Roy G. Perry College of Engineering

OVERVIEW

The Roy G. Perry College of Engineering has 6 undergraduate programs and 5 graduate programs: BS Chemical, BS Civil, BS Computer, BS Electrical, BS Mechanical , BS Computer Science, MS Engineering, MS Computer Science, MS Information Systems, MS Electrical Engineering, and PhD Electrical Engineering. The College has over 1,300 undergraduate and 300 graduate students. To support the outstanding students the College has 85 well accomplished professors and researchers and 11 outstanding engineering research centers. The centers include: 1) the Center of Excellence in Research and Education for Big Military Data Intelligence, 2) the Center of Excellence for Cybersecurity, 3) the Smart Microgrid Advanced Research and Technology Center, 4) the Center for Computational Systems Biology, 5) the Center for Energy and Environmental Sustainability, 6) Center for High Pressure Combustion in Microgravity, 7) the Center of Excellence for Communication Systems Technology Research, 8) the Thermal Science Research Center, 9) the Future Aerospace Science and Technology, 10) the Texas Gulf Coast Environmental Data Center, and 11) the Center for Radiation Engineering and Science for Space Exploration.

RESEARCH CENTERS:

The Center of Excellence in Research and Education for Big Military Data Intelligence (CREDIT): The CREDIT center is a research center targeting mission-critical big data analytics and platforms with a five-million-dollar seed funding from the US Department of Defense (DOD). The center's research focus includes deep learning, big data analytics, wireless sensor networks, data security, and the Internet-of-Things (IoT). CREDIT center has a multidisciplinary team of faculty researchers from Electrical and Computer Engineering and Computer Science, research scientists and postdocs, and many graduate and undergraduate research assistants. This center is supported by 3 labs: the Deep Learning Lab, the Cloud Computing Lab, and the Wireless Communications Lab. The Deep Learning Lab in this center features four NVIDIA DGX-1 Deep Learning systems totaling 32 Tesla P100 GPUs with 114,688 CUDA cores, 2,752 GB memory, and 244 TB HDD. Each DGX-1 system has eight Tesla P100 GPU accelerators connected through NVLink, the NVIDIA high-performance GPU interconnect, in a hybrid cube-mesh network. Together with dual socket Intel Xeon CPUs and four 100 Gb InfiniBand network interface cards, DGX-1 provides unprecedented performance for deep learning. Moreover, the DGX-1 system software and powerful libraries are tuned for scaling deep learning on its network of Tesla P100 GPUs to provide a flexible and scalable platform for deep learning.

Center of Excellence in Cybersecurity (SECURE): The SECURE Center is focused on developing novel protocols to ensure cybersecurity in multiple environments—communications and networks, power grid, social networking in virtual space, cloud computing, and video analytics. It is also engaged in developing sensitive techniques for malware and virus detection and elimination. The center develops innovative technologies such as hardware/software co-design, novel low-cost security primitives, and AI solutions for malicious behavior detection. Another area of emphasis is information (video, image, text and audio) steganography using discrete wavelet transform and artificial intelligence. This center is supported by 5 labs: Network Security lab, IoT Security Lab, Hardware Security Lab, IP Networking Lab, and Wireless Security Lab.

Smart Microgrid Advanced Research and Technology (SMART) Center*:* The vision of the SMART Center is to create multitude of smart microgrids in the world that are reliable, sustainable, secure and more environmentally-safe. The center is focusing on the following areas: (i) enhancing the power quality for the microgrid, (ii) optimizing the electromagnetic compatibility (EMC) of electronic devices in the microgrid, (iii) providing secure and robust data collection and exchange in the microgrid, (iv) designing novel fault detection, protection, and control of the microgrid, and (v) designing a test bed for

experimental validation. The center is currently working on the following projects: 1) Modeling and Simulation of Low-Cost and High-Efficiency Solar Cells for the Microgrid, 2) Novel Model Predictive Control for Electrical Machine Drives Considering Circuit Faults, 3) Microgrid Distribution Power Flow Controller (DPFC) Based on Fuzzy and ANFIS Techniques, 4) Maximum Power Point Tracker (MPPT) Improvement for Energy Harvesting Systems, 5) Effects of Electromagnetic Interference on the Smart Grid, and 6) Electric Load Forecasting using Smart Meter Data.

