elkeelany**, Siraj Moosa, “Towards Real-Time Embedded System Design for Video Capturing and Privacy Protection,” In proceedings of IEEE Future Technologies Conference, December 2016.
2. S. R. Hasan, **Omar Elkeelany**, “Formal Verification of Ladder Logic programs using NuSMV”, IEEE SoutheastCon, March 2017

GHAFOOR, SHEIKH**Conference Proceedings:**

1. Sheikh Rabiul Islam, William Eberle, and Sheikh K. Ghafoor. Mining Bad Credit Card Accounts from OLAP and OLTP. **In the Proceedings of ACM--ICDDA 2017 International Conference on Compute and Data Analysis.** 19–23 May 2017, Lakeland, Florida

HASAN, SYED**Journal/Transactions:**

1. F.K. Lodhi, S.R. Hasan, O. Hasan, F. Awwad, “Analyzing Vulnerability of Asynchronous Pipeline to Soft Errors: Leveraging Formal Verification”, **Journal of Electronics Testing Theory and Applications (JETTA)**, Vol. 32, No. 5, October 2016, pp. 569-86. 10.1007/s10836-016-5819-8 (<http://dl.acm.org/citation.cfm?id=3004874>) (Impact Factor last five years: 0.397)
2. S.R. Hasan, W. Gul, O. Hasan, “Clock Domain Crossing (CDC) in 3D-SICs: Semi QDI Asynchronous vs. Loosely Synchronous”, Integration the **VLSI Journal**, January 2016. <http://dx.doi.org/10.1016/l.vlsi.2015.05.002> (Impact factor last five years: 0.721).

Conference:

1. W. Gul, **S.R. Hasan**, O. Hasan, F.K. Lodhi, F. Awwad, “Synchronously Triggered GALS Design Templates Leveraging QDI Asynchronous Interface”, in IEEE International Symposium of Circuits and Systems (ISCAS' 2016). Acceptance Rates 52%.
2. **S.R. Hasan**, Charles Kamhoua, Kevin Kwiat and Laurent Njilla, “Translating Circuit Behavior Manifestations of Hardware Trojans using Model Checkers into Run-time Trojan Detection Monitors”, accepted for publication in IEEE Asian Hardware Oriented Security and Trust Symposium (Asian HOST), Taipei, Taiwan, 2016) Acceptance Rate ~35%.

HUDDLESTON, DAVID H.**Online Proceedings:**

2. Huddleston, D.H., Elizandro, D., Liu, J., Ramirez, G., Hutchins, E., Nixon, B., (2016, December 13), Mastering Engineering Mechanics of Materials educator study investigates student performance in a hybrid format at Tennessee Technology University. Retrieved from <http://www.pearsoned.com/results/masteringengineering-mechanics-materials-educator-study-investigates-student-performance-hybrid-format-tennessee-technological-university/>.

- Huddleston, D.H., Elizandro, D., Liu, J., Ramirez, G., Hutchins, E., Nixon, B., (2016, November 17), Mastering Engineering Mechanics Statics educator study investigates student performance in a hybrid format at Tennessee Technology University. Retrieved from <http://www.pearsoned.com/results/masteringengineering-educator-study-investigates-student-performance-hybrid-format-tennessee-technological-university/>.

IDEM, STEVE

Journal Articles:

- Sleiti, A., Salehi, M., and Idem, S., 2016, "Detailed Velocity Profiles in Close-Coupled Elbows – Measurements and CFD Predictions," **Science and Technology for the Built Environment**, In Press.
- Salehi, M., Idem, S., and Sleiti, A., 2016, "Experimental Determination and CFD Predictions of Pressure Loss in Close-Coupled Elbows," **Science and Technology for the Built Environment**, <http://dx.doi.org/10.1080/23744731.2016.1268904>.
- Salehi, M., Sleiti, A., and Idem, S., 2016, "Study to identify computational fluid dynamics models for use in determining HVAC duct fitting loss coefficients," **Science and Technology for the Built Environment**, <http://dx.doi.org/10.1080/23744731.2016.1204889>.
- Kulkarni, D. and Idem, S., 2016, "Energy Balance Analysis of HVAC Divided Flow Fittings," **Science and Technology for the Built Environment**, <http://dx.doi.org/10.1080/23744731.2016.1210973>.
- Silapillayarputhur, K. and Idem, S., 2016, "Design of a Single Tube Oil Preheater," **Heat Transfer Engineering**, <http://dx.doi.org/10.1080/01457632.2016.1255030>.

Proceedings:

- Chittireddy, V., ElSawy, A., and Idem, S., 2017, "Study of a Flat Plate Solar Collector with an Air Conditioner Radiator as a Heat Absorber for a Domestic Water Heater," International Conference on Renewable Energies and Power Quality (ICREPPQ'17), Malaga, Spain, Submitted.
- Languri, E., Cunningham, G., Cui, J., and Idem, S., 2016, "Feasibility Study of the Use of Ground-Coupled Condensers in Industrial Thermal Management," PowerEnergy-59074, Proceedings of ASME Power and Energy Conference, Charlotte, NC.

Standards:

- BSR/ASHRAE Standard 120-2008R, "Method of Testing to Determine Flow Resistance of HVAC Ducts and Fittings," Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
- ASHRAE Standard 215P, "Method of Test to Determine Leakage Airflows and Fractional Leakage of Operating Air-Handling Systems," Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

Handbook Chapters:

- ASHRAE, 2017. *I-P & SI Handbook-Fundamentals*, Chapter 36, "Measurement and Instruments". Atlanta, GA: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

LANGURI, EHSAN

Journal Articles:

- Esfahani M. (Postdoc), **Languri E.**, "Exergy Analysis of a Shell-and-Tube Heat Exchanger using Graphene Oxide Nanofluids", **Experimental Thermal and Fluid Science**, 10.1016/j.expthermflusci.2016.12.004 (2017).

2. Esfahani M. (Postdoc), **Languri E.**, Nunna, M. (MSc Student), "Effect of Particle Size and Viscosity on Thermal Conductivity Enhancement of Graphene Oxide Nanofluid", **International Communications in Heat and Mass Transfer**, Vol 76, 2016, Pages 308–315.

Proceedings:

1. **Languri E.** and Alvarado J., "Microencapsulated Phase Change Material Slurry Flow Behavior through Curved Pipe", Gordon Research Conference, Galveston, TX, January 2017.
2. Esfahani M. (Postdoc), **Languri E.**, Chavez L., "Combined Effects of Hydrodynamics and Support Layer Geometry on Internal Concentration Polarization in Forward Osmosis: A Numerical Study", Gordon Research Conference, New London, NH, July 31-August 5, 2016.

