



**UT** Permian  
Basin™  
College of Engineering

**College of Engineering**  
**NEWSLETTER | SPRING 2019**

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**PG. 2**

**Welcome from the Dean** | A message from Dr. George Nnanna.

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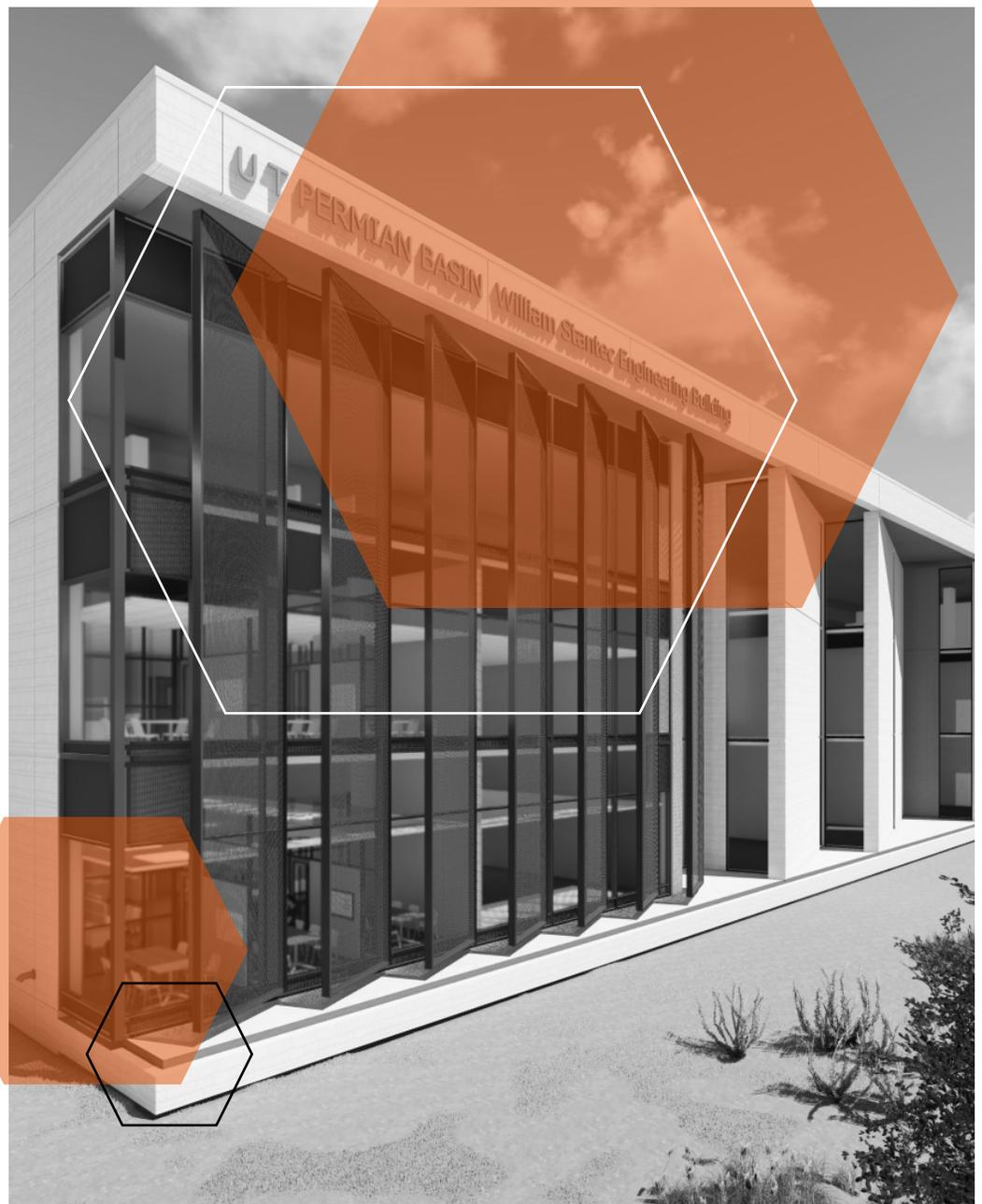
**PG. 4**

