

A man with glasses and a beard, wearing a dark blue button-down shirt, is focused on working with a complex mechanical device in a laboratory. The device features various components, including a blue control panel with a digital display, a coiled metal spring, and a vertical rod. A yellow warning label is visible on the equipment. The background shows a typical lab environment with shelves and other equipment. The image is framed by a dark blue diagonal overlay in the top right corner and a gold diagonal overlay in the bottom left corner.

FIU

Engineering & Computing

Mechanical and Materials Engineering

2019-2020

ANNUAL REPORT

CHAIR'S MESSAGE 2019-20



DR. ARVIND AGARWAL

Dear Friends of FIU Mechanical and Materials Engineering,

I am pleased to share the annual report of the department for the year 2019-20. At the outset, I thank every MME student, staff, and faculty member for their support, resilience, and grit demonstrated since March 2020 when COVID-19 struck. The sudden transition of teaching and labs to online and remote options in March would not be possible without the collective effort. It is a real example of what MME can achieve together as a family. I applaud and congratulate each MME team member for their selfless contribution and support towards the common goal and mission of helping our students.

Despite these challenges, the department witnessed significant growth in research during 2019-20. Our research award grew to \$5 million, which is a 47% growth since the previous year. Our faculty won major grants, including the NASA-MIRO center grant. The number of patents filed doubled in during 2019-20. Materials Science and Engineering Ph.D. program was ranked 61 by US News & World Report in 2020, which is a gain of 8 ranks from 2019 and inching closer to reach the goal of Top 50 programs in the next 3 years. Our 4-year FTIC graduation rate grew in the last three years by 1.5 times due to curriculum overhaul, creation of online courses for offering scheduling flexibility, and excellence in advising. We were also successful in hiring 2 new faculty members.

Our students and alumni continue to win honors at professional society meetings and conferences at the National level. Several leading researchers and academicians visited the department to deliver talks during 2019-20. The support received from Industrial Advisory Board members both in terms of Senior Design Projects mentoring and evaluation is much appreciated.

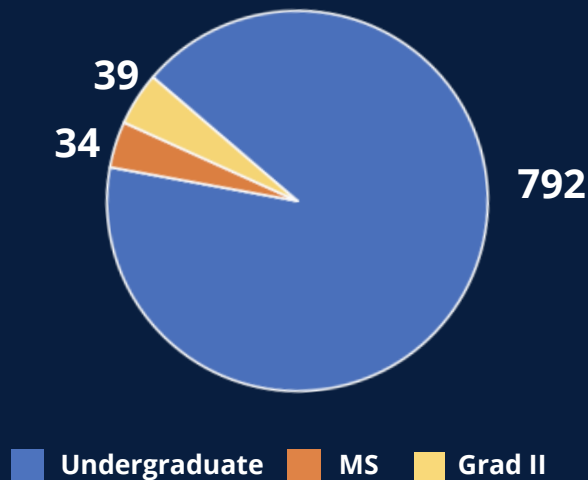
MME is very proud of its diversity. Among our faculty, we have a total of 6 women faculty members in the department. The presence of accomplished women faculty members is an inspiration for female students who are pursuing degrees in pervasively male-dominated engineering fields.

As MME continues its journey to reach greater heights and the goal of being in Top 50 programs, we will continue seeking the guidance of our friends and well-wishers in this journey. I encourage and invite you to become a part of this excitement.