LEE, CHABUM

Journal Articles

1. Abolfazl Zolfaghari, Seongkyul Jeon, Christopher K. Stepanick, and ChaBum Lee, "A novel sensor for two degree-of-freedom motion measurement of linear nanopositioning stage using knife edge displacement sensing technique", **Review of Scientific Instruments**, Vol. 88, Iss. 6, 065110 (2017); doi: 10.1063/1.4989517.
2. ChaBum Lee, Seongkyul Jeon, Christopher K. Stepanick, Abolfazl Zolfaghari, and Joshua A. Tarbuton, "Investigation of optical knife edge sensor for low cost, large-range and dual-axis nanopositioning stages", **Measurement**, Vol. 103, pp. 157-164 (2017) 10.1016/j.Measurement.2017.02.030.
3. ChaBum Lee, Rui Zhao, and Seongkyul Jeon, "A simple optical system for miniature spindle runout monitoring", **Measurement**, Vol. 102, pp. 42-46 (2017) 10.1016/j.Measurement.2017.01.056.
4. ChaBum Lee, Christopher K. Stepanick, Sun-Kyu Lee, and Joshua A. Tarbuton, "Cross-coupling effect of large range XY nanopositioning stage fabricated by stereolithography process", **Precision Engineering**, Vol. 46, pp. 81-87, 2016.
5. ChaBum Lee, Satish M Mahajan, Rui Zhao, Seongkyul Jeon, "A curved edge diffraction-utilized displacement sensor for spindle metrology". **Review of Scientific Instruments**, Vol. 87, 075113, 2016.

Conference Proceedings

1. Seongkyul Jeon and ChaBum Lee, "On-machine cutting tool wear monitoring technique based on edge diffraction theory", 16th Annual Early Career Conference, Birmingham AL, USA, Nov. 5–6, 2016.
2. Soomin Choi and ChaBum Lee, "Novel surface roughness measurement technique tool using capacitance effect", 16th Annual Early Career Conference, Birmingham AL, USA, Nov. 5-6, 2016.

LIU, JANE

Conference Presentations:

1. Aravind Shanmusgasundaram, **Y. Jane Liu**, John Peddieson, "An Application of the Method of Groebner Bases to a Geometrically Non-linear Free Vibration Analysis of Composite Plates", presented at the 7th International Conference on Computational Methods ICCM 2016, August 1-4, 2016, Berkeley, CA, USA.
2. **Y. Jane Liu**, Bruno Buchberger, Markus Rosendranz, Alexander Maletzky, "Examples of Non-commutative Groebner Bases to Plate Bending Analysis", presented at the 7th International Conference on Computational Methods ICCM 2016, August 1-4, 2016, Berkeley, CA, USA.

MAHAJAN, SATISH**Journal Articles:**

1. ChaBum Lee, Satish M Mahajan, Rui Zhao, Seongkyul Jeon, "A curved edge diffraction-utilized displacement sensor for spindle metrology, **Review of Scientific Instruments**, Vol. 87, 075113, 2016; <http://dx.doi.org/10.1063/1.4958882>.
2. "Sensor technologies for the energy-water nexus – A review"; Brook W. Abegaz, and Tania Datta, and Satish M. Mahajan; **J. of Applied Energy (Elsevier)**; February 2017; <https://doi.org/10.1016/j.apenergy.2017.01.033>.

Conference Proceedings:

1. "A New Efficient Algorithm to Detect Current Transformer Saturation", (With G. Kumbhar, and K. Kumar), IEEE Power and Energy Systems General Meeting, (**PES GM**), Boston, July 2016.
2. "Energy Core-ness Based Analysis of Hybrid Distributed Energy Systems using Convolved Perturbations", (With B. Abegaz), IEEE Power and Energy Systems General Meeting (**PES GM**), Boston, July 2016.
3. "Effect of a Distribution of Primary Winding on the Short-Circuit Forces of a Current Transformer"; (With G.B. Kumbhar); 5th International Conference on Electrical Energy and Networks (**ICEEN**), Singapore, March 2017.
4. "Modeling of V2G Net Energy Injection into the Grid"; (With U.C. Chukwu); **International Conference on Clean Electric Power (ICCEP)**, Santa Margherita, Italy, June 2017.

MAHMOUD, MOHAMED**Journal papers:**

1. **M. Mahmoud**, N. Saputro, P. Akula, and K. Akkaya, "Privacy-Preserving Power Injection over a Hybrid AMI/LTE Smart Grid Network", IEEE Journal on Internet of Things (IoT), published online, July 2016.
2. K. Rabieh, M. Mahmoud, and M. Younis, "Privacy-Preserving Route Reporting Schemes for Traffic Management Systems", IEEE Transactions on Vehicular Technology (TVT), vol. 66, no. 3, pp. 2703-2713, March 2017.
3. A. Sherif, K. Rabieh, M. Mahmoud, and X. Liang, "Privacy-Preserving Ride Sharing Scheme for Autonomous Vehicles in Big Data Era", IEEE Journal on Internet of Things (IoT), vol. 4, no. 2, pp. 611-618, April 2017.
4. S. Tonyali, O. Cakmak, K. Akkaya, M. Mahmoud and I. Guvenc, "Secure Data Obfuscation Scheme to Enable Privacy-Preserving State Estimation in Smart Grid AMI Networks", IEEE Journal on Internet of Things (IoT), vol. 3, no. 5, pp. 709-719, Oct. 2016.

Conference Proceedings/Presentations:

1. M. Hadin, X. Liang, T. Altuwaiyan, and **M. Mahmoud**, "Privacy-Preserving mHealth Data Release with Pattern Consistency", Proc. of IEEE Globecom 2016, Washington, DC, USA, December 2016.
2. A. Elsharif, S. Tonyali, M. Mahmoud, K. Akkaya, M. Ismail, and E. Serpedin, "Performance Analysis of Certificate Renewal Scheme for AMI Networks", the 7th International Workshop on Computer Science and Engineering, Beijing, China June 25-27 2017.
3. S. Gunukula, A. Sherif, [M. Pazos-Revilla](#), [B. Ausby](#), M. Mahmoud and [X. Shen](#), "Efficient Scheme for Secure and Privacy-Preserving Electric Vehicle Dynamic Charging System", IEEE ICC'17, Paris, France, May 2017.
4. H. Mohammed, S. Tonyali, K. Rabieh, **M. Mahmoud**, and K. Akkaya, "Efficient Privacy-Preserving Data Collection Scheme for Smart Grid AMI Networks", Proc. of IEEE Globecom 2016, Washington DC, USA, December 2016.