**Competitions** | From off-road Mini-Baja races to robotics.

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**PG. 7**

**Student Profiles** | Meet Randy Kidwell, Greg Miller, and Kyle Blankenship.



# FALCON ENGINEERS ARE ANYTHING BUT AVERAGE

**89% OF UT PERMIAN BASIN STUDENTS PASS THE FUNDAMENTALS OF ENGINEERING EXAM – A RATE NEARLY 10% HIGHER THAN THE NATIONAL AVERAGE.**



# WELCOME FROM THE DEAN

Greetings from the Office of the Dean of the College of Engineering at the University of Texas Permian Basin! The Permian Basin is the most active oil producing area in the U.S.A and the largest unconventional oil play globally. The University of Texas Permian Basin is strategically located in the epicenter of the oil and gas industry in the cities of Odessa and Midland, Texas.

As Dean, I am excited to spearhead a number of initiatives to increase student enrollment and faculty professional development, develop new programs and research institutes, increase industrial partnerships, integrate research into undergraduate education, expand experiential learning and internship opportunities, and explore engineering-entrepreneurial projects.

This is an exciting time for the College of Engineering. The mechanical and petroleum engineering programs were both reaccredited for another six years. Two new engineering programs, chemical engineering and electrical engineering, were started in fall 2018. Plans are being developed for a master of science degree in mechanical engineering, and an Applied Research Institute with emphasis on water and energy. In fall 2019, all the engineering departments and research laboratories will move into the new state-of-the-art, \$55 million, 105,000 sq. ft. Engineering Building on the Midland Campus.

In roughly one year, the College of Engineering received over \$2 million in external funding through The University of Texas System STARs program to support research infrastructure, establish labs and fund the Water Energy Institute.

The College of Engineering offers a world-class and student-centered undergraduate engineering education through integration of research into teaching, experiential learning, hands-on design competitions, and internships. Our undergraduate research in engineering program provides students an opportunity to earn stipends while working closely with faculty and industry professionals on projects during the academic year and/or summer. Our Mini-Baja SAE competition offer students hands-on experience to design, build, and test an off-road vehicle. Our paid internship program offers an opportunity for students to work with Practicing Engineers to solve real world engineering problems. With over 40 Engineering Advisory Board members, our students are constantly sought after for internship opportunities.

We remain unwavering in our commitment to excellence in engineering education and innovative research, and in our aspiration to building a comprehensive world-class College of Engineering. I invite you to read this newsletter, visit our website for news updates, and learn several ways to stay connected. I wish you well---Go Falcons!





# RESEARCH

## \$2.55 MILLION DOLLARS IN RESEARCH FUNDING

**High Performance Computing in the Deep Learning Arena | Dr. Mohsin M. Jamali, Electrical Engineering, \$500,000**

This research explores avenues through which the computational aspect of Deep Learning can be sped up. There are two computational stages for Deep Learning; the first is learning or training the data and the second is algorithm computation. Because Deep Learning is inherently parallel in nature, computations can also be performed in parallel. The research into high performance computing in the deep learning Arena can be divided into three main categories. In the first category computational algorithm is parallelized, in the second the memory access time is shortened, while in the third word length is strategically reduced. Our High-Performance Computing Laboratory has acquired DGX workstation from NVIDIA for computation on GPUs and we are currently in the process of acquiring FPGA based development systems. This work is funded by The University of Texas System STARS program.

## **Water Energy Research Institute | Dr. George Nnanna, Dean College of Engineering, \$500,000**

Oil production usually results in co-production of large volumes of water, averaging 5 barrels of water per barrel of oil. Managing this produced water is challenging, particularly with recent emphasis on producing oil from unconventional tight low permeability plays. This project proposes a multi-disciplinary and multi-institutional Water Energy Nexus Institute to assess energy efficient approaches to treat produced water, and generate water for re-use/recycling in hydraulic fracturing, and for agricultural and municipal use. The objectives are to develop: (1) novel approaches to treat, reuse, and recycle produced water by harvesting solar and wind energy to partially drive the treatment process; (2) treatment techniques for immobilized activated carbon-membrane-enabled solar evaporation; (3) multifunctional heterogeneous nanomaterials immobilized on membranes substrates to absorb pollutants such as total dissolved solids, salts, microbes; and (4) nano-photocatalyst for advanced oxidation/reduction processes. Initial funding for this project was from The University of Texas System STARs Program and support from the industry.