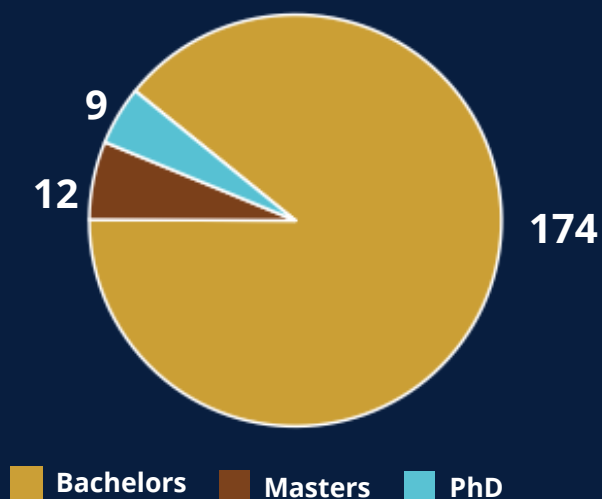


FACTS AND FIGURES 2019-2020

TOTAL ENROLLMENT- 865



DEGREES AWARDED- 195

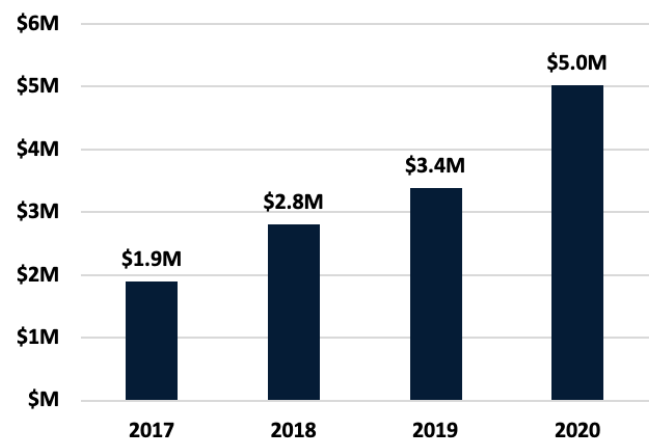


FACULTY

- Full Professors- 9
- Associate Professors- 6
- Assistant Professors- 2
- Teaching Professors- 2
- Associate Teaching Professors- 2
- Assistant Teaching Professors- 3

RESEARCH

MME AWARDS 2017-2020



INVENTIONS

- Disclosures- 29
- Patents filed- 11
- Patents awarded- 5

MME PROGRAM EXPERTISE AND LABORATORIES

DEGREE PROGRAMS

- BS in Mechanical Engineering
- Accelerated Bachelor's/Master's Degree in Mechanical Engineering
- MS & PhD in Mechanical Engineering
- MS & PhD in Materials Science and Engineering

AREAS OF EXPERTISE/LABS

- Robotics and Mechatronics
- Thermo/fluid Systems
- Multidisciplinary Design Optimization
- Renewable Energy
- Advanced Manufacturing
- Advanced Materials and Processing
- Nanomaterials and Biomaterials
- Energy Materials
- Ceramics and Composite Materials
- Functional Materials

AFFILIATED LABORATORIES AND CENTERS

- Advanced Ceramics Laboratory
- Advanced Materials Engineering Research Institute (AMERI)
- Center for Study of Matter at Extreme Conditions (CeSMEC)
- C-MEMS Laboratory
- Composites Laboratory
- Computational Fluids and Energy Sciences Laboratory
- Corrosion Laboratory
- Engineering Manufacturing Center (EMC)
- Fluid Structure Interaction Laboratory
- Mechatronics Laboratory
- Multidisciplinary Analysis, Inverse Design, Robust Optimization and Control Laboratory (MAIDROC)
- Nanomaterials Laboratory
- Plasma Forming Laboratory (PFL)
- Robotics & Automation Laboratory
- Sustainable Energy and Thermal Transport Systems Laboratory



FACULTY AWARDS

Dr. Daniela Radu



Dr. Daniela Radu received \$3 million NASA award for research into materials to support Mars and space exploration efforts. Radu will lead the Center for Research and Education in 2D Optoelectronics (CRE2DO), whose researchers will explore novel two-dimensional (2D) functional materials. The superconductor materials developed by CRE2DO aim to eliminate the need for battery power, while the material composites could be used in the infrastructure for spaceship components destined for Mars, and on wearable electronics placed inside space suits to enable high-speed communication by astronauts back to the space station. The award was granted through NASA's Minority University Research and Education Project (MUREP) Institutional Research Opportunity (MIRO).

MUREP supports training and development of students and faculty involved in STEM fields at Minority Serving Institutions (MSIs). MIRO was established to strengthen and develop the research capacity and infrastructure of MSIs in areas of strategic importance and value to NASA's mission and national priorities.

Dr. Darryl Dickerson

Dr. Darryl Dickerson has been awarded an NSF grant for his work titled "An Exploratory Investigation of Tissue Engineering Professional Formation" in conjunction with CELL-MET (Nanosystems Engineering Research Center for Directed Multiscale Assembly of Cellular Metamaterials with Nanoscale Precision). CELL-MET, an NSF Engineering Research Center, is designed to advance nano-bio-manufacturing methods that could lead to large-scale fabrication of functional heart tissue to replace diseased or damaged muscle after a heart attack. One of the core goals of CELL-MET is to stimulate translation of research to practice by facilitating worldwide corporate, clinical, and institutional partnerships. Aligned with these goals, Dr. Dickerson's work focuses on integrating fundamental scientific breakthroughs in nanopatterning, nanomechanics, biomicroscopy, and advanced tissue engineering into the undergraduate curriculum.