MOHR, BENJAMIN**Presentations:**

1. **Mohammed-Ali, U.**, Mohr, B.J., "Nanoparticles for the Enhancement of Cementitious Materials", Poster Presentation), TTU CISE Program, October 2016.
2. **Mohr, B.J.**, "Chemistry of Cement", (Invited). Department of Chemistry, Mississippi State University, August 11, 2016.

OJO, JOSEPH**Journal/Transactions:**

1. Charles Udeh, Emeka Obe and Olorunfemi Ojo, "Topology for Cascaded Inverter", **IET Journal of Power Electronics**, vol. 9, no. 5, 2016.
2. Sachin Jain, Ch. Ramulu, P. Sanjeevikumar, Olorunfemi Ojo, Ahmet E. Ertas, "Dual MPPT Algorithm for Dual PV Source Fed Open-End Winding Induction Motor Drive for Pumping Application", **Engineering Science and Technology: An International Journal (JESTECH), Elsevier Journal Publications**, 16 July 2016. Doi: 10.1016/j.jestch.2016.07.008.

Conference:

1. Allen Uhlik, Jacob Dyer, Rere Fatunmbi, and Olorunfemi Ojo, "Modeling and Analysis of a DC-DC Bidirectional Converter for Vehicular Applications, 42nd Annual Conference of the IEEE Industrial Electronics Society, pp. 2474-2479, 2016.
2. Kanokwan Klinieam and Olorunfemi Ojo, "Minimum Loss Control of a Variable Speed Offshore Interior Permanent Magnet Wind Generator Integrated to a Weak Grid by a Voltage Source High Voltage Direct Current Link", IEEE 7th International Symposium on Power Electronics for Distributed Generation Systems (PEDG), PP. 1-8, 2016.
3. Sanjeeth Sewchurran, Innocent Davidson, and Olorunfemi Ojo, "Impact Analysis of Landfill Gas to Electricity Distributed Generation on Existing Distribution Networks to Mitigate South Africa's Energy Shortage", 2016 Clemson University Power Systems Conference, pp. 1-9, 2016.
4. Jonathan Okoronkwo, Olorunfemi Ojo, and Innocent Davidson, "Design Considerations of the Katsina Wind Farm in Nigeria", 2016 IEEE PES Power Africa, pp. 251-253, 2016.
5. T.R. Ayodele, A.S. Ogunjuyigbe, and Olorunfemi Ojo, "On the Transmission Power Transformers in Nigeria: Lagos Subregion as Case Study", 2016 IEEE PES Power Africa, pp. 169-173, 2016.
6. T.R. Ayodele, A.S. Ogunjuyigbe, S. Ogunmuyiwa, and Olorunfemi Ojo, "Determination of Electrical Energy Use Index for Two Selected Nigerian Food and Beverages Industries", pp. 36-40, 2016 IEEE PES PowerAfrica, 2016.
7. Sanjeevikumar Padmanaban, Patrick Wheeler, Frede Blaabjerg, Ahmet Ertas, Olorunfemi Ojo, and Pawel Szczesnak, "Proposed Novel Multiphase-Multilevel Inverter Configuration for Open-End Winding Loads", 18th European Conference on Power Electronics and Applications, pp. 1-9, 2016.
8. M.S. Bhaskar, P. Sanjeevikumar, Olorunfemi Ojo, Marco Rivera, R. Kulkarni, "Non-Isolated and Inverting Nx Multilevel Boost Converter for Photovoltaic DC Link Applications", Proc. of IEEE Intl. Conf. on Automatica, XXII Congress of the Chilean Association of Automatic Control, IEEE-ICA/ACCA'16, University of Talca, Talca (Chile), 19-21 Oct. 2016.

PEDDIESON, JOHN**Journal Articles:**

1. J. Peddieson and A. Chamkha, "Modeling of Nanofluid Aggregation", *Current Nanomaterials*, Vol. 1, pp. 117-133 (2016).
2. J. Peddieson and J. Liu, "Axisymmetric Deformation of a Materially Nonlinear Circular Plate", *Meccanica*, Vol. 52, pp. 1035-1050 (2017).

Proceedings:

1. A. Shanmugasundaram, J. Liu, and J. Peddieson, "An Application of the Method of Groebner Bases to a Geometrically Nonlinear Free Vibration Analysis of Composite Plates," Presented at ICMM (2016).

PIESCIOROVSKY, EMILIO**Journal Articles:**

1. "Comparison of non-real-time and real-time simulators with relays-in-the-loop for adaptive overcurrent protection", Emilio C. Piesciorovsky, Noel N. Schulz. Available online 17 November 2016. <http://dx.doi.org/10.1016/j.epr.2016.10.049> 0378-7796/© 2016 Elsevier B.V. All rights reserved.
2. "Fuse relay adaptive overcurrent protection scheme for microgrid with distributed generators", Emilio C. Piesciorovsky, Noel N. Schulz. The Institution of Engineering and Technology 2016 (IET), Gener. Transm. Distrib., 2017, Vol. 11, Iss. 2, pp. 540–549. Accepted on 28th September 2016, doi: 10.1049/iet-gtd.2016.1144. www.ietdl.org.

RAHMAN, MOHAMMAD**Journal Articles**

1. Sara Qamar, Zahid Anwar, **Mohammad A. Rahman**, Ehab Al-Shaer, and Bei-Tseng Chu, "Data-driven analytics for cyber-threat intelligence and information sharing," **Computers and Security, Elsevier**, volume 67, pages 35-58, June 2017 (impact factor 2.849).

Conference Workshop Presentations:

