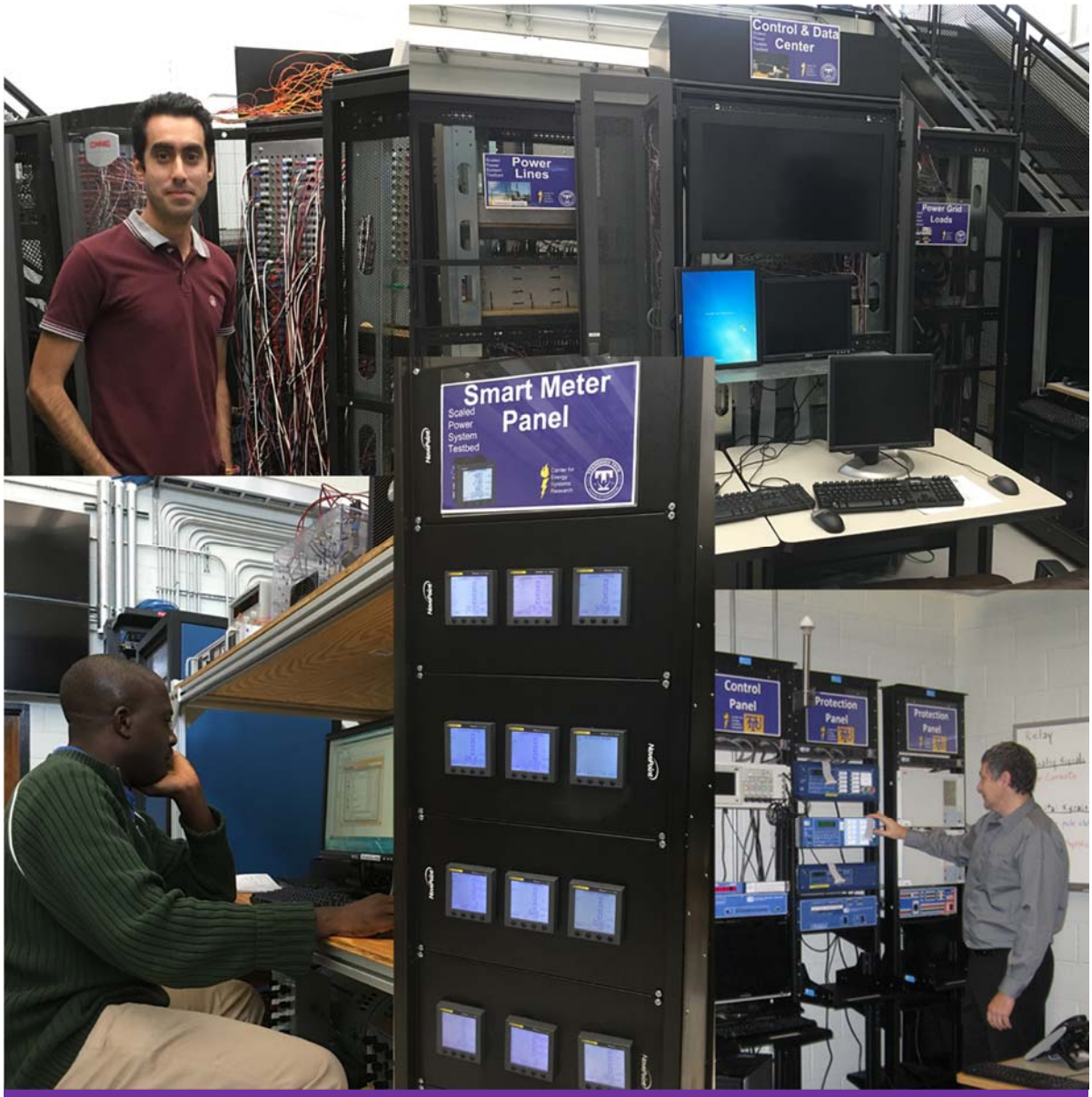
Center For Energy Systems Research

Tennessee Tech University

Annual Report for Fiscal Year 2015-2016



New Smart Grid Laboratory

Center for Energy Systems Research

Annual Report for Fiscal Year

July 1, 2015 – June 30, 2016

Satish M. Mahajan, Director
www.tntech.edu/cesr

Center for Energy Systems Research
"Where research is put into practice."

TENNESSEE TECH UNIVERSITY

Center for Energy Systems Research

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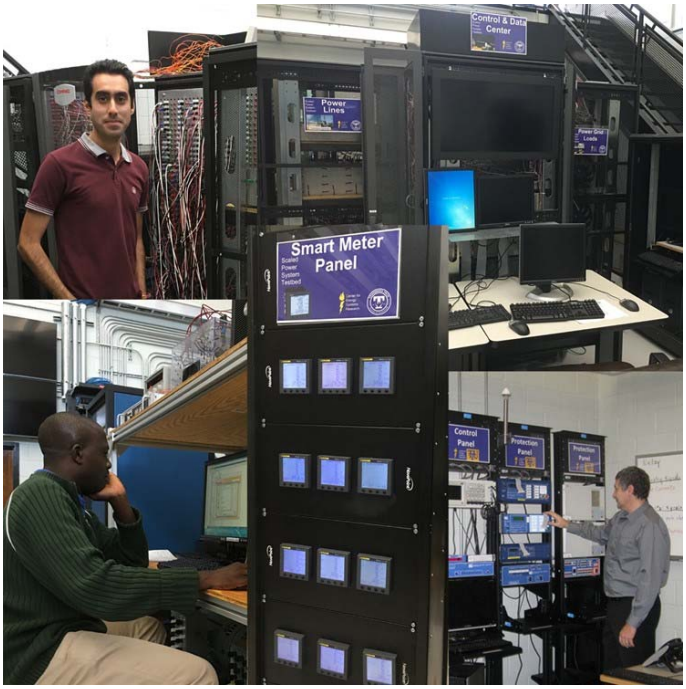

Cover Description:

Smart Grid Lab

Sina Zarrabian, Ph.D. Research Assistant, ECE (*upper left)*

Smart Grid Work Station (*upper right*)

Lecturer Funso Ariyo, Ph.D., Visiting Research Scholar from Obafemi Awolowo University, Nigeria (*lower left*)

Emilio Piesciorovsky, ECE Post-Doctoral Research Associate, at the newly organized industrial relay racks which will be integrated with a real time digital simulator and/or connected to the physical power grid also housed in the laboratory *lower right*).

The Smart Grid Laboratory is a newly occupied state of the art laboratory for scale power grid research including renewables.

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Satish M. Mahajan, CESR Director, Rabie Belkacemi, ECE Assistant Professor; Ghadir Radman, ECE Professor, Vahid Madani, Ph.D. Fellow IEEE, of Pacific Gas and Electric Co.; Emilio Piesciorovsky, ECE Post-Doctoral Research Associate.

CESR welcomed invited speaker Vahid Madani, Ph.D. Fellow IEEE, of Pacific Gas and Electric Co. who presented "Innovations in Wide-area for System Reliability Improvement". He attended several laboratory tours and meeting with various groups of researchers which stimulated many conversations on smart grid research and synchrophasors in particular.

The Smart Grid Laboratory is a newly introduced state-of-the-art laboratory for a scaled power grid research including renewables.

The SolBat Laboratory has over 17 pieces of state of the art equipment for the production and testing of coin cell and pouch cell batteries.

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 2015-2016. The CESR continues to focus on the two strategic research areas of the College of Engineering: Smart Grid and Resilient Infrastructure. One of the major accomplishments this year has been the completion of renovation of the Smart Grid Laboratory and the Battery Laboratory. Both laboratories are fully operational. The addition of equipment to increase capabilities of these laboratories will continue in the future.

Dr. Emilio Piesciorovsky joined CESR in January 2016 as a post-doctoral research associate to assist in the relay and protection area of the electrical power systems. Dr. Daniel VandenBerge joined the Civil and Environmental Engineering Department and will be helping CESR in the resilient infrastructure research area. Dr. M. Ashique Rahman joined the Computer Science Engineering Department and is expected to help CESR in the security aspects of the electrical power systems as well as cyber physical systems.

Dr. Ambareen Siraj secured the largest single research grant from NSF in the history of Tennessee Tech University (TTU) and also continued to contribute to CESR on the ongoing NSF CReST grant. A Center for Education, Research and Outreach activities (CEROC) was established by Dr. Siraj. Dr. Daniel Badoe received a 3-year grant from TDOT in the area of transportation. Dr. Matthew Yarnold continued to work on the structural health through the ongoing NSF grant. Dr. Joseph Biernacki received funding from NSF in area of 3D printing of infrastructure material. Dr. Sheikh Ghafoor and Dr. VandenBerge were also successful in attracting funding from ORNL and LUNA Innovations, respectively. Dr. Belkacemi and others received a grant from TBR related to power line monitoring.

As can be seen in upcoming sections of this report the proposal submission activity went up significantly as compared to the previous year. The grant activation amount was also higher than the previous year.

Many CESR faculty associates earned recognitions for their outstanding contributions. During the past year, CESR affiliated faculty and students published 45 journal papers, 99 proceedings/conference presentations and contributed to 4 book chapters. These are listed in the following pages of this report.

During 2015-16 fiscal year, a total of 11 international faculty, students and researchers visited CESR and conducted research in the relevant areas of the Center for various periods. Of the 11 international visiting researchers, three faculty and four students were from Annamalai University, India, under the Indo-US Obama-Singh 21st Century Knowledge Initiative Grant Program.

PROGRAMMATIC REPORT

Research contract and grant awards included in Matching from July 1, 2015 thru June 30, 2016 total $715,596.41. Gifts and Other Awards included in Matching total $61,200. Therefore, the 2015-2016 Match is $776,796.41. Indirect costs of approximately $128,349.35 were also received during the 2015-2016 Fiscal Year. The result is that the 2015-2016 Matching and Indirect Costs total $905,145.76. The State Appropriation was $887,000 for 2015-2016.

CESR continues to enjoy a broad base of support. The funding categories for 1985 thru 2016 as illustrated in Figure 1 are: in-state utilities, 11.98 percent; out-of-state utilities, 6.7 percent; state and local agencies, 10.99 percent; federal government, 56.96 percent; other, 13.37 percent. The "other" category includes a variety of national and international industries, universities and professional societies. Through June 2016, the cumulative research funding of the Center is $27,769,866.76. 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 31-year match of about $27.4 million represents 99.4 percent of the state appropriations of $27.6 million. Indirect costs of approximately $4.88 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 2016

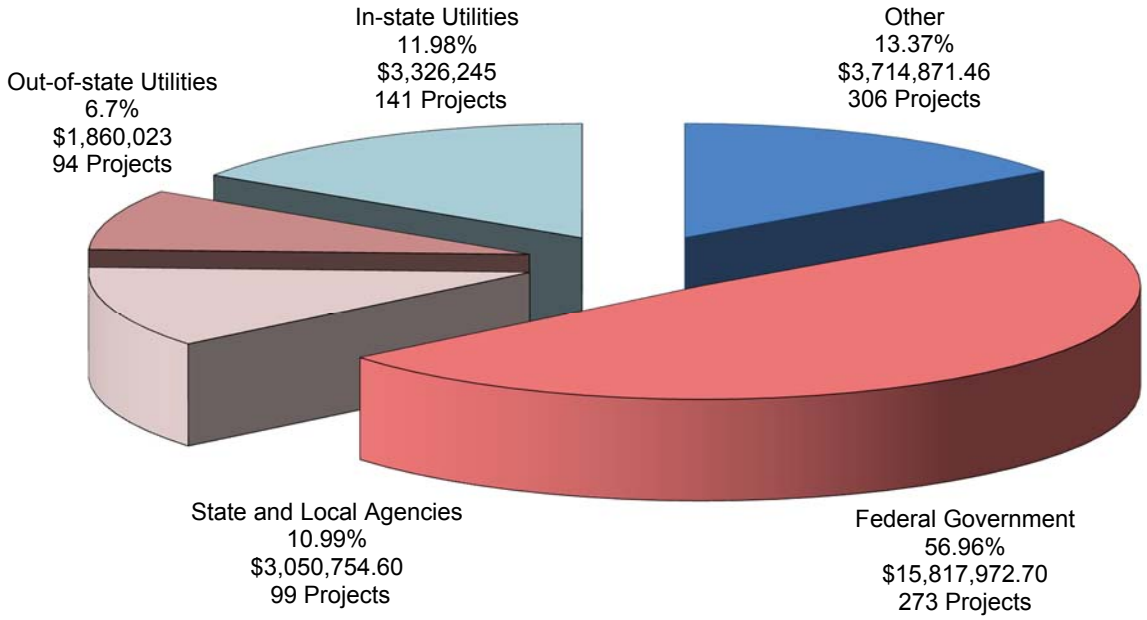

Figure 1: Types of Research Funding (Total $27,769,866.76)