This work will also develop a continuum of experiences to create a diverse workforce through K-12, undergraduate, graduate, and postdoctoral programs that sustain interest, create a sense of belonging, build curiosity, and increase the preparedness to enter this emerging job market

NEW FACULTY HIRES



Dr. Cheng-Yu Lai, Associate Professor, obtained his BS and MS degrees in Chemistry from National Chung Hsing University in Taiwan, and his Ph.D. in Inorganic Chemistry (2004) from Iowa State University. During his Ph.D. and postdoctoral training (Scripps Research, CA), he specialized in nanomaterials with application in biomedicine.

His current research encompasses development of advanced functional materials with applications in bionanotechnology, catalysis for biofuels synthesis, tissue engineering, biosensors, and biorenewable resources utilization. Dr. Lai has recently been awarded an NSF grant to support his research titled “Biomolecular Mechanisms of Interaction between 2D Chalcogenide Materials and Environmentally-Relevant Biosystems”. This project will investigate the behavior of two-dimensional nanomaterials interacting with mammalian cells, focusing on three distinct aspects: the mechanism of cellular entry, the potential structural transformations of the nanomaterial in the mammalian cells, and the reactivity in the cellular environment to understand any potential inflammatory effects.



Dr. Tony Thomas, Assistant Teaching Professor, received his B.E. degree in Industrial and Production Engineering from Sri Jayachamarajendra College of Engineering, India in 2010, the MSc degree in Engineering Design in 2011 and PhD in Mechanical Engineering in 2015 from University of Bath, UK. He also obtained the MS degree in Materials Science and Engineering from West Virginia University, USA in 2017.

Dr. Thomas has diverse area of expertise which include advanced and non-traditional manufacturing technology, finite element analysis, advanced characterization techniques, ceramic processing, porous materials development and corrosion science. Dr. Thomas is Co-PI in the ‘Corrosion Behavior of 3D Printed Stainless Steels’ research project funded by Honeywell.

2019-2020

MME RESEARCH CENTERS

CELL-MET ERC

The NSF Engineering Research Center in Cellular Metamaterials – CELL-MET – is designed to stimulate translation of research to practice by facilitating worldwide corporate, clinical, and institutional partnerships. CELL-MET—with Boston University as the lead institution— aims to transform cardiovascular care by combining breakthroughs in nanotechnology and manufacturing with tissue engineering and regenerative medicine, while also developing areas of expertise in education, diversity, administration, and outreach.

CELL-MET @FIU PI: Dr. Arvind Agarwal



NASA-CRE2DO

CRE2DO's primary goal is to develop cutting-edge technologies that integrate 2D materials in space-resilient infrastructure materials, communication devices, and small satellite technology. The nanomaterials enhance reliability of mechanical and electrical components in spaceship devices and wearable electronics. The superconductor materials developed by CRE2DO aim to eliminate the need for battery power, while the material composites could be used in the infrastructure for spaceship components destined for Mars, and on wearable electronics placed inside space suits to enable high-speed communication by astronauts back to the space station.

NASA-MIRO PI: Dr. Daniela Radu



PRE-CCAP FIU

Pre-CCAP has offered summer research opportunities at Plasma Forming Laboratory (PFL), in the Department of Mechanical and Materials Engineering. The Research Experiences for Undergraduates (REU) hired undergraduate students enrolled in a STEM academic program (Mechanical and Materials Engineering or related fields) to perform different research's activities in their 9 weeks stay at FIU. PRE-CCAP REU's focused their research on material characterization, advanced materials processing, ceramics and spark plasma sintering.

PRE-CCAP @FIU PI: Dr. Arvind Agarwal



PATHS-UP ERC

The specific vision of our PATHS-UP ERC is to change the paradigm for the health of underserved populations by developing revolutionary and cost-effective technologies and systems at the point-of-care. The initial PATHS-UP technologies and systems are designed to help with chronic diseases such as diabetes and cardiovascular disease, which are leading causes of morbidity and mortality world-wide. Paths-Up group is working on flexible biomedical pressure sensor that can detect pulse pressure from the wrist. Pulse is an important physiological biomarker that can tell if a person is suffering from any cardiovascular disease. To tell precisely if a person is suffering from any particular cardiovascular disease it is important just not to count the pulse only but to have the precise features of a single pulse.