1. MGM Mehedi Hasan and Mohammad A. Rahman, "Protection by Detection: A Signaling Game Approach to Mitigate Co-Resident Attacks in Cloud," in the 10th IEEE International Conference on Cloud Computing (CLOUD), June, 2017 (acceptance rate ~25%).
2. Amarjit Datta, Brian K Ledbetter, and Mohammad A. Rahman, "Optimal Deployment of Charging Stations for Electric Vehicles: A Formal Approach," in the IEEE International workshop on Communication, Computing, and Networking in Cyber Physical Systems (CCNCPS) in association IEEE **ICDCS**, June 2017.
3. Mohammad Adiliy, Amin Mohammadi, Mohammad Manshaei, and **Mohammad A. Rahman**, "A Cost-Effective Security Management for Clouds: A Game-Theoretic Deception Mechanism," IFIP/IEEE International Symposium on Integrated Network Management (IM), April 2017. [Contribution: 20%]
4. A.H.M. Jakaria, Bahman Rashidi, **Mohammad A. Rahman**, Carol Fung, and Wei Yang, "Dynamic DDoS defense resource allocation using Network Function Virtualization," ACM International Workshop on Security in Software Defined Networks & Network Function Virtualization (**SDN-NFV Security**) in conjunction with the ACM CODASPY, Scottsdale, Arizona, USA, March 2017 (Invited Paper). [Contribution: 25%]
5. Vitaly Ford, Ambareen Siraj, Eric Brown and Ada Haynes, "Capture the Flag Unplugged: An Offline Cyber Competition", Proceedings: ACM Special Interest Group on Computer Science Education (SIGCSE), to be held in Seattle, WA, March 8th - 11th, 2017.
6. **Mohammad Ashiqur Rahman**, Abdullah Al Farooq, Amarjit Datta, and Ehab Al-Shaer, "Automated Synthesis of Resiliency Configurations for Cyber Networks," IEEE Conference on Communications and Network Security (CNS), Philadelphia, Pennsylvania, USA, October 2016, (acceptance rate~ 29%). [Contribution: 60%]
7. Mujahid Mohsin, Zahid Anwar, Ghaith Husari, Ehab Al-Shaer, and **Mohammad A. Rahman**, "IoT SAT: A Formal Framework for Security Analysis of the Internet of Things," IEEE Conference on Communications and Network Security (CNS), Philadelphia, Pennsylvania, USA, October 2016, (acceptance rate~ 29%). [Contribution: 15%]

8. Mohammad S. Nourbakhsh, Mohammad H. Manshaei, **Mohammad A. Rahman**, and Walid Saad, "Electrical Vehicle Consumption Markets: An Economic Analysis," IEEE Global Conference on Signal and Information Processing (GlobalSIP), Washington DC, USA, December 2016. [Contribution: 25%]
9. Abdullah Aydeger, Nico Saputro, Kemal Akkaya, and **Mohammad A. Rahman**, "Mitigating Crossfire Attacks using SDN-based Moving Target Defense," The 41st Annual IEEE Conference on Local Computer Networks (LCN), Short Paper, Dubai, UAE, November 2016. [Contribution: 20%]

RAMIREZ, GUILLERMO

Online Proceedings:

1. Huddleston, D.H., Elizandro, D., Liu, J., Ramirez, G., Hutchins, E., Nixon, B., (2016, December 13), Mastering Engineering Mechanics of Materials educator study investigates student performance in a hybrid format at Tennessee Technology University. Retrieved from <http://www.pearsoned.com/results/masteringengineering-mechanics-materials-educator-study-investigates-student-performance-hybrid-format-tennessee-technological-university/>.
2. Huddleston, D.H., Elizandro, D., Liu, J., Ramirez, G., Hutchins, E., Nixon, B., (2016, November 17), Mastering Engineering Mechanics Statics educator study investigates student performance in a hybrid format at Tennessee Technology University. Retrieved from <http://www.pearsoned.com/results/masteringengineering-educator-study-investigates-student-performance-hybrid-format-tennessee-technological-university/>.

SCOTT, STEPHEN

Conference/Workshop Papers

1. "A Cooperative Approach to Virtual Machine Based Fault Injection," (**Stephen Scott** with C. Engelmann, G. Vallee, and F. Aderholdt), 9th Workshop on Resiliency in High Performance Computing in Clusters, Clouds, and Grids (Resilience 2016) at 22nd International European Conference on Parallel and Distributed Computing (Euro-Par) 2016, August 22-26, 2016, Grenoble, France.

SIRAJ, AMBAREEN

Journal:

1. Vitaly Ford, Ambareen Siraj, and M. Ashiqur. Rahman, "Secure and Efficient Protection of Consumer Privacy in Advanced Metering Infrastructure Supporting Fine-grained Data Analysis", **Journal of Computer and System Sciences Special Issue on Cyber Security in the Critical Infrastructure: Advances and Future Directions**, Volume 83, Issue 1, Pages 84-100, 2016.

Conference/Workshop Papers

1. Brian Ledbetter, Zach Wallace, Adam Harms, **Ambareen Siraj**, and Laurin Buchanan, "CySCom: CyberSecurity COMics," in *IEEE Intelligence and Security Informatics Conference*, held in Tucson, AZ September 28-30, 2016.
2. Vitaly Ford, Ambareen Siraj, Eric Brown and Ada Haynes, "Capture the Flag Unplugged: An Offline Cyber Competition", Proceedings: *ACM Special Interest Group on Computer Science Education (SIGCSE)*, Seattle, WA, March 8th - 11th, 2017.

VANDENBERGE, DANIEL

Journal:

1. McGuire, M. and VandenBerge, D.R., (2017) "Interpretation of Shear Strength Uncertainty and Reliability Analyses of Slopes", **Landslides**, <http://dx.doi.org/10.1007/s10346-017-0836-5>.
2. Castellanos, B.A., Brandon, T.L., and VandenBerge, D.R. (2016). "Correlations for Fully Softened Shear Strength Parameters", **Geotechnical Testing Journal**.

3. VandenBerge, D.R., and Wright, S.G., (2016). "An Improved Undrained Strength Interpolation Scheme for Rapid Drawdown (Technical Note)", **Journal of Geotechnical and Geoenvironmental Engineering**, 10.1061/(ASCE)GT.1943-5606.0001471,06016002.

Conference Proceedings

1. VandenBerge, D. R. and McGuire, M. (2017). "Response surfaces for probabilistic analyses of slope stability," *Proc. of 19th Intl. Conf. Soil Mech. and Geotech. Eng.*, Seoul, 4 pp.
2. Zwetchkenbaum, J. D., Castellanos, B. A., VandenBerge, D. R., Brandon, T. L., and Pandey, U. (2017). "Potomac clay of Northern Virginia: Fully softened shear strengths," *29th Central Pennsylvania Geotech. Conf.*, Hershey, PA, 16 pp.
3. VandenBerge, D. R., Duncan, J. M., and Brandon, T. L. (2017). "Practical considerations for measuring the shear strength of compacted clay," *GeoFrontiers 2017*.
4. Thompson, M. J. and VandenBerge, D. R. (2017). "Shear strength of remolded and compacted Beaumont Clay," *GeoFrontiers 2017*.
5. VandenBerge D. R. (2017). "V-Shaped failure surfaces in bearing capacity type limit equilibrium analyses," *GeoFrontiers 2017*.

Conference / Invited Presentations

1. "Lessons Learned from Rapid Drawdown Analysis," J. Michael Duncan Symposium, March 15, 2017 GeoFrontiers 2017.
2. "Appropriate Use and Limitations of Transient Seepage Analysis," May 11, 2017, United States Army Corps of Engineers – 2017 Geotechnical Community of Practice Meeting," Chattanooga, TN.