Total Projects = 913

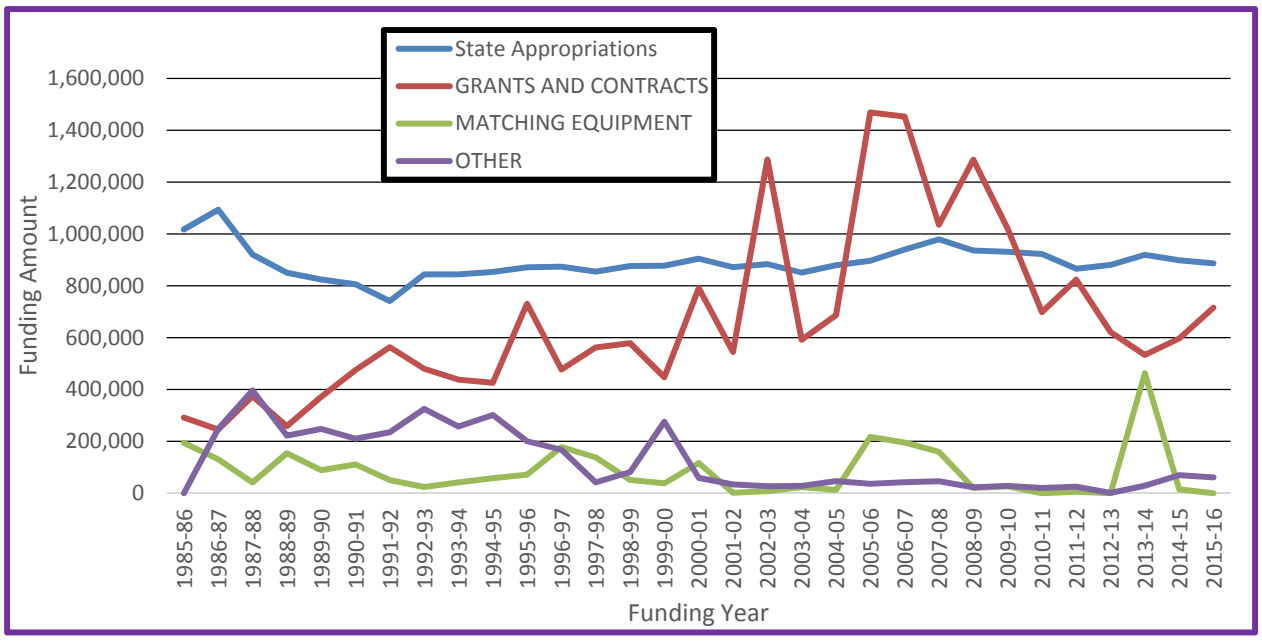

Figure 2: Historical State Appropriations and Matching 1985–2016 (Spring)

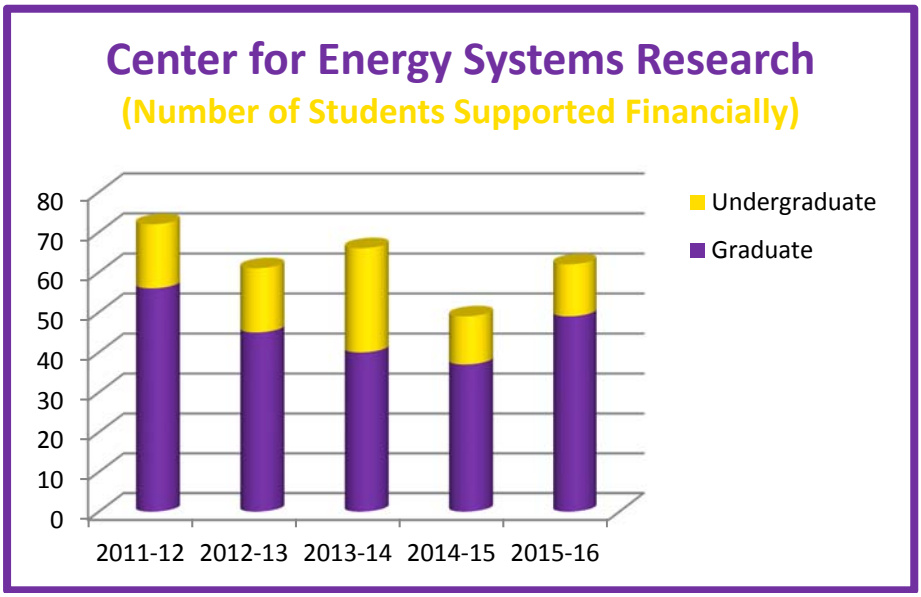

Fig. 3. Number of Students Supported

FACULTY AWARDS AND ACCOMPLISHMENTS 2015–2016

Mohamed Mahmoud, Assistant Professor ECE, received the Best Paper Award, IEEE Wireless Communications and Networking Conference (WCNC16), Doha, Qatar, 3-6 April 2016. This award was one of only four given, among more than 1000 papers submitted, and was the sole award for the Network Track. International award. http://wcnc2016.ieee-wcnc.org/

Ambareen Siraj, Associate Professor CSC, Attended CReST Faculty Workshop as Lead Principal Investigator in Arlington, Virginia in July 2015.

STUDENT ACCOMPLISHMENTS AND AWARDS 2015–2016

Civil and Environmental Engineering MS student James Locum, (advisor Professor L. K. Crouch) was awarded the prestigious ASTM International Bryant and Katharine Mather Scholarship for concrete research in December 2015.

The ASTM International Katharine and Bryant Mather Scholarship honors Katharine and Bryant Mather, who together contributed in excess of 100 years to the investigation and research of various concreting materials and construction techniques, and on the ability of hydraulic-cement concretes to remain durable under aggressive exposure conditions. The ASTM scholarship honors their leadership, dedication, determination, and technical knowledge.

ASTM International is one of the largest voluntary standards development organizations in the world - a trusted source for technical standards for materials, products, systems, and services. Known for their high technical quality and market relevance, ASTM International standards play important roles in the information infrastructure that guides design, manufacturing, construction and trade in the global economy.

The Committee C09 and the Staff at ASTM International, also congratulated Tennessee Tech for the work and involvement with students pursuing degrees specializing in cement or concrete materials technology.

STUDENTS CONFERENCE PRESENTATIONS

ADENIYI BABALOLA

R. Belkacemi, A. Babalola and S. Zarrabian, “Experimental Implementation of Multi-Agent System Algorithm to Prevent Cascading Failure after N-1-1 Contingency in Smart Grid Systems”, in IEEE Power and Energy Society General Meeting, July 2015.

SINA ZARRABIAN

(Rabie Belkacemi, Advisor) IEEE PES General Meeting in Denver, Colorado in July 2015 presented paper

(Rabie Belkacemi, Advisor) IEEE PES Transportation and Distribution Conference and Exposition 2016 in Dallas, Texas in May 2016, presented paper “Q-learning Algorithm to Prevent Cascading Failure in Smart Grids: Experimental Implementation”.

OJAS CHAUDHARI

(Joseph Biernacki, Advisor) presented paper “Discerning the Mechanism of Interaction for Organic Molecules used as Admixtures in Portland Cement”, ACerS Cements Division Annual Meeting, July 2015. At the American Society in Manhattan, Kansas.

(Joseph Biernacki, Advisor) presented paper “Molecular Modeling of Select Organic Molecules at the Air-Water Interfaces”, at the ChE Conference in Salt Lake City, Utah in November 2015.

WONDMAGEGN Y. YIGZAW

(David Huddleston, Advisor) Attended American Geophysical Union (AGU) Fall 2015 Meeting in San Francisco and presented paper “Water-sustainability of large cities and cities near artificial reservoirs from the perspectives of population increase, anthropogenic activities, and climate change”.

VANCE TRAMMELL

(Ambareen Siraj, Advisor) Presented paper “CyberWorkShops: Resources and Strategies for Teaching Cybersecurity in Computer Science” and attended CReST Faculty Workshop at The George Washington University’s Graduate Education Center in Arlington, Virginia in July 2015.

Presented paper and attended SIGSCE 2016 in Memphis, Tennessee in March 2016.

KONSTANTIN S. MENAKO

(Ambareen Siraj, Advisor) Presented paper and attended SIGSCE 2016 in Memphis, Tennessee in March 2016.

FUTURE PLANS

CESR is currently pursuing the acquisition of an externally mounted solar panel array for integration with the Smart Grid Lab.

PLANS FOR 2016-2017

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. Trips to ORNL and attending TREEDC at TTU are examples of these 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% during the remaining two of the original three years.

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. The recently granted Autonomous drone for transmission line inspection project through the TBR exemplifies this as not only integrating multiple mechanical and electrical engineering researchers from TTU but also reaching out and collaborating with MTSU researchers with drone expertise.

4. Add Laboratory Facilities

Add a functional solar array capability to the smart grid lab which will also provide a valuable representation to the university community of the commitment to green renewable energy.

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

Inflatable Chimney for Evaporative Cooling

Photos: upper left Stephen Idem, Professor ME
Eric Umphrey, ME student
Top right Robert Craven, R&D Engineer, CESR
Lower photos Stephen Idem, ME Professor

CESR FACULTY AND STAFF 2015-2016

Center Directors:	Satish M. Mahajan, Professor	Director, CESR
CESR Staff:	Robert Craven	R&D Engineer
	Anthony Greenway	Information Technology Associate 9
	Linda Lee	Administrative Associate 3
	Tammy Martin (Part Time)	Administrative Associate 3
	Etter Staggs	Financial Analyst
	Emilio Piesciorovsky, Ph.D.	Post-Doctoral Research Associate
	Brook Abegaz, Ph.D. (Part Time)	Research Assistant II
Visitors:	Lecturer Funso Ariyo, Ph.D.	Visiting Research Scholar from Obafemi Awolowo University, Nigeria
	Associate Professor Zahra Moravej	Visiting Scholar from Semnan University, Iran
	Assistant Professor Sanjoy Parida	Indo-US Bhaskara Advanced Solar Energy Visiting Scholar
	Payam Niknejad	Visiting Scholar from Babol Noshirvani University of Technology, Iran

Visitors from Annamalai University:

Faculty and Staff	Dean Sangoden Velusami
	Professor Aravindhababu Palanivelu
	Professor Ramanathan Neela
Students	Palraj Balaji
	Vandarkuzhali Ramanujam
	Sai Lakshmi Surya Ramanan
	Sudha Vedhanayagam

FACULTY PARTICIPATION SM-2

Faculty participating in the Strategic Research of the Center are:

Smart Grid

Joseph Ojo - ECE - Coordinator
Ali Alouani - ECE
Adam Anderson -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
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
Doug Talbert - CSC

Resilient Infrastructure

Joseph Biernacki, CHE - Coordinator
Daniel Badoe - CEE
Laura Arias Chavez - ChE
Stephen Canfield - ME
Steven Click - CEE
L. K. Crouch - CEE
Ahmed Elsawy - MET
Ismail Fidan - MET
David Huddleston -CEE
Stephen Idem - ME
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