PATHS UP @MME research faculty: Dr. Chunlei Wang.

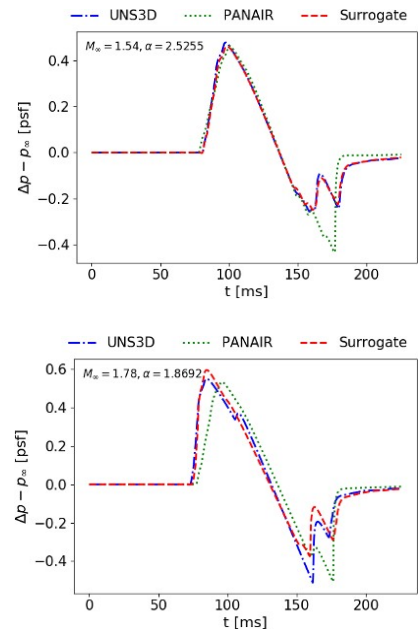


MME RESEARCH NUGGETS

Multidisciplinary Analysis, Inverse Design, Robust Optimization and Control (MAIDROC) Laboratory

Prof. George Dulikravich's research group works on developing mathematical models for evolution of Covid-19, prediction of thermal damage of laser-tissue interaction, electrochemistry of electric car batteries, high temperature alloys chemistry optimization, and design of compact heat exchangers. Currently the team is working to minimize shock wave loudness and drag of a supersonic passenger airplane. They are developing software to find the optimum locations and magnitudes of in-flight geometry modifications to achieve this. So far, this software has been proven capable of making these calculations accurately and reliably.

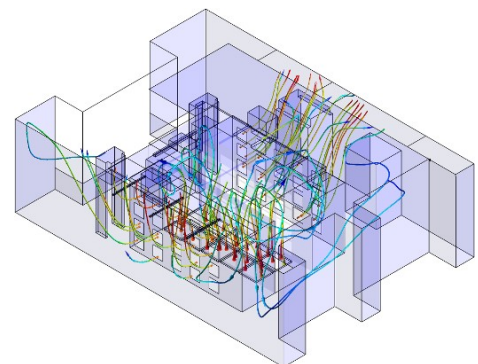
Sohail R. Reddy: "Stochastic Many-Objective Hybrid Optimization Under Uncertainty with Applications", Ph. D. dissertation, ME Dept., FIU, Dec. 2019, currently with NRC-NPS.



FIU surrogate modeling results for ground pressure signatures due to shock waves

Heat Flow Modeling in Data Center

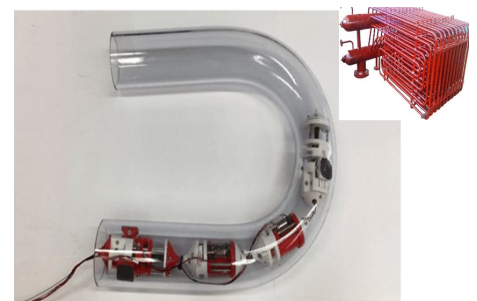
Dr. Charlie Lin's group is conducting research on the thermal and airflow management in data centers, which host arrays of IT equipment for cloud computing. The IT equipment, mostly heat-dissipating servers fitted in racks, are cooled by computer room air handlers (CRAH). To ensure data centers operate at high energy efficiency without overheating, it is important to accurately predict the turbulent airflow and temperature distributions in the data centers. In this work, a realistic 3D computational fluid dynamics (CFD) model, with key data center features, such as cold/hot aisles, perforated tiles, and blowers, is built for the simulation of the flow fields. The main objective of this project is to develop and validate a practical CFD guideline for the data center industry, which can be used by engineers for the effective design and optimized operation of real data centers. The project is funded by ASHRAE.



Streamlines in a model data center

Robotic Inspection of Power Plants

Prof. Dwayne McDaniel and his team are conducting research for DOE-NETL that involves the development of robotic inspection tools to assess the health of superheater tubes in fossil energy power plants. The tubes are often difficult to access from the outside and have diameters of approximately 2 inches. In addition, the tubes can have multiple 90° and 180° turns to navigate through. FIU has developed an electric crawler that can traverse through the inside of the tubes and navigate through the multiple turns. The crawler is modular with two grippers and two extenders that operate in a successive manner to propel the unit forward or backward. In addition, FIU is currently adding instrumentation modules to the crawler that will include an ultrasonic transducer for measurement of the tubes thickness and a LiDAR for mapping the inner surface of the tubes.