Center for Computational Systems Biology (CCSB): The CCSB center is a multidisciplinary center which studies complex biological processes such as cancer, head injury in football, Parkinson's disease, pulmonary hypertension, and herbicide-resistant weeds, by employing state-of-the-art computational and engineering skills. External collaborations include Translational Genomics Research Institute, Salk Institute, University of Pittsburg Medical Center, and the University of Cambridge. The Center is supported by funds from the CRI, NCI/NIH, Stand up To Cancer (SU2C), NSF, and Michael J. Fox Foundation (MJFF).

Center for Energy and Environmental Sustainability (CEES): The CEES center was established with seed funding in the amount of $5M in 2010. The Center for Energy & Environmental Sustainability (CEES) conducts research in the areas of renewable energy and environmental sustainability. An area of focus for this center is biofuels research which include in-depth fundamental studies to understand the reaction pathways of fast pyrolysis and how they affect the final composition of bio-oil and other by-products as process variables are varied in an effort to improve yields and quality of specific chemical species present in the bio-oil.; design of biofuels reactors for process and yield investigation of catalytic pyrolysis of biomass into biofuels and the development of catalytic conversion strategies for upgrading bio-oil to useful fuels. Additional research involves TGA reaction kinetics study of the pyrolysis process for different biomass.

Center for High Pressure Combustion in Microgravity: This NASA center consist of a multidisciplinary team of researchers from the College of Engineering, the College of Agriculture & Human Science and the College of Arts & Science focus on the science and engineering of fuel combustion under high pressure in microgravity representative of practical engines. The project, emphasizes both experimental and numerical approaches, is part of NASA's efforts to guide advanced engine designs to improve overall engine performance to keep the nation's leadership in engineering and science areas.

The Center of Excellence for Communication Systems Technology Research (CECSTR): This center received seed funding from Texas Instruments to conduct comprehensive research in the selected aspects of communication systems, Wavelets and Wavelet Transforms, Compressed Sensing/Compressive Sampling Systems, DSP Solutions, Signal/Image/Video Processing, Mixed Signal Systems, Communication Control Systems and High Speed (Broadband) Communication Systems. Among other emerging areas of research, it also seeks solutions to the problems that plague both military and commercial satellite and radar-based communication systems.

The Thermal Science Research Center (TRC): The TSRC is focused on the design and development of physical models to couple heat transfer measurements and modeling, single-phase and two-phase flow measurements and correlation development, interdisciplinary design and development of enclosed natural convection modeling and measurements, and mixed convection modeling. Research results are of importance to fusion reactions, cooling of electronic components, and other high heat flux applications, such as magnetic fusion plasma-facing components, rocket and propulsion systems.

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The Future Aerospace Science and Technology (FAST): The FAST Center is dedicated to the development, processing, and characterization of lightweight and high-temperature structural materials and nanomaterials with emphasis on research, education, and technology transfer. Research activities include the processing, characterization, and environmental simulation of nanocomposites for use in both military and civilian applications.

The Texas Gulf Coast Environmental Data Center: collects data from space through NASA for predicting environmental changes in the region and for developing a methodology for ecosystem risk assessment. The Center also uses remote sensing data in detecting the sea surface temperature in the Gulf of Mexico to study its impact on biological activities. The TEXGED Center aims at collecting and analyzing data regarding environmental problems such as alteration and loss of habitats, water pollution, air pollution, flooding and hurricanes, climatic changes and degradation and loss of green spaces.

The Center for Radiation Engineering and Science for Space Exploration (CREESE): The CRESSE center is focused on developing materials and technologies that would keep astronauts and their critical electronic equipment safe from the effects of harmful space radiation. The Center carries out research in the area of developing space radiation detection systems in testbed zones during exposures at particle accelerator facilities and obtaining detailed dosimetry data and particle spectroscopy data for use in prediction of risks of space radiation in environment and health.

FACILITIES

Prairie View A&M University (PVAMU) is a member of the Texas A&M University System. The Roy G. Perry College of Engineering at PVAMU, has a complex of 6 buildings which has over 90,000 square feet including nearly 20,000 square feet of research and teaching laboratory space. The equipment in the laboratories is worth more than $4,500,000.

PAST PERFORMANCE

Several of the research centers have become nationally recognized. All of the center researchers have published papers in peer reviewed journals and conferences at both the national and international levels. The centers have secured funding from industry and various government agencies including NSF, NIH, DOD, DOE, and NASA.

More information about the research centers in the Roy G. Perry College Of Engineering can be found at the link: https://www.pvamu.edu/research/centers-and-institutes/

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