Activated Between July 1, 2015 and June 30, 2016

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
533258	Self-Charging Unmanned Aerial System for Power Lines Inspection (Principal Investigator: Assistant Professor Rabie Belkacemi)	Tennessee Board of Regents	7/1/15-8/15/16	40,000.00	9,157.36
531283	Collaborative Research: Cyberworkshops: Resources and Strategies for Teaching Cybersecurity in Computer Science (Year 2 of 3) (Principal Investigator: Associate Professor Ambareen Siraj)	National Science Foundation	9/1/15-8/31/16	176,219.00	188,848.06
531224	Collaborative Research: Structural Health Monitoring using Temperature Related Data (Year 2) (Principal Investigator: Assistant Professor Matthew Yarnold)	National Science Foundation	8/1/15-7/31/16	63,201.00	68,866.77
531205	Tennessee Louis Stokes Alliance for Minority Participation (TLSAMP) (Year 3 of 5) (Principal Investigator: Dean Joseph Rencis)	Tennessee State University (Funding from the National Science Foundation)	9/15/15-9/14/16	29,000.00	21,233.17
539354	Traffic Monitoring Program (Federal) (Principal Investigator: Professor Daniel Badoe)	Tennessee Department of Transportation	10/1/15-3/31/18	108,390.40	29,701.44
539355	Traffic Monitoring Program (State) (Principal Investigator: Professor Daniel Badoe)	Tennessee Department of Transportation	10/1/15-3/31/18	27,097.60	2,629.46

Activated Between July 1, 2015 and June 30, 2016

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
539356	Hernando Desoto I-40 Bridge Seismic Instrumentation Upgrade (Principal Investigator: Assistant Professor Matthew Yarnold)	University of Memphis (Tennessee Department of Transportation) partial funding from FHWA	10/1/15-9/30/16	25,853.00	13,564.15
539286	Developing a TDOT Class S-LH (Lower Heat) PCC Mixture Specification (Federal) (Principal Investigator: Professor L. K. Crouch)	Tennessee Department of Transportation	1/1/16-12/31/16	4,000.00	22,422.57
539287	Developing a TDOT Class S-LH (Lower Heat) PCC Mixture Specification (State) (Principal Investigator: Professor L. K. Crouch)	Tennessee Department of Transportation	1/1/16-12/31/16	1,000.00	3,491.22
532325	Knowledge-Based Flood Inundation Forecast on Affordable Mobile Platforms to Empower Farmers (Year 1) (Principal Investigator: Associate Professor Sheikh Ghafoor)	USAID through University of Washington	1/28/16-1/27/19	17,500.00	2,519.53
532294	Phase I: Real-Time Distributed Sensing of Subsurface In-Situ Stress (Principal Investigator: Assistant Professor Daniel VandenBerge)	Luna Innovations, Inc., (SBIR from the Department of Energy)	3/15/16-11/15/16	20,207.00	2,892.92

Activated Between July 1, 2015 and June 30, 2016

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
539347	Development of Tennessee Travel Demand Model Users' Group (Year 4 of 5) (Principal Investigator: Professor Daniel Badoe)	UTK, TDOT	1/1/16-12/31/16	10,900.00	9,671.23
539365	Develop and Benchmark Architecture Agnostic Scalable Library of Data Parallel Kernels for Big Data Architecture (Principal Investigator: Associate Professor Sheikh Ghafoor)	Oak Ridge National Laboratory	4/1/16-9/30/16	8,454.00	-
539366	Design and Benchmark Architecture Agnostic Scalable Library of Data Parallel Kernels for Big Data Architecture (Principal Investigator: Associate Professor Sheikh Ghafoor)	Oak Ridge National Laboratory	4/20/16-9/30/16	16,546.00	12,650.51
531279	Tennessee CyberCorps: A Hybrid Program in Cybersecurity (Principal Investigator: Associate Professor Ambareen Siraj)	National Science Foundation	1/1/16-12/31/16	214,864.30	37,228.35
531288	Collaborative Research: 3D Printing of Civil Infrastructure Materials with Controlled Microstructural Architectures (Principal Investigator: Professor Joe Biernacki)	National Science Foundation	6/15/16-5/31/17	55,438.00	-
	SUB - TOTAL GRANTS AND CONTRACTS			**818,670.30**	**424,876.74**

Activated Between July 1, 2015 and June 30, 2016

POWER-TEST-SERVICE ACCOUNT

Contract Number	Title	Source	Project Dates	Total Amount	Estimated Expendit.
538597	Power-Test-Service Account (Principal Investigators: Professor Satish Mahajan, Professor Stephen Idem, Professor Jie Cui, Professor Joe Biernacki, Robert Craven)	Various	7/1/15-6/30/16	25,275.46	15,829.66
	SUB - TOTAL POWER-TEST-SERVICE ACCOUNT			**25,275.46**	**15,829.66**
	TOTAL CONTRACTS AND GRANTS DURING 2015-2016			**843,945.76**	**440,706.40**

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
1.	Computational Fluid Dynamic Testing of a Telsa Model X Drag-Reduction Modification	Professor Jie Cui	Roland W. Jacobs, M.D. (Diplomate of the American Board of Psychiatry and Neurology)	6,000	Funded
2.	Development of an Electronic App for Android and iPhone Cell Phones to Calculate Equivalent Dimensions of Sheet Metal Ducts	Professor Stephen Idem, Engineer Robert Craven	Eastern Sheet Metal	7,500	Funded
3.	CAREER: Towards an Immune Electric Power System to Cascading Failures and Outages	Assistant Professor Rabie Belkacemi	National Science Foundation	508,062	Unfunded
4.	CAREER: Hardware Trojan Resilient System on Chips (SoCs): How Regular Hardware Design Can Co-Exist with Hardware Trojan	Assistant Professor Syed Hasan	National Science Foundation	458,774	Unfunded
	SUBTOTAL, PROPOSALS FOR 2015-2016			**980,336**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
5.	REU Site: Immersive Research in Energy Generation, Storage/Conversion, and Power Transmission (IREST)	Assistant Professor Indranil Bhattacharya, Professor Joseph Biernacki, Director and Professor Satish M. Mahajan, Assistant Professor Rabie Belkacemi, Associate Professor Holly Stretz, Associate Professor Cynthia Rice, Assistant Professor Steven Anton, Assistant Professor Ehsan Languri, Assistant Professor Laura Arias Chavez, Associate Professor George Chitiyo	National Science Foundation	366,592	Unfunded
6.	Multi-Output, High Efficiency and Energy Dense Bi-Directional Contactless Power Transfer System for Electric Battery Charging Applications	Professor Joseph Ojo	Qatar National Research Fund	171,926	Pending
	SUBTOTAL, PROPOSALS FOR 2015-2016			**538,518**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
7.	NCHRP Synthesis 20-05/Topic 47-03: Current Practices and Guidelines for the Reuse of Bridge Foundations	Assistant Professor Matthew Yarnold, Assistant Professor Daniel VandenBerge	National Cooperative Highway Research Program	45,000	Unfunded
8.	Collaborative Research: 3D Printing of Civil Infrastructure Materials with Controlled Microstructural Architecture	Professor Joseph Biernacki	National Science Foundation	176,872	Revised to $133,000 and Funded
9.	Rising Renaissance (R2) Scholars Project	Assistant Professor Kristine Craven, Director Harry Ingle, Associate Professor Lenly Weathers, Coordinator Elizabeth Powell	National Science Foundation	851,300	Unfunded
10.	CRII: CPS: Proactive Security Analysis and Countermeasure Synthesis for Smart Grid Energy Management Systems	Assistant Professor Mohammad Rahman	National Science Foundation	174,998	Unfunded
	SUBTOTAL, PROPOSALS FOR 2015-2016			**1,248,170**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
11.	Phase I with Luna Innovations "Real-Time Distributed Sensing of Subsurface In-situ Stress"	Assistant Professor Daniel VandenBerge	Subcontract to Luna Innovations, Inc., from SBIR Department of Energy	20,207	Funded
12.	Hernando Desoto I-40 Bridge Seismic Instrumentation Upgrade	Assistant Professor Matthew Yarnold	The University of Memphis (Funding from the Tennessee Department of Transportation)	25,853	Funded
13.	Development and Modeling of High Energy Density and Cost-Effective All Solid State Lithium-ion Battery	Assistant Professor Indranil Bhattacharya	American Chemical Society	110,000	Unfunded
14.	Development and Modeling of High Energy Density All Solid State Lithium Sulfur Battery	Assistant Professor Indranil Bhattacharya	National Science Foundation	299,995	Unfunded
15.	Wavelength-Selective Surface Plasmon Resonance Devices Based on Retrodiffraction	Assistant Professor ChaBum Lee, Director and Professor Satish M. Mahajan	National Science Foundation	350,000	Unfunded
	SUBTOTAL, PROPOSALS FOR 2015-2016			**806,055**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
16.	Collaborative Research: Cost-Effective Perovskite Multijunction Solar Cells	Assistant Professor Indranil Bhattacharya	National Science Foundation	154,596	Unfunded
17.	Retrodiffractive Surface Plasmon Resonance Sensing Technology for Bio-Chemical Material Property Characterization	Assistant Professor ChaBum Lee, Director and Professor Satish M. Mahajan	W. M. Keck Foundation	1,100,000	Unfunded
18.	TWC: Small: Collaborative: Multi-Layer Approaches for Securing Enhanced AMI Networks against Traffic Analysis Attacks	Assistant Professor Mohamed Mahmoud, Professor Robert Qiu, Engineer Terry Guo	National Science Foundation	380,662	To be funded in 2016-2017
19.	MRI: Development of an Inner Body Navigation System for Drug Delivery and Minimally Invasive Surgeries	Professor Ali Alouani, Assistant Professor Steve Anton, Associate Professor Ahmed Kamal, Engineer Robert Craven	National Science Foundation	560,190	Unfunded
20.	NCHRP 12-110: Proposed New AASHTO Load Rating Provisions for Implements of Husbandry	Assistant Professor Matthew Yarnold, Associate Provost Sharon Huo	NCHRP, Transportation Research Board	550,000	Unfunded
	SUBTOTAL, PROPOSALS FOR 2015-2016			**2,745,448**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
21.	NCHRP 12-109: Use of 0.7 in. Diameter Strands in Precast Pretensioned Girders	Assistant Professor Matthew Yarnold	Subcontract to the University of Tennessee-Knoxville (Funding from NCHRP 12-109)	47,613	Unfunded
22.	Formal Threat Analytics for Supervisory Control and Data Acquisition Systems	Assistant Professor Mohammad Rahman, Assistant Professor Syed Hasan, Associate Professor William Eberle, Assistant Professor Mohamed Mahmoud, Assistant Professor Hicham Chaoui	Tennessee Board of Regents	40,000	Unfunded
23.	Recruitment, Retention, and Recognition: A Three-Tiered Approach to Graduating Renaissance Engineers: 2016-2017 Student Engagement, Retention, and Success Grant Application	Coordinator Elizabeth Powell, Director Harry Ingle, Director Tony Marable	Tennessee Board of Regents	25,000	Funded
	SUBTOTAL, PROPOSALS FOR 2015-2016			**112,613**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
24.	Energy Efficiency Retrofit Potential based on Energy Audits of Bank Buildings in Tennessee	Assistant Professor Ehsan Languri, Associate Professor Glenn Cunningham, Director and Professor Satish M. Mahajan	Department of Energy	834,008	Unfunded
25.	University of Samarra Civil and Environmental Engineering Curriculum Review	Professor David Huddleston, Professor Craig Huddleston, Instructor Kevin Young	IREX/USA, Education Programs Division	24,418	Unfunded
26.	Design and Benchmark Architecture Agnostic Scalable Library of Data Parallel Kernels for Big Data Architecture	Associate Professor Sheikh Ghafoor	Oak Ridge National Laboratory	16,546	Funded
27.	Develop and Benchmark Architecture Agnostic Scalable Library of Data Parallel Kernels for Big Data Architecture	Associate Professor Sheikh Ghafoor	Oak Ridge National Laboratory	8,454	Funded
	SUBTOTAL, PROPOSALS FOR 2015-2016			**883,426**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
28.	Pressure Drop Testing of Corrugated Stainless Steel Pliable Gas Tubing (CSST)	Professor Stephen Idem	Titeflex Corporation	15,773	Unfunded
29.	Development of Reinforced Tables for Spiral Flat Oval Ducts	Professor Stephen Idem, Professor Jane Liu	Spiral Duct Manufacturers Association (SPIDA)	112,568	Pending
30.	CEDS SIREN-MG	Associate Professor Ambareen Siraj, Assistant Professor Mohammad Rahman	Electric Power Research Institute	225,595	Pending
31.	Rising Renaissance (R2) Scholars Project	Assistant Professor Kristine Craven, Director Harry Ingle, Associate Professor Lenly Weathers, Coordinator Elizabeth Powell, Assistant Vice President Melissa Irvin	National Science Foundation	999,765	Pending
32.	Further Development of a Smartphone App to Calculate Equivalent Dimensions of Sheet Metal Ducts	Professor Stephen Idem, Engineer Robert Craven	Eastern Sheet Metal	4,500	Pending
	SUBTOTAL, PROPOSALS FOR 2015-2016			**1,358,201**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
33.	CPS: Breakthrough: Formal Analytics for Resilient Supervisory Control and Data Acquisition in Smart Grids	Assistant Professor Mohammad Rahman, Director and Professor Satish M. Mahajan, Assistant Professor Rabie Belkacemi, Engineer Robert Craven	National Science Foundation	498,240	Pending
34.	Regional Transportation Center on Reducing Congestion	Associate Professor Steven Click	University of Florida Transportation Institute	100,000	Pending
35.	Retrodiffraction-Utilized Surface Plasmon Sensing Platform for High Resolution Biochips	Assistant Professor ChaBum Lee, Director and Professor Satish M. Mahajan, Assistant Professor Mohammad Rahman	Samsung GRO	200,000	Pending
36.	Proactive Security and Resiliency Threat Detection and Mitigation for Dependable Internet of Things	Assistant Professor Mohammad Rahman, Assistant Professor ChaBum Lee	Samsung GRO	200,000	Pending
	SUBTOTAL, PROPOSALS FOR 2015-2016			**998,240**	