DIVERSIFYING GENDER IN MECHANICAL AND MATERIALS ENGINEERING FACULTY

In 2015, only 13.2 percent of bachelor's degrees in engineering were earned by women, according to the American Society for Engineering Education (ASEE). Almost 5 years later, although we have made major strides as a society to increase this number, there is still a lot of work to be done. The Mechanical and Materials Engineering (MME) Department at FIU is working towards changing this statistic. The Mechanical and Materials Engineering (MME) Department is proud to have one of the highest percentages of women faculty members in the College of Engineering and Computing. Research has shown that having a female role model has a powerful positive effect on women's performance in STEM-related courses. The presence of accomplished women who serve as faculty members serves as inspiration for women who are pursuing degrees in these pervasively male-dominated fields. Currently, the MME department hosts a total of 6 women faculty members who come from distinct backgrounds and each brings a unique perspective to the table, bridging from their individual experiences and qualities.



Dr. Chunlei (Peggy) Wang joined FIU in 2006 following her time at the University of California Irvine and Osaka University where she held various research positions. She received her Ph.D. in Solid State Physics, Masters, and a bachelor's degree from Jilin University in China. Her research group focuses on areas ranging from carbon microelectromechanical systems (C-MEMS) based bio-sensing to micro-supercapacitors to advance human technology.

Dr. Daniela Radu joined FIU in 2018 as part of FIU's inaugural FIU's Diversity Mentor Professor Initiative. The Diversity Mentor Professor Initiative is aimed at recruiting multiple excellent STEM faculty with strong research backgrounds who have a history of and commitment to the mentorship of women and underrepresented minority students in STEM, particularly Hispanic-American and African American students. Prior to joining the MME faculty, Radu was an associate professor at Delaware State University, an HBCU (historically black college and university) where she was a mentor to many students and junior faculty members. She also devoted several years to serve in her role as an industrial scientist at the DuPont Experimental Station's Central Research Department in the Division of Materials Science and Engineering. Dr. Radu has also recently been named the head of the Center for Research and Education in 2D Optoelectronics (CRE2DO) and received a \$3 million grant from NASA to research materials that can "withstand the extreme environment of space



Dr. Ju Sun joined FIU in 2004 following a one-year postdoctoral training at the Center for Biomedical Engineering at the University of Texas Medical Branch. She received her Ph.D. and master's degrees in the Department of Mechanical Engineering at Stony Brook University in New York. Prior to her time at Stony Brook, she received her BS in Thermal Engineering from the Beijing University of Technology, China. In her role as the University Instructor within the department, she teaches various undergraduate courses including statics and dynamics



Dr. Carmen Muller joined FIU in 2016 as an academic advisor and is now serving as an instructor in the MME department where she teaches courses such as applied mechanics, statics and dynamics to hundreds of undergraduate students. Prior to receiving her Ph.D. in biomechanical engineering at the Central University of Venezuela, she received her masters at the University of Virginia and a bachelors at Simón Bolívar University in mechanical engineering. She has a long record and experience in teaching engineering subjects and is dedicated to improve students learning experience in engineering core courses such as Statics and Dynamics by applying effective teaching practices, implementing new teaching ideas, using learning assistants, and developing virtual content for online teaching.

Part of the results of this effort was presented at the 2020 ASEE Conference in the paper “Dynamics Online Course: A Challenge content delivered with best teaching practices keeps students engaged”. This paper shows qualitative and quantitative data of four consecutive terms, offering additional proof that developing and delivering a Dynamics Course at a distance, using instructional design best practices, is equivalent to an in-person course. This is clearly reflected by the steadily improvement of students’ performance and high rated student perception. “Chunking” the content into short 5 to 15 minutes videos of narrated lectures and problem solving of key concepts, was welcomed by the students, as it’s shown by their comments on the Student Perception of Teaching Surveys. The results of The Pearson Test correlated the students’ perception in relation to the passing grade, and this revealed that fairness of the instructor was one of the variables with higher value and led us to infer that students found helpful the detailed rubrics for each assessment. The experience gained in the process of the development of this course, has also been shared with other Faculty on the FIU Online Conference and Online Faculty Webinar as part of our growth in training and praxis.