## **Different-Mode Vortex Interactions with Wings in Simultaneous Pitching and Yawing | Dr. Redha A. Wahidi, Aerospace Engineering, \$300,000**

This research is aimed at exploring the flow physics of four modes of vortex interactions (parallel, perpendicular with and without breakdown, and normal) with blades undergoing simultaneous pitching and yawing. Vortex-body and vortex-vortex interactions occur in many engineering applications and natural phenomena. Of interest is the vortex interactions in unsteady flows where dynamic stalls are encountered which affects the performance and control of many engineering applications including helicopter blades, maneuvering aircrafts, wings in gust encounter, and wind turbine blades; it also relates to the development of flapping wing in micro air vehicles (MAVs). Dynamic stalls are complex unsteady flow phenomenon which combined with vortex interactions results in additional challenges. The vortex interactions increase the loading on the lifting surfaces, and create local dynamic stall. The outcome of this experimental investigation contributes to knowledge necessary to model the flow around helicopters and wind turbine blades to better predict and improve their performance. This research is funded by The University of Texas Rising STAR program.

## **Carbon Dioxide Life Cycle from Well to Wheel | Dr. Sepehr Arbabi, Chemical Engineering, \$300,000**

Carbon dioxide (CO<sub>2</sub>) is a major component of Green House Gas (GHG) produced by power plants and oil/gas operations. The utilization of CO<sub>2</sub> as an Enhanced Oil Recovery (EOR) agent in storage, sequestration and production during hydraulic fracturing and shale plays affects global economics and environment. This project proposes to study various technical issues related to CO<sub>2</sub> in this lifecycle. The general objectives are: (1) to improve current understanding of the feasibility of CO<sub>2</sub>-EOR in production from Permian Basin including Residual Oil Zones (ROZ); (2) develop practical models for associated storage and sequestration of CO<sub>2</sub>; (3) propose novel ways to reuse CO<sub>2</sub> emission for CO<sub>2</sub>-EOR technology to reduce environmental footprint of GHG. Initial funding of this project was from The University of Texas System STARs Program.

## **Integrated Research and Education Developmental Activities for the Mechanical Engineering-Nuclear Track Students and Faculty at UTPB, PI | Essam A. Ibrahim, Ph.D., P.E., Co-PI: Forrest W. Flocker, Ph.D., P.E., Co-PI: Ramiro H. Bravo, Ph.D., P.E., Co-PI: Luis Trueba, Jr., Ph.D.**

The proposed project is aimed at enhancing recruitment, retention, and preparation of the mechanical engineering–nuclear track students and faculty at UTPB through multi-faceted research and educational developmental activities in areas relevant to Nuclear Regulatory Commission (NRC) mission. The research training component of the project will be accomplished by involving undergraduate students in the research activities of the faculty investigators. This research endeavor will contribute to augmenting students' technical reading comprehension and communication skills, in addition to enriching students learning experience and appreciation of scientific knowledge. As a result, students will be more poised to pursue and succeed in challenging careers and advanced studies. A myriad of proven instructional methodologies will be implemented to improve students' comprehension and grasp of course subject matter. The pedagogical approaches will focus on aspects of critical thinking, collaborative, and inductive learning. The main goals of the proposed research and educational efforts are to widen the pool of graduates from underrepresented groups who are qualified to assume positions in nuclear industry, support faculty development to achieve academic excellence and research competency, and to disseminate knowledge.