Submitted Between July 1, 2015 and June 30, 2016

	TITLE	INVESTIGATORS	SOURCE	AMOUNT	STATUS
37.	Modeling a Distribution Feeder along with Distribution-Connected Smart Inverters & Composite Load Model in Time Domain	Assistant Professor Rabie Belkacemi, Director and Professor Satish M. Mahajan	Electric Power Research Institute	60,000	Pending
	SUBTOTAL, PROPOSALS FOR 2015-2016			**60,000**	
	TOTAL, PROPOSALS FOR 2015-2016			**9,731,007**	

ALOUANI, ALI

Journal

"Efficient Prediction of Maximum PV Module Output Power through Dynamic Modeling", Mohammad Saad Alam, Ali T. Alouani, Mohammad F. Azeem, (Elsevier) Sustainable Energy Technologies and Assessments, Vol.11 (Sept. 2015) Pages 27–35.

ANDERSON, ADAM

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K. Sharifabad, F.; Jensen, M.; Anderson, A., "Array Beamforming Synthesis for Point-to-Point MIMO Communication", *Antennas and Propagation, IEEE Transactions* on, vol. PP, no 99, 2015.

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C. Cooke and A.L. Anderson, "Frequency Envelope Modulation (FEM): A Passive Approach to Universal Spectrum Recognition and Network Self-Configuration", *IEEE Global Comm. Conf*. (GLOBECOM), Dec. 2015.

ANTON, STEVEN

Proceedings

Kettle, R. A. and Anton, S. R., Rapid Evaluation of Mechanical Boundary Conditions using Impedance Based Structural Health Monitoring, *Proc. SPIE, 2016*, Vol. 9805, 98051S (13 pp.).

Safaei, M. and Anton, S. R., The Effects of Dimensional Parameters on Sensing and Energy Harvesting of an Embedded PZT in a Total Knee Replacement, Proc. SPIE, 2016, Vol, 9799, 97992P (13 pp.).

Tefft, E. C., and Anton, S. R., A Multiple Degree of Freedom Modeling Approach of Piezoelectret Foam in a Multilayer Stack Configuration, *Proc. SPIE*, 2016, Vol. 9799, 97991P (12 pp.).

Kettle, R. A., Dick, A. J., Dodson, J. C., Foley, J. R., and Anton, S. R., Real-Time State Detection in Highly Dynamic Systems, *Proc. SEM IMAC*, 2016 (9 pp.).

BADOE, DANIEL

Journal

"The New 2015 TDOT 204.06 Flowable Fill Specification", L. K. Crouch, Aaron Crowley, James Locum, Blakeslee Eagan, and Daniel Badoe, *Tennessee Concrete*, Vol. 29, No. 2, pp. 8-15. Fall 2015.

"Bad Ash Flowable Fill", L. K. Crouch, James Locum, Caleb Smith, Blakeslee Eagan, Sarah Dillon, Daniel Badoe, and Heather P. Hall, *Tennessee Concrete*, Vol. 29, No. 3, Winter 2015/16.

BELKACEMI, RABIE

Conference

R. Belkacemi, S. Zarrabian, A. Babalola and R. Craven, "Experimental Transient Stability Analysis of MicroGrid Systems: lessons learned", in IEEE Power and Energy Society General Meeting, July 2015.

R. Belkacemi, A. Babalola and S. Zarrabian, "Experimental Implementation of Multi-Agent System Algorithm to Prevent Cascading Failure after N-1-1 Contingency in Smart Grid Systems", in IEEE Power and Energy Society General Meeting, July 2015.

Sina Zarrabian, Rabie Belkacemi, "Intelligent Control of Real-Time Smart Grids to Mitigate Blackouts after N-1 Contingency", IEEE Power and Energy Conference, Illinois, February 2016.

BHATTACHARYA, INDRANIL

Journal

B. Tiwari, M.J. Hossain, I. Bhattacharya*, "GaP/InGaAs/InGaSb triple junction current matched photovoltaic cell with optimized thickness and quantum efficiency", Solar Energy, Volume 135, October 2016, Pages 618-624, ISSN 0038-092X, http://dx.doi.org/10.1016/j.solener.2016.06.032.

I. J. Ogundana, S. Y. Foo, Z. Yu, I. Bhattacharya, "Low Cost Fabrication of High Efficiency Polymer Solar Cells", Electrochemical Society Transactions, 07/16/2015.

Conference

J. Sirigineedi, R. Penumaka, I. Bhattacharya*, "Analysis of Electrochemical Properties of Li Iron Phosphate Cathode Material Doped with Aluminium", 18th International Meeting on Lithium Batteries, June 19-24, 2016, in Chicago, Illinois.

BIERNACKI, JOSEPH

Conference

O. Chaudhari and J. J. Biernacki, "*Molecular Modeling of Select Organic Molecules at the Air-Water Interface*", AIChE Annual Meeting, November 2015.

O. Chaudhari and J. J. Biernacki, "Discerning the Mechanism of Interaction for Organic Molecules used as Admixtures in Portland Cement", ACerS Cements Division Annual Meeting, July 2015.

J. J. Biernacki, "Designing Concrete Admixtures – A Computer Aided Strategy and Foray into Unknown Territory", University of Illinois at Urbana-Champaign, April 13, 2016

CANFIELD, STEPHEN

Proceedings

Qualls, J., Hill, T., Shibakov, A., and S.L. Canfield, "Kinematic analysis of a Mobile Robot Performing Manufacturing Tasks on Non-planar Surfaces," *Proc. of the 2015 ASME International Design Engineering Technical Conferences*, Boston MA, Aug. 2015, DETC2015-47637.

Canfield, S. L., Hill, S. Hill, T., and S. Zuccaro, "Creating a Digital Homework Set for a Kinematics and Dynamics of Machinery Course," *Proc. of the 2015 ASME International Design Engineering Technical Conferences*, Boston MA, Aug. 2015, DETC2015-47558.

CHAOUI, HICHAM

Journal

B. Hamane, M.L. Doumbia, M. Bouhamida, A. Draou, H. Chaoui, and M. Benghanem: "Comparative Study of PI, RST, Sliding Mode and Fuzzy Supervisory Controllers for DFIG based Wind Energy Conversion Systems", *International Journal of Renewable Energy Research, 5 (4), pp. 1174-1184, December 2015*.

B. Hamane, M.L. Doumbia, H. Chaoui M. Bouhamida, A. Cheriti, and M. Benghanem: "PI and RST Control Design and Comparison for Matrix Converters Using Venturini Modulation Method", *Journal of Power and Energy Engineering,* 3 (8), pp. 36-54, Aug. 2015.

Conference

A. El Mejdoubi, A. Oukaour, H. Gualous, H. Chaoui, and J. Sabor: "Experimental Investigation of Aging Calendar Parameters for Supercapacitors", *IEEE International Renewable and Sustainable Energy Conference (IRSEC)*, Marrakech-Ouarzazate, Morocco, December 2015.

M. Hafiane, J. Sabor, M. Taleb, H. Gualous, and H. Chaoui: "Adaptive Second Order Sliding Mode Speed Control of Doubly Fed Induction Generator Wind Turbines", *IEEE International Renewable and Sustainable Energy Conference (IRSEC),* Marrakech-Ouarzazate, Morocco, December 2015.

H. Teiar, H. Chaoui, and P. Sicard: "Almost Parameter-free Sensorless Control of PMSM" *IEEE Conference on Industrial Electronics Society (IECON)* Yokohama, Japan, November 2015.

M. Elsied, A. Oukaour, H. Gualous, H. Chaoui, A. Salem, F. De. Belie, J. Melkebeek, T. Yousself, and O. Mohammed: "Efficient Power-Electronic Converters for Electric Vehicle Applications"**,** *IEEE Vehicle Power and Propulsion Conference* (VPPC), Montreal, Quebec Canada, October 2015.

CRAVEN, ROBERT

Conference

R. Belkacemi, S. Zarrabian, A. Babalola and R. Craven, “Experimental Transient Stability Analysis of MicroGrid Systems: lessons learned”, in IEEE power and Energy Society General Meeting, July 2015.

R. Belkacemi, S. Zarrabian, A. Babalola and R. Craven, “Experimental Implementation of Multi-Agent System Algorithm to Prevent Cascading Failure after N-1-1 Contingency in Smart Grid Systems”, in IEEE Power and Energy Society General Meeting, July 2015.

CROUCH, L.K.

Journal

“The New 2015 TDOT 204.06 Flowable Fill Specification”, L. K. Crouch, Aaron Crowley, James Locum, Blakeslee Eagan, and Daniel Badoe, *Tennessee Concrete*, Vol. 29, No. 2, Fall 2015.

“Bad Ash Flowable Fill”, L. K. Crouch, James Locum, Caleb Smith, Blakeslee Eagan, Sarah Dillon, Daniel Badoe, and Heather P. Hall, *Tennessee Concrete*, Vol. 29, No. 3, Winter 2015/16.

CUI, JIE

Conference Paper:

Languri, E., Cunningham, G., Cui, I, 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, June 26 -30, 2016.

Vadake, K., Cui, J., “Numerical and Experimental Study of Turbulent Flows Around Clark Y-14 Aerofoil,” paper IMECE2015-50536, ASME International Mechanical Engineering Congress and Exposition, Houston, Texas, USA, November 13-19, 2015

Proceedings

Bentley, J., Cui, J., “Heat Transfer Modeling in a Double Wall Helical Coil Heat Exchanger,” paper IMECE2015-50542, ASME International Mechanical Engineering Congress and Exposition, Houston, Texas, USA, November 13-19, 2015

ELKEELANY, OMAR

Conference

Rami Amiri, Omar Elkeelany, “Integrating Open TCP/IP Core and FPGA-based Cryptosystem on Chip”, IEEE SoutheastCon, 2016.

S. R. Hasan, S. F. Mossa, O. S. A. Elkeelany, F. Awwad, "Tenacious Hardware Trojans Due to High Temperature in Middle Tiers of 3-D ICs", Proceedings of the MidWest Symposium on Circuit and Systems (MWSCAS'2015), August, 2015.

Proceedings

Omar Elkeelany, Kiran Prince, Siraj Fulum Mossa, ‘System-on-a-Chip design for YUV2 to RGB Color Space Conversion on Altera DE2 FPGA Board,’ ICIEEE proceedings, Pp. 159 – 163, 2015.

ELSAWY, AHMED

Conference

An Overview of Renewable Energy Sources and Applications, The Association of Egyptian American Scholars 42nd Annual International Conference, Dec. 27-29, 2015, Ain Shams University, Cairo, Egypt.

FIDAN, ISMAIL

Guest Editor

Fidan, "Special Issue I: Recent Advances in Additive Manufacturing/3D Printing Technologies," International Journal of Rapid Manufacturing, Inderscience Enterprises Ltd, Vol. 5, Nov. 1, 2015.