Dr. Alicia Boymelgreen joined FIU as a visiting faculty member in the Fall of 2019. Dr. Boymelgreen received her Ph.D. in mechanical engineering from the Israel Institute of Technology. Prior to her time at the Israel Institute of Technology, she received her master’s at Tel Aviv University and her bachelor’s degree at Monash University. Dr. Boymelgreen’s research interests encompass micro/nanofluidic systems and their biological applications including point-of-care diagnostics, lab-on-a-chip technology, colloidal transport and dynamic assembly of reconfigurable materials as well as bottom-up microfluidic chip design and the intersection of micro/nanofabrication with additive manufacturing. “I’ve always loved science and I chose to be an engineer because I wanted to advance the practical application of new technology. Being a woman in STEM at a time where formally, women have equal opportunity but in actuality, this is not being realized, I am passionate about promoting diversity through mentorship” says Dr. Boymelgreen when asked about her journey as a woman pursuing a career in STEM.



Ms. Carmen Schenck is a two-time FIU alumna who has been continually commended for her service and dedication to the FIU engineering community. Schenck received both her bachelor’s and master’s degrees in mechanical engineering from FIU. She has served 26 years in the FIU community. In addition to her role as Senior Instructor and Advisor where she oversees hundreds of MME undergraduate students, Ms. Schenck also leads various secondary school informative sessions pertaining to pursuing a degree in engineering at FIU. She shares her experience being an FIU engineering alumna and the various doors opened as a result of pursuing a degree in STEM. As a result of her efforts, the MME department has seen an increase in enrollment and retention. She has also received a Tau Beta Pi Certificate of Appreciation for her dedication and support of engineering students throughout her time at FIU

The MME Department is working on advancing women faculty in engineering in hopes that a higher percentage of women in engineering fields might lead to innovation, creativity, and an all-around more inclusive community.

STUDENT NEWS AND SUCCESS



Amin Rabiei Baboukani and **Iman Khakpour** were awarded a new patent (US 10,676,357). Their patent titled “Bipolar Exfoliation of Black Phosphorus into Phosphorene” is about exfoliating black phosphorus as a 2D material via a single-step bipolar electrochemistry method.



Noemie Denis, undergraduate student researcher, was awarded first prize in undergraduate poster presentation at Automotive Composites Conference & Exhibition in Novi, Michigan.



Patricia Garcia, mechanical engineering undergraduate, is inspiring women to pursue a career in STEM. Recently, Garcia was selected as the undergraduate face of mass media company Televisa's TECHNOLOchicas campaign, to empower Latina women in STEM. Member of the Society of Women Engineers (SWE) and the Society of Hispanic Professional Engineers (SHPE), she recently came in second place in the iChangeFIU competition with her start-up idea that focused on creating more sustainable, inclusive and school-spirited college campuses. Garcia participated in prestigious internships every summer since her high school graduation, interning at places such as the University of Miami, Worcester Polytechnic Institute, Massachusetts Institute of Technology (MIT) and the University of California Berkeley. She was also selected as one of 20 undergraduate students chosen for the 2020 University of South Florida Frank and Ellen Daveler Entrepreneurship Program.

MME STUDENT ORGANIZATIONS



FIU AERO STUDENT BRANCH FIU AERO Engineering Club/AIAA Student Chapter placed 2nd nationwide and 7th internationally among 121 participating universities who competed in the Micro Class Category at the SAE AERO EAST Competition in Lakeland FL on March 2020.

US Department of Energy Solar District Cup challenges multidisciplinary student teams to design and model optimized distributed energy systems for a campus or urban district. The Solar District Cup Class of 2020 competed from September 2019 to April 2020. The Class of 2020 participants were students and faculty advisors from 61 teams, representing 52 collegiate institutions. MME graduate and undergraduate students **Juan Marron, Samanta Rodriguez, Raul Garcia, Mayra Molina, Briana Canet, Jonathan Gonzalez, Corey Henry, Karla Pabellon, Joaquin Sefair, Beichao Hu and Talha Khan** competed to develop solutions to the renewable energy needs of campuses or urban districts and built their portfolios. They won the 1st place in district competition in the 2020 Solar District Cup. FIU team proposed a 13,632 MW PV system to offset the energy produced on the campus by approximately 78%. The proposed PV system would utilize rooftop areas, available land, and a church parking lot on campus to mount 32,633 panels.

FIU FES STUDENT BRANCH received the 2018 - 2019 FES Most Active Student Chapter: Alpha/Beta Award. **Kumar Shah** received the 2019 FES Student Service Award, for the endless service he has done for the chapter. He also was installed as the 2019-2020 FES: Alpha/Beta Student Chapters' State Representative, as well as, the FES Miami: Student Chapters' Strategic Consultant.