# COMPETITIONS

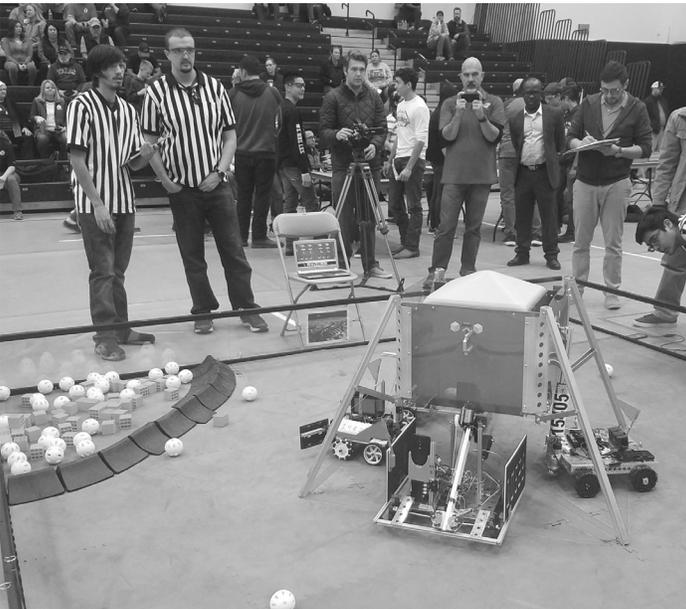
## MINI-BAJA VEHICLE COMPETITION



This year, two senior design groups within the Mechanical Engineering Department are designing a small off-road vehicle for the Baja SAE competition. This competition, sponsored by the Society of Automotive Engineers, attracts teams from Universities throughout the world.

The purpose of the project and competition is to allow our senior mechanical engineering students to complete a comprehensive design project similar to those they will see when they are on the job. The project involves designing the car, writing a design report, and traveling to the competition next spring. One design group will be responsible for the chassis, suspension system, steering, and electrical system; the other group will design the powertrain and braking system.

## COLLEGE OF ENGINEERING HOSTS ROBOTICS COMPETITION



The College of Engineering organized the 2019 FIRST Tech Challenge regional championship on January 26<sup>th</sup>, 2019 at the UT Permian Basin Gym Building. This student-centered championship program was aimed at testing the autonomous and operated robots designed by students in grades 7-12. The robots were tested and evaluated in the following categories: design, build, program, and test. A total of 36 teams around the cities of Midland and Odessa competed at the Championship. Each team had about 15 students. The event was fast-paced and exciting, and offered opportunities to design and build real-world engineering system, connect theory with practice, experiential learning, and networking with other teams and industry.



# STUDENT INVOLVEMENT

## ENGINEERING HONOR SOCIETY – UPSILON TAU BETA PI

The College of Engineering has taken the first step to establishing a UT Permian Basin chapter of the engineering honor society, Tau Beta Pi. Tau Beta Pi is the oldest engineering honor society and the second oldest collegiate honor society in the United States. It honors engineering students who have shown a history of academic achievement as well as a commitment to personal and professional integrity.

## UT PERMIAN BASIN XTO ENERGY ENGINEERING OUTREACH PROGRAM, 6-8<sup>TH</sup> AND 9-11<sup>TH</sup> GRADERS

As high school students begin thinking about college decisions, personal hands-on experience can be extremely valuable. The Engineering Outreach Program (EOP) at UT Permian Basin provides such personal experience. EOP is an interactive learning curriculum for students interested in the field of engineering. The EOP is focused on connecting these students to some of the engineering areas. It is structured to connect science, math, and their engineering-related applications together. The engineering outreach program is an enrichment program, not a remedial program. The overall objective of the EOP program is to expose participants to various fundamental concepts of engineering, and to highlight the excellent job opportunities in engineering.

## SEMESTER UNDERGRADUATE RESEARCH IN ENGINEERING (SURE) PROGRAM

SURE provides engineering students an opportunity to work closely with faculty and industry professionals on research projects during the academic year and/or summer. These projects help prepare students in engineering fields for graduate school and the workforce through critical thinking, teamwork, and hands-on experience. SURE links undergraduate students with faculty and industry mentors, and introduces them to advanced research tools and database at the frontier of engineering. The SURE program is designed for sophomore, junior, and senior level engineering students with a minimum cumulative GPA of 3.0. Students with GPA lower than 3.0 are encouraged to apply and will be considered for conditional acceptance into the program.

## ENGINEERING AMBASSADOR PROGRAM

Engineering Ambassadors are current students who represent the college in various enrichment activities, serve as mentors for freshman engineering students, participate in promoting the engineering programs, and stimulate community interest in the field of engineering. Ambassadors act as a link between the college and the University, middle and high school students, prospective students and their families, industry partners, and outside community.