I. Fidan, "Special Issue II: Recent Advances in Additive Manufacturing/3D Printing Technologies," International Journal of Rapid Manufacturing, Inderscience Enterprises Ltd, Vol. 5, Nov. 3-4, 2015.

Journal

T. Fresques, D. Cantrell, I. Fidan, "The Development of A Framework between the 3D Printed Patterns and Sand-Cast Work Pieces," International Journal of Rapid Manufacturing, pp. 170-185, Vol. 5, No. 2, 2015.

Conference

V. Gaddam, I. Fidan, B. Barger, "Hands-on Entrepreneurial Engineering Management Course and Its Experiential Learning," 2016 ASEE Annual Conference, New Orleans, LA, June 26-29, 2016, under review.

I. Fidan, B. Barger, "Development Leadership, Innovation, and Entrepreneurship in Manufacturing Education," Proceedings of the 2015 ASEE Annual Conference, pp. 26.443.1 - 26.443.10, ISBN: 978-0-692-50180-1, Seattle, WA.

GHAFOOR, SHEIKH

Journal

Parker, J. M., Canfield, S. L., Ghafoor, S. K., and K. M Lum, "Using Hardware-Based Programming Experiences to Enhance Student Learning in a Junior-Level Systems Modeling Course*", ASEE Computers in Education Journal,* Number 4: October – December 2015.

Conference

Sheikh K. Ghafoor and Mike D. Rogers, "Integrating Parallel Distributed Computing Topics throughout Undergraduate CS Curriculum: A Work in Progress" in the proceedings of EduPar 15 workshop in IPDPS 2015 conference, Hyderabad, India, 2015.

GUO, NAN (TERRY)

Journal

J. Bonior, Z. Hu, T. Guo, R. Qiu, James P. Browning, and M. Wicks, "Software-Defined-Radio-Based Wireless Tomography: Experimental Demonstration and Verification," IEEE Geoscience and Remote Sensing Letters, vol.12, no.1, pp.175-179, Jan. 2015.

Conference

J. Aribido, T. Guo and R. Qiu, "Visualization of Large Wireless Network Behavior Using Random Matrix Theory," IEEE WCNC'15.

K. Rabieh, M. Mahmoud, T. Guo and M. Younis, "Cross-Layer Scheme for Detecting Large-scale Colluding Sybil Attack in VANETs," IEEE ICC'15.

HASAN SYED RAFAY

Conference

F. K. Lodhi, S. R. Hasan, O. Hasan, F. Awwad, "Formal Analysis of Macro Synchronous Micro Asynchronous Pipeline for Hardware Trojan Detection", in IEEE Nordic Circuits and Systems Conference (NORCAS'2015). October 2015.

S. R. Hasan, S. F. Mossa, O.S.A. Elkeelany, F. Awwad, "Tenacious Hardware Trojans Due to High Temperature in Middle Tiers of 3-D ICs", in Midwest Symposium on Circuit and Systems (MWSCAS'2015), August 2015.

S. R. Hasan, S. F. Mossa, C. Junior, F. Awwad, "Hardware Trojans in Asynchronous FIFO-Buffers: From Clock Domain Crossing Perspective", in MidWest Symposium on Circuit and Systems (MWSCAS'2015), August 2015.

HUDDLESTON, DAVID

Journal

Huddleston, D. H., Elizandro, D., Liu, J., Ramirez, G., Hutchins, E. (2016), "An Academic Program Assessment Methodology to Leverage Drive to 55 in the CCTA Integrated Higher Education Environment", TBR Critical Conversations, https://www.tbr.edu/academics/criticalconversations/critical-conversations-interdisciplinary-journal, Volume 1 Summer 2016 (pending).

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Elizandro, D., Huddleston, D. H., Liu, J., Ramirez, G., Hutchins, E. (2016), "An Academic Program Assessment Methodology to Leverage the Integrated Higher Education Environment Created by the Complete College Tennessee Act (CCTA)," 2016 *ASEE Annual Conference, New Orleans, LA, June.*

IDEM, STEPHEN

Proceedings

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.

Silaipillayarputhur, K. and Idem, S., 2015, "Transient Response of a Cross Flow Heat Exchanger with Neither Parallel nor Counter Flow Circuiting Subjected to Flow and Temperature Perturbations," IMECE2015-52562, Proceedings of IMECE, Houston, TX.

KALYANAPU, ALFRED

Journal

Ahmadisharaf, E., Kalyanapu, A. J., and Chung, E. S. "Spatial Probabilistic Multi-Criteria Decision Making for Assessment of Flood Management Alternatives", Journal of Hydrology, Vol. 533, 365-378, doi: 10.1016/j.jhydrol.2015.12.031. (February 2016)

Conference

Kalyanapu, A. J., (2015) "Challenges and Advances of Modeling Flood Hazards in the 21st Century: Use of Gaming Technology, Monte Carlo Methods and Geo-Spatial Analysis for Realistic Predictions" 40th Natural Hazards Research and Applications Workshop, Broomfield, Colorado, July 19-22, 2015.

Dullo, T. T.; Kalyanapu, A. J.; Ghafoor, S.K.; Anantharaj, V.; Marshall, R. J.; Tatarczuk, J.; and Shih-Chieh, K. (2015). "Computational Performance of a Two-Dimensional Flood Model in Single and Multiple GPU Frameworks" Geophysical Research Abstracts, Vol. 17, EGU2015-14739, 2015, EGU General Assembly 2015.

Ahmadisharaf, E.; Kalyanapu, A. J. (2015) "Investigation of the Impact of Streamflow Temporal Variation on Dam Overtopping Risk: Case Study of a High-Hazard Dam." In: Karvazy, K.; Webster, V. L.; (Eds). Proceedings of the World Environmental and Water Resources Congress, 1050-1057, Austin, TX.

Bhuyian, N. M.; Kalyanapu, A. J.; and Hossain, F. (2015) "Estimating Relative Impacts for Difference Sources of Digital Elevation Models for Flood Consequence Assessment for Extreme Flood Events", In: Karvazy, K.; Webster, V. L.; (Eds). Proceedings of the World Environmental and Water Resources Congress, Austin, TX.

Dullo, T.; and Kalyanapu, A. J. (2015) "Calibration of Levee Breach: A Case Study of New-Madrid Floodway, Illinois, USA", In: Karvazy, K.; Webster, V. L.; (Eds). Proceedings of the World Environmental and Water Resources Congress, Austin, TX.

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"Dealing with Floods: Modeling Solutions in the 21st Century" Department of Civil and Environmental Engineering, CEE 1020 Introduction to Civil Engineering, September 29, 2015.

KAMAL, AHMED

Journal

Ahmed Kamal "The Effect of Viagra on Autonomic Function Using Spectral Analysis and Approximate Entropy Method", International Journal of Neuro Rehabilitation Eng, 2015, 2:2

Ahmed Kamal "Assessment of Autonomic Function in Children Autism and Normal Children Using Spectral Analysis and Posture Entrainment: A Pilot Study, Journal of Neurology and Neurosciences,

Vol. 6 No. 3:37, 2015.

LEE, CHABUM

Journal

C. Lee, J. Tarbutton, Compliance and control characteristics of an additive manufactured-flexure stage, Rev. Sci. Instrum. 84(4), 45107, 2015.

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C. Lee, J. Tarbutton, Electric poling-assisted additive process for lead-free piezoelectric device fabrication, Procedia Manufacturing, 1, 320-326, 2015.

C. Lee, S-K. Lee, J. Tarbutton, Optical knife edge sensing method of long-stroke XY nanopositioning systems, Precision Engineering (In revision).

C. Lee, S. Mahajan, S. Jeon and R. Zhao, "A curved edge diffraction-utilized displacement sensor for spindle metrology", Rev. Sci. Instruments, 87, 075113 (2016); http://dx.doi.org/10.1063/1.4958882.

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C. Lee, H-S. Yoon, K-L. Ting, J. Tarbutton, J. D. Ellis, S-K. Lee, On-machine measurement of cutting tool damage based on optical knife edge diffraction, Annual Early Career Conference, Birmingham, AL, Nov. 2015.

C. Lee. S-K. Lee, J. Tarbutton, Novel displacement sensing technique utilizing knife-edge diffraction, ASPE, Austin, TX, Nov. 2015.

C. Lu, J. Tarbutton, C. Lee, J. D. Ellis, T.L. Schmitz, Improvement of a periodic error compensation algorithm based on the continuous wavelet transform, ASPE, Austin, TX, Nov. 2015.

C. Lee, S-K. Lee, J. Tarbutton, Long-term positioning effectiveness of additive manufactured-monolithic double compound notch type flexure mechanism, ASPE, Raleigh, NC, 2015.

C. Lee, R. Mahamud, T. Farouk, J. Tarbutton, Preliminary study of corona-assisted additive manufacturing process of piezoelectric thermopolymer, ASPE, Raleigh, NC, 2015.

V-G. Gomez, S. Smith, C. Lee, J. Tarbutton, Assessing additive manufacturing processes with X-Ray metrology, ASPE, Raleigh, NC, 2015.

V-G. Gomez, S. Smith, C. Lee, J Tarbutton, Dimensional metrology of complex inner geometries built by additive manufacturing, ASPE, Raleigh, NC, 2015.

LIU, JANE

Conference

Markus Rosenkranz, **Jane Liu**, Alexander Maletzky, and Bruno Buchberger, "Two-Point Boundary Problems with One Mile Singularity and an Application to Graded Kirchhoff Plates," Proceedings of Computer Algebra in Scientific Computing (CASC) September 2015, Aachen, Germany.

Kallie Curtis, Jane Liu, Tim Harrell and John Peddieson, "Torsional Property Measurement for Polycarbonate Using DIC Technique with 3D Printed Specimens," presented at the 1st International Digital Image Correlation Society Conference & Workshop, November 2015, Columbia, SC, USA.

Markus Rosenkranz, **Jane Liu**, Alexander Maletzky, and Bruno Buchberger, "Two-Point Boundary Problems with One Mile Singularity and an Application to Graded Kirchhoff Plates," Presented at Computer Algebra in Scientific Computing (CASC) September 2015, Aachen, Germany.

Jane Liu, Bruno Buchberger, Markus Rosenkranz, Alexander Maletzky, Loredana Tec and Wolfgang Windsteiger, "Application of Non-Commutative Groebner Bases to Kirchhoff Circular Plates with Functionally Graded Materials," Presented at the 8th MSJ SI 2015, Seasonal Institute, Current Trends on Groebner Bases: the 50th Anniversary of Groebner Bases, August, 2015, Osaka, Japan.

MAHAJAN, SATISH M.

Journal

"A Curved Edge Diffraction-Utilized Displacement Sensor for Spindle Metrology (with ChaBum Lee, Rui Zhao, and Seongkyul Jeon), Rev. Sci. Instruments, 87, 075113 (2016); http://dx.doi.org/10.1063/1.4958882.

"Optimal Energy Management for a Smart Grid using Resource-Aware Utility Maximization", (with B. W. Abegaz and E.O. Negeri), International Journal of Electrical Power and Energy Systems, **IJEEPS**, (Vol.

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"Magneto-optic Evaluation of Antiferromagnetic α-Fe203 Nanoparticles Coated on a Quartz Substrate", (with S. Balasubramanian, R. Panmand, G. Kumar, and B. B. Kale), Proceedings of SPIE 9758, Quantum Dots and Nanostructures: Growth, Characterization, and Modeling XIII, 975800 (March 15, 2016); doi:10.1117/12.2209003.

"A New Efficient Algorithm to Detect Current Transformer Saturation", (with G. Kumbhar, and K. Kumar), IEEE Power and Energy Systems General Meeting, Boston, July 2016.

"Energy Core-ness Based Analysis of Hybrid Distributed Energy Systems using Convoluted Perturbations", (with B. Abegaz), IEEE Power and Energy Systems General Meeting, Boston, July 2016.

MAHMOUD, MOHAMED

Journal

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), published online December 2015.

K. Rabieh**, M. Mahmoud, K. Akkaya, S. Tonyali, "Scalable Certificate Revocation Schemes for Smart Grid AMI Networks Using Bloom Filters", IEEE transactions on dependence and secure computing (IEEE TDSC), published online August 2015.

