

Elihu Deneke

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EDUCATION: **Purdue University; West Lafayette, Indiana**
Pursuing: Ph.D. Mechanical Engineering
Prairie View A&M University; Prairie View, TX
M.S. Engineering (Thesis based)
B.S. Mechanical Engineering

Graduation Date: Aug 2021
GPA: 3.52
Graduation Date: August 2017
GPA: 3.88
GPA: 3.46

EXPERIENCE:

Sandia National Laboratory

Graduate Year-Round Intern

Dec. 2020 – Current

- Current research focuses on using computational molecular dynamics to understand the development of gas-phase nanoparticle sintering for counter-proliferation R&D.

Research: Artificial Neural Network for Power System

DOE: Gore Research Group

May 2018 – Current

- Research focuses on the development, testing, and employment of a hybrid physics and data-based model to evaluate the thermo-economic performance of industrial boilers to reduce operation cost and improve plant financial feasibility.
- Exergy-based cost balance, degradation science, and machine learning are employed to project plant cycling cost and project system components life span based on sequential operation. The model will be utilized forecast performance of the system and aid in dispatching commitment decisions.

Research: Unburned Pocket Statistics of Turbulent Flames

Gore Research Group

Jan. 2020 – Dec. 2020

- Contributed to the Development of an application to conduct image post processing to characterize turbulent reacting flows based on unburnt pocket formation. The method uses convolutional neural network (CNN) to analyze sequential frames and identify and track unburnt pockets.
- Using this information our goal is to then characterize the turbulent reacting flow and determine the heat release rate and hydrocarbon emissions.

Research: Machine Learning for Hot Surface Ignition Prediction

Gore Research Group

Nov. 2019 – Dec. 2020

- Aviation fluids were investigated to determine the minimum hot surface temperature required for ignition. Using the data gathered from experiments conducted by Air Force Research Laboratory (Johnson et al 1988), an artificial neural network (ANN) model was developed to predict the probability of ignition given fuel and surrounding area properties.

Research: Flame Spread Measurements of Alternative Aviation Fuels

FAA: Gore Research Group

Aug. 2017 – Dec. 2019

- Investigated fire-safety property flame spread rate of alternative aviation fuels (Jet-A, Fischer-Tropsch-S8, Synthetic Iso-Paraffin, and Hydro-processed esters and fatty acids).
- Experiments were conducted for a range of liquid fuel temperatures. K-type thermocouples and a high-speed camera were used to measure flame spread rates.

NASA CACI, Houston, TX: Swarm Robotics

PVAMU Employment Program

Jan. 2016 – Aug. 2017

- Applied numerical optimization techniques such as Ant Colony Optimization and Particle Swarm Optimization to effectively conduct search patterns and identify targets using a robotic swarm system. Conducted simulations to test performance of developed algorithms.
- Developed software using C/C++ and used Robotic Operating System (ROS) as the framework of communication.
- Accomplishments present an approach that decentralizes a robotic unit to a cohesive self-optimizing system capable of adapting when experiencing disturbances.

Research: Flex Multi-Body Dynamic Simulation (Parallel Processing)

Conference Research Paper

Aug. 2016 – May 2017

- Developed and analyzed the performance of a flexible multiple body simulation which models International Space Station's manipulator arm by using the method of Divide and Conquer Algorithm (DCA). The computational performance was compared to the traditional means of describing bodies and their motion.
- DCA breaks down a system to elementary components then assigns a CPU to compute the assigned bodies' motion, a step-by-step recursive process describing the entire system. This method of computing the system motion is an alternative to the traditional mass matrix approach.

NASA L-3 NSS, Houston, TX

PVAMU Employment Program

Dec. 2014 – Dec. 2015

- Conducted oversight on the Orion Multi-Purpose Crew Vehicle's Flight Software development. Using a Unix/Linux platform to produce programs that accurately simulate orbital courses around Earth for the Orion Multi-Purpose Crew Vehicle.
- Completed Python, C++, and Java components used in simulations for verification and validation of the Orion Multi-Purpose Crew Vehicle Flight Software.
- Developed a graphical user interface (GUI) that simplifies user commands by constructing and executing flight test scripts. The GUI minimizes risk of human error and increases efficiency in command execution.
- Accomplished Verification and Validation documentation for the graphical user interface's installment.

Research: Building Systems- 0% Energy Loss; Prairie View, TX

Feasibility Analysis

Aug. 2014 – Dec. 2014

- Lead research for a capable program to conduct energy analysis, cost analysis and emission analysis throughout the duration of a 0% energy loss building system project's life span. End goal was to use the software in support of a project's installment proposition.
- Research lead to the decision to use RETScreen in a Building Energy Efficiency project proposition and is now the basis of a new technical elective engineering class at Prairie View A&M University.

LEADERSHIP:

Teaching Assistant

Purdue University

Spring 2018 – Spring 2019

- **Introduction to Machine Design:** Facilitated a Machine Design laboratory where students were introduced to the product design process. Lead students through the following steps: development of product design specifications using customer inputs, benchmarking, product/market research and patent review, concept generation and evaluation, functional decomposition, modeling and decision matrices. Resulting in a detailed product design including assembly, economic analysis, CAD, and bill of materials
- **Thermodynamics:** Assisted students in addressing challenging questions by problem solving with an engineering approach. Covered topics such as conservation of mass, first and second laws of thermodynamics, analyses of individual devices, systems and cyclic devices, and reversible vs irreversible processes

National Society of Black Engineers

Public Relations Officer

Aug. 2013 – Dec. 2013

- Increased member participation by utilizing various social media, email, and webpage outlets to enhance communication efforts

Student Enrichment Program

Tutor Facilitator

Aug. 2011 – Dec. 2013

- Lead students to master challenging science and mathematical concepts. Covered Subjects: Calculus 1,2&3, and University Physics I & II

ACTIVITIES & AWARDS:

Purdue Doctoral Fellow

Fall 2017

- Awarded the distinguished Purdue Doctoral Fellowship

Partners for the Advancement of Collaborative Engineering Education Competition

Fall 2014

- 3rd Place Achievement in PACE Kinematic Course Competition Competition Sponsors: GM, AUTODESK, HP, ORACLE, SIEMENS

TECHNICAL SKILLS:

- Tensorflow, CEA, Ansys, EES, ProE, MATLAB, Java, Python, C/C++, Linux, Eclipse, Excel, ROS, Raspberry Pi, Beaglebone Black, Arduino

Publications:

1. Research: Artificial Neural Network for Power System

E. Deneke, V. R. Hasti, and J. P. Gore, "Cyclic load analysis of a steam generator in a coal-burning power plant," (Submitted Jan. 2021)

2. Research: Artificial Neural Network for Power System

A. Navarkar, V. R. Hasti, E. Deneke, and J. P. Gore, "A data-driven model for thermodynamic properties of a steam generator under cycling operation," *Energy*, 2020.

3. Research: Flex Multi-Body Dynamic Simulation

L. A. Nguyen, E. Deneke, and T. L. Harman, "Multithreading/Multiprocessing Simulation of The International Space Station Multibody System Using A Divide and Conquer Dynamics Formulation with Flexible Bodies," in *ICARA 2017: International Conference on Autonomous Robots and Agents*, 2017.

4. Research: Artificial Neural Network for Power System

E. Deneke, V. R. Hasti, and J. P. Gore, "Exergy-based cost analysis of a coal-fired steam generator under cyclic loading," (In Progress for 2021)