## INTERNSHIP PROGRAM - ENGR 4192 (ENGINEERING INTERNSHIP, 1 CREDIT HOUR)

An internship is an integral component of engineering education. It offers an opportunity for students to work side by side with professionals in the industry, academia, and research laboratories to solve real world engineering problems. It helps students

build their resume credentials, enhances the chance of employment after graduation, cultivates the relationship between UT Permian Basin and industry, and provides the workforce needed for the Permian Basin economy.



## SCHOLARSHIP OPPORTUNITIES

- Ortloff Engineers Ltd
- The Giovanni Castelazo Scholarship
- QEP Education Foundation Petroleum Engineering Scholarship
- Partners Scholarship/Pickering
- PBIOS Scholarship - Engineering
- ConocoPhillips Scholarship
- Robert L. Jackson, Jr. Memorial Scholarship
- RL Hamm, Jr. Memorial Book Scholarship for Petroleum Engineering
- Chevron Legacy Scholarship
- Buddy West Memorial Endowed Scholarship
- Jack D. Ladd Memorial Endowment
- API Sour Crude Endowed Scholarship
- Green Family Endowed Scholarship
- Mark Nicholas Endowed Presidential Scholarship in Engineering
- SPEE Jack Ladd Memorial Scholarship in Petroleum Engineering
- Women Energy Network Scholarship

# SCHOLARSHIP AWARDS

## STUDENTS EARN OVER \$100,00 IN SCHOLARSHIPS

The UT Permian Basin College of Engineering awarded \$101,500 in scholarships to 58 engineering students for the spring 2019 semester. The scholarship was partially funded by the Permian Basin International Oil Show (PBIOS) for \$86,500, and partly from QEP in the amount of \$15,000.

The Permian Basin International Oil Show Scholarship helps to educate the workforce needed to drive the Permian Basin economy. Furthermore, it is one of the ways PBIOS is giving back to the community. The QEP Scholarship helps to educate the next generation of energy professionals. It offers financial support to eligible engineering students in energy-related fields. QEP is committed to creating partnerships that have a positive and meaningful impact to communities. Both the PBIOS and QEP scholarships will help to lessen the financial stress on students and the burden on parents to pay for their education. With this scholarship, students may be able to focus more on their studies to achieve scholastic excellence instead of juggling between work and school.



## STUDENT PROFILES

### RANDY KIDWELL



Randy Kidwell is a petroleum engineering senior here at The University of Texas Permian Basin. Randy has maintained a 4.0 GPA throughout his course work at UTPB and hopes to continue this accomplishment through graduation in December 2019. Randy graduated from the University of Oklahoma in 2016 with a degree in finance. Prior to graduation from the University of Oklahoma, Randy held internships at Cudd Pumping Services and Seaboard Oil Company while pursuing his first bachelor's degree. These internships proved to be extremely valuable, providing the opportunity to work on fracking jobs, coiled tubing, and other hands on experience. Randy is also serving as a student officer for UTPB's chapter of the Society of Petroleum Engineers. This position has been very rewarding in getting to know the rest of his classmates while helping organize lunch and learn programs. Upon graduation, Randy plans to continue working for Seaboard Oil Co.

## GREG MILLER



Greg Miller, a graduate of Permian High School in Odessa, Texas, is a senior in the mechanical engineering program at UT Permian Basin. Greg enrolled in UTPB and began his studies to become a mechanical engineer. In his junior year at UT Permian Basin, Greg decided that UTPB needed a student chapter of the Society of Automotive Engineers and set his mind to starting one from scratch. He was able to get the required number of students to form a chapter and today he is the chapter's president. Shortly after forming the chapter, he decided that UTPB needed to design and build an SAE Baja car to compete

in an annual competition that includes teams from engineering schools throughout North and South America. He is currently captain of the UTPB Baja team and directs the efforts of two senior design groups: a frame and suspension group and a powertrain group. Greg will graduate with a BS degree in mechanical engineering this spring.

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## KYLE BLANKENSHIP



Kyle Blankenship transferred to UTPB from Tarrant County College (TCC) in Fort Worth, Texas. He chose to pursue a bachelor's degree in electrical engineering at UTPB because of his fascination with modern technology, and recent electrical innovations. While schooling part-time, he works full-time for a small business in Midland, TX which specializes in oilfield services, such as tubular hard-banding (a form of welding) and drill pipe inspection. After graduating from UTPB, Kyle plans on collaborating with electrical companies to develop more efficient electrical storage systems for automobiles, and a more efficient or advanced type of power grid.