K. Rabieh**, M. Mahmoud, M. Azzer, M. Allam, "A Secure Event Reporting Scheme for Vehicular Ad Hoc Networks", Wiley Security and Communication Networks, vol. 8, no. 17, pp. 3271-3281, November 2015.

M. Mahmoud, J. Misic, K. Akkaya, X. Shen, "Investigating Public-Key Certificate Revocation in Smart Grid", IEEE Journal on Internet of Things (IoT), vol. 2, no. 6, pp. 490-503, December 2015.

K. Akkaya, K. Rabieh**, M. Mahmoud, and S. Tonya, "Customized Certificate Revocation Lists for IEEE 802.11s based Smart Grid AMI Networks", IEEE Transactions on Smart Grid, vol. 6, no. 5, pp. 2366-2374, Sept. 2015.

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M. Mahmoud, M. Ismail, P. Akula*, K. Akkaya, E. Serpedin, K. Qaraqe, "Privacy-aware PEV Charging Coordination in Future Smart Grids", Proc. of IEEE Wireless Communications and Networking Conference (IEEE WCNC), Doha, Qatar, April 2016. 48% acceptance ratio.

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Z. Haddad^, M. Mahmoud, S. Taha, and I. Saroit, "Secure and Privacy-Preserving AMI-Utility Communications via LTE-A Networks", Proc. of IEEE 11th International Conference on Wireless and Mobile Computing, Networking and Communications, IEEE WiMob'15, Abu Dhabi, UAE, 28% acceptance ratio.

P. Akula*, M. Mahmoud, K. Akkaya, M. Song, "Privacy-Preserving and Secure Communication Scheme

for Power Injection in Smart Grid", Proc. of IEEE International Conference on Smart Grid Communications (IEEE SmartGridComm), Miami, Florida, USA, 2-5 November 2015.

K. Rabieh**, M. Mahmoud, A. Seraj, J. Misic, "Efficient Privacy-Preserving Chatting Scheme with Degree of Interest Verification for Vehicular Social Networks", Proc. of IEEE Global Communications Conference, Selected Areas in Communications: Social Networks ('GC' 15 - SAC - Social Networks'), San Diego, USA, December 2015.

MOHR, BENJAMIN

Journal

Mohr, B. J.; Bryant, L. B.; "Utilization of Quarry By-Products for Reduction of Expansion Due to Alkali-Aggregate Reaction", *Cement and Concrete Composites*. 2016; 73: 235-240. http://dx.doi.org/10.1016/j.cemconcomp.2016.07.014.

Conference

Shekar, Y; Mohr, B .J.; "Nanoscale Characterization of Pore Structure During Delayed Ettringite Formation", American Ceramics Society, Cements Division, 6th Advances in Cement Based Materials, Manhattan, KS, July 2015.

France-Mensah, J.; Mohr, B. J.; "Development of Leachate Test for Delayed Ettringite Formation Potential in Cementitious Materials", American Ceramics Society, Cements Division, 6th Advances in Cement-Based Materials, Manhattan, KS, July 2015.

OJO, JOSEPH

Journal

J. L. Febin Daya, P. Sanjeevikumar, Frede Blaabjerg, Patrick W. Wheeler Olorunfemi Ojo, Ahmet H. Ertas, "Analysis of Wavelet Controller for Robustness in Electronic Differential of Electric Vehicles – An Investigation and Numerical Implementation", *Journal of Electric Power Components and Systems, Taylor and Francis Publications*, vol. 44, no. 7, pp. 763-773, 4 Apr. 2016, Doi: 10.1080/15325008.2015.1131771.

P. Sanjeevikumar, G. Grandi, Frede Blaabjerg, Patrick W. Wheeler, Olorunfemi Ojo, "Analysis and Implementation of Power Management and Control Strategy for Six-Phase Multilevel AC Drive System in Fault Condition", *Engineering Science and Technology: An International Journal (JESTECH), Elsevier Journal Publications,* vol. 19, no. 1, pp. 31-39, Mar. 2016.

P. Sanjeevikumar, G. Grandi, Olorunfemi Ojo, Frede Blaabjerg, "Direct Vector Controlled Six-Phase Asymmetrical Induction Motor with Power Balanced Space Vector PWM Multilevel Operation", *International Journal of Power and Energy Conversion, Inderscience Publications*, vol. 7, no. 1, pp. 57-83, Feb. 2016.l

R. Gunabalan, P. Sanjeevikumar, Frede Blaabjerg, Patrick Wheeler, Olorunfemi Ojo, Ahmet H. Ertas, "Speed Sensor-Less Vector Control of Parallel Connected Three-Phase Two Motor Single Inverter Drive System", *FACETS Journal, NRC Research Press Journal*, Canadian Science Publishing, Ottawa (Canada), pp. 1-16, Jan. 2016. Doi: 10.1139/facets-2015-004.

J. L. Febin Daya, P. Sanjeevikumar, Frede Blaabjerg, Patrick W. Wheeler Olorunfemi Ojo, "Implementation of Wavelet Based Robust Differential Control for Electric Vehicle Application", *IEEE Trans. On Power Electronics*, vol. 30, no. 12, pp. 6510-6513, Dec. 2015.

R. Gunabalan, P. Sanjeevikumar, Frede Blaabjerg, Olorunfemi Ojo, V. Subbiah, "Analysis and Implementation of Parallel Connected Two Induction Motor Single Inverter Drive by Direct Vector Control for Industrial Application", *IEEE Trans. on Power Electronics,* vol. 30, no. 12, pp. 6472-6475. Dec. 2015.

P. Sanjeevikumar, G. Grandi, Frede Blaabjerg, Olorunfemi Ojo, Patrick Wheeler, "Power Sharing Algorithm for Vector Controlled SixPhase AC Motor with Four Customary Three-Phase Voltage Source Inverter Drive", *Engineering Science and Technology*: An International (JESTECH) Elsevier Journal Publications, vol. 18, no. 3, pp. 408-415, Sept. 2015.

Conference:

P. Sanjeevikumar, Michael Hontz, Raghav Khanna, Patrick Wheeler, Frede Blaabjerg, Olorunfemi Ojo, "Isolated/Non-Isolated Quad-Inverter Configuration for Multilevel Symmetrical/Asymmetrical Dual Six-Phase Star-Winding Converter", Conf. Proc., 25th IEEE International Symposium on Industrial Electronics, IEEE-ISIE'16, Santa Clara, CA, (USA), pp. 498-503, 8-10 Jun. 2016.

P. Sanjeevikumar, Frede Blaabjerg, Patrick Wheeler, Olorunfemi Ojo, Kiran M. Pandav, “A Novel Double Quad-Inverter Configuration for Multilevel Twelve-Phase Open-Winding Converter”, Conf. Proc. of 7th IEEE Intl. Conf. on Power System IEEE-ICPS’16, Indian Institute of Technology (IIT-Delhi) Delhi (India) 4-6 Mar. 2016.

P. Sanjeevikumar, J.L. Febin Daya, Patrick W. Wheeler, Frede Blaabjerg, Viliam Fedák, Joseph Olorunfemi Ojo, , “Wavelet Transform with Fuzzy Tuning Based Indirect Field Oriented Speed Control of Three-Phase Induction Motor Drive”, *Conf.* Proc*. The 18th IEEE Intl. Conf. on Electrical Drives and Power Electronics, IEEE-EDPE’15,* Slovakia Republic (Europe), pp. 111-116, 21-23 Sept. 2015.

Mehdy Khayamy and Olorunfemi Ojo, “Peculiar Dynamics of the Stand-Alone Current Source Converter Based Photovoltaic System”, 2015 IEEE ECCE (Energy Conversion Congress and Exposition), 2015 Annual Meeting, pp. 5757-5762, September 2015.

Olorunfemi Ojo, Medhi Ramezani and Amrit Gautam, “Sensor-less Vector Control of the Nine-Phase Concentrated Wound Interior Permanent Magnet Motor Drive Using a Unique Third Sequence High Frequency Injection into the Stator Windings”, 2015 IEEE ECCE (Energy Conversion Congress and Exposition), 2015 Annual Meeting, pp. 853 - 859, September 2015.

T.R. Ayodele, A.S. Ogunjuyigbe, E. O. Oyediran and Olorunfemi Ojo, “Temperature Based Model for Estimating the Daily Average Global Solar Irradiation of Ibadan, Nigeria”, Conference proceeding of the 12th IEEE 2015 AFRICON International Conference on Innovation for African Renaissance, pp, 605 - 609, September 2015.

PEDDIESON, JOHN

Journal

A. Jayanthi and J. Peddieson, “Multiphase Mixture Model Fragmentation Solutions for Self Similar Jet Flows,” Meccanica, Vol. 50, pp. 1431-1149 (2015).

“Size Class Convergence in Multiphase Continuum Mechanics Modeling of Convective Fragmentation,” with A. Jayanthi, *International Journal of Energy and Technology*, 7, 2015, pp. 1-18.

Proceedings

K. Curtis, J. Liu, T. Harrell, and J. Peddieson, “Torsional Property Measurement for Polycarbonate Using DIC Technique,” Proceedings of 1st International Digital Image Correlation Society Conference, Columbia, SC (Nov 2015).

RADMAN, GHADIR

Journal

Waheed A. Oyekanmi, Ghadir Radman, Adeniyi A. Babalola, “Effects of Power System Models on Angle Stability Margin in Transient Stability Analysis*”, International Review of Electrical Engineering* (I.R.E.E.), December 2015.

RAHMAN, MOHAMMAD

Conference

Mohammad Ashiqur Rahman and Ehab Al-Shaer, “Formal Synthesis of Dependable Configurations for Advanced Metering Infrastructures”, in the IEEE International Conference on Smart Grid Communications (SmartGridComm), November 2015.

Bata Tripathy, Padmalochan Bera, and Mohammad Ashiqur Rahman, “Analysis of Trust Models in Mobile Ad hoc Networks: A Simulation Based Study”, in the 8th International Conference on Communication Systems and Networks (COMSNETS), January 2016.

SIRAJ, AMBAREEN

Journal

Vitaly Ford and Ambareen Siraj, "Secure and Efficient Protection of Consumer Privacy in Advanced Metering Infrastructure Supporting Fine-grained Data Analysis", under review in *Journal of Computer and System Sciences, Special Issue on Cyber Security in the Critical Infrastructure: Advances and Future Directions*, March 2016.

Jeffery D. Dodson and Ambareen Siraj, "Applying Fuzzy Hashing to Steganography," *International Journal of Future Computer and Communication*, vol. 4, no. 6, pp. 421-425, 2015.

Ambareen Siraj, Blair Taylor, Siddarth Kaza, Sheikh Ghafoor (2015), "Integrating Security in The Computer Science Curriculum," ACM Inroads, 6(2), pp 77-81

Conference

Christa Cody, Vitaly Ford, and Ambareen Siraj, "Decision Tree Learning for Fraud Detection in Consumer Energy Consumption," in the 14th *IEEE International Conference on Machine Learning and Applications,* December, 2015.

Khaled Rabieh, Mohamed Mahmoud, Ambareen Siraj, J. Misic, "Efficient Privacy-Preserving Chatting Scheme with Degree of Interest Verification for Vehicular Social Networks", Proc. of *IEEE Global Communications Conferenc*e, Selected Areas in Communications: Social Networks, San Diego, USA, 2015.

Lenin Mookiah, William Eberle, and Ambareen Siraj, "Survey of Crime Analysis and Prediction," *International Conference of the Florida AI Research Society (FLAIRS), May 2015*.

Presenter: "The World and My World in Cybersecurity" *Women in Science Event by Qatar National Research Fund (QNRF)*, held October 2015 at Qatar, Doha.

Presenter: "CAE Community and the National Women in Cybersecurity (WiCyS) Initiative: Collaboration/Engagement Opportunities", *2015 Centers of Academic Excellence Community Meeting* held November 2015 at San Diego, CA.

Presenter: Birds-of-a-feather Let's Work Together to Empower CS Education Community to Teach Cybersecurity across the Curriculum," *2015 National Initiative for Cybersecurity Education Conference and Expo (NICE),* Columbia, MD.