Conference Papers:

1. **Reed, E., Poston, K., Munasque, L.,** Kalyanapu, A., and VandenBerge, D.R., (2016). "South Carolina Flooding and Dam Failures", ASDSO Dam Safety 2016, (selected as winner of the 2016 ASDSO Student Paper Competition.).
2. VandenBerge, D.R., (2016). "Probabilistic Analysis of Rapid Drawdown", Proceedings of the 12th International Symposium on Landslides, Napoli, Italy.
3. Thompson, M.J., Bentler, D.J., Brandon, T.L., and VandenBerge, D.R., (2016). "Shear Strength of Compacted Beaumont Clay for Consolidated-Undrained Conditions", USSD 2016 Annual Conference.

YARNOLD, MATTHEW**Refereed Journal:**

1. Yarnold, M.T., and Weidner, J.S., (2016). "Monitoring of a Bascule Bridge during Rehabilitation", **Bridge Structures Journal**, 12(1-2), 33-40.

Conference Papers:

1. Murphy, B.R. and Yarnold, M.T., "Temperature-Driven Assessment of a Cantilever Truss Bridge", ASCE Structures Congress, Denver, CO., pages 461-473, April 6-8, 2017.

LEE, CHABUM

Book, Chapter

1. ChaBum Lee, "Large-range nano-scanning devices based on optical sensing technology", Book chapter, *Advanced Mechatronics and MEMS Devices II*, **Springer 2017**: 10.1007/978-3-319-32180-6_22.

1. **ANIRUDDHA GOKHALE**, Associate Professor of Computer Science and Engineering, Vanderbilt University, Nashville, Tennessee, presented a seminar titled, “Software-Defined Networking Enhancements for Managing Communication Resources in Next-generation Cyber Physical Systems”, Tuesday, August 16, 2016 in Brown Hall 208.
2. **CHARLES W. VAN NESTE**, Ph.D. Research Associate in Chemical and Materials Engineering, University of Alberta, Canada, presented seminar titled, A New “Wireless”: An Array of Possibilities, Monday, October 3, 2016 in Prescott Hall 225.
3. **DAVID FUGATE**, ORNL, presented seminar, “Transactive Energy and Control”, Tuesday, October 18, 2016 in Prescott Hall 225.
4. **TAPAN MANNA**, Ph.D., Technical Consultant in the areas of HVDC and FACTS, Burns and McDonnell, presented seminar titled, “Impact of Geomagnetic Disturbances (GMD) on the Bulk Power Systems”, March 24, 2017 , Prescott Hall 225.
5. **VINAY TANTED**, Civil Field Engineer, presented seminar titled, “Wind Farm Construction: A Controlled Chaos”, in Prescott Hall 330, March 16, 2017.



Aniruddha Gokhale,
Assoc. Professor,
Vanderbilt University



Charles Van Neste
Research Assoc. Univ.
of Alberta, Canada



David Fugate
ORNL



Tapan Manna
Burns and McDonnell



Vinay Tanted
Civil Field Engineer

GRADUATE THESIS/DISSERTATIONS AND OTHER STUDENT PUBLICATIONS**MASTERS****JUSTIN RYAN ALEXANDER****Structural Health Monitoring of the Hernando Desoto Bridge**

Spring 2017

Assistant Professor Matthew Yarnold

Civil Engineering

HARSHINI DACHEPALLY**Simplified Constitutive Equations to Describe Elastic Material Nonlinearity**

Fall 2016

Professor John Peddieson and Professor Jane Liu

Mechanical Engineering

MICHELLE EDWARDS**An Investigating of the Impact of Count Duration, Cycle, and Seasonal Factor Development on Accuracy of Annual Average Daily Traffic Estimates from Short Period Traffic Counts**

Spring 2017

Professor Daniel Badoe

Civil Engineering

MOHAMMAD JOBAYER HOSSAIN**Novel High Efficiency Quadruple Junction Solar Cell Wit Current Matching and Optimized Quantum Efficiency**

Fall 2016

Assistant Professor Indranil Bhattacharya

Electrical and Computer Engineering

EMILY HUMPHREYS**Evaluating Triggers for Retiming Traffic Signals**

Spring 2017

Associate Professor Steven Click

Civil Engineering

MD. TOUFIQUL ISLAM**A Framework for Determining Kernel Schedules**

Fall 2016

Associate Professor Michael Rogers

Computer Science

NEENU KOOMULLIL JOSEPH**Modified Newton Raphson Power Flow Method for Systems Embedded with Voltage Regulator**

Spring 2017

Professor Ghadir Radman

Electrical and Computer Engineering

RYAN MARSHALL

Spring 2017

Computer Science

KONSTANTIN MENAKO

Spring 2017

Computer Science

GRADUATE THESIS/DISSERTATIONS AND OTHER STUDENT PUBLICATIONS**MASTERS (Continued)****HAWZHIN MOHAMMED****Secure and Privacy Preserving Data Collections in Smart Grid AMI Networks**

Spring 2017

Assistant Professor Mohamed Mahmoud

Electrical and Computer Engineering

SHEDRACH OKE

Participation of Permanent Magnet Synchronous Generator Based Wind Energy Conversion System in Load Frequency Control

Fall 2016

Professor Ghadir Radman

Electrical and Computer Engineering

JESSE ROBERTS**MNFIS+; or, a Better Hybrid Heuristic Maximum Power Point Tracker**

Spring 2017

Assistant Professor Indranil Bhattacharya

Electrical and Computer Engineering

NATALIA SHLONIMSKAYA**Experimental Validation of Computer Designed Shrinkage Reducing Compounds for Portland Cement Concrete**

Summer 2016

Professor Joseph Biernacki

Chemical Engineering

JAGADISH BABU SIRIGINEEDI**Enhanced Electrochemical Properties of Aluminum Doped Lithium Iron Phosphate (LiFePO₄) Cathode Material for Li-ion Battery Using Solid State Synthesis**

Summer 2016

Assistant Professor Indranil Bhattacharya

Electrical and Computer Engineering

JARED THOMPSON**Use of Superabsorbent Polymers as Physical Air Entrainer with the Use of Marginal Fly Ash**

Fall 2016

Associate Professor Benjamin Mohr

Civil Engineering

STEPHEN ZUCCARO**Power Consumption of Skid-Steer Mobile Robots Based on Dynamic Predictions of Slip**

Spring 2017

Professor Stephen Canfield

Mechanical Engineering

GRADUATE THESIS/DISSERTATIONS AND OTHER STUDENT PUBLICATIONS

PHD

ADENIYI BABALOLA

Artificial Immune and Multi-agent Systems Algorithms for Autonomous Real-Time Cascading Failures Prevention in Smart Power Grids
 Fall 2016
 Assistant Professor Rabie Belkacemi
 Engineering