# FACULTY SPOTLIGHT

## DR. AHMED H. KAMEL

Dr. Kamel is an associate professor in the Petroleum Engineering Department and holds the Ellen and Bill Noel Distinguished Fellowship for Energy Research.

Dr. Kamel's research interests include fluid flow in straight and coiled tubing, drilling fluids, coiled tubing applications, polymers and surfactants applications, slurry flow, wellbore stability, rheology and fluid characterization, as well as oil and gas wells drilling, and completion. Dr. Kamel has published a number of articles in peer-reviewed journals and conference proceedings.



## DR. MOHSIN M. JAMALI

Dr. Jamali is Professor and Coordinator of Electrical Engineering. His research is in parallel computer architectures for real-time applications.

He has developed parallel architectures for on-board processors, signal and sensor array processing applications. Recent research interests include parallel processing using FPGAs, Multicore, GPUs and Emerging Architectures for radar signal processing, machine learning algorithms, deep learning and IR video Processing. He received a \$500,000 grant from the UT System STARS Program for developing high performance computing laboratory for deep learning.

Dr. Jamali's research has been sponsored by NASA, Office of Naval Research, Air Force and the Department of Energy. He received Summer Faculty Research Fellowships from AFOSR (Sensor Directorate-2005) and Air Force Research Laboratory (Air Vehicle Directorate- 2007 & 2008) at the Wright Patterson Air Force Base in Dayton, Ohio. He was appointed as IEEE Circuits and System Society's Distinguished Lecture Program-Lecturer (2014- 2015). He was the Chair of IEEE VLSI Systems Applications Technical Committee, IEEE Circuits and Systems Society (2016-2018), and is a senior member of IEEE.

# ENGINEERING ADVISORY BOARD

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## SPOTLIGHT

## 42 Advisory Board Members STRONG - from local Industry and Partners

Pioneer Natural Resources; Henry Resources; SwiftWater Energy Services; Legacy Reserves; Dickson Process Systems; Independent Engineer; Summit Engineering Services; Rex-Tac LLC; Surge Energy; O'Ryan Oil and Gas; Oncor; XTO Energy Inc.; TSPE; Crown Quest Operating; Saulsbury Industries; Laredo Petroleum; Waid Environmental; Anadarko Petroleum Corp; H2O Midstream; Petro Growth; Westech Seal, Inc; Ortloff Engineers Ltd.; URENCO, USA; Newman cubed; Conoco-Phillips; Nicholas Consulting Group, Inc; Southwest Machine Products; Hy-Bon; Halliburton; Air Compressor Solutions; Trey Resources; Permian Basin Petroleum Assn.; Sivalls, Inc; Slater Controls Inc; Diamondback Energy; Cudd Pumping Services; Chevron; Parsley Energy; SCAL, Inc.; SPE - Bill Webb Inc.; Schlumberger (Software); Williamson Petroleum Consultants.

The Engineering Advisory Board is the primary connection between the University and industry. The board has All-Board Meetings in the fall and spring. There are three subcommittees:

### 1. Education and Workforce Development Initiatives (EWDI)

The purpose of the EWDI Subcommittee is to promote experiential learning through internships, design competitions, and support K-12 outreach activities. Roles include promoting and linking students to internship opportunities, and serving as mentors to students. Students would begin professional development by applying what they learn in the classroom to real world activities.

### 2. Strategic Research Initiatives (SRI)

The SRI Subcommittee will have two goals. The first is to work with industry partners to identify projects for the Senior Design class. This would include arranging industry speakers and serving as mentors on projects. The second goal is to work with industry to identify research opportunities. This would include surveys on research needs, serving as an industry advisor on projects, and other collaboration. This will be of particular importance with the creation of engineering graduate programs.

### 3. Strategic Finance Initiatives (SFI)

The SFI Subcommittee will work with the Engineering Department to identify program needs such as building and space naming, purchase of laboratory equipment, and establishing a machine shop. The SFI would also be involved in fundraising in coordination with the University's Advancement Office for endowments, scholarships, and other department needs.