Presenter/Organizer, 2nd National Women in Cybersecurity Conference: Conference to bring together women at different levels in academia, industry, and government to promote recruitment, retention and progression of women in cybersecurity, held April 2015, at Atlanta, GA

Presenter/Organizer: "1st CReST Workshop" George Washington University, Arlington, VA

STRETZ, HOLLY

Journal

Simhadri, J. J., Stretz, H. A., Arce, P. E., "Choosing the optimal gel morphology in electrophoresis separation by a differential evolution approach," Journal of Brazilian Chemical Engineering, in press, 07-15-2015.

Esfahani, M. R., Tyler, J. L., Stretz, H. A., Wells, MJM, "Effects of a dual nanofiller, nano-TiO2 and MWCNT for polysulfone-based nanocomposite membranes for water purification," Desalination, 372 (2015) 47-56.

Esfahani, M. R., Stretz, H. A., Wells, MJM, "Abiotic reversible self-assembly of fulvic and humic acids in low electrolytic conductivity solutions by dynamic light scattering," Science of the Total Environment, 537 (2015) 81-92.

Esfahani, M. R., Stretz, H. A., Wells, MJM, "Comparing humic acid and protein fouling on polysulfone ultrafiltration membranes: adsorption and reversibility," Journal of Water Process Engineering, 6 (2015) 83-92.

Simhandri, J., Arce, P. E., Stretz, H. A., "Assessing performance of irregular macrovoids in electrophoresis separations," Industrial and Chemical Engineering Research, 54 (2015) 10434-10441.

Conference

H. Stretz, "Tennessee Technological University Pathways to Innovation," Pathways to Innovation National 3rd Cohort Kickoff Conference, Phoenix, AZ, 1-2016.

H. Stretz, "Tennessee Technological University Pathways to Innovation," Pathways to Innovation National Summary Conference, Las Vegas, Nevada, 10-2015.

Presentations (graduate student);

Jamkhindikar, S., Stretz, H. A., Massingill, J., " Fabrication of alginate nanoparticles using microfluidics, effect of flow rate on dispersity of particle diameters," AICHE Annual Proceedings, Salt Lake City, Utah, 11-2015.

Koutahzadeh, N., Esfahani, M. R., Stretz, H. A., Arce, P. E., "Effect of UV/H_2O_2 Pretreatment on the Natural Organic Matter Fouling on Nanocomposite Ultrafiltration Membranes," 2015 North American

Membrane Society Boston, MA, 2015.

Esfahani, M. R., Stretz, H. A., Wells, MJM, "Effects of a Dual Nanofiller: nano-TiO_2 and MWCNT, for Polysulfone-based Nanocomposite Membranes for Water Purification," 2015 North American Membrane Society Boston, MA, 2015.

Proceedings

Koutahzadeh, N., Esfahani, M. R., Stretz, H. A., Arce, P. E., "Hybrid Advanced Oxidation Process-Ultrafiltration Polysulfone Membrane: Application to Industrial Waste Water Treatment," AICHE Annual Proceedings, Salt Lake City, Utah, 11-2015.

TALBERT, DOUG

Proceedings

Neely R, Cleghern Z, Talbert DA. "Using Subgroup Discovery Metrics to Mine Interesting Subgraphs." Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS), 2015.

VANDENBERGE, DANIEL

Journal:

Castellanos, B. A., Brandon, T. L., and VandenBerge, D.R. (2016). "Correlations for Fully Softened Shear Strength Parameters*", Geotechnical Testing Journal*, http://dx.doi.org/10.1520/GTJ20150184 ISSN 0149-6115.

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.

Castellanos, B. A., Brandon, T. L., and VandenBerge, D. R. (2015). "Use of Fully Softened Shear Strength in Slope Stability Analysis", *Landslides*, DOI 10.1007/s10346-015-0597-y.

Conference

VandenBerge, D. R. (2015). "A Comparison of Limit Equilibrium and Finite Element Methods for Undrained Drawdown Analysis", *2015 Central Pennsylvania Geotechnical Conference*, Hershey, PA, 25 pp.

VandenBerge, D. R. and Brandon, T. L., (2015). *Consolidated-Undrained Triaxial Compression Testing of Compacted Clay*, CGPR #84, Center for Geotechnical Practice and Research, Virginia Tech, Blacksburg, VA, 18 pp.

VandenBerge, D. R., Duncan, J. M., and Brandon, T. L., (2015). *Consolidated-Undrained Strength of Compacted Clay, CGPR #83*, Center for Geotechnical Practice and Research, Virginia Tech, Blacksburg, VA, 128 pp.

YARNOLD, MATTHEW

Journal

Yarnold, M.T. & Dubbs, N.C. (2015). "Bearing Assessment using Periodic Temperature-Based Measurements," *Journal of the Transportation Research Record, 2481, 115-123.*

Conference

Yarnold, M.T. & Murphy, B.R. (2016). "Temperature-Based Model Updating of Bridge Structures," *ASCE Structures Congress*, Phoenix, AZ.

Yarnold, M.T. & Weidner, J. (2016). "Monitoring of a Bascule Bridge during Construction," *Transportation Research Board, Washington, DC.*

Yarnold, M.T., Murphy, B., Glisic, B., and Reilly, J. (2016). "Temperature-Based Evaluation and Monitoring Techniques for Long-Span Steel Bridges," *Transportation Research Board, Washington, DC.*

Proceedings

Reilly, J., Abdel-Jaber, H., Yarnold, M., Glisic, B. (2016). Identification of Steady-State Uniform Temperature Distributions to Facilitate a Temperature Driven Method of Structural Health Monitoring. *Proceedings SPIE*, Las Vegas, NV.

ANTON, STEVEN

Book, Chapter

Anton, S. R., 2016, Chapter 3: Piezoelectric Conversion, chapter in *Materials for Sustainable Energy Applications. Conversion, Storage, Transmission and Consumption,* Pan Stanford Publishing, Singapore.

FIDAN, ISMAIL

Book, Chapter

I. Fidan, "Academic Activities and Capabilities in Additive Manufacturing," pp. 233-258, Wohlers Report 2015, (ISBN: 978-0991-33-321-9

LEE, CHABUM

Book, Chapter

Bin Wei, Advanced Mechatronics and MEMS Devices, Springer (In print); Chapter: Long-range nano-scanning devices based on optical sensing technology.

RAHMAN, MOHAMMAD ASHIQUR

Book

Ehab Al-Shaer and Mohammad A. Rahman, “Security and Resiliency Analytics for Smart Grids: Static and Dynamic Approaches”, Springer, to be published in June 2016.

TAPAN SAHA, (Electrical Engineering Professor, University of Queensland) presented a seminar titled "Impact of High Solar PV Penetrations on Distribution Network and Solar PV Research at the University of Queensland, Australia", Monday, August 3, 2015 in Prescott Hall 225.

STEVE WILSON, P.E., (General Manager, Research and Development, Southern Company) presented a seminar titled "Introduction of the Southern Company and Opportunities for students and graduates", Friday, September 18, 2015 in Prescott Hall 225.

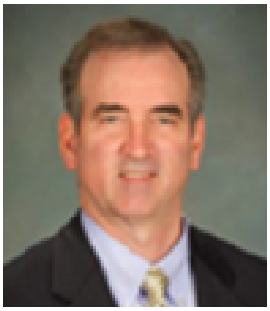
ANISH GAIKWAD, Sr. Project Manager in Grid Operations and Planning Group in the Power Delivery & Utilization Sector at Electric Power Research Institute (EPRI) presented a seminar titled "Grid Planning and Operation in 21st Century: Challenges and Opportunities", Thursday, September 24, 2015 in Prescott Hall 225.

BRAD CROSS, (President, STC, Inc. in Illinois) presented a seminar titled, "Big Technology from a Small Company," Prescott Hall 225, Thursday, October 15, 2015.

VAHID MADANI, Ph.D. Fellow IEEE, Pacific Gas and Electric Co., in San Francisco, CA presented a seminar titled "Innovations in Wide-area for System Reliability Improvement, Thursday, April 21, 2016 in Brown Hall 315.

ARAVINDHABABU PALANIVELU, Professor of Electrical Engineering, Annamalai University, India, presented a seminar titled "Distribution Power Flow", Monday, May 23, 2016 in Brown Hall 208.

Tapan Saha
EE Professor
Univ. of Queensland



Steve Wilson
General Manager
Southern Co.

Anish Gaikwad
Sr. Project Manager
EPRI

Brad Cross
President, STC Inc.

Vahid Madani
Ph.D. Fellow
Pacific Gas & Electric

Aravindhababu
Palanivelu
EE Professor
Annamalai Univ., India

GRADUATE THESIS/DISSERTATIONS AND OTHER STUDENT PUBLICATIONS

MASTERS

ONYEMOUCHECHUKWU AHIAKWO

A Study on Transient Stability Improvement of Fixed Speed Wind Turbine System using Deep Rotor Bar Properties and Plugging Operation

Summer 2015
Professor Ghadir Radman
Electrical and Computer Engineering

TRACI COOPER

Design of a Field Test to Evaluate a Video Based Vehicle Counting Device at an Intersection

Spring 2016
Associate Professor Steven Click
Civil Engineering

DARIO A. CRUZ RANGEL

An Efficient Hybrid Modeling Strategy for Predicting Microstructure Development in Hydrating Tricalcium Silicate

Summer 2015
Professor Joseph Biernacki
Chemical Engineering

BLAKESLEE EAGAN

The Effect of Supplementary Cementitious Materials on the Surface Resistivity of Concrete

Summer 2015
Professor L. K. Crouch
Civil Engineering

VITALY FORD

Summer 2015
Computer Science

ARNAB GHOSH

Spring 2016
Electrical and Computer Engineering

ERIC JAMES

Development of a Rapid Field Evaluation Method for Steel Girder Bridges

Spring 2016
Assistant Professor Matthew Yarnold
Civil Engineering

GRADUATE THESIS/DISSERTATIONS AND OTHER STUDENT PUBLICATIONS

MASTERS (Continued)

JAMES LOCUM

Investigation of Tennessee Bridge Deck PCC Surface Resistivity

Fall 2015
Professor L. K. Crouch
Civil Engineering

RAJA PENUMAKA

Design, Modeling and Simulation of Ultra High Efficient Inverted Metamorphic III-V Multijunction Solar Cells

Fall 2015
Assistant Professor Indranil Bhattacharya
Electrical and Computer Engineering

JOSHUA QUALLS

Kinematic Analysis and Control of a Mobile Robot Performing Manufacturing Tasks on Non-Planar Surfaces using Differential Geometry

Fall 2015
Professor Stephen Canfield
Mechanical Engineering

STEPHEN SALAMAN

Identification of the Force Distribution for Steel Truss Bridges

Spring 2016
Assistant Professor Matthew Yarnold
Civil Engineering

MOHAMMAD SALEHI

Study to Identify CFD Models for use in Determining HVAC Duct Fitting Loss Coefficients: Experimental Program ASHRAE RP – 1682

Spring 2016
Professor Stephen Idem
Mechanical Engineering

CALEB SMITH

A Comparison of TDOT Class D Concrete Mixtures

Spring 2016
Professor L. K. Crouch
Civil Engineering

JOSEPH TATARCZUK

Spring 2016
Computer Science

GRADUATE THESIS/DISSERTATIONS AND OTHER STUDENT PUBLICATIONS

PHD

WAHEED OYEKANMI

Power Systems Transient Stability-Based Dynamic Security Assessment

Fall 2015

Professor Ghadir Radman

Engineering

	M.S.	Ph.D.
Number of Students	**14**	**1**

MS STUDENTS

Name	Dept.	Source of Support	Anticipated Graduation Date	Advisor
Alexander, Justin	CEE	CESR	Spring 2017	Assistant Professor Yarnold
Cooper, Traci	CEE	CESR, CEE	Spring 2016	Associate Professor Click
Duong, Steven	ME	CESR	Spring 2017	Professor Idem
Edwards, Michelle	CEE	TDOT, CEE	Spring 2017	Professor Badoe
Ford, Vitaly	CSC	CESR	Summer 2015	Associate Professor Siraj
Ghosh, Arnab	ECE	CESR	Spring 2016	Chairperson/Professor Johnson
Gonzalez Rivas, Marco	ECE	CESR, DOE	Fall 2017	Director/Professor Mahajan
Gunukula, Surya	ECE	CESR, CMR	Spring 2017	Assistant Professor Mahmoud
Guy-Baker, Christine	CEE	CESR, CEE	Fall 2016	Professor Crouch
James, Eric	CEE	CESR, CEE	Spring 2016	Assistant Professor Yarnold
Locum, James	CEE	TDOT	Fall 2015	Professor Crouch
Menako, Konstantin	CSC	NSF	Spring 2017	Associate Professor Siraj
Salaman, Stephen	ME	CESR, CEE	Spring 2016	Assistant Professor Yarnold
Salehi, Mohammad	ME	CESR; Embry-Riddle Aeronautical University, ASHRAE	Spring 2016	Professor Idem
Sherry, Wyatt	CEE	CESR, CEE	Fall 2016	Assistant Professor Yarnold
Smith, Caleb	CEE	CESR, CEE	Spring 2016	Professor Crouch
Uhlik, Allen	ECE	CESR, COE	Spring 2017	Professor Ojo