OJAS CHAUDHARI

Discerning the Mechanism of Interaction for Organic Molecules Used as Admixtures in Portland Cement
 Summer 2016
 Professor Joseph Biernacki
 Engineering

VITALY FORD

A Secure Privacy-Preserving Advanced Metering Infrastructure Supporting Fine-Grained Energy Consumption Data Analysis
 Spring 2017
 Associate Professor Ambareen Siraj
 Engineering

MEHDY KHAYAMY

Efficiency Operation and Control of an Interior Permanent Magnet Synchronous Motor
 Spring 2017
 Professor Ghadir Radman
 Engineering

MEHDI RAMEZANI

New Sensorless Control of Nine-Phase Interior Permanent Magnet Machine Using High Frequency Injection in Non-Torque Producing Circuit for Single-Star and Triple-Star Connections
 Summer 2016
 Professor Joseph Ojo
 Engineering

WONDMAGEGN YIGZAW

Climate Feedback-Based Dam Design and Operation for the 21st Century
 Summer 2016
 Professor Faisal Hossain and Professor David Huddleston
 Engineering

SINA ZARRABIAN

Intelligent and Machine Learning-Based Approaches for Congestion Management and Cascading Failure and Blackout Prevention in Smart Grids
 Spring 2017
 Assistant Professor Rabie Belkacemi
 Engineering

	M.S.	Ph.D.
Number of Students	16	7

MS STUDENTS

			Anticipated	
		Source of	Graduation	
Name	Dept.	Support	Date	Advisor
Alexander, Justin	CEE	CESR	Spring 2017	Assistant Professor Yarnold
Bala, Jnana Deepika	CSC	CESR, CSC	Summer 2017	Associate Professor Siraj
Bewermeier, Niclas	ECE	CESR, ECE	Fall 2018	Assistant Professor Mohamed Mahmoud
Duong, Steven	ME	CESR	Summer 2017	Professor Idem
Edwards, Michelle	CEE	TDOT	Spring 2017	Professor Badoe
Gonzalez Rivas, Marco	ECE	CESR, EPRI	Fall 2017	Director/Professor Mahajan
Gunukula, Surya	ECE	CESR, ECE	Fall 2017	Assistant Professor Mahmoud
Himes, Joseph Hunter	CHE	ORNL, CESR	Spring 2019	Assistant Professor Arias Chavez
Hossain, Md Mosharaf	CSC	University of Washington, CSC	Summer 2018	Associate Professor Ghafoor
Jevtic, Kristina	CHE	CESR, CHE	Fall 2017	Chair/Professor Arce
Lambert, Joshua	ECE	CESR, MIT	Spring 2018	Chair/Professor Johnson
Mehedi Hasan, Md	CSC	CESR, CSC	Fall 2017	Assistant Professor Rahman
Menako, Konstantin	CSC	NSF	Spring 2017	Associate Professor Siraj
Mohammed, Hawzhin	ECE	Qatar National Research Fund	Spring 2017	Assistant Professor Mahmoud
Reed, Emily	CEE	CESR, Virginia Tech, GeoPier Foundation Company	Spring 2018	Assistant Professor VandenBerge
Tallapudi, Sashankha	CHE	CHE, CESR	Fall 2017	Professor Stretz
Uhlik, Allen	ECE	CESR, ECE	Summer 2017	Professor Ojo
Ullah, Mohammed Arman	CSC	CESR, ORNL	Spring 2018	Associate Professor Ghafoor

PHD STUDENTS

Name	Dept.	Source of Support	Anticipated Graduation Date	Advisor
Alsharif, Ahmad	ECE	NSF, CESR, Qatar National Research Fund	Summer 2019	Assistant Professor Mahmoud
Amro, Nadia	CHE	NSF	Spring 2020	Professor Biernacki
Babalola, Adeniyi	ECE	CESR	Fall 2016	Assistant Professor Belkacemi
Datta, Amarjit	CSC	CESR	Spring 2020	Assistant Professor Rahman
Fatunmbi, Rereloluwa	ECE	CESR	Fall 2018	Professor Ojo
Haruna, Josiah	ECE	CESR, ECE	Spring 2019	Professor Ojo
Jaladi, Divya	ME	CESR	Spring 2020	Assistant Professor Languri
Kavimandan, Utkarsh	ECE	CESR	Spring 2020	Director/Professor Mahajan
Locum, James	CEE	TDOT, CEE	Fall 2018	Professor Crouch
Marshall, Ryan	CSC	CESR	Summer 2018	Associate Professor Ghafoor
Mahmoud, Mahmoud Nabil	ECE	NSF	Fall 2020	Assistant Professor Mahmoud
Mohammadizadeh, Mahdi	CHE	CESR	Fall 2020	Professor Stretz
Mohammed, Hawzin	ECE	CESR, ICT Fund	Fall 2020	Assistant Professor Hasan
Murphy, Brittany	CEE	NSF	Spring 2018	Assistant Professor Yarnold
Penumaka, Rani	ME	CESR	Spring 2018	Assistant Professor Bhattacharya
Rawal, Sunil	CHE	CHE, CESR	Fall 2017	Chair/Professor Arce
Stepanick, Christopher	ME	CESR, MIT	Spring 2020	Assistant Professor Lee

CEE Civil and Environmental Engineering (Tennessee Technological University)

CESR Center for Energy Systems Research (Tennessee Technological University)

CSC Computer Science (Tennessee Technological University)

EPRI Electric Power Research Institute

ECE Electrical and Computer Engineering (Tennessee Technological University)

ME Mechanical Engineering (Tennessee Technological University)