SOCIETY OF HISPANIC PROFESSIONAL ENGINEERS (SHPE)

Mechanical Engineer student **Raul Gianino**, Professional Development Chair, won the Shining Star award, while **Mariana Ontiveros**, President, Mechanical Engineer student won the Ace of Initiative at the 2019 SHPE National Convention in Phoenix.



MME-BOEING ALUMNI NETWORKING

First MME-Boeing alumni networking event in Seattle, in November 2019. Dr. Boesl, Dr. Boutsen, and Ms. Jeanine Shrein were hosted by MME alum and National Industry Advisory Board (NIAB) member **Mr. David Virzi**.



MME EVENTS

The Senior Design Capstone project is broken into two courses: EML 4551, Ethics Study and Design Organization, a one-credit course, and EML 4905, Senior Design. In the first course on Design Organization, students are organized into design teams, select a design project and complete the preliminary design. In Senior Design, details pertaining to their final design project will be completed with either a prototype (full-scale, miniature, functional or possibly a mock-up), or a set of engineering drawings only if a large system is designed, for example an HVAC system. The capstone design project emphasizes teamwork as an integral part of the design process. All the projects are presented in a department wide conference at the end of the semester and evaluated by the Industrial Advisory Board and faculty. The spirit of the Capstone Design Project is provided by ABET (the Accreditation Board of Engineering and Technology), which accredits all national engineering programs. With the health and well-being of our guests and community in mind, the College of Engineering & Computing (CEC) has decided to cancel the Spring 2020 Senior Design Showcase. Students and faculty members will continue to perform their academic work remotely until the end of the spring semester.

Fall 2019: Design of Aerodynamic Motorcycle Racing Helmet Group: Maria Caldera, Daniella Ceballos, Christopher Fleites, Helenn Gutierrez, Cristian Rodriguez.

Spring 2020: Robotic System for Harvesting Fruit Group: Gabriella Fuller, Ashley Matuszak, Vincent Leone, Samanta Rodriguez, Abdulaziz Alazemi.



Engineering EXPO on February 21, 2020

The Engineering Expo is the college's premiere community outreach event.

of K-12 Students Participated: **1,606**

of Schools that came to campus: **30**

FIU CEC Labs open: **23**

FIU CEC Student Org Demos/Activities: **24**

FIU CEC REU's: **2**

The college welcomed more than 1,600 K-12 students from Miami-Dade and Broward County schools to the FIU Engineering Center to engage FIU student organizations, researchers, and staff, and to explore degrees in engineering or computer science. In 2020, 23 labs and 24 student organizations represented each major within the college, and provided students with tours, demonstrations, and hands-on activities.



FIGHTING COVID-19

Due to the pandemic worldwide, a severe restriction on day to day life was imposed. However, during this situation, the academic life of the students has been going on in full swing but with some modifications. Students are participating in their classes via zoom where spontaneous participation is observed. Attending to the research laboratories for conducting research is one of the most important jobs for our graduate students. Our different research groups have come up with smart solution to work on schedule and they are carrying out their research efficiently. This schedule is maintained in such a way that appropriate social distancing is maintained.

A cross-departmental project supported the FIU CARTA initiative to design and 3D- print non-disposable face shields. Please join us in congratulating **Dr. Andres Tremante, Mr. Richard Zicarelli Dr. Ibrahim Tansel and Dr. Tony Thomas** from the Department of Mechanical and Materials Engineering; Dr. Grover Larkins, Dr. Yuri Vlasov and Dr. Ou Bai from the Department of Electrical and Computer Engineering; and Dr. Jessica Ramella-Roman and Dr. Yun Qian from the Department of Biomedical Engineering. Also, the following students involved in the 3D-printing non-disposable face shields project: Aleksander Aleman, Ian Briggs, Issac Ghobrial, Kevin Leiva, Ricardo Maury, Edwin Robledo, and **Kumar Yogesh Shah.**



MME ALUMNI SPOTLIGHT

Sara Rengifo, '16. Born and raised in Medellin, Colombia, Sara Rengifo always dreamed of being a scientist or engineer. Today, she is a tribology and metrology engineer at NASA's Marshall Space Flight Center in Huntsville, Alabama, working to provide data and analysis on NASA hardware." Rengifo earned her Materials Engineering Master degree at Florida International University in 2016, and only 3 years later she received the **NASA Trailblazer Award**.