PHD STUDENTS

Name	Dept.	Source of Support	Anticipated Graduation Date	Advisor
Babalola, Adeniyi	ECE	CESR	Spring 2017	Assistant Professor Belkacemi
Chaudhari, Ojas	CHE	CESR, NSF	Summer 2016	Professor Biernacki
Datta, Amarjit	CSC	CESR	Spring 2020	Assistant Professor Rahman
Fatunmbi, Rereloluwa	ECE	CESR	Fall 2018	Professor Ojo
Ford, Vitaly	CSC	CESR/RED	Spring 2017	Associate Professor Siraj
Jakaria, A H M	CSC	CESR	Spring 2019	Assistant Professor Rahman
Locum, James	CEE	TDOT	Spring 2019	Professor Crouch
Marshall, Ryan	CSC	CESR	Spring 2017	Associate Professor Ghafoor
Murphy, Brittany	CEE	NSF	Spring 2018	Assistant Professor Yarnold
Penumaka, Rani	ECE	CESR	Spring 2017	Assistant Professor Bhattacharya
Rabbani Esfahani, Amirsalar	CEE	CESR, CEE	Spring 2019	Associate Professor Mohr
Zarrabian, Sina	ECE	CESR	Fall 2016	Assistant Professor Belkacemi
Yigzaw, Wondmagegn	CEE	NASA, CESR	Summer 2016	Associate Professor Hossain/ Professor Huddleston

ASHRAE American Society of Heating, Refrigerating, and Air-Conditioning Engineers
CEE Civil and Environmental Engineering (Tennessee Technological University)
CESR Center for Energy Systems Research (Tennessee Technological University)
CMR Center for Manufacturing Research (Tennessee Technological University)
COE College of Engineering (Tennessee Technological University)
CSC Computer Science (Tennessee Technological University)
DOE Department of Energy
ECE Electrical and Computer Engineering (Tennessee Technological University)
ME Mechanical Engineering (Tennessee Technological University)
NASA National Aeronautics and Space Administration
NSF National Science Foundation
RED Research and Economic Development (Tennessee Technological University)
TDOT Tennessee Department of Transportation

HOURLY STUDENT PERSONNEL SM-10

GRADUATE/UNDERGRADUATE STUDENTS	DEGREE AND MAJOR
Prem Akula	M.S. ECE
Jason Alexander	M.S. CE
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
Shritesh Bhattarai	B.S. CSC
Uddhav Bhattarai	Ph.D. ECE
Ryan Brown	B.S. COMP ENGR
Ojas Chaudhari	Ph.D. CHE
Traci Cooper	M.S. CE
Kallie Curtis	B.S. CE
Harshini Dachepally	M.S. ME
Amarjit Datta	Ph.D. CSC
Steven Duong	M.S. ME
Blakeslee Eagan	M.S. CE
Michelle Edwards	M.S. CE
Brandon England	Ph.D. ECE
Rereloluwa Fatunmbi	Ph.D. ECE
Jacob Fesmire	B.S. EE
Vitaly Ford	M.S. CSC
Arnab Ghosh	M.S. ECE
Marco Gonzalez Rivas	M.S. ECE
Hunter Goodson	B.S. COMP ENGR
Erik Graubner	M.S. ECE
Surya Gunukula	M.S. ECE
Christine Guy-Baker	M.S. CEE
Guillermo Neumer-Hernandez	B.S. CE
Jobayer Hossain	M.S. ECE
Emily Humphreys	M.S. CEE
A H M Jakaria	Ph.D. CSC
Eric James	M.S. CEE
James Kent	B.S. EE
Mehdy Khayamy	Ph.D. EE
Leon Lambert	B.S. EE
James Locum	M.S. CEE
James Locum	Ph.D. CE
Ryan Marshall	Ph.D. CSC
Konstantin Menako	M.S. CSC
Brittany Murphy	Ph.D. CEE
Enahoro Oriero	M.S. ECE
Raja Penumaka	M.S. ECE
Rani Penumaka	Ph.D. ME
Perry Colin	B.S. CEE
Mehdi Ramezani	Ph.D. EE
Emily Reed	M.S. CEE
Stephen Salaman	M.S. CEE
Mohammad Salehi	M.S. ME
Wyatt Sherry	M.S. CEE

HOURLY STUDENT PERSONNEL SM-10

GRADUATE/UNDERGRADUATE STUDENTS (CONTINUED)	DEGREE AND MAJOR
Jagadish Babu Sirigineedi	M.S. ECE
Caleb Smith	M.S. CEE
Christopher Stepanick	M.S. ME
Bibek Tiwari	Ph.D. ECE
Vance Trammell, Jr.	B.S. CSC
Daniel Tyler	B.S. CSC
Allen Uhlik	M.S. ECE
Wondmagegn Yigzaw	Ph.D. CEE
Sina Zarrabian	Ph.D. ECE
Stephen Zuccaro	M.S. ME

WORK STUDY/WORK SCHOLARSHIP	DEGREE AND MAJOR
Johnathon Bryant	B.S. CSC
Amber Patterson	B.S. CSC
Mareev Tallat	B.S. BIOLOGY
Austin Jenkins	B.S. ME
Andrew Moore	B.S. CHEMISTRY
Allen Roisen-Reinoso	B.S. CSC

2015 – 2016

Undergraduate Student	Sponsor	Program	Faculty Advisor
Issac 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 Bhattari	USAID Program through the University of Washington	Knowledge-Based Flood Forecast to Empower Farmers	Associate Professor Sheikh Ghafoor
Ryan Brown	Tennessee Board of Regents	Unmanned Aerial Power Line Inspection	Assistant Professor Rabie Belkacemi
Kallie Curtis	The Ureca! Grant and the Center for Energy Systems Research for Summer 2015	Material Property Measurement for Polycarbonate by DIC Technique with 3D Printed Specimens	Professor Jane Liu
Jacob Fesmire	Tennessee Board of Regents	Unmanned Aerial Power Line Inspection	Assistant Professor Rabie Belkacemi
Hunter Goodson	Tennessee Board of Regents	Unmanned Aerial Power Line Inspection	Assistant Professor Rabie Belkacemi
Guillermo Neumer-Hernandez	Tennessee Department of Transportation	Determining Concrete Chloride Permeability Rapidly and Effectively	Professor L. K. Crouch
James Kent	Tennessee Board of Regents	Unmanned Aerial Power Line Inspection	Assistant Professor Rabie Belkacemi

2015 – 2016

Undergraduate Student	Sponsor	Program	Faculty Advisor
Leon Lambert	Center for Energy Systems Research, Tennessee Technological University	Wireless Power Transfer via Magnetic Coupling	Assistant Professor Indranil Bhattacharya
Perry Colin	Center for Energy Systems Research, Tennessee Technological University	Preliminary Study and Finite Element Modeling for Flat Oval Ducts using ANSYS	Professor Jane Liu
Vance Trammell, Jr.	National Science Foundation	CReST Project Index 531283	Associate Professor Ambareen Siraj
Daniel Tyler	Center for Energy Systems Research, Tennessee Technological University	Developing a Simulation Environment for a Privacy-Preserving Protocol in the Advanced Metering Infrastructure	Associate Professor Ambareen Siraj

ACTUAL, PROPOSED, AND REQUESTED BUDGET

SCHEDULE 7

Institution: Tennessee Technological University

Center: Center for Energy Systems Research

Expenditures	FY 2015-16 Actual			FY 2016-17 Proposed			FY 2017-18 Requested		
	Matching	Appropr.	Total	Matching	Appropr.	Total	Matching	Appropr.	Total
Salaries									
Faculty	$132,528	$166,014	$298,542	$98,960	$188,971	$287,931	$72,607	$137,010	$209,617
Other Professional	$15,308	$151,026	$166,334	$5,044	$261,445	$266,489	$5,194	$191,344	$196,538
Clerical/Supporting	$450	$81,426	$81,876	$500	$141,645	$142,145	$0	$90,127	$90,127
Assistantships	$116,311	$233,924	$350,235	$100,188	$320,228	$420,416	$173,450	$135,000	$308,450
Total Salaries	**$264,597**	**$632,390**	**$896,987**	**$204,692**	**$912,289**	**$1,116,981**	**$251,251**	**$553,481**	**$804,732**
Fringe Benefits	$91,193	$245,712	$336,905	$75,559	$395,129	$470,688	$119,364	$268,432	$387,796
Total Personnel	**$355,790**	**$878,102**	**$1,233,892**	**$280,251**	**$1,307,418**	**$1,587,669**	**$370,615**	**$921,913**	**$1,192,528**
Non-Personnel									
Travel	$26,508	$18,145	$44,653	$22,167	$56,269	$78,436	$16,523	$26,000	$42,523
Software		$2,834	$2,834		$3,000	$3,000		$4,000	$4,000
Books & Journals		$41	$41		$500	$500		$500	$500
Other Supplies	$82,079	$60,434	$142,513	$54,932	$114,520	$169,452	$43,582	$51,027	$94,609
Equipment	$34,810	$55,546	$90,356		$76,155	$76,155		$10,000	$10,000
Maintenance		$5,445	$5,445		$0	$0		$0	$0
Scholarships	$25,000		$25,000	$25,000	$0	$25,000	$25,000	$0	$25,000
Consultants	$24,350	$4,681	$29,031	$19,000	$2,000	$21,000		$3,000	$3,000
Renovation	$17,590		$17,590		$0	$0		$0	$0
Other (Specify):	$0	$0	$0			$0			$0
Participant Support Costs	$210,669		$210,669	$35,050	$0	$35,050	$2,500	$0	$2,500
			$0			$0			$0
			$0			$0			$0
Total Non-Personnel	**$421,006**	**$147,126**	**$568,132**	**$156,149**	**$252,444**	**$408,593**	**$87,605**	**$94,527**	**$182,132**
GRAND TOTAL	**$776,796**	**$1,025,228**	**$1,802,024**	**$436,400**	**$1,559,862**	**$1,996,262**	**$458,220**	**$916,440**	**$1,374,660**
Revenue									
New State Appropriation		$887,000	$887,000		$872,800	$872,800		$916,440	$916,440
Carryover State Appropriation		$825,290	$825,290	$0	$687,062	$687,062			$0
New Matching Funds	$776,796		$776,796	$436,400		$436,400	$458,220		$458,220
Carryover from Previous Matching Funds			$0			$0			$0
Total Revenue	**$776,796**	**$1,712,290**	**$2,489,086**	**$436,400**	**$1,559,862**	**$1,996,262**	**$458,220**	**$916,440**	**$1,374,660**

JUSTIFICATION FOR 2017 — 2018 APPROPRIATIONS REQUEST

The Center for Energy Systems Research (CESR) is requesting a 5% increase in the Appropriations Request for 2017-2018. There has not been a faculty member based in the CESR during the last few years to prepare proposals and obtain research funding. Therefore, the CESR would like to hire at least one new faculty member to be based in the CESR to concentrate on research. 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. The CESR began paying these stipends during 2015-2016 and needs to continue paying the graduate students at this level. It is also expected that these levels of support will be requested to increase during the next fiscal year. It is also expected that additional supplies will be needed in the new Smart Grid Laboratory which became operational during 2015-2016.