MIT Massachusetts Institute of Technology

NSF National Science Foundation

ORNL Oak Ridge National Laboratory

TDOT Tennessee Department of Transportation

HOURLY STUDENT PERSONNEL

SM-10

GRADUATE/UNDERGRADUATE STUDENTS

DEGREE AND MAJOR

Justin Ryan Alexander	M.S. CE
Ahmad H. Alsharif	Ph.D. EE
Muzakhir Amanzholov	B.S. CSC
Nadia Amro	Ph.D. CHE
Adeniyi Babalola	Ph.D. ECE
Isaac Baird	B.S. ME
Elijah Barrett	B.S. Comp. Engr.
Papari Behnaz	Ph.D. ECE
Niclas Bewermeier	M.S. ECE
Shritesh Bhattarai	B.S. CSC
Uddhav Bhattarai	Ph.D. ECE
Kathryn Burks	B.S. MATH
Sudipto Chakraborty	M.S. CE
Ojas Chaudhari	Ph.D. CHE
Brandon Childress	M.S. ECE
Amarjit Datta	Ph.D. CSC
Steven Duong	M.S. ME
Michelle Edwards	M.S. CE
Brandon England	Ph.D. ECE
Rereloluwa Fatunmbi	Ph.D. ECE
Marco Gonzalez	M.S. ECE
Hunter Goodson	B.S. Comp. Engr.
Surya Gunukula	M.S. ECE
Clayton Harra	B.S. EE
Josiah Haruna	Ph.D. EE
Guillermo Neumer-Hernandez	M.S. CE
Mohammad Jobayer Hossain	M.S. ECE
Emily Humphreys	M.S. CE
A H M Jakaria	Ph.D. CSC
Rachel Jennings	Ph.D. CSC
Kristina Jevtic	M.S. CHE
Jordan Johnson	B.S. CSC
Utkarsh Kavimandan	Ph.D. EE
Alex Kelley	B.S. CE
Mehdy Khayamy	Ph.D. EE
Leon Lambert	B.S. EE
Miguel Lastres	M.S. ECE
James Locum	Ph.D. CE
Chelsey Long	B.S. CSC
Mahmoud Nabil Mahmoud	Ph.D. Comp. Engr.
Ryan Marshall	Ph.D. CSC
Nathan Martindale	B.S. CSC
Farzin Mashali	M.S. ME
Mamaa Grant Monney	M.S. CE
Sara Monteen	B.S. CSC
Brittany Murphy	Ph.D. CEE
John Nelms	B.S. ME
Babajide Onanuga	M.S. CHE
Venkata Avinash Paruchuri	Ph.D. ME
Rani Penumaka	Ph.D. ME

HOURLY STUDENT PERSONNEL

SM-10

GRADUATE/UNDERGRADUATE STUDENTS (CONTINUED) DEGREE AND MAJOR

Colin Perry	B.S. CE
Emily Reed	M.S. CE
Wyatt Sherry	M.S. CE
Christopher Stepanick	M.S. ME
Bibek Tiwari	Ph.D. ECE
Vance Trammell, Jr.	M.S. CSC
Allen Uhlik	M.S. ECE
Alexander West	B.S. CSC
Wondmagegn Yigzaw	Ph.D. CEE
Sina Zarrabian	Ph.D. ECE

WORK STUDY/WORK SCHOLARSHIP

DEGREE AND MAJOR

Brandon Arndts	B.S. ME
Jarod Bacon	B.S. CE
Jacob Epley	B.S. CSC
Andrew Moore	B.S. Biochemical Engr.
Bishoy Mousa	B.S. EE
Mareev M. Tallat	B.S. BIOL

2016 – 2017

Undergraduate Student	Sponsor	Program	Faculty Advisor
Muzakhir Amanzholov	Center for Energy Systems Research, Tennessee Technological University; and Oak Ridge National Laboratory	Benchmark and Analyze Numerical Libraries on HPC Architectures for Performance Prediction	Associate Professor Sheikh Ghafoor
Isaac Baird	Center for Energy Systems Research, Tennessee Technological University	Phase Changing Materials	Assistant Professor Ehsan Languri
Elijah Barrett	Tennessee Board of Regents	Unmanned Aerial Power Line Inspection	Assistant Professor Rabie Belkacemi
Shritesh Bhattarai	USAID Program through the University of Washington	Knowledge-Based Flood Forecast to Empower Farmers	Associate Professor Sheikh Ghafoor
Kathryn Burks	National Science Foundation	Collaborative Research: CyberWorkshops: Resources and Strategies for Teaching Cybersecurity in Computer Science	Associate Professor Ambareen Siraj
Hunter Goodson	Tennessee Board of Regents	Unmanned Aerial Power Line Inspection	Assistant Professor Rabie Belkacemi
Clayton Harra	Tennessee Board of Regents	Unmanned Aerial Power Line Inspection	Assistant Professor Rabie Belkacemi
Guillermo Neumer-Hernandez	Tennessee Department of Transportation; and the Center for Energy Systems Research, Tennessee Technological University	Determining Concrete Chloride Permeability Rapidly and Effectively	Professor L. K. Crouch

2016 – 2017

Jordan Johnson	Miami University, funding from the Ohio Department of Medicaid	Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care	Chairperson Gerald Gannod
Alex Kelley	Tennessee Department of Transportation	Determining Concrete Chloride Permeability Rapidly and Effectively	Professor L. K. Crouch
Leon Lambert	Center for Energy Systems Research, Tennessee Technological University	Wireless Power Transfer via Magnetic Coupling	Assistant Professor Indranil Bhattacharya
Chelsey Long	Miami University, funding from the Ohio Department of Medicaid	Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care	Chairperson Gerald Gannod
Nathan Martindale	Miami University, funding from the Ohio Department of Medicaid	Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care	Chairperson Gerald Gannod
Sara Monteen	Miami University, funding from the Ohio Department of Medicaid	Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care	Chairperson Gerald Gannod
John Nelms	Center for Energy Systems Research, Tennessee Technological University	Designing a Multipurpose Decay Station	Assistant Professor Mustafa Rajabali
Colin Perry	Center for Energy Systems Research, Tennessee Technological University	Preliminary Study and Finite Element Modeling for Flat Oval Ducts using ANSYS	Professor Jane Liu