Dr. Sadegh Behdad, Dr. Benjamin Boesl, and Dr. Arvind Agarwal were awarded **US 10,544,487 B2 patent** "Age-Hardenable Magnesium Alloys".



FACULTY EXPERTISE

Professors

Arvind Agarwal, PhD

Nanocomposites and Coatings, Plasma and Cold Spray, Ultra-High Temperature Ceramics, Spark Plasma Sintering, Nanomechanics and Nanotribology

Yiding Cao, PhD

Heat Transfer, Heat Pipes Gas Turbine Cooling, Internal Combustion Engines, New Air Conditioners, Concentrating Solar Power, Solar Receivers

Jiuhua Chen, PhD

Crystallography, Mineral Physics, High pressure and temperature materials processing, advanced materials characterization

George Dulikravich, PhD

Multi-disciplinary computational analysis, inverse problems and design optimization, Biomedical engineering, Alloys design, Electro-magneto-fluid-dynamics

Ali Ebadian, PhD

Thermodynamics, Heat Transfer, Energy Systems

Cesar Levy, PhD

Fracture mechanics, Lifetime prediction of cracked autofretted thick-walled cylinders, Fitness-for-service prediction for multicroaked systems, VEM abated vibrations, sensing properties of MWCNT composites

Norman Munroe, PhD

Biocompatibility of biomaterials Corrosion of Nitinol and bioresorbable alloys, Fuel Cells, Renewable Energy systems, Deepwater Oil & Gas, Climate Change, Greenhouse Gas Accounting

Ibrahim Tansel, PhD

Structural Health Monitoring (SHM), Additive Manufacturing (AM), System Identification, Automation of Manufacturing, Soft Robotics, Tracing of Magnetic Objects, Non Destructive Evaluation (NDE)

Chunlei Wang, PhD

C-MEMS based micro-biofuel cells, C-MEMS based biosensing, Micro super capacitors, materials for energy storage, Nanomaterials

Associate Professors

Benjamin Boesl, PhD

Solid mechanics, fracture mechanics, in situ mechanical testing, high strain rate/dynamic material response, processing- structure-property relationship

Zhe Cheng, PhD

Novel materials for solid-state fuel cells, Ultra high temperature ceramics, photovoltaic solar cells, In- situ spectroscopy characterization

Cheng-Yu Lai, PhD

Functionalized mesostructured materials (mesoporous and hierarchical silica nanomaterials) engineered for the following applications: Bionanotechnology

Charlie Lin, PhD

Computational Fluid Dynamics, Heat Transfer, Microfluidics and Energy Simulations, with applications in HVAC, Indoor Environment, Buildings and Data Centers, Power Plants, Electronic Cooling, Solar and Geothermal Energy Utilization

Dwayne McDaniel, PhD

Robotics with applications to infrastructure inspection, autonomous systems, sensor systems, nondestructive evaluation, multi-body dynamics and structural mechanics

Daniela Radu, PhD

Nanomaterials for solar photovoltaics, Advanced functional materials, Sensor design for heavy metals detection

Assistant Professors

Darryl Dickerson, PhD

Bioinspired materials, biological interfaces, orthopedic tissue biomechanics, tissue engineering

Pezhman Mardanpour, PhD

Constructal law, Design with constructal theories, Physics of design, Evolution, Nature, Aeroelasticity, Origami structures

Teaching Professors

Wei-Yu Bao, PhD

Data Acquisition, System Identification, Automatic Control, Modeling and Simulation, Computer Aided Design, Computer Aided Manufacturing

Seyad Beladi, PhD

Internal Combustion Engines Combustion, Thermodynamics, Finite Element, Modeling

Kevin Boutsen, PhD

Internal Combustion Engines, Vehicle Dynamics, Thermodynamics, Exhaust Flow, Motorsport Engineering

Carmen Muller, PhD

Simulation on Mechanical Engineering, vibrations, Finite Element Analysis, Biomechanics, musculoskeletal system, Motion Analysis, Design of Mechanical Medical Devices

Ju Sun, PhD

Ultrafast laser-based techniques for materials processing, micro fabricating, measuring, and nonlinear imaging of biomedical and microscale engineering systems

Tony Thomas, PhD

Advanced and Non-Traditional Manufacturing, Finite Element Analysis, Corrosion, Advanced Materials

Andres Tremante, PhD

Computational Fluid Mechanics & HeatTransfer Hydro & Thermal Turbo-machines, Energy Conversion & Transportation, Automotive & Aerospace Engineering

MME DEPARTMENT KEY PERSONNEL



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