2016 – 2017

Alexander West

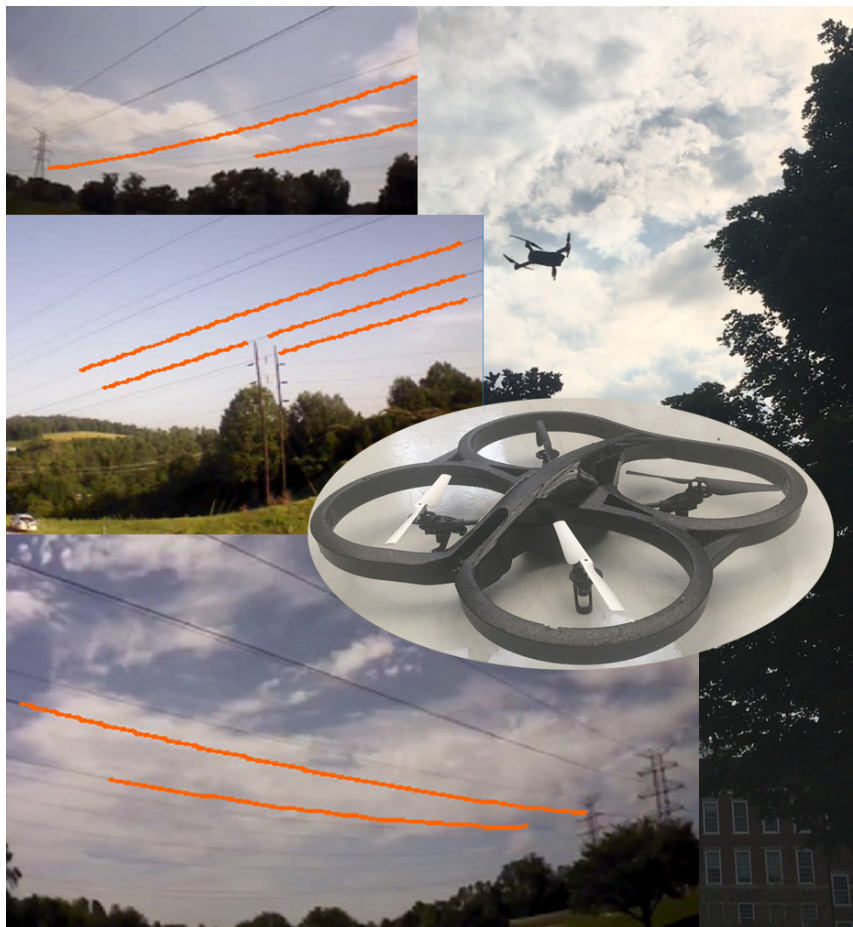
Miami University, funding from the Ohio Department of Medicaid

Incorporating the Preferences for Everyday Living Inventory into Ohio's Nursing Homes to Improve Resident Care

Chairperson
Gerald Gannod

Total Count:

17



CESR researchers teaching a UAV to recognize transmission lines for inspection.

BUDGET MATERIALS



Venkata Avinash Paruchuri (Professor Steve Iidem's Ph.D. student) in Duct Lab for the ADC project.

	Tennessee Technological University			Center:			Center for Energy Systems Research		
	Institution:			Center:			Center for Energy Systems Research		
	FY 2016-17 Actual		Total	FY 2017-18 Proposed		Total	FY 2018-19 Requested		Total
Matching	Appropri.		Matching	Appropri.		Matching	Appropri.		
Expenditures									
Salaries									
Faculty	\$132,726	\$147,176	\$279,902	\$100,101	\$242,097	\$342,198	\$106,230	\$209,097	\$315,327
Other Professional	\$17,414	\$185,196	\$202,610	\$17,640	\$202,997	\$220,637	\$5,351	\$177,805	\$183,156
Clerical/ Supporting	\$0	\$101,733	\$101,733	\$0	\$121,633	\$121,633	\$0	\$105,251	\$105,251
Assistantships	\$232,423	\$182,026	\$414,449	\$126,500	\$293,635	\$420,135	\$88,600	\$105,000	\$193,600
Total Salaries	\$382,563	\$616,131	\$998,694	\$244,241	\$660,362	\$1,104,603	\$200,181	\$597,153	\$797,334
Fringe Benefits	\$134,670	\$227,088	\$361,758	\$89,608	\$442,663	\$532,271	\$71,331	\$280,000	\$351,331
Total Personnel	\$517,233	\$843,219	\$1,360,452	\$333,849	\$1,303,025	\$1,636,874	\$271,512	\$877,153	\$1,148,665
Non-Personnel									
Travel	\$59,398	\$12,941	\$72,339	\$24,994	\$58,330	\$83,324	\$39,388	\$19,147	\$58,535
Software	\$0	\$3,667	\$3,667	\$0	\$3,000	\$3,000	\$0	\$2,000	\$2,000
Books & Journals	\$0	\$216	\$216	\$0	\$200	\$200	\$0	\$250	\$250
Other Supplies	\$77,080	\$61,011	\$138,091	\$23,157	\$94,364	\$117,521	\$15,328	\$44,250	\$59,578
Equipment	\$25,399	\$0	\$25,399	\$0	\$81,155	\$81,155	\$0	\$5,000	\$5,000
Maintenance	\$0	\$1,594	\$1,594	\$0	\$1,500	\$1,500	\$0	\$3,000	\$3,000
Scholarships	\$25,000	\$0	\$25,000	\$25,000	\$0	\$25,000	\$0	\$0	\$0
Consultants	\$49,385	\$430	\$49,815	\$0	\$1,000	\$1,000	\$0	\$500	\$500
Renovation	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Other (Specify): Advertising	\$0	\$210	\$210	\$0	\$0	\$0	\$0	\$0	\$0
Other (Specify): Participant Support Costs	\$285,879	\$0	\$285,879	\$46,000	\$0	\$46,000	\$149,422	\$0	\$149,422
Total Non-Personnel	\$522,141	\$80,069	\$602,210	\$119,151	\$239,549	\$358,700	\$204,138	\$74,147	\$278,285
GRAND TOTAL	\$1,039,374	\$923,288	\$1,962,662	\$453,000	\$1,542,574	\$1,995,574	\$475,650	\$951,300	\$1,426,950
Revenue									
New State Appropriation	\$0	\$872,800	\$872,800	\$0	\$906,000	\$906,000	\$0	\$951,300	\$951,300
Carryover State Appropriation	\$0	\$687,062	\$687,062	\$0	\$636,574	\$636,574	\$0	\$0	\$0
New Matching Funds	\$1,039,374	\$0	\$1,039,374	\$453,000	\$0	\$453,000	\$475,650	\$0	\$475,650
Carryover from Previous Matching Funds	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Total Revenue	\$1,039,374	\$1,559,862	\$2,599,236	\$453,000	\$1,542,574	\$1,995,574	\$475,650	\$951,300	\$1,426,950

JUSTIFICATION FOR 2017 — 2018 APPROPRIATIONS REQUEST

The Center for Energy Systems Research (CESR) is requesting a 5% increase in the Appropriations Request for 2018-2019. The CESR hired a new faculty member who started to work on 8/1/2017. Funds will be needed to provide for the purchase of supplies and equipment and to hire graduate students for laboratory work to support his research efforts. The College of Engineering is requesting that graduate students on Graduate Research Assistantship appointments be paid at least \$1,500 per month at the PH.D. level and at least \$1,200 per month at the M.S. level. It is also expected that these levels of support will be requested to increase. Also, the CESR has had an increase in funded research projects during the 2016-2017 Fiscal Year and anticipates that the research funding will continue to increase. Also, the CESR has been requested to assist with projects in new research centers at TTU as they are created. The two increases in research activities have lead to an increase in the work for the CESR office research personnel, the CESR laboratory research personnel and the CESR network management. One Financial Associate has been hired and started to work part time in the CESR in August 2017. Additional funds are needed to cover these personnel costs.